SIMATIC powerrate for PCS 7

SIMATIC PCS 7 powerrate Configuration Instructions

FAQ • November 2010

Service & Support

SIEMENS

Introduction

SIMATIC PCS 7 powerrate provides for transparency in energy consumption from supply to consumer. SIMATIC PCS 7 powerrate continuously captures, archives and processes energy data. A precise view of the usage profile permits you to configure efficient power supply and detect energy-saving potential, which will help you effectively lower the costs for energy. Monitoring of the power limit agreed will put you in a position to exploit your limit to the full without unnecessarily having to pay high prices or even penalties for the power supply.

Advantages

- Efficient process design and optimization of energy efficiency by identifying power-intensive processes and devices and comparing usage profiles and costs.
- Reduced operating costs through enhanced transparency of energy flow.
- Greater awareness of energy costs through specific assignment of costs, causes and batches.
- Keeping to contractually agreed power limits and thus avoidance of higher power supply costs and penalties.
- Secure application ensured by tested system components.

Contents

1 Preparation and Installation

1.1 Hardware Requirements

The hardware requirements for PCS 7 apply for the installation. More information about compatibility is provided with each version of PCS 7.

1.2 Software Requirements

1.2.1 PCS 7 Installation

To be able to work with SIMATIC PCS 7 powerrate V3.0 SP1 you must install one of the versions of PCS 7 given below.

- SIMATIC PCS 7 V6.1 SP3
- SIMATIC PCS 7 V7.0 SP3
- SIMATIC PCS 7 V7.1
- SIMATIC PCS 7 V7.1 SP1

Note

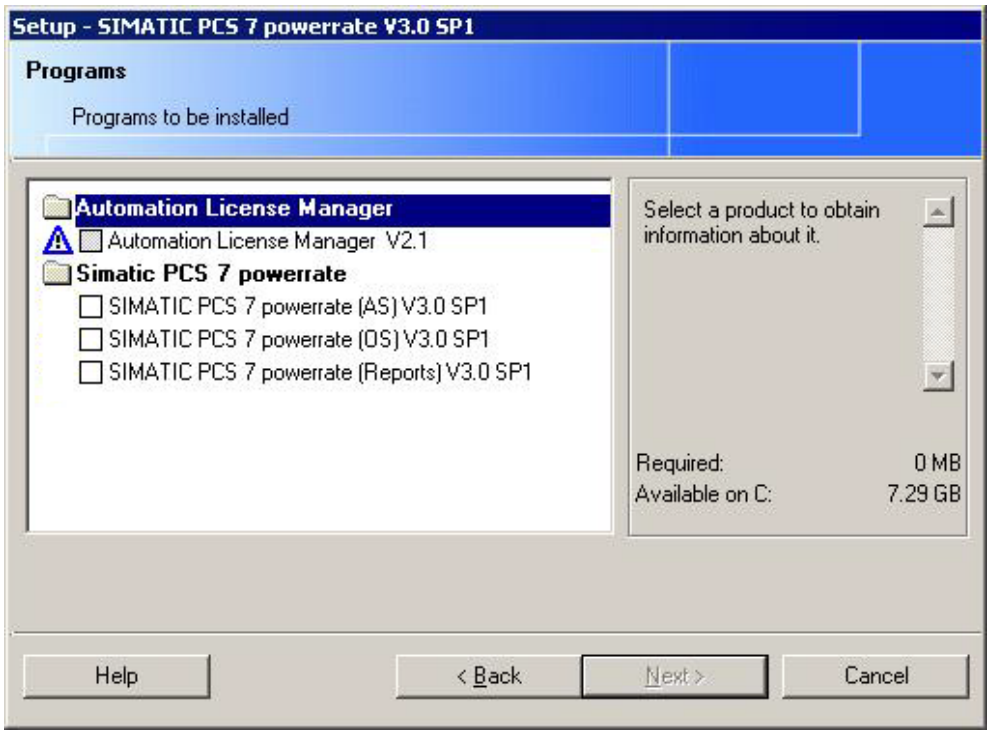
The User Archives option is used for archiving/logging the load management configuration and SIMATIC Batch-related energy data. A license is required for this.

As from version V3.0 SP1 a license for SIMATIC WinCC/User Archives is included in the SIMATIC PCS 7 powerrate Engineering and Upgrade package.

1.2.2 SIMATIC PCS 7 powerrate

Start the "setup.exe" program to start installation. Any further information you might need will be provided in the course of the installation. Please also read the information in the readme file. You can select three components for installation.

- SIMATIC PCS 7 powerrate (AS)
  → AS library for SIMATIC powerrate PCS 7 V3.0 SP1
- SIMATIC PCS 7 powerrate (OS)
  → PCS 7 Faceplates and C Subroutines
- SIMATIC PCS 7 powerrate (Reports)
  → powerrate Reports and Online Help



Note To be able to use the powerrate reports you must have Microsoft Excel 2003 or 2007 installed.

2 Information about the SIMATIC powerrate Library

2.1 Overview

The library is copied into the directory in which the STEP 7 Basis software is also installed (for example, <Drive>:\SIEMENS\Step7\s7libs\powerrate).

2.1.1 Overview of the S7-400 Blocks

Name	Function	Number
PRE_SYNC	Time synchronization	FB1060
PRE_SUM	PCS 7 block for acquiring and processing energy	FB1061
PRE_FIFO_DATA	FIFO buffer	FB1062
PRE_AR_DATA	Data interface for sending the archive data	FB1063
PRE_AR_SND	Archiving of measured values in the WinCC tag logging archive	FB1064
PRE_LMGM	Load management for up to 100 loads	FB1065
PRE_LMGM_75	Load management for up to 75 loads	FB1066
PRE_LMGM_50	Load management for up to 50 loads	FB1067
PRE_LMGM_25	Load management for up to 25 loads	FB1068
PRE_LMGM_10	Load management for up to 10 loads	FB1069
PRE_AS_SEND	Send block for AS-to-AS communication	FB1070
PRE_AS_RECV	Receive block for AS-to-AS communication	FB1071
PRE_SND_H	Send block for AS-4xxH to AS-400 communication	FB1072
PRE_RCV_H	Receive block for AS-4xxH to AS-400 communication	FB1073
PRE_BS	Calls the BSEND system function block (used internally)	FB1074
PRE_BR	Calls the BRCV system function block (used internally)	FB1075
PRE_SUMC	Block for batch-related energy acquisition	FB1077
PRE_UA_S	Archive manager for writing archive data to the user archive	FB1078
PRE_UA_R	Archive manager for reading archive data from the user archive	FB1079
PRE_SWTCH	PCS 7 block for general switch	FB1750
PRE_PAC	PCS 7 block for basic functionality of the PAC3200 / PAC4200	FB1751
PRE_CALC	Calculation block	FC1061
PRE_FIFO_IO	Organizes the FIFObuffer	FC1062

2.1.2 User Data Types

Name	Function	Number
UDT_PRE_FIFO	Data type for check data for organizing the FIFO buffer	UDT1060
UDT_PRE_ITEM	Data type for measured value	UDT1061
UDT_PRE_TLG	Data type for message frame item for sending to the WinCC tag logging archive	UDT1062
UDT_PRE_SND_REQ	Data type for write data request	UDT1063
UDT_PRE_SND	Data type for archive manager checkback signal for writing	UDT1064
UDT_PRE_RCV_REQ	Data type for read data request	UDT1065
UDT_PRE_RCV	Data type for archive manager acknowledgment signal for reading	UDT1066
UDT_PRE_ANY	Data type for Any pointer	UDT1067

Note

You cannot change the numbers of the UDT blocks.

You can change the numbers of the blocks that are not used internally, in the SIMATIC Manager.

2.1.3 Changing the Block Numbers

Proceed as follows to change the numbers of the internally used blocks PRE_BR, PRE_BS and PRE_CALC.

- Copy the library into a PCS 7 project.
- Select the block container and call "Re-wire" in the pop-up menu.
- In the dialog that opens you enter the values for "Old operand" and "New operand" and then run "Re-wire".
  An error message is displayed indicating that you cannot re-wire a block. You can ignore this message.
- Check the changed block number in the "Calls" tab of the block's object properties.
- Update the block numbers in the symbol table.

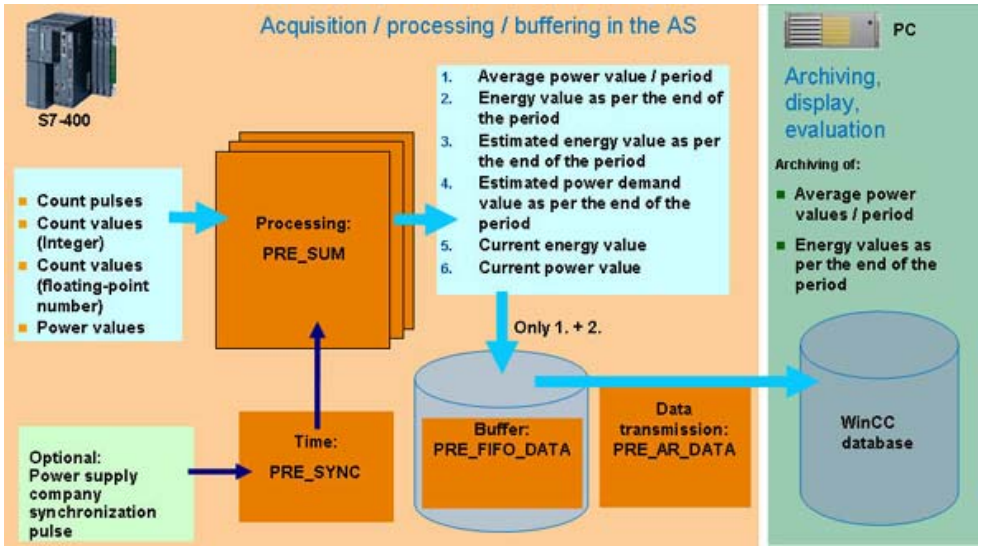
3 Getting Started

This Getting Started provides a fast and precise introduction to SIMATIC PCS 7 powerrate. It does not contain a complete list of all the possible functions, but it does contain all the information required to use the main functions. The sample project provided was created with PCS 7 V 7.1 SP1 and SIMATIC powerrate V 3.0 SP1. Please take this into account when using the sample project.

4 Welcome

SIMATIC PCS 7 powerrate Configuration Instructions

Getting Started uses a sample project to demonstrate how easy it is to work with SIMATIC PCS 7 powerrate WinCC. You will need about 4 hours to work your way through all the topics of this documentation and to acquire the basic knowledge for configuring SIMATIC PCS 7 powerrate. A large part of the documentation is based on figures illustrating the various configuration steps.



The figure above gives you a good overview of the functions of the SIMATIC PCS 7 powerrate function blocks.

The **PRE_SUM** block is used to acquire and process the energy values, and it is the interface of the OS. Various signal types are supported. They are selected using the input parameter "INP_SEL".

- INP_SEL= 0 → counting pulse
- INP_SEL= 1 → integer counter value
- INP_SEL= 2 → analog counter value
- INP_SEL= 3 → energy value* calculated with calculation function

The current value, trend and average value / period can be calculated for each **PRE_SUM** block for performance and energy values.

Note * See calculation algorithms included in the PRE_CALC block.

The **PRE_SYNC** block acts as a clock for synchronizing the PRE_SUM power acquisition block and other SIMATIC powerrate blocks. The SYNC_OUT clock is triggered by an external synchronization signal (EXT_SYNC) or the internal CPU clock.

The **PRE_FIFO_DATA** block serves as a buffer for the measured values to be archived that the **PRE_SUM** block supplies and which are sent to the OS by the **PRE_AR_SND** block.

The **PRE_AR_DATA** function block contains the data interface for the archive data to be sent and calls the **PRE_AR_SND** block that sends the archive data to OS.

The Getting Started consists of the sections below.

- Creating a Project in the SIMATIC Manager
- Copying the Templates from the SIMATIC powerrate Library
- General Settings
- Configuration of the AS and PC stations
- Compiling the OS
- Icons for the Process Pictures
- Relationship between Block Icon and S7 block PRE_SUM

5 Creating a Project in the SIMATIC Manager

Introduction

This chapter provides information about PCS 7 and a description of how to create a project in the SIMATIC Manager. The project is the basis for configuring a user interface in the PCS 7 OS. In the project you can create and process all the objects you need for operating and monitoring the processes.

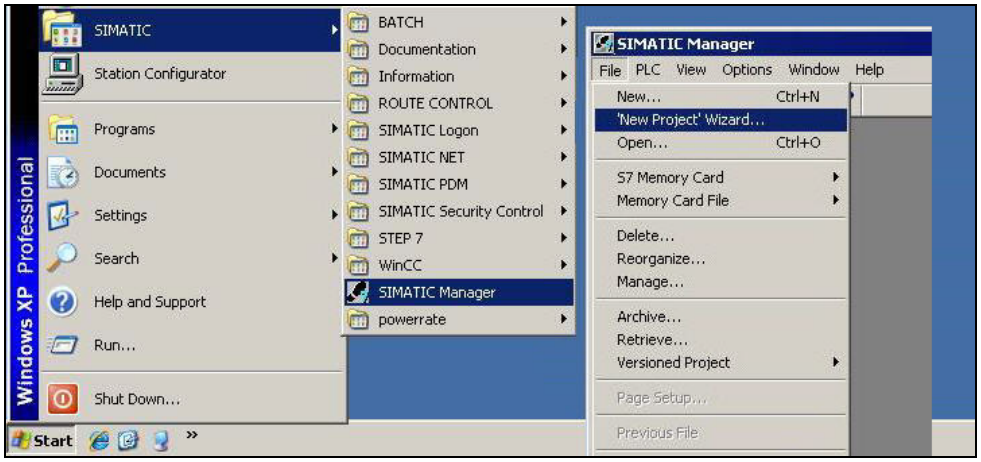
5.1 Creating a PCS 7 Project

Requirements

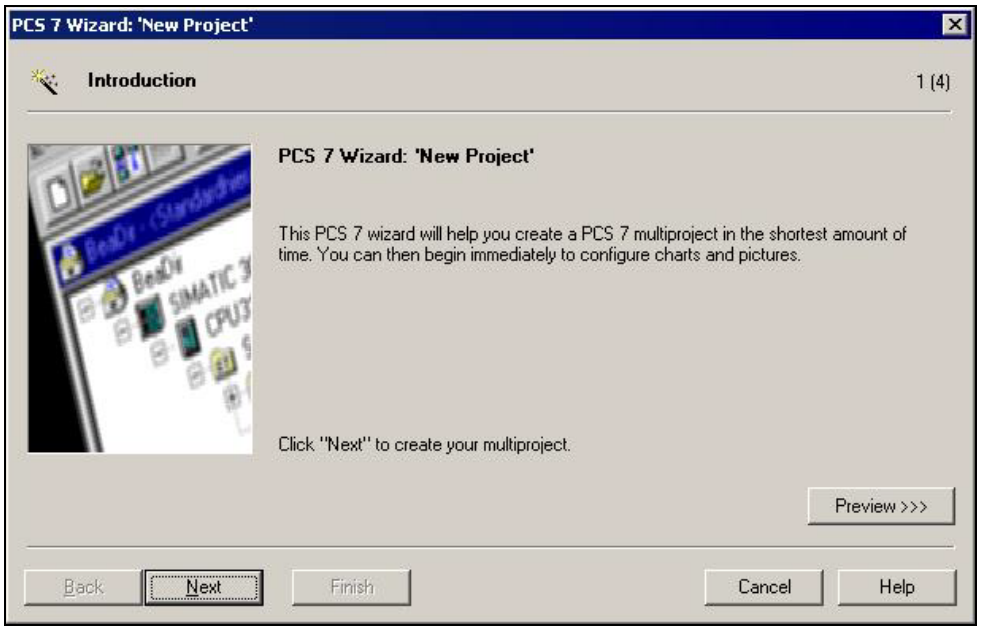
- PCS 7 is installed

Procedure

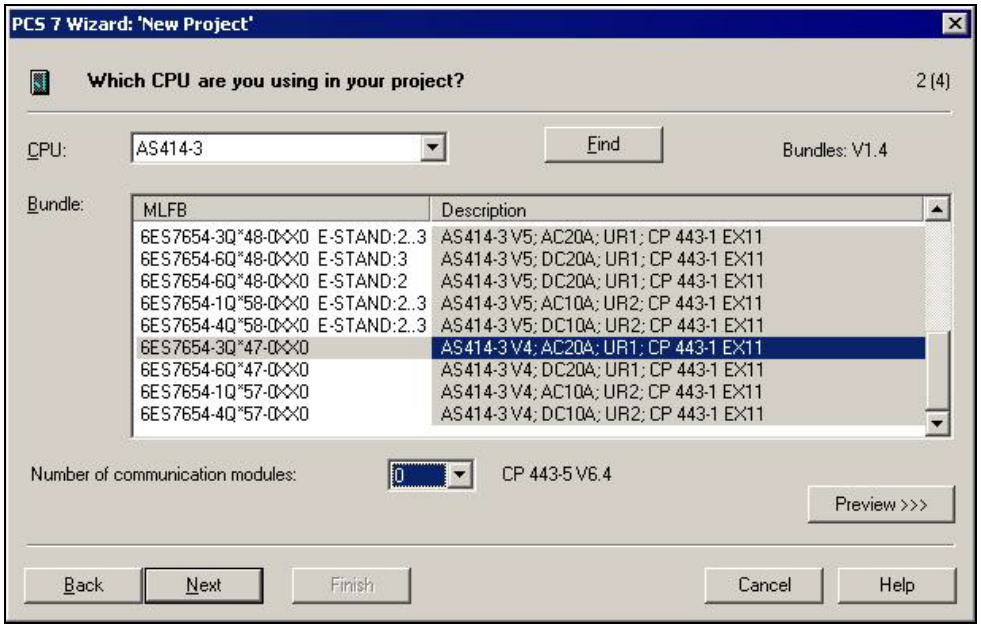
1. Open the SIMATIC Manager and select `"File > "New Project" Wizard…"`.



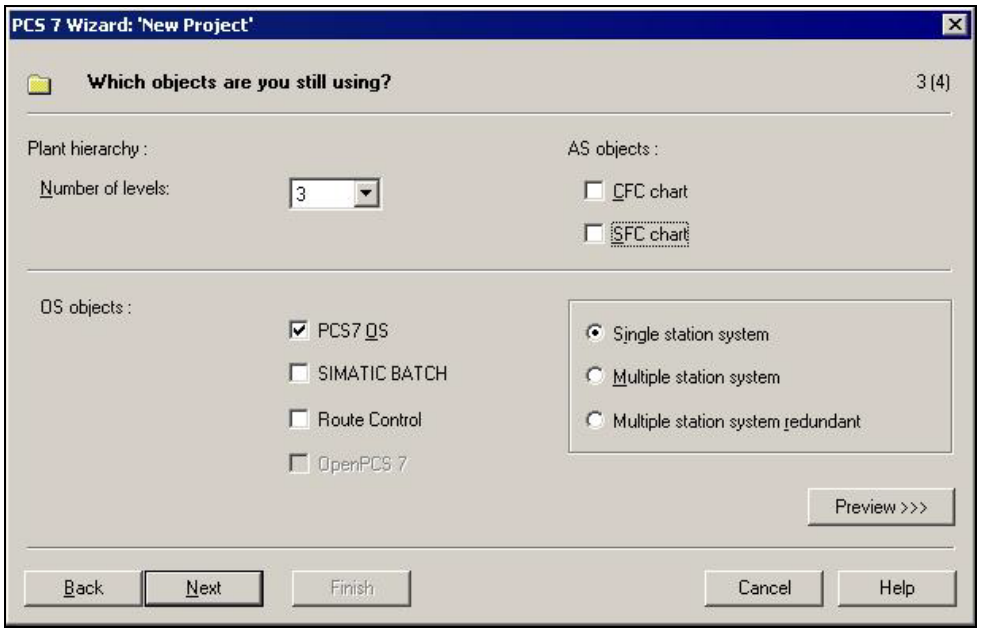
2. Follow the wizard's instructions as shown in the figures below.



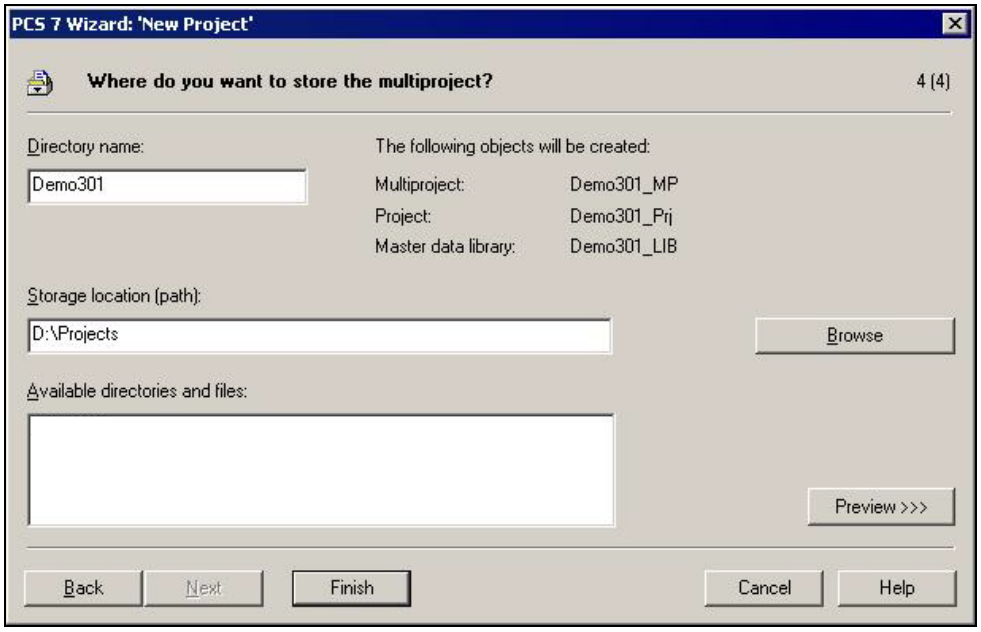
3. Select your bundle type.



4. Define the settings for the OS objects and the plant hierarchy.



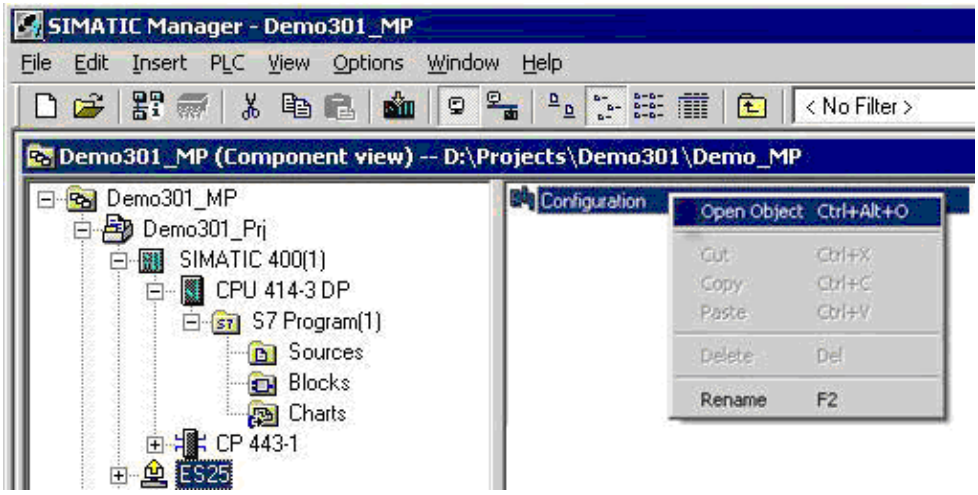
5. Enter the name of the directory and the storage location.



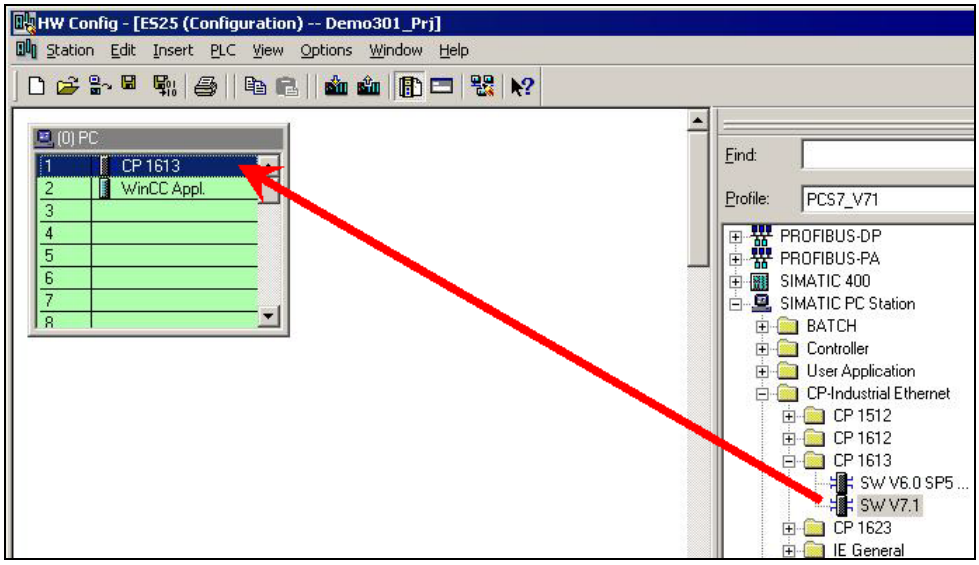
6. Click the "Finish" button to close the wizard.

Note Create a new network (Ethernet (1), for example) for the interface of the CP443-1 and define a MAC address (an IP address is not necessary).

7. Change the default name of the PC station to that of your PG/PC (ES25, for example) and open the configuration.



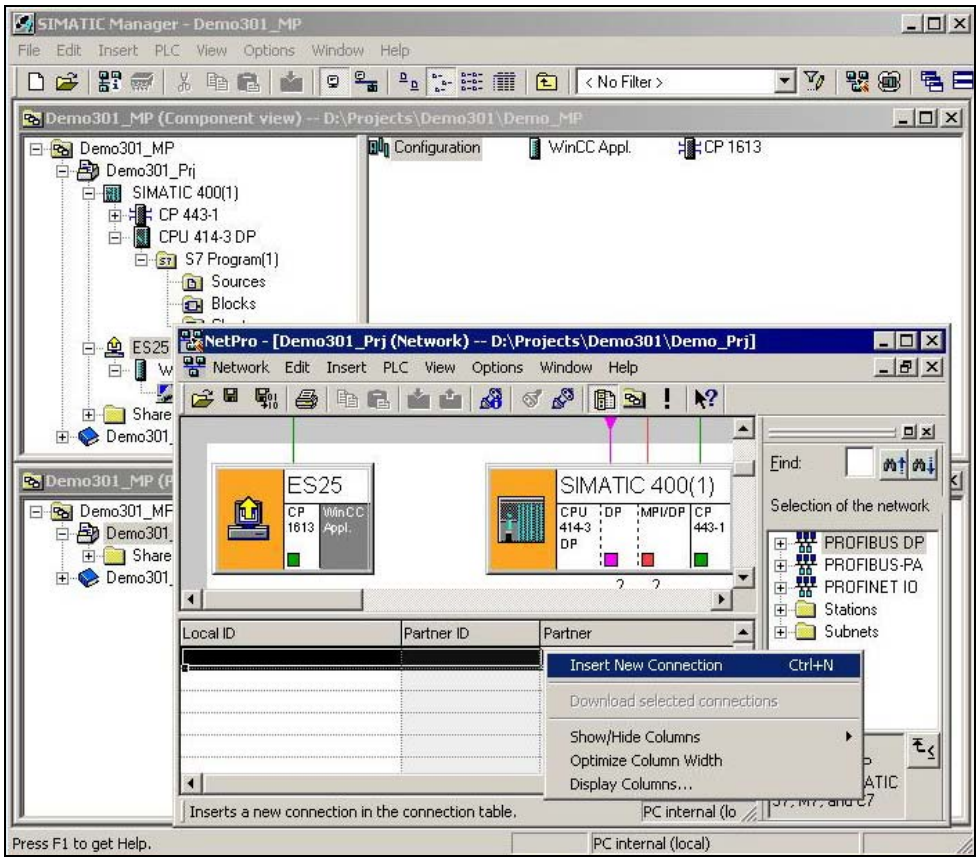
8. Add a CP1613, for example. If you do not have a CP1613, use an IE General instead.



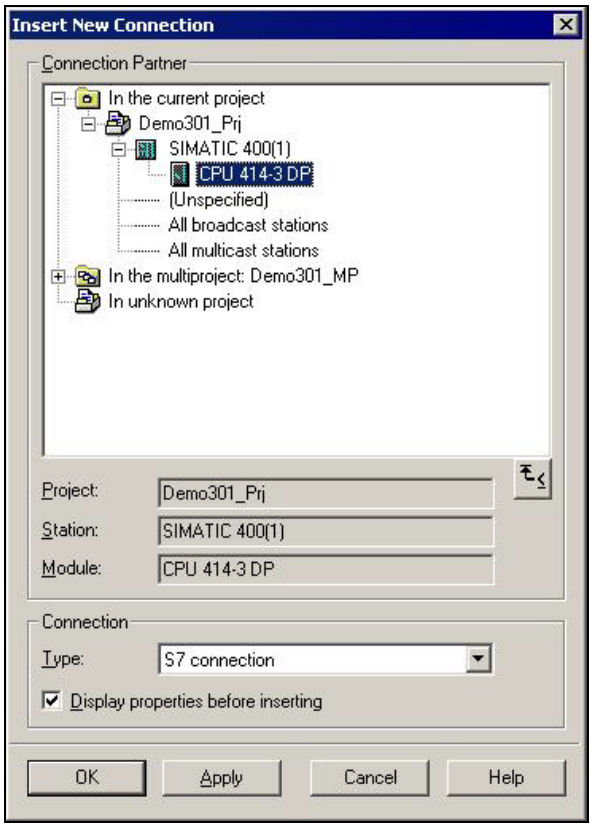
Note

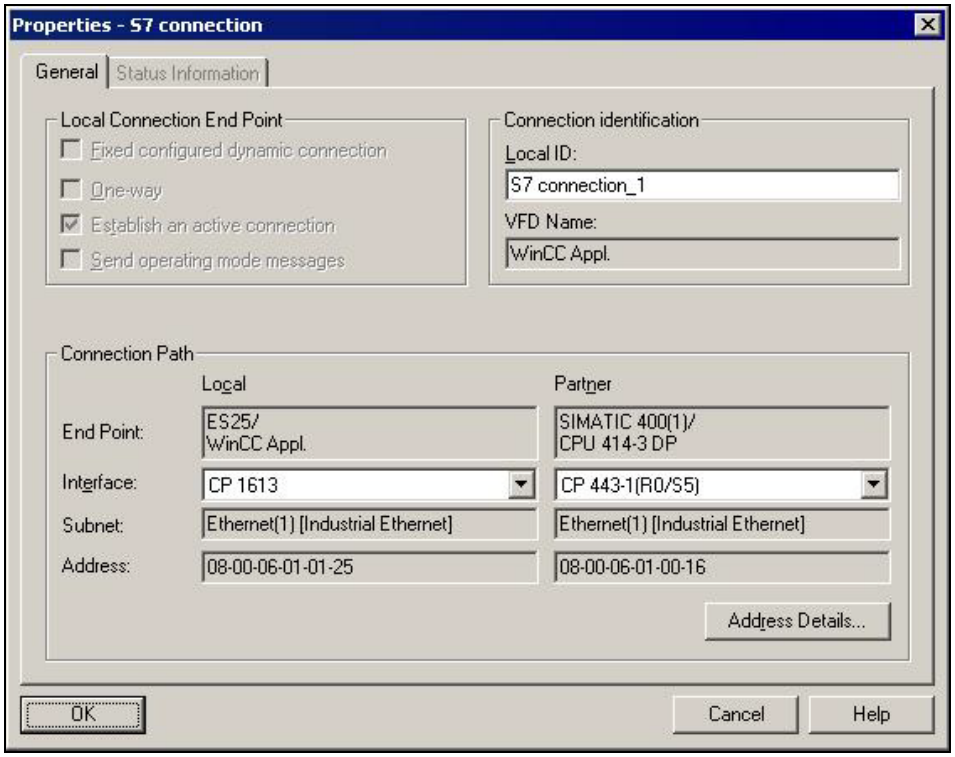
Configure a MAC address for the CP1613 (08-06-01-00-25, for example) and assign the card and the Ethernet(1) network. For the IE General card you must enter the MAC address of the card you wish to use.

9. Start the "NetPro" and select `"Insert New Connection"`.

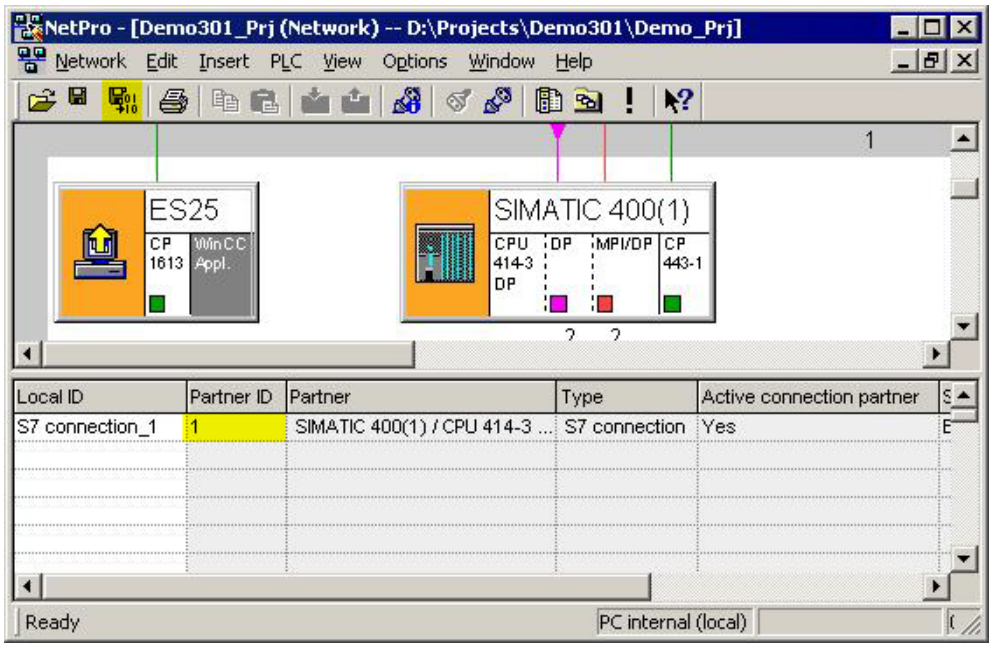


10. Create a new S7 connection. Check the connection settings and path. Quit the dialog with "OK".





11. Save and compile the configuration.



Note You will need the Partner ID again later in the project.

