SIEMENS

SIMATIC

Process Control System PCS 7 First Steps (V9.0 with APL)

Getting Started

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Valid for PCS 7 as of V9.0

12/2017
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Legal information

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⚠ CAUTION

indicates that minor personal injury can result if proper precautions are not taken.

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Security information

1

Siemens provides products and solutions with industrial security functions that support the secure operation of plants, systems, machines, and networks.

In order to protect plants, systems, machines and networks against cyber threats, it is necessary to implement – and continuously maintain – a holistic, state-of-the-art industrial security concept. Siemens' products and solutions constitute one element of such a concept.

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Siemens' products and solutions undergo continuous development to make them more secure. Siemens strongly recommends that product updates are applied as soon as they are available and that the latest product versions are used. Use of product versions that are no longer supported, and failure to apply the latest updates may increase customer's exposure to cyber threats.

To stay informed about product updates, subscribe to the Siemens Industrial Security RSS Feed under
https://www.siemens.com/industrialsecurity.

Preface

2

About this document

The *Getting Started - First Steps* documentation uses a straightforward sample project to illustrate the basic principles of the SIMATIC PCS 7 software components and how they interact during engineering and in a process mode context. This document serves as an introduction and does not contain detailed or background information. If the information in this document has increased your interest in SIMATIC PCS 7, we recommend you to read the *Process Control System PCS 7, Getting Started Part 1*.

Conventions

Note

The names of elements in the software 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. This will differ from the designations used in the documentation.

In PCS 7, you can use standard Windows functions in many situations:

- Multiple selection using the "Ctrl" and "Shift" keys.
- Column sorting in tables by clicking on the column header.
- Use of drag and drop instead of copy and paste.

The individual tutorials in this document are dependent on each other. Therefore, you will create a complete step-by-step PCS 7 project by working through all the modules in the specified sequence.

If you are using the Windows 10 operating system, you can find the Siemens SIMATIC programs in the "Start" menu under **All apps > Siemens Automation**.

Purpose of this documentation

This document guides you through the basics of SIMATIC PCS 7. You will get to know many elementary configuration steps and in the process, you will develop an understanding on how SIMATIC PCS 7 functions.

Prerequisites

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 (additional information is available in the manuals *Process Control System PCS 7 ; PCS 7 PC configuration* and *Process Control System PCS 7; Released Modules*).
- Installation of the SIMATIC PCS 7 engineering station (*Process Control System; SIMATIC PCS 7* DVDs).
- License keys.
- S7-PLCSIM for simulating a SIMATIC S7-400 automation system.

Options for accessing PCS 7 documentation

The documentation required for PCS 7 includes the following types:

- **PCS 7 Readme**
  The readme file is available in two versions:
  - **PCS 7 Readme (offline)**
    This version is installed by PCS 7 Setup. The file only contains general information and links to documents on the Internet.
  - **PCS 7 Readme (online)**
    This version contains all information on the installation and use of PCS 7 in the format which is already familiar to you. The file is only available on the Internet to keep it always up-to-date

    Note

    The information provided in the *PCS 7 Readme* (online) on the Internet takes precedence over **all** other *PCS 7* documentation.

    Read this *PCS 7 Readme* carefully, because it contains important information and amendments on *PCS 7* .

- **PCS 7 System Documentation**
  System documentation contains information that covers several products, such as configuration manuals and Getting Started manuals. This documentation serves as a guideline for the overall system and explains the interaction between the individual hardware and software components.
  Note the information on "PCS 7 Documentation Portal Setup" in the product overview *Process Control System PCS 7; PCS 7 - Documentation*; Section "Options for accessing the documentation"
- **PCS 7 Product Documentation**
  Product documentation contains information about special hardware and software components. The individual documents provide detailed information on the specific component.

Full versions of the documentation are available from the "Technical Documentation SIMATIC PCS 7" website: www.siemens.com/pcs7-documentation (www.siemens.com/pcs7-documentation)

Elements of this documentation

The document is available in.chm and .pdf formats. We recommend using the printed PDF for configuration on the PC.

The online help and the printable manual can be found in the Start menu under the SIEMENS SIMATIC documentation after the successful installation of SIMATIC PCS 7.

Creating the PCS 7 project

3

3.1 Creating the PCS7 project

Introduction

The **PCS 7 'New Project' Wizard** lets you create a new PCS 7 multiproject with a few mouse clicks.

Prerequisites

- PCS 7 V8.0 or higher and the associated license keys are installed.
- S7-PLCSIM V5.4 or higher is installed.

Procedure

Step	Action
1	Under SIEMENS SIMATIC products, select **SIMATIC Manager** in the Start menu or double-click the following icon on the desktop: SIMATIC Manager opens.
2	If projects are still open in SIMATIC Manager, select "File > Close" until all projects are closed.
3	Select **File > 'New Project' Wizard** The program starts the PCS 7 'New Project' Wizard.
4	In step 1(4), Click "Next".
5	In step 2(4): 1. Select "AS410-Single (1H)" CPU. 2. Select the "6ES7654-6C*00-3BF* E-Stand:8" bundle. 3. Select "0" from the "Number of communication modules" drop-down list. 4. Click "Next".
6	In step 3(4): 1. Select "3" in the "Number of levels" field in the "Plant hierarchy" group. 2. Select the "CFC chart" and "SFC chart" check boxes in the "AS objects" group. 3. Select the "PCS 7 OS" check box in the "OS objects" group, and the "Single station system" button. 4. Click "Next".
7	In step 4(4): 1. Enter "fast" in the "Directory name" input box. 2. Select a different storage location for the project if necessary. 3. Click "Finish".

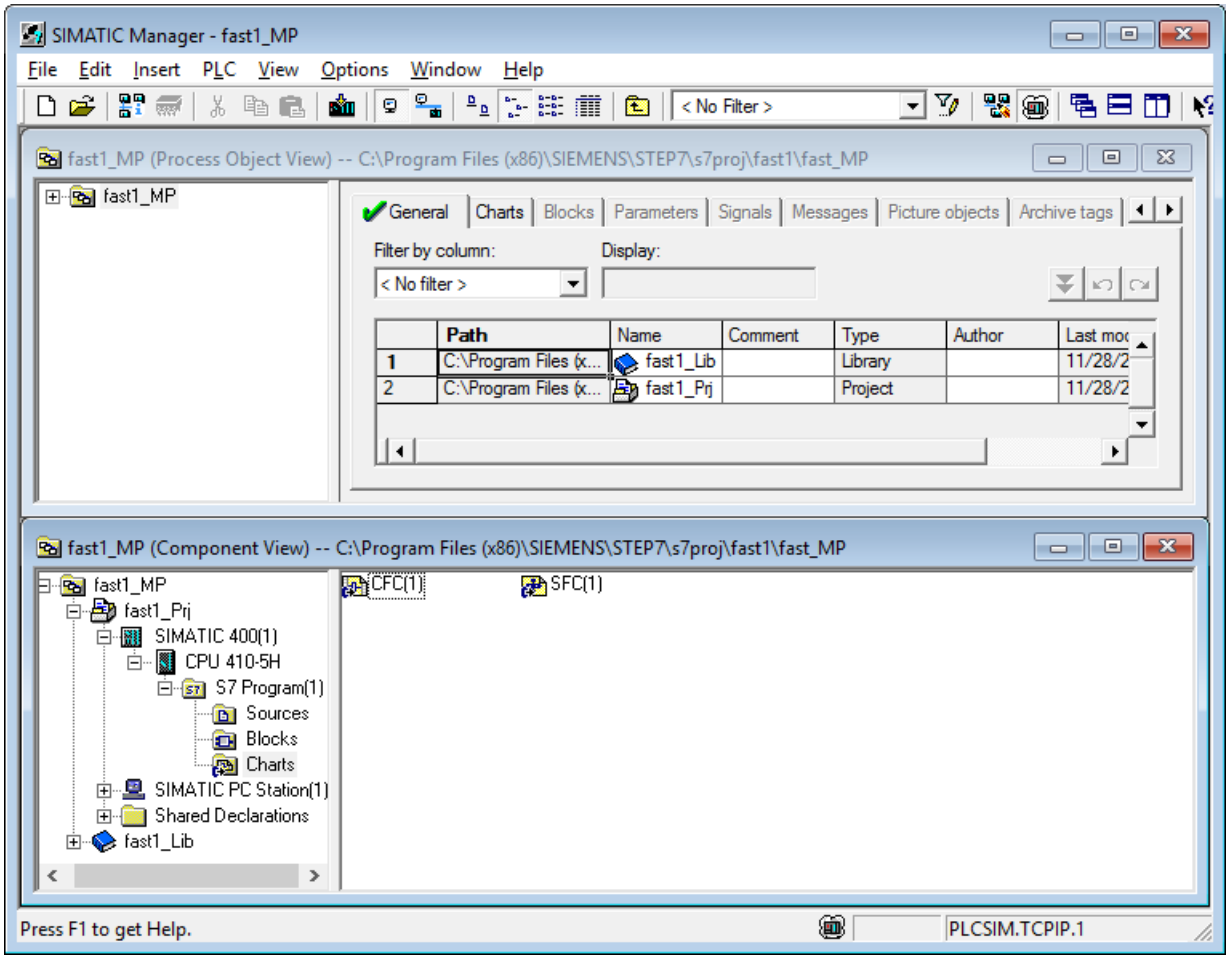
Step	Action
8	On completion, the wizard is closed automatically and the Plant View and Component view are displayed in SIMATIC Manager. Close the Plant View and select **View > Process Object View**.
9	Select **Window > Arrange > Horizontally**. The Process object View and Component view windows are arranged one below the other.

Note

By selecting the "Options > Customize" in SIMATIC Manager, you can select the view to be displayed when you open a project from the "Default project view" entry in the "View" tab of the "Settings" dialog box.

Result

You have successfully created the **fast_MP** multiproject that includes a SIMATIC 400 station, a SIMATIC PC station and the "fast_Lib" master data library in SIMATIC Manager. The new multiproject is displayed in the Process Object View and in the Component view of the SIMATIC Manager.



Configuring the hardware and the networks

4

4.1 Configuring the hardware

Introduction

Perform the following configuration steps in HW Config:

- Create a communication interface.
- Add hardware modules from the hardware catalog for the automation system.

Prerequisite

- You have created the **fast_MP** PCS 7 multiproject.

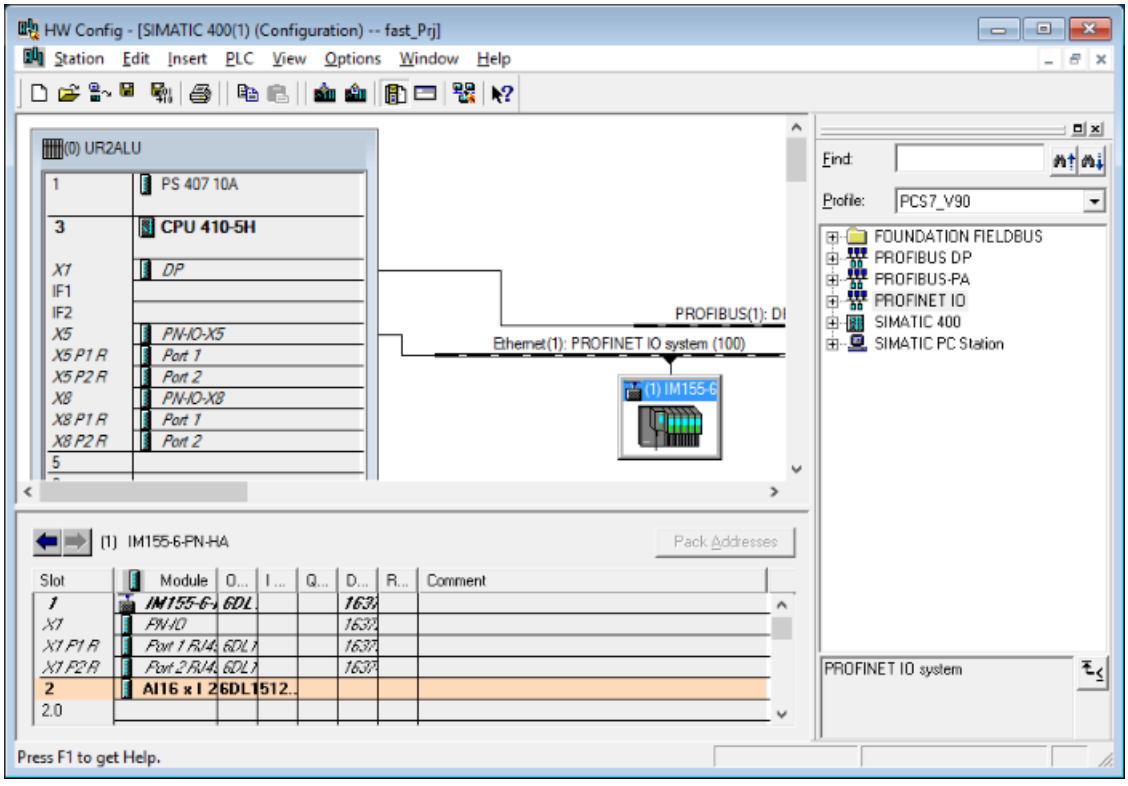
Procedure

Step	Action
1	Select the SIMATIC 400 station in the Component view, and select **Edit > Open Object**. HW Config opens.
2	Within the "UR2ALU" box, scroll down below CPU 410-5H and right click on the "X5" Connector PN-IO. Select "Object Properties". The "Properties - PN-IO (R0/S3.5)" dialog box opens.
3	1. Open the "General" tab. 2. Click the "Properties" button in the "Interface" area. The "Properties - Ethernet interface PN-IO (R0/S3.5)" dialog box opens. 3. Change the entry in the "IP address" input field to a free address within the address range of your computer. Note: You can obtain information on the address range of your computer via the command line program "ipconfig". 4. Click the "New" button in the "Subnet" area. The "Properties - New Subnet Industrial Ethernet" dialog box opens. 5. Enter a name, for example: "Plant bus", for the communication channel in the "Name" input field. 6. Click "OK" in the "Properties – New Subnet Industrial Ethernet" dialog box. The dialog box closes. 7. In the "Properties - Ethernet Interface PN-IO (R0/S3.5)" dialog box, the list in the "Subnet" area now shows the "Plant bus" entry. 8. Click "OK". The dialog box closes. 9. Click "OK" in the "Properties – PN-IO (R0/S3.5)" dialog box. The dialog box closes.

