

Process Control System PCS 7 V7.0



simatic
PCS 7

SIEMENS

Qualified Personnel

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Preface

Information about the Getting Started PCS 7 - First Steps Documentation

The Getting Started PCS 7 First Steps documentation uses a simple sample project to show you the fundamental procedures and the interaction of the software components of SIMATIC PCS 7 during engineering and in process mode.

This Getting Started documentation serves as an introduction and therefore does without detailed and background information. If we have aroused your interest in SIMATIC PCS 7 with this Getting Started documentation, we recommend the Getting Started PCS 7 - Part 1 for Beginners documentation.

Conventions

The names of the software interface elements in this documentation are in the language used for this documentation. If you have installed a multilanguage package for the operating system, some of the names will still appear in the base language of the operating system after you have switched languages and will therefore be different from what is indicated in the documentation.

Purpose of this Getting Started Documentation

The aim of this documentation is to provide you with a rapid and successful guided introduction to 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 (see: *Manual Process Control System PCS 7; PC configuration and authorization*)
- Software package SIMATIC PCS 7 V7.0 and higher 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

This documentation is available as an on-line help and as a printable manual (PDF format). We recommend using the printed PDF for configuration on the PC. In order to reduce the time required for configuration, an archived zip file, which contains the completed CFC charts, is included as a library.

You will find the online help and the printed manual under **Start > SIMATIC > Documentation > English** following installation of SIMATIC PCS 7. The archived .zip file "Sim_lib.zip" is stored under the following path after the SIMATIC PCS 7 has been installed:
Installation_Path\SIEMENS\STEP7\Examples_MP.

We wish you every success!

Your SIEMENS AG

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1 Creating the PCS 7 Project

1.1 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 or higher is installed.
- S7-PLCSIM V5.3 SP1 HF1 or higher is installed.

Procedure

Step	Action
1	Select the menu command Start > SIMATIC > SIMATIC Manager or double-click on the appropriate icon on the Desktop. SIMATIC Manager will be launched.
2	If projects are still open in SIMATIC Manager, select the menu command File > Close until no further projects are open.
3	Select the menu command File > "New Project..." Wizard . The "New Project" PCS 7 Wizard is started.
4	Click on "Next" in step 1(4).
5	In step 2(4): • Select CPU 417-4. • Select the bundle 6ES7654-1LE57-0XX0. • Select "0" from the "Number of Communications Modules" drop-down list. • Click "Next".
6	In step 3(4): • Select "3" Levels for the Technical Hierarchy. • In the "AS Objects" group, check the "CFC Chart" and "SFC Chart" check boxes. • In the "OS Objects" group, check the "PCS 7 OS" check box and select the "Single Station System" option button. • Click "Next".

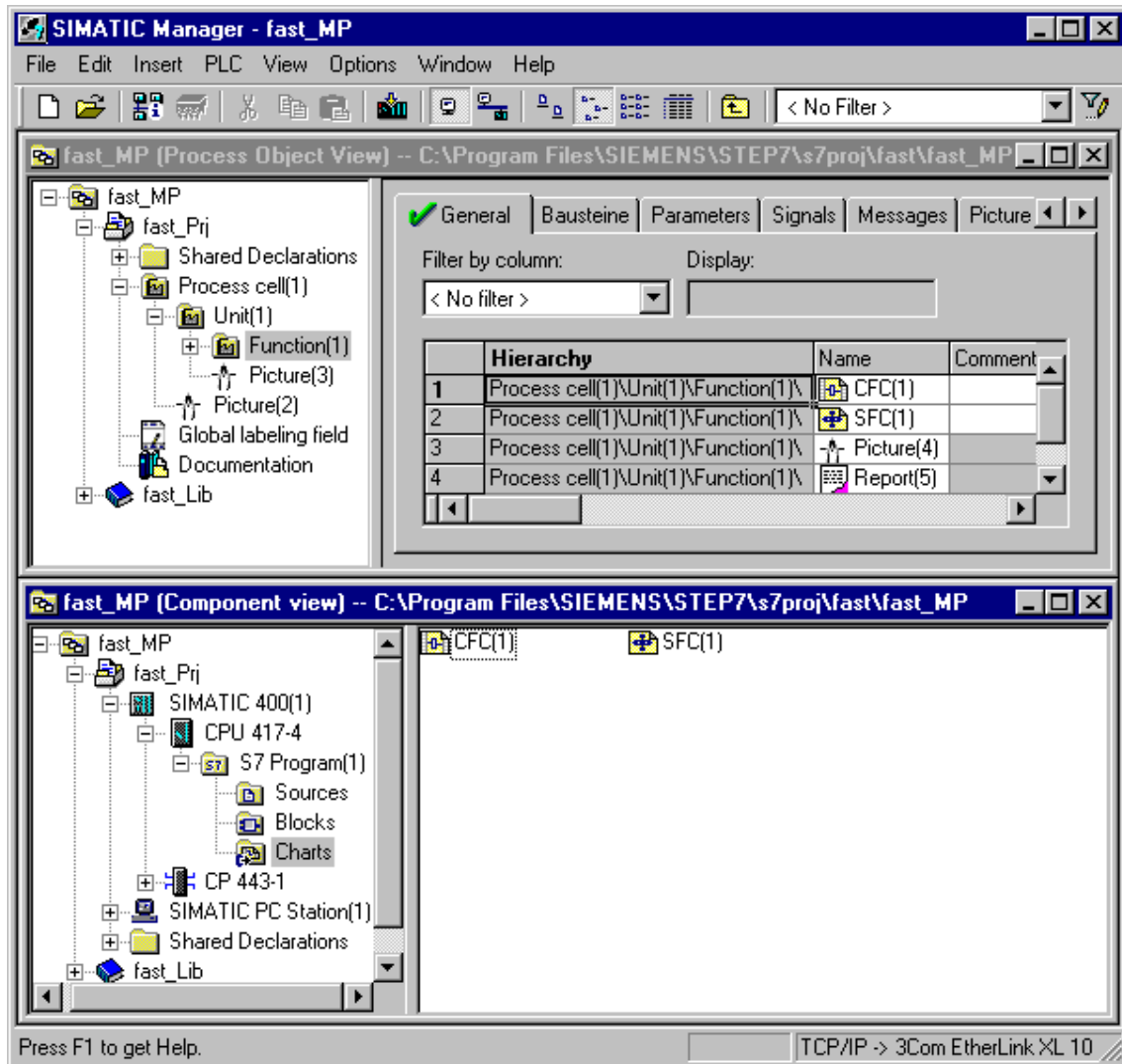
Step	Action
7	In step 4(4): • Enter "fast" in the "Folder Name" text field. • Change the storage location for the project if necessary. • Click "Finish".
8	If you have not changed the default setting "Always Prompt for Settings" for new projects in the "Message Numbers" tab in the "Options" menu, the "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	Close the Plant view and select the menu command View > Process Object View .
10	In SIMATIC Manager, select menu command Window > Arrange > Horizontally . The two windows, "Process Object View" and "Component View" are arranged one above the other.

Note

In the SIMATIC Manager you can use the **Options > Settings** menu command in the "Settings" dialog box of the "View" tab under "Default Project View" to select which view is displayed when a project is opened.

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.



2 Designing the Hardware and the Networks

2.1 How to Configure the Hardware

Introduction

The PCS7 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.

