SIEMENS

SIMATIC

**PCS 7 V7.0
Getting Started - First steps in
PCS 7**

Getting Started

Safety Guidelines

This manual contains notices you have to observe in order to ensure your personal safety, as well as to prevent damage to property. The notices referring to your personal safety are highlighted in the manual by a safety alert symbol, notices referring only to property damage have no safety alert symbol. These notices shown below are graded according to the degree of danger.

⚠ DANGER
indicates that death or severe personal injury **will** result if proper precautions are not taken.

⚠ WARNING
indicates that death or severe personal injury **may** result if proper precautions are not taken.

⚠ CAUTION
with a safety alert symbol, indicates that minor personal injury can result if proper precautions are not taken.

CAUTION
without a safety alert symbol, indicates that property damage can result if proper precautions are not taken.

NOTICE
indicates that an unintended result or situation can occur if the corresponding information is not taken into account.

If more than one degree of danger is present, the warning notice representing the highest degree of danger will be used. A notice warning of injury to persons with a safety alert symbol may also include a warning relating to property damage.

Qualified Personnel

The device/system may only be set up and used in conjunction with this documentation. Commissioning and operation of a device/system may only be performed by **qualified personnel**. Within the context of the safety notes in this documentation qualified persons are defined as persons who are authorized to commission, ground and label devices, systems and circuits in accordance with established safety practices and standards.

Prescribed Usage

Note the following:

⚠ WARNING
This device may only be used for the applications described in the catalog or the technical description and only in connection with devices or components from other manufacturers which have been approved or recommended by Siemens. Correct, reliable operation of the product requires proper transport, storage, positioning and assembly as well as careful operation and maintenance.

Trademarks

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Disclaimer of Liability

We have reviewed the contents of this publication to ensure consistency with the hardware and software described. Since variance cannot be precluded entirely, we cannot guarantee full consistency. However, the information in this publication is reviewed regularly and any necessary corrections are included in subsequent editions.

Table of contents

Preface

1

Information About the Getting Started PCS - First Steps Documentation

The Getting Started PCS 7 - First Steps Documentation uses a straightforward sample project to illustrate the basic principles of the SIMATIC PCS7 software components and how they interact in an engineering and in a Process Mode context.

This Getting Started serves as an introduction and does not contain detailed or background information. If this Getting Started information has increased your interest in SIMATIC PCS 7, we recommend you consider the Getting Started PCS 7 - Part 1 for Beginners.

Conventions

In this documentation the designations of elements of the user interface are specified in the language of this documentation. If you have installed a multi-language package for the operating system, some of the designations will be displayed in the base language of the operating system after a language switch and will, therefore, differ from the designations used in the documentation.

Purpose of this Getting Started Documentation

This document aims to guide you quickly and successfully through the basics of SIMATIC PCS 7. You get to know many elementary configuration steps and develop an understanding for how SIMATIC PCS 7 functions in the process.

Requirements for the Getting Started PCS 7 - First Steps Documentation

The "fast_MP" sample project can be carried out on any PC or programming device on which the following software is installed:

- operating system, Internet Explorer, Message Queuing Service and SQL Server (se: the *Process Control System PCS 7; PC Configuration and Authorization* Manual)
- Software package SIMATIC PCS 7 V7.0 and later and the license key diskette
- S7-PLCSIM for simulating a SIMATIC S7-400 automation system

Elements of the Getting Started PCS 7 - First Steps Documentation

The document is available in online help format or can be printed out as a hardcopy PDF. We recommend using the printed PDF for configuration on the PC.

You will find the online help and the printed manual under **Start > SIMATIC > Documentation > English** following installation of SIMATIC PCS 7

To speed up configuration, we have included a library in the form of the "Sim_lib.zip" file which contains the ready-made CFC charts.

After SIMATIC PCS 7 has been installed, the "Sim_lib.zip" file is saved in the following path: <Installation path>\SIEMENS\STEP7 \Examples_MP. Chapter 3 contains details on how to use this file.

We wish you every success!

Your SIEMENS AG

Creating the PCS 7 Project

<div style="text-align: right; font-size: 3em;">2</div>

2.1 How to Create the PCS 7 Project

Introduction

The PCS 7 "New Project" Wizard enables you to create a new PCS 7 multiproject with just a few mouse clicks.

Requirements

- PCS 7 V7.0 and higher is installed complete with the associated license keys.
- S7-PLCSIM is installed with V5.4 and higher.

Procedure

Step	Action
1	Select the **Start > SIMATIC > SIMATIC Manager** command, or double-click the corresponding symbol on your desktop. SIMATIC Manager starts.
2	Select **File > Close** to close all active projects in SIMATIC Manager.
3	Select the **File > "New Project..." Wizard**. The program starts the "New Project" wizard of PCS 7.
4	Click on "Next" in step 1(4).
5	In step 2(4): • Select CPU "AS 417-4". • Select the bundle 6ES7654-1LE57-0XX0. • Select "0" from the "Number of Communications Modules" drop-down list. • Click "Continue".
6	In step 3(4): • Select "3" from the "Levels" field in the "Plant Hierarchy" group. • Activate the "CFC chart" and "SFC chart" check boxes in the "AS Objects" group. • In the "OS Objects" group, check the "PCS 7 OS" check box and select the "Single Station System" option button. • Click "Continue".

Step	Action
7	In step 4(4): • Enter "fast" in the "Folder Name" text field. • Change the storage location for the project if necessary. • Click "Finish".
8	If you have not changed the default setting "Always Prompt for Settings" for new projects in the "Message Numbers" tab in the "Options" menu, the "Message Number Assignment Selection" dialog box will be displayed. • Activate the "CPU-wide unique message number assignment" option. • Click "OK". In this dialog box you can also specify default settings for future projects/libraries. If you specify a default setting that differs from the standard default setting, the message number assignment selection in the PCS 7 Wizard is no longer prompted.
9	On completion, the wizard closes automatically and the Plant View and Component View are displayed in the SIMATIC Manager. Close the Plant View and select the menu command **View > Process Object View**.
10	Select the menu command **Window > Arrange > Horizontally**. Both the "Process Object View" and "Component View" windows are arranged horizontally.

Note

Select the **Options > Settings** command in SIMATIC Manager to open the "Settings" dialog box. Go to the "Default Project View" area on the "View" tab to select the default view to display when you open a project.

Result

The "fast_MP" multiproject with a SIMATIC 400 station, a SIMATIC PC station and a master data library, "fast_Lib," has been created in the SIMATIC Manager. The newly created multiproject is displayed in the Process Object view and in the Component view in the SIMATIC Manager.
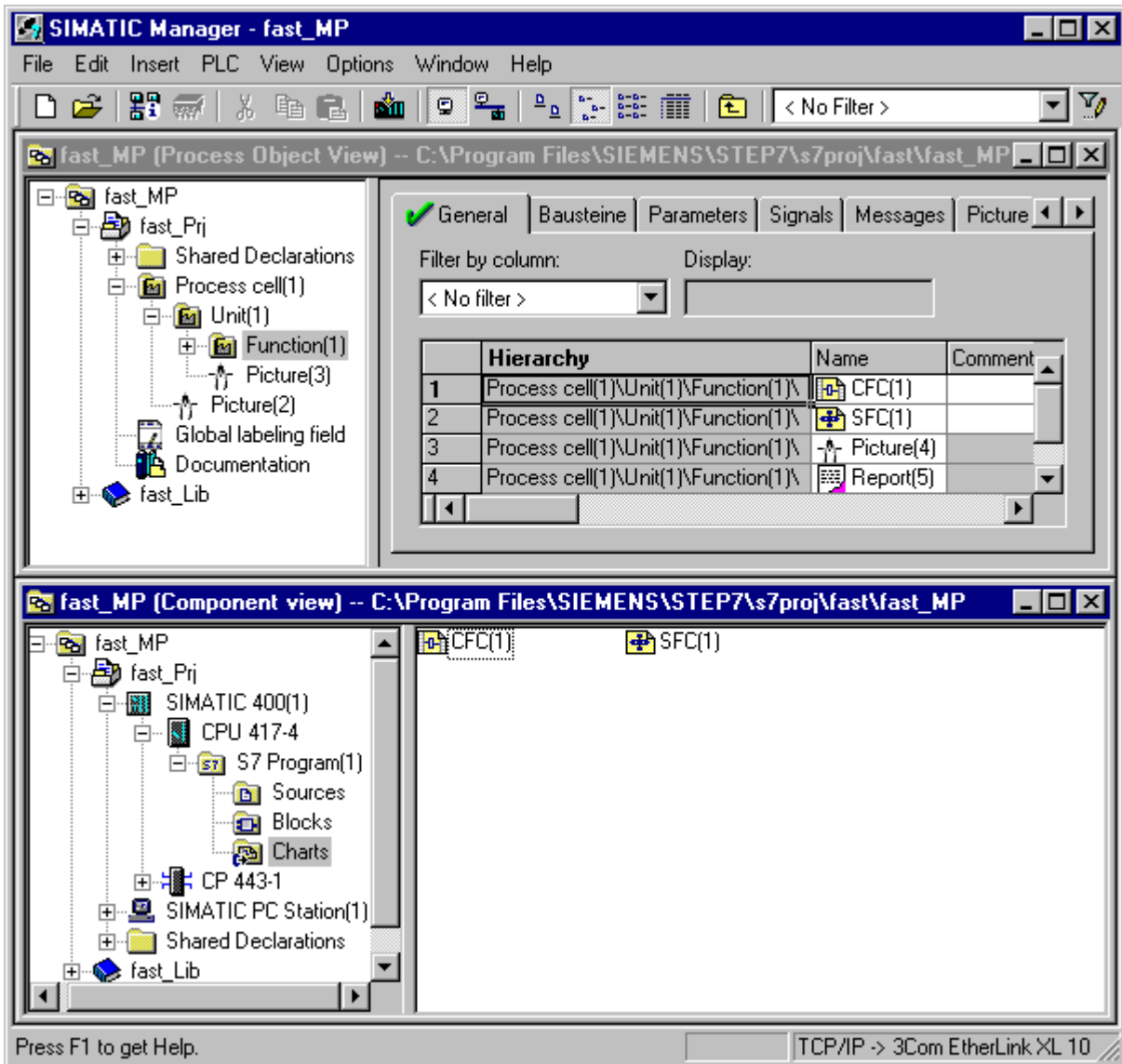
Configuring the hardware and networks

<div style="text-align: right; font-size: 2em;">3</div>

3.1   How to Configure the Hardware

Introduction

The PCS Wizard has created a SIMATIC 400 station, a SIMATIC PC station and master data library. Now add other hardware modules from the hardware catalog to the project.

You perform these configuration steps in HW Config.

Requirement

- The PCS 7 multiproject "fast_MP" has been created.

Procedure

Step	Action
1	Select the SIMATIC 400 station in the component view, and then select the **Edit > Open object** command. HW Config opens.
2	- Open the shortcut menu of the CP 443-1 in slot 5, and then select the **Delete** command. The "Delete" dialog box opens. - Click "Yes". The CP 443-1 is deleted.
3	- If the hardware catalog is not visible select the **View > Catalog** command. - Open the "PROFIBUS DP" folder in the hardware catalog. - Open the "ET 200M" folder and select the "IM 153-2" module. Drag-and-drop the module tot the "DP master system" line. The "Properties - PROFIBUS interface IM 153-2" opens. - Click "OK". The program accepts the default settings.

Step	Action
4	• Click on the plus sign to the left of the "IM 153-2" folder in the hardware catalog. • Open the "AI-300" folder. Drag-and-drop the "SM 331 AI8x12Bit" module (6ES7 331-7KF01-0AB0) to slot 4 at the bottom of the IM 153-2 configuration table. Close the "AI-300" folder. Tip: When the module is selected in the hardware catalog, the Order Number (MLFB) is displayed below in the information box. • Open the "AO-300" folder. Drag-and-drop the SM 332 AO2x12Bit" module (6ES7 332-5HB01-0AB0) to slot 5 at the bottom of the IM 153-2 configuration table. Close the "AO-300" folder. • Open the "DI-300" folder. Drag-and-drop the DI16xDC24V" module (6ES7 321-1BH01-0AA0) to slot 6 at the bottom of the IM 153-2 configuration table. Close the "DI-300" folder. • Open the "DO-300" folder. Drag-and-drop the "SM 322 DO8xDC24V/2A" module (6ES7 322-1BF01-0AA0) to slot 7 at the bottom of the IM 153-2 configuration table. Close the "DO-300" folder.