Step	Action
4	1. If the hardware catalog is not visible, select **View > Catalog**. 2. Select the current PCS 7 version from the "Profile" drop-down list. 3. In the hardware catalog, open the "PROFINET IO > I/O" folder. 4. Open the "ET 200SP HA " folder and select the "IM 155-6 PN HA" module. Drag and drop the module to the "PROFINET IO system" line. If you cannot see the "PROFINET IO system" line, it may be behind the (0) UR2ALU window. The "IM 155-6 PN HA" module is added to PROFINET IO system line.
5	1. In the hardware catalog, click the + symbol to the left of the "IM 155-6 PN HA" folder. 2. Open the "AI" folder and drag the module "AI16 x I 2-wire HART HA V1.0" (Article Number 6DL1 134-6TH00-0PH1) to the slot 2 at the bottom of the IM 155-6 PN HA configuration table (the article number is displayed in the information box at the bottom of the screen). Close the "AI" folder. 3. Open the "AQ" folder and drag the module "AQ8 x I HART HA V1.0" (Article Number 6DL1 135-6TF00-0PH1) to the slot 3 at the bottom of the IM 155-6 PN HA configuration table. Close the "AQ" folder. 4. Open the "DI" folder and drag the module "DI16 x 24DC HA V1.0" (Article Number 6DL1 131-6BH00-0PH1) to the slot 4 at the bottom of the IM 155-6 PN HA configuration table. Close the "DI" folder. 5. Open the "DQ" folder and drag the module "DQ16 x 24VDC/0.5A HA V1.0" (Article Number 6DL1 132-6BH00-0PH1) to the slot 5 at the bottom of the IM 155-6 PN HA configuration table. Close the "DQ" folder.
6	Select **Station > Save** to save all the changes made.

Result

In "HW Config", the IM 155-6 PN HA redundantly-applicable interface module for the ET 200SP HA distributed I/O station is extended with the addition of the analog/digital input/output modules.



4.2 Setting up the PC interface

4.2.1 Setting up the Ethernet interface for the SIMATIC PC station

Introduction

The PCS 7 'New Project' Wizard has created a SIMATIC 400 station, a SIMATIC PC station, and a master data library. In order to use "S7-PLCSIM", you must set up an Ethernet interface for the SIMATIC PC station so that the Operator Station (OS) variables can be compiled and a connection can be established between the Automation System (AS) and OS for PLCSIM.

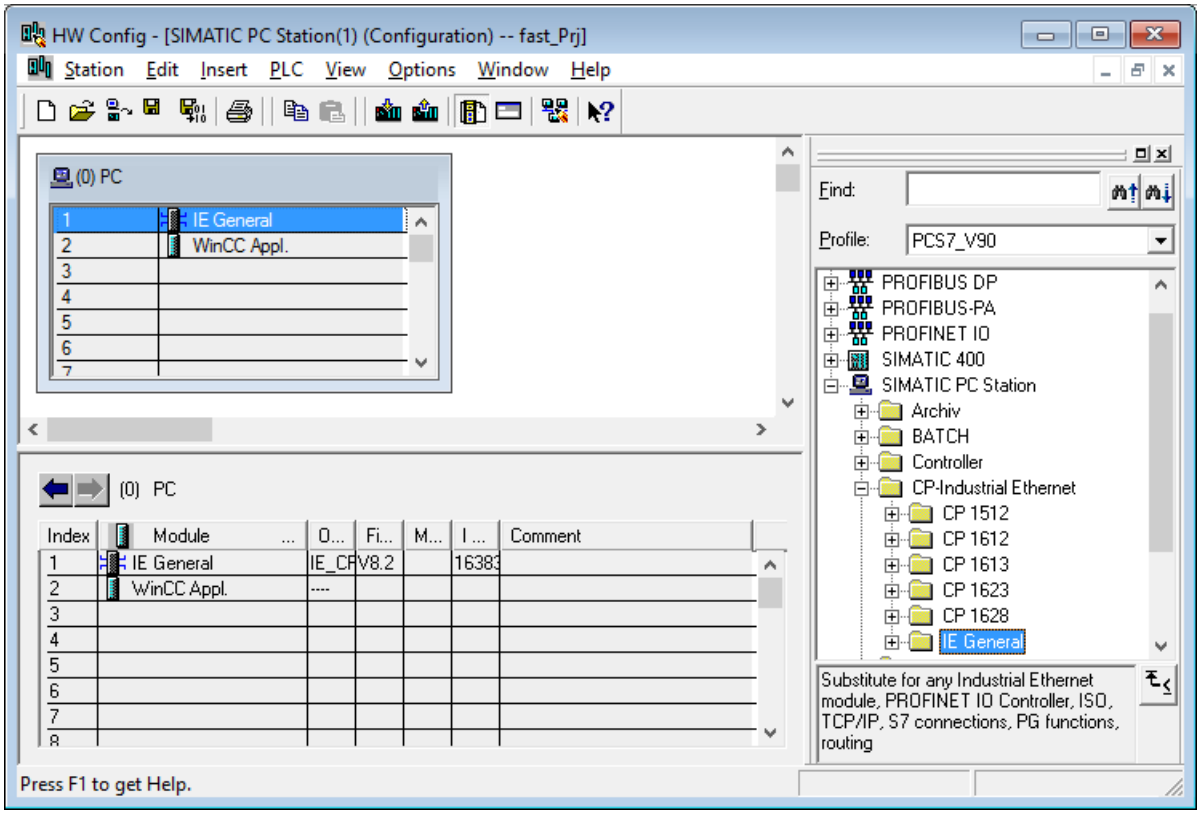
Prerequisites

- The PCS 7 **fast_MP** project has been created using the PCS 7 'New Project' Wizard.
- SIMATIC Manager is open in the Component view.

Procedure

Step	Action
1	In the Component view, select the SIMATIC PC station in the "fast_Prj" folder. Now, click **Edit > Open Object**. "HW Config" opens.
2	1. If the hardware catalog is not visible, select **View > Catalog**. 2. Select the current PCS 7 version from the "Profile" drop-down list. 3. Open the following folder in the hardware catalog: S**IMATIC PC Station > CP Industrial Ethernet > IE General**. 4. Drag & drop the "SW V..." module with the latest version to the slot with index "1". The "Properties – Ethernet Interface IE General (R0/S1)" dialog window opens. 5. Select the "IP protocol is being used" check box. This may already have been ticked. 6. Change the entry in the "IP address" input field to the IP address of your computer. 7. Clear the "Set MAC address/use ISO protocol" check box. This may already be un-checked. 8. Select the "Plant bus" entry in the list in the "Subnet" area. 9. Click "OK". The dialog box closes.
3	Select **Station > Save and Compile**.
4	Select **Station > Exit**.

Result


HW Config - [SIMATIC PC Station(1) (Configuration) -- fast_Prj]
Station Edit Insert PLC View Options Window Help
(0) PC
1 IE General
2 WinCC Appl.
Find:
Profile: PCS7_V90
PROFIBUS DP
PROFIBUS-PA
PROFINET IO
SIMATIC 400
SIMATIC PC Station
Archiv
BATCH
Controller
CP-Industrial Ethernet
CP 1512
CP 1612
CP 1613
CP 1623
CP 1628
IE General
(0) PC
Index Module ... O... Fi... M... I ... Comment
1 IE General IE_CP V8.2 16383
2 WinCC Appl. ----
Substitute for any Industrial Ethernet module, PROFINET IO Controller, ISO, TCP/IP, S7 connections, PG functions, routing
Press F1 to get Help.

4.3 Editing symbols in HW Config

4.3.1 Editing the symbols for the analog input module

Introduction

To allocate names to the addresses of the "AI16 x 12-wire HART HA" analog input module, assign symbolic names and comments for each address in the "Edit symbols" dialog.

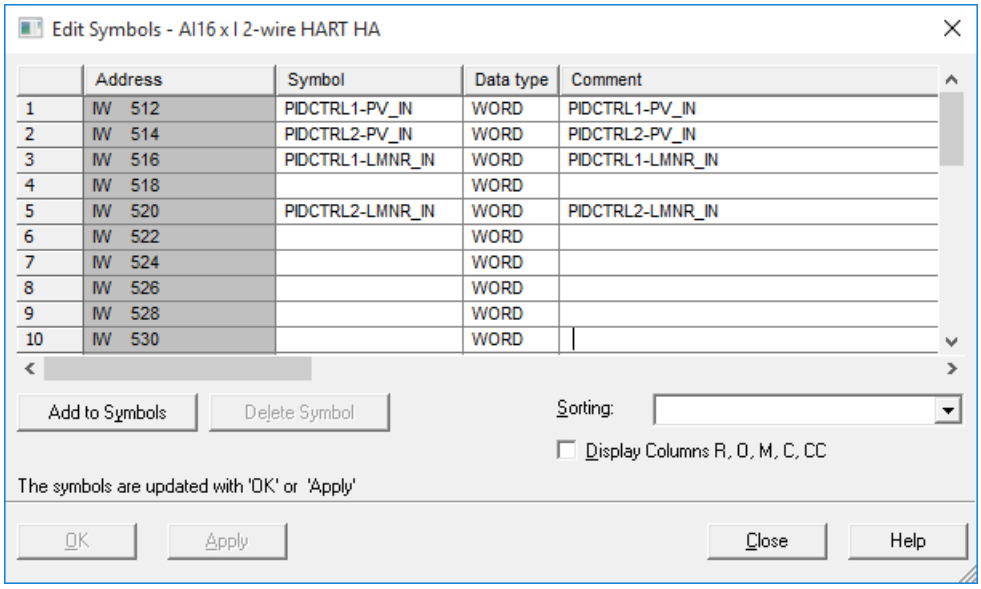
Prerequisites

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

Procedure

Step	Action
1	In the configuration table, right click on the analog input module in slot 2 and select "Edit symbols"
2	In the "Symbol" column, enter "PIDCTRL1-PV_IN" for the first address (IW 512) and use the tab key to move the mouse pointer to the "Data type" column and further to the "Comment" column. In the "Comment" column, re-enter the symbolic name from the "Symbol" 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 manner. • (IW 514): "PIDCTRL2-PV_IN" • (IW 516): "PIDCTRL1-LMNR_IN" • (IW 520): "PIDCTRL2-LMNR_IN"
4	Click "OK". Your settings are applied and the dialog box closes.

Result



4.3.2 Editing the symbols for the analog output module

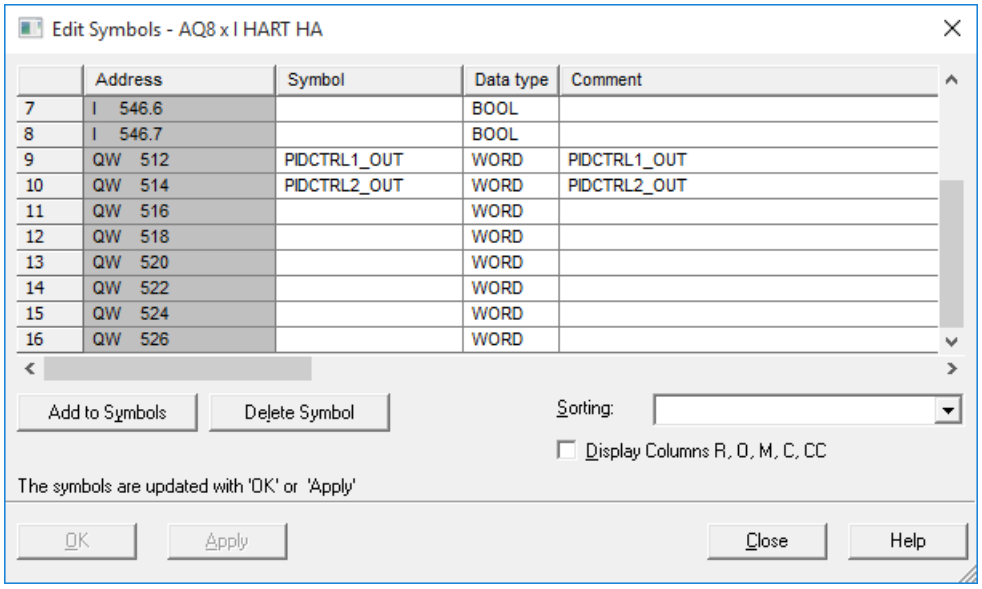
Introduction

To allocate names to the addresses of the "AQ8 x I HART HA" analog output module, assign symbolic names and comments for each address in the "Edit symbols" dialog. The procedure is the same as for the analog input module. Enter the symbolic names and comments as illustrated in the figure below.

Prerequisites

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

Result



4.3.3 Editing the symbols for the digital input module

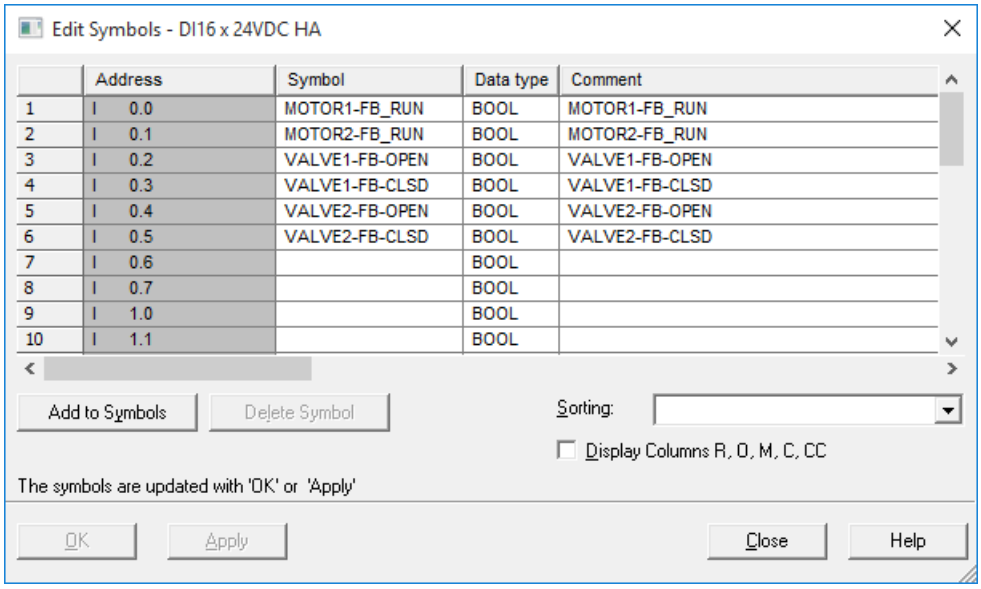
Introduction

To allocate names to the addresses of the "DI16 x 24VDC HA" digital input module, assign symbolic names and comments for each address in the "Edit symbols" dialog. The procedure is the same as for the analog input module. Enter the symbolic names and comments as illustrated in the figure below.