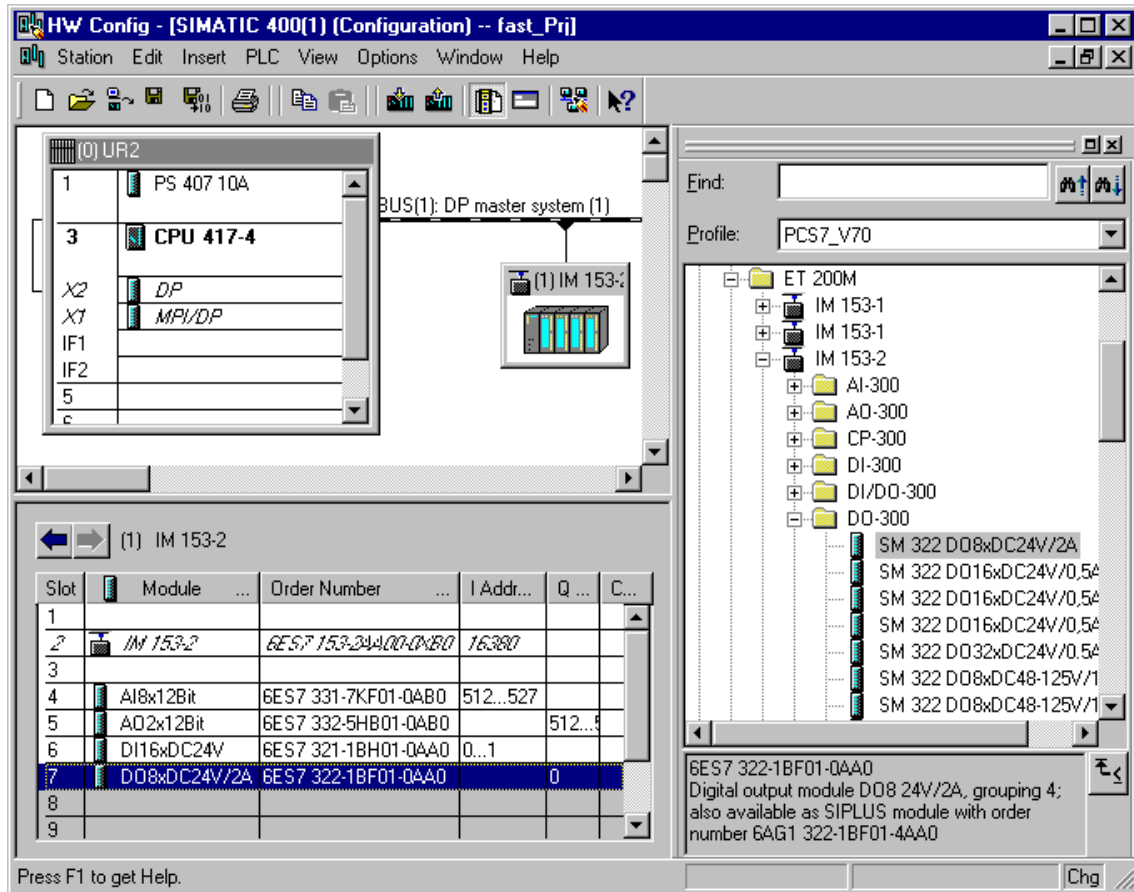
Procedure

Step	Action
1	In the Component view select the SIMATIC 400 station and then select the menu command Edit > Open object . HW Config is opened.
2	• Open the shortcut menu for the CP 443-1 in slot 5 and select the menu command Delete. The "Delete" dialog box opens. • Click "Yes". CP 443-1 will be deleted.
3	• If the hardware catalog is not visible, select the menu command View > Catalog. • Open the "PROFIBUS DP" folder in the hardware catalog. • Open the "ET 200M" folder and select the "IM 153-2" module. Drag the module onto the line of the "DP Master system". The "Properties - PROFIBUS interface IM 153-2" opens. • Click "OK". The default settings are applied.

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 and use Drag&Drop to drag the "SM 331 AI8x12Bit" module (6ES7 331-7KF01-0AB0) onto slot 4 in the IM 153-2 configuration below. 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 and drag the "SM 332 AO2x12Bit" module (6ES7 332-5HB01-0AB0) onto Slot 5 below the IM 153-2 configuration table. Close the "AO-300" folder. - Open the "DI-300" folder and drag the "SM 321 DI16xDC24V" (module 6ES7 321-1BH01-0AA0) onto Slot 6 below the IM 153-2 configuration table. Close the "DI-300" folder. - Open the "DO-300" folder and drag the "SM 322 DO8xDC24V/2A" folder (6ES7 322-1BF01-0AA0) onto 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.



2.2 Editing the Symbols in HW Config

2.2.1 How to Edit Symbols for 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 into 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". Your input is applied and the dialog box closes.

Result

Edit Symbols - AI8x12Bit

	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			

◀ ▶

Sorting:

☐ Display Columns R, O, M, C, CC

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

2.2.2 How to Edit the Symbols for 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.

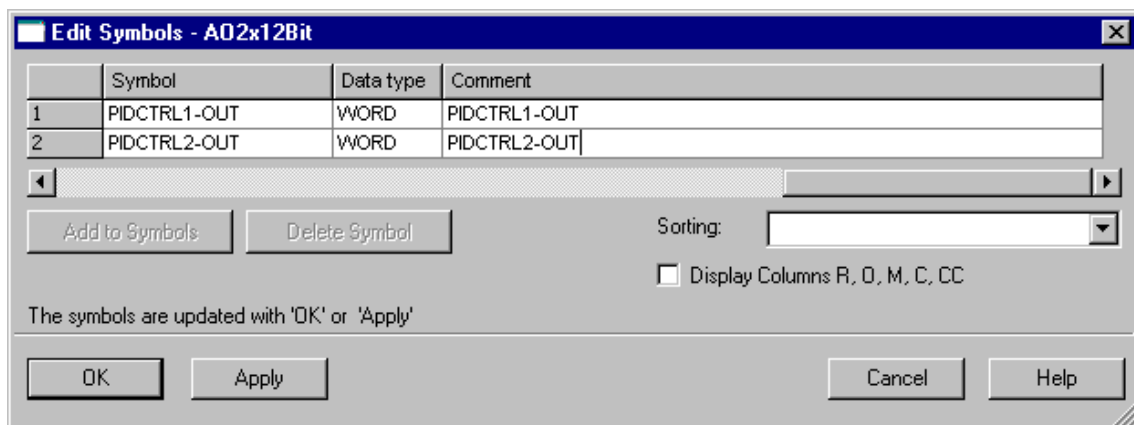
The procedure is the same as for the analog input module.

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



2.2.3 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.

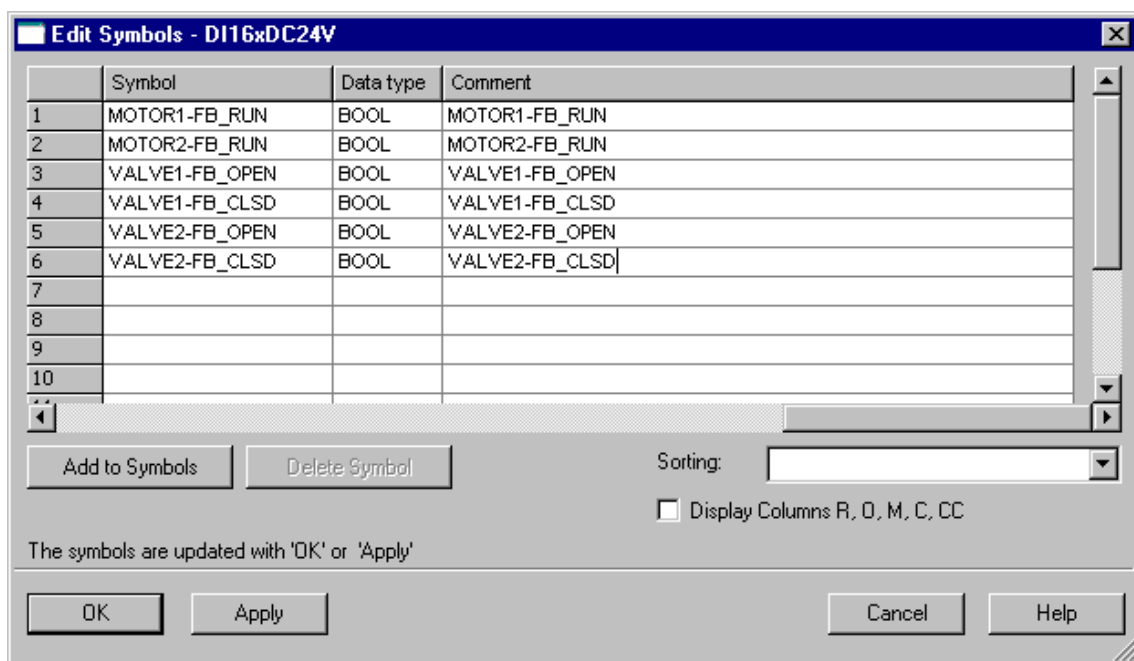
The procedure is the same as for the analog input module.

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



2.2.4 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

	Symbol	Data type	Comment
1	MOTOR1-OUT	BOOL	MOTOR1-OUT
2	MOTOR2-OUT	BOOL	MOTOR2-OUT
3	VALVE1-OUT	BOOL	VALVE1-OUT
4	VALVE2-OUT	BOOL	VALVE2-OUT
5			
6			
7			
8			

Sorting:
☐ Display Columns R, O, M, C, CC

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

2.3 Setting Up the MPI Interface for the SIMATIC PC Station

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

Introduction

In order to use S7-PLCSIM set up an MPI interface for the SIMATIC PC station so that the OS variables can be compiled.