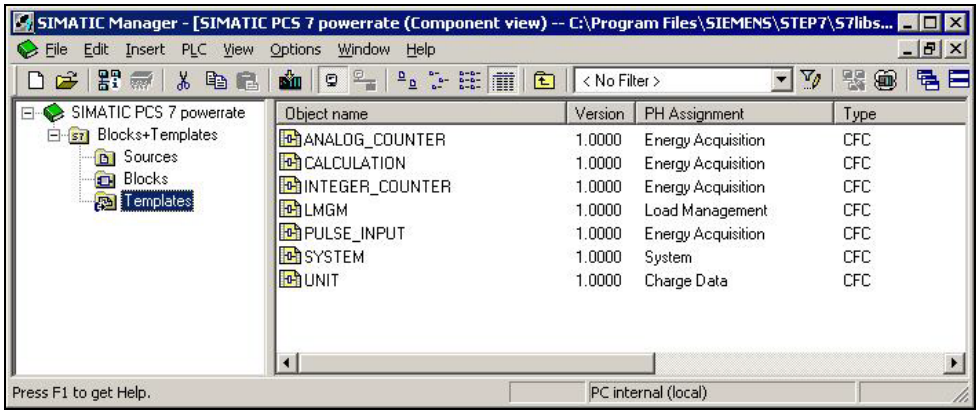
Result

You have created a project called "Demo301_MP".

6 Copying the Templates from the SIMATIC powerrate Library

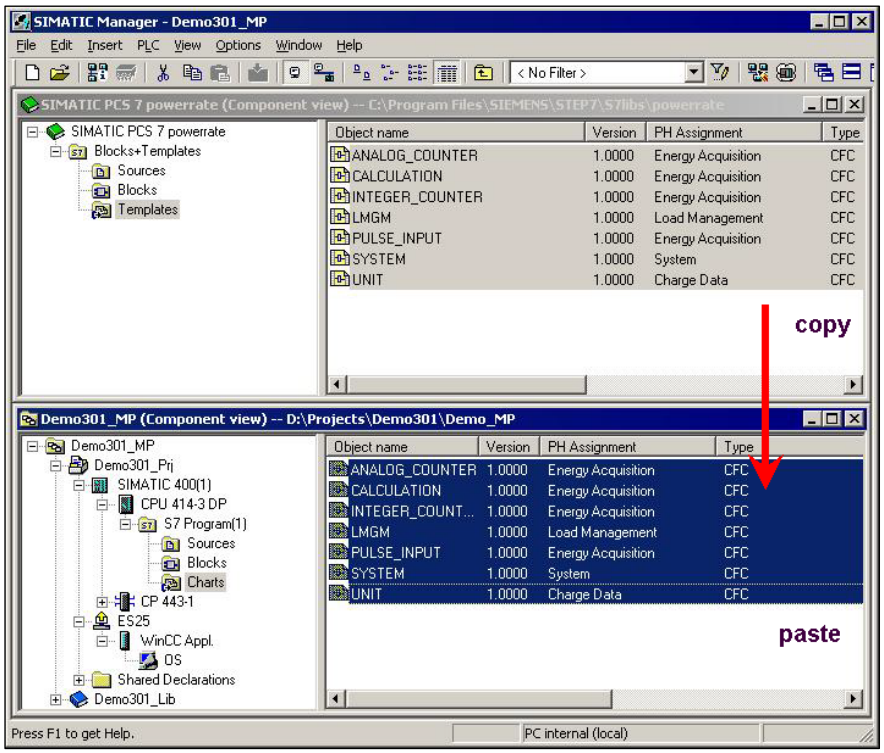
6.1 Overview

The library contains prepared CFC templates that you can use. In the sections below we describe the relevant CFC charts and procedures for creating programs.



6.2 Copying Charts

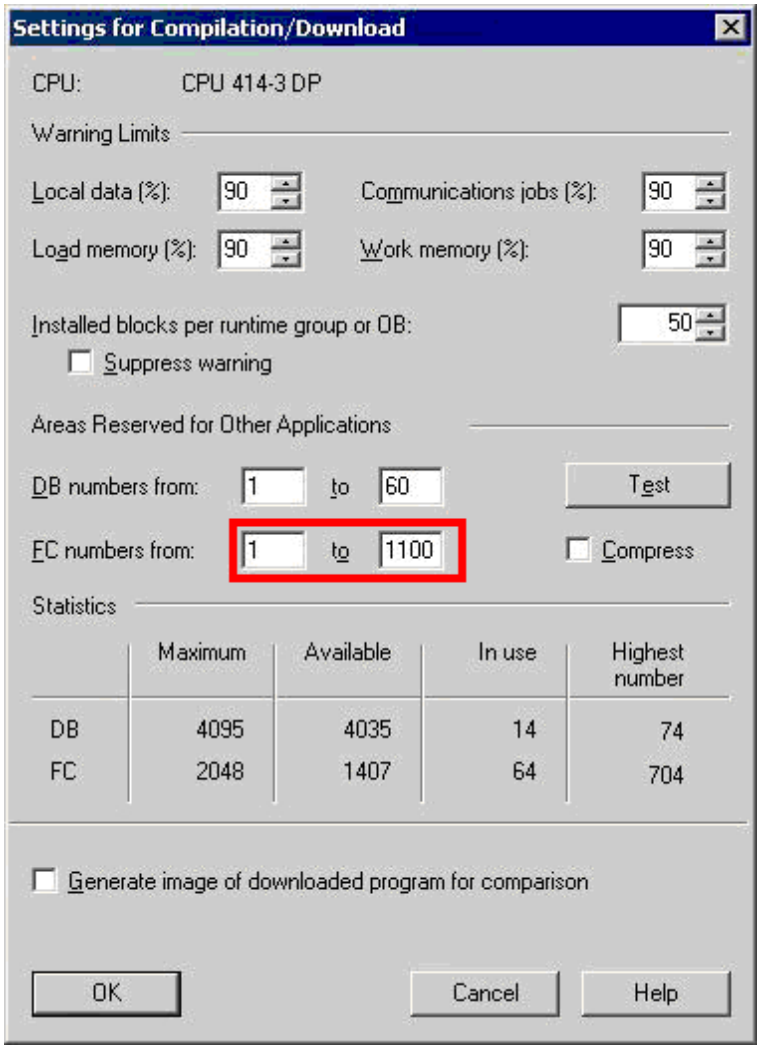
Copy all the charts from the SIMATIC powerrate library into your project.



Open the

Plant View and delete all the unnecessary hierarchy folders created by the wizard.

Since we are using blocks whose numbers have been assigned by default by the CFC, you have to change the Compilation/Download settings in the CFC before compiling the program. You make these changes in the CFC in the menu "Options> Customize> Compile/Download...".



6.3 General Settings

6.3.1 Time Settings

The time of the CPU must be synchronized with the time of the PCS 7 server for correct archiving, application and acquisition of times. The CPU time must be set to UTC time.

Make sure that the time synchronization is set for the CPU, the CP CP443-1 and the CP1613 (not possible for IE General). You must also make the settings in the OS.

6.3.2 Internal Tag

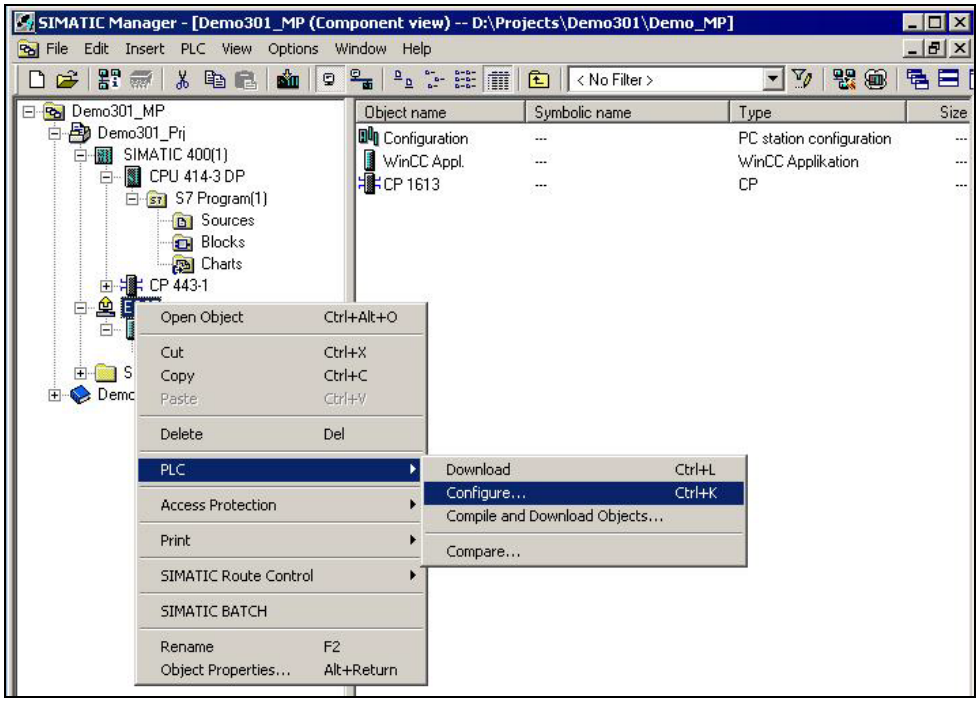
Open the OS and in the Tag Management create an internal tag of the "Text tag 8-bit character set" type named "pre_inf".

7 Downloading the Configuration into the AS and the PC Station

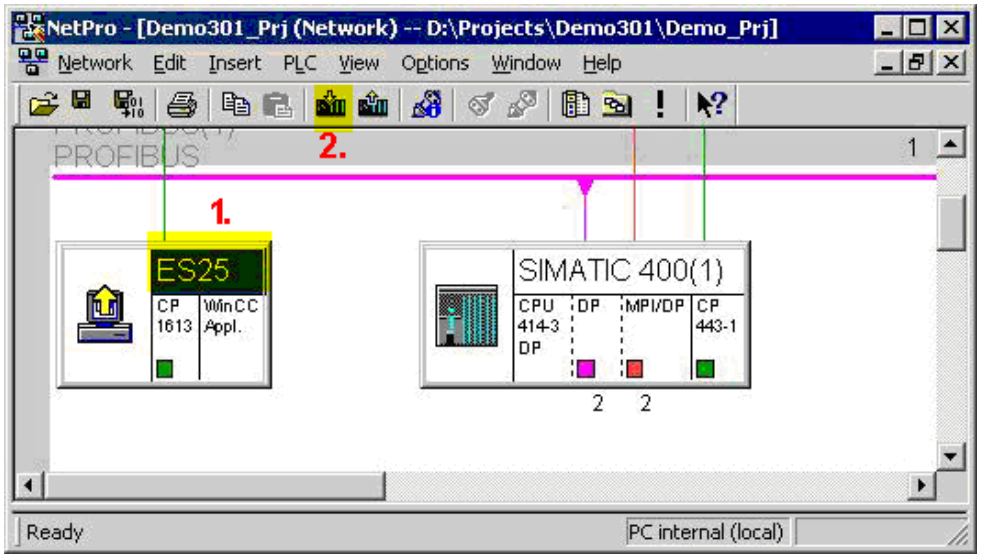
The configuration for the CPU and the PC station is ready. Now you must download both stations.

Note Make sure that the PG/PC interface is set to PC internal (local).

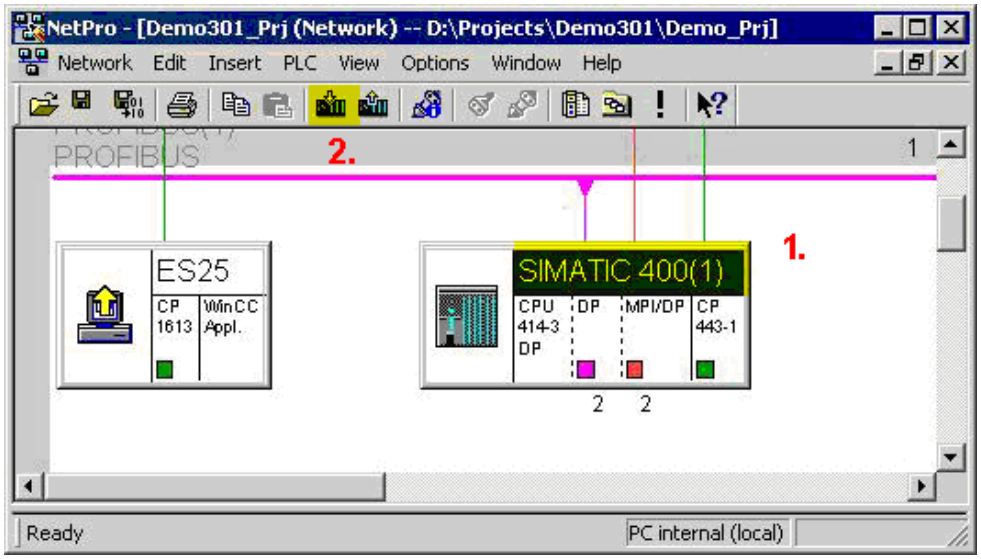
1. Configure the PC station.



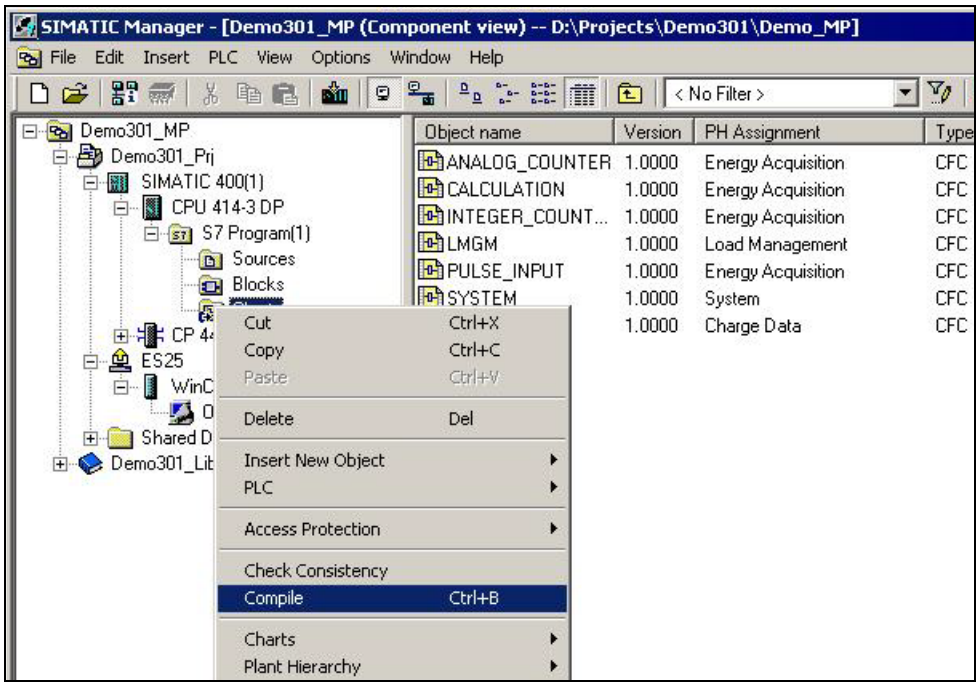
2. Open "NetPro", mark the PC station(1) and download it(2).



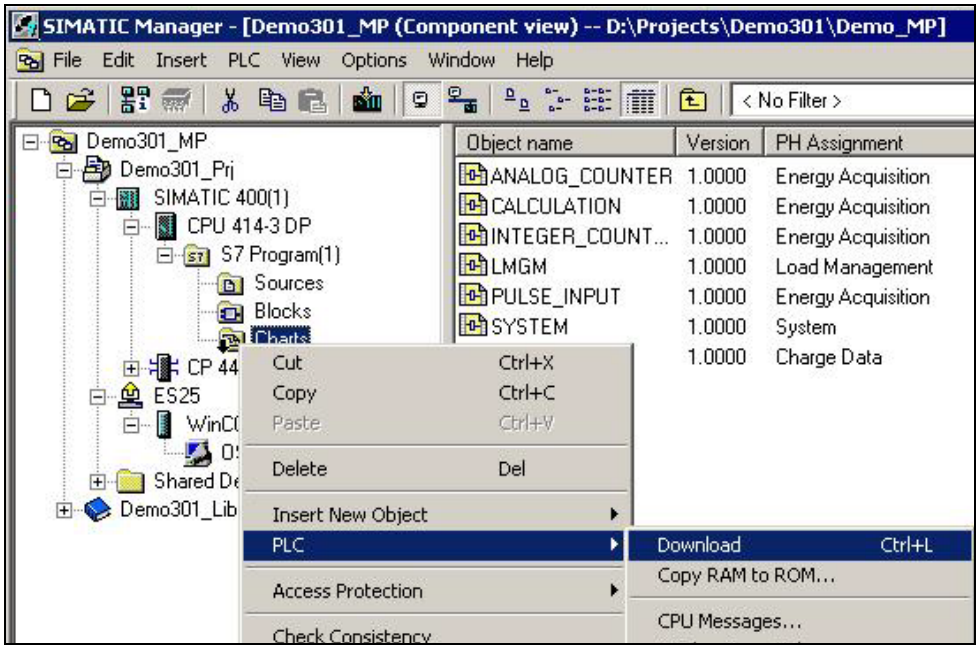
3. Then mark the S7-400 station(1) and download it(2).



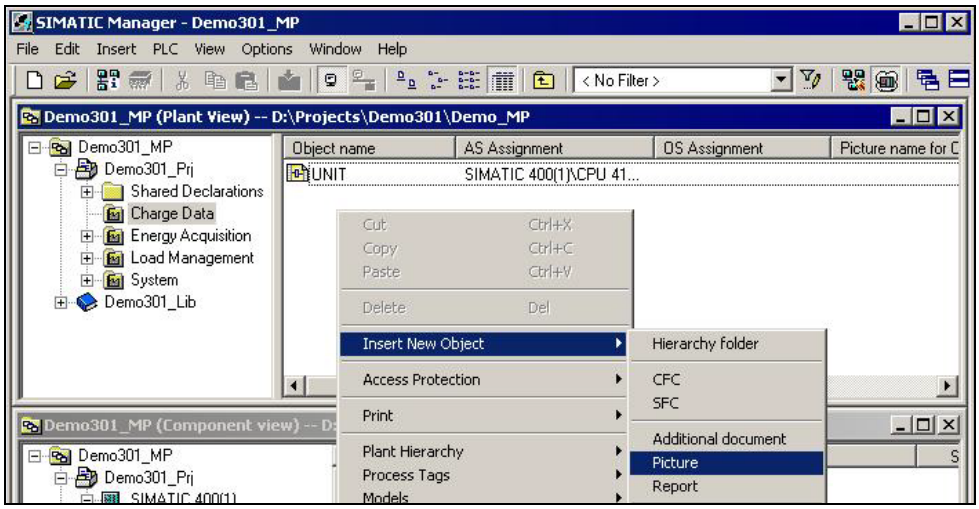
4. Compile your program.



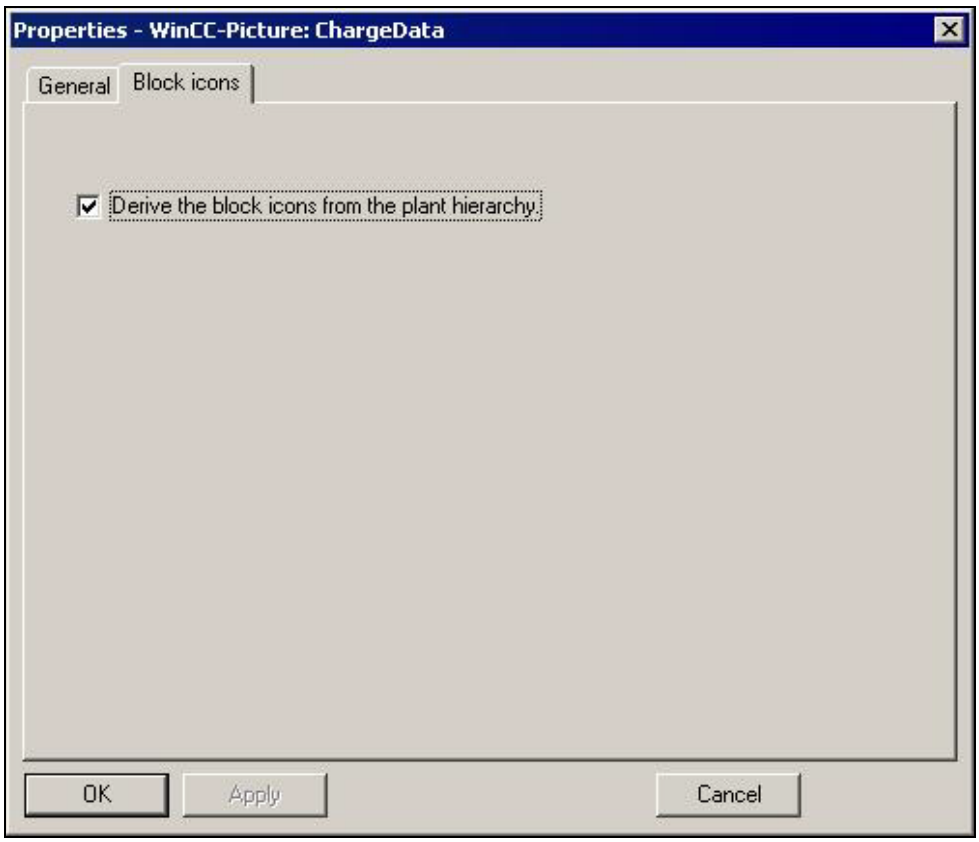
5. After successful compilation, download your program into the CPU.



6. Open the Plant view and insert a picture into each hierarchy folder.

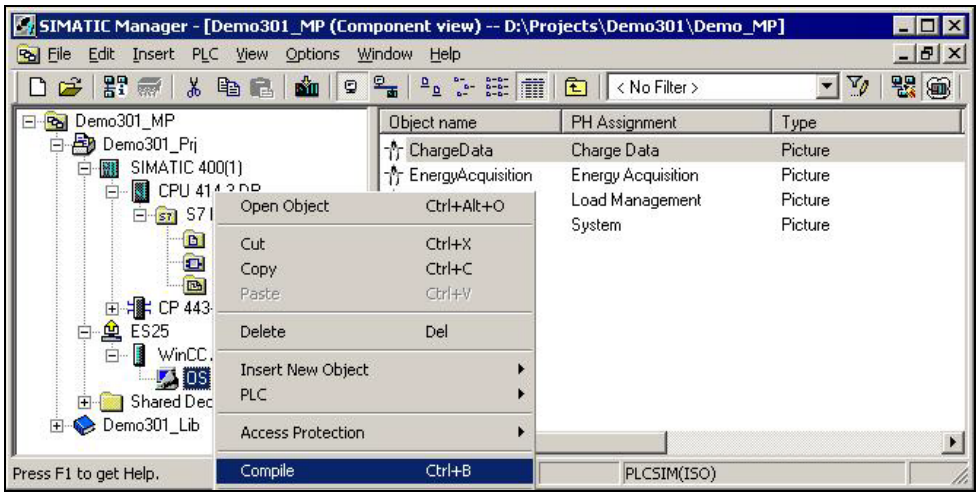


7. The settings for deriving the block icons from the plant hierarchy are set automatically when a picture is inserted into the hierarchy.



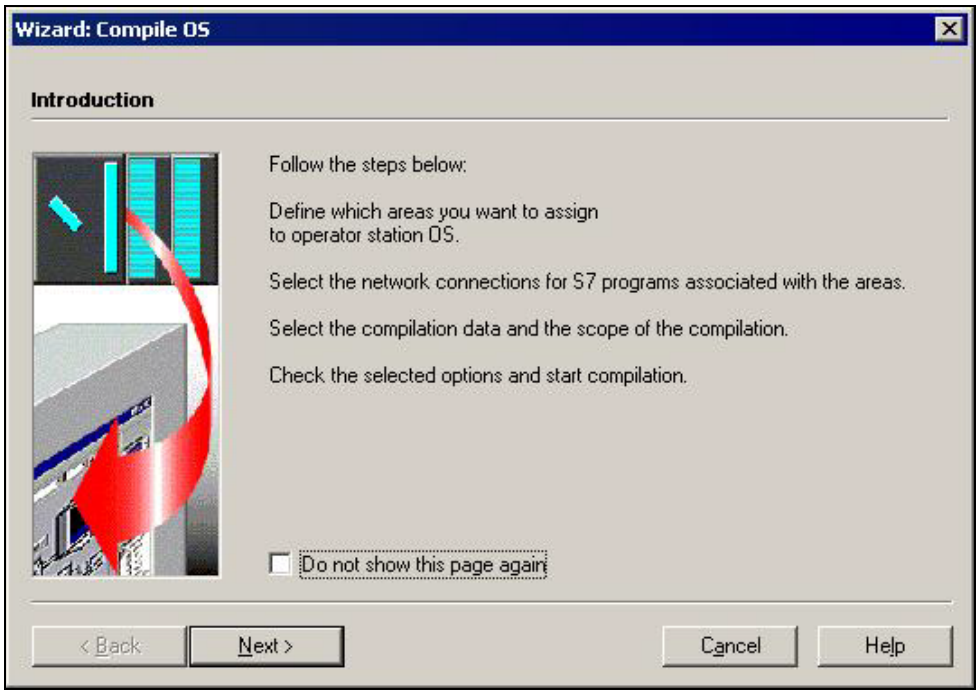
8 Compiling the OS

Mark the OS and select "Compile" in the pop-up menu. The wizard for compiling the OS will start and guide you through the process.



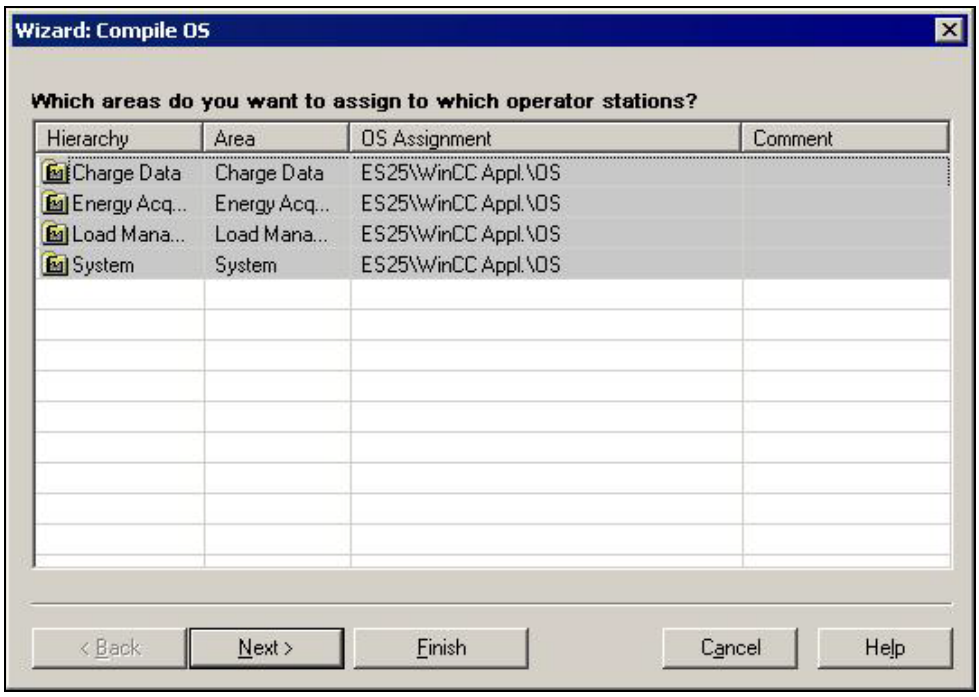
OS Compilation Wizard Step 1

Press the "Next >" button.



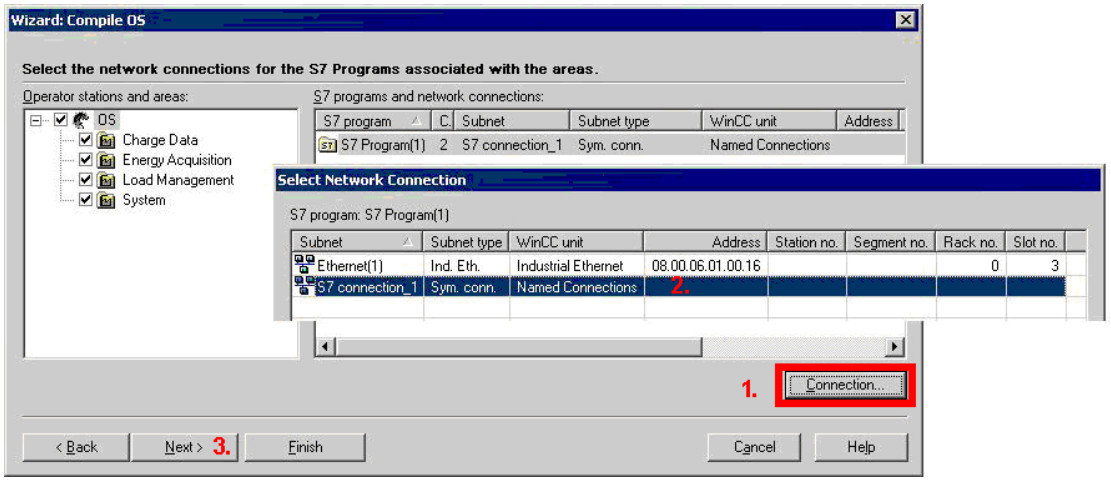
OS Compilation Wizard Step 2

Press the "Next >" button.



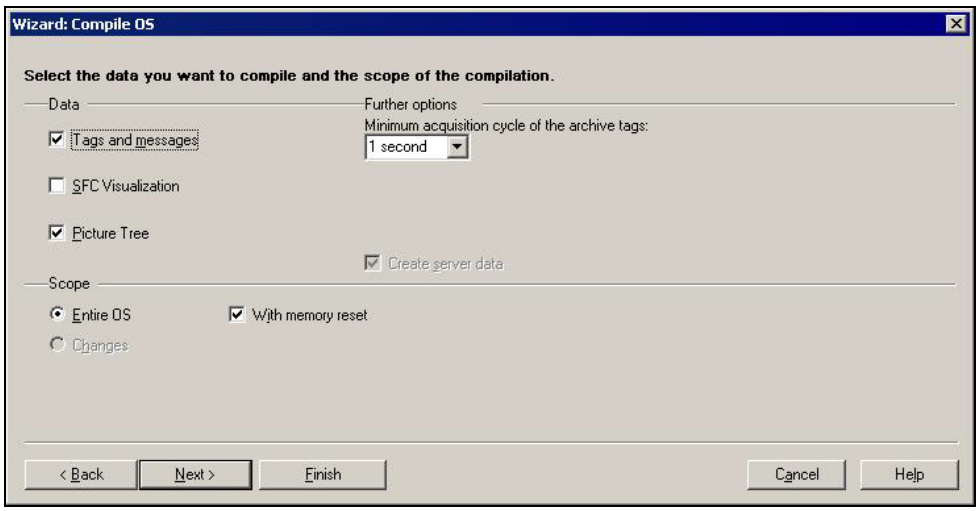
OS Compilation Wizard Step 3

- Click "Connection..." to select the network connection.
- Select the configured S7 connection (Named Connection) and then click the "OK" button.
- Press the "Next >" button.



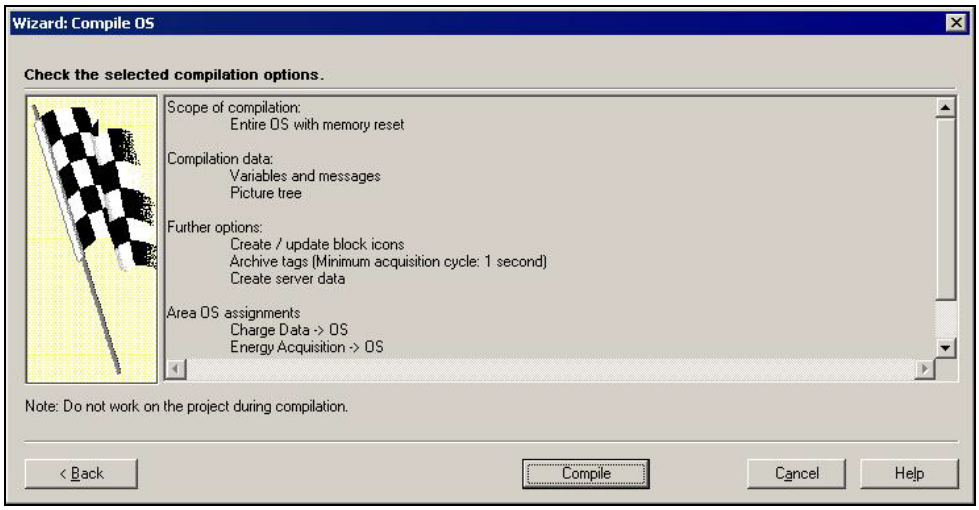
OS Compilation Wizard Step 4

Press the "Next >" button.



OS Compilation Wizard Step 5

Close the wizard by clicking the "Compile" button.

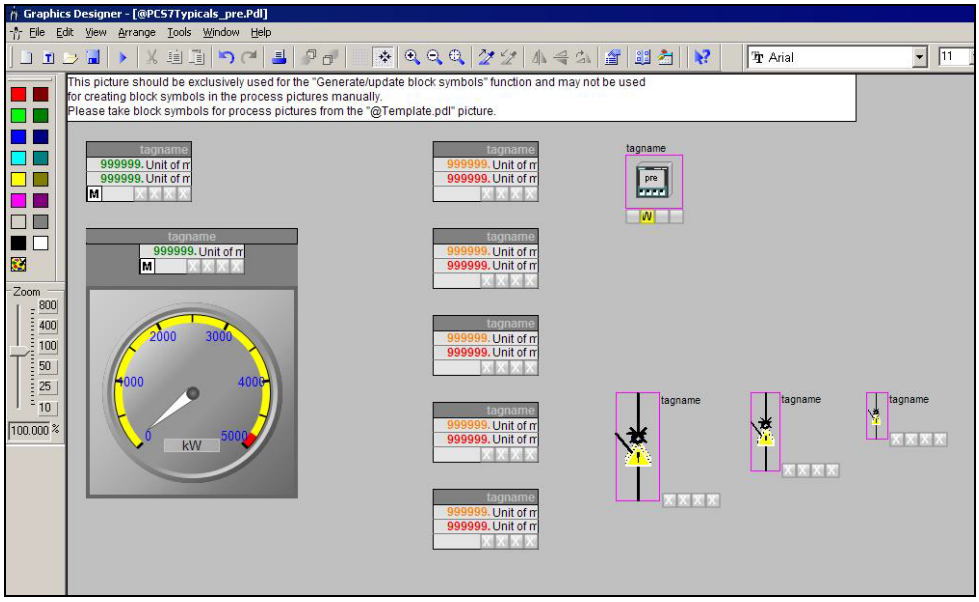


Result

All the relevant OS data is transferred automatically to the PCS 7 OS.

9 Icons for the Process Pictures

The icons that are placed automatically with "Compile OS" are located in the picture "@PCS7Typicals_pre.pdl".