Prerequisites

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

Result



4.3.4 Editing the symbols for the digital output module

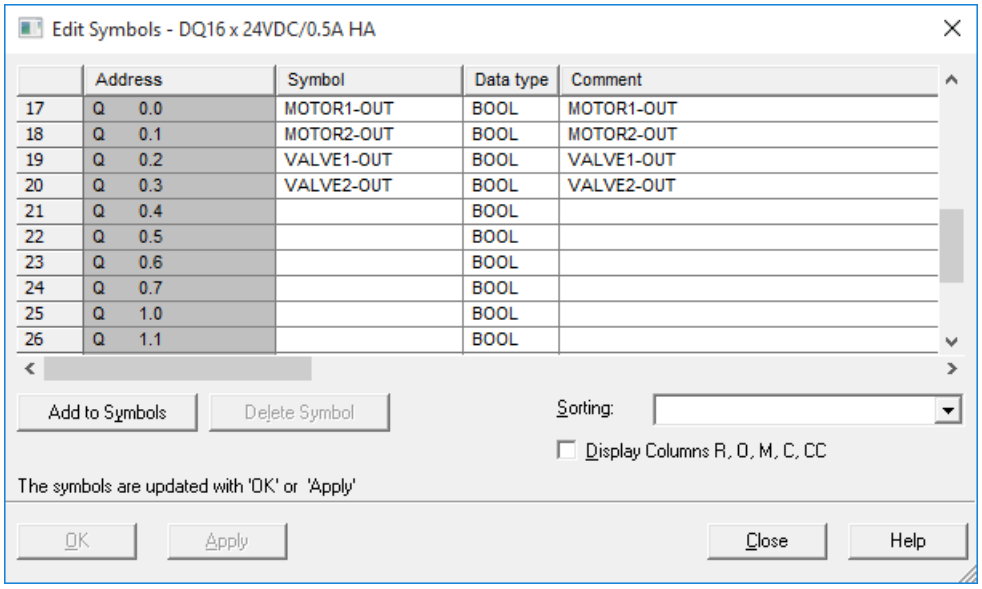
Introduction

To allocate names to the addresses of the "DQ16 x 24VDC/0.5A HA" digital output module, assign symbolic names and comments for each address in the "Edit Symbols" dialog. The procedure is the same as for the analog input module. Enter the symbolic names and comments as illustrated in the figure below.

Prerequisites

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

Result


Edit Symbols - DQ16 x 24VDC/0.5A HA
Address
Symbol
Data type
Comment
17 Q 0.0 MOTOR1-OUT BOOL MOTOR1-OUT
18 Q 0.1 MOTOR2-OUT BOOL MOTOR2-OUT
19 Q 0.2 VALVE1-OUT BOOL VALVE1-OUT
20 Q 0.3 VALVE2-OUT BOOL VALVE2-OUT
21 Q 0.4 BOOL
22 Q 0.5 BOOL
23 Q 0.6 BOOL
24 Q 0.7 BOOL
25 Q 1.0 BOOL
26 Q 1.1 BOOL
Add to Symbols
Delete Symbol
Sorting:
Display Columns R, O, M, C, CC
The symbols are updated with 'OK' or 'Apply'
OK
Apply
Close
Help

4.4 Saving and compiling in NetPro

4.4.1 Saving and Compiling the configurations in NetPro

Introduction

The settings that you have configured in HW Config for the OS Ethernet interface are accepted by NetPro. Now save, compile, and check the network configuration.

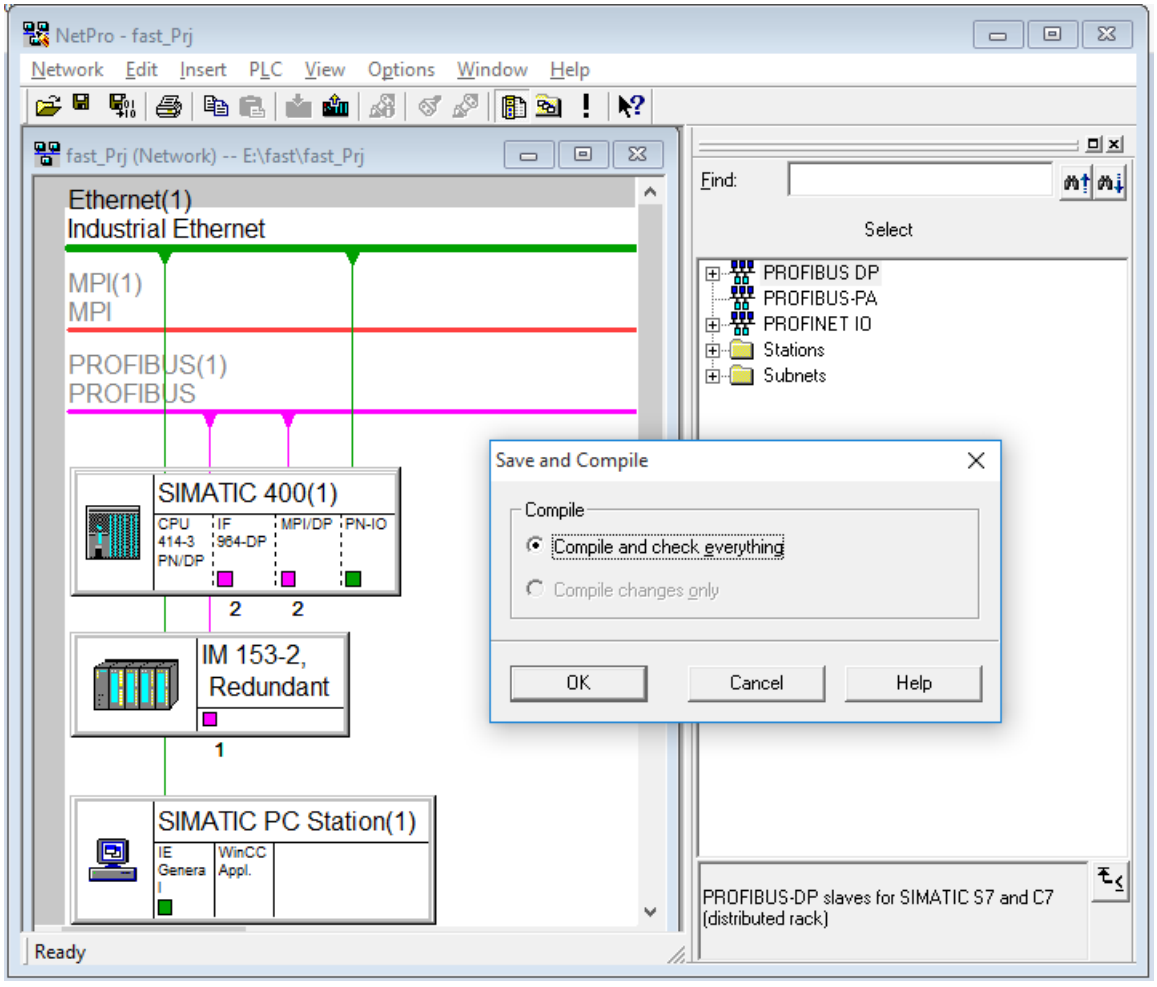
Prerequisite

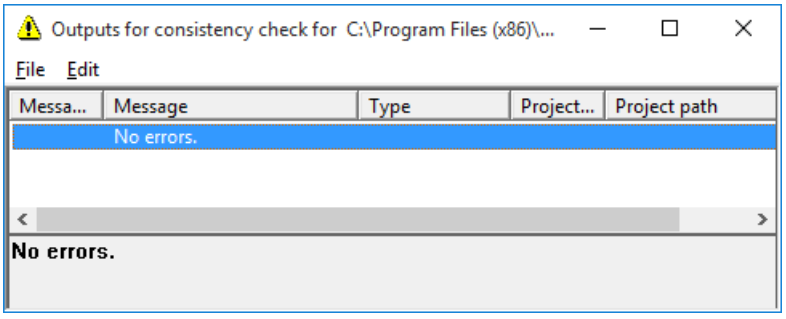
- Configuration has been completed in HW Config.

Procedure

Step	Action
1	In the Component view, select the "fast_Prj" project in the tree view of SIMATIC Manager.
2	In the detail view of SIMATIC Manager, double-click the "Plant bus" object. The "NetPro" dialog box opens.
3	Select **Network > Save and Compile** in NetPro. The "Save and Compile" dialog box opens.
4	Select the "Compile and check everything" option and click "OK".
5	Close the "Outputs for consistency check" dialog box.

Result


NetPro - fast_Prj
Network Edit Insert PLC View Options Window Help
fast_Prj (Network) -- E:\fast\fast_Prj
Ethernet(1)
Industrial Ethernet
MPI(1)
MPI
PROFIBUS(1)
PROFIBUS
SIMATIC 400(1)
CPU 414-3 PN/DP
IF 964-DP
MPI/DP
PN-IO
2
2
IM 153-2, Redundant
1
SIMATIC PC Station(1)
IE Genera l
WinCC Appl.
Find:
Select
PROFIBUS DP
PROFIBUS-PA
PROFINET IO
Stations
Subnets
Save and Compile
Compile
Compile and check everything
Compile changes only
OK
Cancel
Help
PROFIBUS-DP slaves for SIMATIC S7 and C7 (distributed rack)
Ready


Outputs for consistency check for C:\Program Files (x86)\...
File Edit
Messa...
Message
Type
Project...
Project path
No errors.
No errors.

4.5 Starting S7-PLCSIM

4.5.1 Starting S7-PLCSIM

Introduction

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

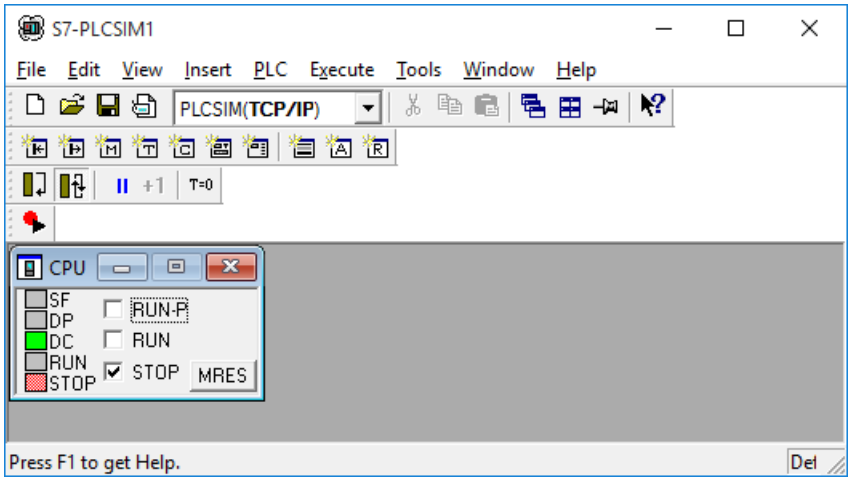
Prerequisites

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

Procedure

Step	Action
1	Switch to the SIMATIC Manager window.
2	Select **Options > Simulate Modules**. The "S7-PLCSIM1" dialog box opens.
3	Select the "PLCSIM(TCP/IP)" entry from the drop-down list in the toolbar.
4	Ensure that the CPU is in the "STOP" state.
5	Using the task bar, go back to NetPro.

Result



4.6 Downloading the target system

4.6.1 Downloading the Ethernet interface from NetPro to the PLC

Introduction

This section describes the process to download the Ethernet interface configured in HW Config from NetPro to the PLC.

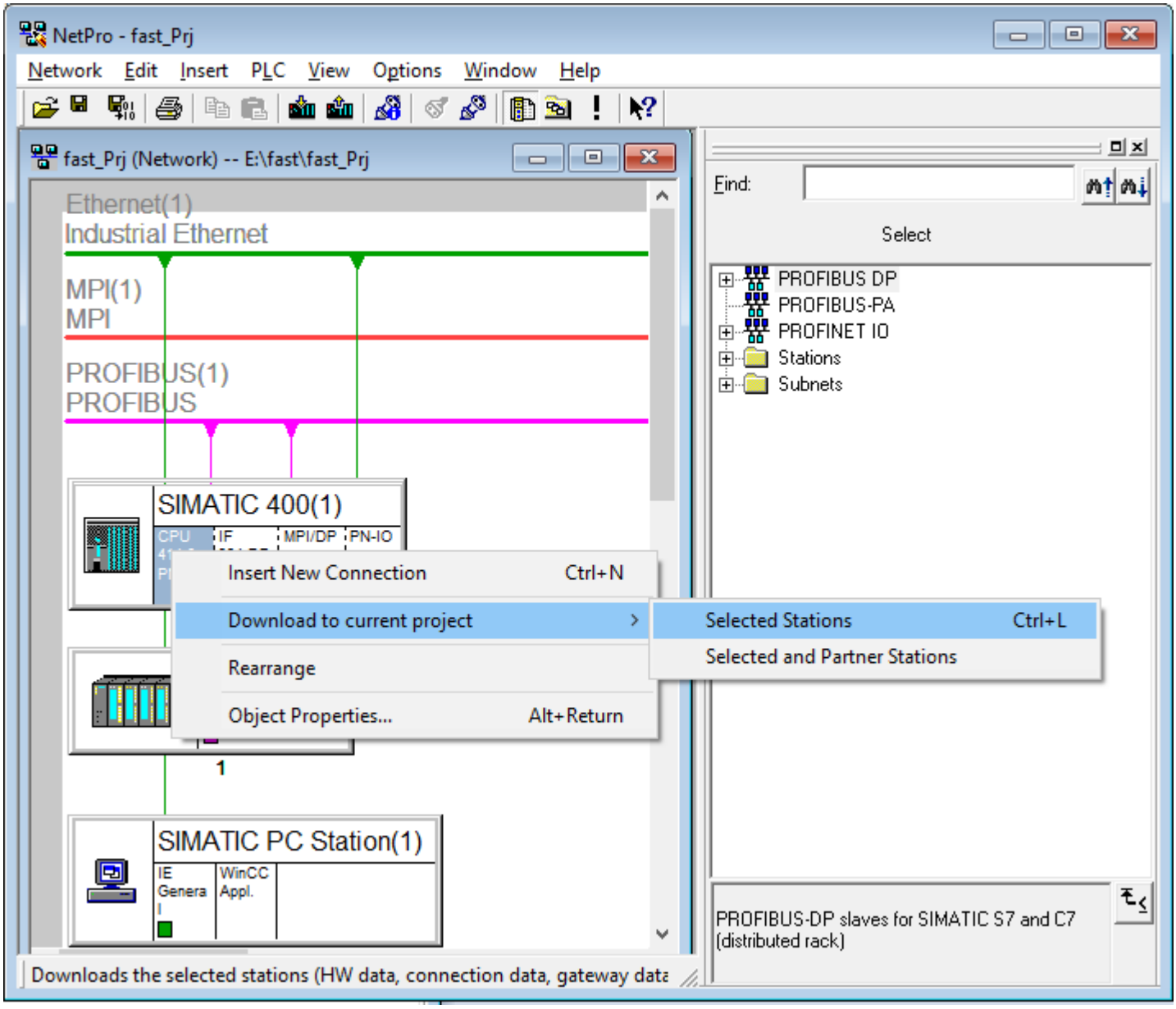
Prerequisites

- Configuration has been completed in HW Config.
- NetPro is open.
- 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 "CPU 410-5H" interface.
2	Right click and select **Download to current project > Selected Stations**.
3	Click the "Yes" button in the warning dialog box that appears.
4	Select **Network > Exit**. NetPro closes.