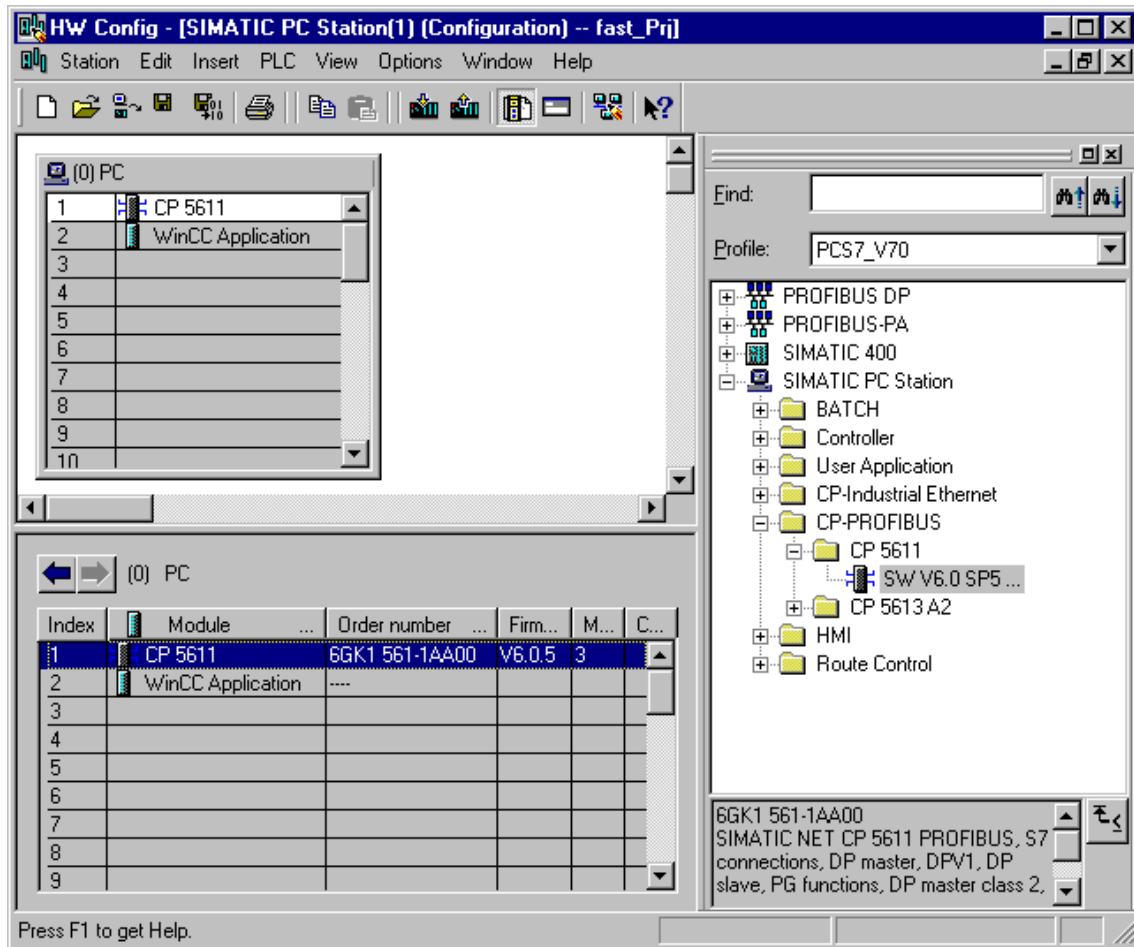
Requirement

- 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 the object "SW V6.0 SP5..." contained in it onto Index 1 in the configuration table. The "Properties - PROFIBUS interface CP 5611 (R0/S1)" dialog box opens. - Click "OK". The pre-assignment is applied and the dialog box closes.
4	Open the shortcut menu of the inserted CP 5611 and select the menu command Object Properties . The "CP 5611 Properties" dialog box opens.
5	- Select the "MPI" entry from the "Type:" drop-down list in the "Interface" group on the "General" tab. Then confirm the warning dialog box that appears by clicking on "Yes". - Click "Properties" in the "Interface" group and select MPI(1)" under "Subnet". The address for MPI is automatically converted to Address 3 since the CPU is already using Address 2. - Click on "OK" in the "Properties - MPI Interface CP 5611 (R0/S1)" dialog box. The dialog box is closed. - Click "OK" in the "CP 5611 Properties" dialog box. The dialog box is closed.
6	Select the menu command Station > Save and compile .
7	Select the menu command Station > Exit .

Result



2.4 Saving and Compiling in Netpro

2.4.1 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.

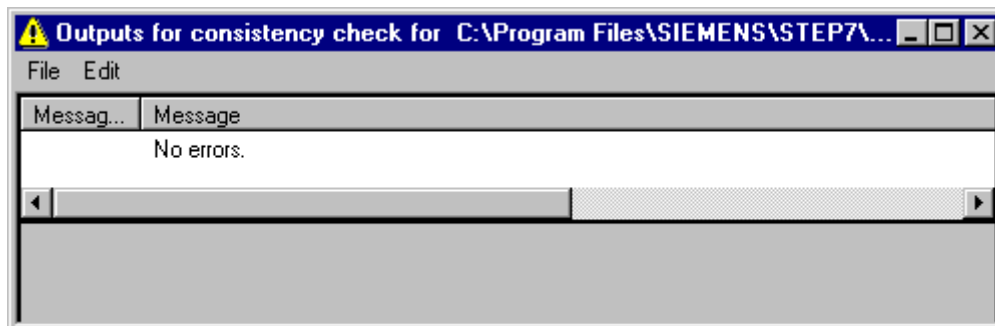
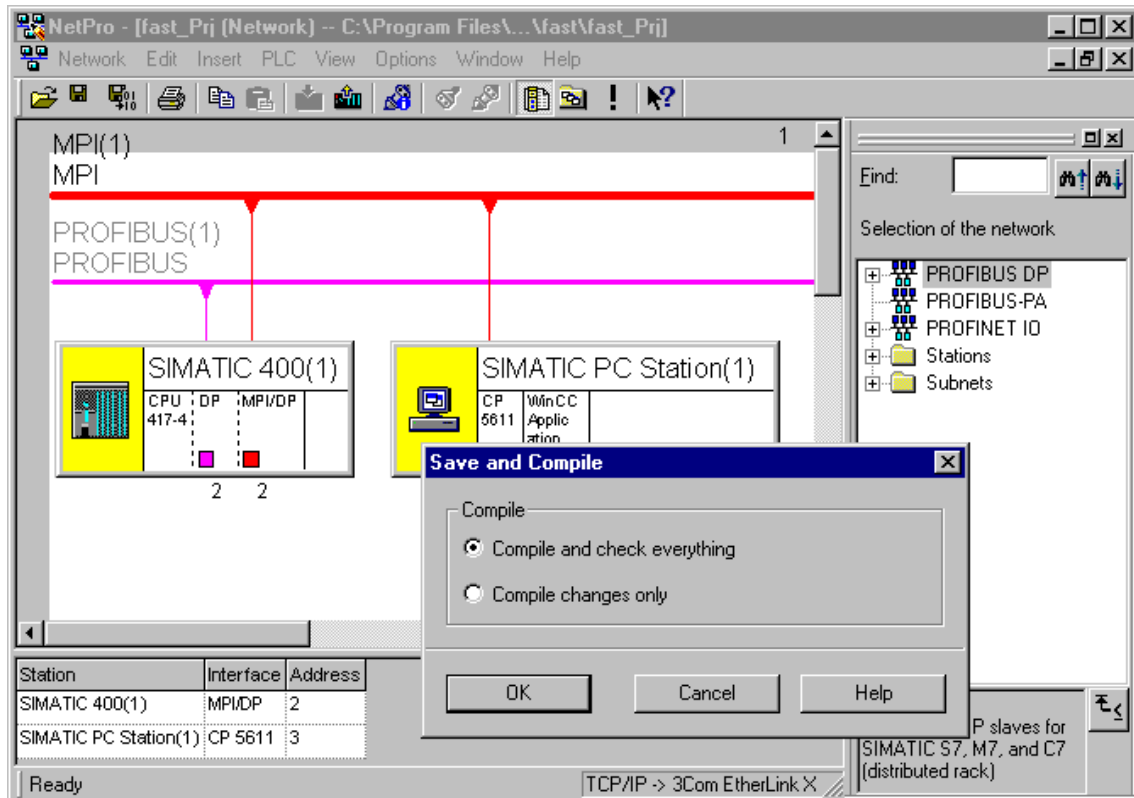
Requirement

- 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 Network > Save and compile from the NetPro menu. The "Save and Compile" dialog box opens.
4	Check the "Compile and Test Everything" option button and Click "OK".
5	Close the "Output for Consistency Testing" dialog box.

Result



2.5 Starting S7-PLCSIM

2.5.1 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.

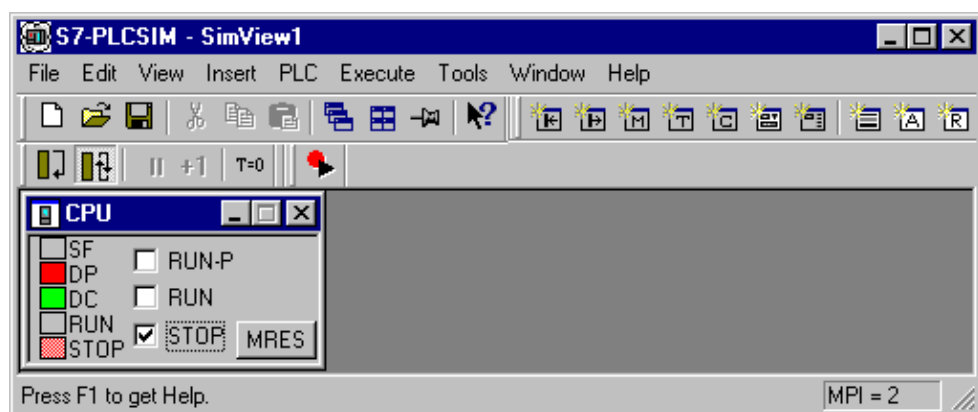
Requirements

- 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 menu command Options > Simulate Modules . The "S7-PLCSIM" dialog box opens.
3	Make sure that the CPU is in "STOP".
4	Using the task bar, go back to NetPro.

Result



2.6 Loading the Target System

2.6.1 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.