10 Configuring the Measuring Points with PRE_SUM

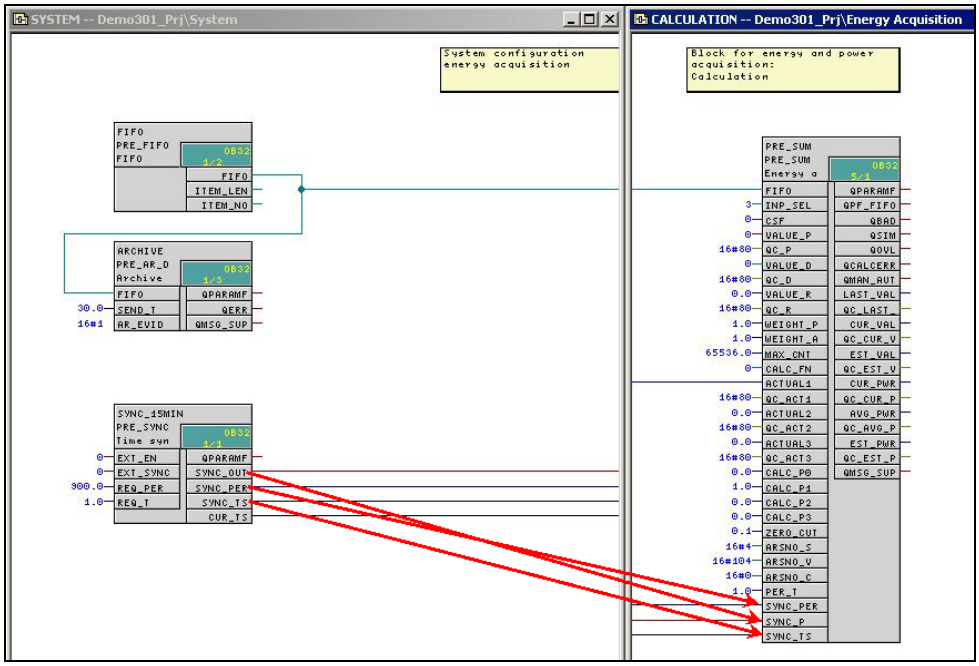
10.1 Description of the PRE_SUM Block

The PRE_SUM block is for acquiring and processing the power data and is the interface to the OS.

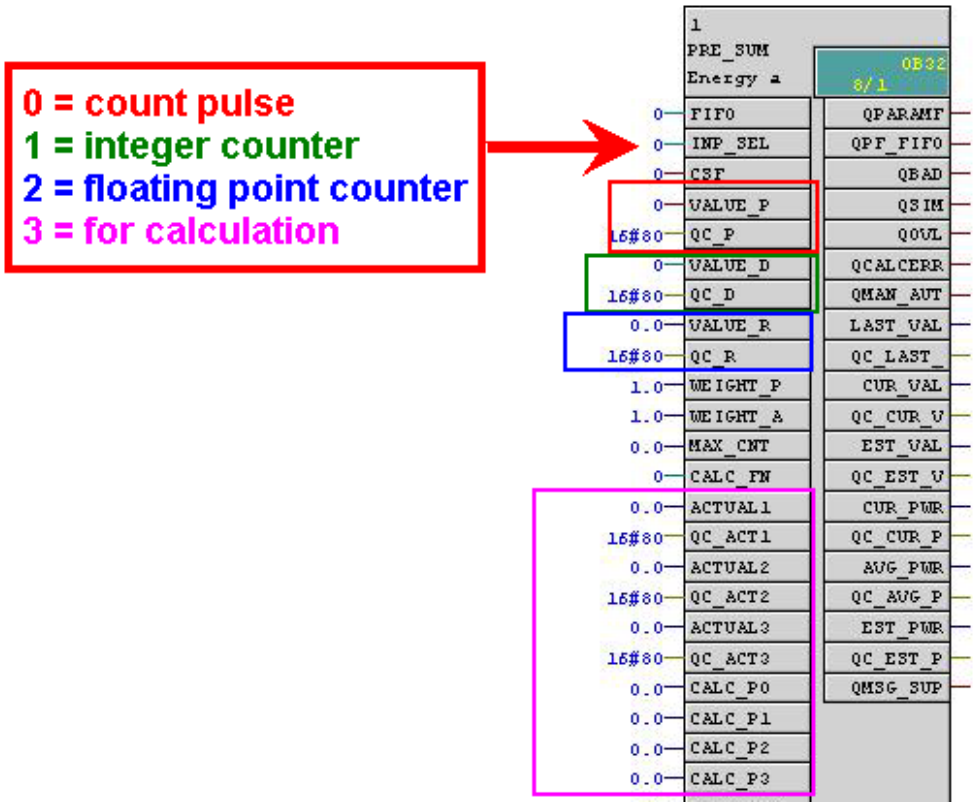
The inputs (depending on INP_SEL) are for interconnecting count pulses or counter values (integer or analog).

The synchronization period is configured at the REQ_PER input of the PRE_SYNC block. The SYNC_PER output of the PRE_SYNC block is interconnected with the SYNC_PER input of the PRE_SUM block.

The mean power value and energy usage value over a specific period of time (usually 15 minutes) are output at the outputs.



PRE_SUM – Important Inputs

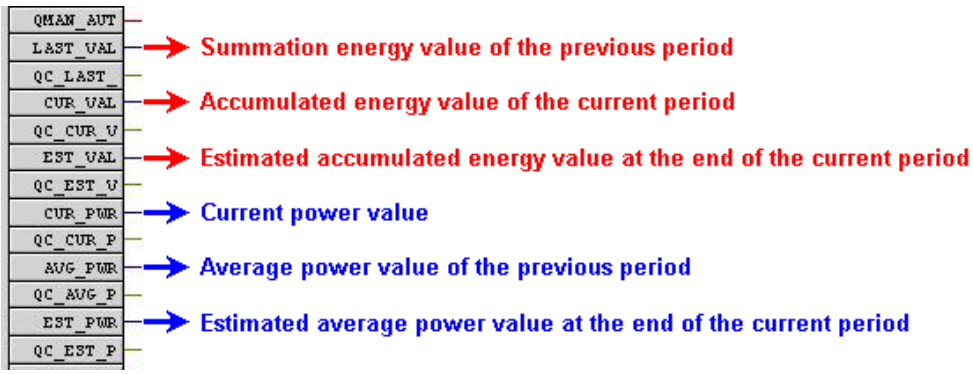


Note

The energy value is measured with the values 0, 1 and 2 at the "INP_SEL" input.

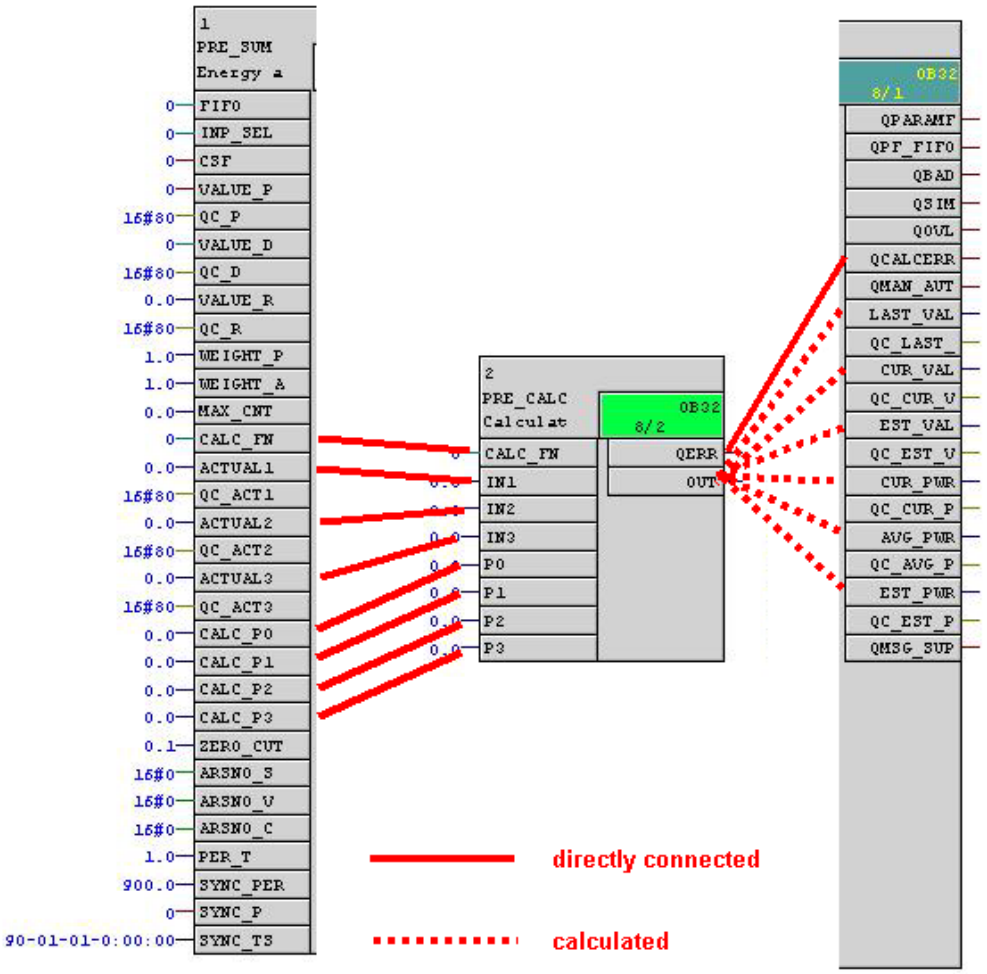
A power value is measured with the value 3 at the "INP_SEL" input.

PRE_SUM – Important Outputs



PRE Blocks PRE_SUM with Calculation Function

The PRE_CALC block is called internally by the PRE_SUM block. The connections between PRE_SUM and PRE_CALC are shown below.



Calculation Algorithms

The PRE_CALC function includes calculation algorithms that can be used for forming measured values for the PRE_SUM block.

The function is available as a source in the library and the user can extend it with additional calculations.

WARNING **It is not permitted to change the interface of the function.**

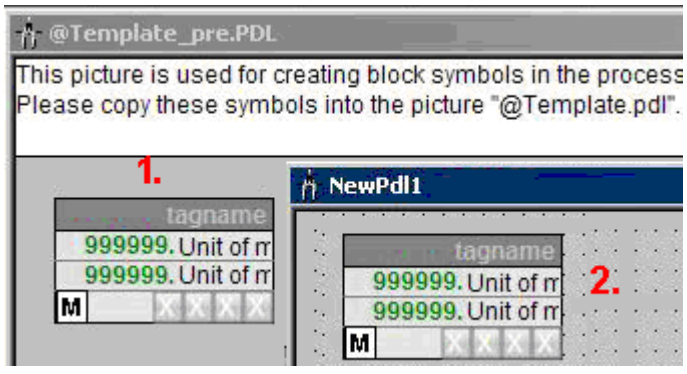
- Table 10-1

Function CALC_FN	Algorithm
0	OUT = P0 + P1 * IN1 + P2 * IN2 + P3 * IN3
1	Calculation of the quantity of heat for liquids OUT = P0*IN1*P1*IN2 P0 = specific heat capacity c P1 = density ρ IN1 = flow rate V IN2 = temperature difference ΔT

10.2 Configuring the Faceplates for PRE_SUM

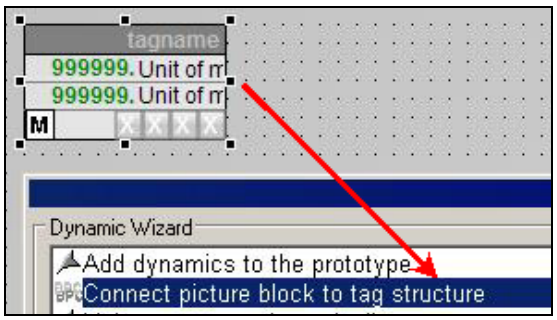
The icons are placed automatically in the relevant picture of the hierarchy. Proceed as follows if you want place another instance manually in a different picture.

1. Copy the icon from the "@Template_pre.pdl" picture.

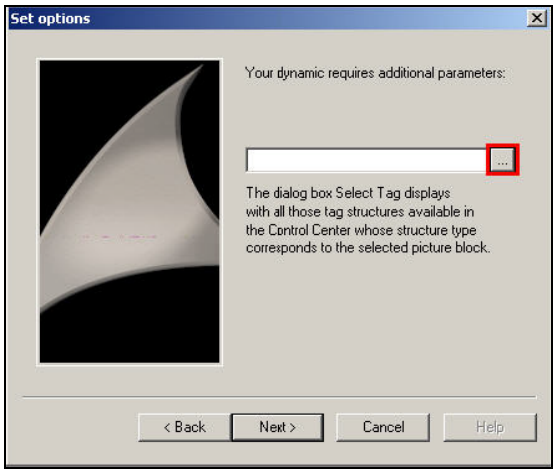


2. Connect the block icon with the structure using the "Dynamic Wizard". Make sure that the icon is marked. Start the "Connect faceplate to measuring point"

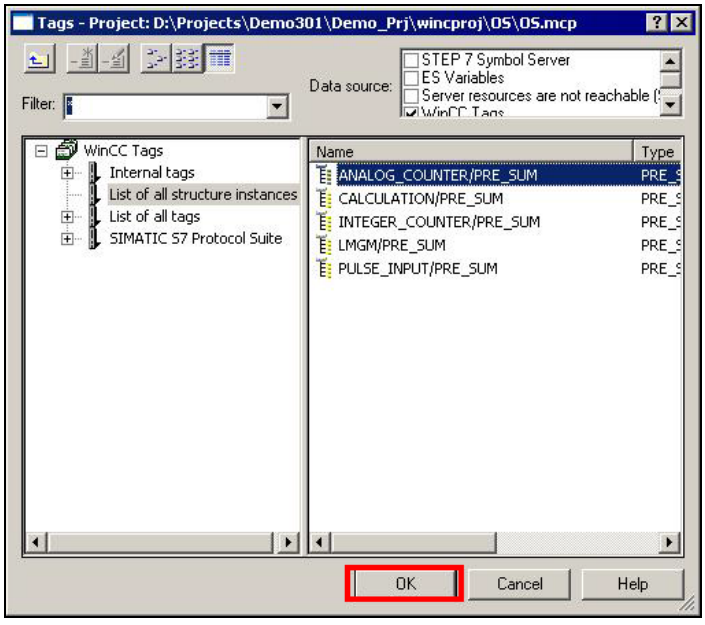
wizard.



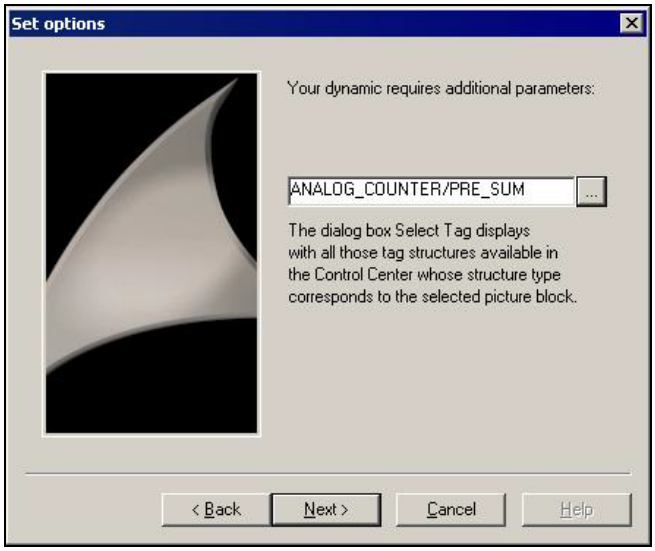
3. Follow the wizard and assign the structure to the block icon. For this you click the "Search" button to select the WinCC structure.



4. Select the structure type "ANALOG_COUNTER/PRE_SUM", for example, and confirm with "OK".

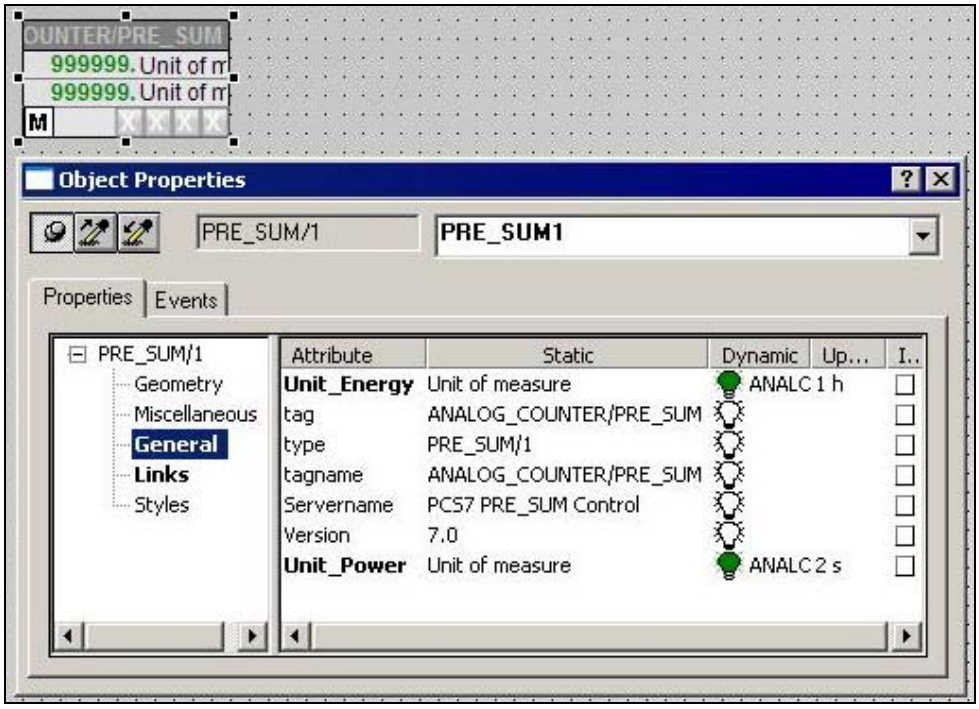


5. The structure is selected. Close the wizard by clicking "Next>".



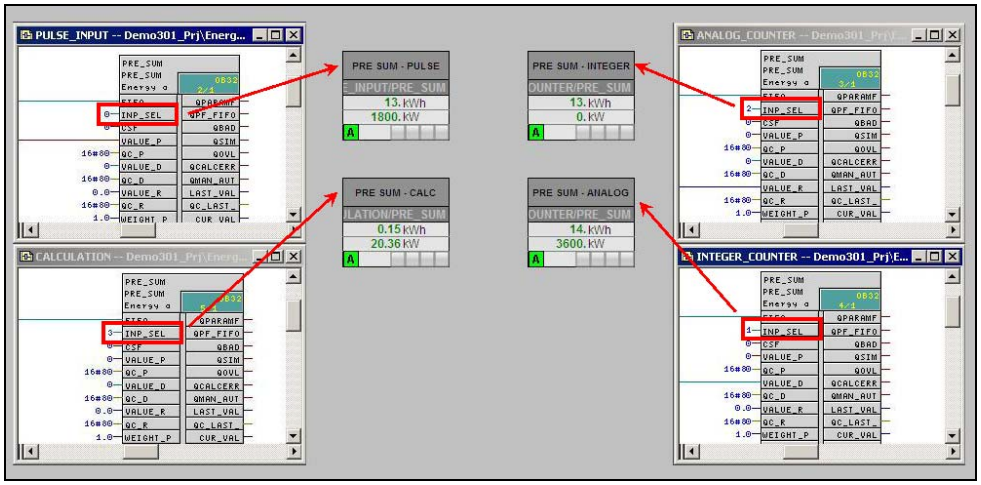
Result

The icon is connected with the structure.



10.3 Relationship between Block Icon and Function Block PRE_SUM

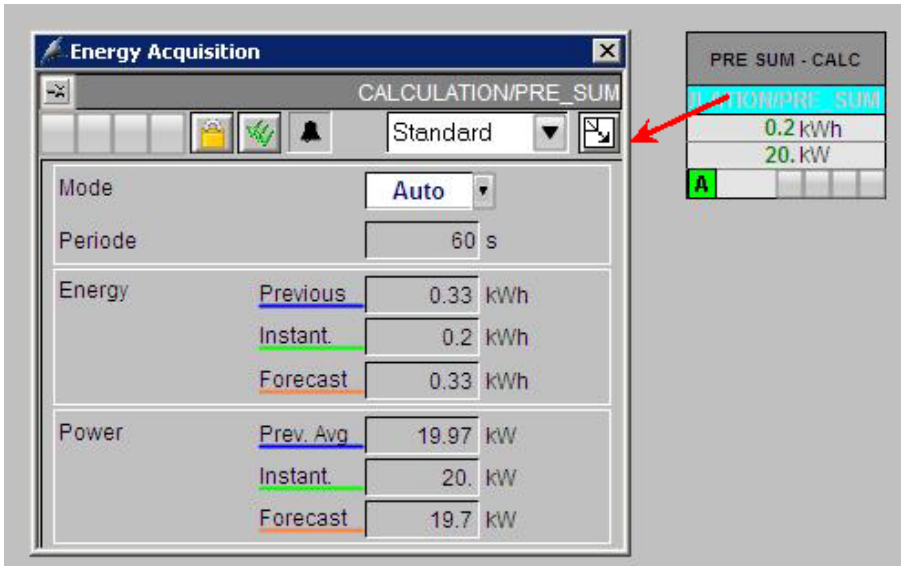
The PRE_SUM block is for acquiring and processing the power data and is the interface to the OS. Different types of signal are supported. You select them with the INP_SEL switch. Each operable block has a block icon in the PCS 7 OS. More details are available in the programming and operating manual "Power management for PCS 7 - SIMATIC PCS 7 powerrate".



10.4 Using Faceplates

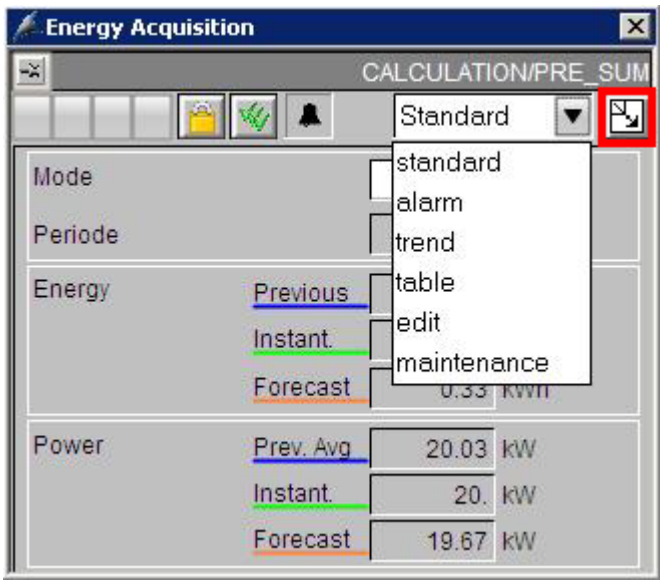
Open a faceplate

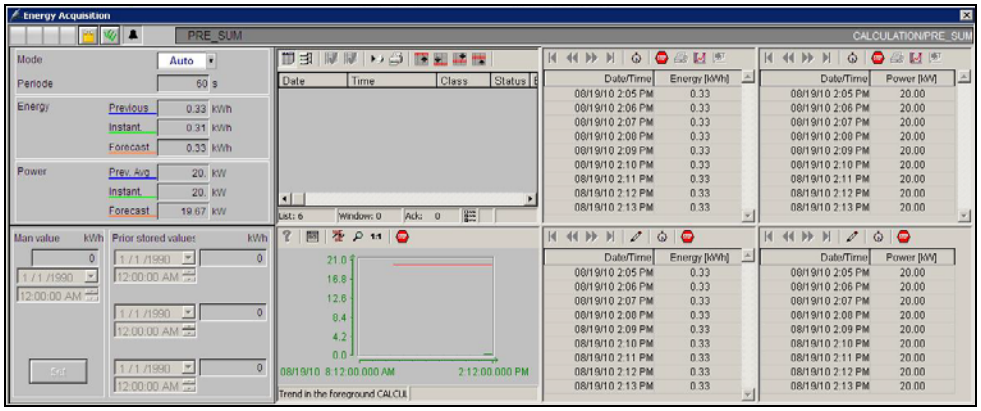
You can open a faceplate by clicking on the associated block icon in PCS 7 OS Runtime.



Views

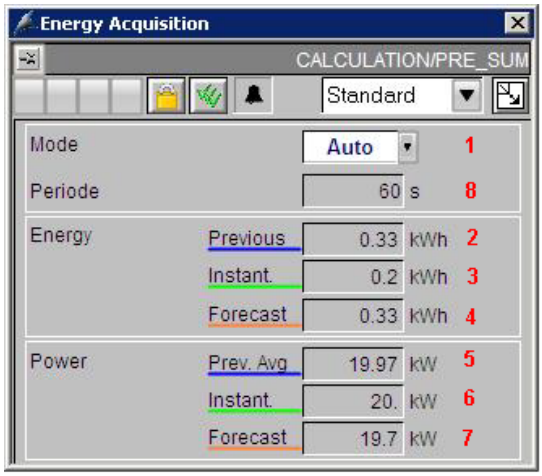
You can choose one of the six views from the drop-down menu. Alternatively you can have them displayed simultaneously in the loop display view (the data is available in the trend displays as soon as you have configured Tag Logging - described later on in the document).





10.5 Description of Faceplates and Block Icons

10.5.1 Standard



(1) QMAN_AUT / AUT_ON_OP
(2) LAST_VAL / unit →LAST_VAL#unit
(3) CUR_VAL / unit →CUR_VAL#unit
(4) EST_VAL / unit →EST_VAL#unit
(5) AVG_PWR / unit →AVG_PWR#unit
(6) CUR_PWR / unit →CUR_PWR#unit
(7) EST_PWR / unit →EST_PWR#unit
(8) SYNC_PER

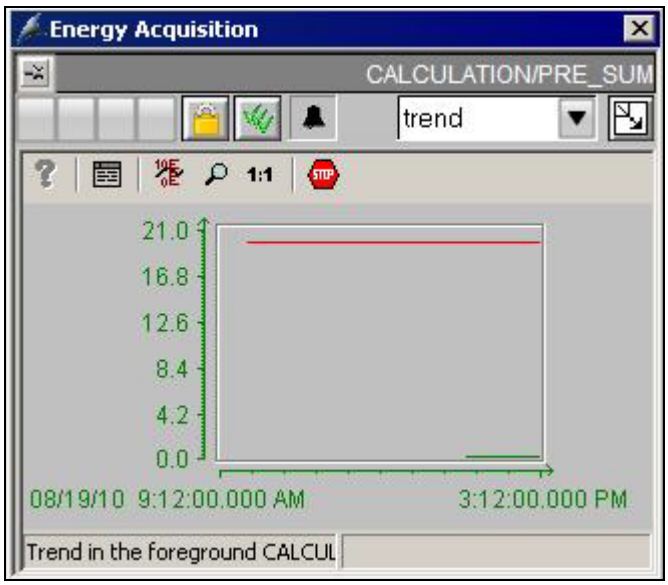
Explanation of the values

Item		Signal type 0, 1 – 2 (automatic)	Signal type 1 – 2 (manual)	Signal type 3
Energy: (work)	Previous	Last archived energy value from the previous synchronization period	Last archived energy value from the last time period entered	Last archived energy value from the previous synchronization period
	Instant.	Energy value accumulated within the current synchronization period	Energy consumption of the time period entered	Energy value accumulated within the current synchronization period
	Forecast	Extrapolated accumulated energy value to end of synchronization period	See energy: Instant.	Extrapolated accumulated energy value to end of synchronization period
Power:	Prev. Avg	Last archived average power value	Average power value for the last time period entered	Last archived average power value
	Instant.	Current power value	See Power: Instant.	Current power value
	Forecast	Extrapolated average power value to end of synchronization period	See Power: Instant.	Extrapolated average power value to end of synchronization period

10.5.2 Trends

If archiving of the accumulated energy values is activated, the archive tags S (summed energy value) and V (average power value) are displayed in the trend view.

If the archiving of the accumulated energy values is not activated, the trend view shows the online variables CUR_VAL (current energy) and CUR_PWR (current power).



If you wish to archive values for 15 minutes, for example, you must create archive tags. Since SIMATIC powerrate works with process-controlled archive tags, a number of additional configuration steps are required.

- Define a raw data variable for transferring values for 15 minutes, for example.
- Copy files (Global Script actions).
- Change the Global Script actions.
- Create process-controlled archive tags in the Tag Logging editor.

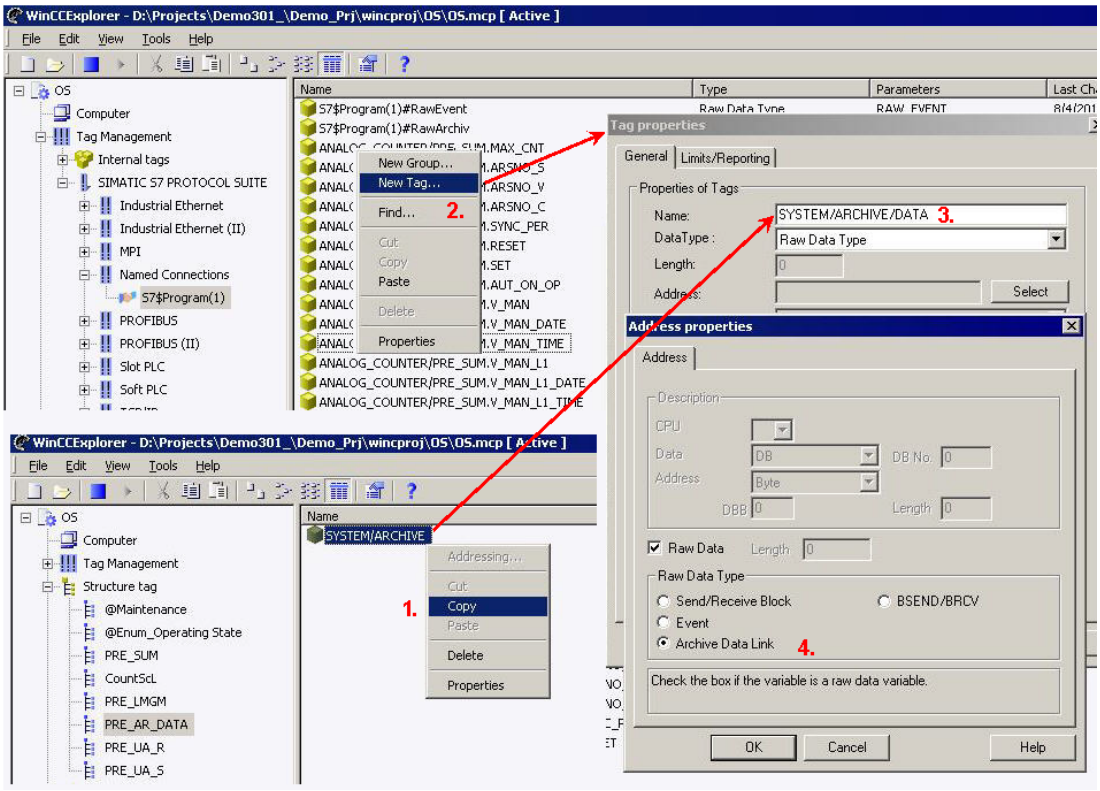
Note

Steps 1 to 3: Necessary only once per PCS 7 project.

Step 4: Repeat this step for each energy measuring point.

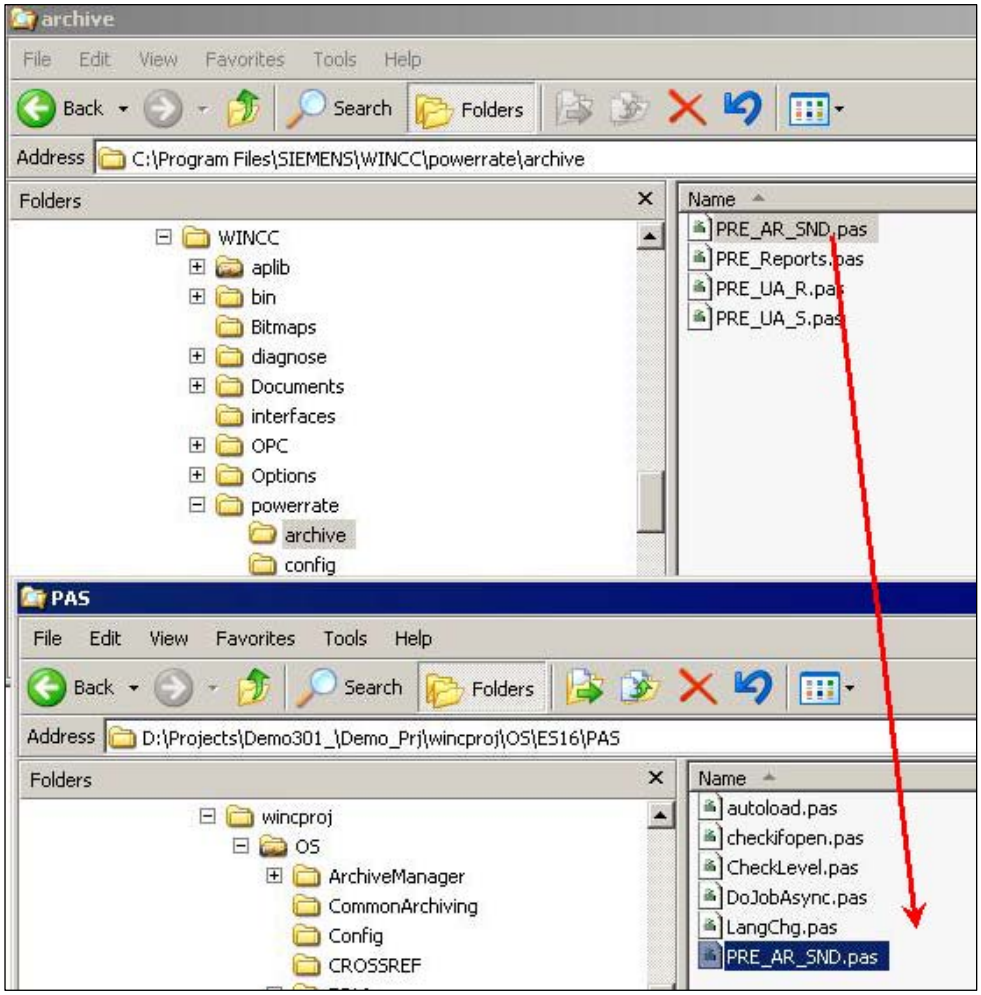
10.5.3 Configuring the Tag Logging

- Create one raw data tag per PRE_AR_DATA block for archiving in the OS Tag Management.
  - Structure of the tag name:
    OS tag name of the block PRE_AR_DATA + Suffix "/DATA".
  - Type:
    Archive Data Link.



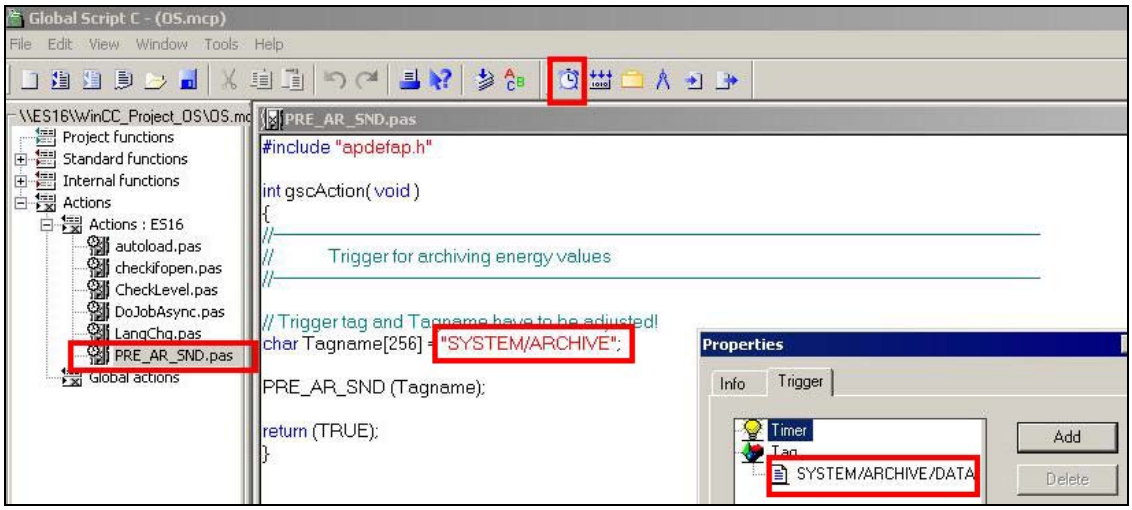
Copying files

- Copy the C action PRE_AR_SND.pas from the \WinCC\powerrate\Archive folder into the project directory\computer name\PAS of the project (server project if you have a multiple-station system).