Result


NetPro - fast_Prj
Network Edit Insert PLC View Options Window Help
fast_Prj (Network) -- E:\fast\fast_Prj
Ethernet(1)
Industrial Ethernet
MPI(1)
MPI
PROFIBUS(1)
PROFIBUS
SIMATIC 400(1)
CPU
IF
MPI/DP
PN-IO
Insert New Connection Ctrl+N
Download to current project
Rearrange
Object Properties... Alt+Return
Selected Stations Ctrl+L
Selected and Partner Stations
1
SIMATIC PC Station(1)
IE
Genera
l
WinCC
Appl.
Find:
Select
PROFIBUS DP
PROFIBUS-PA
PROFINET IO
Stations
Subnets
PROFIBUS-DP slaves for SIMATIC S7 and C7
(distributed rack)
Downloads the selected stations (HW data, connection data, gateway data

Configuring the process tags and the sequential control 5

5.1 Copying the CFC charts to the master data library

Introduction

Use the following standard templates from the *PCS 7 AP Library Vxx* for configuration purpose:

- MotorLean
- PIDConL_ConPerMon
- ValveLean

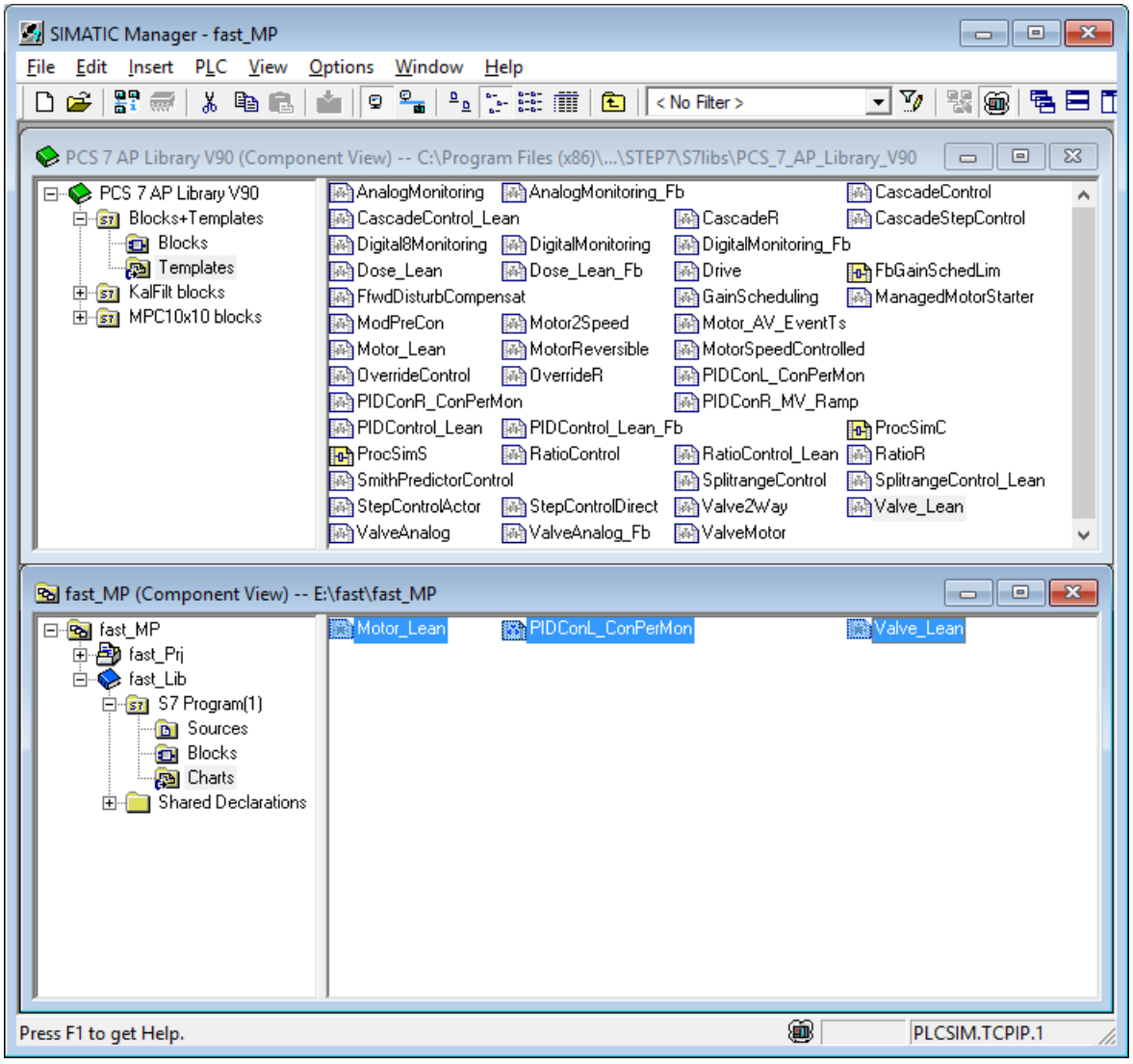
Prerequisites

- SIMATIC Manager is open in the Component view.
- You have created the **fast_MP** PCS 7 project as a multiproject using the **PCS 7 'New Project' Wizard** and opened it.
- The "S7 Program(1)/Charts" folder under "fast_Lib" is open.
- The latest *PCS 7 AP Library Vxx* has been installed.

Procedure

Step	Action
1	• Select "File > Open". • Select the "Libraries" tab. • In the list, select "PCS 7 AP Library <Vxx>". • Click "OK".
2	In SIMATIC Manager, select "Window > Arrange > Horizontally".
3	• Navigate to the "fast_Lib" master data library in the folder "S7 Program(1)/Charts" in the "fast_MP" multiproject. • In the "PCS 7 AP Library V... (Component view)..." window, open the "PCS 7 AP Library <Vxx> > Blocks + Templates > Templates" folder. • Keeping **<Ctrl>** pressed, select the "Motor-Lean", "PIDConL_ConPerMon" and "Valve-Lean" process tag types (CFC charts) in the right window. • Drag-and-drop the selected process tag types (CFC charts) to the "S7 Program(1)/ Charts" folder in the "fast_Lib" master data library of the "fast_MP" multiproject. You have successfully saved the process tag types (CFC charts) to the master data library within your multiproject.
4	Close the "PCS 7 AP Library V... (Component view)..." window.

Result


SIMATIC Manager - fast_MP
File Edit Insert PLC View Options Window Help
< No Filter >
PCS 7 AP Library V90 (Component View) -- C:\Program Files (x86)\...\STEP7\S7libs\PCS_7_AP_Library_V90
PCS 7 AP Library V90
Blocks+Templates
Blocks
Templates
KalFilt blocks
MPC10x10 blocks
AnalogMonitoring
AnalogMonitoring_Fb
CascadeControl
CascadeControl_Lean
CascadeR
CascadeStepControl
Digital8Monitoring
DigitalMonitoring
DigitalMonitoring_Fb
Dose_Lean
Dose_Lean_Fb
Drive
FbGainSchedLim
FfwdDisturbCompensat
GainScheduling
ManagedMotorStarter
ModPreCon
Motor2Speed
Motor_AV_EventTs
Motor_Lean
MotorReversible
MotorSpeedControlled
OverrideControl
OverrideR
PIDConL_ConPerMon
PIDConR_ConPerMon
PIDConR_MV_Ramp
PIDControl_Lean
PIDControl_Lean_Fb
ProcSimC
ProcSimS
RatioControl
RatioControl_Lean
RatioR
SmithPredictorControl
SplitrangeControl
SplitrangeControl_Lean
StepControlActor
StepControlDirect
Valve2Way
Valve_Lean
ValveAnalog
ValveAnalog_Fb
ValveMotor
fast_MP (Component View) -- E:\fast\fast_MP
fast_MP
fast_Prj
fast_Lib
S7 Program(1)
Sources
Blocks
Charts
Shared Declarations
Motor_Lean
PIDConL_ConPerMon
Valve_Lean
Press F1 to get Help.
PLCSIM.TCPIP.1

5.2 Creating a project-specific CFC chart

You have copied a chart or template to the master data library from a library or project. You can use this object as it is or modify it and then use it in the project.

In the example, you have copied templates from the PCS 7 AP Library Vxx to the master data library of the **fast_MP** project. These charts are adapted for the specific project in question.

Note

The CFC Editor contains a zoom function. Use this function to adjust the display size of the blocks. Throughout the rest of this step, you will be working exclusively with templates from the "fast-Lib" master data library.

Procedure

Step	Action
1	• In the Component view in SIMATIC Manager , open the "S7 Program(1)/Charts" folder in the "fast_Lib" master data library. • Select the "Motor-Lean" CFC chart. In the shortcut menu, select the menu command "Rename". Enter the object name "MOTOR1" . • Select the "Valve-Lean" CFC chart. In the shortcut menu, select the menu command "Rename". Enter the object name "VALVE1" . • Select the "PIDConL_ConPerMon" CFC chart. In the shortcut menu, select the menu command "Rename". Enter the object name "PIDCTRL1" . After being renamed, the process tag types become process tags.
2	• Double-click on the "MOTOR1" CFC chart. The CFC Editor opens. • Connect the "Start" parameter of the "Motor" block to the "`SimPV_In`" parameter of the "FbkRun" block. Proceed as follows: – Left-click on the "`Start`" parameter and keep the mouse button pressed. – Move the cursor to the "`SimPV_In`" parameter until an arrow symbol appears. – Release the mouse button. • Double-click on the "`Sim_On`" parameter on the "FbkRun" block. The "Select Structure Element" dialog box opens. • Double-click the "Value ..." line. The "Properties - Input/Output" dialog box opens. • Change the entry in the "Value" input box to 1. • Click "OK". The "Properties - Input/Output" dialog box closes. • Click "Close". The "Select Structure Element" dialog box closes. • In the CFC Editor, select **Chart > Close**.

Step	Action
3	• In the Component view in SIMATIC Manager , open the "S7 Program(1)/Charts" folder in the "fast_Lib" master data library. • Double-click on the "VALVE1" CFC chart.The CFC Editor opens. • Connect the "Ctrl" parameter of the "Valve" block to the "SimPV_In" parameter of the "FbkOpen" block. • Double-click on the "Sim_On" parameter on the "FbkOpen" block. The "Select Structure Element" dialog box opens. • Double-click the "Value ..." line. The "Properties - Input/Output" dialog box opens. • Change the entry in the "Value" input box to 1. • Click "OK". The "Properties - Input/Output" dialog box closes. • Click "Close". The "Select Structure Element" dialog box closes. • Connect the "Ctrl"parameter of the "Valve" block to the "SimPV_In" parameter of the "FbkClose" block. • Select the "SimPV_In" parameter of the "FbkClose" block. Select "Invert" in the shortcut menu. Note: An inversion of an input signal is represented by a solid circle at the block input. • Double-click on the "Sim_On" parameter on the "FbkClose" block. The "Select Structure Element" dialog box opens. • Double-click the "Value ..." line. The "Properties - Input/Output" dialog box opens. • Change the entry in the "Value" input box to "1". • Click "OK". The "Properties - Input/Output" dialog box closes. • Click "Close". The "Select Structure Element" dialog box closes. • In the CFC Editor, select **Chart > Close**.

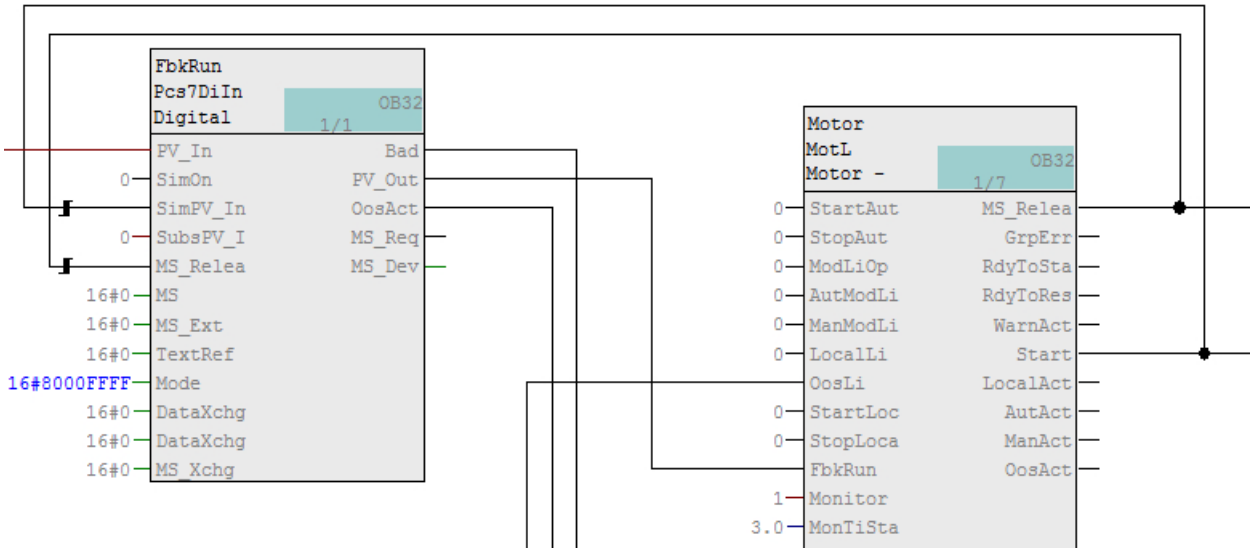
Result

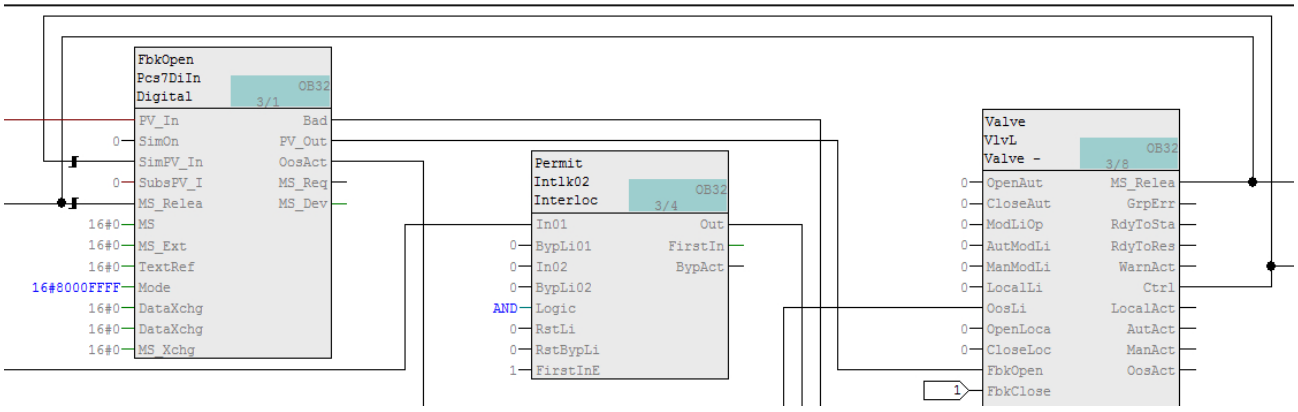
The "MOTOR1" and "VALVE1" CFC charts are adapted for the specific project in question. The "PIDCTRL1" CFC chart is a copy of the "PIDConL_ConPerMon" template of the PCS 7 AP Library Vxx.