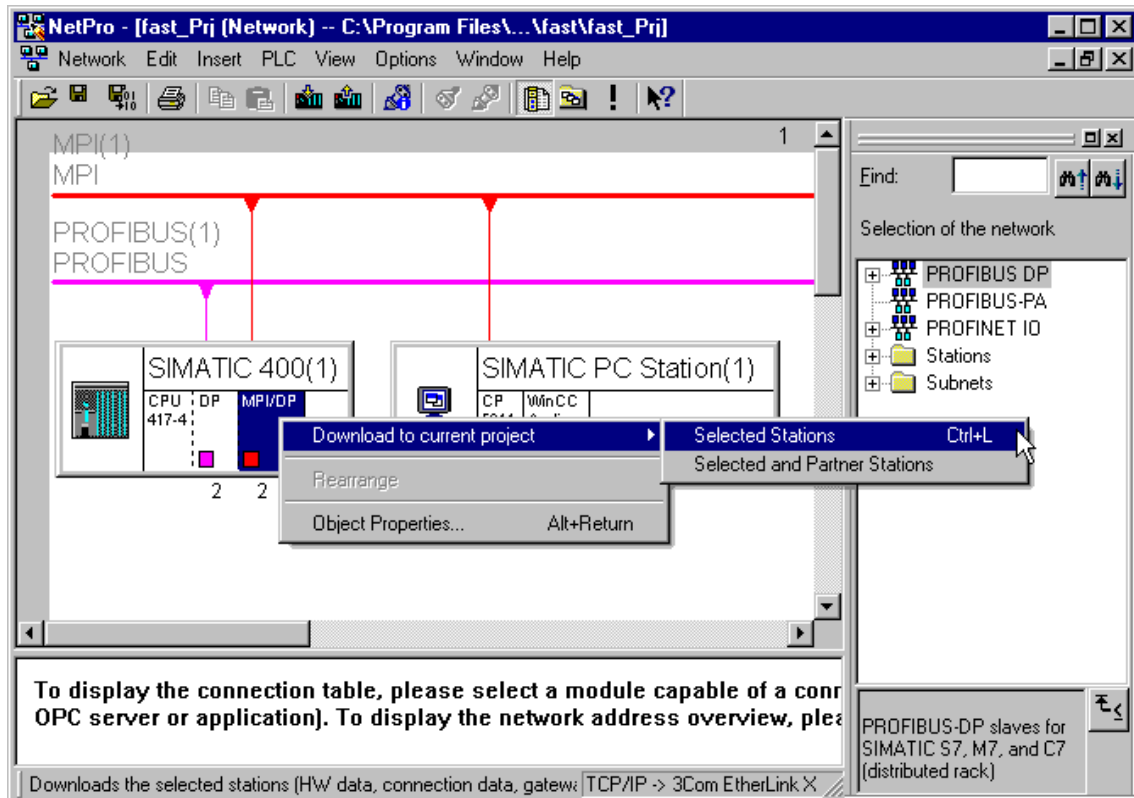
Requirements

- 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	Open the shortcut menu for the "MPI/DP" interface in the network view window of NetPro in the SIMATIC 400(1) entry and select the menu command Load to Current Project > Selected Stations .
2	Click the "Yes" button in the warning dialog box that appears.
3	Select the menu command Network > Exit to exit NetPro.

Result



3 Designing the Process Tags and Sequence Control

3.1 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 have already been prepared and archived as a Zip file. To reduce the time required, retrieve the prepared CFC charts, which were archived as a zip file, in the SIMATIC Manager and copy them into the "Charts" folder in the master data library within the S7 program.

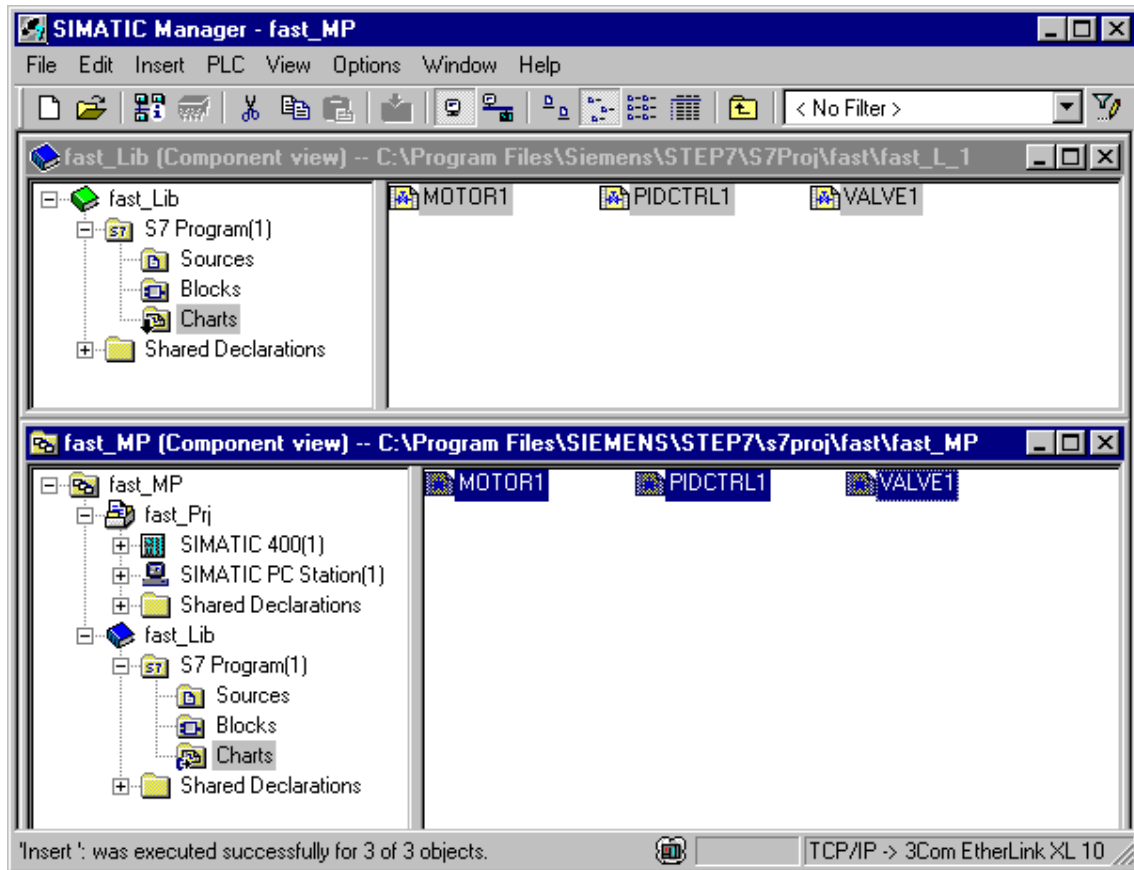
Requirements

- 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 menu command File > Retrieve to open the library archived as a zip file. - In the "Retrieve - Select Archive" dialog box select the "Sim_lib.zip" archive file and click the "Open" button. The "Select Destination Directory" dialog box opens. - Click on the plus sign of the order in which you have stored your project (S7Proj). Select the "fast" project folder. Click "OK". The "Retrieve from Archive - Directory Exists" dialog box opens. - Click "Rename". The "Retrieve from Archive" dialog box opens. - Click "OK". The "Retrieve" dialog box opens again with another text. - Click "Yes". The "Retrieve" dialog box opens again with another text. - Click "Yes". The "fast_Lib (Component view)" dialog box opens.
2	In SIMATIC Manager, select menu command Window > Arrange > Horizontally .
3	- In "S7-Program(1)", select the "Charts" folder in the master data library of the "fast_Lib" multiproject. - In the left window of the "fast_Lib" library, select the "Charts" folder in the "S7-Program(1)" folder. - Keeping <Ctrl> pressed, select the MOTOR1, PIDCTRL1 and VALVE1 CFC charts in the right window. - Use Drag&Drop to copy the selected CFC charts to the "Charts" folder in the "fast_Lib" master data library in the S7 program. The CFC charts are now stored in the master data library within your multiproject.
4	Close the "fast_Lib" window.

Result



3.2 How to Copy the CFC Charts into the Project

Introduction

You can now copy the adapted and renamed CFC charts from the "fast_Lib" master data library into the "fast_Prj" project in the "Function(1)" directory of the plant. When you have completed copying you can continue with configuration in SIMATIC Manager in the Process Object view.

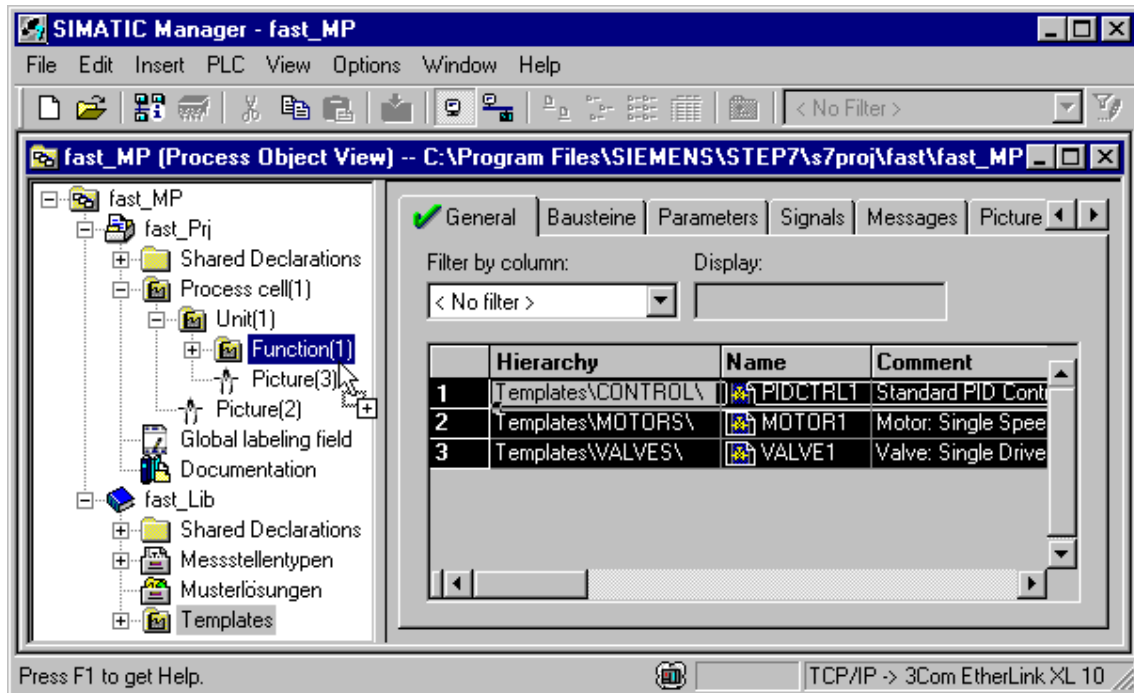
Requirement

- The templates MOTOR1, VALVE1 and PIDCTRL1 are contained in the master data library 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 hierarchical folders.
2	Click the "Templates" folder in the "fast_Lib" folder in the left window. The three adapted and renamed MOTOR1, VALVE1 and PIDCTRL1 CFC charts are displayed in the right window.
3	Keep pressing <Ctrl> and click each line of the first column in succession to select all three charts.
4	Copy the selected CLC charts by dragging them to the "Function(1)" folder in the "fast_Prj" folder.