Creating C action for archiving

- Match tag trigger to raw data tag for archiving.
- Match tag link in the C script to tag name of the PRE_AR_DATA block. The name is case sensitive - also in the trigger!



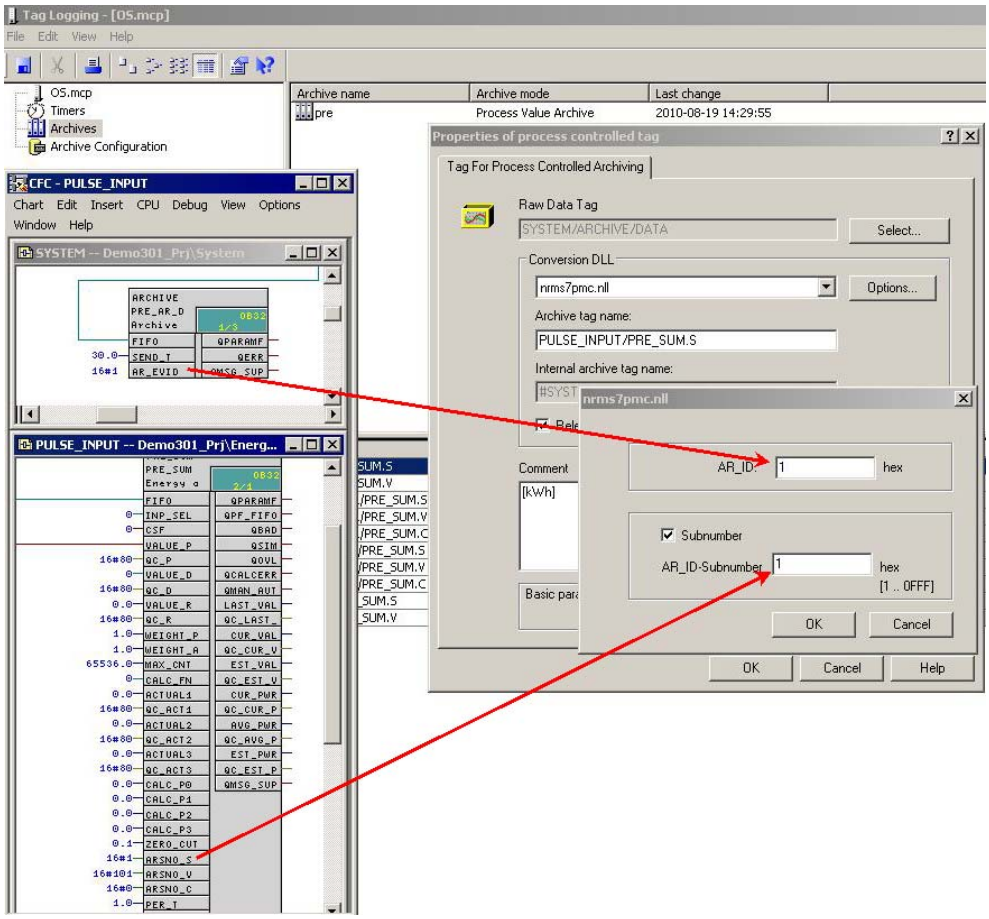
Configuring the process value archive

- Create a process value archive named "pre".
- Create two or three archive tags for the PRE_SUM block.
- Assign the raw data tags of the associated block for archiving PRE_AR_DATA. The names of the archive tags have the following structure:
  - Accumulated energy value (LAST_VAL): tagname.S
  - Average power value (CUR_PWR): tagname.V
  - Absolute counter value (VALUE_D / VALUE_R) optional tagname.C

Note

The tag name corresponds to the tag name of the PRE_SUM block. You can copy this into the structure type by selecting the PRE_SUM block in the WinCC Explorer. The name of the archive tag must be unique throughout the project.

- Parameterize the AR_ID with the AR_EVID parameter of the associated archiving block PRE_AR_DATA.
- Parameterize the subnumbers with the parameters ARSNO_S (for the energy value), ARSNO_V (for the average power value) and ARSNO_C (for absolute counter value if available) of the associated energy acquisition block PRE_SUM.



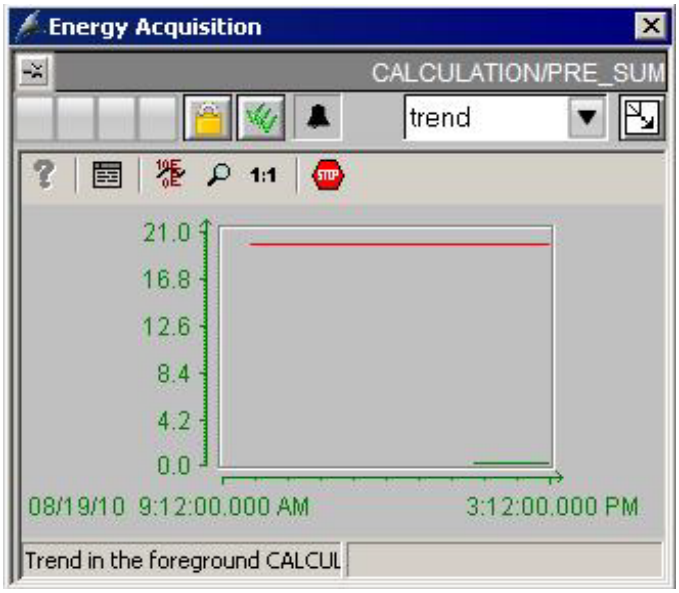
Values used in the sample program

Table 10-2

Archive tag name	AR_ID	AR_ID subnumber	Comment
PULSE_INPUT/PRE_SUM.S	1	1	[kWh]
PULSE_INPUT/PRE_SUM.V	1	101	[kW]
INTEGER_COUNTER/PRE_SUM.S	1	2	[kWh]
INTEGER_COUNTER/PRE_SUM.V	1	201	[kW]
INTEGER_COUNTER/PRE_SUM.C	1	202	[kWh]
ANALOG_COUNTER/PRE_SUM.S	1	3	[kWh]
ANALOG_COUNTER/PRE_SUM.V	1	103	[kW]
ANALOG_COUNTER/PRE_SUM.C	1	203	[kWh]
CALCULATION/PRE_SUM.S	1	4	[kWh]
CALCULATION/PRE_SUM.V	1	104	[kW]

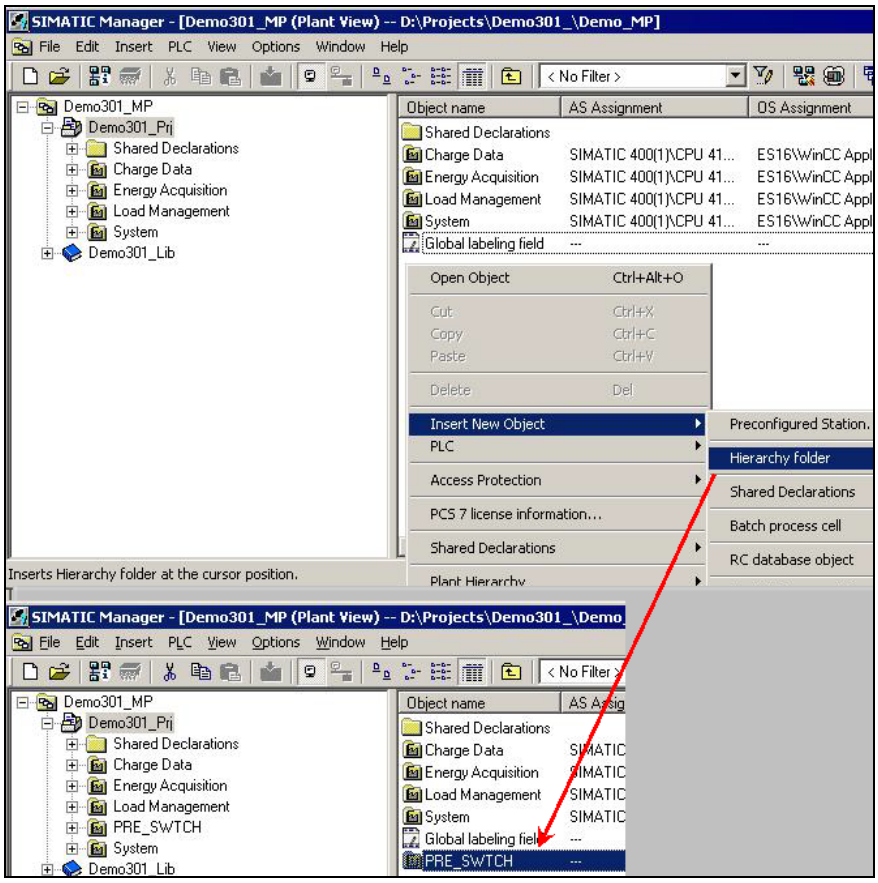
Result

Now the values are displayed in PCS 7 OS Runtime.

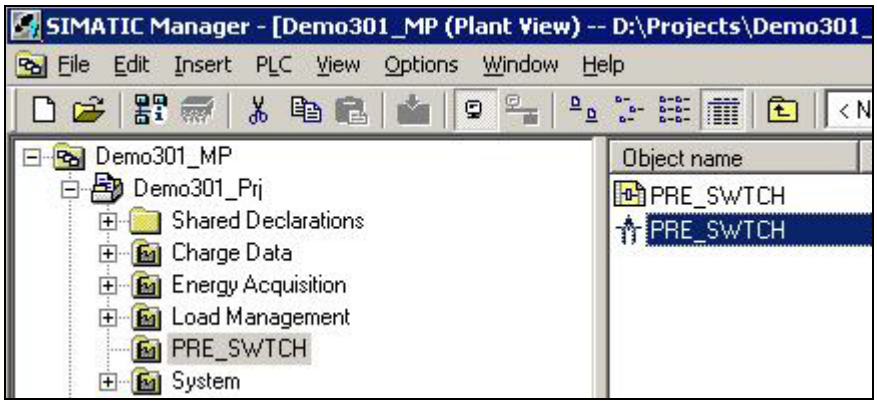


11 Configuring the General Switch with PRE_SWTCH

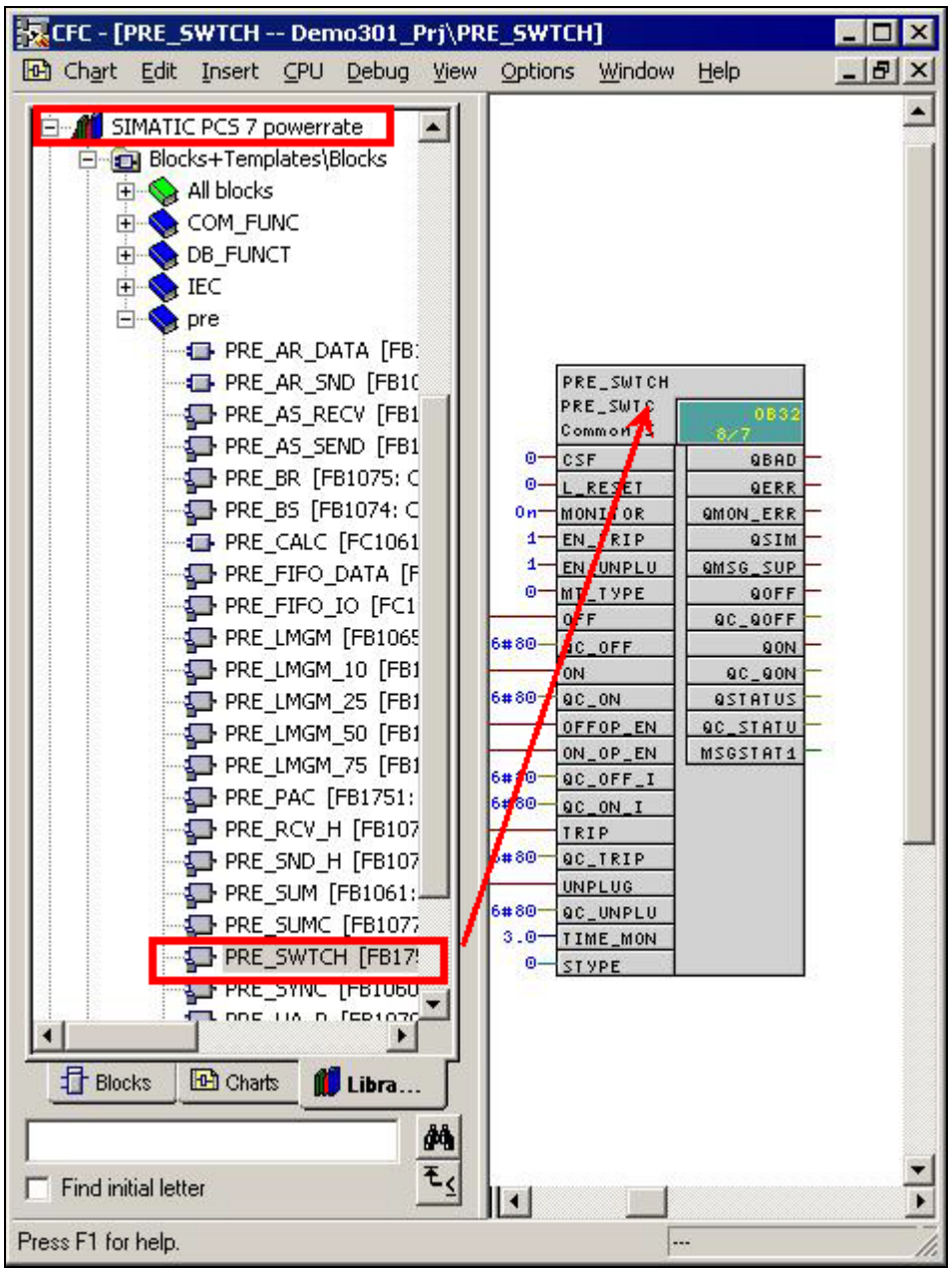
1. Create a new PRE_SWTCH folder in the Plant View.



2. Insert a new CFC and a new picture.



3. Open the CFC and insert a PRE_SWTCH block from the SIMATIC PCS 7 powerrate library into the chart.



4. Compile and load the program. Then compile the OS.

Result

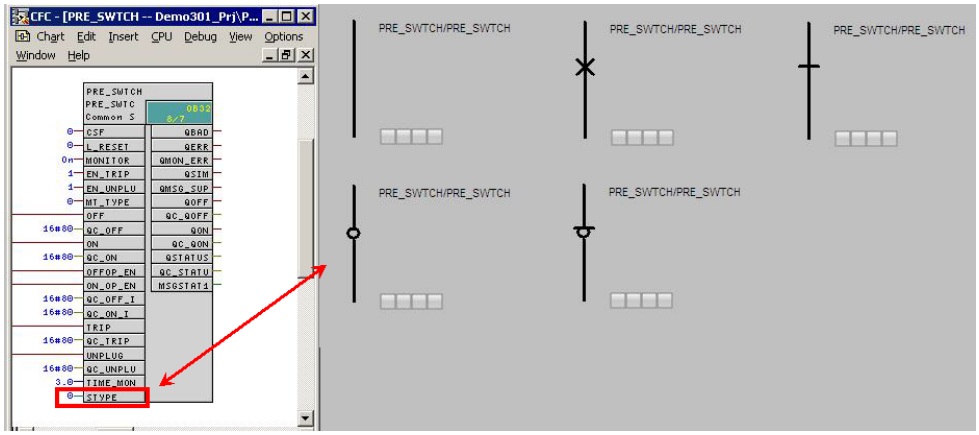
The new area is created in the OS and the block icon for the PRE_SWTCH has been inserted automatically into the picture. A simulation for the switch is already available in the sample project.

11.1 Relationship between Block Icon and Function Block PRE_SWTCH

The PRE_SWTCH function block is for displaying and operating a switch via digital inputs and outputs.

The input parameters ON, OFF, TRIP and UNPLUG are used to form the switch status. The input parameters TRIP and UNPLUG are not evaluated if EN_TRIP or EN_UNPLUG = FALSE respectively.

You can change the appearance of the switch at the STYPE_INT input. The views below are possible for the switch depending on the value at the STYPE_INT input.



The following switch statuses are formed depending on the inputs and are displayed in the faceplate and icon.

Table 11-1

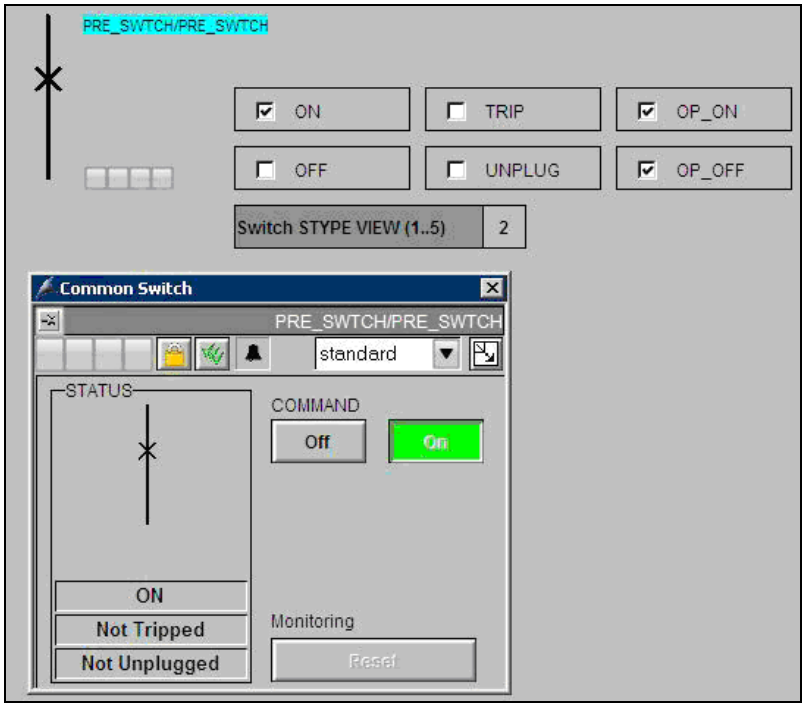
Status	Output QSTATUS	Input ON	Input OFF	Input TRIP	Input UNPLUG
On	Bit 0	TRUE	FALSE	FALSE	FALSE
Off	Bit 1	FALSE	TRUE	FALSE	FALSE
Tripped	Bit 2	X	X	TRUE	FALSE
Unplugged	Bit 3	X	X	X	TRUE

X → Irrelevant in this status and not evaluated.

11.2 Using Faceplates

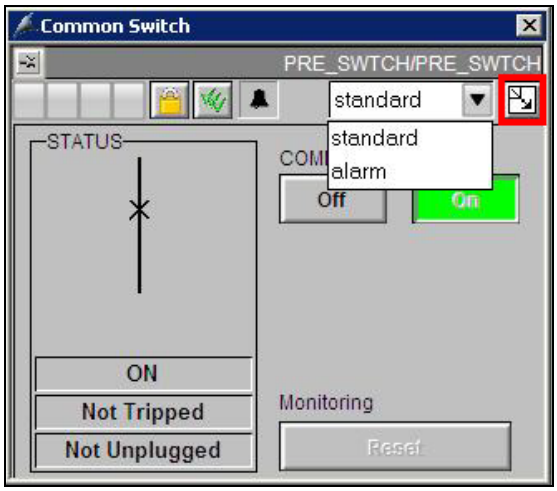
Open a faceplate

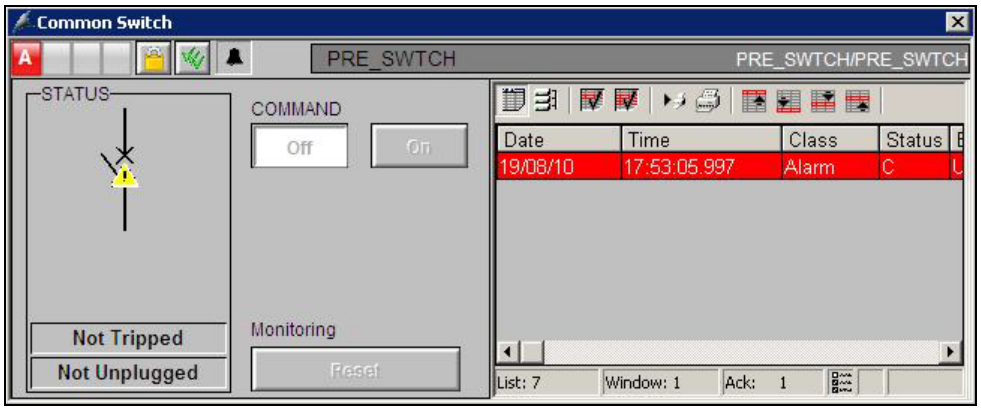
You can open a faceplate by clicking on the associated block icon in PCS 7 OS Runtime.



Views

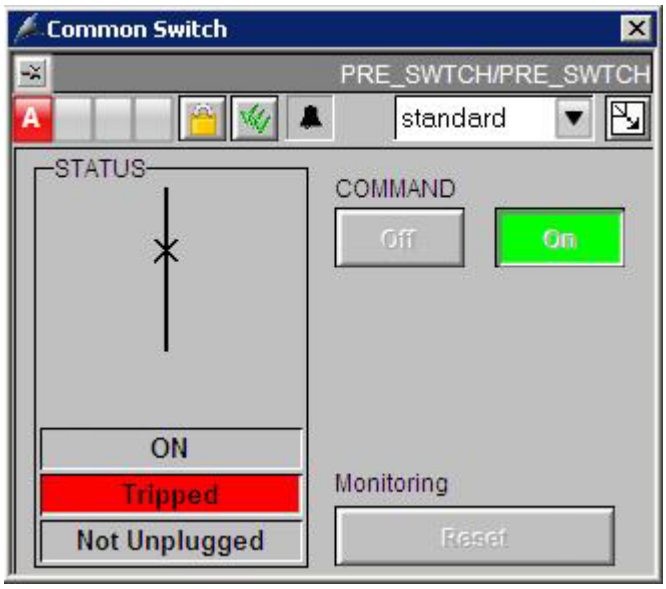
You can choose one of the two views from the drop-down menu or in the loop display view.





Description of Faceplates and Block Icons

Standard



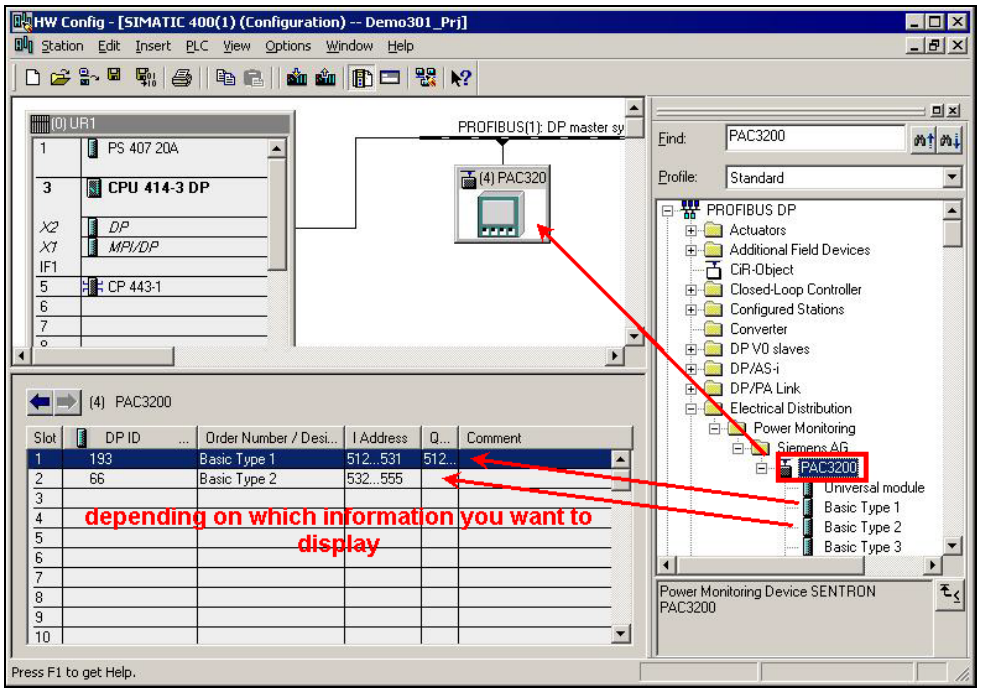
The parameters below are displayed:

Table 11-2

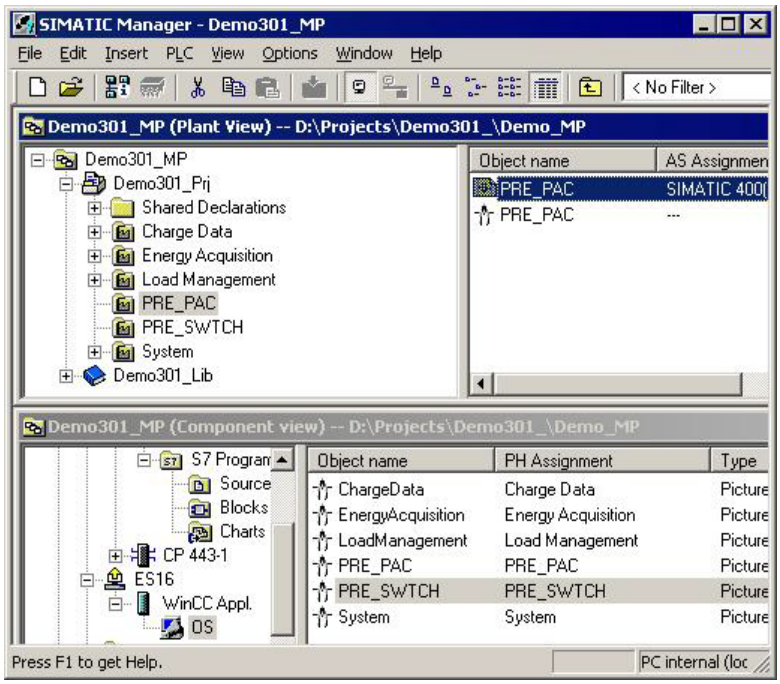
Element	Parameter	Description
Status	QSTATUS	Switch status
Command	MAN_ON	0 = off, 1 = on
Monitoring – Reset	Reset	Reset of the monitoring error

12 Configuring PAC3200 / PAC4200 with PRE_PAC

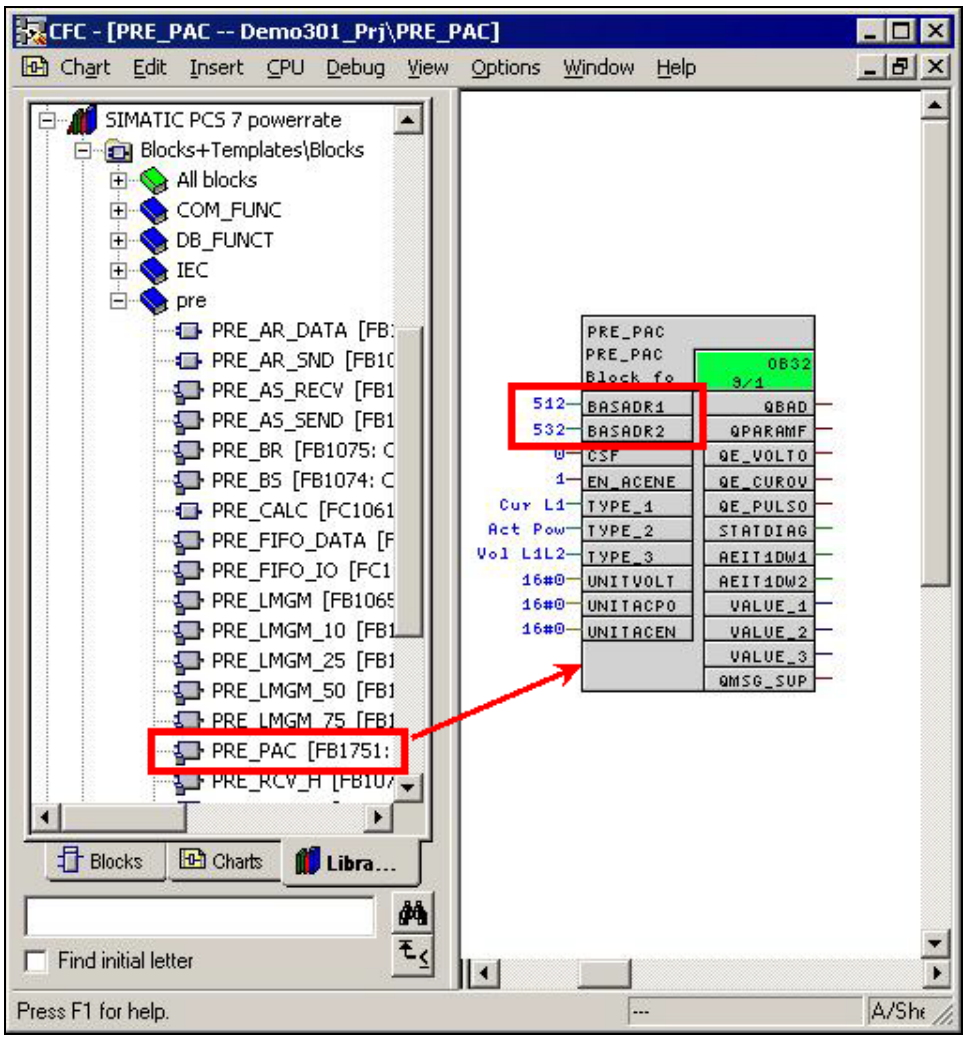
1. Insert a new PAC3200 module in the HW Config.



2. Create a new PRE_PAC folder in the Plant View and insert a new CFC and a new picture.



3. Open the CFC and insert a PRE_PAC block from the SIMATIC PCS 7 powerrate library into the chart.



4. Compile and load the program. Then compile the OS.

Result

The new area is created in the OS and the block icon for the PRE_PAC has been inserted automatically into the picture.

12.1 Relationship between Block Icon and Function Block PRE_PAC

The PRE_PAC function block is for displaying selected measured values and reporting status information of the multifunctional measuring devices PAC3200 and PAC4200.

Measured value display

You can select data of basic types 1 and 2 for the measured value display. However, when you parameterize the PAC in the HW Config you must make sure that the basic types for the data to be displayed are configured accordingly.

The parameters BASADR1 and BASADR2 must each be supplied with the logical basic addresses of basic types 1 and 2 if used.

You specify the type of measured value with the TYPE_x parameter.

Table 12-1

Measured value type TYPE_x	Basic type	Meaning	Unit
1	1	Current a	A
2	1	Current b	A
3	1	Current c	A
4	1	Total active power	W
5	2	Voltage PH-PH a-b	V
6	2	Voltage PH-PH b-c	V
7	2	Voltage PH-PH c-a	V
8	2	Total power factor	-

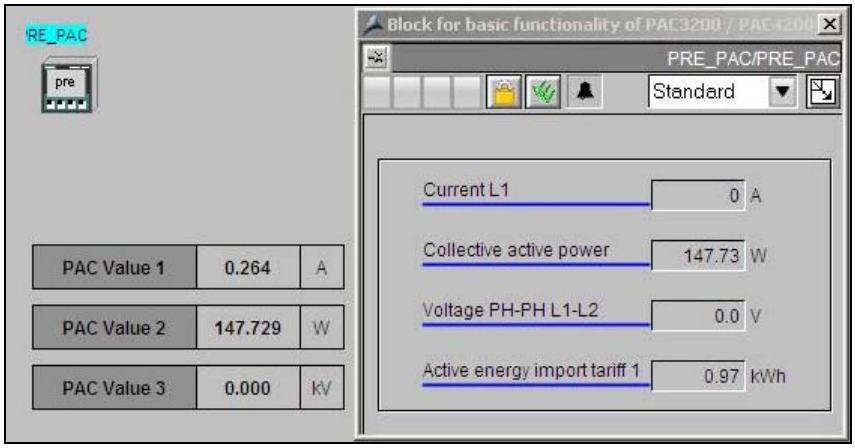
The status information is output in the STATDIAG parameter.

More details are available in the programming and operating manual "Power management for PCS 7 - SIMATIC PCS 7 powerrate".

12.2 Using Faceplates

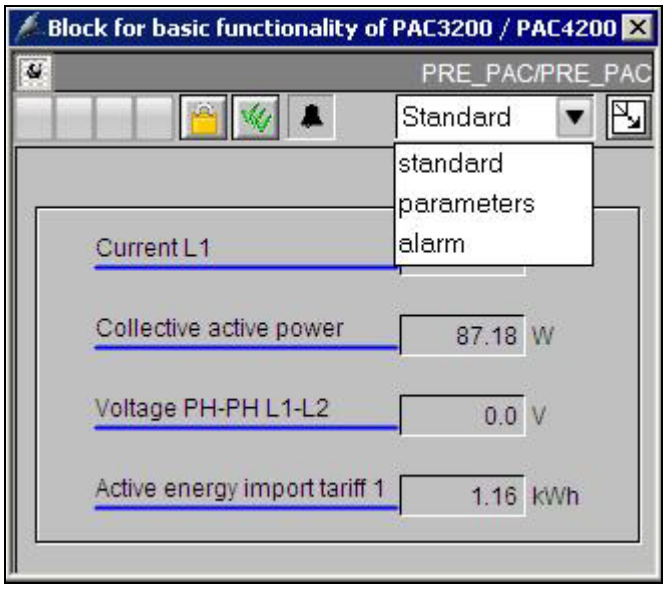
Open a faceplate

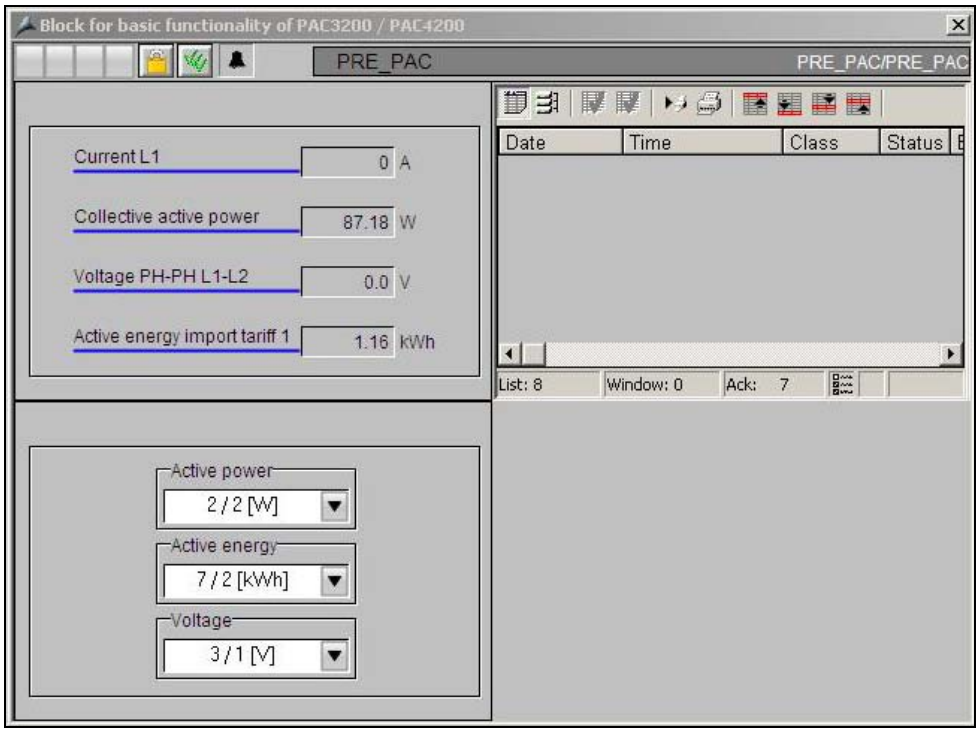
You can open a faceplate by clicking on the associated block icon in PCS 7 OS Runtime.