Note

MOTOR1 and VALVE1 example

The changes made to the APL templates are marked in red on the screenshots below.


FbkRun
Pcs7DiIn
Digital
OB32
1/1
PV_In
SimOn
SimPV_In
SubsPV_I
MS_Relea
MS
MS_Ext
TextRef
Mode
DataXchg
DataXchg
MS_Xchg
Bad
PV_Out
OosAct
MS_Req
MS_Dev
0
0
16#0
16#0
16#0
16#8000FFFF
16#0
16#0
16#0
Motor
MotL
Motor -
OB32
1/7
StartAut
StopAut
ModLiOp
AutModLi
ManModLi
LocalLi
OosLi
StartLoc
StopLoca
FbkRun
Monitor
MonTiSta
MS_Relea
GrpErr
RdyToSta
RdyToRes
WarnAct
Start
LocalAct
AutAct
ManAct
OosAct
1
3.0


FbkOpen
Pcs7DiIn
Digital
OB32
3/1
PV_In
SimOn
SimPV_In
SubsPV_I
MS_Relea
MS
MS_Ext
TextRef
Mode
DataXchg
DataXchg
MS_Xchg
Bad
PV_Out
OosAct
MS_Req
MS_Dev
Permit
Intlk02
Interloc
OB32
3/4
In01
BypLi01
In02
BypLi02
Logic
RstLi
RstBypLi
FirstInE
Out
FirstIn
BypAct
AND
Valve
VlvL
Valve -
OB32
3/8
OpenAut
CloseAut
ModLiOp
AutModLi
ManModLi
LocalLi
OosLi
OpenLoca
CloseLoc
FbkOpen
FbkClose
MS_Relea
GrpErr
RdyToSta
RdyToRes
WarnAct
Ctrl
LocalAct
AutAct
ManAct
OosAct
1

5.3 Copying the CFC charts to the project

Introduction

This section guides you to copy CFC charts to the project. 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.

Prerequisites

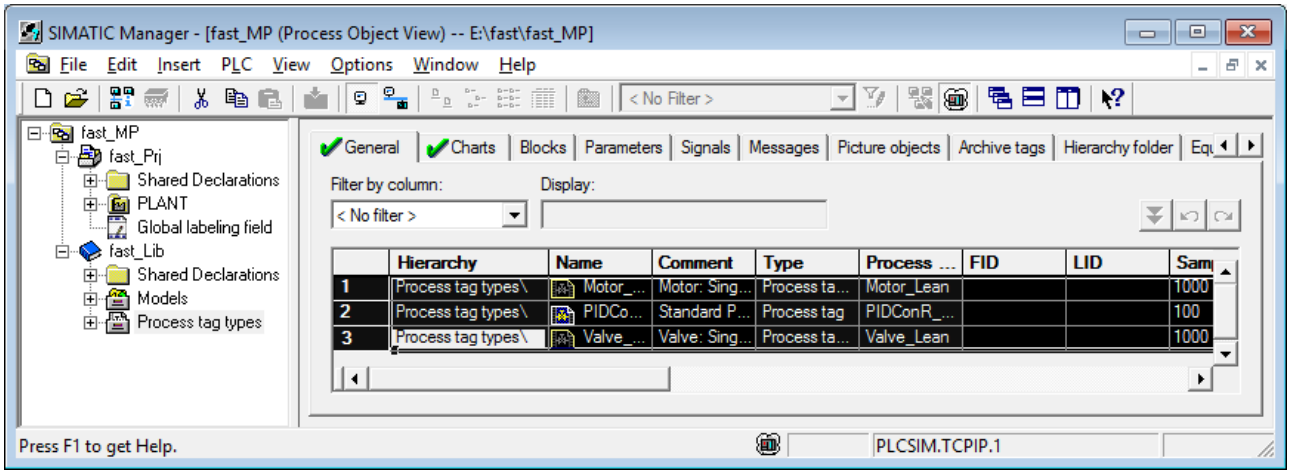
- SIMATIC Manager is open in the Component View.
- The project-specific CFC charts "MOTOR1", "VALVE1" and "PIDCTRL1" are located in the "Charts" folder of the master data library in the Component View.

Procedure

Step	Action
1	Select "View > Plant View" in SIMATIC Manager.
2	In the Plant View, open the tree in the left-hand window.
3	Select the "Process tag types" folder in the "fast_Lib" folder.
4	In SIMATIC Manager, select **Window > Arrange > Horizontally**.
5	In the Component View, select the folder **"fast_Lib" > S7 Program(1) > Charts**
6	Keeping <CTRL> pressed, select the 3 charts "MOTOR1", "VALVE1" and "PIDCTRL1".
7	Open the shortcut menu and select "Cut".
8	Select the "Process tag types" folder in the Plant View.
9	Open the shortcut menu and select "Paste". The 3 charts are now located in the "Process tag types" folder in the Plant View.
10	In the SIMATIC Manager, select **View > Process Object View**.
11	In the Process Object View, open the tree in the left-hand window.
12	Click the "Process tag types" folder in the "fast_Lib" folder.
13	In the right window, open the "General " tab. The following CFCs are displayed in the table: • "MOTOR1" • "VALVE1" • "PIDCTRL1"
14	Select all 3 charts. To do this, click on the row number in the first column. Drag-and-drop the selected CFC charts to the "fast_Prj\Process Cell(1)\Unit(1)\Function(1)" folder. Note: You can select multiple charts by simultaneously pressing the <Ctrl> key.
15	Click "fast_Prj\Process Cell(1)\Unit(1)\Function(1)". Open the "Charts" tab. You will see the created CFC charts in the table.

Result

The figure below shows the charts that were copied in the "Process tag types" folder.



5.4 Configuring the SFC chart

Introduction

The **PCS 7 'New Project' Wizard** has created an SFC chart "SFC(1)" in the "Function(1)" folder of the "fast_Prj" project. This section guides you to rename the SFC chart and adapt it for simulation. It also helps you to interconnect tags from structures.

Prerequisites

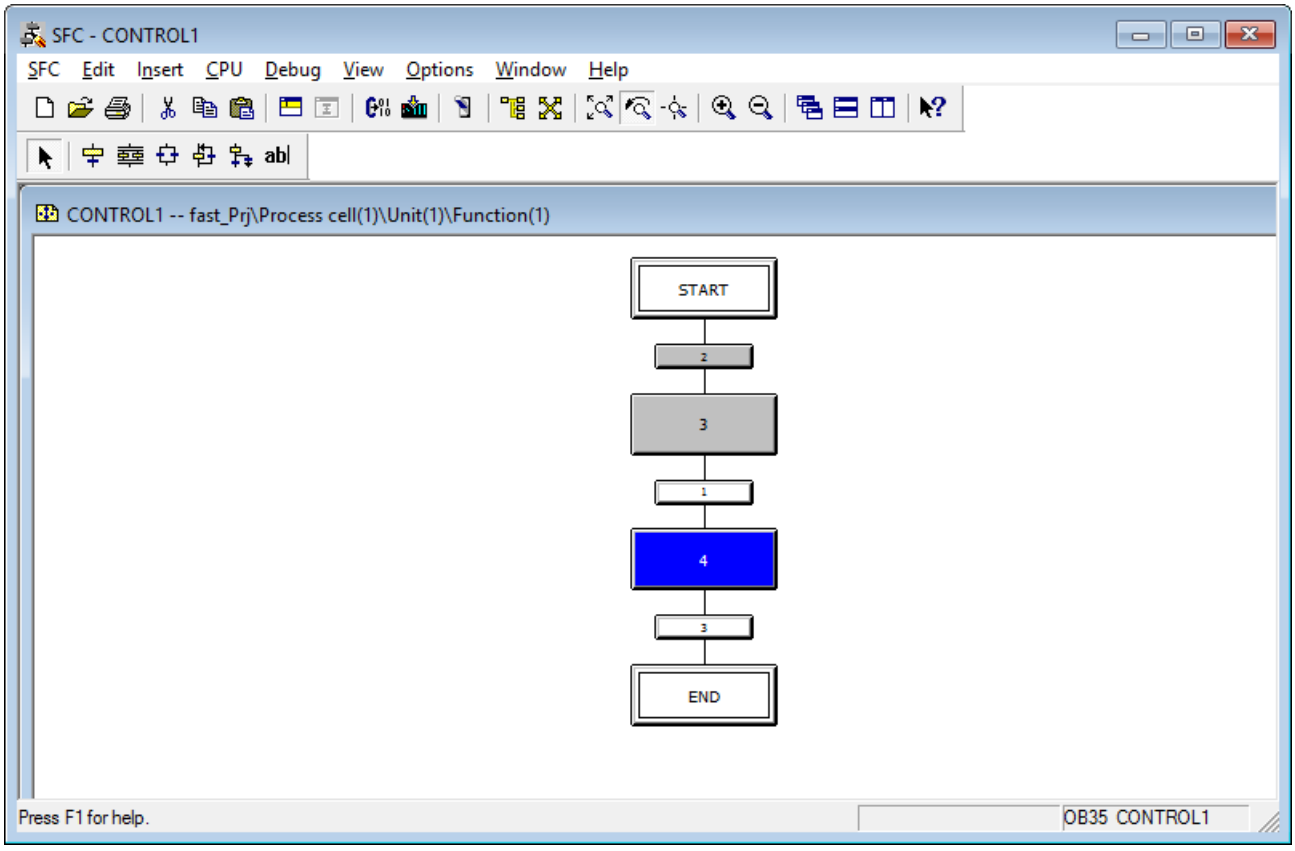
- You have completed the session in the **PCS 7 'New Project' Wizard**.
- SIMATIC Manager is open and the **fast_MP** project and all open hierarchy folders are displayed in the Process Object view.

Procedure

Step	Action
1	In the "fast_Prj \ Process Cell(1) \ Unit(1) \ Function(1)" folder, open the shortcut menu of the "SFC(1)" object. Select "Rename".
2	Enter "CONTROL1" and press Enter.
3	Double-click the "CONTROL1" object. The SFC Editor opens.
4	• In the SFC Editor, select **Insert > Step+Transition**. • Move the cursor in the SFC chart below the "START" step until a green line is displayed and then press the left mouse button. • Select "Insert > Select".
5	• Select the first transition (2) below the "START" step and then select the "Object Properties" from the shortcut menu. • Select the "Condition" tab. • Click "Browse". • Click the plus symbol in front of the "PIDCTRL1" CFC chart. • Select the "PID" block. • Select the "PV_Out" connection in the "Name" column. Change the width of the dialog box and the individual columns if the columns are not shown with sufficient width. • Open the shortcut menu and select "Open Structure". • In the "Name" column, select the "Value" connection. Click "Apply". • In line 1 of the "Properties - 2 **--...**" dialog box, enter the number "50" next to the "=" and change the character from "=" to ">". • Click "Apply" and then "Close".

Step	Action
6	• In the SFC chart, open the shortcut menu of step (3) below the transition (2) and then select "Object Properties". • At the "Minimum:" entry in the "Runtimes" group, enter "10s" (without space). • Select the "Processing" tab. • Click "Browse". • Click the plus symbol in front of the "MOTOR1" CFC chart. • Select the "Motor" block. • In the "Name" column, select the "StartAut" connection. • Open the shortcut menu and select "Open Structure". • In the "Name" column, select the "Value" connection. Click "Apply". • In the "Properties - 3 **--…**" dialog box, enter the number "1" next to ":=" in line 1. Click "Apply". • Select the second line. • Click "Browse". • Select the "Motor" block. • In the "Name" column, select the "StopAut" connection. • Open the shortcut menu and select "Open Structure". • In the "Name" column, select the "Value" connection. Click "Apply". • In the "Properties - 3 **--…**" dialog box, enter "0" next to ":=" in line 2. Click "Apply" and "Close". The motor is now switched on when the process value of the control system reaches or exceeds the value 50.
7	• Open the shortcut menu for step 3 of the SFC and select "Copy". • Open the shortcut menu in the blank area of the SFC chart and select "Paste". • Move the cursor in the SFC chart above the "End" step until the green line appears, and then press the left mouse button.
8	• In the SFC chart, open the shortcut menu for step (4) and select the "Object Properties". • Select the "Processing" tab. • In the first line ("StartAut" parameter), change the value from "TRUE" to "FALSE". • In the second line ("StopAut" parameter), change the value from "FALSE" to "TRUE". • Click "Apply" and then "Close". • The motor switches off. Processing continues for 10 seconds.
End	• Select **SFC > Exit**.

Result


SFC - CONTROL1
SFC Edit Insert CPU Debug View Options Window Help
CONTROL1 -- fast_Prj\Process cell(1)\Unit(1)\Function(1)
START
2
3
1
4
3
END
Press F1 for help.
OB35 CONTROL1

5.5 Organizing the project folder

Introduction

The PCS 7 Wizard has created and named Unit(1) of the "fast_Prj" project. In the following, you will rename these hierarchy folders:

- Folder "Plant(1)" will become "PLANT"
- "Unit(1)" will become "UNIT_A"

This will make the plant structure clearer. Objects created by the PCS 7 Wizard that are not required can be deleted.