Result



3.3 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

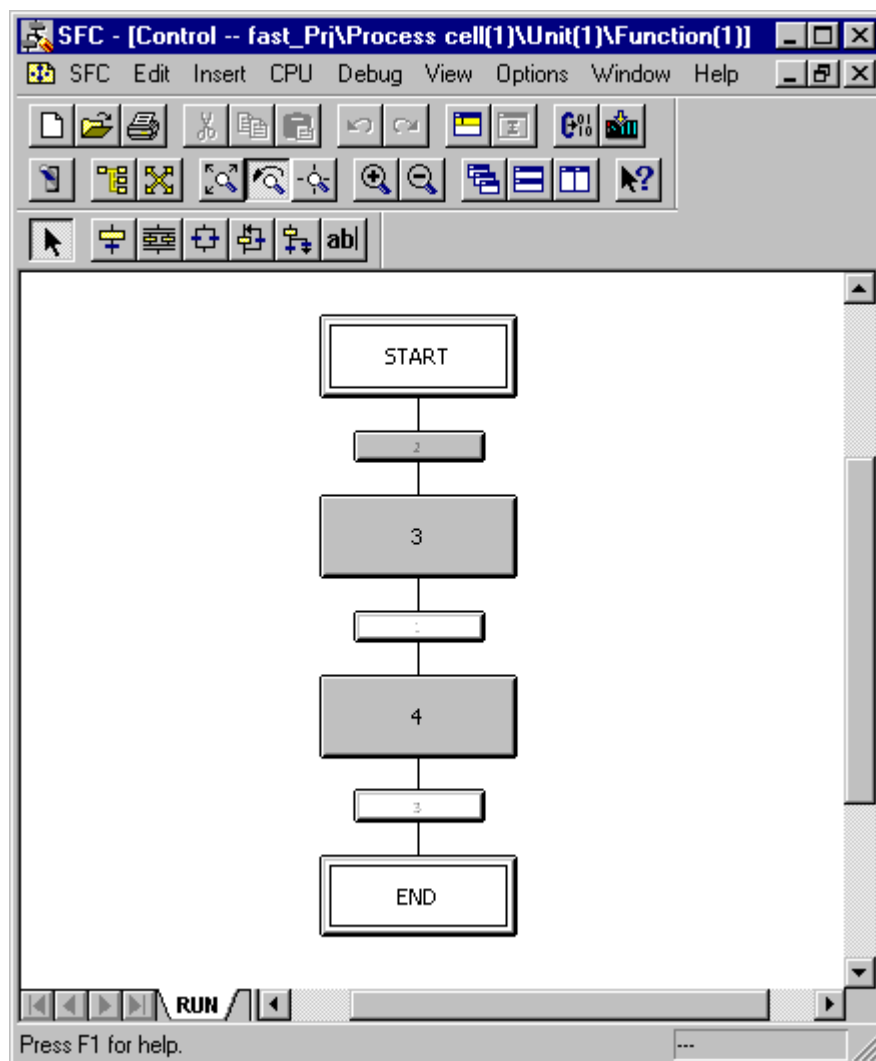
- The PCS 7 Wizard "New Project" has been executed.
- The SIMATIC Manager is open and the "fast_MP" project is displayed in the Process Object view with all the opened hierarchy folders.

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	• In the SFC select the menu command Insert > Step+Transition. • Move the cursor in the SFC chart below the "START" step until the green line appears and then press the left mouse button. • Then select the menu command 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 "Browse". • 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. - Under "Minimum" in the "Run time" area, enter: 10s, without a space between 10 and s. - 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 the menu command SFC > Exit.

Result



3.4 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.

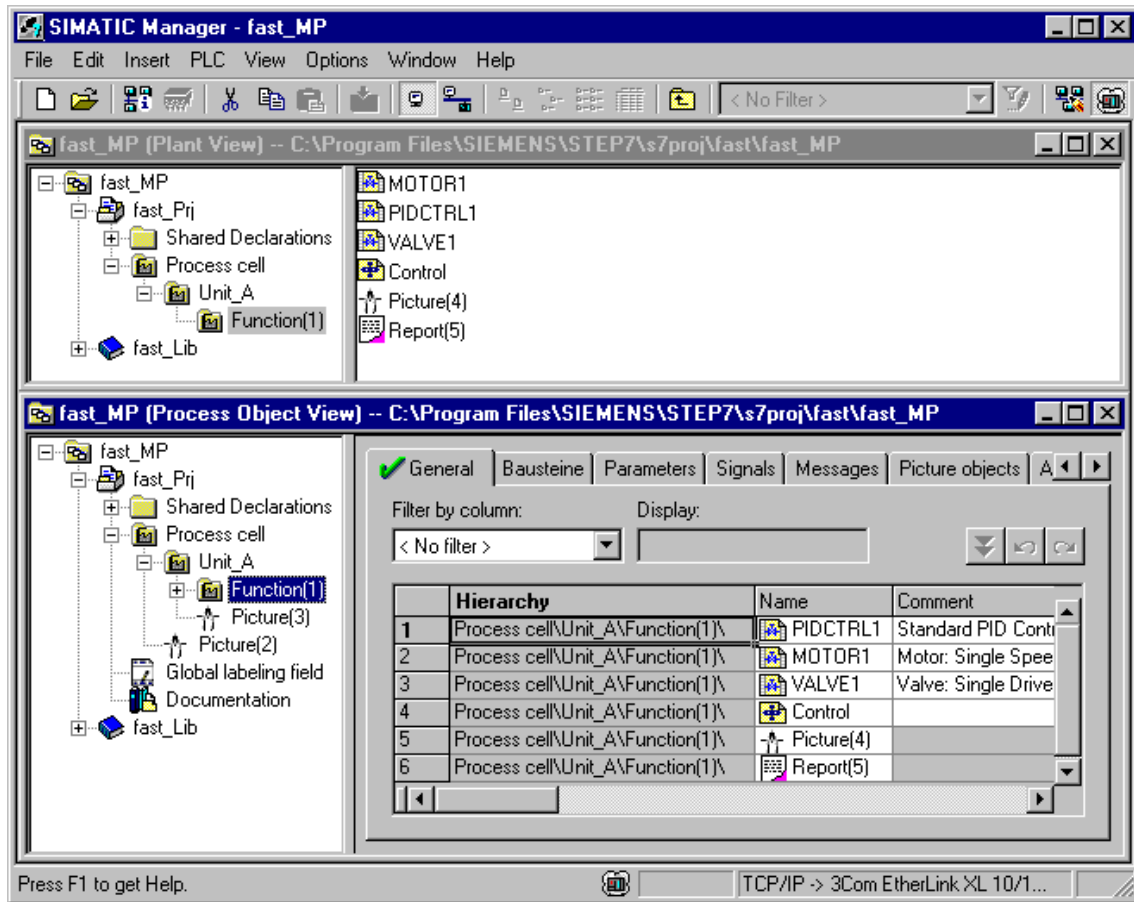
Note

The various views in the SIMATIC Manager are set by using the menu command **View > e.g. Plant View**.

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 window and select the menu command Delete . The "Delete" dialog box opens.
7	Click "Yes".