Views

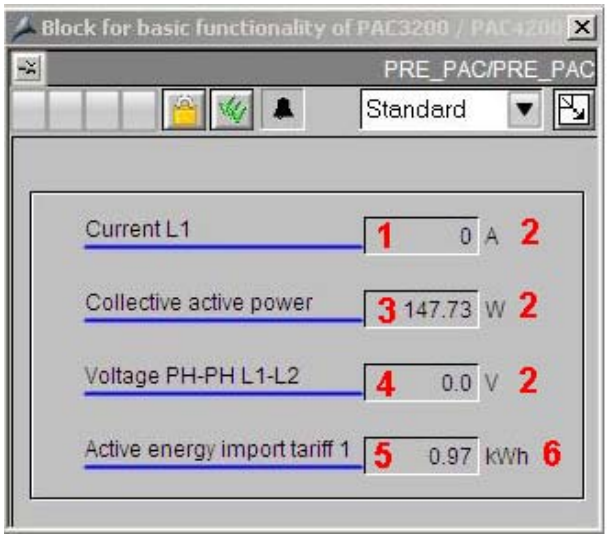
You can choose one of the three views from the drop-down menu or alternatively you can have them displayed in the loop display view.





Description of Faceplates and Block Icons

Standard



(1) VALUE_1
(2) UNITVOLT / UNITACPOW
(3) VALUE_2
(4) VALUE_3
(5) AEIT1DW1 / AE1T1DW2
(6) UNITACENER

The parameters below are displayed:

Table 12-2

Item	Parameter	Description
Values 1 ... 3	VALUE_x TYPE_x	Depending on the TYPE_x measured value, the relevant value is displayed with a description.
	UNITVOLT / UNITACPOW	The format and unit of the measured value can be set in the Parameters view.
Active energy import tariff 1	AEIT1DW1 / AE1T1DW2	The active energy is displayed if the parameter EN_ACENER = TRUE.
	UNITACENER	The format and unit of the measured value can be set in the Parameters view.

Note The values for current are rounded to 2 figures. For example, if the current current value is 1.45A, 1A is displayed in the faceplate.

Parameter

Here you can parameterize the format (number of places before and after the decimal point) and unit for the different measured value types.

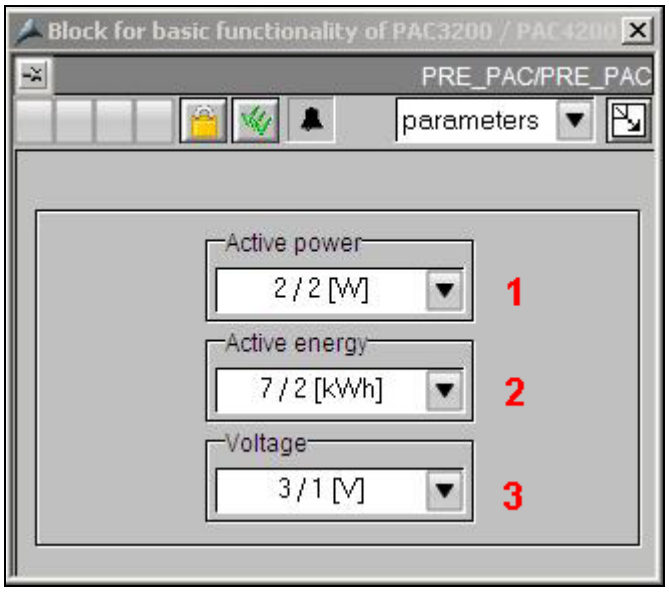


Table 12-3

	Item	Parameter	Description
(1)	Active power	UNITACPOW	0 ≙ 2 / 2 [W] 1 ≙ 3 / 1 [kW] 2 ≙ 4 / 0 [kW] 3 ≙ 4 / 0 [MW]
(2)	Active energy	UNITACENER	The selection box for the active energy is displayed if the parameter EN_ACENER = TRUE. 0 ≙ 7 / 2 [kWh] 1 ≙ 9 / 0 [kWh] 2 ≙ 9 / 0 [MWh] 3 ≙ 9 / 0 [GWh]
(3)	Voltage	UNITVOLT	0 ≙ 3 / 1 [V] 1 ≙ 2 / 2 [kV] 2 ≙ 3 / 1 [kV]

13 Batch-related Acquisition of Energy Data with PRE_SUMC

13.1 Description

The PRE_SUMC block adds together the energy usage for 5 types of energy from 10 consumers in each case (VALx_y) with the same unit and assigns the total energy usage (CUR_VALx, LASTVALx) to a batch.

The acquisition of the energy usage is started and stopped with an input signal. The energy usage acquired in this time period is archived in PCS7 OS user archives (PRE_SUMC_x) with start/end times and information about the batch. The PRE_UA_S archive manager block for writing is used for archiving.

The input signal for energy data acquisition is independent of the synchronization pulse. The PRE_SUM block provides the energy values of the separate consumers.

Structure of the user archives

The user archive has the data structure below.

Field name	Data type	Block parameter	Meaning
BA_NA	STRING[32]	BA_NA	Batch name
STARTTIME	DATE_AND_TIME	-	Start time
ENDTIME	DATE_AND_TIME	-	End time
UNIT	STRING[24]	UNIT	System
BA_ID	INT	BA_ID	Batch ID
REC_NA	STRING[32]	REC_NA	Recipe name
VALUEx	REAL	CUR_VALx	Total work value x (x = 1 ... 5)
VAL_UNITx	STRING[8]	VALUNITx	Unit x (x = 1 ... 5)
TYPEx	STRING[32]	TYPEx	Energy type x (x = 1 ... 5)

The PRE_SUMC block collects the usage data at the inputs except for the start and end points. These data points are derived from the input signal ACTIVE.

The user archives are named PRE_SUMC_x (where x is the archive ID). You can enter a meaningful name for the alias name. For example, this name can include the designation of the PCELL that you can use as filter criterion for export.

Archiving

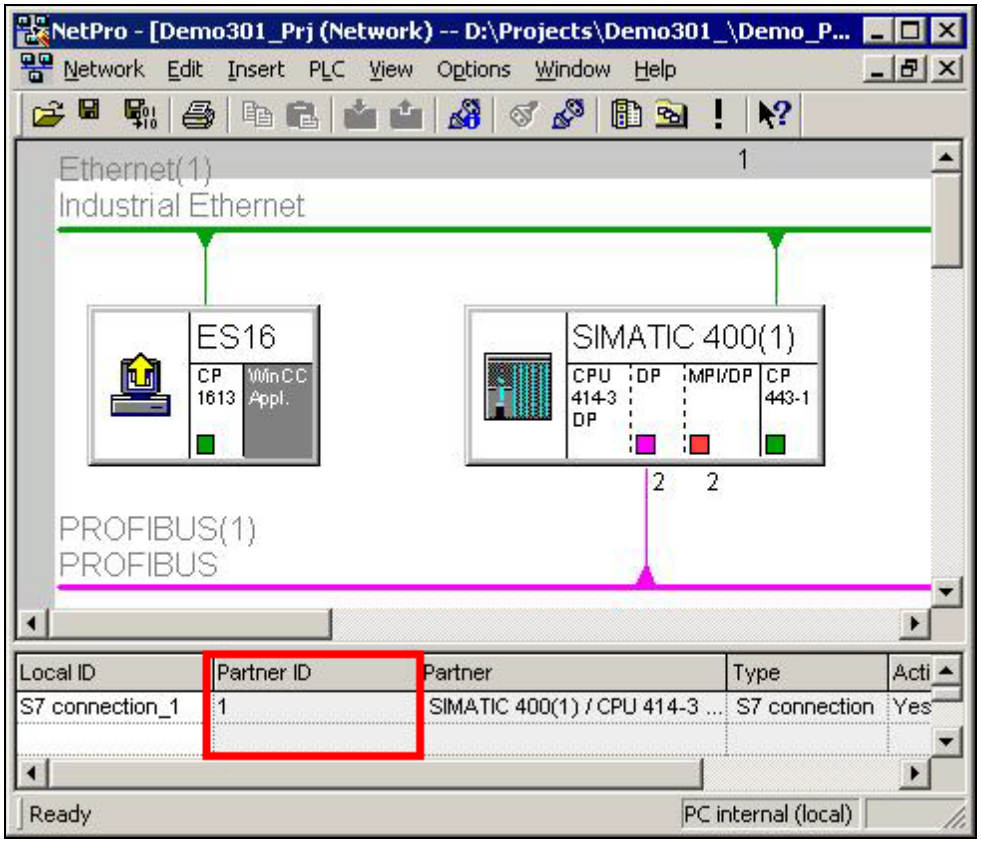
A positive edge from ACTIVE issues a Start job to the archive manager or stores it in the internal buffer if a job is still active. This is necessary to ensure that no data is lost when one job quickly follows the other. Only one job can be buffered.

Note The PRE_SUMC block determines and stores the starting time. The default end time is 01.01.1990. The end time is updated when measurement is finished.

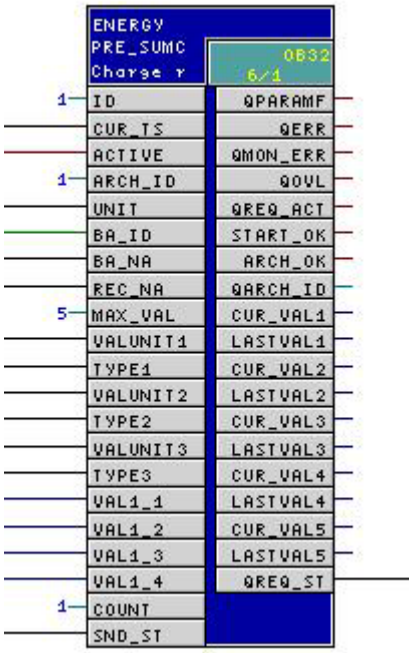
13.2 Configuring the PRE_SUMC Block

NetPro

Open the NetPro editor. The partner ID of the configured S7 connection used here is needed later for configuring the PRE_UA_S block.



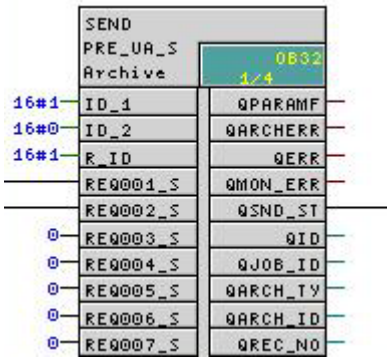
PRE_SUMC block parameters



Meaning of important inputs

- Input **ID**: Block ID; unique number for this block.
- Input **CUR_TS**: Output CUR_TS of the PRE_SYNC block.
- Input **ACTIVE**: Active batch. Trigger to send data to the user archive.
- Input **ARCH_ID**: Number of the user archive. For example, PRE_SUMC_**1** (PRE_SUMC_+"**ARCH_ID**").
- Input **MAX_VAL**: Maximum number of energy values (values: 1 to 5).
- Input **VALUNITx**: value unit of energy type x (x = 1 ... 5)
- Input **TYPEx**: energy type x (x = 1 ... 5)
- Input **VALx_y**: current working value of energy type x (x = 1 ... 5) of consumer y (y = 1 ... 10)
- Input **SND_ST**: output QSND_ST of the PRE_UA_S block.

PRE_UA_S block parameters



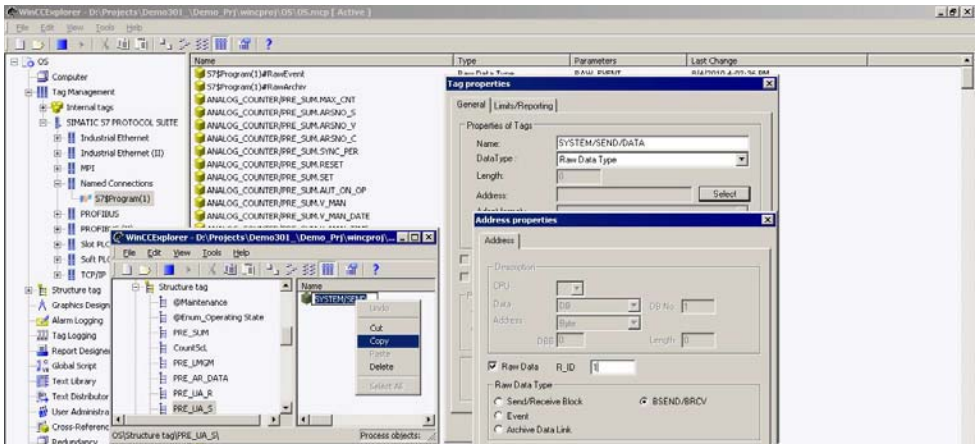
Meaning of important inputs

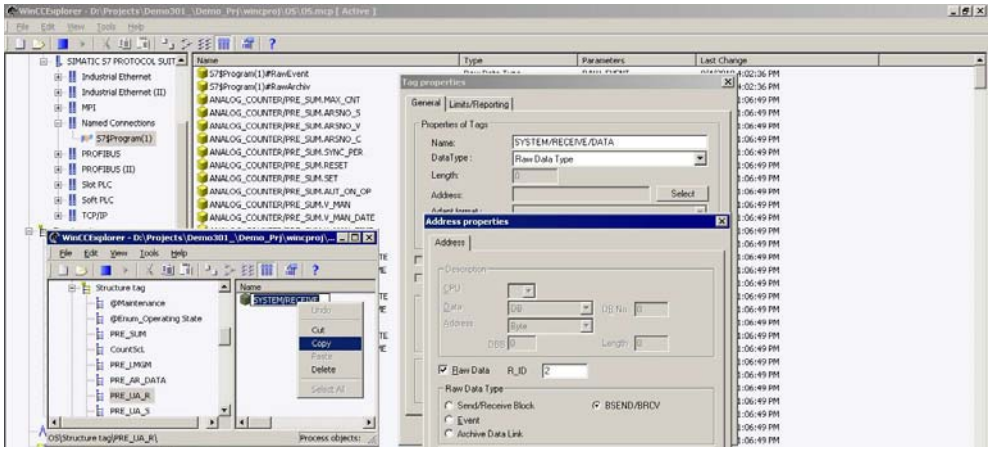
- Input **ID_1**: Partner ID of the S7 connection.
- Input **ID_2**: Only needed for redundant connections.
- Input **R_ID**: Connection to the user archive.
  This ID is used for the raw data tag of the type BSEND/BRCV, which was created for sending the data to the user archive.
- Input **REQ001_ST**: Output QREQ_ST of the PRE_SUMC block that will be connected with the input of the REQ001_ST block of the PRE_UA_S.

Create a raw data tag of the BSEND/BRCV type

Create a raw data tag for each archive manager block PRE_UA_S / PRE_UA_R in the OS Tag Management for the configured connection. The tag name has the structure below.

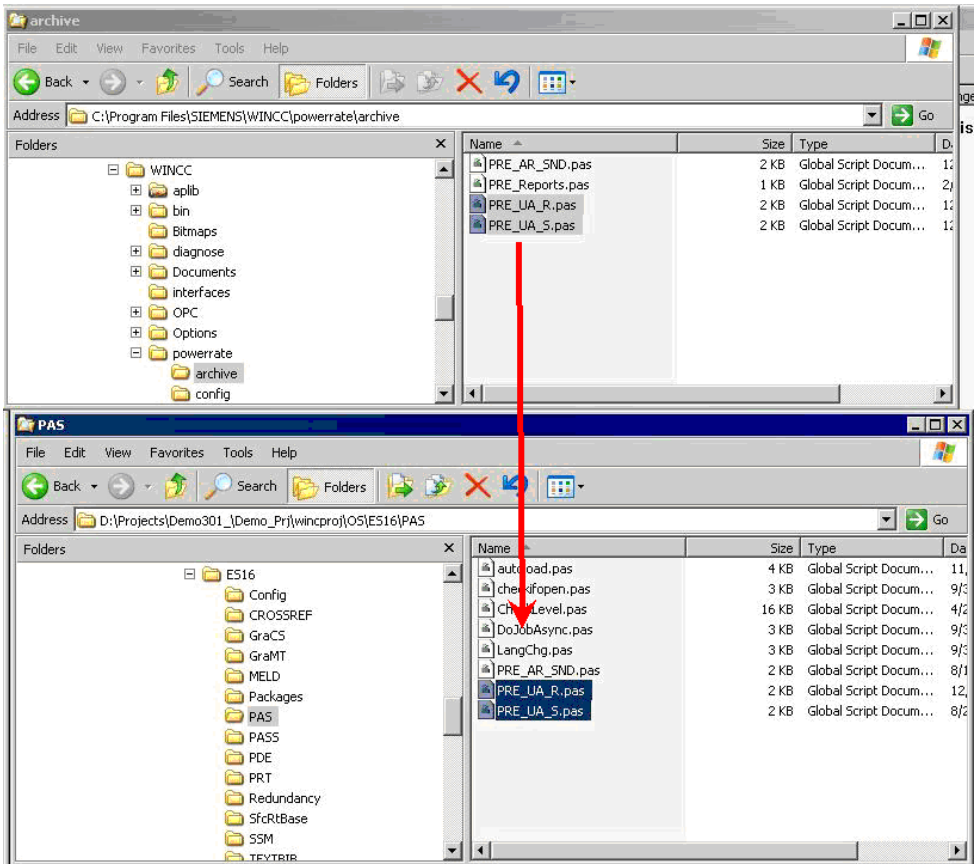
- PRE_UA_S / PRE_UA_R + Suffix "/DATA".
- Type: BSEND / BRCV.
- R_ID of the associated archive manager block PRE_UA_S / PRE_UA_R.




SIMATIC S7 PROTOCOL SUIT
Industrial Ethernet
Industrial Ethernet (II)
MPI
Named Connections
PROFIBUS
PROFIBUS (II)
Slot PLC
Soft PLC
TCP/IP
Tag properties
General
Limits/Reporting
Properties of Tags
Name:
SYSTEM/RECEIVE/DATA
DataType :
Raw Data Type
Length:
Address:
Select
Address properties
Address
Description
CPU
DB Nr.
Byte
Length:
Raw Data
R_ID
Raw Data Type
Send/Receive Block
BSEND/BRCV
Event
Archive Data Link
Structure tag
@Maintenance
@Enum_Operating State
PRE_SUM
CountScL
PRE_LIMSIM
PRE_AR_DATA
PRE_UA_R
PRE_UA_S
Cut
Copy
Paste
Delete
Select All

Copy the global script actions

Copy the PRE_UA_S.pas and PRE_UA_R.pas files from the SIMATIC powerrate installation directory into your OS project folder.

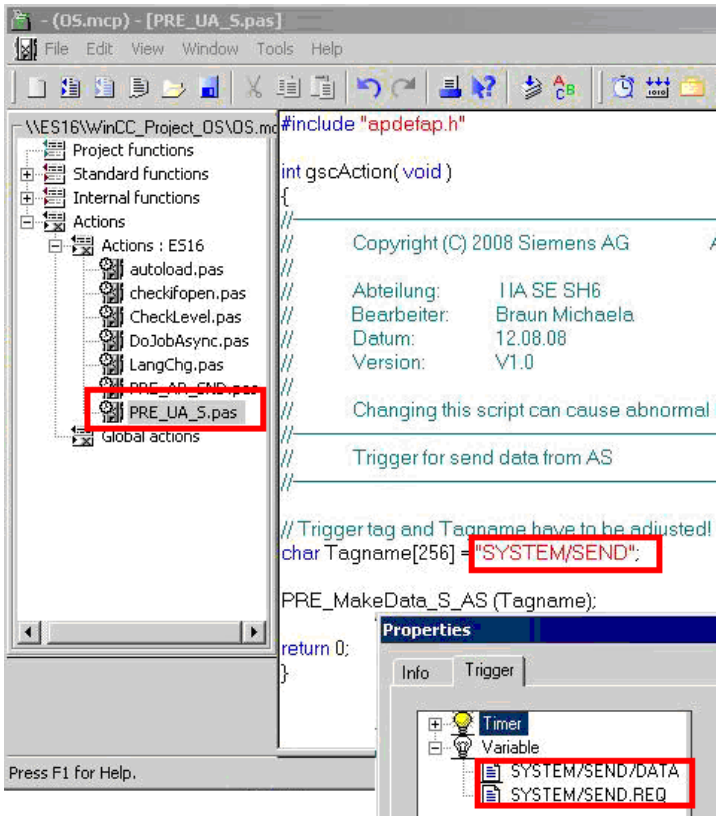


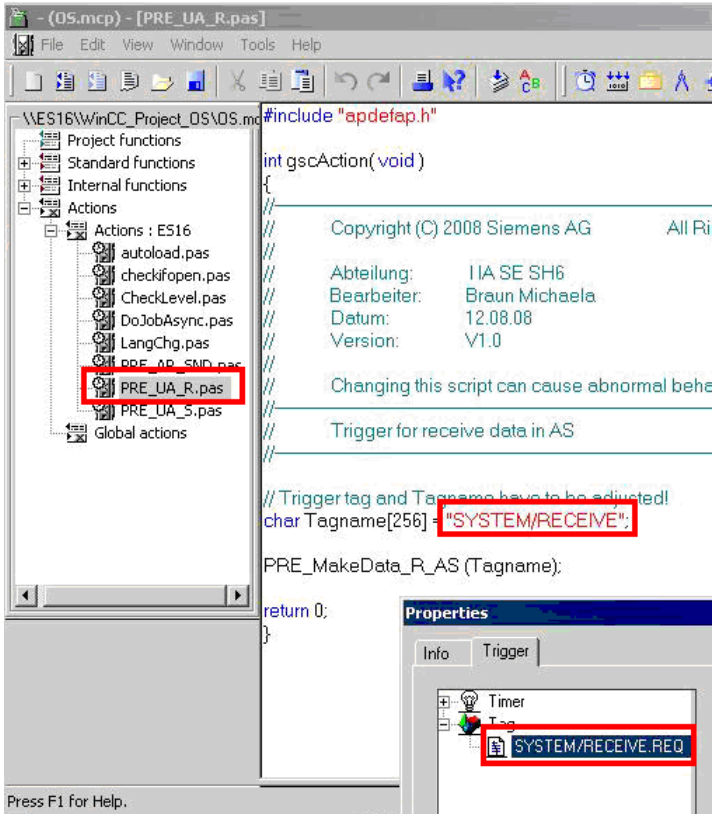
Change the global script actions

You must change the tag names and tag triggers in both scripts.

In your example PRE_UA_S.pas: tag name → "SYSTEM/SEND" and tag trigger → "SYSTEM/SEND.REQ" and "SYSTEM/SEND/DATA". After making the changes, compile and save the script.

For the script PRE_UA_R.pas: tag name → "SYSTEM/RECEIVE" and tag trigger → "SYSTEM/RECEIVE.REQ". After making the changes, compile and save the script.


- (OS.mcp) - [PRE_UA_S.pas]
File Edit View Window Tools Help
\\ES16\WinCC_Project_OS\OS.mc
Project functions
Standard functions
Internal functions
Actions
Actions : ES16
autoload.pas
checkifopen.pas
CheckLevel.pas
DoJobAsync.pas
LangChg.pas
PRE_UA_S.pas
Global actions
#include "apdefap.h"
int gscAction(void)
{
// Copyright (C) 2008 Siemens AG
// Abteilung: I IA SE SH6
// Bearbeiter: Braun Michaela
// Datum: 12.08.08
// Version: V1.0
// Changing this script can cause abnormal
// Trigger for send data from AS
// Trigger tag and Tagname have to be adjusted!
char Tagname[256] = "SYSTEM/SEND";
PRE_MakeData_S_AS (Tagname);
return 0;
}
Properties
Info
Trigger
Timer
Variable
SYSTEM/SEND/DATA
SYSTEM/SEND.REQ
Press F1 for Help.


- (OS.mcp) - [PRE_UA_R.pas]
File Edit View Window Tools Help
\\ES16\WinCC_Project_OS\OS.mc
Project functions
Standard functions
Internal functions
Actions
Actions : ES16
autoload.pas
checkifopen.pas
CheckLevel.pas
DoJobAsync.pas
LangChg.pas
PRE_UA_R.pas
PRE_UA_S.pas
Global actions
#include "apdefap.h"
int gscAction(void)
{
// Copyright (C) 2008 Siemens AG
// Abteilung: I IA SE SH6
// Bearbeiter: Braun Michaela
// Datum: 12.08.08
// Version: V1.0
// Changing this script can cause abnormal
// Trigger for receive data in AS
// Trigger tag and Tagname have to be adjusted!
char Tagname[256] = "SYSTEM/RECEIVE";
PRE_MakeData_R_AS (Tagname);
return 0;
}
Properties
Info
Trigger
Timer
SYSTEM/RECEIVE.REQ
Press F1 for Help.

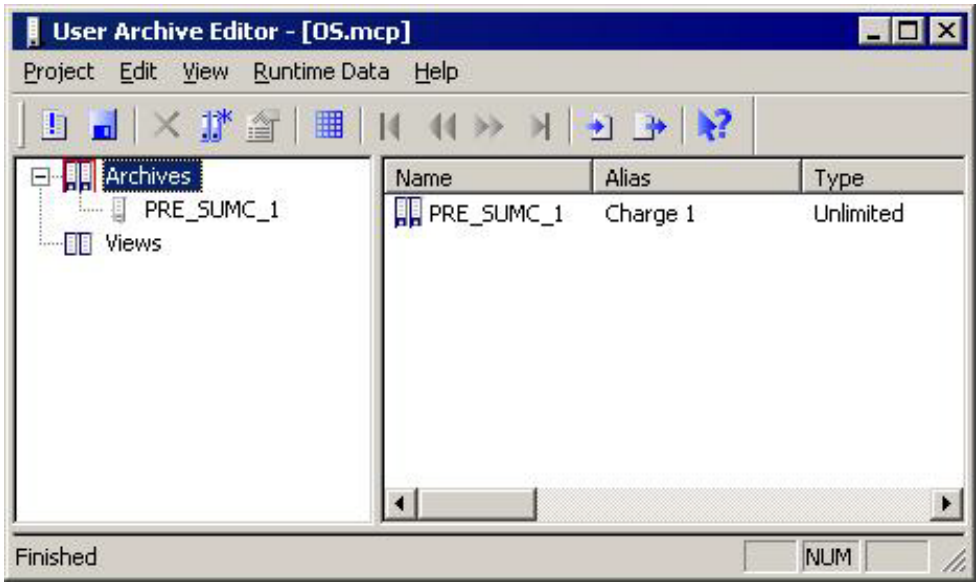
Import the archives

All the user archive files required are located in the WinCC installation directory (for example, **WinCC Installation_path\powerrate\config)**.

Configuration

- Open the user archive editor in the WinCC Explorer.
- Select `"Project → Import..."` from the menus.
- In the file selection dialog you use the "Browse..." button to select the "UserArchiveConfigurationEnglish.uap".
- After making your selection, click the "Load" button. The result is that all the archive configuration files are displayed.
- Select the "PRE_SUMC_1" item and click the "Import" button.
- After importing, you save the changes and quit the user archive configuration.

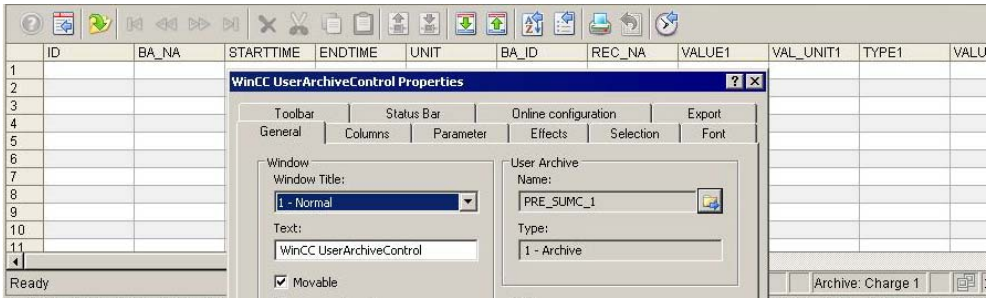
Result



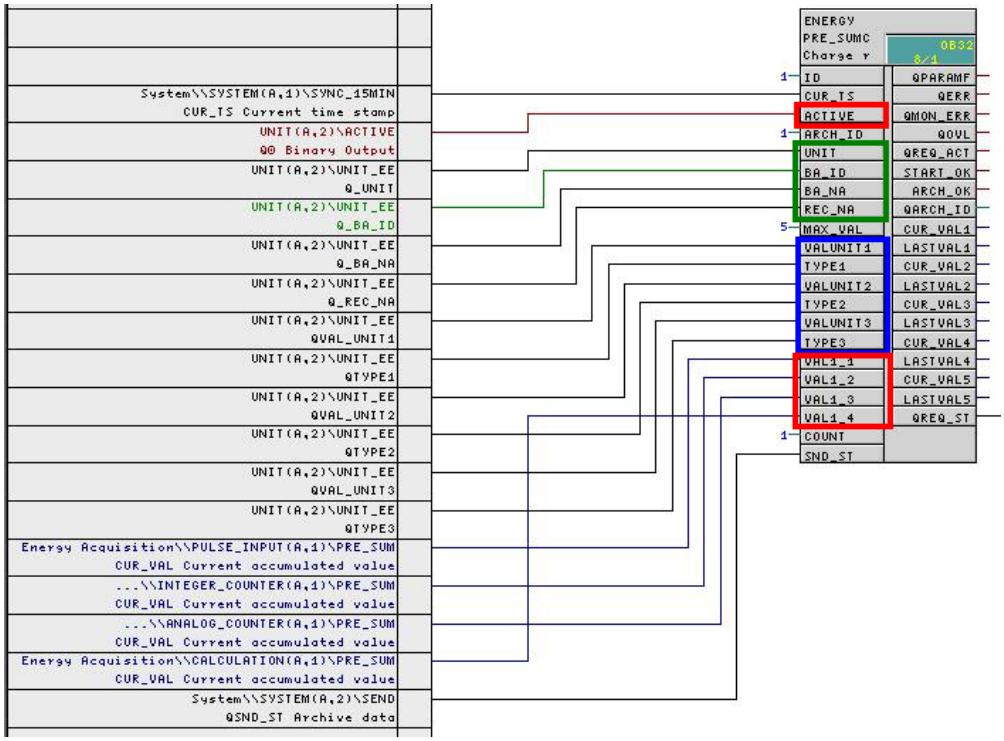
Configure process picture

- Open the picture that you created for the "Batch Data" area.
- Insert a WinCC OCX control "WinCC UserArchiveControl" from the object catalog - "Control" tab.
- Double-click the control to open the configuration dialog.
- Go to the "General" tab and select the previously configured archive "PRE_SUMC_1".

Result



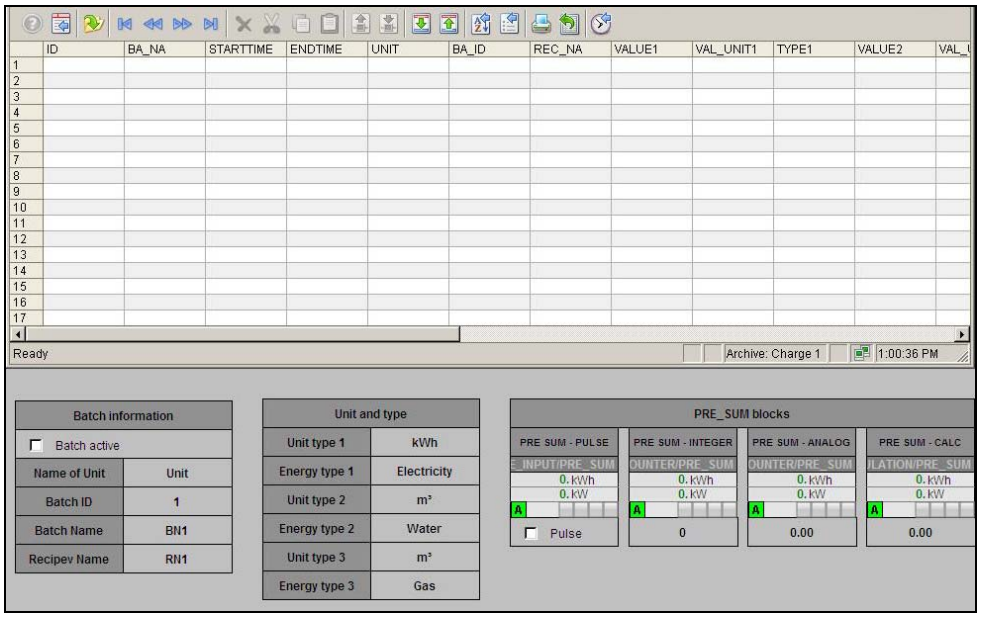
13.3 Simulating a Batch



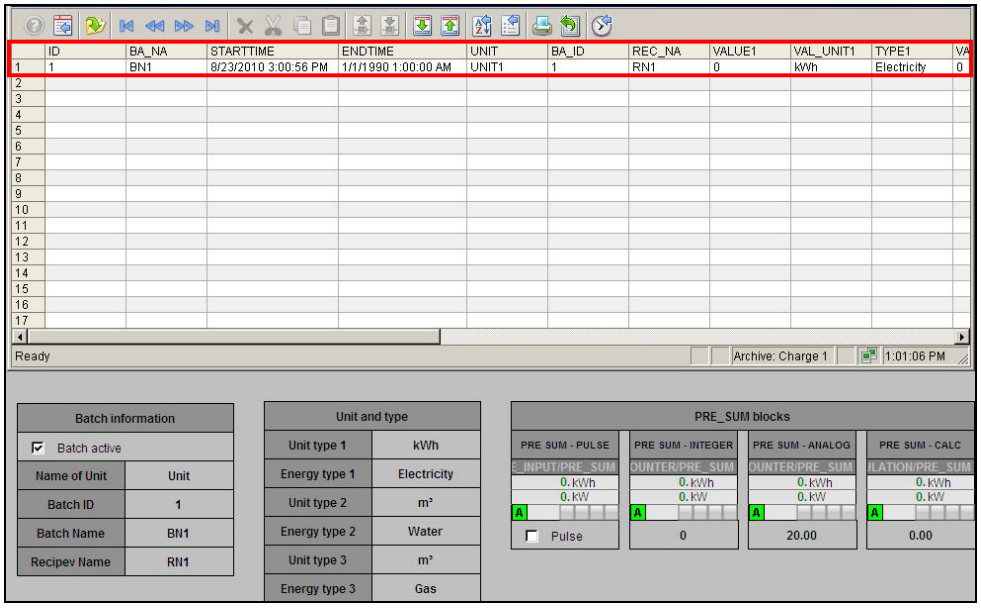
- ACTIVE → Start/Stop measuring
- UNIT → Name of the plant
- BA_ID, BA_NA and REC_NA → The inputs can be used to identify individual measurements. These values are stored in addition in the user archive.
- VALUNITx → Value unit (kWh or m³, for example).
- TYPEx → Energy type (electric, for example).
- VALx_y → Current working value of energy type y (x = 1 ... 5, y = 1 ... 10)

The VALx_y inputs must be interconnected with the outputs of the PRE_SUM block. In your example the outputs of the four PRE_SUM blocks are interconnected.