Result

In HW Config, the redundantly applicable interface module IM 153-2 for the ET 200M distributed I/O station is extended by the analog/digital input/output modules
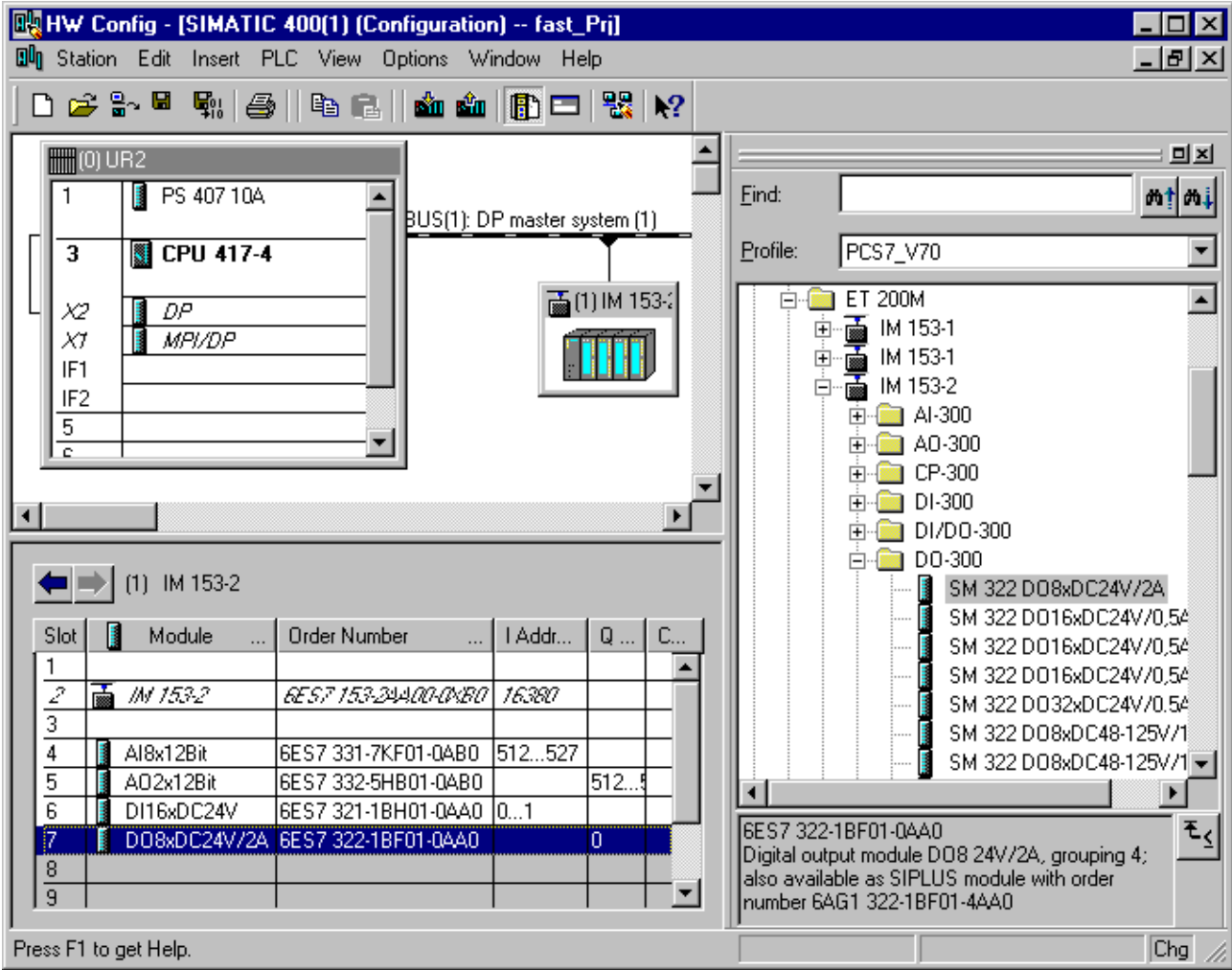
3.2 Editing the symbols in HW Config

3.2.1 How to edit the symbols of the analog input module

Introduction

In order to assign names to the addresses of the "AI8x12Bit" analog input module, assign symbolic names and comments for each address in the "Edit Symbols" dialog box.
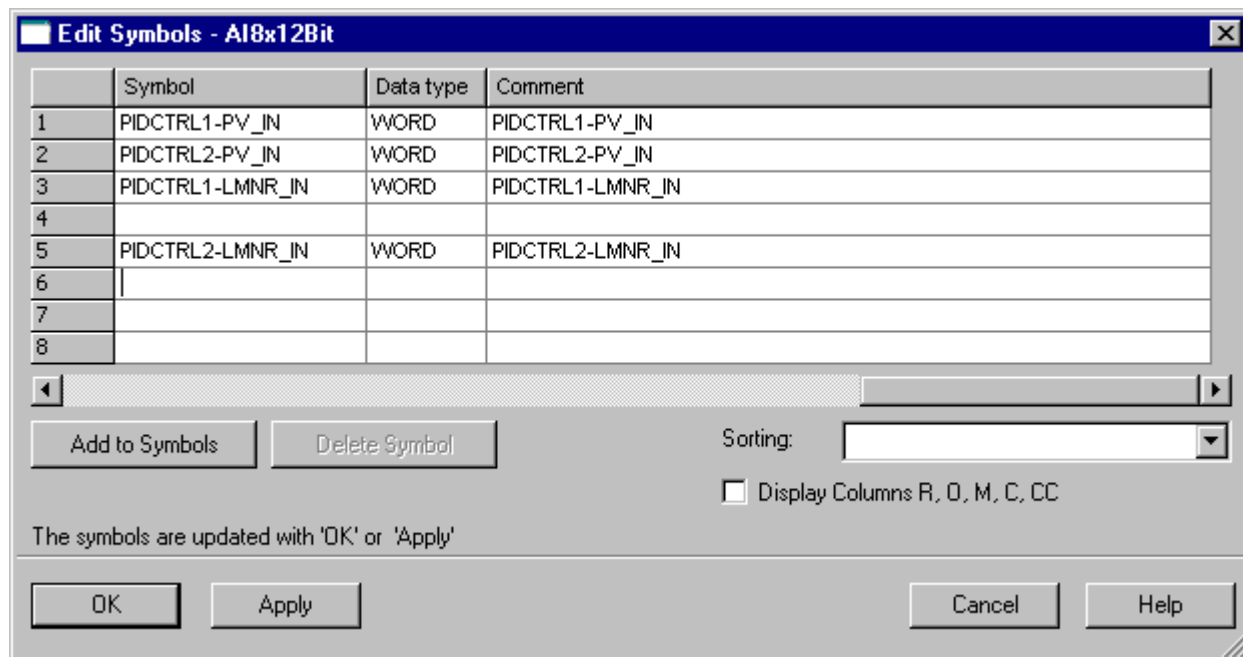
Requirements

- The analog input module has been configured in HW Config.
- HW Config is open.

Procedure

Step	Action
1	• Open the shortcut menu for the analog input module in slot 4 in the configuration table and select the menu command **Edit Symbols...**. • To save previous changes, click "OK" in the dialog box.
2	In the"Symbol" column enter "PIDCTRL1-PV_IN" for the first address (IW 512) and move the cursor onto the "Data type" column using the tabulator key and then on to the "Comment" column. Enter the symbolic name from the "Symbol" column again in the "Comment" column. **Tip**: Copy the name entered in the "Symbol" column and paste it to the "Comment" column.
3	Enter the symbolic names and comments for the remaining addresses in the same way: • Second address (IW 514): "PIDCTRL2-PV_IN" • Third address (IW 516): "PIDCTRL1-LMNR_IN" • Fourth address (IW 520): "PIDCTRL2-LMNR_IN"
4	Click "OK". The program saves your settings and closes the dialog box.

Result

	Symbol	Data type	Comment
1	PIDCTRL1-PV_IN	WORD	PIDCTRL1-PV_IN
2	PIDCTRL2-PV_IN	WORD	PIDCTRL2-PV_IN
3	PIDCTRL1-LMNR_IN	WORD	PIDCTRL1-LMNR_IN
4			
5	PIDCTRL2-LMNR_IN	WORD	PIDCTRL2-LMNR_IN
6			
7			
8			

Edit Symbols - AI8x12Bit

Add to Symbols   Delete Symbol

Sorting:

☐ Display Columns R, O, M, C, CC

The symbols are updated with 'OK' or 'Apply'

OK   Apply   Cancel   Help

3.2.2   How to Edit the Symbols of the Analog Output Module

Introduction

In order to assign names to the addresses of the analog output module "AO2x12Bit", assign symbolic names and comments for each address in the "Edit Symbols" dialog box.
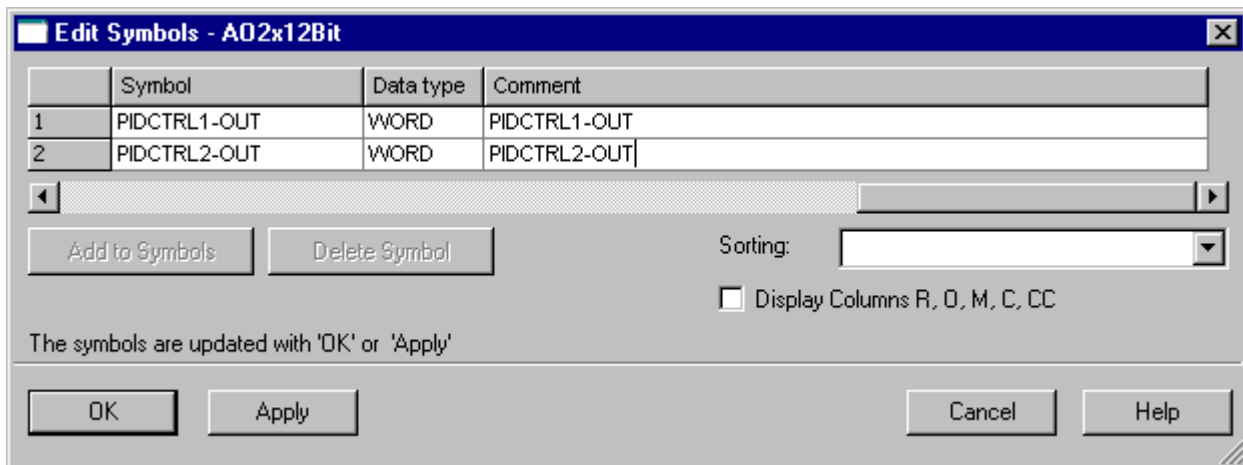
The procedure is the same as for the analog input module.

Please enter the symbolic names and comments as shown in the figure below.

Requirements

- The analog output module has been configured in HW Config.
- HW Config is open.

Result

3.2.3　　How to Edit the Symbols for the Digital Input Module

Introduction

In order to assign names to the addresses of the "DI16x24V" digital input module, assign symbolic names and comments for each address in the "Edit Symbols" dialog box.
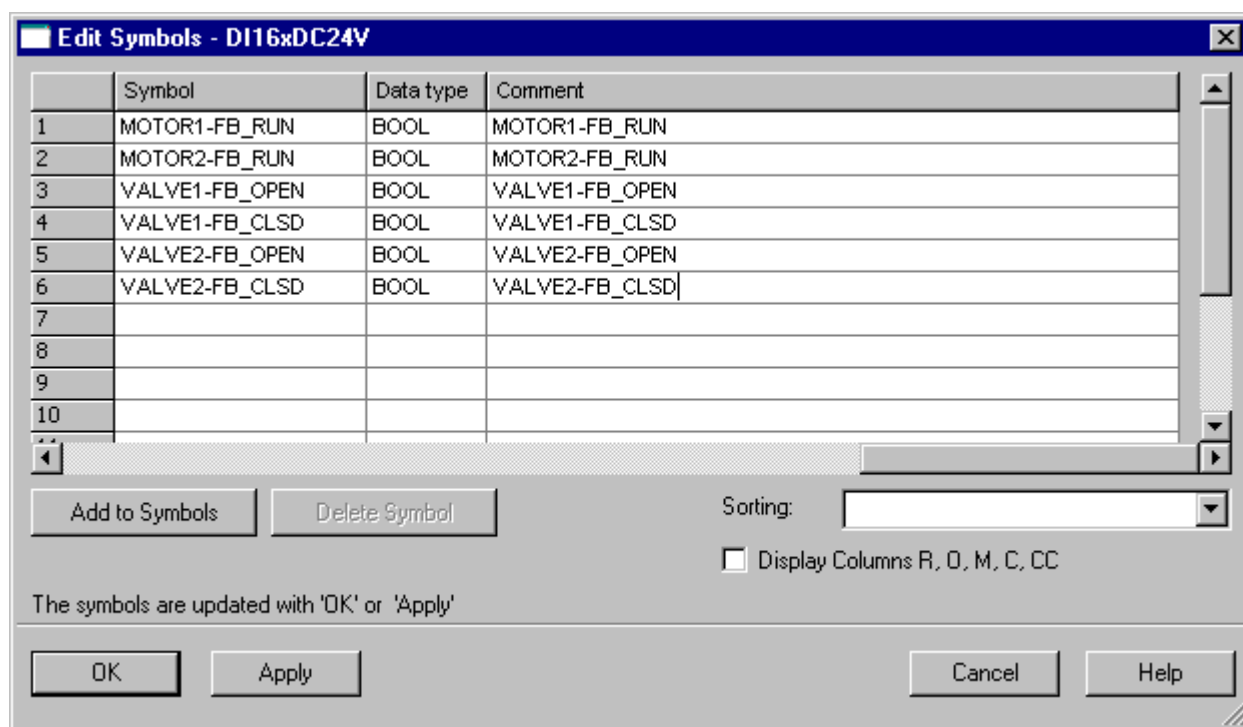
The procedure is the same as for the analog input module.

Please enter the symbolic names and comments as shown in the figure below.

Requirements

- The digital input module has been configured in HW Config.
- HW Config is open.