Prerequisites

- You have completed the session in the **PCS 7 Wizard: 'New Project'**.
- SIMATIC Manager is open and the **fast_MP** project and all open hierarchy folders are displayed in the "Plant view".

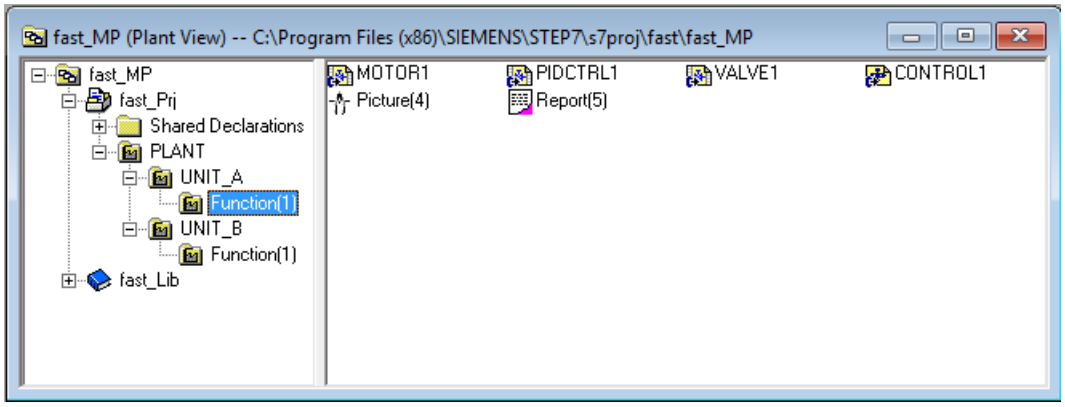
Note

You can configure the different views in SIMATIC Manager by selecting "View >" and then, for example, Plant View.

Procedure

Step	Action
1	Open the shortcut menu of the "Process cell(1)" folder in the left pane of the Plant view and select "Rename".
2	Enter the name "PLANT" and press Enter.
3	Open the shortcut menu of the "Unit(1)" folder in the left pane of the Plant view and select "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-hand window and select "Delete". The "Delete" dialog box opens.
7	Click "Yes".

Result


fast_MP (Plant View) -- C:\Program Files (x86)\SIEMENS\STEP7\s7proj\fast\fast_MP
fast_MP
fast_Prj
Shared Declarations
PLANT
UNIT_A
Function(1)
UNIT_B
Function(1)
fast_Lib
MOTOR1
PIDCTRL1
VALVE1
CONTROL1
Picture(4)
Report(5)

Preparing the process picture for automatic generation 6

6.1 Preparing the process picture for automatic generation

Introduction

To prepare for automatic process picture generation, follow the steps described below.

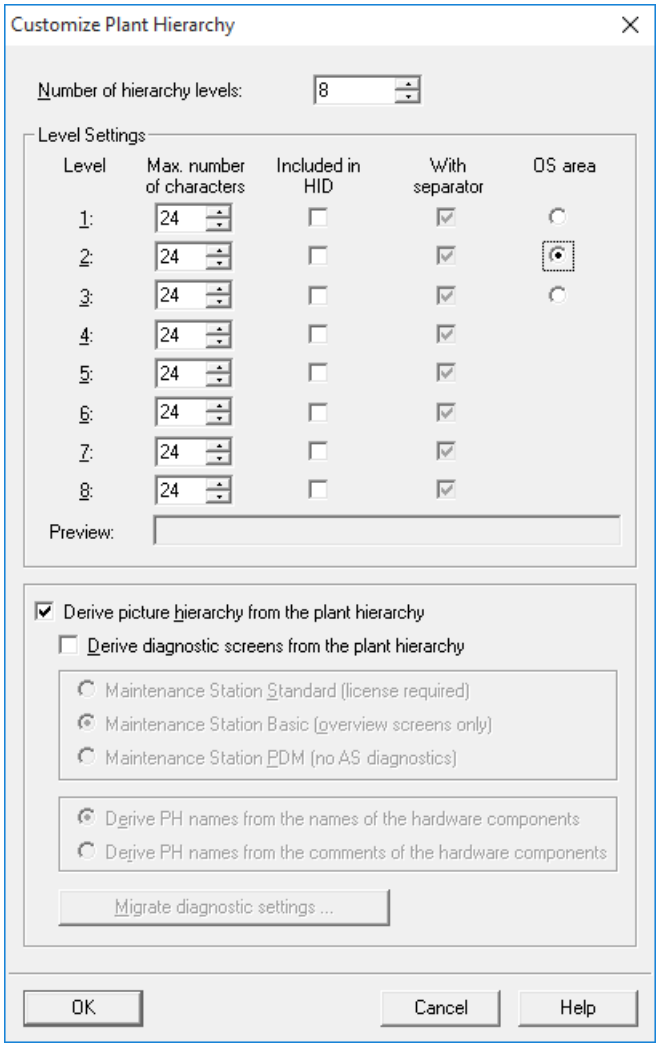
Prerequisites

- You have completed the session in the **PCS 7 'New Project' Wizard.**
- SIMATIC Manager is open and the **fast_MP** project and all open hierarchy folders are displayed in the Plant View.

Procedure

Step	Action
1	Select the "UNIT_A" folder in the tree view of the Plant View.
2	Open the shortcut menu of the "Picture(3)" object in the detailed view and then select "Object Properties"
3	Select the "Block icons" tab.
4	Select the "Derive block icons from the plant hierarchy" check box and click "OK". This may already have been selected.
5	Open the shortcut menu of the "UNIT_A" folder, and select **Plant Hierarchy > Settings**. The "Customize Plant Hierarchy" dialog box opens.
6	Go to the "Level Settings" box. In the Level 2 row, check the "OS area" button.
7	Select "Derive picture hierarchy from the plant hierarchy" check box.
8	Click "OK".

"Customize Plant Hierarchy" dialog box



Creating a unit by means of copying 7

7.1 Creating a unit by copying the "UNIT_A" unit

Introduction

This section guides you to copy "UNIT_A" to the "PLANT" folder in the Plant View. During copying, a duplicate of "UNIT_A" is generated, including all of its configured objects. You need to rename the copied objects.

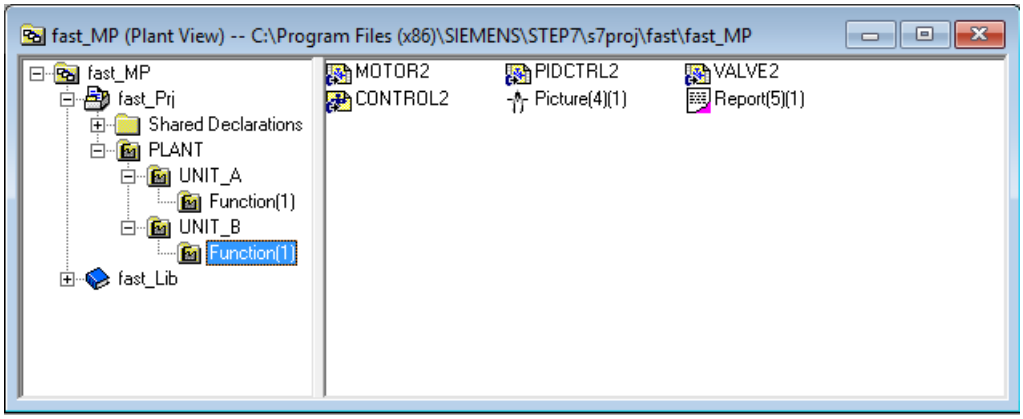
Prerequisite

- SIMATIC Manager is open and the **fast_MP** project and all open hierarchy folders are displayed in the Plant View.

Procedure

Step	Action
1	Open the shortcut menu of the "UNIT_A" folder in the tree view of the Plant View and select "Copy".
2	Open the shortcut menu of the "PLANT" folder and select "Paste".
3	1. Open the shortcut menu of the copied folder "UNIT_A(1)" and select "Rename". 2. Enter "UNIT_B" and press "Enter".
4	In the tree view, select the "Function(1)" folder below the "UNIT_B" folder.
5	1. In the detail view, open the shortcut menu of the "MOTOR1(1)" object and select "Rename". 2. Enter "MOTOR2" and press "Enter". 3. In the detail view, open the shortcut menu of the "PIDCTRL1(1)" object and select "Rename". 4. Enter "PIDCTRL2" and press "Enter". 5. In the detail view, open the shortcut menu of the "VALVE1(1)" object and select "Rename". 6. Enter "VALVE2"and press "Enter". 7. In the detail view, open the shortcut menu of the "CONTROL1(1)" object and select "Rename". 8. Enter "CONTROL2" and press "Enter".

Result


fast_MP (Plant View) -- C:\Program Files (x86)\SIEMENS\STEP7\s7proj\fast\fast_MP
fast_MP
fast_Prj
Shared Declarations
PLANT
UNIT_A
Function(1)
UNIT_B
Function(1)
fast_Lib
MOTOR2
PIDCTRL2
VALVE2
CONTROL2
Picture(4)(1)
Report(5)(1)

Assigning parameters to and interconnecting the process tags

8

8.1 Assigning parameters to and interconnect the process tags

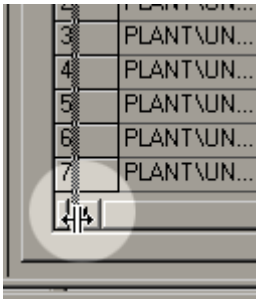
Introduction

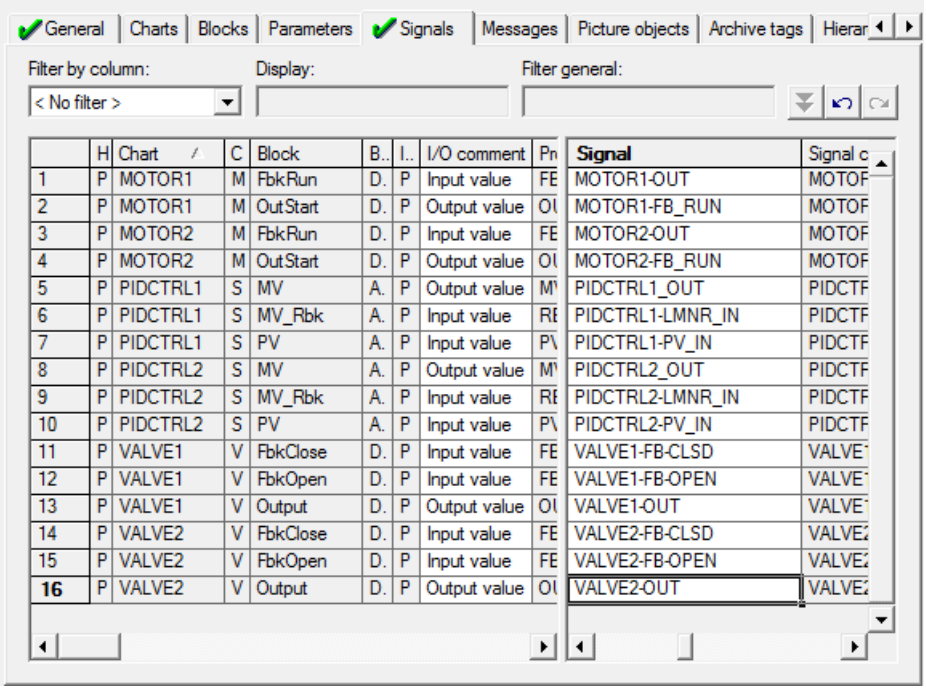
To assign parameters to and interconnect the process tags, you must first insert the signals in the Process Object View and then modify the parameter values.

Prerequisite

- SIMATIC Manager is open and the **fast_MP** project and all open hierarchy folders are displayed in the Process Object View.

Procedure

Step	Action	
1	In the tree view of the Process Object View, click the "PLANT" folder.	
2	In the detail view, click the "Signals" tab.	
3	In the detail view, split the display window into two sections by positioning the cursor over the bar to the left of the horizontal scroll bar at the bottom (as shown in the screenshot). When the cursor turns into the split symbol, move the bar to the middle of the display window.	
4	1. Click the "Chart" column title to sort the column in ascending order. 2. Use the scroll bar on the bottom left to view the "Chart", "Block", and "I/O comment" columns in the left window. Position the split cursor at the edges of the column titles to hide or reduce the size of the columns. 3. Next, use the scroll bar on the bottom right to view the "Signal" column.	

Step	Action
5	1. Find the row in the table with the Chart column; "MOTOR1" entry and Block column; "FbkRun" entry 2. Open in the corresponding "Signal" column from the shortcut menu. Now, select "Insert Signal". 3. In the "Insert Signal" dialog box, open the shortcut menu of the "Inputs" folder in the right window and select "Open". The "Insert Signal" dialog box opens. 4. Open the "SIMATIC 400 ...\Outputs" folder. 5. Select the "MOTOR1-OUT" signal in the right window and click "Apply". The signal is inserted.
6	The following table shows the signals that you have to assign to the block I/Os. Proceed as described in the previous step. Note that you must switch between the "Inputs" and "Outputs" folders in the left window of the "Insert Signal" dialog box for each signal.
	