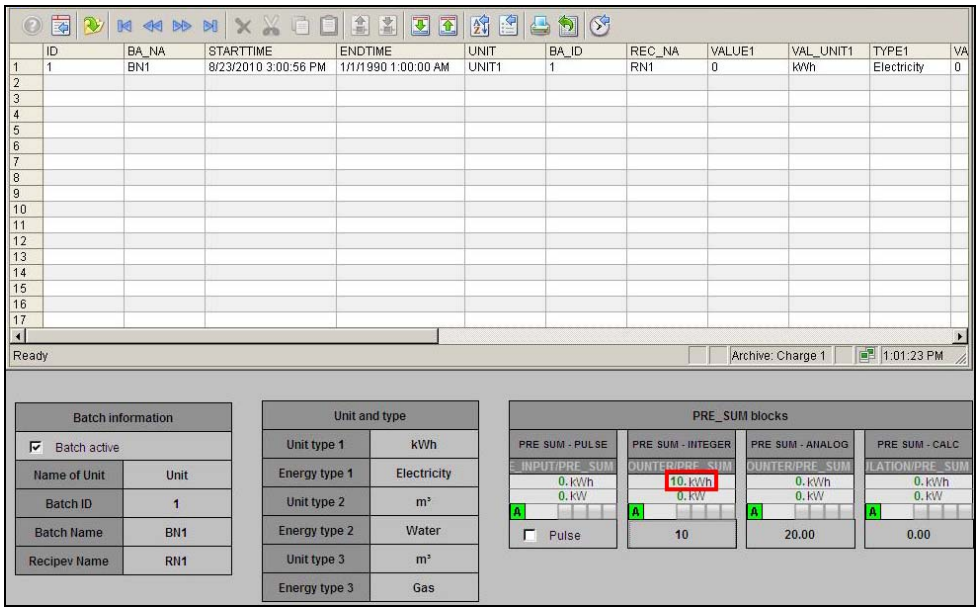
The picture in the test project has been extended for test purposes. You can use the I/O fields to change the input values interconnected with the "**PRE_SUMC**" block.



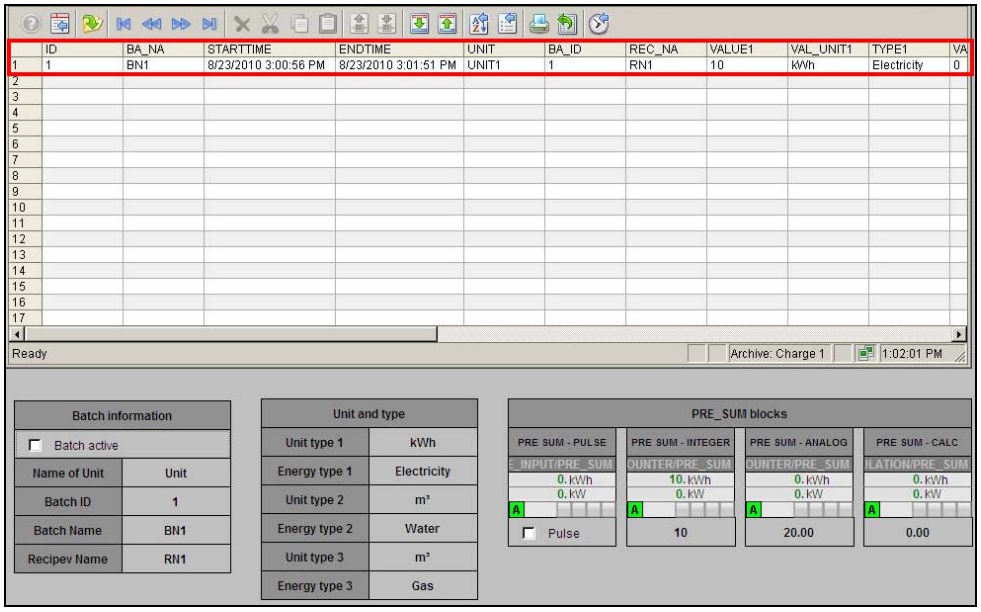
When the ACTIVE input is set to 1, a new data record is created in the WinCC user archive. The start time is updated to the current time. The default end time is 01.01.1990. The end time is updated when measurement is stopped.



The counter value for INTEGER has been increased to 10 kWh.



The ACTIVE input has been reset. This means that measuring has been stopped and the end time and VALUE1 fields have been updated.



14 Configuring the Load Management with PRE_LMGM

Load management in the context of energy management systems is understood to be the monitoring of the power limit per time interval agreed with the utility company. The time interval depends on the medium; for electricity it is typically 15 minutes, with gas 1 hour.

The general load management functions below are implemented in SIMATIC powerrate.

- Calculation of the difference in power based on the current consumption and the trend taken from the PRE_SUM block.
- Monitoring of the supply limit.
- A pending limit overshoot triggers a warning / alarm.
- Archiving of additional data when limits are overshot.
- Generation of a release/block signal for each consumer based on the priority list taking into account min./max. switch-off times and min. switch on times of the consumer.

For this, blocks with different quantity frameworks are made available depending on the required number of consumers. The blocks below are available.

- PRE_LMGM_10 up to 10 consumers
- PRE_LMGM_25 up to 25 consumers
- PRE_LMGM_50 up to 50 consumers
- PRE_LMGM_75 up to 75 consumers
- PRE_LMGM up to 100 consumers

14.1 General Information about Configuration

WinCC user archives are used for storing the load management configuration. You must configure the load management in the faceplate. When you edit and save the parameters in the individual steps, the data is both downloaded to the controller and written to the WinCC user archives.

If you want to make sure that the current status of the priority list is being used in the controller, you can use the "Download from PLC" function in the faceplate view "Edit List of Priorities".

It is recommended to read back the program in the CFC before making a total download of the controller to ensure that the last configuration is active when you restart the CPU. If reading back is not possible or an old configuration is to be activated, you can download the complete configuration immediately into the controller from the faceplate view "Configuration".

You can see which is the latest configuration from the Config ID (if known) or from the "Start of configuration" time stamp and "End of configuration" (empty).

14.2 Configuring the Total Energy Consumption / Total Power Supply

You use the PRE_SUM block to acquire the information below. The block parameters must be interconnected according to PRE_LMGM.

- Total energy consumption (CUR_VAL) / total power supply (CUR_PWR)
- Trend calculation up to the end of the period (EST_VAL / EST_PWR).
- Average energy consumption/power supply values up to the end of the period.

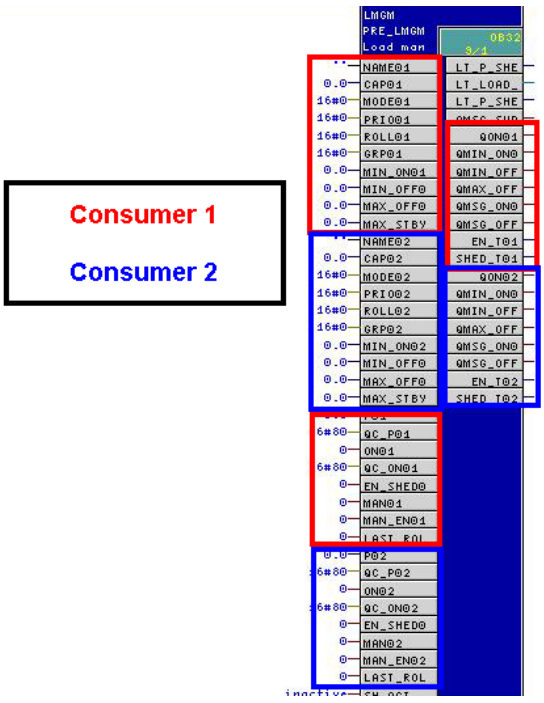
Note The interconnections are described in section 14.4.1 "PRE_LMGM Block Parameterss".

14.3 Configuring the Consumers

The block used in the template can manage up to 100 consumers. (You can also replace this with the PRE_LMGM_10 block which can manage up to 10 consumers.)

You must specify at the MAX_LOAD input the highest number at whose input a consumer is interconnected. You can make settings for each consumer.

Below we describe the associated parameters, where x stands for the number of consumers and x = 01 - 100.



MODES

The current consumer power is at input Px. This input is evaluated only if the input MODEx (see below) has the value 1.

The rated capacity is specified at input CAPx. The rated capacity is always taken as the basis for calculating when connecting. In MODEx = 2 or 3 it is assumed that the consumer runs at the rated capacity when switched on.

The input ONx is interconnected with the switching state of the consumer (only MODEx = 2).

Modex	Consumer type
1	The current consumer power is interconnected at the Px input.
2	The switching state of the consumer is interconnected at the ONx input.
3	Only the rated capacity of the consumer is known.

Depending on the consumer type, a consumer is considered to be switched off under the conditions listed below.

Consumer type	Conditions for "OFF"
MODEx = 1	Px < CAPx*MAX_STBYs/100.0 Current consumer power is less than the consumer's maximum standby power.
MODEx = 2	ONx = FALSE Feedback: "OFF"
MODEx = 3	QONx = FALSE Consumer not released by Load Management.

Times

A minimum switch-on time, a minimum switch-off time and a maximum switch-off time can be parameterized for each consumer at the inputs MIN_ONx, MIN_OFFx and MAX_OFFx respectively.

- Minimum switch-on time, i.e. after release how long must the consumer remain released until it can be blocked again.
- Minimum switch-off time, i.e. after switch-off how long must the consumer remain switched off until it can be released again.
- Maximum switch-off time, i.e. after switch-off how long may the consumer remain switched off until it must be switched on again (MAX_OFFx = 0 means that there is no maximum switch-off time).

Release

Each consumer has an EN_SHEDx input which specifies whether the consumer is in the Load Management (1 = consumer is in the Load Management).

Each consumer has a MAN_ENx input which specifies whether or not manual mode can be released for the consumer (MAN_ENx =1).

The MANx input specifies whether manual mode is switched on.

Priority

There is one PRIOx input for each consumer at which the priority of the consumer is parameterized as a number (1...255). 1 is the highest priority, 0 means that the consumer is not part of the load management or that there is no consumer available.

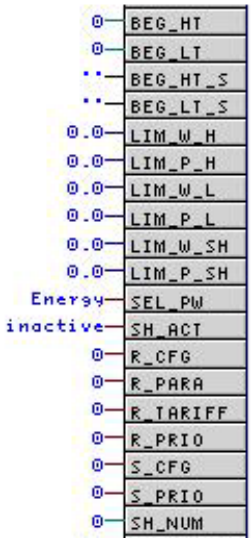
Rolling consumers

There is one input named ROLLx for each consumer at which is defined whether the consumer is a rolling consumer in the priority group (ROLLx > 0) or not (ROLLx = 0).

Consumers switched as rolling consumers all have the same priority. The ROLLx parameter defines the order in which the consumers concerned are switched off.

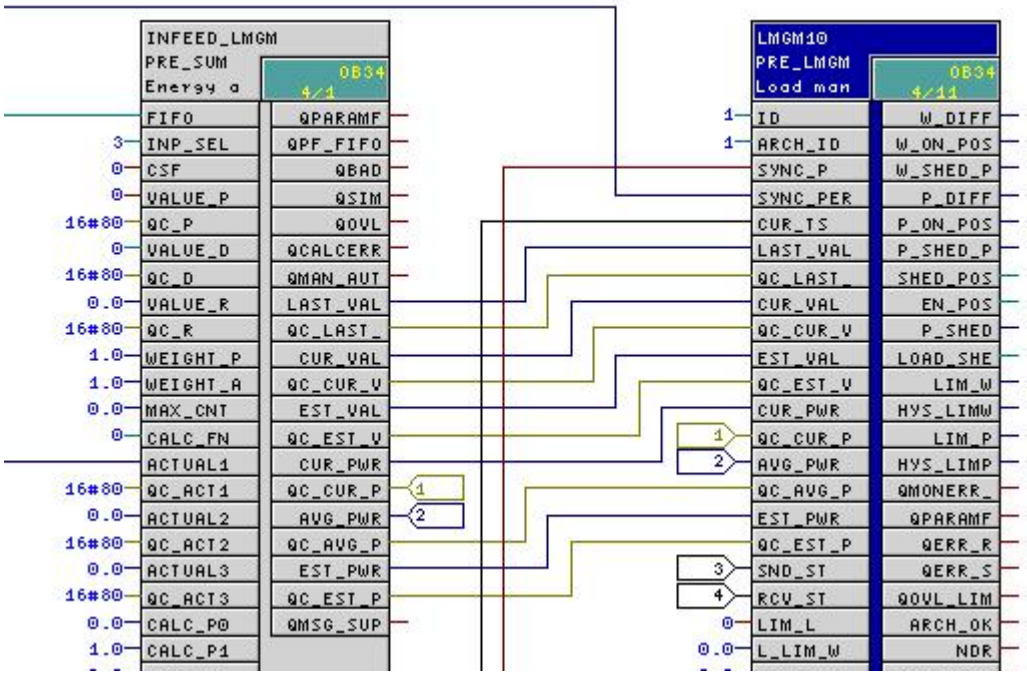
Tariffs

The block has three tariffs (on-peak tariff, off-peak tariff, and Sunday or holiday tariff). Either a work limit or a power limit can be defined for each tariff. You define the limit values either using the faceplate or switchable inputs.



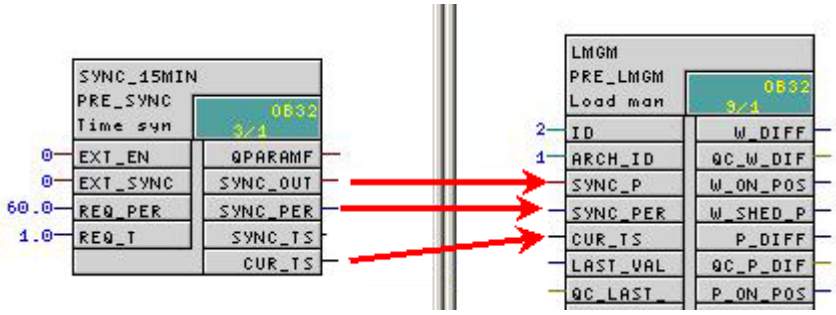
Parameters input data

The figure below shows the input parameters that are to be interconnected.



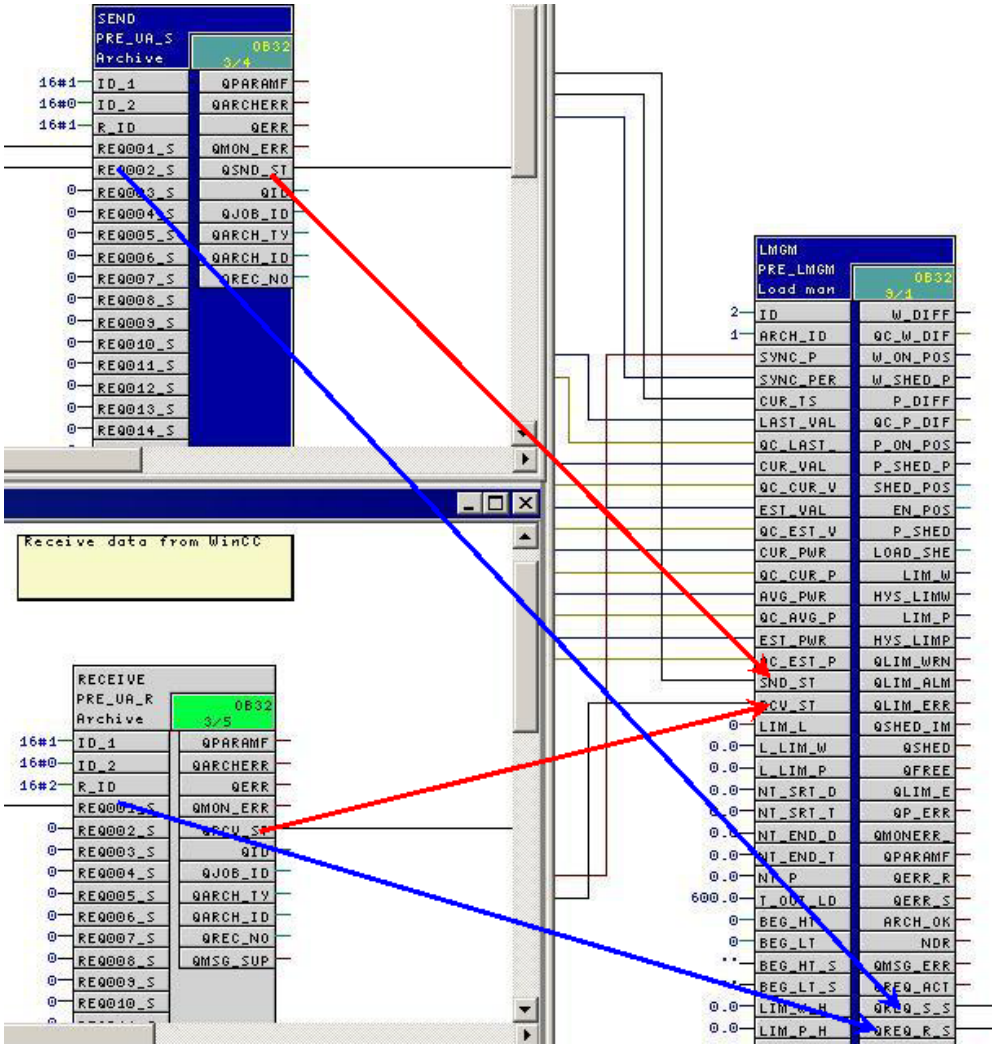
Interconnection with the PRE_SYNC block

The three marked inputs of the LMGM block must be interconnected with the outputs of the PRE_SYNC block.



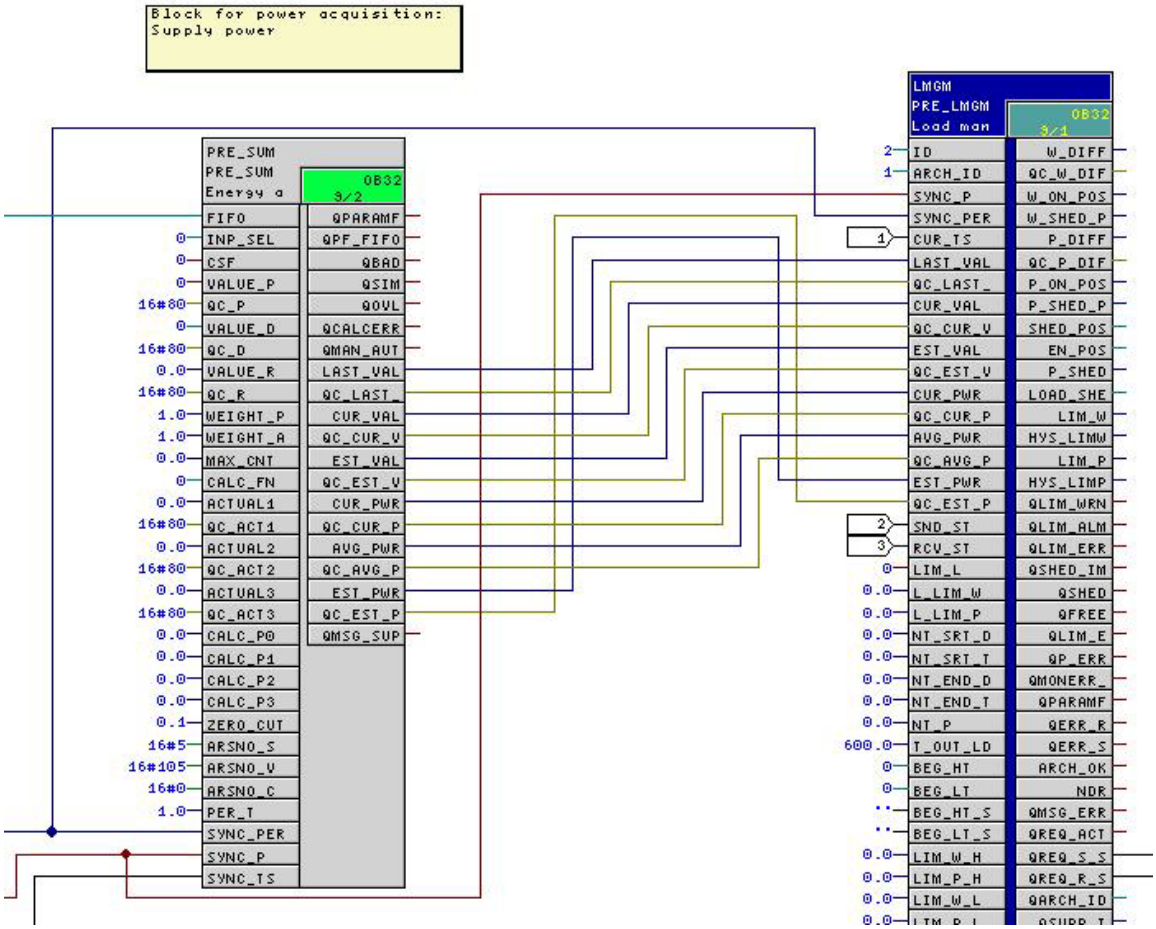
Interconnection with the PRE_UA_S and PRE_UA_R blocks

The PRE_UA_S and PRE_UA_R blocks are used to write data from the controller to the WinCC user archive and read data from them.



14.4 Sample Commissioning of the Load Management

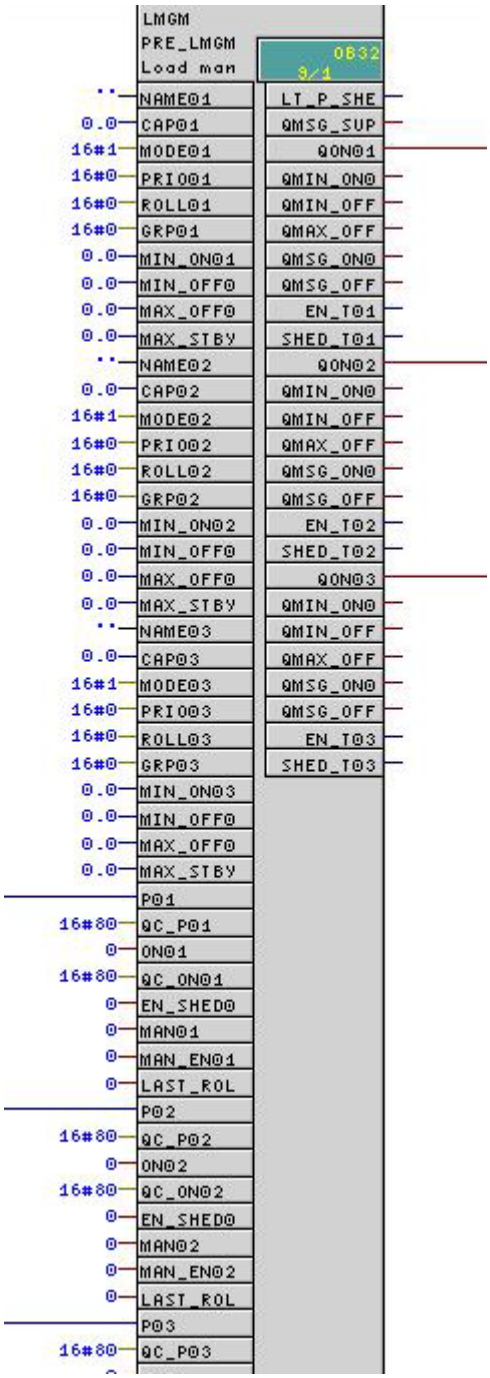
14.4.1 PRE_LMGM Block Parameters



Meaning of important inputs

- **MAX_LOAD**: maximum number of consumers.
- **ID**: all blocks that use PRE_UA_S or PRE_UA_R to exchange data with the WinCC user archives need a unique ID.
- **ARCH_ID**: number of the user archive, for example PRE__LMGM_CONFIG_**1** (PRE__LMGM_ CONFIG_+"**ARCH_ID**").
- **SYNC_P, SYNC_PER, CUR_TS**: these must be interconnected with the outputs of the PRE_SYNC block.
- **SND_ST, RCV_ST**: these must be connected with the outputs of the PRE_UA_S and PRE_UA_R blocks.

In the sample project the inputs of the PRE_SUM block are interconnected with blocks that are used for simulation.



We want to control 3 consumers in out example. All of them are running in MODE 1. Therefore we must connect the inputs P01, P02 and P03 and outputs QON01 QON02 and QON03 with the simulation data block (see sample project).

The values of the inputsCAP01, CAP02 and CAP03 are defined using the faceplate.

The MAX_LOAD parameter must be set to "3".

Now you have finished the program. Compile the program and download the changes into the CPU. Then compile the OS.

14.4.2 Creating Raw Data Tags

You must create raw data tags for sending/receiving data to/from the PCS 7 OS. This has already been described in the previous chapter.

If you have not already done so, execute this step now.

14.4.3 Creating Archive Tags

If you want to archive the PRE_SUM values, you must do this in the Tag Logging as described above in the document.

14.4.4 Copying the Global Script Actions

The PRE_UA_S.pas and PRE_UA_R.pas scripts are needed for sending/receiving data to/from the CPU. This has already been described in the previous chapter.

If you have not already done so, execute this step now.

14.4.5 Changing the Global Script Actions

You must change the tag names and tag triggers in both scripts.

If you have not already done so, execute this step now.

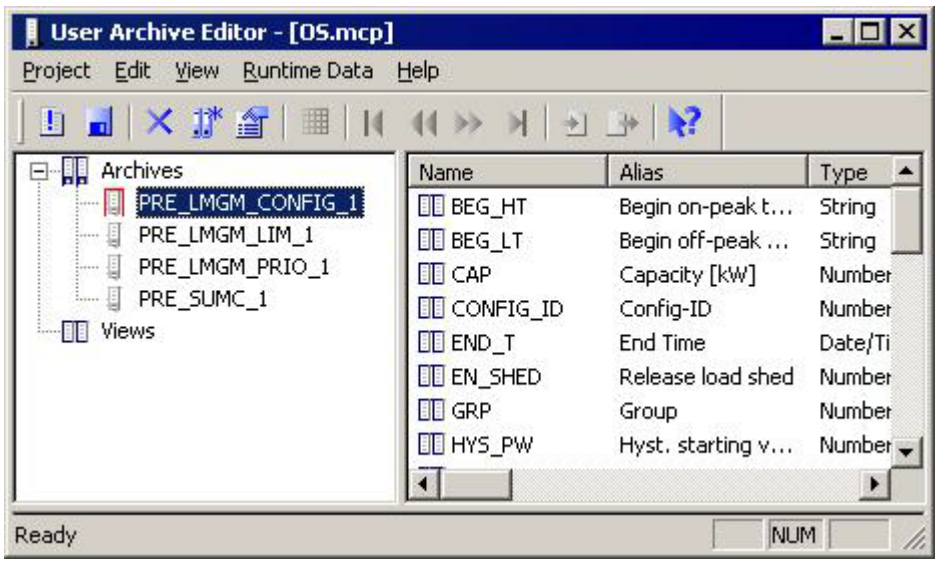
14.4.6 Importing the Archives

All the user archive files required are located in the WinCC installation directory (for example, **WinCC Installation_path\powerrate\config)**.

Configuration

- Open the user archive editor in the WinCC Explorer.
- Select `"Project > Import..."` from the menus.
- In the file selection dialog you use the "Browse..." button to select the "UserArchiveConfigurationEnglish.uap".
- After making your selection, click the "Load" button. The result is that all the archive configuration files are displayed.
- Select the "PRE_LMGM_*" item and click the "Import" button.
- After importing, you save the changes and quit the user archive configuration.

Result



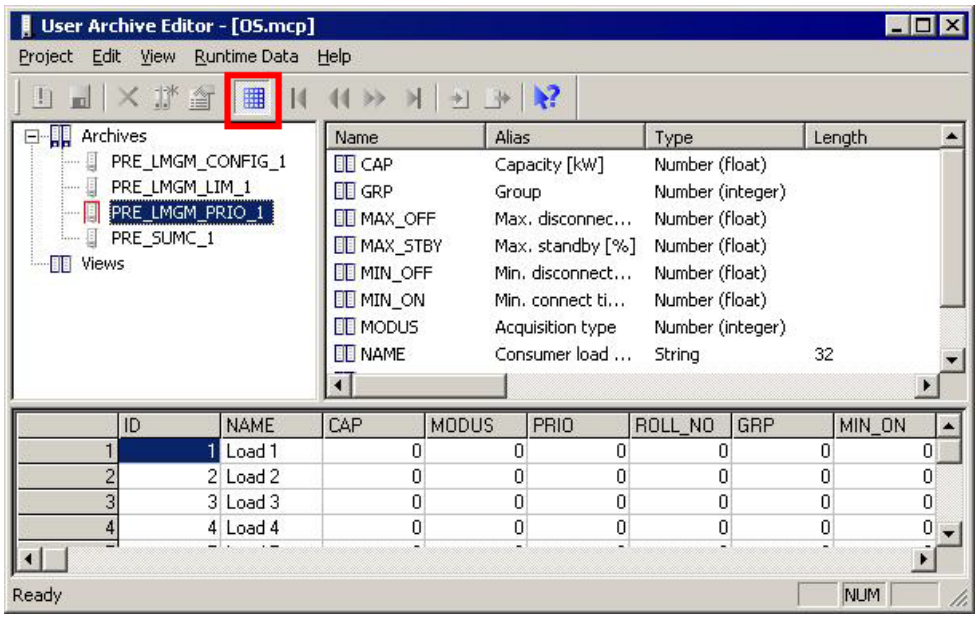
14.4.7 Importing the Runtime Data

You must import the Runtime data for the "PRE_LMGM_PRIO_1" archive.

Configuration

- Open the user archive editor in the WinCC Explorer.
- Select `"Runtime Data > Import"` from the menus.
- In the file selection dialog you use the "Browse..." button to select the import file.
- Select the "PRE_LMGM_PRIO_English.csv" file from the powerrate installation directory.
- In the archive selection field you select the "PRE_LMGM_PRIO_1" archive and click the "Import" key.
- After importing, you save the changes and quit the user archive configuration.

Result



Note

A file (PRx_LMGM_PRIO_Deutsch.csv / PRx_LMGM_PRIO_English.csv) which contains the default settings for the PRE_LMGM_PRIO_1 archive is provided. If necessary, you can edit this file in Microsoft Excel and then import it.

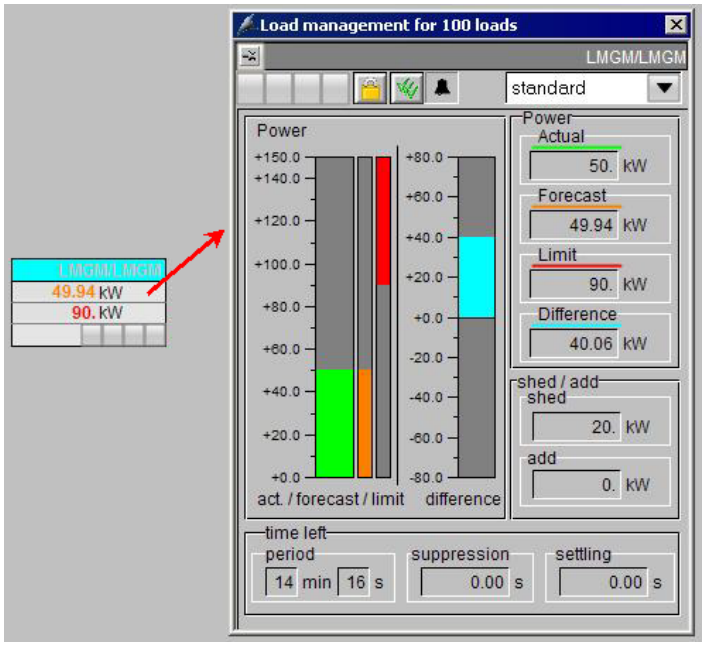
14.5 Configuring the LMGM Block

The icon for the LMGM block is placed automatically in the relevant picture when the OS is compiled.

14.6 Using Faceplates

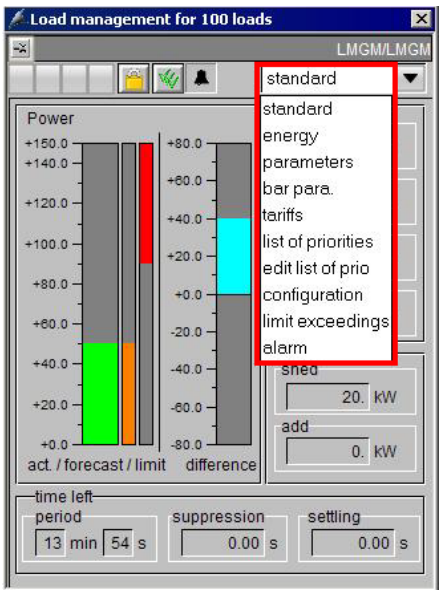
Open a faceplate

You can open a faceplate by clicking on the associated block icon in PCS 7 OS Runtime.



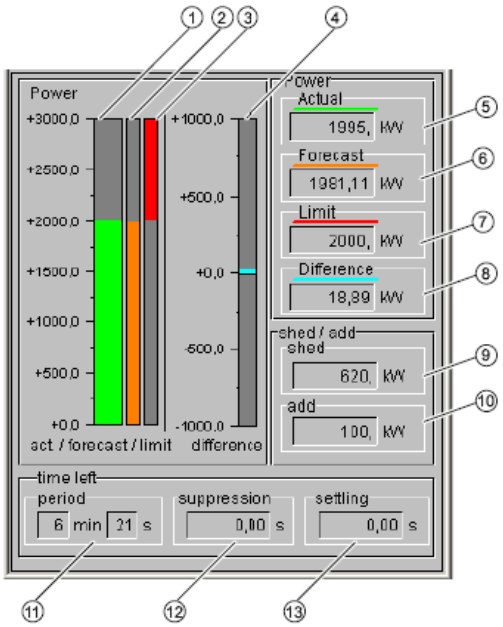
Views

You can choose one of the views from the drop-down menu.