Result



4 Preparing the Plant Display for Automatic Generation

4.1 How to Prepare the Plant Display for Automatic Generation

Introduction

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

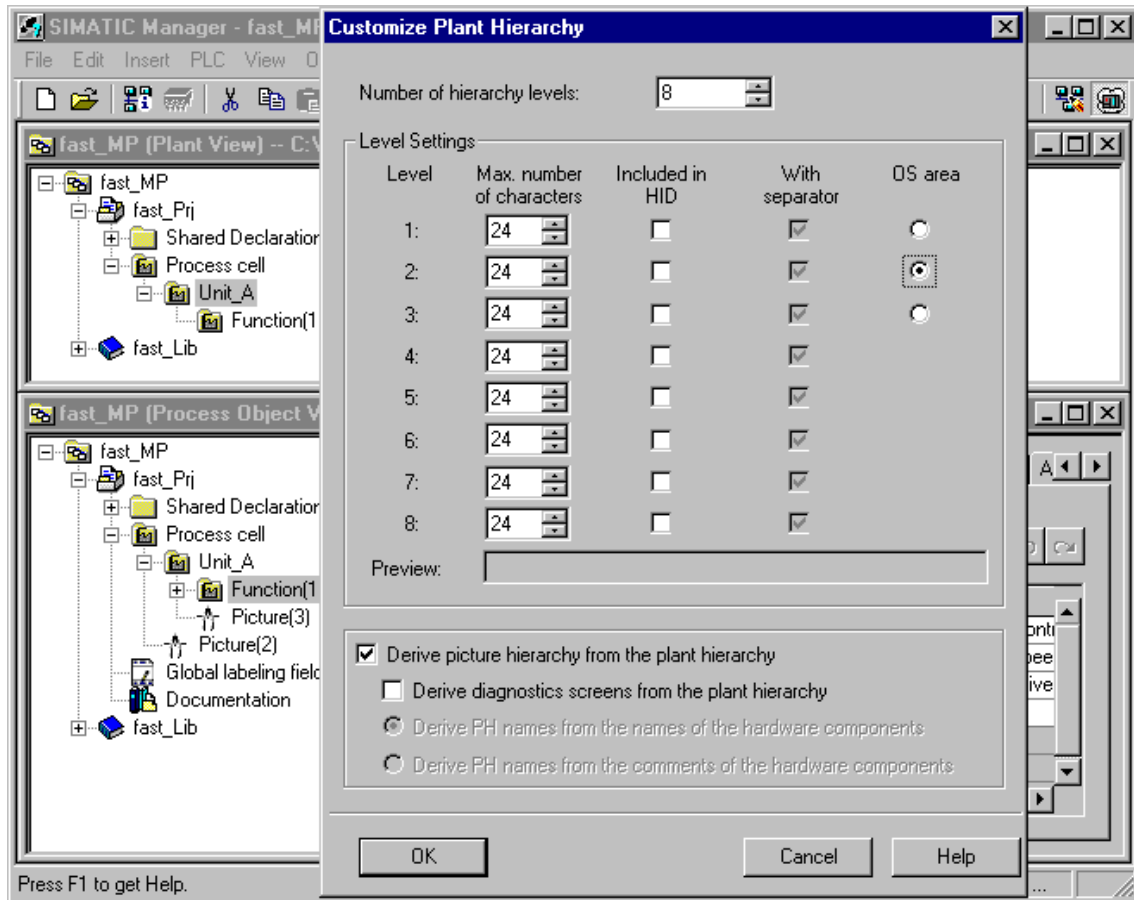
Requirements

- 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



5 Creating Unit_B by Copying Unit_A

5.1 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".

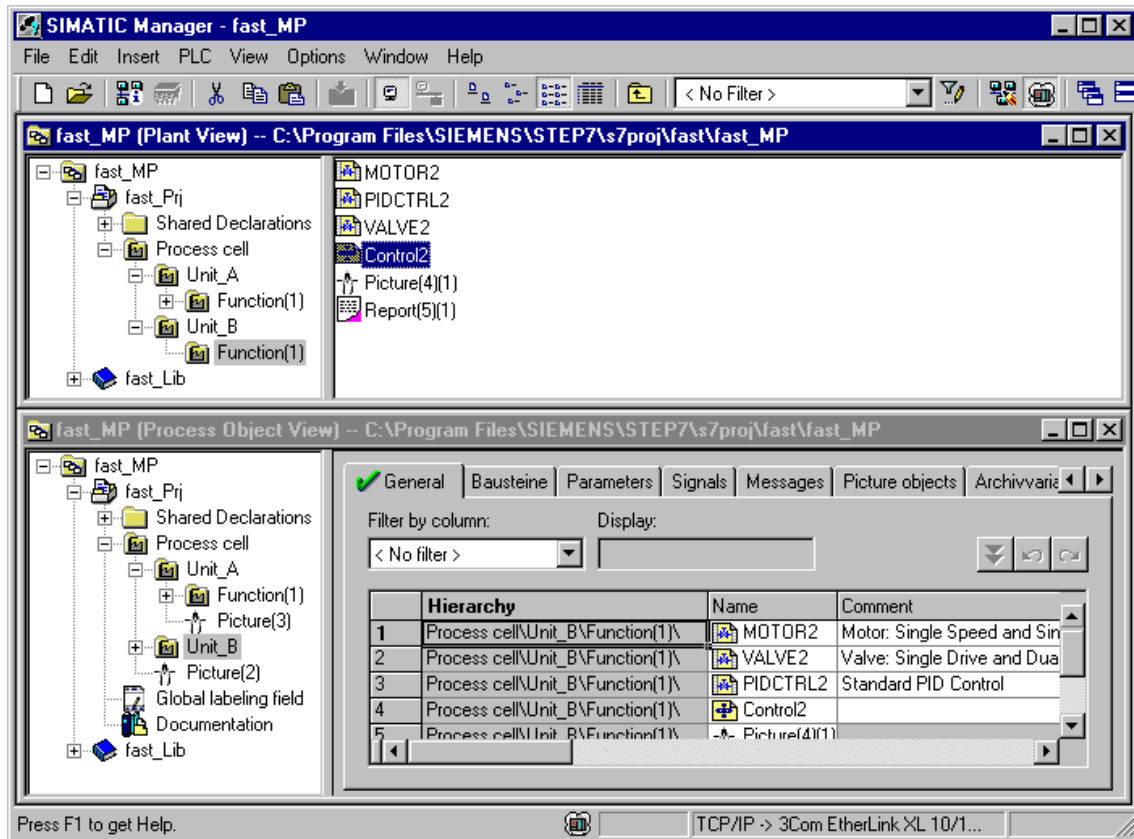
Requirement

- 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 window of the Plant view and select the menu command Copy .
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



6 Configuring and Interconnecting Process Tags

6.1 How to Configure and Interconnect 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.

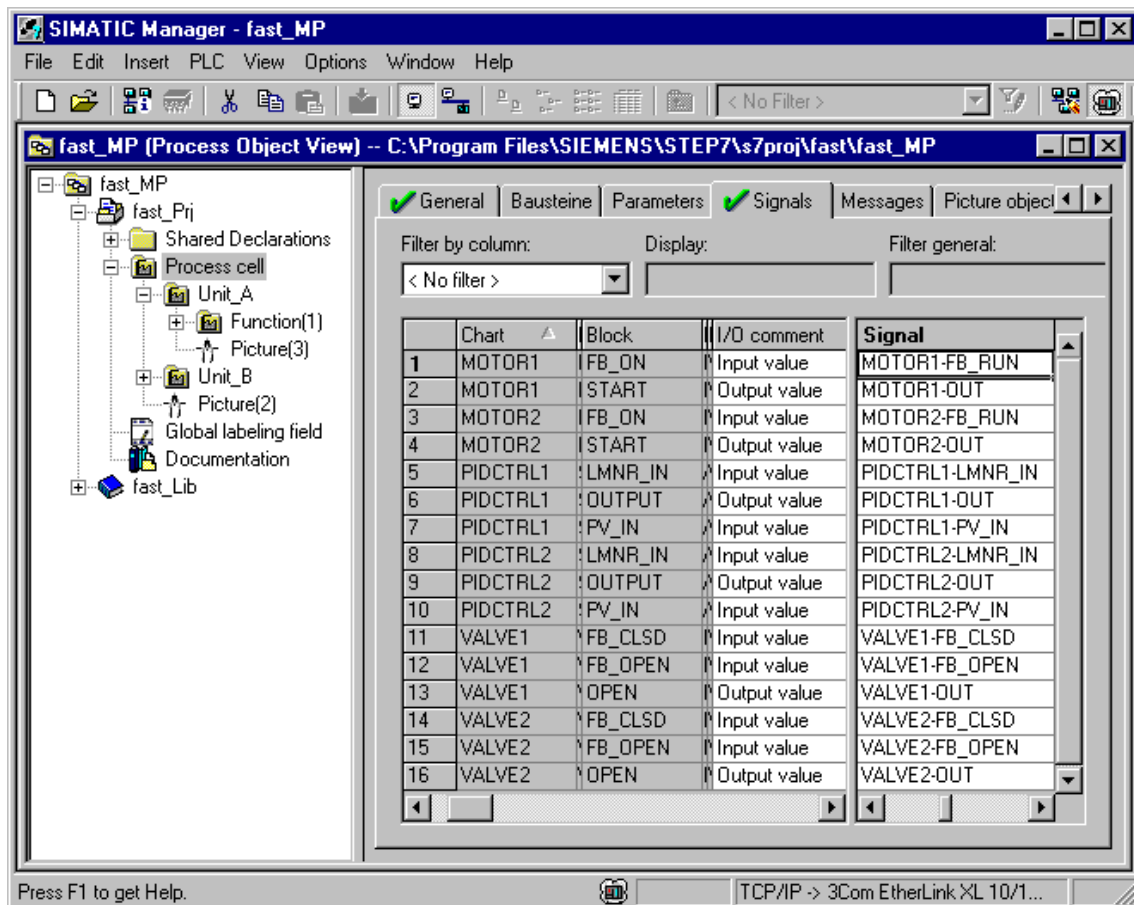
Procedure

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. • Then scroll the scroll bar of the left bottom scroll bar until the left window displays the "Chart", "Block" and "I/O comment" columns. Use the split-symbol cursor on the column margins and headers to hide or reduce the columns. • Thereafter, move the bar of the right bottom scroll bar until the "Signal" column is displayed. • Click the "Chart" header to sort the column in ascending order.
4	• In the "Signal" column open the shortcut menu of the "Motor1" chart and the "FB_ON" block and select the menu command Insert signal. • In the "Insert Signal" dialog box open the shortcut menu for 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.