Result

3.2.4　　How to Edit the Symbols for the Digital Output Module

Introduction

In order to assign names to the addresses of the "DO8x24 VDC/2A" digital output module, assign symbolic names and comments for each address in the "Edit Symbols" dialog box.
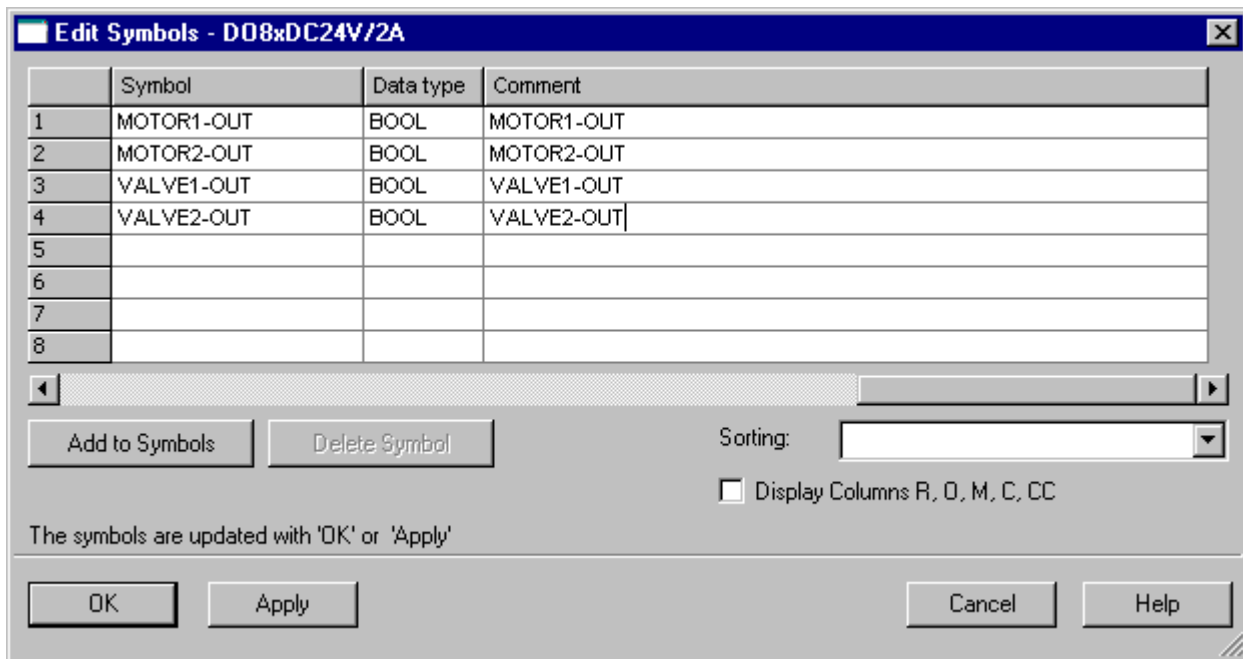
The procedure is the same as for the analog input module.

Please enter the symbolic names and comments as shown in the figure below.

Requirements

- The digital output module has been configured in HW Config.
- HW Config is open.

Result

3.3 Configuring the MPI interface for the SIMATIC PC Station

3.3.1 How to Set Up the MPI Interface for the SIMATIC PC Station

Introduction

In order to use S7-PLCSIM, you will need to set up an MPI interface for the SIMATIC PC station so that the OS variables can be compiled and a connection can be established between the AS and OS for PLCSIM.
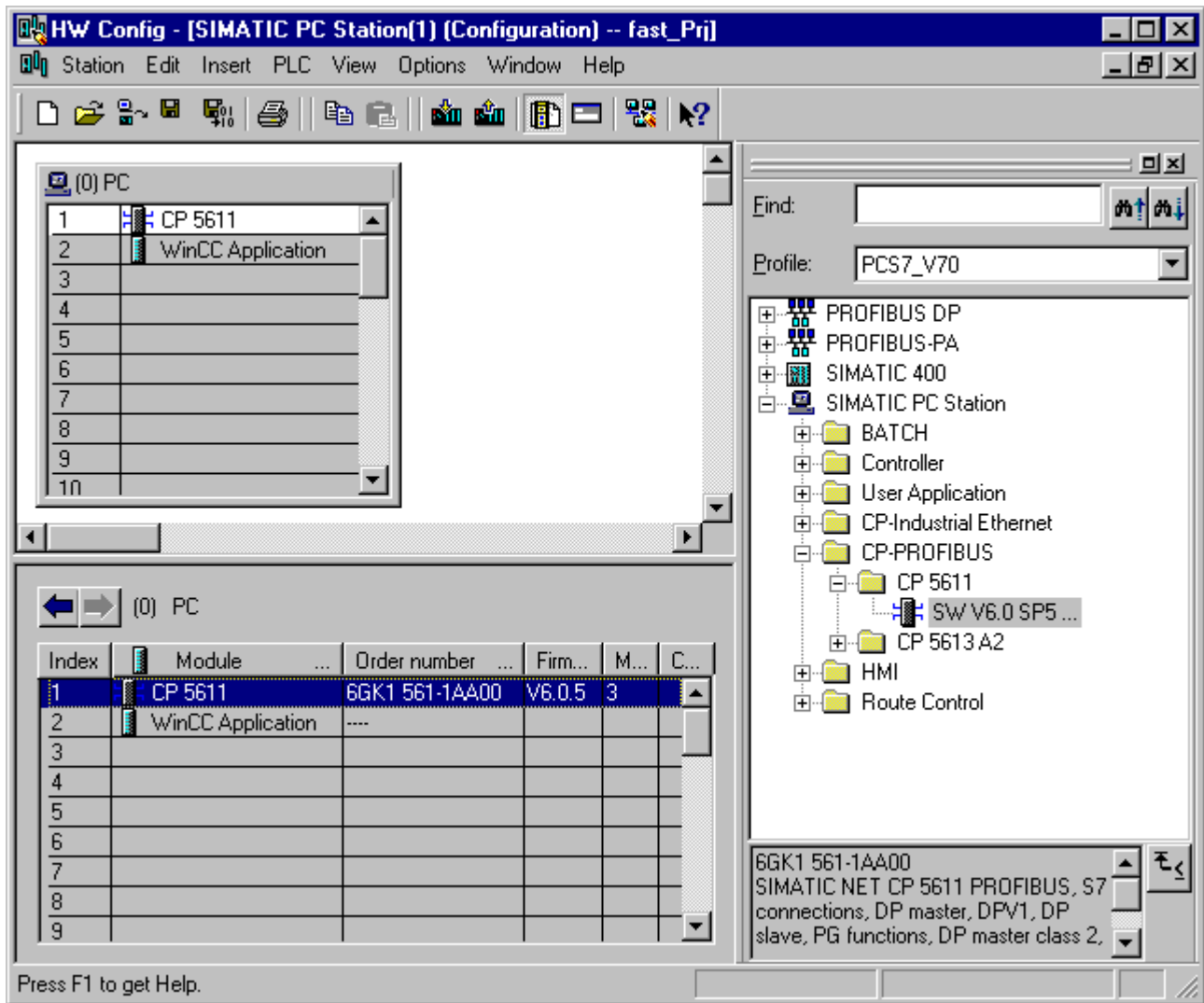
Requirement

- The PCS 7 "fast_MP" project has been created using the PCS 7 Wizard.

Procedure

Step	Action
1	Select the SIMATIC PC station contained in the "fast_Prj" folder in the Component view of the SIMATIC Manager.
2	In the right window of the SIMATIC Manager double click the "Configuration" object.
3	• Open the "SIMATIC PC-Station" folder in the hardware catalog. • Open the "CP-PROFIBUS" folder contained in it and thereafter the "CP 5611" folder. • Drag-and-drop the "SW V6.0 SP5..." object from this folder to Index 1 in the configuration table. The "Properties - PROFIBUS interface CP 5611 (R0/S1)" opens. • Click "OK". The program accepts the default settings and closes the dialog box.
4	Open the shortcut menu of the CP 5611 you inserted and select the **Object Properties** command. The "Properties - CP 5611" dialog box opens.
5	• Open the "General" tab. Go to the "Interface" group and select the "MPI" entry from the "Type:" drop-down -list box. Confirm your selection by clicking "Yes" in the warning dialog box. • Click "Properties" in the "Interface" group and select the MPI(1)" entry from the "Subnet" area. The program automatically sets MPI address 3 because address 2 is already in use by the CPU. • Click on "OK" in the "Properties - MPI Interface CP 5611 (R0/S1)" dialog box. The program closes the dialog box. • Click "OK" in the "Properties - CP 5611" dialog box. The program closes the dialog box.
6	Select the **Station > Save and Compile** command.
7	Select the **Station > Exit** command.

Result

3.4 Saving and compiling data in Netpro

3.4.1 How to Save and Compile the Configurations in NetPro

Introduction

The settings for the MPI interface of the OS that you have configured in HW Config are imported into NetPro. The network configuration must now be saved, compiled and tested.
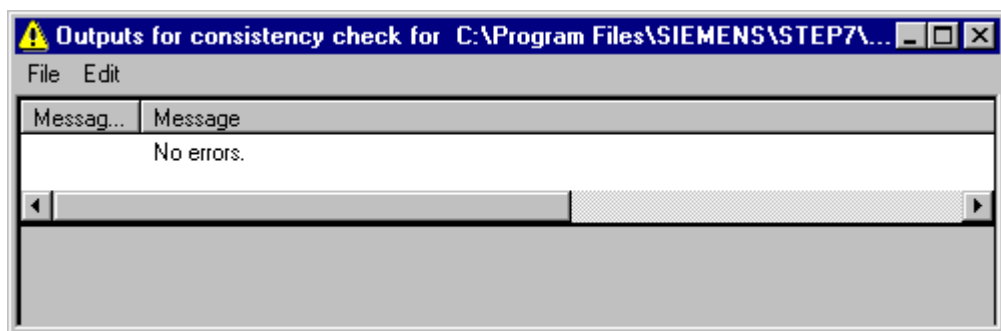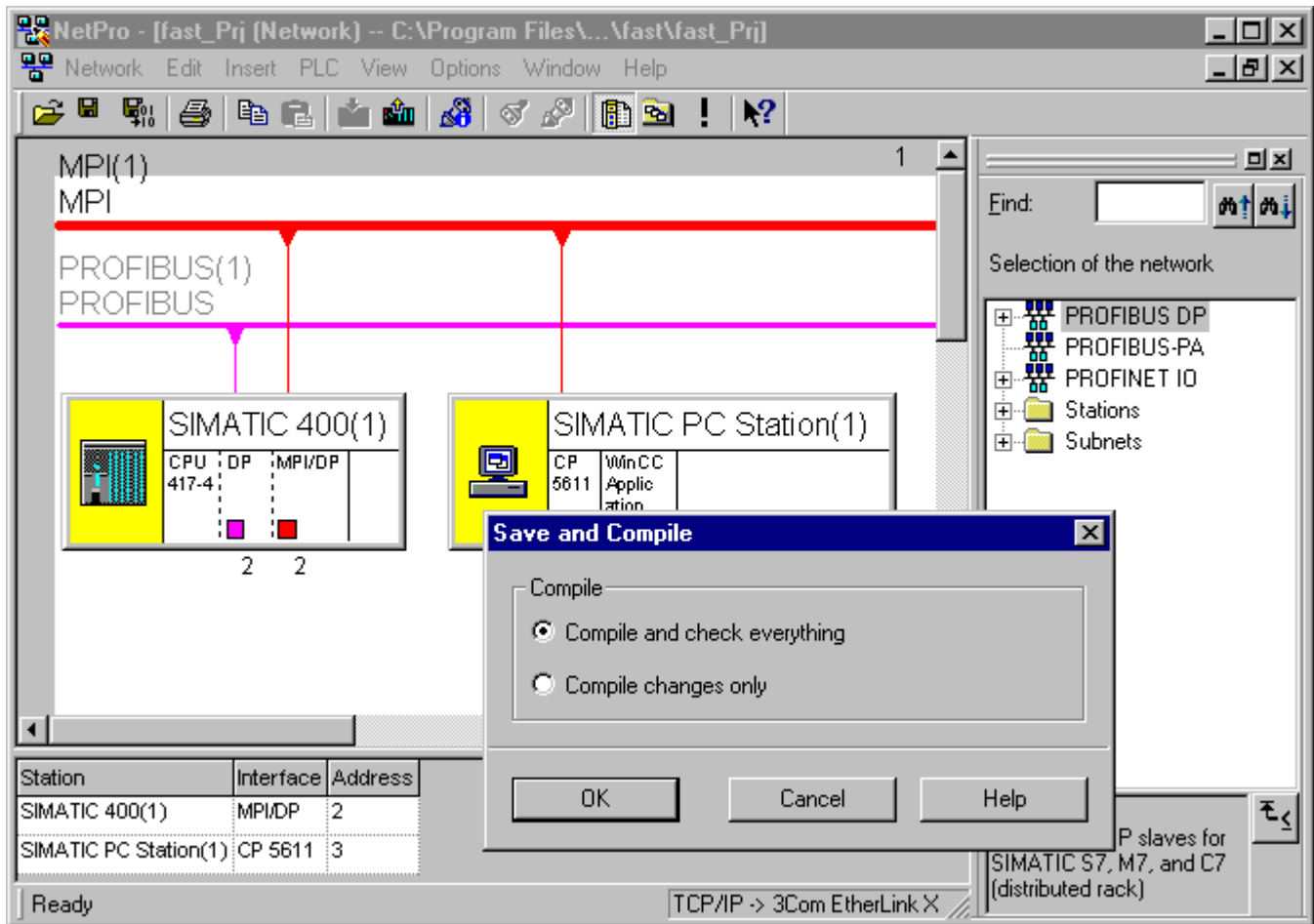
Requirement

- Configuration has been completed in HW Config.

Procedure

Step	Action
1	Select the "fast_Prj" project in the Component view in the left window of the SIMATIC Manager.
2	In the right window of the SIMATIC Manager double click the "MPI(1)" object. The "NetPro" dialog box opens.
3	Select the **Network > Save and compile** command in NetPro. The program opens the "Save and compile" dialog box.
4	Activate the "Compile and check all" check box and then click "OK".
5	Close the "Output for Consistency Testing" dialog box.