Description of the faceplates and block icons

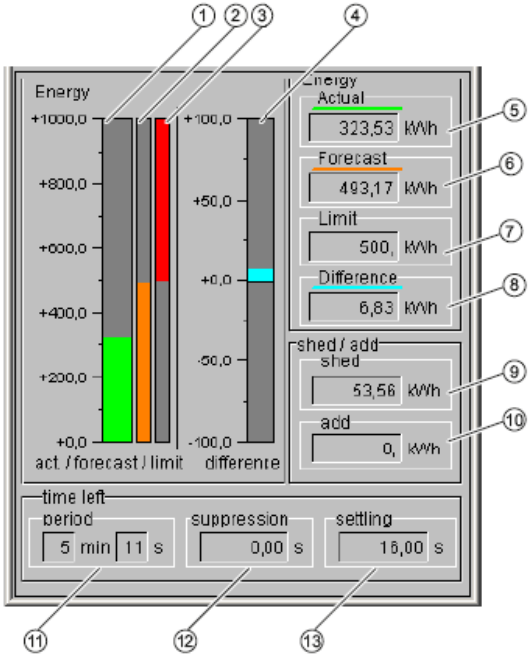
Standard



Explanation of the values

	Item	Parameter	Description
(1)	Power – act.	CUR_PWR	The current supply power, shown as a bar graph
(2)	Power – Trend	EST_PWR	The calculated trend at the end of the period, shown as a bar graph
(3)	Limit	HYS_LIMP	The currently valid limit, shown as a bar graph
(4)	Difference	P_DIFF	The difference between the trend and the current limit, shown as a bar graph
(5)	Power – Actual	CUR_PWR	The current supply power, shown as a value
(6)	Power – Trend	EST_PWR	The calculated trend at the end of the period
(7)	Limit	HYS_LIMP	The currently valid limit
(8)	Difference	P_DIFF	The difference between the trend and the current limit, shown as a value
	shed / add		
(9)	trip	P_SHED	The disconnect power still available according to the priority list
(10)	add	P_ON	The connect power still available according to the priority list
	Remaining times		
(11)	Period	SYNC_PER	Synchronization period
(12)	Suppression	QSUPP_T	Suppression time: Time that must elapse from the start of the period before load management becomes active
(13)	Settling	QSETTLE_T	Settling time: Specifies the time which must elapse following release/hold before a new signal is set

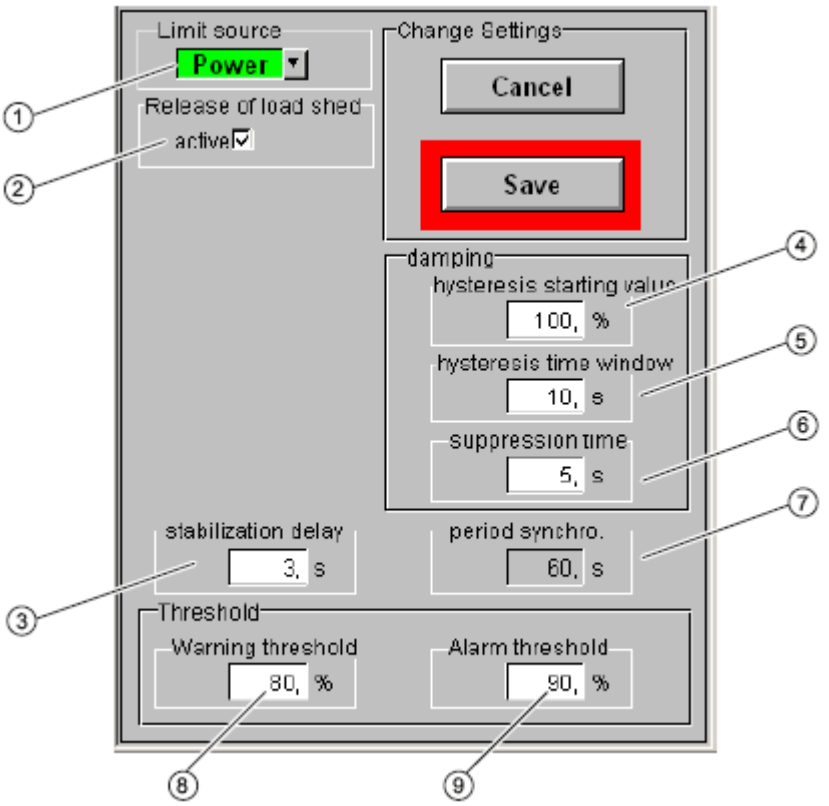
Operation



The parameters below are displayed:

	Item	Parameter	Description
(1)	Energy – act.	CUR_VAL	The current supply energy, shown as a bar graph
(2)	Energy – Trend	EST_VAL	The calculated trend at the end of the period, shown as a bar graph
(3)	Limit	HYS_LIMW	The currently valid limit, shown as a bar graph
(4)	Difference	W_DIFF	The difference between the trend and the current limit, shown as a bar graph
(5)	Energy – Actual	CUR_VAL	The current supply energy, shown as a value
(6)	Energy – Trend	EST_PWR	The calculated trend at the end of the period
(7)	Limit	HYS_LIMW	The currently valid limit
(8)	Difference	W_DIFF	The difference between the trend and the current limit, shown as a value
	shed / add		
(9)	trip	W_SHED	The disconnect energy still available according to the priority list
(10)	add	W_ON	The connect energy still available according to the priority list
	Remaining times		
(11)	Period	SYNC_PER	Synchronization period
(12)	Suppression	QSUPP_T	Suppression time: Time that must elapse from the start of the period before load management becomes active
(13)	Settling	QSETTLE_T	Settling time: Specifies the time which must elapse following release/hold before a new signal is set

Parameters

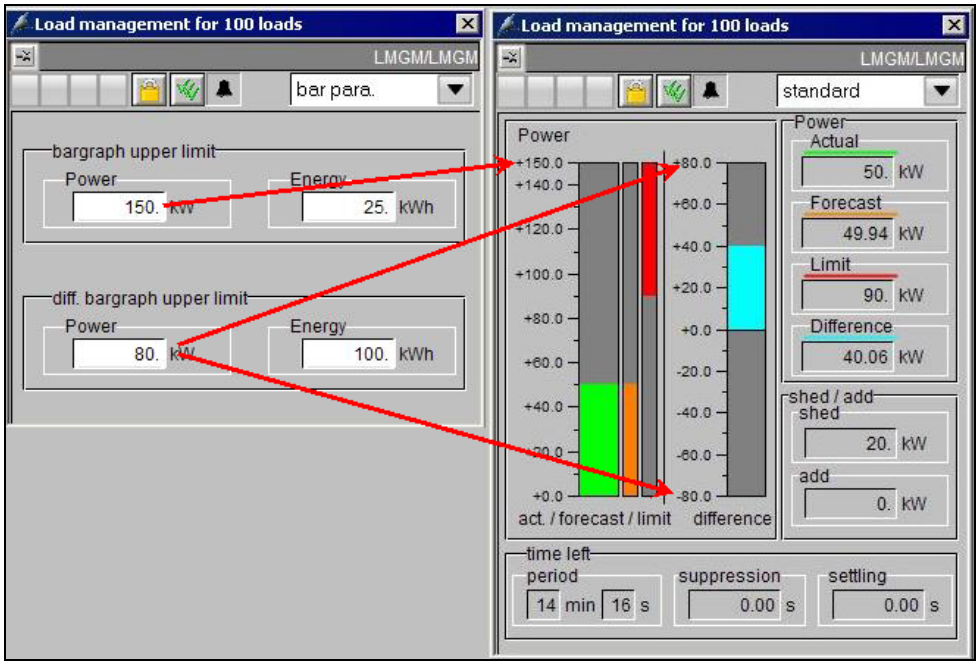


The parameters below are displayed:

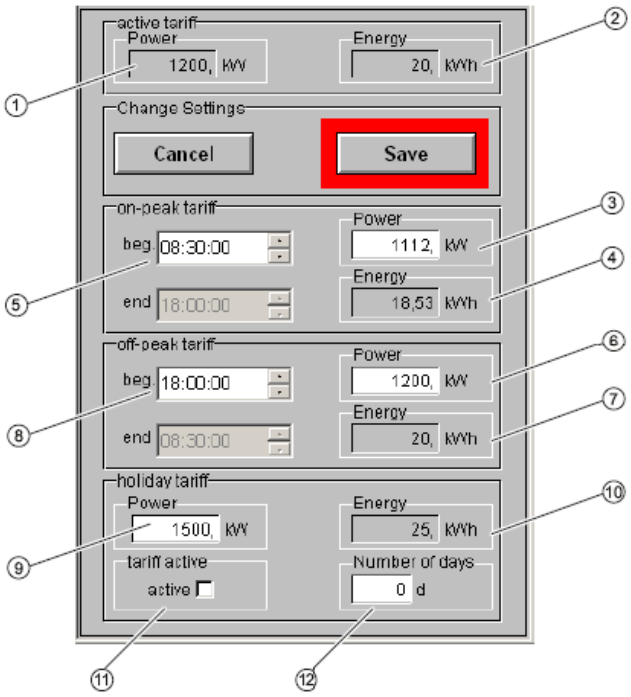
	Item	Parameter	Description
(1)	Limit source	SEL_PW	Specifies whether the limit will be defined as energy (work) or power.
(2)	Release of load shed	EN_SHED	If this box is checked, loads are released/held in accordance with the priority list. If the box is not checked, only a trend calculation and limit monitoring are performed, i.e. corresponding messages are output if a limit is about to be exceeded.
(3)	Stabilization delay	SETTLE_T	Specifies the time which must elapse following release/hold before a new signal can be set
(4)	Hysteresis – starting value	HYS_PW	% value based on the current limit for the hysteresis starting value at the start of the period
(5)	Hysteresis – time window	HYS_T	Time until hysteresis has reached 0, i.e. until the specified limit is used as a basis.
(6)	Suppression time	SUPP_T	Time which must elapse from the start of the period before load management becomes active
(7)	Period synchro.	SYNC_PER	Time for the specified limit (for electricity, usually 15 min); this value is configured at the PRE_SUM block.
	Threshold		Specifies when a a warning or alarm will be output. The values are given as percentages of the specified limit.
(8)	Warning limit	LIM_WRN	% value of the limit after which a warning message indicating a limit is about to be exceeded is issued
(9)	Alarm threshold	LIM_ALM	% value of the limit after which an alarm message indicating a limit is about to be exceeded is issued

Bar parameters

With this view you specify the limit values for the bar display in the standard view.



Tariffs

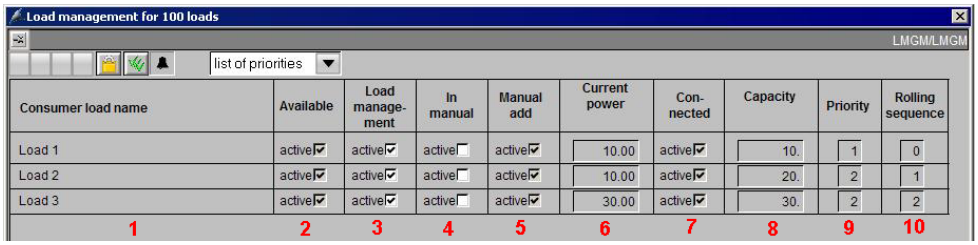


The parameters below are displayed:

	Item	Parameter	Description
	Current tariff		
(1)	Power	LIM_P	Shows the currently valid tariff as power.
(2)	Energy	LIM_W	Shows the currently valid tariff as energy.
	On-peak tariff		
(3)	Power	LIM_P_H	Power limit for on-peak tariff
(4)	Energy	LIM_W_H	Energy limit for on-peak tariff
(5)	Start time on-peak tariff	BEG_HT / BEG_HT_S	Start time for on-peak tariff
	Off-peak tariff		
(6)	Power	LIM_P_L	Power limit for off-peak tariff
(7)	Energy	LIM_W_L	Energy limit for off-peak tariff
(8)	Start time off-peak tariff	BEG_LT / BEG_LT_S	Start time for off-peak tariff
	Holiday tariff		
(9)	Power	LIM_P_SH	Power limit for holiday tariff
(10)	Energy	LIM_W_SH	Energy limit for holiday tariff
(11)	Tariff active	SH_ACT	From 00:00 of the next day, the holiday tariff applies for "Number of days" (until 24:00)
(12)	Number of days	SH_NUM	Number of days for holiday tariff

Priority list

This view shows the current status of the individual consumers in the Load Management and provides the option of taking individual consumers out of the Load Management controller and releasing them manually.



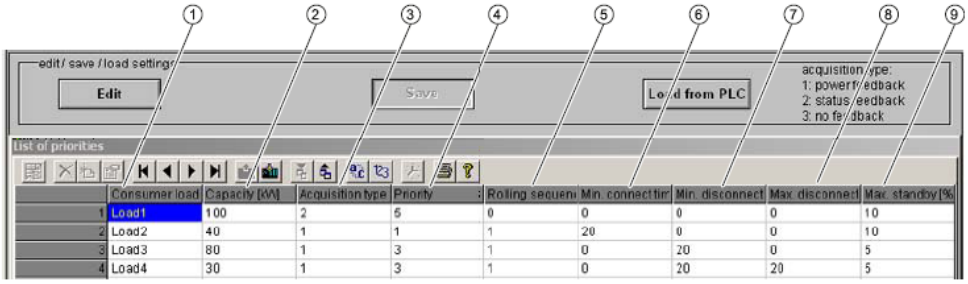
The values below are displayed:

	Item	Parameter	Description
(1)	Load name	NAMEx	Shows the name of the load.
(2)	Released	QONx	Indicates whether the load is currently released via load management or not.
(3)	In the load management	EN_SHEDx	Defines whether the load is included in load management control or not.
(4)	in manual	MANx	Defines whether the load can be released manually or not.
(5)	manual add	MAN_ENx	This manually releases the load so that it is no longer under load management control.
(6)	Current output	Px	Shows the load's calculated power, provided it exists.
(7)	Switched on	ONx	Shows the status of the load, provided the load has status feedback.
(8)	Rated output	CAPx	Contains the load's configured rated power.
(9)	Priority	PRIOx	Shows the load's priority, which is used for holding.
(10)	Rolling sequence	ROLLx	Specifies the sequence in which loads of the same priority are disconnected in a rolling process. If loads have the same priority and rolling sequence, they are switched together as a group.

x = 01 to 10, 25, 50, 75 or 100

Edit list of priorities

The PRE_LMGM_PRIO_x user archive is displayed here. The view permits you to edit load parameters and download the current configuration from the CPU. You can also import and export the priority list in this view.



The values below are displayed:

	Item	Parameter	Description
(1)	Loads	NAMEx	Name of the load
(2)	Rated output	CAPx	Load's rated power
(3)	Mode	MODEx	Load status feedback: 0: No load present 1: Power feedback 2: Status feedback 3: No feedback
(4)	Priority	PRIOx	Shows the load priority used for holding
(5)	Rolling sequence	ROLLx	Specifies the sequence in which loads of the same priority are disconnected in a rolling process. If loads have the same priority and rolling sequence, they are switched together as a group.
(6)	Min. connect time	MIN_ONx	Minimum time the load must be released before it can be held again
(7)	Min. disconnect time	MIN_OFFx	Minimum time the load must be held before it can be released again
(8)	Max. disconnect time	MAX_OFFx	Maximum time the load may be held
(9)	Max. standby	MAX_STBYx	Max. standby power of the load as a percentage of the rated power

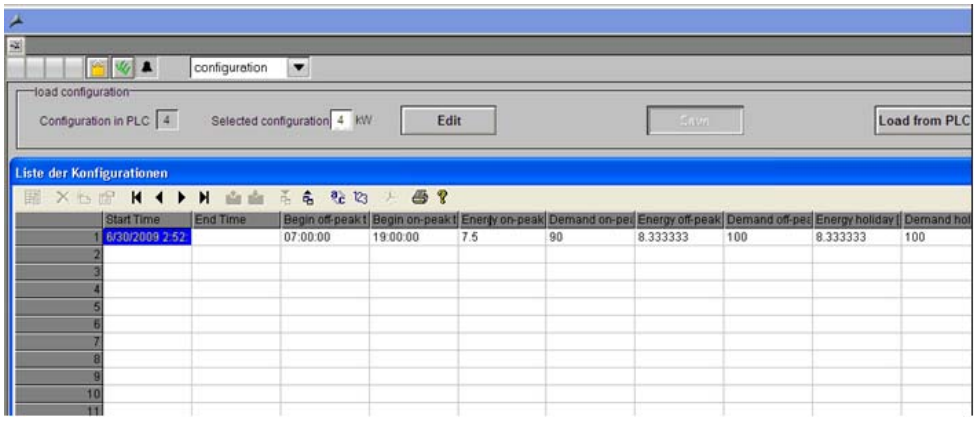
x = 01 to 10, 25, 50, 75 or 100

Configuration

This list contains the current and last CFG_MAX configurations of the Load Management (user archive PRE_LMGM_CONFIG_x).

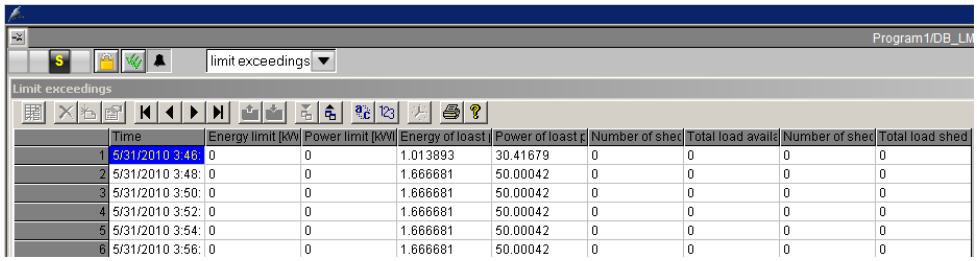
When you open the faceplate view, the current configuration is always selected (CONFIG_ID = CFG_CUR). When you enter the CONFIG_ID, you can select any configuration or also all configurations if you set an appropriate filter condition.

You can display, print, export and import the configurations and download them into the controller. Each configuration includes the time stamp of its validity as well as the values from the faceplate views "Parameters", "Tariffs" and "Edit list of priorities".



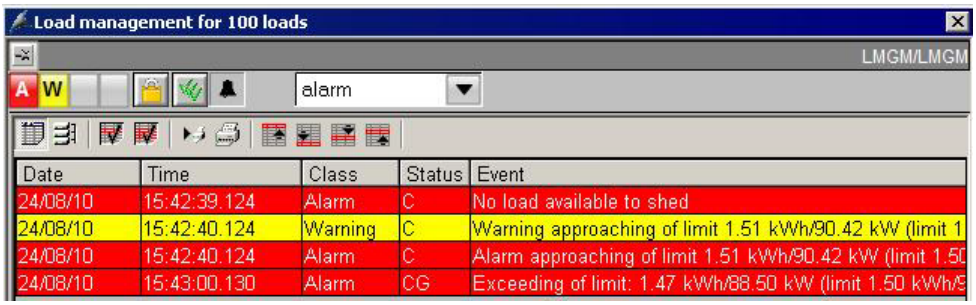
Limit violations

This list displays the archived limit violations (user archive PRE_LMGM_LIM_x). You can export this list.



Alarm

All the messages concerning the Load Management block are displayed here.



14.7 Commissioning the Load Management Using the Faceplate

14.7.1 Overview

To start with, it is necessary to define the parameters of the Load Management using the faceplate.

Configuration

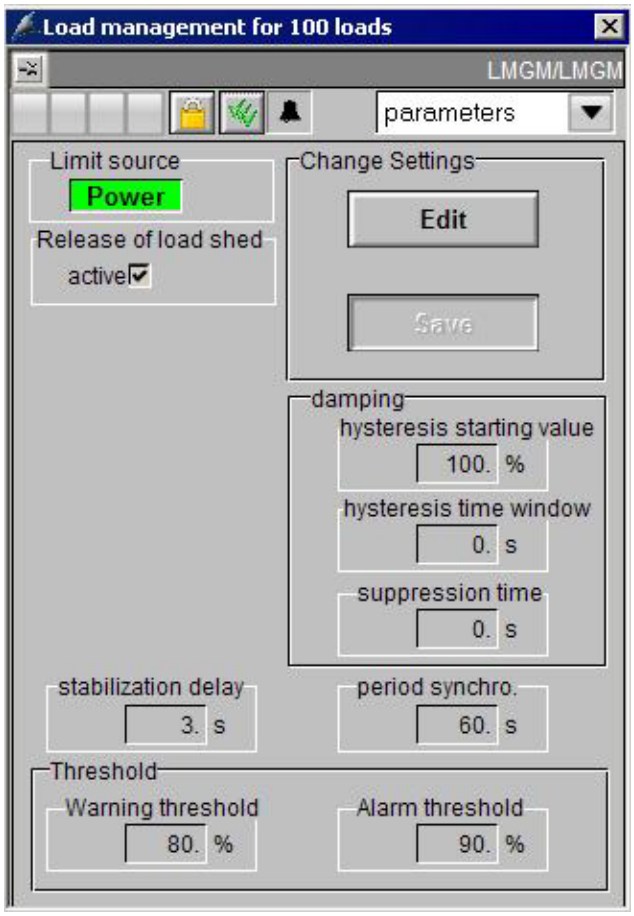
- Changing the Values in the "Parameters" View
- Define tariffs and power values.
- Parameterize consumer data.
- Enable consumers for Load Management.
- Test the Load Management.
- Read back parameters from the controller into the project.

14.7.2 Changing the Values in the "Parameters" View

Configuration steps

- Select the "Parameters" view in the LMGM faceplate.
- Click the "Edit" button.
- Change the parameters for:
  - "Limit source" to power.
  - "Stabilization delay" to 3s.
  - "Hysteresis starting value" to 100%
  - "Warning threshold" to 80%.
  - "Alarm threshold" to 90%.
- Click "Save" to write the settings to the CPU and the user archive.

Result

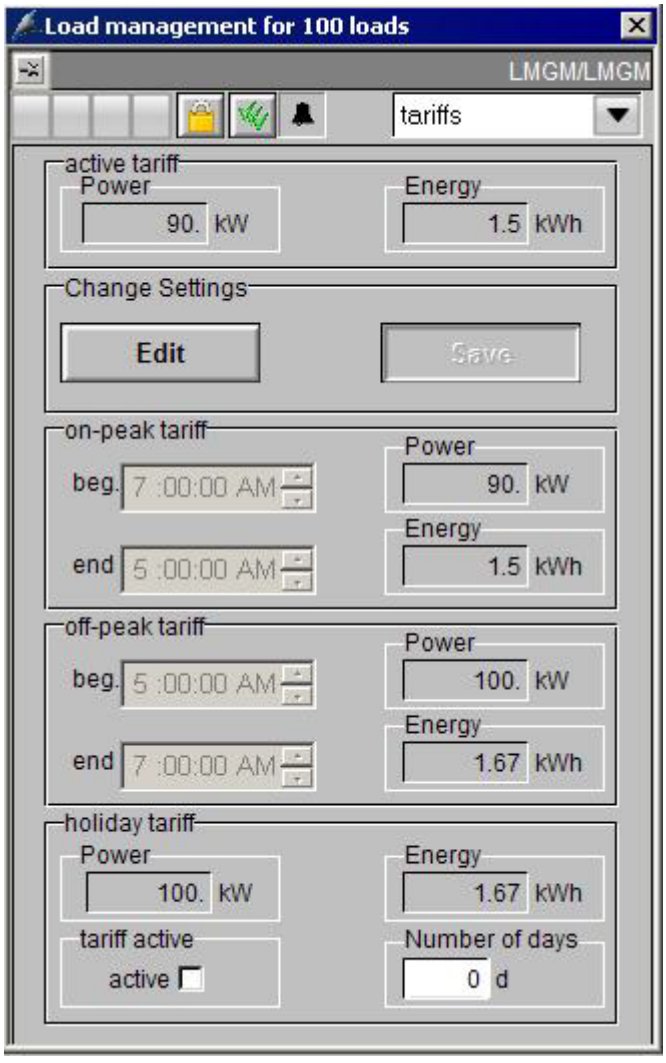

Load management for 100 loads
LMGM/LMGM
parameters
Limit source
Power
Release of load shed
active
Change Settings
Edit
Save
damping
hysteresis starting value
100. %
hysteresis time window
0. s
suppression time
0. s
stabilization delay
3. s
period synchro.
60. s
Threshold
Warning threshold
80. %
Alarm threshold
90. %

14.7.3 Changing the Values in the "Tariffs" View

Configuration steps

- Select the "Tariffs" view in the LMGM faceplate.
- Click the "Edit" button.
- Define the times and power values for the 3 tariffs:
  - "On-peak tariff"
  - "Off-peak tariff"
  - "Holiday tariff"
- Save the settings.

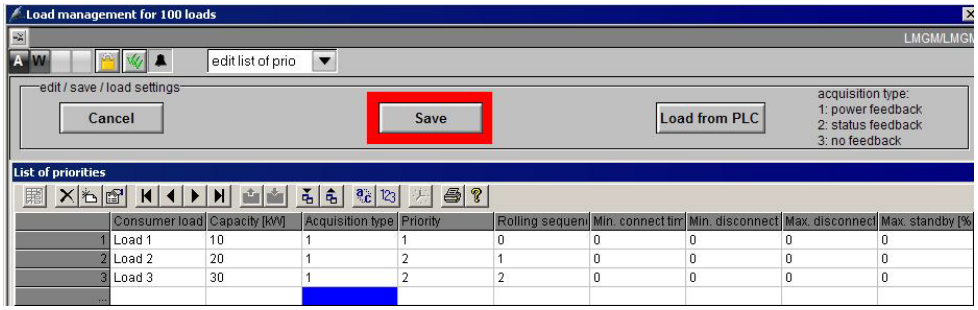
Result



14.7.4 Changing the Values in the "Edit List of Priorities" View

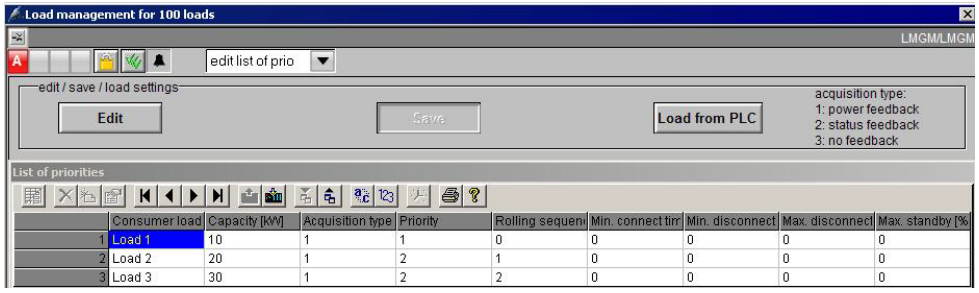
Configuration steps

- Select the "Edit list of priorities" view in the LMGM faceplate.
- Click the "Edit" button.
- Change the values for the consumer data as shown in the figure:
  - "Capacity"
  - "Acquisition type"
  - "Priority"
  - "Rolling sequence no."



- Save the settings.

Result



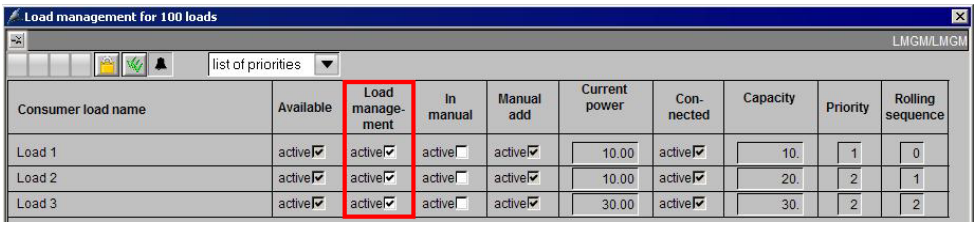
Note To start with only the default values are in the table. All the values are set to "0".

14.7.5 Changing the Values in the "Priority List" View

Configuration steps

- Select the "Priority list" view in the LMGM faceplate.
- In the "Load Management" column you select the consumers that are integrated in the Load Management.

Result

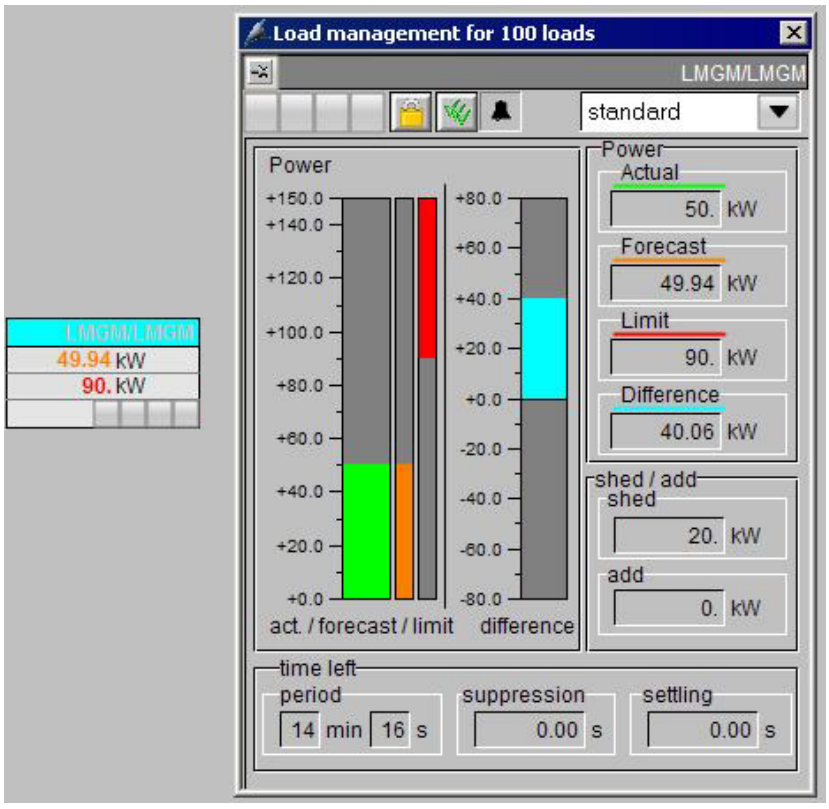


Consumer load name	Available	Load manage-ment	In manual	Manual add	Current power	Con-nected	Capacity	Priority	Rolling sequence
Load 1	active	active	active	active	10.00	active	10.	1	0
Load 2	active	active	active	active	10.00	active	20.	2	1
Load 3	active	active	active	active	30.00	active	30.	2	2

Note

If a consumer is not activated in the Load Management, it is not switched off automatically as soon as the alarm limit is reached.

After changing the values in the various views of the LMGM faceplate, you can see the configured values in the "Standard" view of the faceplate.



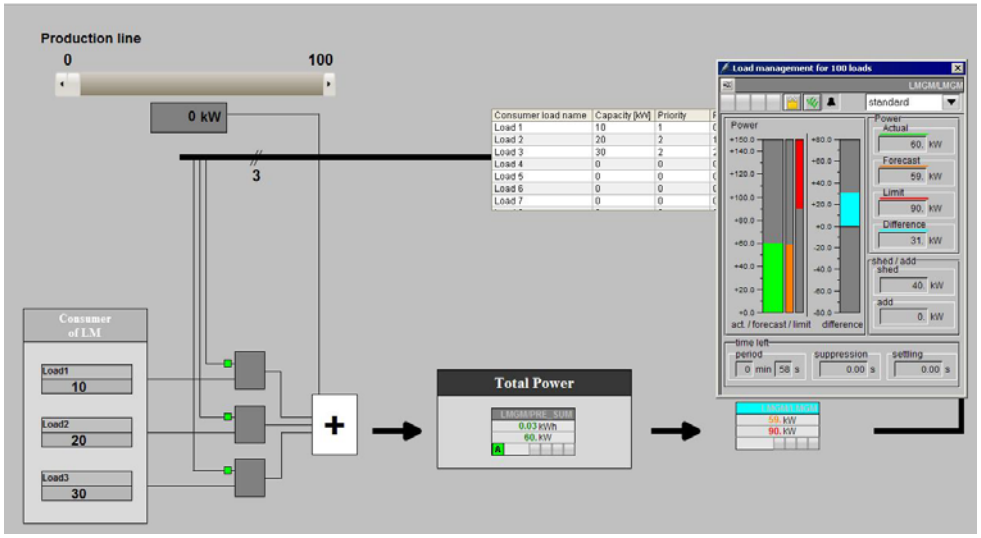
14.7.6 Testing the Load Management

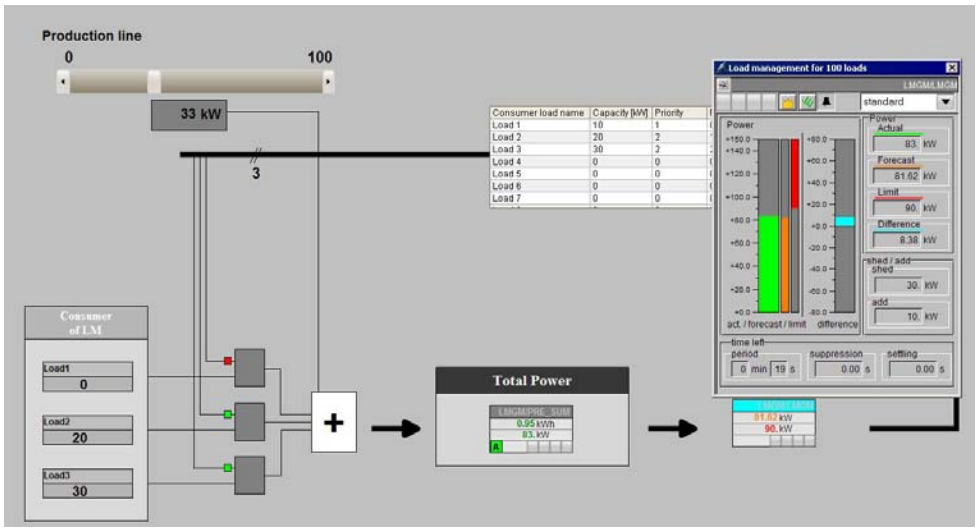
The power supply of the sample project is defined by the PRE_SUM block in the "LMGM" CFC. This block gets its values from simulation blocks that are in the same CFC.

The power values for the 3 consumers (inputs P01, P02 and P03) are:

- Consumer 1 → 10kW
- Consumer 2 → 20kW
- Consumer 3 → 30kW

The Load_Var block in the "LMGM" CFC is used for simulation purposes. It is linked with a bar display in the picture. If the value is increased, then the power supply increases. If the alarm limit is reached, a consumer is switched off automatically.

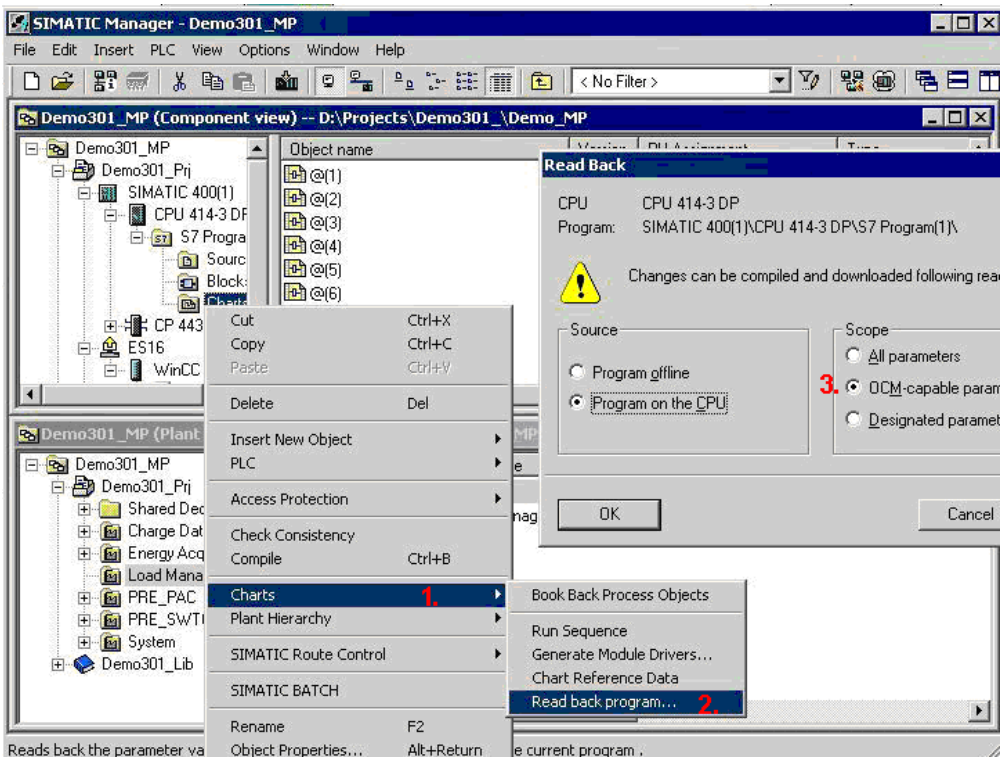




14.7.7 Reading Back Parameter from the CPU

Configuration steps

- Open the project in the SIMATIC Manager.
- Select `"Read back program..."` in the pop-up menu of the Charts folder.
- Select `"OCM-capable parameters"`.