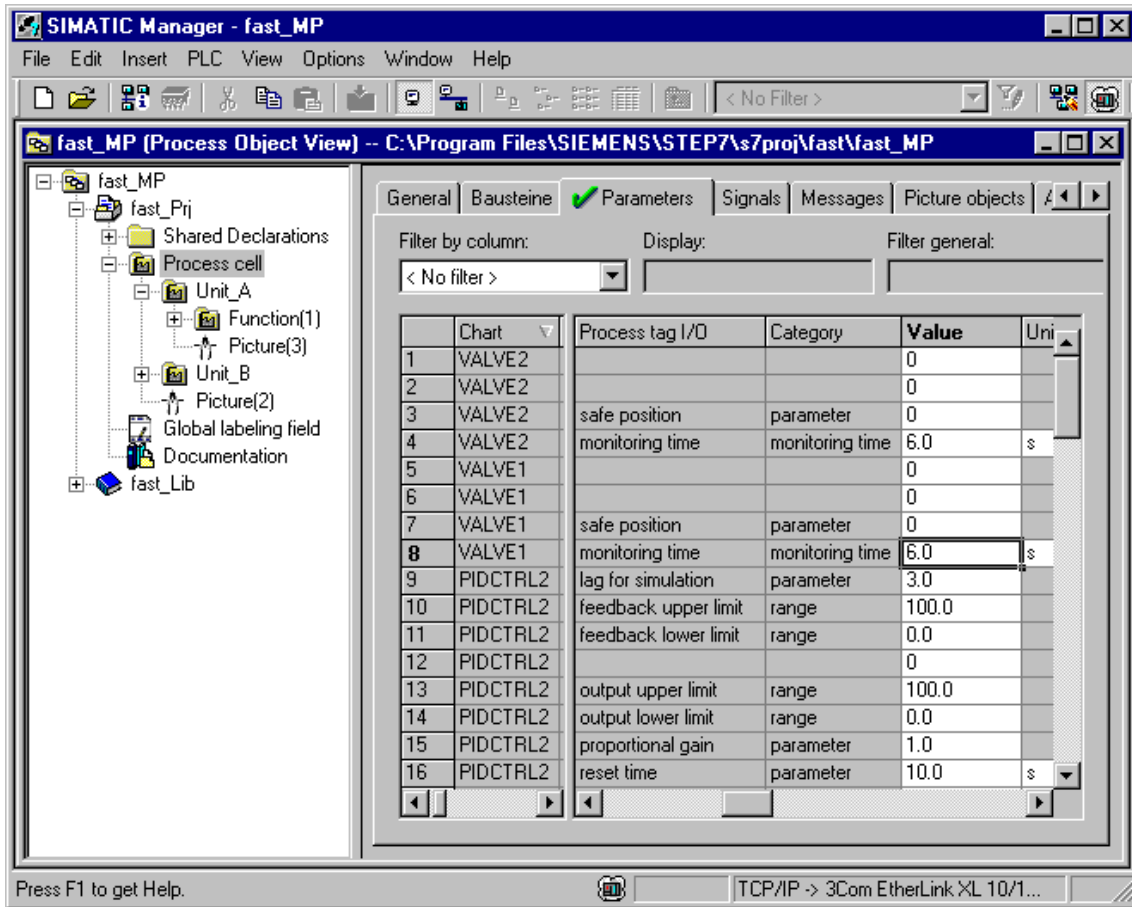
Step	Action
5	- In the "Insert signal" dialog box in the left window click the "Outputs" folder. - Select the "MOTOR1-OUT" signal in the right window and click "Apply".
6	Insert all other signals as described in step 5. Note that, depending on the signal, you have to change between the "Inputs" and "Outputs" 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.



7 **Compiling and Downloading**

7.1 **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.

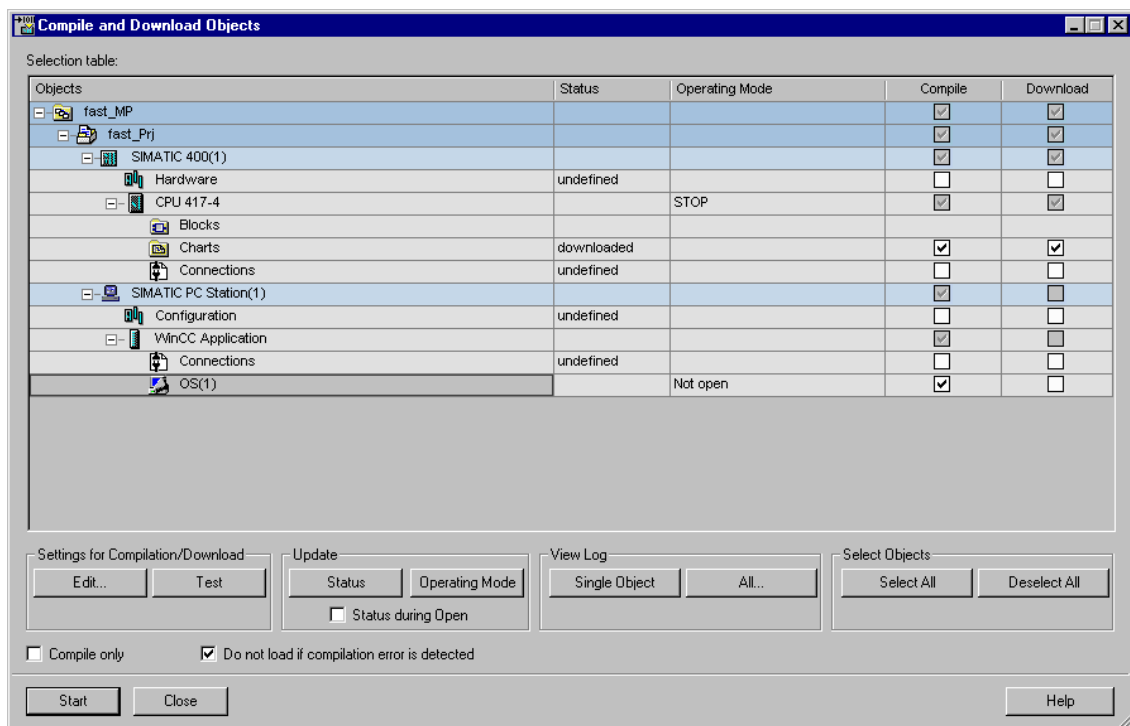
Procedure

Step	Action
1	• In the left window open the shortcut menu for the top level folder "fast_MP" and select the menu command Target System > Compile and Download Objects. • 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 the "Edit" button in the "Settings for Compilation/Download" group. The "Compile Program/Download Target System" dialog box opens.
2	• Check the "Complete Program" option in the "Scope" option group. • Click "OK". The "Download Archive System" dialog box opens. • Click "OK". Both dialog boxes are closed.

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. Check the "Complete OS" button and the "With Reboot" check box in the "Scope" group. - Then click "Apply". The dialog box is closed.
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 process starts. When it is complete, the log file is opened. - 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:

```

Compile and Download Objects - Notepad
File Edit Format View Help

Date: 08/29/2006 time: 05:15:10 PM
Compile:
fast_Prj\SIMATIC 400(1)\CPU 417-4\S7 Program(1)\Charts
-> Object compilation was executed (with warnings)

Refer to the log for the single objects for more information.

Date: 08/29/2006 time: 05:19:23 PM
Compile:
fast_Prj\SIMATIC PC Station(1)\winCC Application\OS(1)
-> Object was compiled without errors

Date: 08/29/2006 time: 05:21:03 PM
Download:
fast_Prj\SIMATIC 400(1)\CPU 417-4\S7 Program(1)\Charts
-> Object download was executed (with warnings)

Refer to the log for the single objects for more information.

```

Update blocks

If the compiling of the CFC charts is not successfully completed in higher versions of PCS 7, this may be mean that the blocks need to be updated. In this case, proceed as follows:

Step	Action
1	Select the menu command File > Open in the SIMATIC Manager. The "Open Project" dialog box opens.
2	Open the "Libraries" tab in the line of the current PCS 7 library and click "OK". The library opens with 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 menu command Options > Charts > Update Block Types... The "Open Project" dialog box opens.
5	Select the line "fast_Prj" and click "OK".
6	Click "Next".
7	Follow the instructions of the wizard.
8	Repeat the "Compile and Download Objects" process. (Step 4 of the top table)

7.2 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.

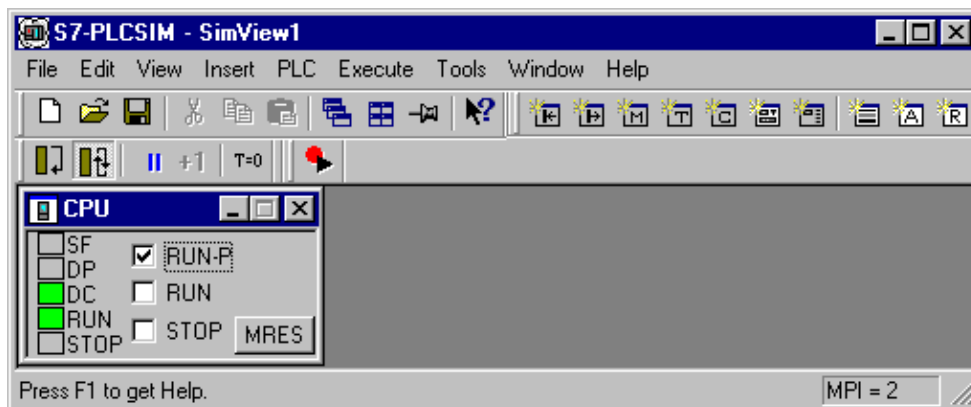
Requirements

- 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.

Result



8 Operating and Monitoring the Process

8.1 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

The automatically generated displays - Display (3) from Unit_A and Display (3)(1) from Unit_B - can be modified or removed as required.

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.