Result

3.5 Starting S7 PLCSIM
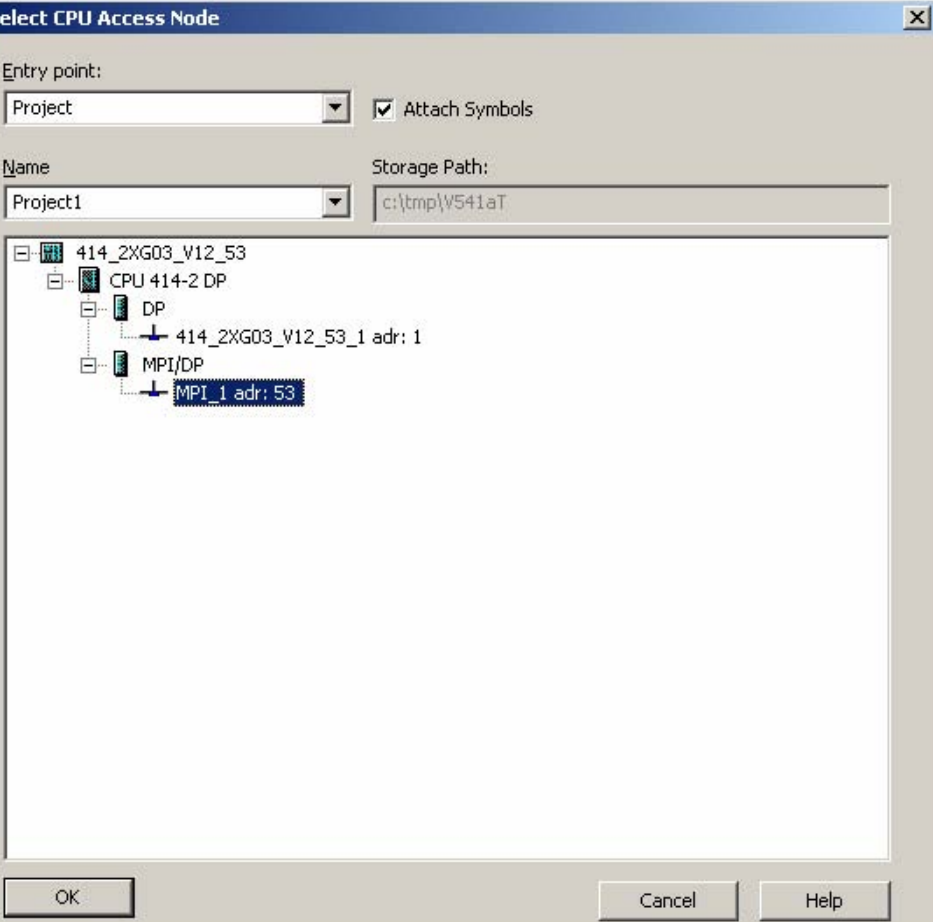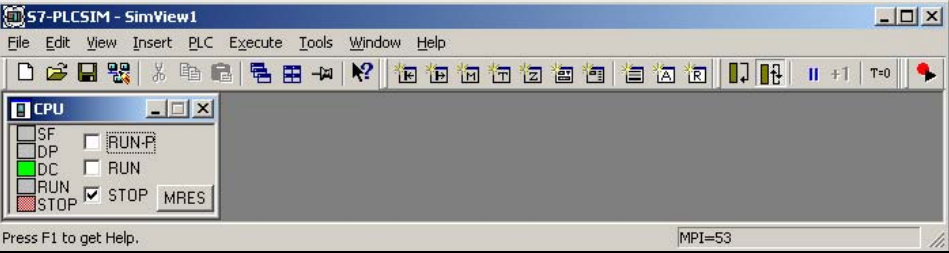
3.5.1 How to Start S7-PLCSIM

Introduction

Once S7-PLCSIM has been started, you can download the MPI interface configured in HW Config from NetPro to the PLC.

Requirements

- Configuration has been completed in HW Config.
- The network configuration from NetPro has been saved, compiled and checked.

Procedure

Step	Action
1	Using the task bar change to the SIMATIC Manager window.
2	Select the **Options> Simulate Modules** command. The "S7 PLCSIM" dialog box opens.
3	Select option "Select CPU Access Nodes". Click "OK".

Step	Action
4	The next dialog box ("Select CPU Access Nodes") opens.
5	Select the MPI access nodes in your project. Click "OK". Result:
6	Make sure the CPU is in "STOP" state.
7	Using the task bar, go back to NetPro.

3.6 Download to the PLC

3.6.1 How to download the MPI interface from NetPro to the PLC

Introduction

The following section describes how to download the MPI interface configured in HW Config from NetPro to the PLC.

Requirements

- Configuration has been completed in HW Config.
- NetPro has been opened in the original window.
- S7-PLCSIM has been started and the CPU is in the "STOP" state

Procedure

Step	Action
1	In the network view in NetPro, click on the AS "SIMATIC 400(1)" symbol on the MPI/DP" interface.
2	Open the context menu and select menu command **Download in current project > Selected stations**.
3	Click the "Yes" button in the warning dialog box that appears.
4	Select the menu command **Network > Exit.** NetPro closes.

Result
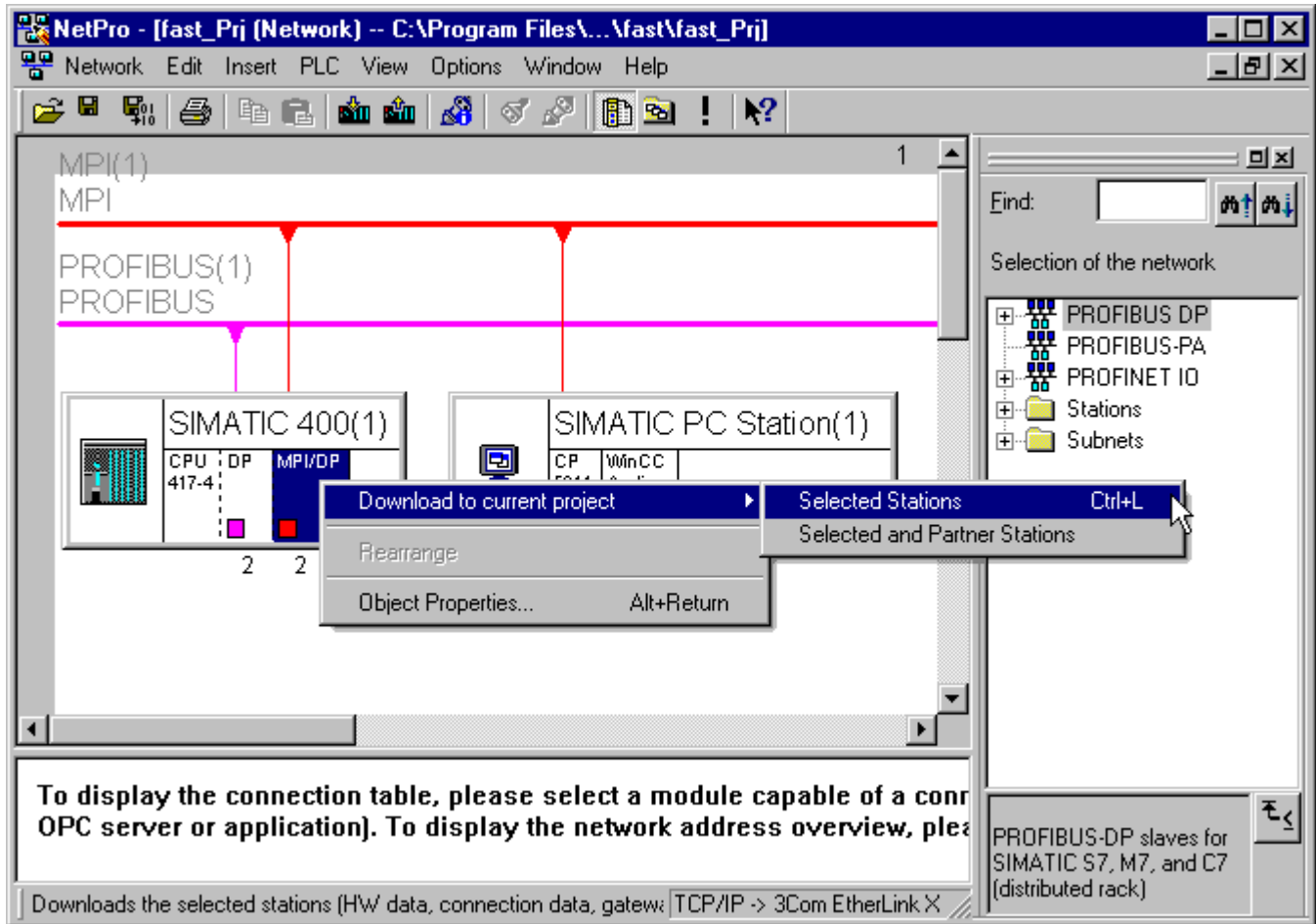
Configuring the process tags and the sequence control

4

4.1 How to Copy the CFC Charts from the Zip File to the Master Data Library

Introduction

The standard templates for MOTOR, VALVE and PIDCTRL from *PCS 7 Library* have to be adapted for process simulation.

The CFC charts are prepared and archived as Zip file. To reduce the CFC execution time, open SIMATIC Manager and unpack the CFC charts from the zip files to the "Charts" folder of the master data library in the S7 program.

Requirements

- The PCS 7 "fast_MP" project has been created using the PCS 7 Wizard.
- The SIMATIC Manager is open and the "fast_MP" project is displayed in Components view with all open hierarchy folders.
- The "Sim_lib.zip" ZIP file has been copied from the "..\SIEMENS\STEP7\Examples_MP" folder to the "..\SIEMENS\STEP7\S7tmp" folder.

Procedure

Step	Action
1	• Select the **File > Retrieve** command to open the library from the zip file.
	• In the "Retrieve - Select Archive" dialog box, select the "Sim_lib.zip" archive file and click the "Open" button. Dialog box "Select Target Directory" opens.
	• Click the plus symbol of the folder to which you have saved your project (S7Proj). Select the "fast" project folder Click "OK". The "Retrieve - Folder exists" dialog box opens.
	• Click "Rename". The "Retrieve" dialog box opens.
	• Click "OK". The "Retrieve" dialog box opens once again with a different text.
	• Click the "Yes" button. Component view "fast_Lib (Component View)" opens.

Step	Action
2	Select the **Window > Arrange > Tile vertically** command in SIMATIC Manager.
3	• In the "fast_Lib (Component View)" window, select the "Charts" folder under "S7 Program(1) in the "fast_Lib" master data library. • Keeping <Ctrl> pressed, select the MOTOR1, PIDCTRL1 and VALVE1 CFC charts in the right window. • Drag and drop the selected CFC charts to the "fast_MP" multiproject in order to copy them to the "S7 Program(1)/Charts" folder" in the "fast_Lib" master data library. The CFC charts are now stored in the master data library within your multiproject.
4	Close the "fast_Lib (Component View)" window.

Result
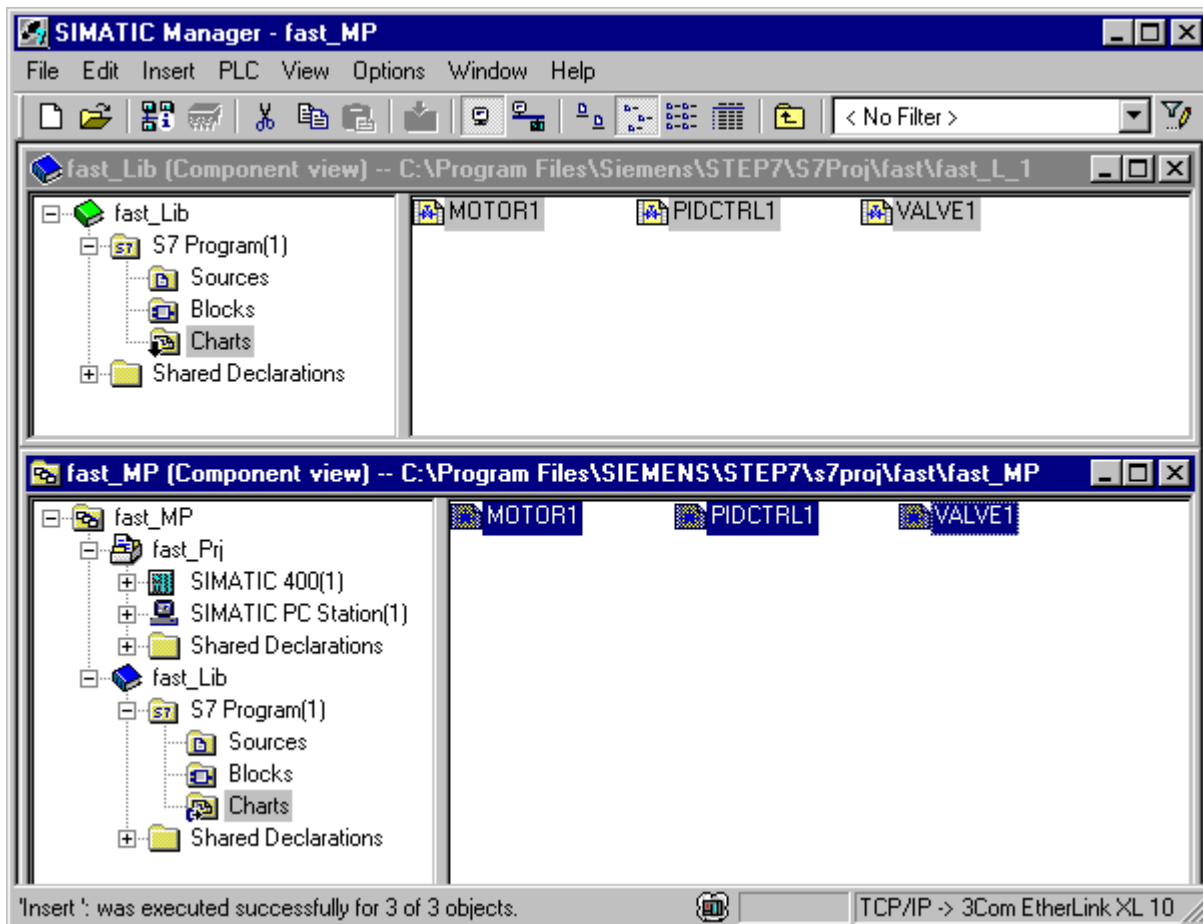
4.2 How to Copy the CFC Charts into the Project