7	Close the "Insert Signal" dialog box.

	H	Chart	C	Block	B..	I..	I/O comment	Pr	Signal	Signal c
1	P	MOTOR1	M	FbkRun	D.	P	Input value	FE	MOTOR1-OUT	MOTOF
2	P	MOTOR1	M	OutStart	D.	P	Output value	OU	MOTOR1-FB_RUN	MOTOF
3	P	MOTOR2	M	FbkRun	D.	P	Input value	FE	MOTOR2-OUT	MOTOF
4	P	MOTOR2	M	OutStart	D.	P	Output value	OU	MOTOR2-FB_RUN	MOTOF
5	P	PIDCTRL1	S	MV	A.	P	Output value	MV	PIDCTRL1_OUT	PIDCTF
6	P	PIDCTRL1	S	MV_Rbk	A.	P	Input value	RE	PIDCTRL1-LMNR_IN	PIDCTF
7	P	PIDCTRL1	S	PV	A.	P	Input value	PV	PIDCTRL1-PV_IN	PIDCTF
8	P	PIDCTRL2	S	MV	A.	P	Output value	MV	PIDCTRL2_OUT	PIDCTF
9	P	PIDCTRL2	S	MV_Rbk	A.	P	Input value	RE	PIDCTRL2-LMNR_IN	PIDCTF
10	P	PIDCTRL2	S	PV	A.	P	Input value	PV	PIDCTRL2-PV_IN	PIDCTF
11	P	VALVE1	V	FbkClose	D.	P	Input value	FE	VALVE1-FB-CLSD	VALVE
12	P	VALVE1	V	FbkOpen	D.	P	Input value	FE	VALVE1-FB-OPEN	VALVE
13	P	VALVE1	V	Output	D.	P	Output value	OU	VALVE1-OUT	VALVE
14	P	VALVE2	V	FbkClose	D.	P	Input value	FE	VALVE2-FB-CLSD	VALVE
15	P	VALVE2	V	FbkOpen	D.	P	Input value	FE	VALVE2-FB-OPEN	VALVE
16	P	VALVE2	V	Output	D.	P	Output value	OU	VALVE2-OUT	VALVE

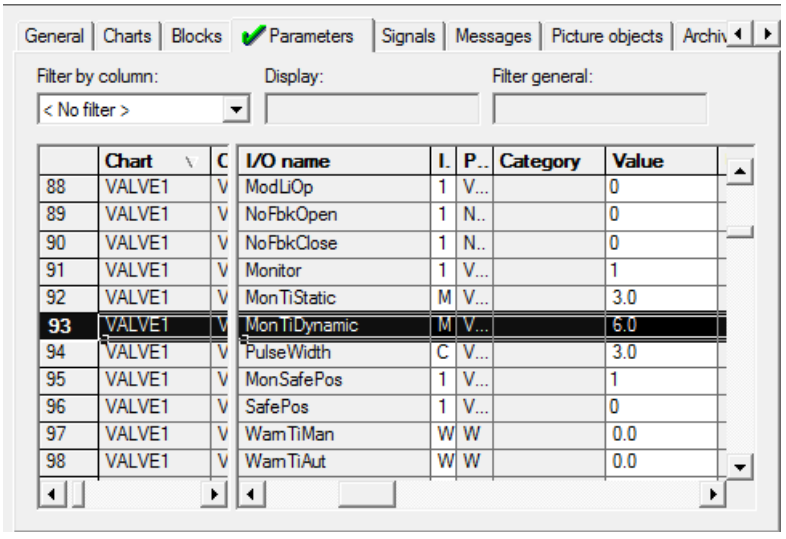
Step	Action
8	1. In the detail view of the Process Object view, click the "Parameters" tab. 2. Split the right window into two sections, as described in step 3 above. The left window displays the "Chart" column and the right window displays the "I/O", "Category", and "Value" columns. 3. Click the "Chart" column title to sort the column in descending order. 4. Enter the value 6 in the "Value" column in the right window for the chart name "VALVE1" and I/O "MonTiDynamic" . 5. Enter the value 6 in the "Value" column in the right window for the chart name "VALVE2" and I/O "MonTiDynamic" .
	

	Chart	C	I/O name	I.	P..	Category	Value
88	VALVE1	V	ModLiOp	1	V...		0
89	VALVE1	V	NoFbkOpen	1	N..		0
90	VALVE1	V	NoFbkClose	1	N..		0
91	VALVE1	V	Monitor	1	V...		1
92	VALVE1	V	MonTiStatic	M	V...		3.0
93	VALVE1	V	MonTiDynamic	M	V...		6.0
94	VALVE1	V	PulseWidth	C	V...		3.0
95	VALVE1	V	MonSafePos	1	V...		1
96	VALVE1	V	SafePos	1	V...		0
97	VALVE1	V	WarnTiMan	W	W		0.0
98	VALVE1	V	WarnTiAut	W	W		0.0

Compile and download

9

9.1 Compiling and downloading objects

Introduction

You have now completed all preparations for compiling and downloading the objects. Configure all settings required for compilation and download of the charts and OS in the "Compile and Download Objects" dialog box.

Prerequisites

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

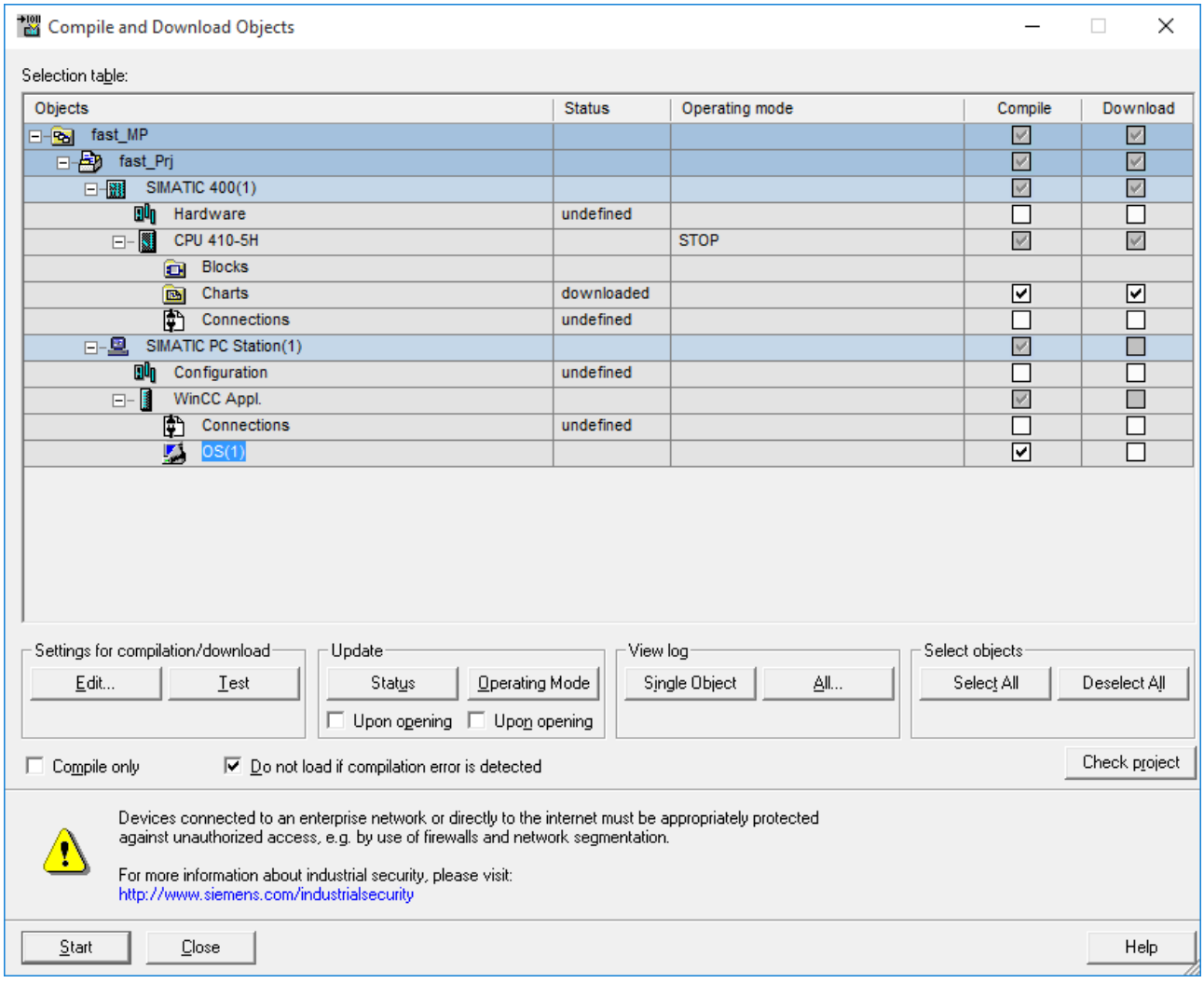
Procedure

Step	Action
1	1. In the tree view, open the shortcut menu of the **fast_MP** root folder and select "PLC > Compile and Download Objects". 2. Expand the folder structure in the "Compile and Download Objects" dialog box by clicking the "plus" symbol. 3. Select the check boxes in the "Compile" and "Download" columns in the "Charts" folder. 4. Click the "Charts" folder, and then click "Edit" in the "Settings for Compilation/Download" group. The "Compile Program / Download to Target System" dialog box opens.
2	1. Select the "Entire program" check box in the "Scope" group. 2. Click "OK".The "Download to PLC" dialog box opens. 3. Click "OK".The program closes both dialog boxes.

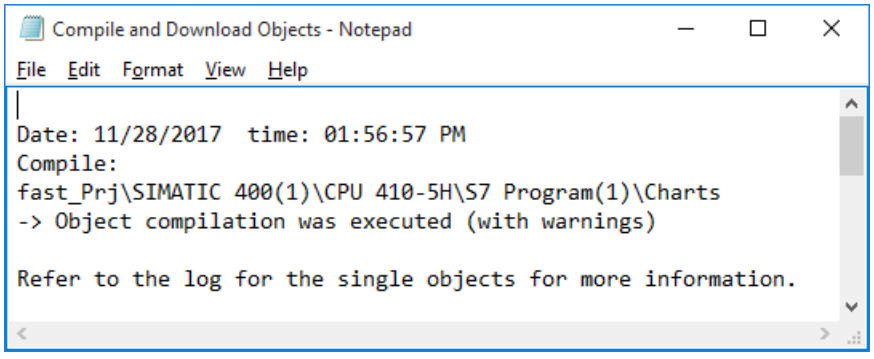
Step	Action
3	1. Select the check box for the "OS(1)" folder in the "Compile" column in the "Compile and Download Objects" dialog box. 2. Click the "OS(1)" folder and then on "Edit" in the "Settings for Compilation/Download" group. 3. Click "Next" in the "Wizard: Compile OS" dialog box. 4. Click "Next" again. 5. Activate the following check boxes in the dialog box that appears. • In the "Data" group: - "Tags and messages" check box - "SFC Visualization" check box - "Picture Tree" check box. In the "Scope" group: - "Entire OS" option box • Click "Apply".The dialog box closes.
4	1. Click "Start" in the "Compile and Download Objects" dialog box. The "Compile and download objects" dialog box opens. 2. Click "OK". 3. A further "Compile and Download Objects" dialog box opens. 4. Click "Yes". The operation is started. The log file is displayed at the end of this operation. 5. Close the log file. 6. Click "Cancel" 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 log file is displayed on completion of the compilation and download. The warnings can be ignored here.



9.2 Setting the CPU to RUN-P in S7-PLCSIM

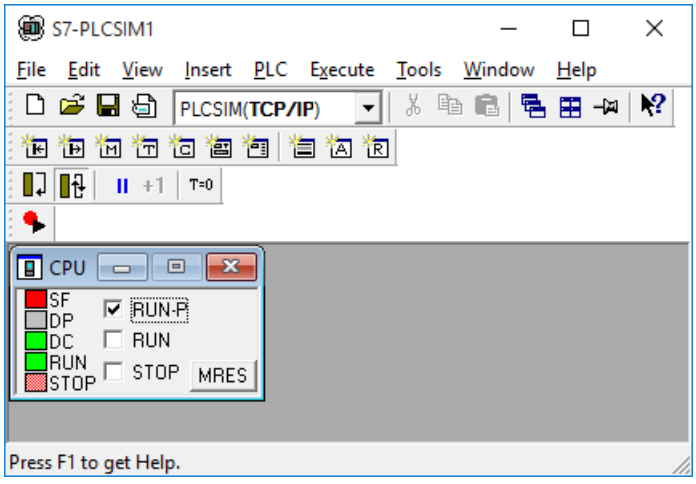
Introduction

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.

Prerequisites

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

Procedure

Step	Action
1	Click the "S7-PLCSIM" window in the task bar to open the window.
2	Activate the "RUN-P" check box in the "CPU" window as shown below: 
3	In the "S7-PLCSIM1" window, click the "Minimize" button.

Adapting process pictures 10

10.1 Adapting process pictures

Introduction

To operate and monitor the process, open the OS in SIMATIC Manager and activate the OS project.

You can make any changes or expansions you like for the process pictures in the Graphics Designer of the WinCC Explorer .

The following process pictures contain process objects that are generated automatically:

- **Picture(3)** from unit "UNIT_A"
- **Picture(3)(1)** from unit "UNIT_B"

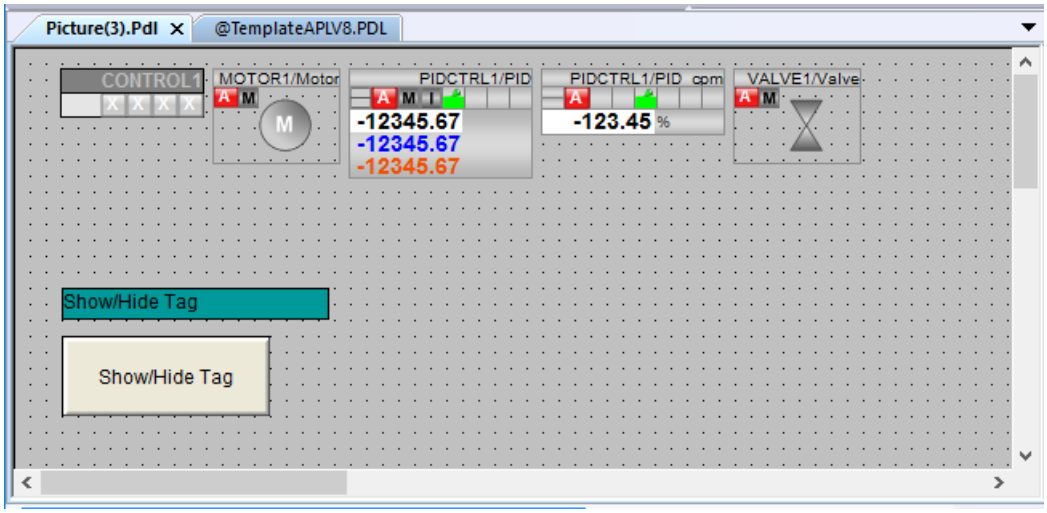
Object names are not shown in automatically generated process pictures. In view of this, insert the "Show/Hide Tag" button from the "@ TemplateAPLVx.PDL" template picture into the "Picture(3)" process picture. Use this button to show/hide the object name.

Procedure

Step	Action
1	In the Component view, open the tree view of the SIMATIC PC station > WinCC Appl.
2	Right-click the "OS(1)" folder and select "Open object" from the shortcut menu. WinCC Explorer opens.
3	If the user interface language of the WinCC Explorer does not match the user interface language of the SIMATIC Manager, select **Tools > Language** in the WinCC Explorer and change the language.
4	Select the "Graphics Designer" folder in the tree view.
5	Double-click the "Picture(3).Pdl" object in the list in the "Name" column. The process picture opens in the Graphics Designer.
6	Select **File > Open**. The "Open" dialog window opens
7	Double-click the "@ TemplateAPLVx.PDL" object in the list in the "**Name**" column. The "@ TemplateAPLVx.PDL" template picture opens.
8	Select the "Show/Hide Tag" objects.
9	Select "Copy" in the shortcut menu.
10	Click the "Picture(3).Pdl" open picture.
11	Select **Edit > Paste**.
12	Select **File > Save**.
13	Select **File > Exit**. The Graphics Designer closes.