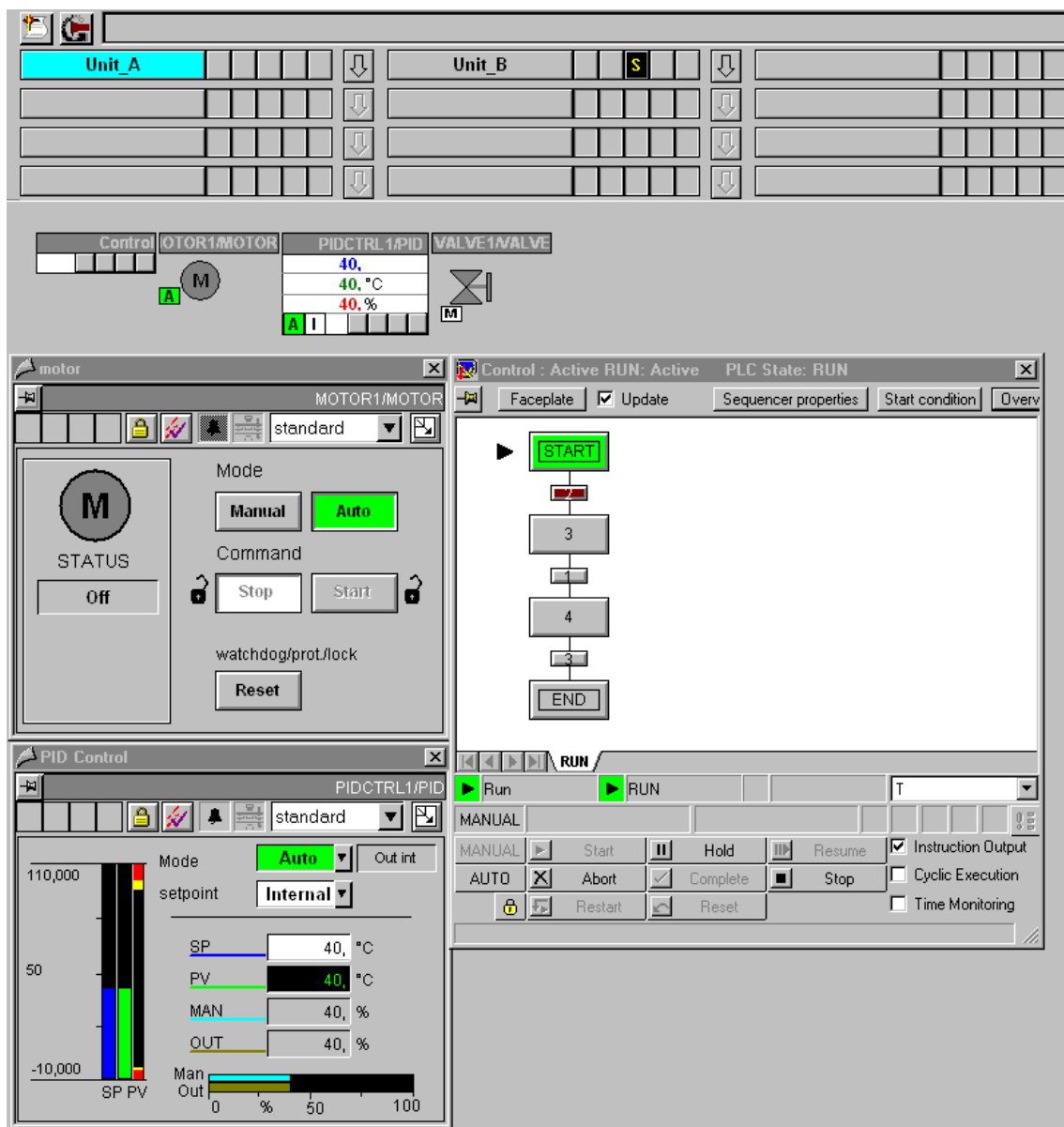
Procedure

Step	Action
1	Open the Tree view of the SIMATIC PC-Station in the left window of the SIMATIC Manager.
2	Open the shortcut menu of the "OS(1)" file with the right mouse button and select the menu command Open object .
3	Select the menu command 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: If you press Enter, there is no need to click "Execute". - Click "Start" and then "Execute" in the dialog box that is displayed. The motor starts. "On" is to be seen in the faceplate on the left side beneath "Status".
6	Also have the faceplates of the controller and valve displayed in the working area and try out their operation.
7	- Click "STOP" in the "MOTOR1" faceplate and then "Execute" in the dialog box that is displayed to stop the motor. - Click "Auto" and then "Execute" in the dialog box that is displayed to put the "MOTOR1" faceplate in the "Automatic" mode.
8	- Click the "PIDCTRL1/PID" symbol in order to display this faceplate in the working area. - Set the operating mode to "Auto". - Click in the edit box next to "SP" in order to enter the setpoint value 40.
9	- Change to Button Set 2 by using the "Button Set Change" button at the bottom left in the user interface. - Click the "SFC Visualization" button in the Button Set 2. - Select the "Control" entry in the "Open SFC" dialog box in the right window in the "SFC name" column and click "OK". The window of the SFC overview is displayed in the working area. - Click in the window of the SFC overview. The Details view opens. - Click "Start" in the Details window and acknowledge the dialog box that appears by clicking "OK". If the process value of the controller does not exceed 50, the sequential control system stops at the first transition and is no longer executed. - Click the window of the controller block "PIDCTRL1/PID" already displayed. - Click the edit box next to "SP" and enter "90" as the setpoint. Monitor the Details window of the SFC. The sequential control system is executed completely. MOTOR1 is started in the flow chart in Step 3 and stopped again in Step 4.

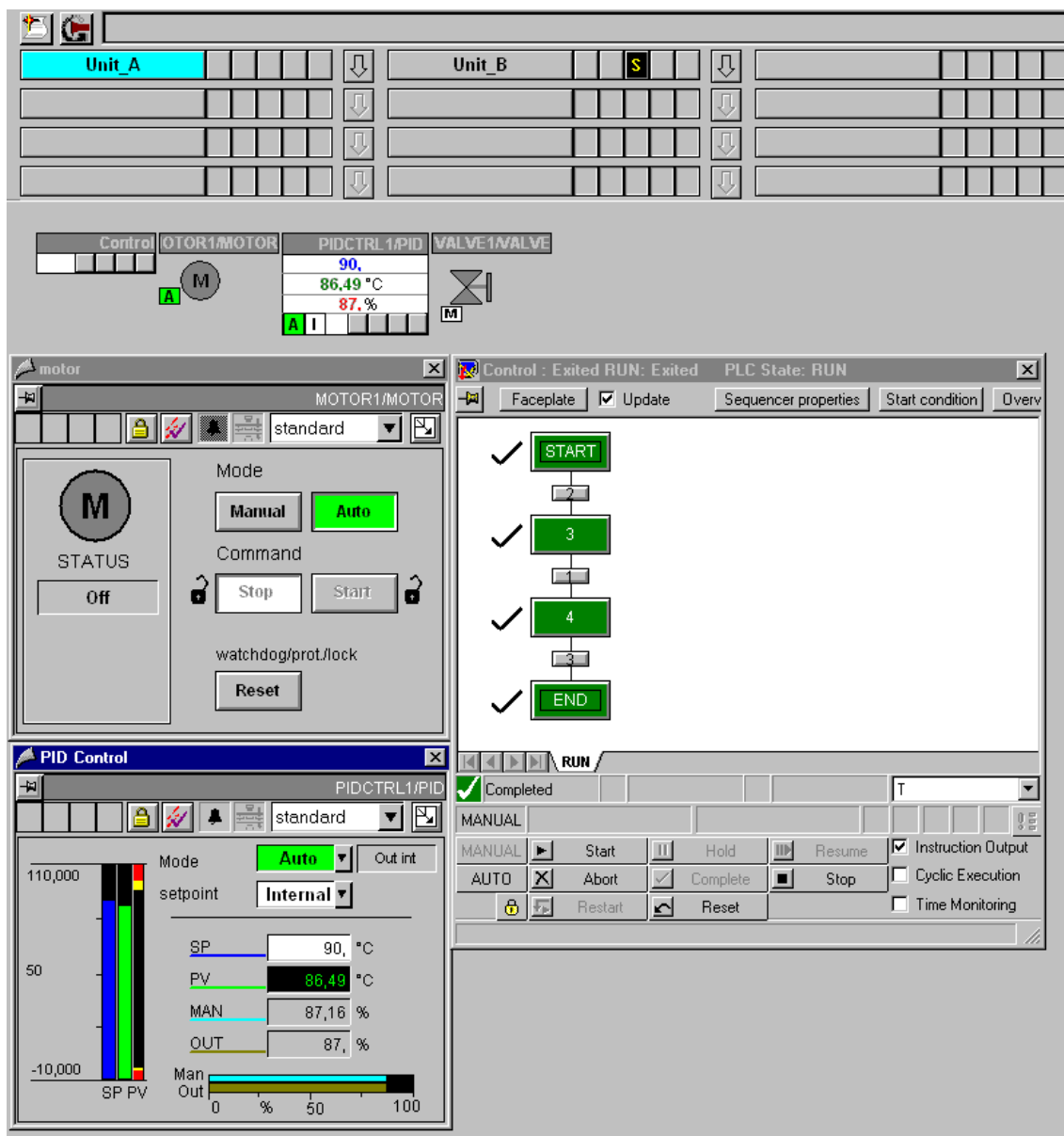
Step	Action
10	- Click "Change button set" to change to button set 1. - Click "Message system". New messages are displayed in the working area. - Click "Operating message list". The operating message list is displayed in the working area. All the operator actions you have carried out in the faceplates are listed here.

Result

Working area with all operating elements (step 6):



Execution of the sequential control system (step 5):



Operations list (step 10):

Unit_A						Unit_B					
operation list											
...	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						

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