Introduction

Now copy the adapted and renamed CFC charts from the "fast_Lib" master data library in the "fast_Prj" project to the plant's "Function (1)" folder. When you have completed copying you can continue with configuration in SIMATIC Manager in the Process Object view.
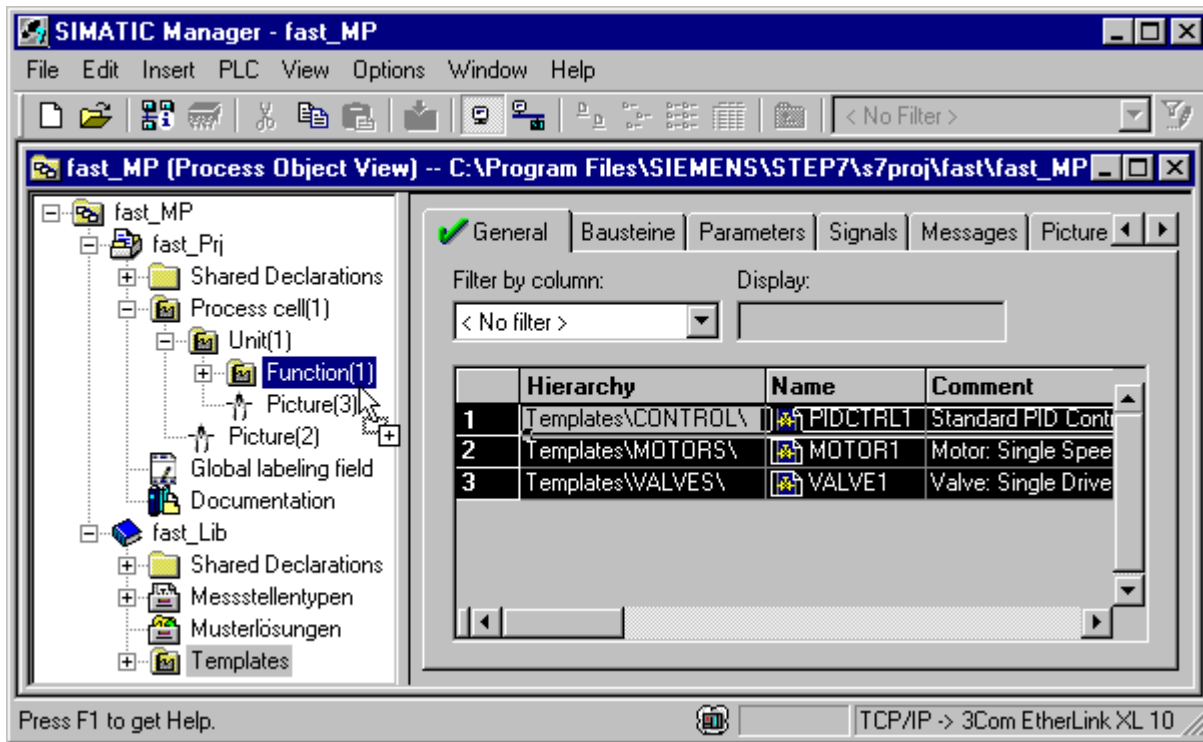
Requirement

- In the master data library, the MOTOR1, VALVE1 and PIDCTRL1 templates are located in the "Templates" folder in the Process Object view.

Procedure

Step	Action
1	In the SIMATIC Manager, select the menu command **View > Process Object view** and open all hierarchy folders.
2	Click the "Templates" folder in the "fast_Lib" folder in the left window. The three CFC charts MOTOR1, VALVE1 and PIDCTRL1 will be displayed in the table in the right-hand window.
3	Press and hold down the <Ctrl> key and select all three charts by clicking on each of the line numbers in the first column.
4	Drag and drop the selected CFC charts in order to copy them to the "fast_Prj\Plant(1)\Unit(1)\Function(1)" folder. The copied CFC charts will be displayed in the table in the right-hand window.

Result

4.3 How to Configure the SFC Chart

Introduction

The PCS 7 Wizard has created an SFC chart "SFC(1)" in the "Function(1)" folder in the "fast_Prj" project. The following section describes how to rename the SFC chart and adapt it for simulation.

Requirements

- The PCS 7 Wizard "New Project" has been executed.
- The SIMATIC Manager is open and the "fast_MP" project is displayed in the Process Object view with all the opened hierarchy folders.

Procedure

Step	Action
1	Open the shortcut menu of the "SFC(1)" object in the "Function(1)" folder and select the menu command **Rename**.
2	Enter the new name "Control" and press the Enter key.
3	Double click the "Control" object.. The SFC editor opens.
4	• Select the **Insert > Step+Transition** command in the SFC. • Move the cursor in the SFC chart below the "START" step until the green line appears and then press the left mouse button. • Select **Insert > Select**.
5	• Select the first transition (2) beneath the "START" step, open the shortcut menu and select the menu command **Object Properties**. • Select the "Condition" tab. • Click the "Browse" button. • Click on the plus sign in front of the "PIDCTRL1" CFC. • Select the "PID" block. • Now select the "PV_IN" I/O in the "Name" column and then click the "Apply" and "Close" buttons. • In line 1 of the "Properties - 2 --..." dialog box, enter the number "50" next to the "=" and change the sign from "=" to ">". • Click the "Apply" and "Close" buttons.

Step	Action
6	• Open the shortcut menu of step (3) in the SFC chart below the transition (2) and select the menu command **Object Properties**.
	• Enter the value "10s" at "Minimal:" in the "Runtimes" group (without white spaces).
	• Select the "Processing" tab and click the "Browse" button.
	• Click on the plus sign in front of the "MOTOR1" CFC.
	• Select the "MOTOR" block.
	• Now select the "AUTO_ON" I/O in the "Name" column and then click the "Apply" and "Close" buttons.
	• In line 1 of the "Properties - 3--..." dialog box, enter the number "1" next to the "=" and click on "Apply" and "Close".
	The motor is now switched on when the process value of the control system reaches the value of 50 or exceeds it.
7	• Open the shortcut menu for step 3 of the SFC and select the menu command **Copy**.
	• Open the shortcut menu in the blank area of the SFC chart and select the menu command **Insert**.
	• Move the cursor in the SFC chart above the "End" step until the green line appears and then press the left mouse button.
8	• Open the shortcut menu of step (4) inserted and select the menu command **Object Properties**.
	• Select the "Processing" tab.
	• In line 1 of the "Properties - 4--..." dialog box, enter the number "0" next to the "=" and click on "Apply" and "Close".
	The motor is switched off again.
	• Select **SFC > Exit**.

Result
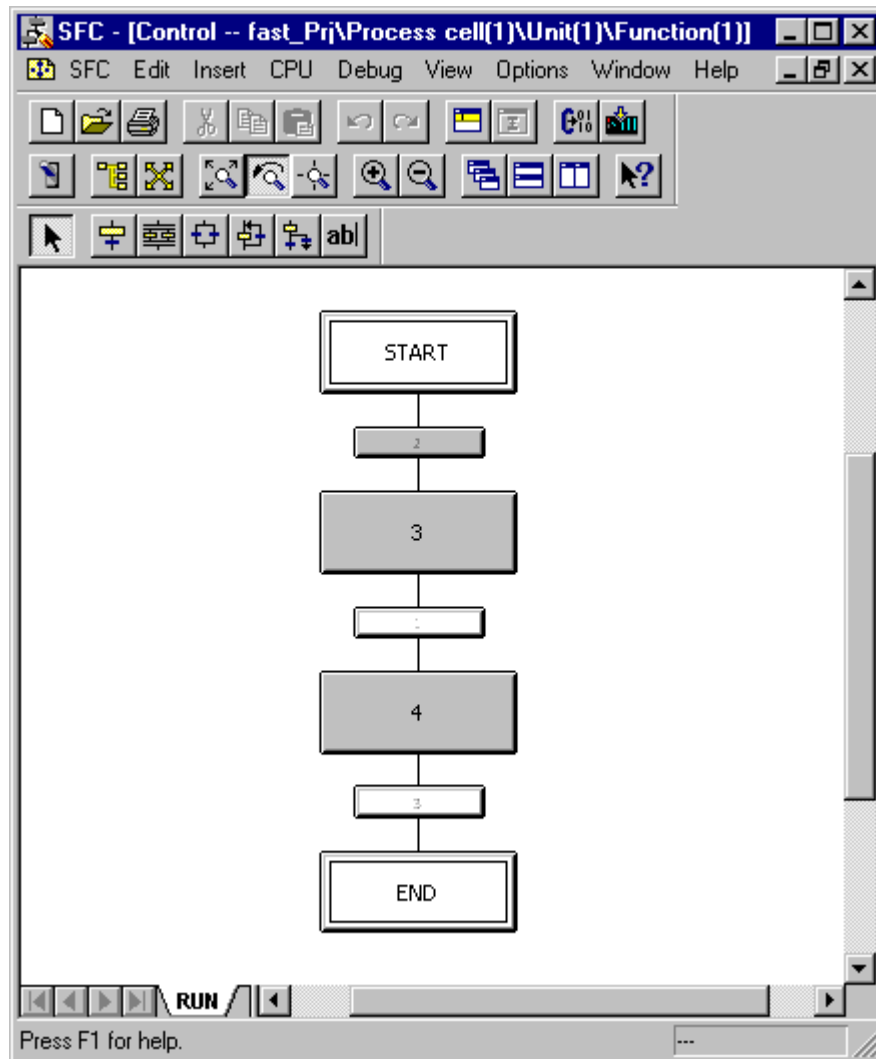
4.4 How to Organize the Project Folder

Introduction

The "Unit(1)" contained in the "fast_Prj" project has been created and named by the PCS 7 Wizard. In the following section you will rename Unit(1) as Unit_A and move it to the "Process cell(1)" folder. The plant structure gains in clarity by being renamed. Objects created by the PCS 7 Wizard that are not required can be deleted

Requirements

- The "New Project" PCS 7 Wizard has been executed.
- The SIMATIC Manager is open and the "fast_MP" project is displayed with all the opened hierarchy folders in the Plant view.


Note

Configure the views in SIMATIC Manager, for example, by selecting the **View >Plant View** command.

Procedure

Step	Action
1	Open the shortcut menu of the "Process cell(1)" folder in the left window of the Plant view and select the menu command **Rename**.
2	Enter the name "Plant" and press Enter.
3	Open the shortcut menu of the "Unit(1)" folder in the left window of the Plant view and select the menu command **Rename**.
4	Enter the name "Unit_A" and press Enter.
5	Click the "Function(1)" folder below the "Unit_A" folder.
6	Open the shortcut menu of the "CFC(1)" object in the right pane and select the **Delete** command. The "Delete" dialog box opens.
7	Click "Yes".

Result
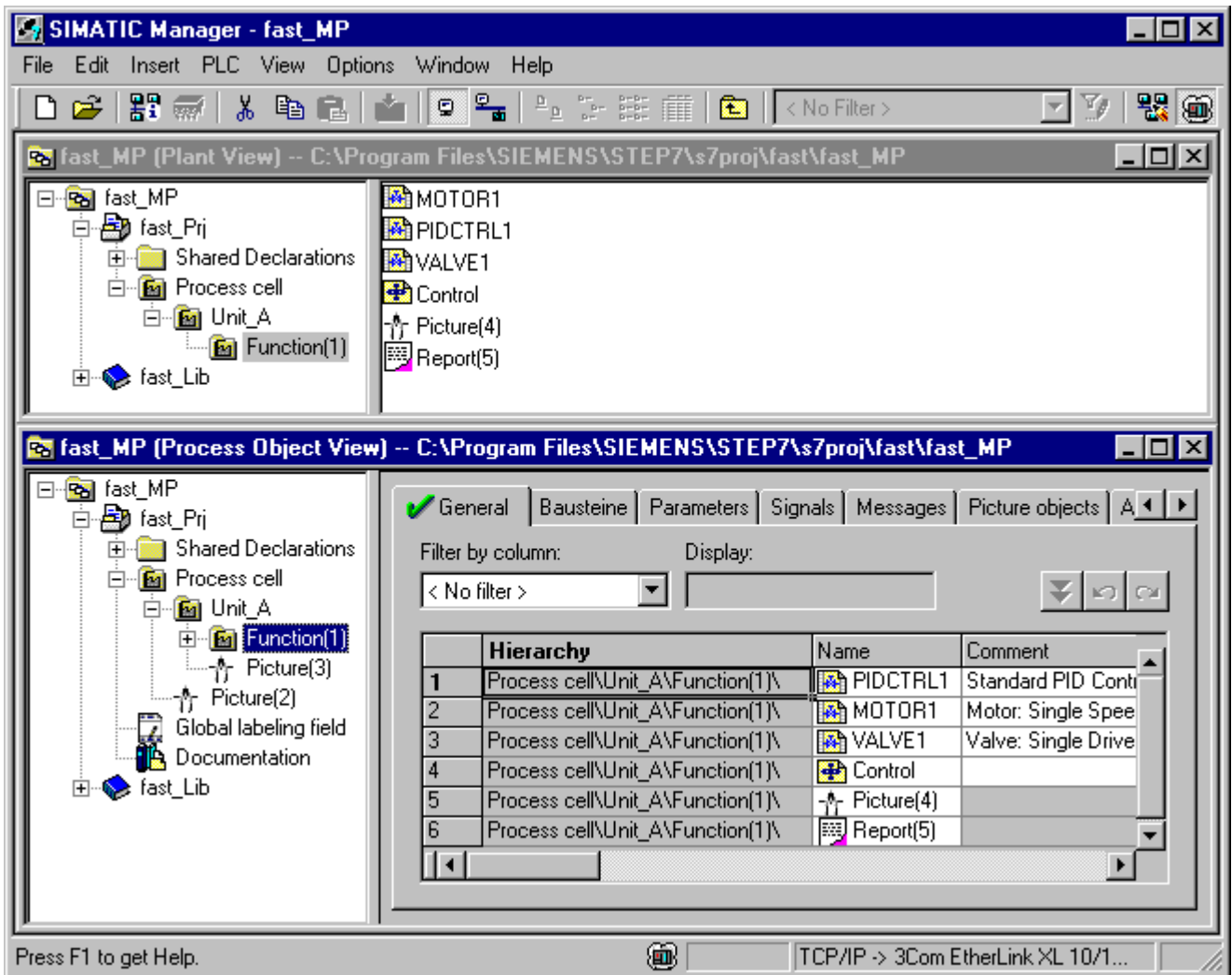
Preparing the plant display for automatic generation 5

5.1 How to Prepare the Plant Display for Automatic Generation.

Introduction

You can prepare for automatic plant display generation by taking the steps described below.