Result

The "Show/Hide Tag" object is inserted into the "Picture(3).Pdl" process picture.



10.2 Operating and monitoring the process

10.2.1 Operating and monitoring the process

Introduction

To operate and monitor the process, open the OS in SIMATIC Manager and activate the OS project.

Note

You can modify and expand the automatically generated pictures - Picture(3) from the "UNIT_A" unit and Picture(3)(1) from the "UNIT_B" unit in the Graphics Designer of the WinCC Explorer to fit your requirements.

Prerequisites

- In S7-PLCSIM , the CPU simulation is set to the "RUN-P" state.
- 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 SIMATIC Manager .
2	Right-click the "OS(1)" folder and select "Open object' from the shortcut menu. WinCC Explorer opens.
3	Check the following setting: 1. Double-click on "Tag Management". The "WinCC Configuration Studio" opens. 2. In the "Tag Management" window, go to "SIMATIC S7 PROTOCOL SUITE > TCP/IP". 3. Open the shortcut menu and select "System parameters". The "System parameters - TCP/IP" dialog box opens. 4. Select the "Unit" tab. 5. In the "Select logical device name" area, the entry for "Logical device name" should now be "PLCSIM.TCPIP.1". If this is not the case, select this entry from the drop-down list. 6. Click "OK". The "System parameters - TCP/IP" dialog box closes. 7. Close the "WinCC Configuration Studio". If you have made changes, restart WinCC Explorer.
4	1. Right-click on the "OS(1)" folder in the WinCC Explorer to open the shortcut menu and select "Properties". 2. Select the "Options" tab. 3. Select the "Allow activation on ES" check box. Click "OK"
5	Select "File > Activate" in the WinCC Explorer . WinCC Runtime starts.

<table>
<tr><th>Step</th><th>Action</th></tr>
<tr><td>6</td><td>1. If the user interface language of WinCC Runtime does not match the user interface language of the SIMATIC Manager, change to key set 2 by clicking the "Key set change" button at the bottom left of the user interface.
 </td></tr>
<tr><td></td><td>1. Click the "Change language" button in key set 2. The "Change language" dialog box opens.

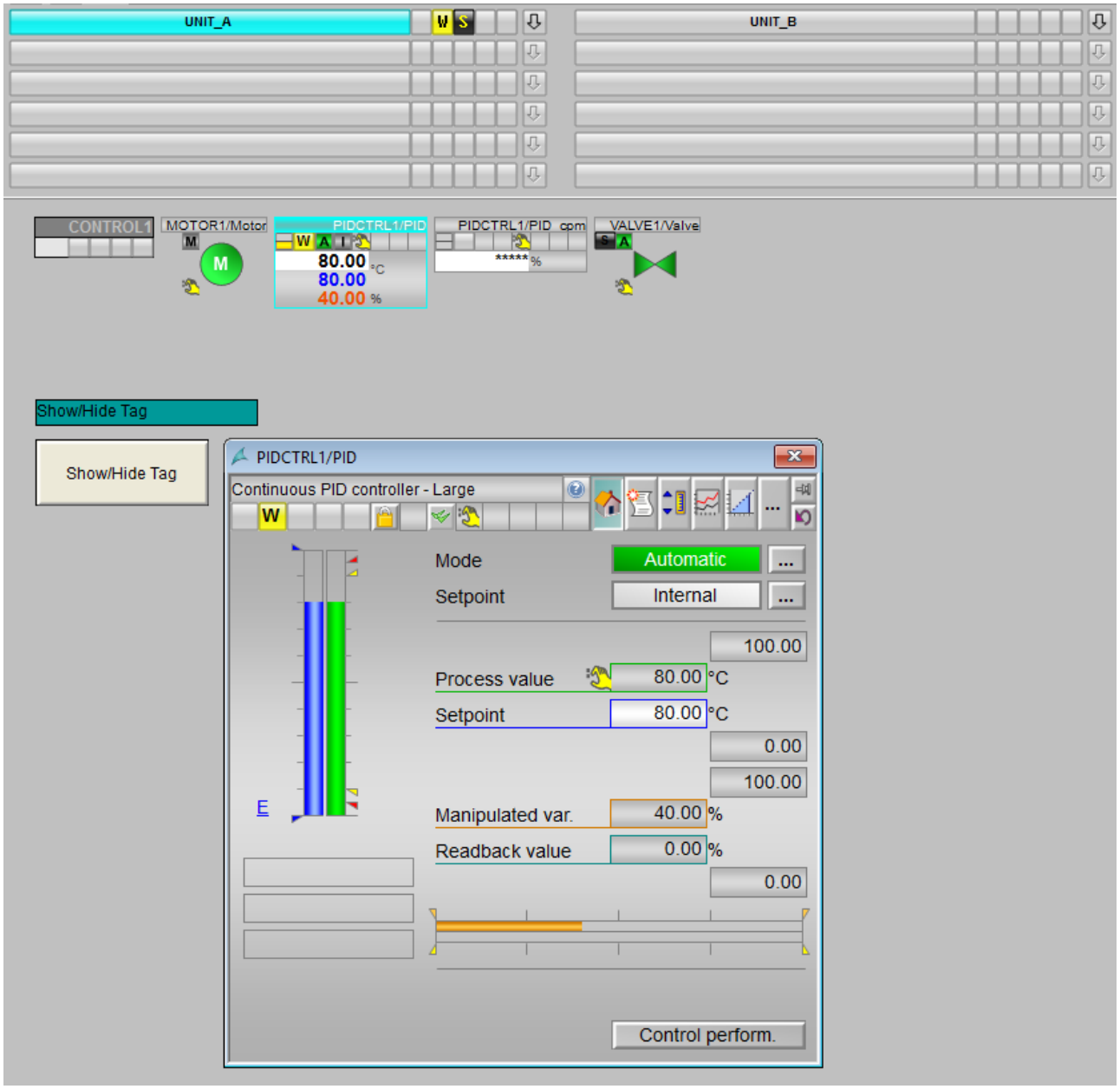
2. Select the required user interface language for WinCC Runtime.</td></tr>
<tr><td>7</td><td>1. Click the "UNIT_A" area selection key in the overview area at the top left of the "SIMATIC PCS 7 Control System" user interface (see figure below "Work area with all operator controls").
2. Click the grey "Show/Hide Tag" button. The designations for the picture objects appear.
The automatically generated picture contains the block icons of the following objects:
<table>
<tr><td>CONTROL1</td><td>Sequential control system</td></tr>
<tr><td>MOTOR1</td><td>Motor</td></tr>
<tr><td>VALVE1</td><td>Valve</td></tr>
<tr><td>PIDCTRL1</td><td>Controller</td></tr>
<tr><td>Show/Hide Tag</td><td>Click to show/hide the designations for the picture objects.</td></tr>
</table>
Note:
In the figure below "Work area with all control elements", the faceplates of the motor and the controller are open.</td></tr>
<tr><td>8</td><td>1. Click the "MOTOR1/Motor" block icon in the work area of the user interface. The faceplate of the motor is displayed in the work area of the user interface.
2. Click the "..." button in the "Command" row. The "MOTOR1/ Motor" faceplate is extended.
3. In the extended faceplate, click "Start". Click "OK".
4. The motor starts. The "Status" in the faceplate displays "Start".</td></tr>
<tr><td>9</td><td>Repeat the basic procedure of step 8 for the Value block icon and test the "Open" command. Test the "Stop" command for the motor and the "Close" command for the valve.</td></tr>
<tr><td>10</td><td>In both the Motor and Valve Faceplates, repeat the basic procedure of step 8 for "Automatic" mode.
Leave the faceplate of the motor in "Automatic" mode. The Valve faceplate may be set as EITHER automatic OR manual.</td></tr>
</table>

Step	Action
11	1. Click the "PIDCTRL1/PID" block icon in the work area of the user interface. 2. Click the "**...**" button in the row entitled "Mode". The "PIDCTRL1/PID" faceplate is expanded. 3. Click the "Automatic" button and click "OK". The controller is switched to "Automatic". 4. Click the display box to the right of the word "Setpoint". The "PIDCTRL1/PID" faceplate is expanded. 5. Use the slider in the expanded section to set the setpoint to `25`. Click "OK". 6. Wait until the process value is **>** `10`. 7. In the toolbar of the faceplate, click the "Acknowledge error" button. The icon for this button displays two green ticks. The controller is now free of errors and in the "Automatic" operating mode.
12	1. Change to keyset 2 by clicking "Keyset change" on the bottom left of the user interface. The arrow will turn from right-facing to left-facing
13	1. Click "SFC Visualization" in key set 2. The "Open SFC" dialog box opens.
14	1. In the right window, select "CONTROL1" in the "SFC Name" column and click "OK". The SFC overview is displayed in the work area. 2. Click the "Start" button and confirm the dialog box that appears by clicking "OK".If the process value of the controller is not higher than `50`, the sequential control system stops at the first transition and is not executed further. If this is the case, do the following:Click on the faceplate of the "PIDCTRL1/PID" controller (see picture below "Executing the sequential control system").Click on the input box next to "Setpoint" in the faceplate of the controller. The faceplate is expanded. Enter "`80`" as the setpoint. Click "OK".
15	1. Observe the execution of the sequential control system. – When the configuration is correct, the sequential control system is executed completely. – MOTOR1 is started in the flow chart in step 3 and stopped again in step 4.
16	1. Click "Keyset change" to change to keyset 1.

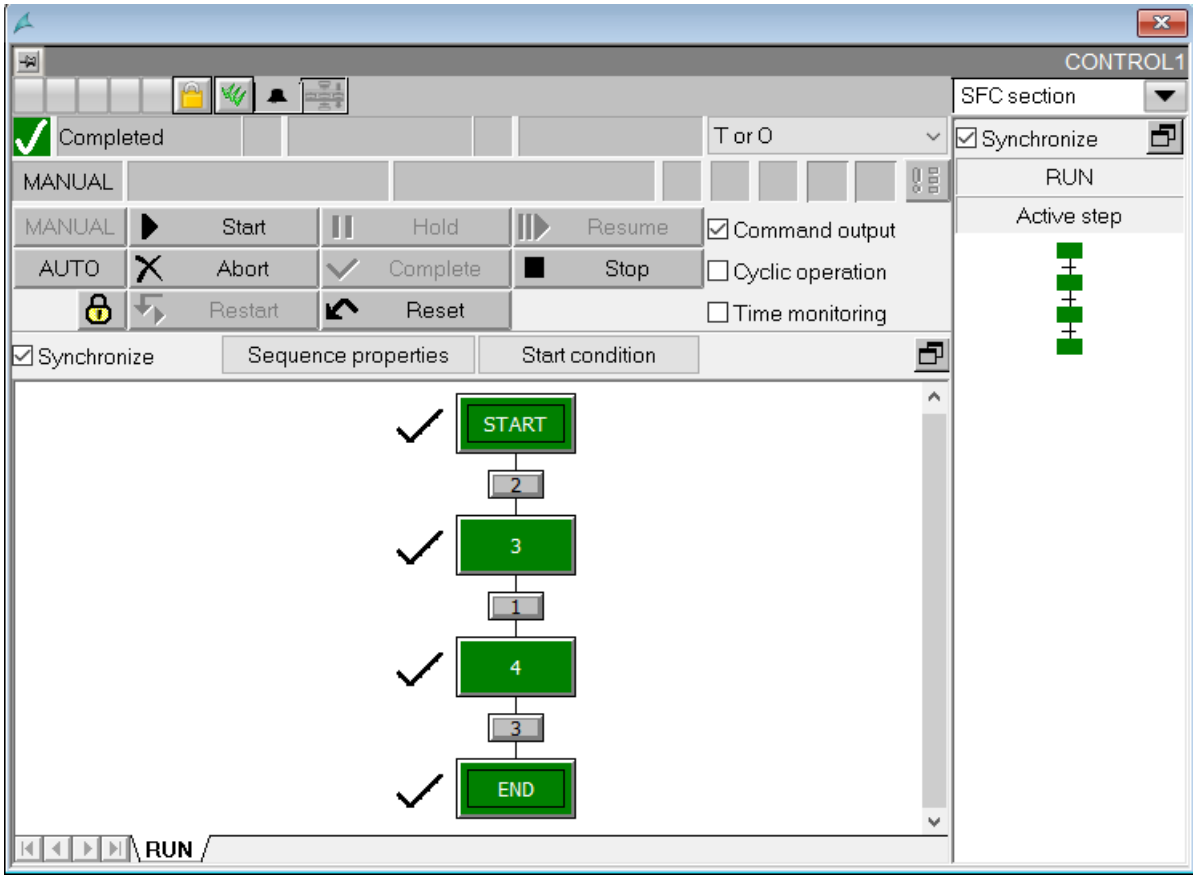
Step	Action
17	1. Click the "Alarm Logging" button. The newly received messages are displayed in the work area.
18	1. Click "Operation List". The operating messages are displayed in the work area. The list displays all actions you have performed in the faceplates.

Result

Work area with opened faceplate of PIDCTRL1:



Execution of the sequential control system (Step 9 to 11):



Operation List (step 10):

operation list

	Date	Time	Priorit	Source	Operation
1	28/11/17	15:08:09.000	0	MOTOR1/Motor	: Start (StartMan) new = 1 old = 0
2	28/11/17	15:09:24.350	0	CONTROL1	Executing 'Start' command
3	28/11/17	15:09:41.029	0	CONTROL1	Step control mode is set to "T or O"
4	28/11/17	15:09:46.469	0	CONTROL1//RUN	Transition: 2 Acknowledging operator prompt
5	28/11/17	15:09:51.273	0	CONTROL1//RUN	Transition: 1 Acknowledging operator prompt
6	28/11/17	15:09:55.053	0	CONTROL1//RUN	Transition: 3 Acknowledging operator prompt
7	28/11/17	15:18:00.000	0	VALVE1/Valve	: Open (OpenMan) new = 1 old = 0
8	28/11/17	15:18:21.000	0	VALVE1/Valve	: Automatic (AutModOp) new = 1 old = 0
9	28/11/17	15:19:18.000	0	PIDCTRL1/PID	: Automatic (AutModOp) new = 1 old = 0
10	28/11/17	15:20:22.000	0	PIDCTRL1/PID	: Setpoint (SP_Int) new = 25 °C old = 40 °C

Exit WinCC Runtime

To exit WinCC Runtime, use the following icon:

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