Requirements

- The "New Project" PCS 7 Wizard has been executed.
- The SIMATIC Manager is open and the "fast_MP" project is displayed with all the opened hierarchy folders in the Plant view.

Procedure

Step	Action
1	Select the "Unit_A" folder in the Plant view in the left window.
2	Open the shortcut menu of the "Display(3)" object in the right window and select the menu command **Object Properties**.
3	Select the "Block icons" tab.
4	Select the "Derive block icons from the plant hierarchy" check box and click "OK".
5	Open the shortcut menu of the "Unit_A" folder and select the menu command **Plant Hierarchy > Settings**
6	Select the check box in the "OS area" column for the second level in the "Customize Plant Hierarchy" dialog box in the "Level Settings" group.
7	Activate the "Derive picture hierarchy from the plant hierarchy" check box.
8	Click "OK".

Result
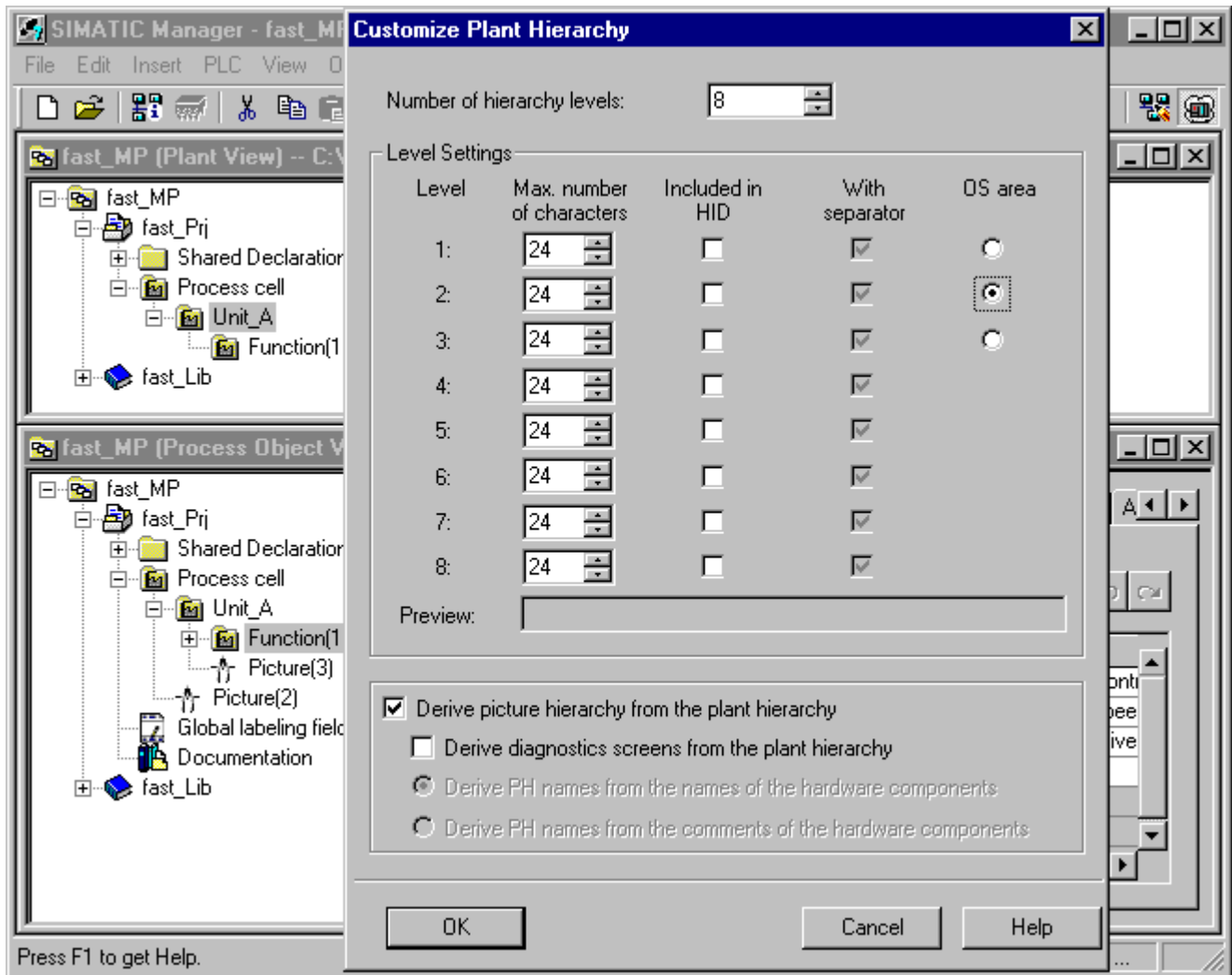
Creating a Unit_B by Copying unit_A

6

6.1 How to Create Unit_B by Copying Unit_A

Introduction

The following is a description of how to copy "Unit_A" into the "Plant" folder in the Plant view. In the copying process a duplicate of Unit_A is created with all the contained and configured objects. You then rename the copy of "Unit_A" as "Unit_B".
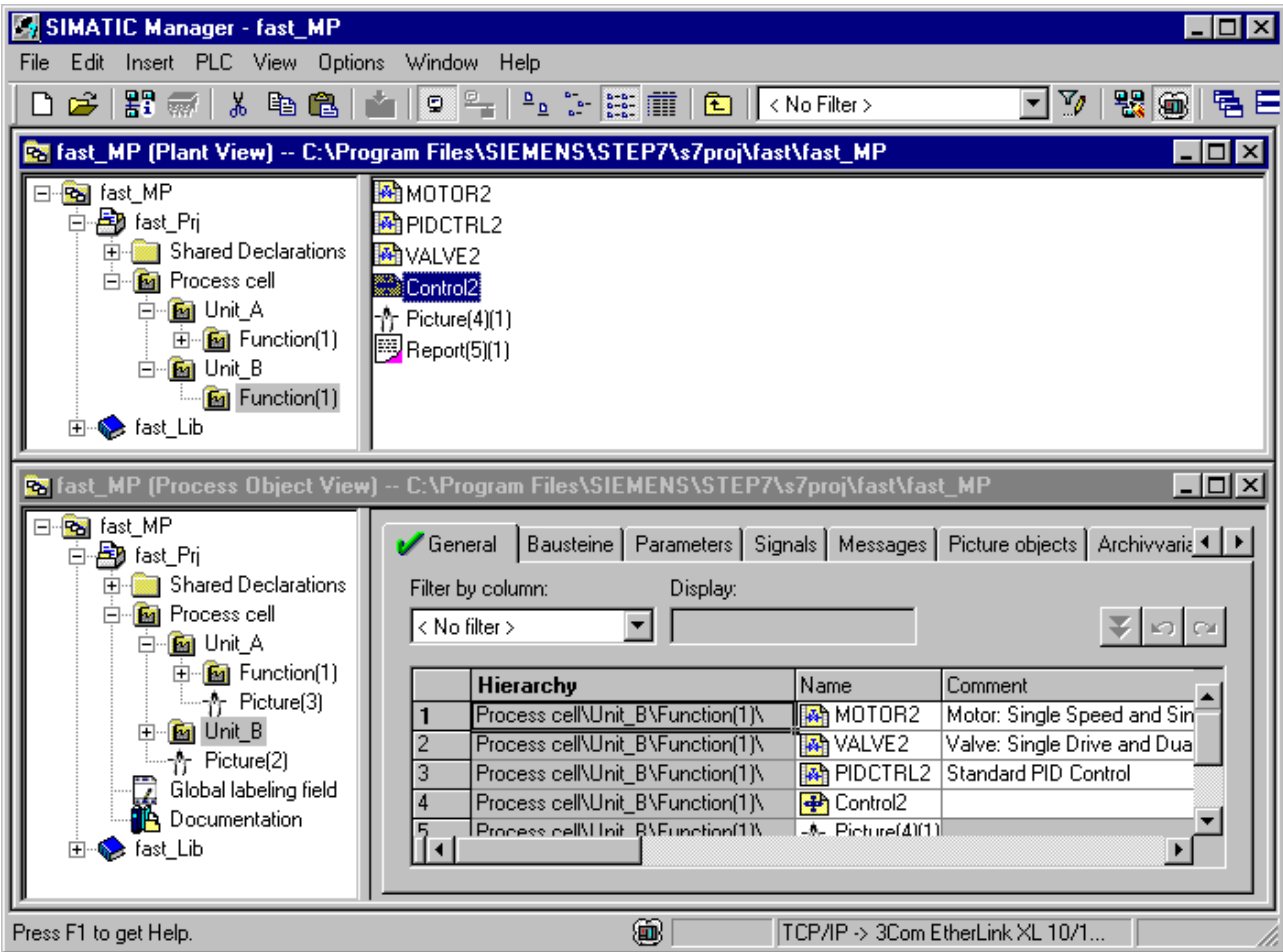
Requirement

- The SIMATIC Manager is open and the "fast_MP" project is displayed with all the opened hierarchy folders in the Plant view.

Procedure

Step	Action
1	Open the shortcut menu of the "Unit_A" folder in the left pane of the plant view. Select the **Copy** command.
2	Open the shortcut menu of the "Plant" folder and select the menu command **Paste**.
3	Open the shortcut menu of the copied "Unit_A (1)" file and select the menu command **Rename**.
4	Enter the name "Unit_B" and press Enter.
5	In the left window below the "Unit_B" folder, select the "Function(1)" folder.
6	- In the right window, open the shortcut menu of the "MOTOR1(1)" folder and select the menu command **Rename**. - Enter the name "MOTOR2" and press Enter. - In the right window open the shortcut menu of the "PIDCTRL1(1)" folder and select the menu command **Rename**. - Enter the name "PIDCTRL2" and press Enter. - In the right window open the shortcut menu of the "VALVE1(1)" file and select the menu command **Rename**. - Enter the name "VALVE2" and press Enter. - In the right window, open the shortcut menu of the "Controller(1)" folder and select the menu command **Rename**. - Enter the name "Controller2" and press Enter.

Result

Programming and interconnecting the process tags

7

7.1 How to program and interconnect the process tags

Introduction

To configure and interconnect the process tags, first insert the signals in the Process Object view and then modify the parameter values.

Requirement

- The SIMATIC Manager is open and the "fast_MP" project is displayed in the Process Object view with all the opened hierarchy folders.

Procedure

| Step	Action
1	Click the "Plant" folder in the Process Object view in the left window.
2	Click the "Signals" tab in the right window.
3	• In the right window split the display window into two sections by positioning the cursor over the bar on the left next to the bottom horizontal scroll bar. When the cursor assumes the split symbol, move the bar to the middle of the display window. • Use the bottom left scroll bar to view the "Chart", "Block" and "I/O comment" columns in the left pane. Use the split cursor on the edges of the column headers to hide or reduce the size of columns. • Next, use the bottom right scroll bar to view the "Signal" column. • Click the "Chart" header to sort the column in ascending order.
4	• Open the shortcut menu of the "Motor1" chart and the "FB_ON" block in the "Signal" column. Select the **Insert signal** command. • In the "Insert Signal" dialog box open the shortcut menu of the "Inputs" folder in the right window and select the menu command **Open**. In the hardware configuration the signal names are selected as composites of the name of the process tag "Chart" column, and the name of the channel drivers, "Block" column. • Select the "MOTOR1-FB_RUN" signal accordingly in the "Insert Signal" dialog box in the right window and then click "Apply". In the Process Object view the inserted signal is applied automatically in the "Signal" column and the next cell is selected.
5	• In the "Insert signal" dialog box in the left window click the "Outputs" folder. • Select the "MOTOR1-OUT" signal in the right window and click "Apply".

Step	Action
6	Insert all other signals as described in step 5. Note that, depending on the signal, you have to change between the "Inputs" and "Outputs" folders in the "Insert Signal" dialog box in the left window
7	Close the "Insert signals" dialog box.
8	• Click the "Parameters" tab in the Process Object view in the right window.
	• Split the right window into two sections as described in step 3. The "Chart" column is displayed in the left window and the columns "Process tag I/O", "Category" and "Value" are displayed in the right window.
	• Click column header "Chart" to sort the column in descending order.
	• Enter the value 6 in the "Value" column in the right window for the "VALVE1" chart name and "Monitoring time" process tag/IO interface.
	• Enter the value 6 in the "Value" column in the right window for the "VALVE2" chart name and "Monitoring time" process tag/IO interface.

Result

The result shown in the following figure is displayed after step 7.
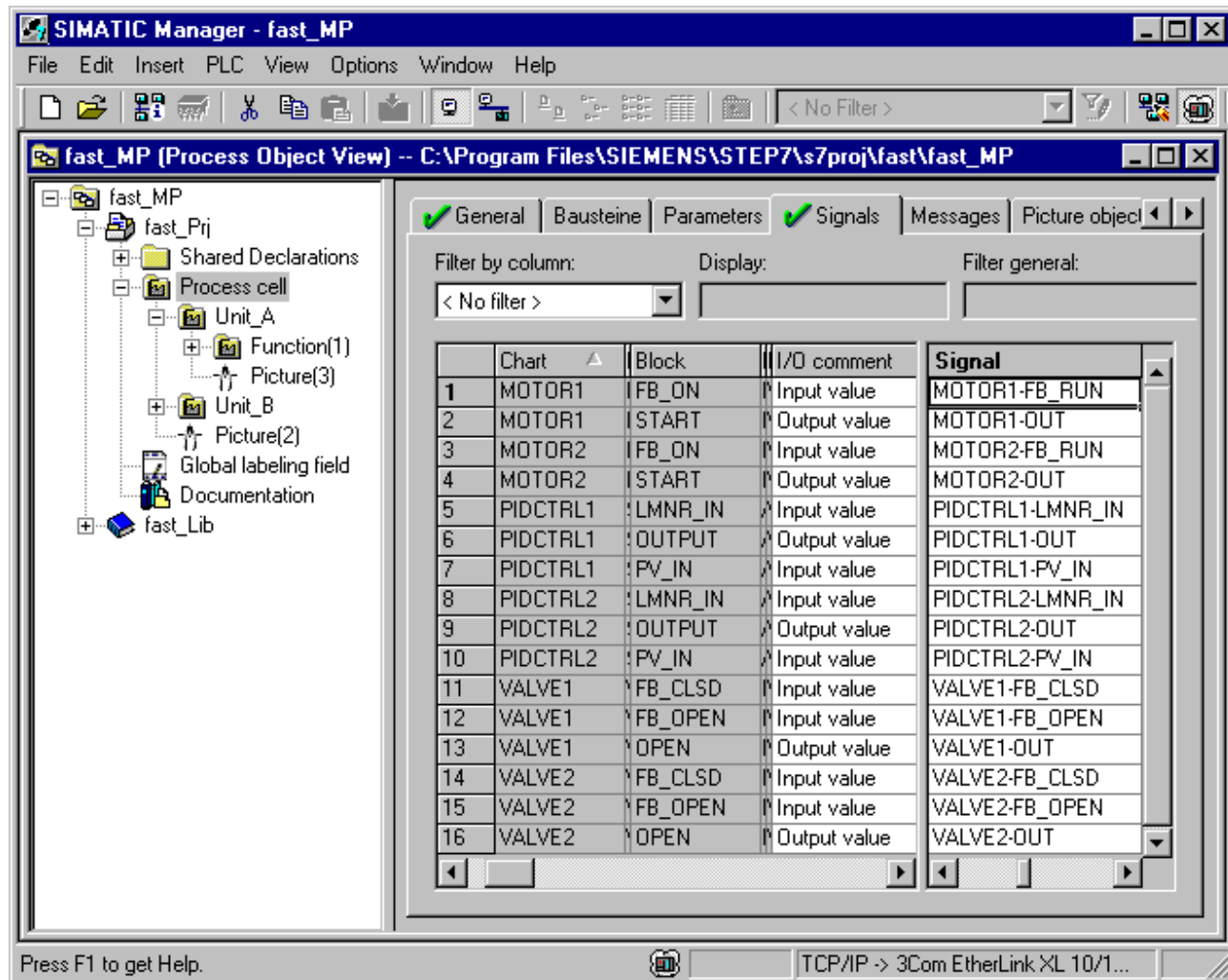
The result shown in the following figure is displayed after step 8.
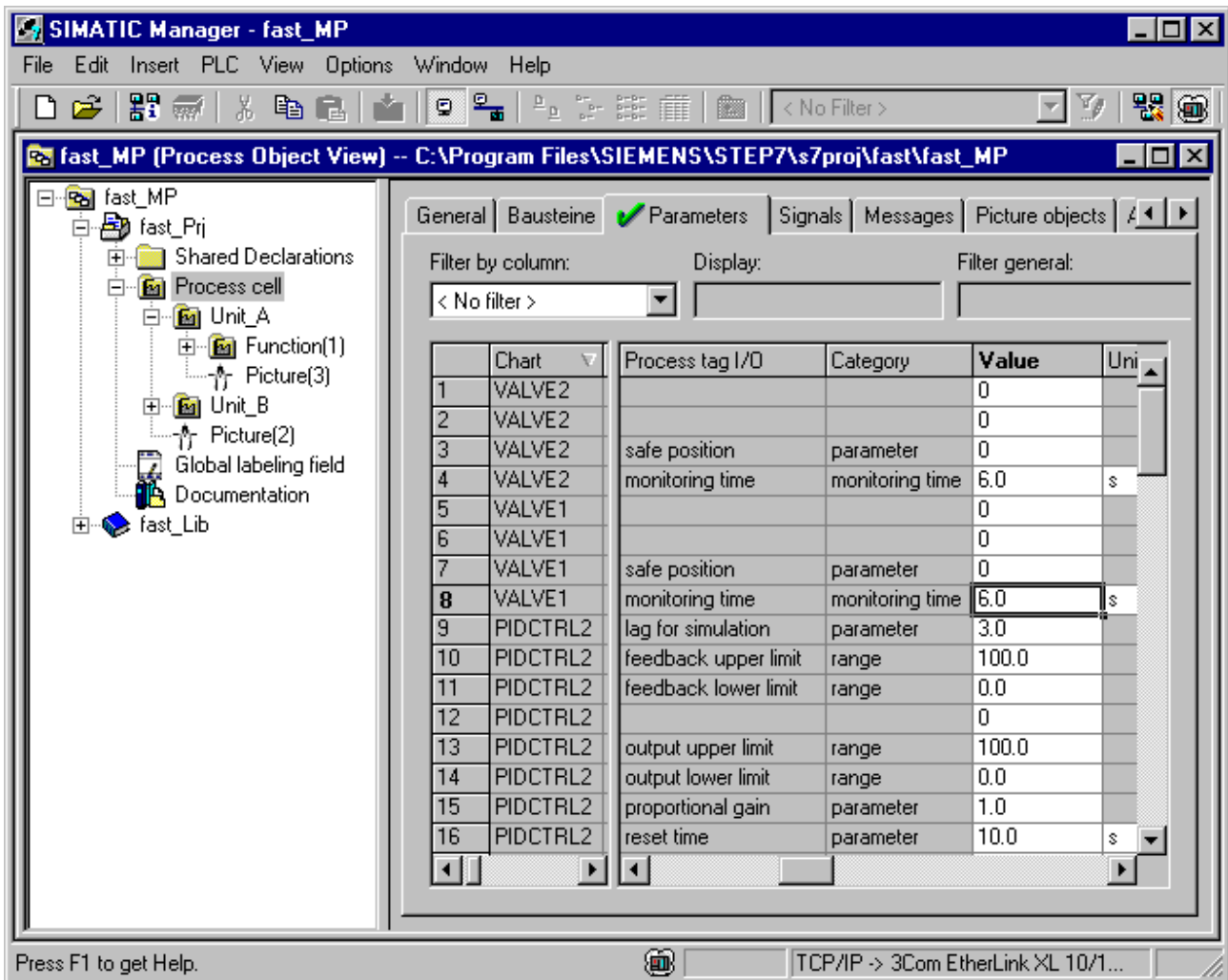
Compiling and downloading

8

8.1 How to Compile and Download Objects

Introduction

You have now carried out all the preparations for compiling and downloading the objects. Configure all the necessary settings for compiling and downloading the charts and the OS in the "Compile and Download Objects" dialog box.

Requirements

- The SIMATIC Manager is open and the "fast_MP" project is displayed in the Component view.
- S7-PLCSIM has been started.

Procedure

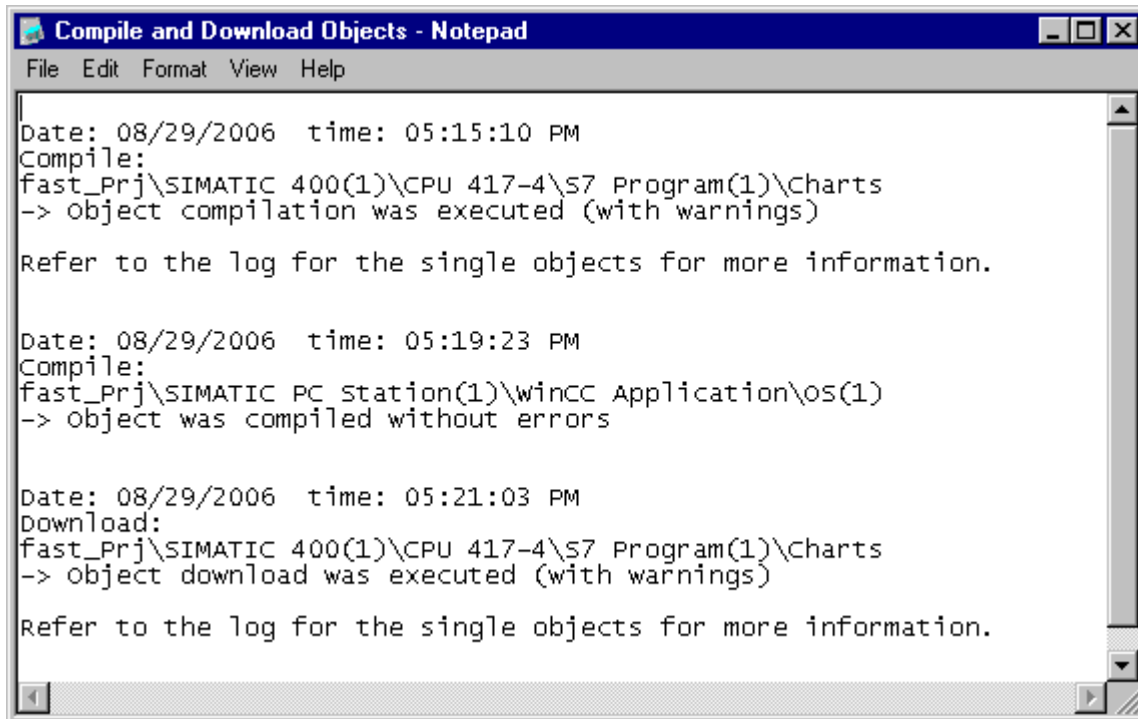| Step	Action
1	• Open the shortcut menu of the "fast_MP" root folder on the left pane. Select the **PLC > Compile and download objects** command.
	• Open all folders in the "Compile and Download Objects" dialog box by clicking on the plus sign.
	• Select the check boxes in the "Compile" and "Download" columns in the "Charts" folder.
	• Click the "Charts" folder, and then click "Edit" in the "Settings for Compilation/Download" group. The "Compile program/download to PLC" dialog box opens.
2	• Check the "Complete Program" option in the "Scope" option group.
	• Click OK". The "Download to PLC" dialog box opens.
	• Click "OK". The program closes both dialog boxes.

Step	Action
3	• Select the check box for the "OS(1)" folder in the "Compile" column in the "Compile and Download Objects" dialog box.
	• Click the "OS(1)" folder and then on "Edit" in the "Settings for Compiling/Downloading" group.
	• Click "Next" in the "Settings: Compile OS" dialog box.
	• Click "Next" again.
	• Select the "Variables and Messages", "SFC Visualization" and "Picture Tree" check boxes in the following dialog box of the "Data" group. In the "Scope" group, activate the "Entire OS" and "With memory reset" check boxes.
	• Click "Apply". The program closes the dialog box.
4	• Click "Start" in the "Compile and download objects" dialog box. The "Compile and download objects" dialog box opens.
	• Click "OK".
	• A further "Compile and Download Objects" dialog box opens.
	• Click "Yes". The program starts the operation. The program opens the log file when this operation is completed.
	• Close the log file.
	• Click "Close" in the "Compile and Download Objects" dialog box.

Result

The edited "Compile and Download Objects" dialog box is shown in the figure below.
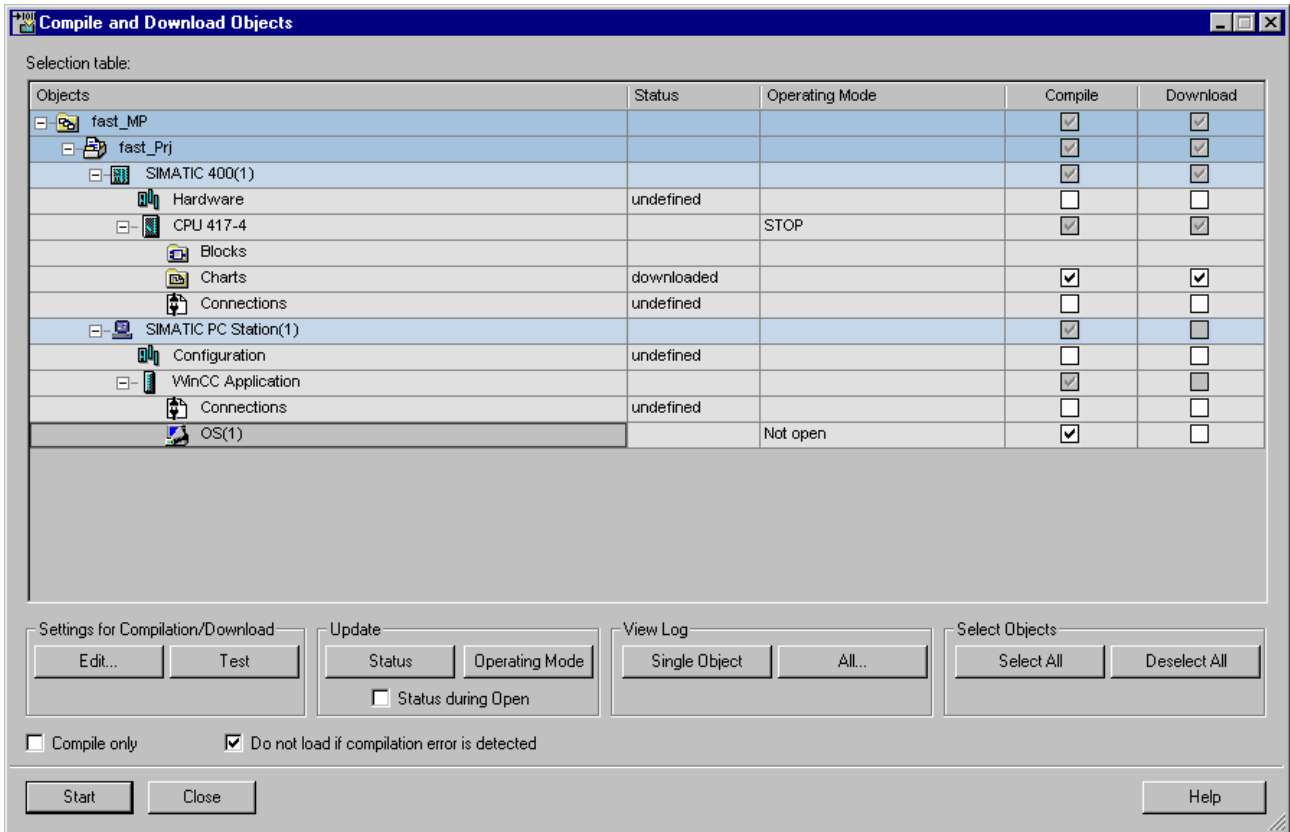
The following file is displayed after the compiling and downloading process has been completed:

Update blocks

You may have to update certain blocks if compilation of the CFC charts fails in higher version of PCS 7.
Procedure:

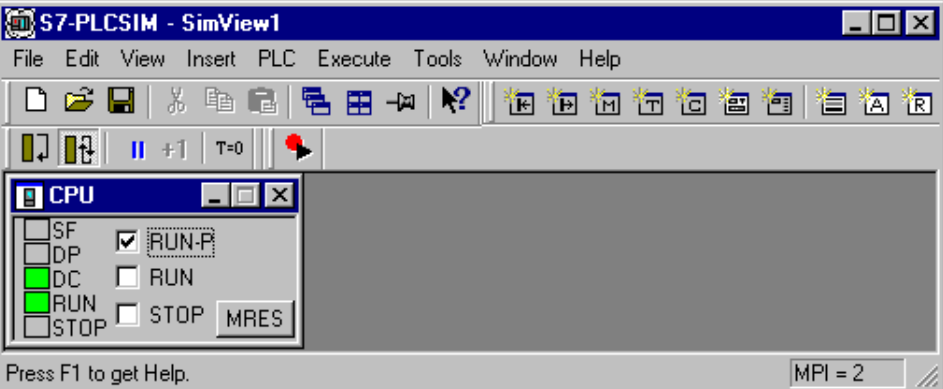| Step	Action
1	Select **File > Open** in SIMATIC Manager. The "Open Project" dialog box opens
2	Select the line of the current PCS 7 library on the "Libraries" tab and click "OK". The library opens in the component view.
3	Select all blocks in the folder "PCS 7 Library\ Blocks+Templates\Blocks" with the key combination <Ctrl>+a.
4	Select the **Options> Charts > Update block types** command. The "Open project" dialog box opens.
5	Select the line "fast_Prj" and click "OK".
6	Click "Continue".
7	Follow the instructions of the wizard.
8	Repeat the "Compile and download objects" operation. (step 4 in the upper table)

8.2 How to Set the CPU to RUN/P in S7-PLCSIM

Introduction

After the objects have been compiled and downloaded, the simulation of the CPU has to be switched over from the "STOP" state to the "RUN-P" state.

Requirements

- The objects have been compiled and downloaded.
- The program S7-PLCSIM has already been started.

Procedure

Step	Action
1	Click the "S7/PLCSIM / SimView1" window in the task bar to open the window.
2	Select the "RUN-P" check box in the "CPU" window.
3	Click "Minimize" in the "S7-PLCSIM - SimView1" window.

Operating and monitoring the process

9

9.1 How to Operate and Monitor the Process

Introduction

If you activate the OS from the SIMATIC Manager and activate the OS project, you can operate and monitor the process.

Note

You can modify and extend the automatically generated displays (pictures) - Display (3) from Unit_A and Display (3)(1) from Unit_B in the WinCC Explorer Graphics Designer.

Requirements

- The simulation of the CPU in the "RUN-P" state is set in S7-PLCSIM.
- The SIMATIC Manager is open and the "fast_MP" project is displayed in the Component view.

Procedure

Step	Action
1	Open the Tree view of the SIMATIC PC-Station in the left window of the SIMATIC Manager.
2	Right-click the "OS(1)" folder and select the **Open object** command from the shortcut menu.
3	Select **File > Activate** in WinCC Explorer.
4	• Click the "Unit_A" area selection key in the overview area at the top left of the "SIMATIC PCS 7 Control system" user interface. The automatically generated display is displayed with the "Control", "Controller", "Motor" and "Valve" objects and symbols.
5	• Click the "MOTOR1/MOTOR" symbol in the working area of the user interface. The faceplate of the motor is displayed in the working area of the user interface. • Click "Reset" in the faceplate and then "Execute" in the dialog box that is displayed. **Tip:** Use the "Enter" key to avoid having to click on "Execute". • Click "Start" and then "Execute" in the dialog box that is displayed. The motor will start. The "Status" on the left of the faceplate will now show "On".
6	Repeat the procedure from Step 5 onwards for the controller and valve faceplates. Then test the operator inputs.
7	• To stop the motor, click "STOP" in the "MOTOR1" faceplate followed by "Execute" in the dialog box that appears. • To set the "MOTOR1" faceplate to "Automatic" mode, click "Auto" followed by "Execute" in the dialog box that appears.
8	• Click the "PIDCTRL1/PID" symbol to display this faceplate in the working area. • Set the operating mode to "Auto". • Click the text field next to "SP". Then use it to enter a setpoint value of 40.
9	• Use the "Keyset Change" button in the bottom left of the user interface to switch to keyset 2. • Click "SFC Visualization" in keyset area 2. • In the right-hand window of the "Open SFC" dialog box, select "Control" in the "SFC Name" column. Then click "OK". The SFC overview window will now be displayed in the working area. • Click into the SFC overview window. The detailed window opens. • Click "Start" in the detailed window and then click "OK" to acknowledge the dialog field that appears. Unless the controller actual value is higher than 50, the sequential control will stop at the first transition and will no longer run. • By this point, the "PIDCTRL1/PID" control block window will have appeared and you should click it. • Click the text field next to "SP". Then use it to enter a setpoint value of 90. Watch what happens in the SFC detailed window. The sequential control runs right through to the end. MOTOR1 starts in step 3 of the sequence control chart and stops again in step 4.

Step	Action
10	• Click "Keyset Change" to switch to keyset 1.
	• Click "Message System".
	Any new messages will be displayed in the working area.
	• Click "Control List".
	The control list will be displayed in the working area. All the operator actions you performed in the faceplates are shown here.

Result

Working area with all control elements (step 8):
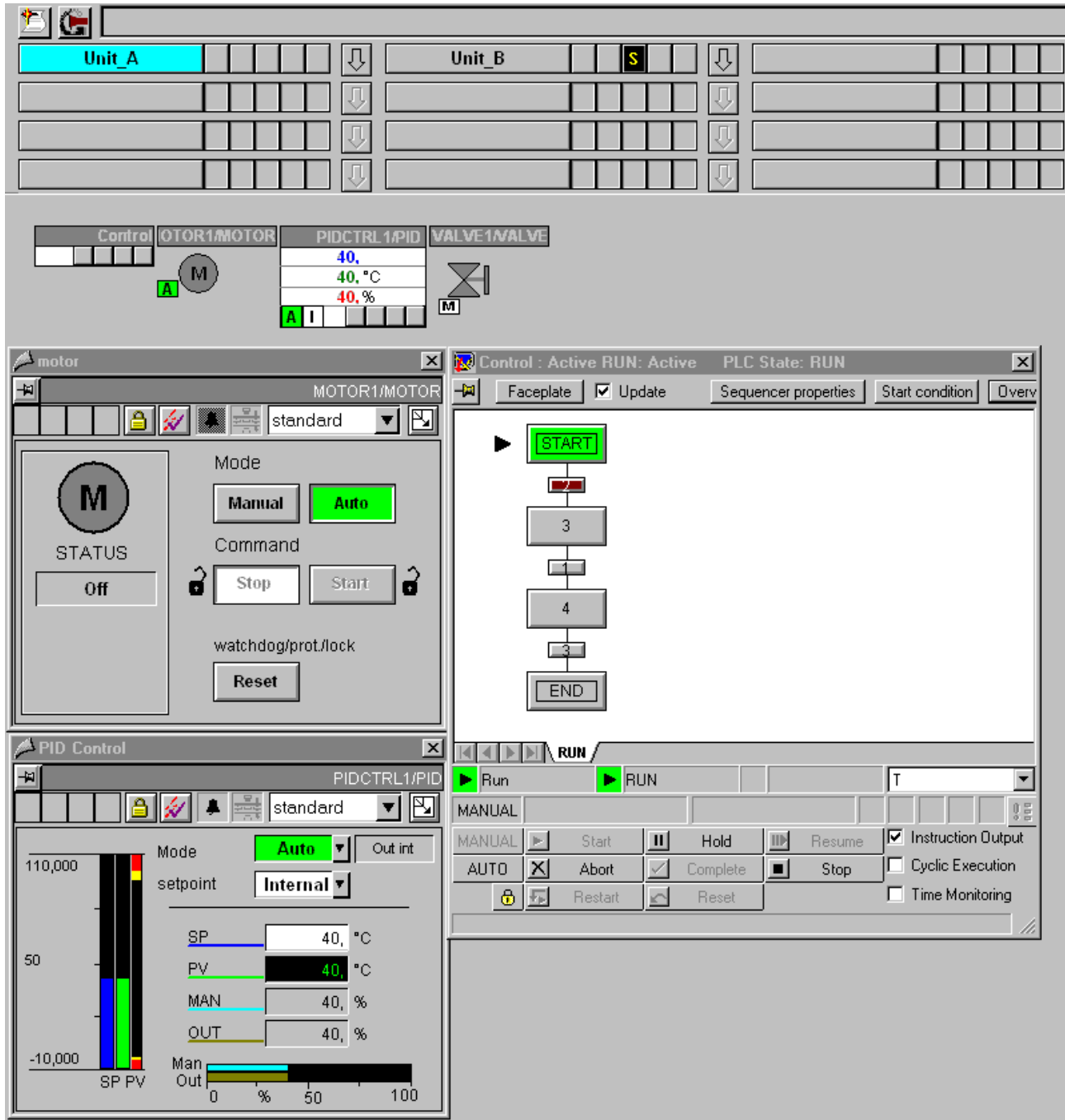
Sequential control execution (step 9):

Control list (step 10):

...	Date	Time	Priori	Source	Operation
1	29/08/06	17:29:20.000	0	MOTOR1/MOTOR	Error=Reset new = 1 old = 0
2	29/08/06	17:29:24.000	0	MOTOR1/MOTOR	Motor=Start new = 1 old = 0
3	29/08/06	17:29:33.000	0	MOTOR1/MOTOR	Motor=Stop new = 0 old = 1
4	29/08/06	17:29:38.000	0	MOTOR1/MOTOR	Mode=Auto new = 1 old = 0
5	29/08/06	17:30:09.000	0	PIDCTRL1/PID	SP new = 40 °C old = 65 °C
6	29/08/06	17:30:14.000	0	PIDCTRL1/PID	Auto new = 1 old = 0
7	29/08/06	17:30:34.000	0	VALVE1/VALVE	Error=Reset new = 1 old = 0
8	29/08/06	17:30:40.000	0	VALVE1/VALVE	Error=Reset new = 1 old = 0
9	29/08/06	17:33:17.423	0	Control	Executing 'Start' command
10	29/08/06	17:36:57.000	0	PIDCTRL1/PID	SP new = 90 °C old = 40 °C
11	29/08/06	17:39:37.000	0	MOTOR1/MOTOR	Mode=Manual new = 0 old = 1
12	29/08/06	17:39:42.000	0	MOTOR1/MOTOR	Motor=Start new = 1 old = 0
13	29/08/06	17:39:51.000	0	MOTOR1/MOTOR	Motor=Stop new = 0 old = 1
14	29/08/06	17:39:53.000	0	MOTOR1/MOTOR	Mode=Auto new = 1 old = 0
15	29/08/06	19:30:42.740	0	VALVE1/VALVE	<reichlew>: Acknowledgment PLC pro
16	29/08/06	19:30:43.819	0	VALVE2/VALVE	<reichlew>: Acknowledgment PLC pro
17	29/08/06	19:30:44.350	0	VALVE2/VALVE	<reichlew>: Acknowledgment PLC pro
▶ 18	29/08/06	19:30:44.694	0	VALVE2/VALVE	<reichlew>: Acknowledgment PLC pro

operation list

Unit_A   Unit_B   S

Index

A

Analog input module, 14
    Editing symbols, 14
Analog output module, 16
    Editing symbols, 16
Automatic generation, 37
    Plant display, 37

C

CFC chart, 27, 29
    copy to project, 29
    copying from the zip file to the master data
    library, 27
Compile, 21, 45
    NetPro, 21
    Object, 45
Configuration, 11, 31
    Hardware, 11
    SFC chart, 31
Configure, 41
    Process tag, 41
Copy, 27, 29, 39
    CFC from the Zip file to the master data library, 27
    Unit, 39
Copying
    CFC chart, 29
CPU, 50
    Setting PLCSIM to RUN-P, 50
Creating, 7, 39
    Unit by copying a unit, 39
Creation
    PCS 7 project, 7

D

Delete, 34
    Object in project folder, 34
    Project object, 34
Digital input module, 17
    Editing symbols, 17
Digital output module, 18

Editing symbols, 18
Download, 25, 45
    MPI interface download from NetPro to the PLC, 25
    Object, 45

E

Edit, 14, 16, 17, 18
    Symbols of the analog input module, 14
    Symbols of the analog output module, 16
    Symbols of the digital input module, 17
    Symbols of the digital output module, 18

H

Hardware, 11
    Configuring, 11

I

Information about this Getting Started, 5
Interconnect, 41
    Process tag, 41

M

Master Data Library, 27
    Copying the CFC from the Zip file to ~, 27
Monitoring, 51
    Process, 51
MPI address, 19, 25
    setup for SIMATIC PC station, 19
MPI interface
    Download from NetPro to the PLC, 25

N

NetPro, 21
    Compile, 21
    Save, 21