Result

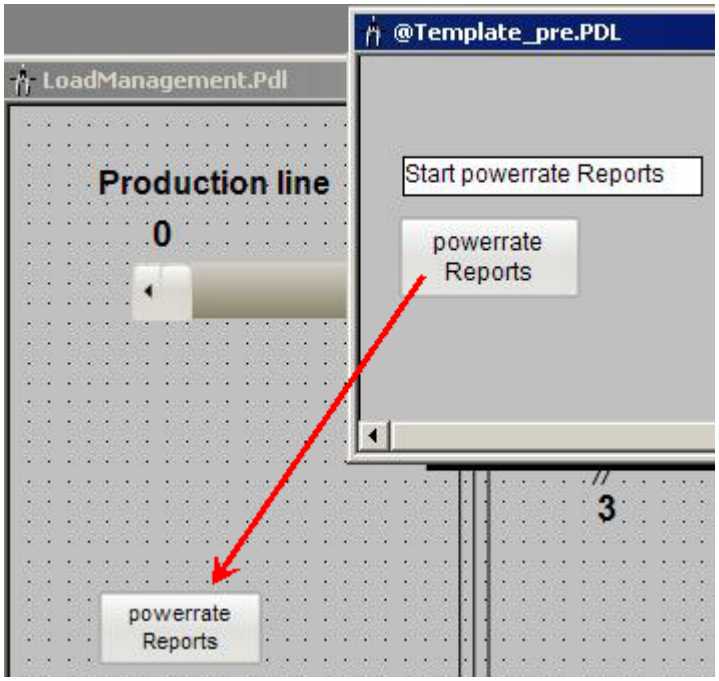
You have saved all the parameters of the Load Management in your STEP 7 project.

15 Configuring SIMATIC powerrate Reports

15.1 Calling SIMATIC powerrate Reports

There are two options for starting powerrate Reports.

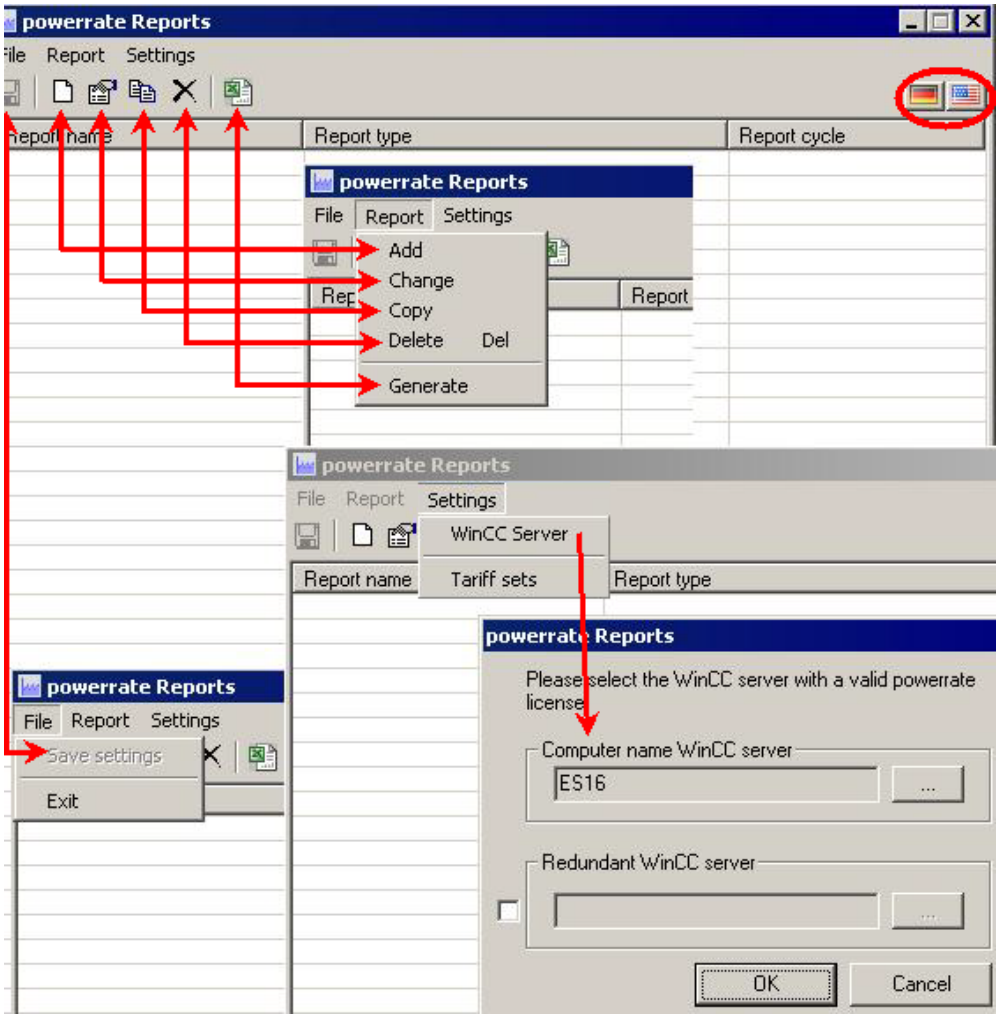
- Use the Start menu `"SIMATIC > powerrate > Reports"`.
- Configure a button in the PCS 7 OS Runtime.
  This button is in the template picture @Template_pre.pdl.



15.2 Configuring the Reports

You can create manual or automatic reports in the Start window of SIMATIC powerrate Reports.

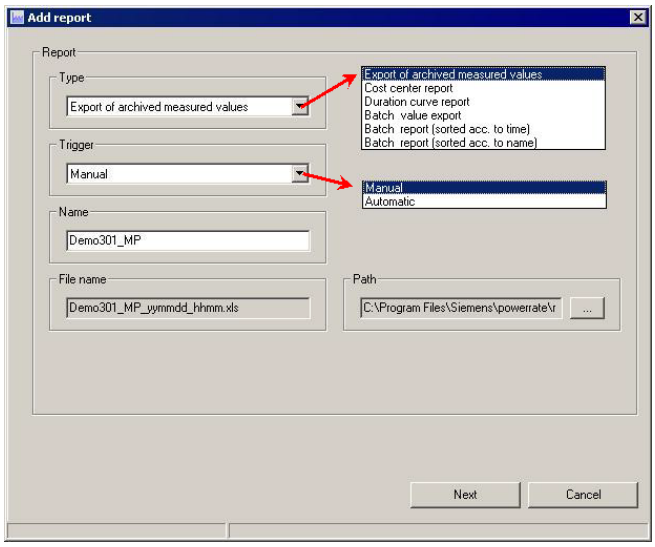
The figures below give you an overview of the menu options in the SIMATIC **powerrate Reports Editor**.



Note Under "Settings / PCS 7 Server" you can set the name of the PCS 7 server. If you are using redundancy, you also specify the name of the redundant server.

15.2.1 Adding Reports → Exporting Archived Measured Values

Start the Report Wizard with the menu item `"Report > Add"`.



Note You can only add a report if you have opened your WinCC project.

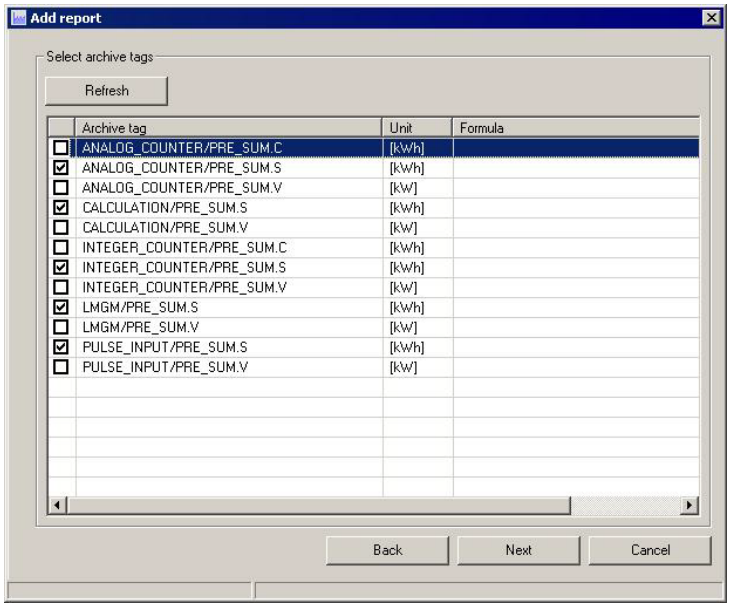
Select archive tags

When you select a report for energy evaluations (export of archived measured values, cost center report, duration curve report), the archive tags in the process value archive, which are available under the name "pre", are read out of the WinCC Tag Logging archive.

The archive tags that are offered for reading out are those that are suitable for the type of report selected. The archive tag types below are evaluated:

Table 15-1

Archive tag extensions	Meaning
.C	Absolute counter value
.S	Energy value
.V	Average power value

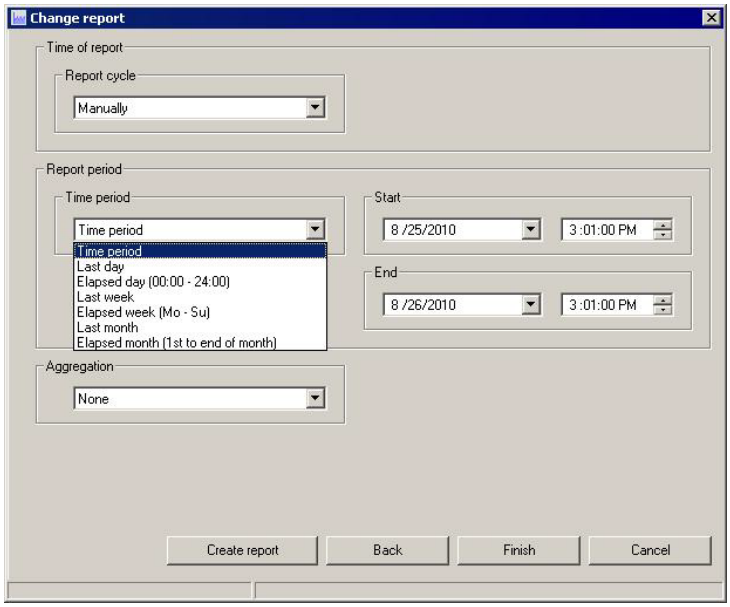


Note .S is only possible with energy values (INTEGER_COUNTER or ANALOG_COUNTER, for example).

Time period

The start and end times of the archive values are specified for manual reports as the report time period.

- Last day
  → The report displays the time period of the last 24 hours.
- Elapsed day
  → The report displays the time period of the previous day from 0:00 to 24:00.

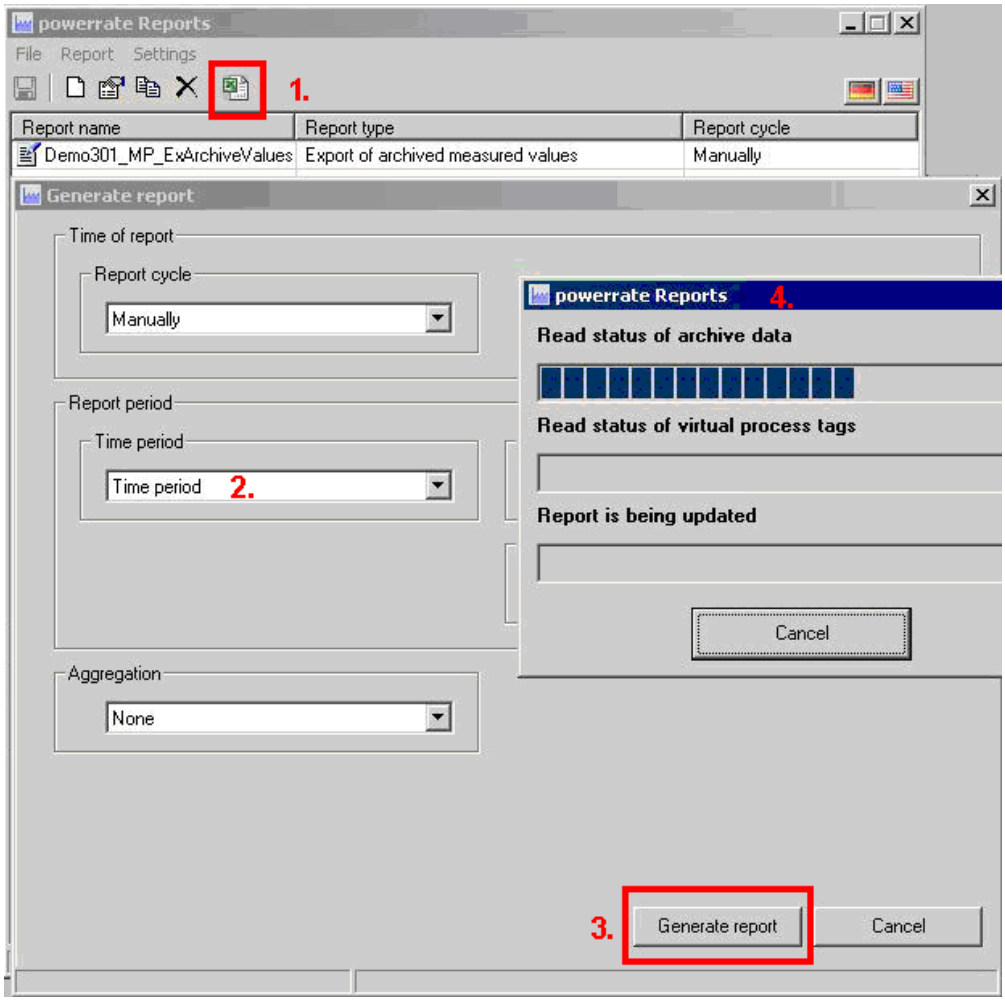


Result

Select a time period and quit the wizard by clicking the "Finish" button.

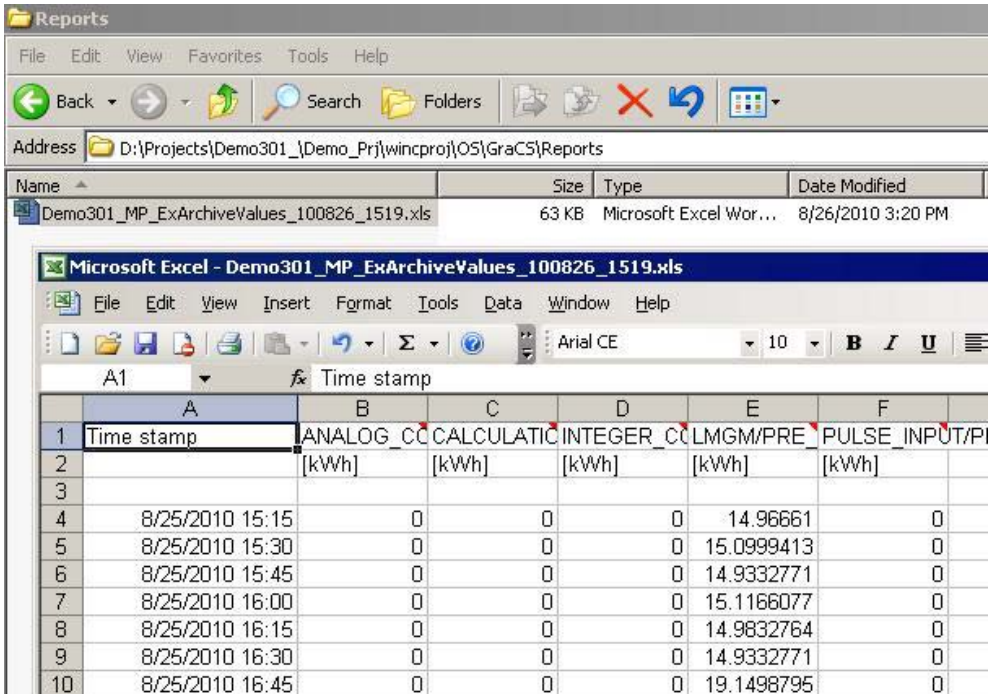
Generate reports

1. Click the menu item "Generate report".
2. You have the option of changing the time period before the report is generated.
3. Click the "Generate report" button.



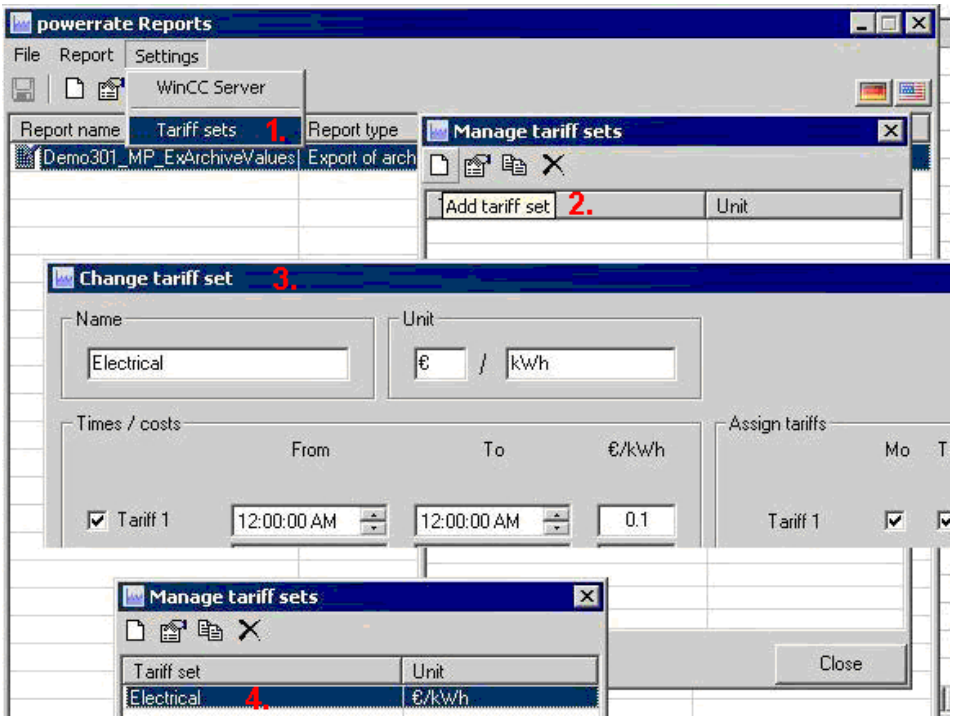
Result

Once the report has been generated successfully, you can save the Excel files in the path configured.

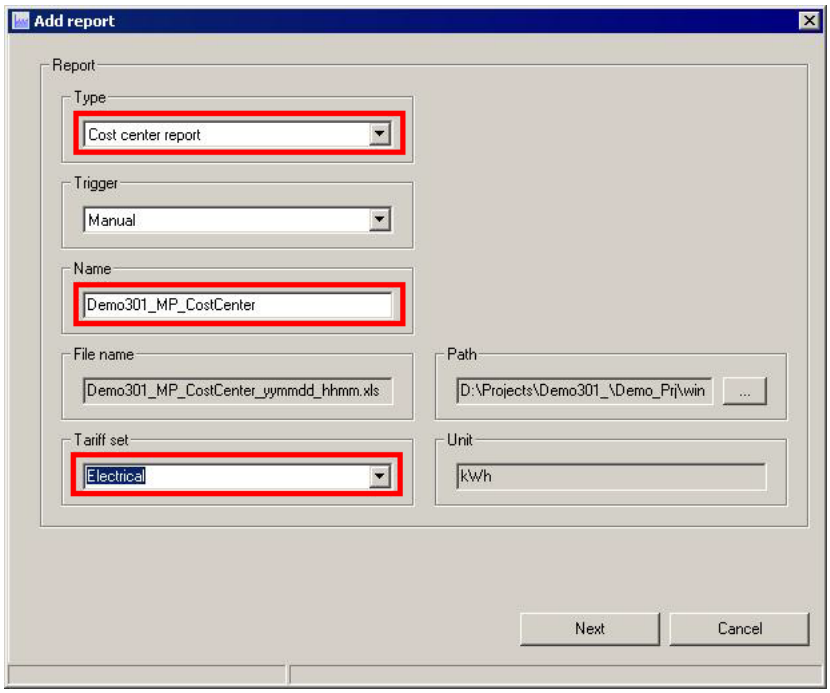


15.2.2 Adding Reports → Cost Center Report

Before you can add a cost center report you must create tariff sets and define the parameters as shown in the figure.

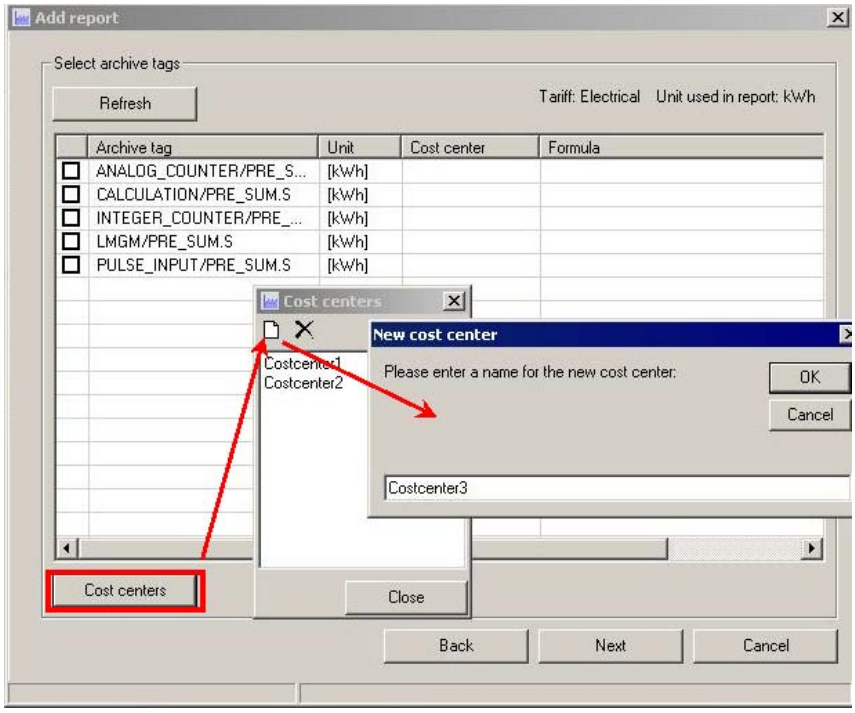


Now add a cost center report. Enter the parameters as shown in the figure below.



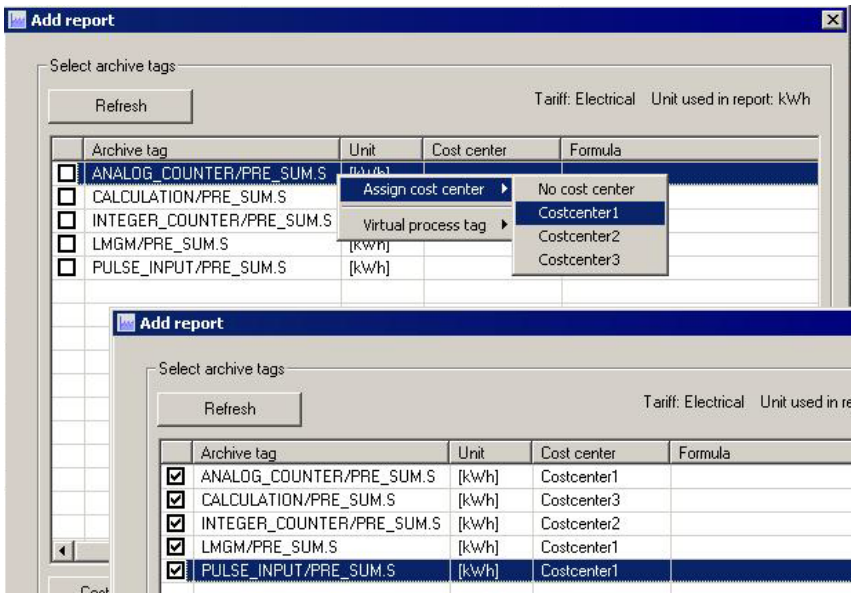
Add cost centers

Before you can add cost centers you must first create names for them. 3 cost centers are created in this example.



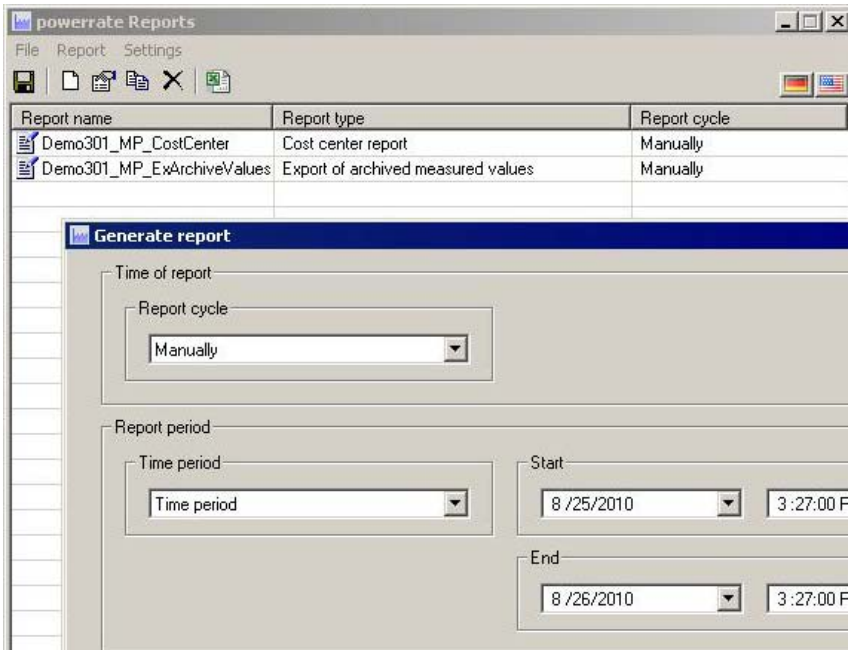
Assign cost centers

Select a cost center from the pop-up menu and do this for all the archive tags.



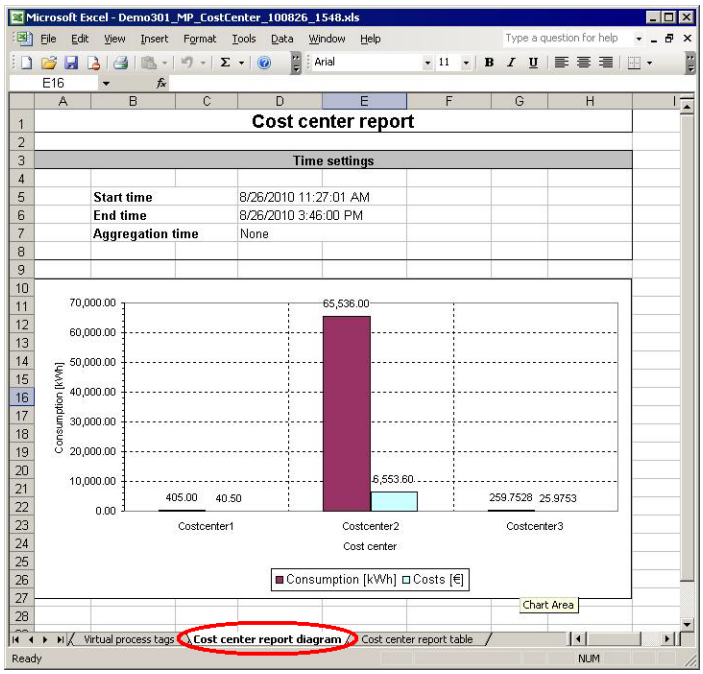
Time period

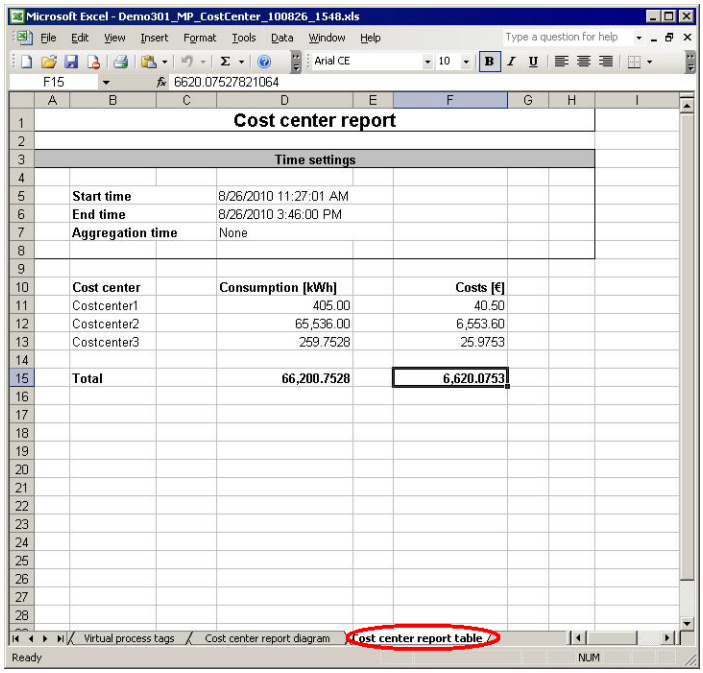
Select the report time period and close the wizard by clicking the "Finish" button.



Result

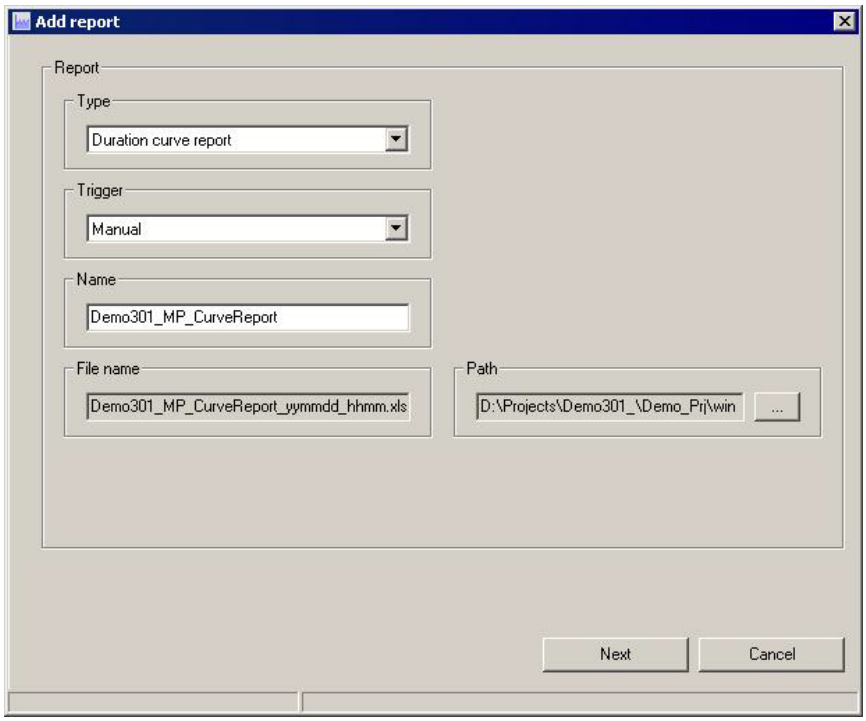
After successful generation the reports are located in the path configured.





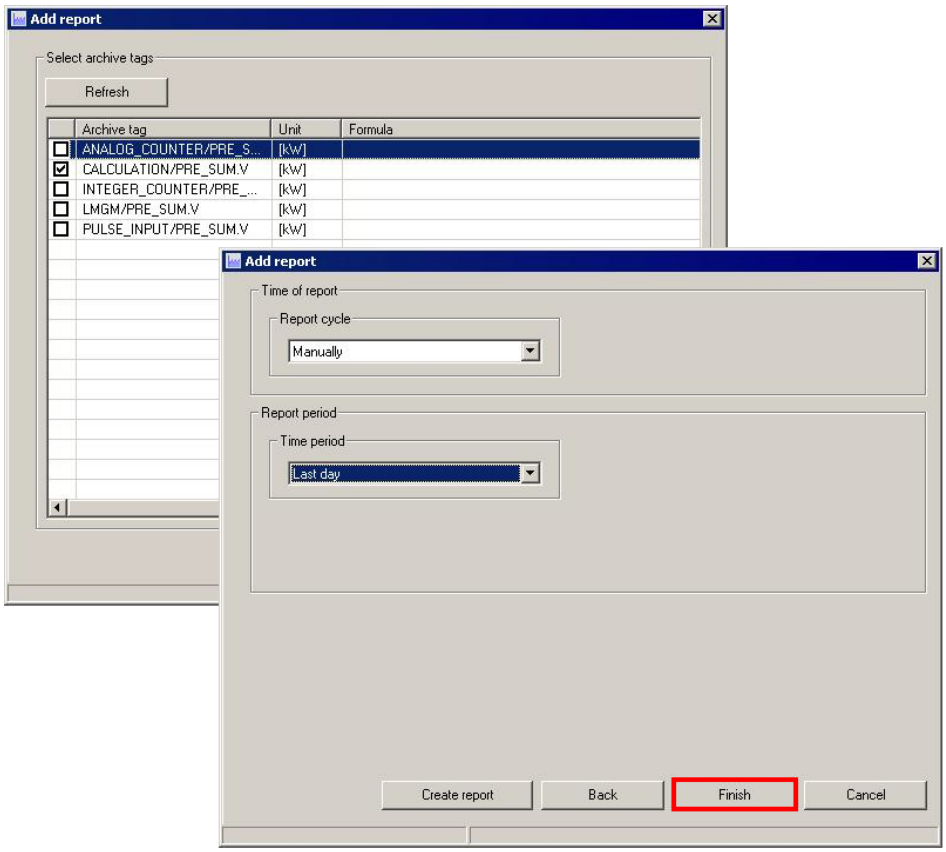
15.2.3 Adding Reports → Duration Curve Report

Add a report of the "Duration Curve Report" type and configure the parameters as shown in the figure below.



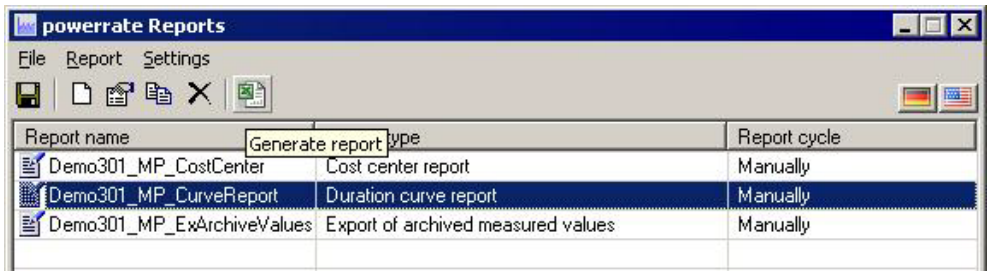
Add archive tags and select time period

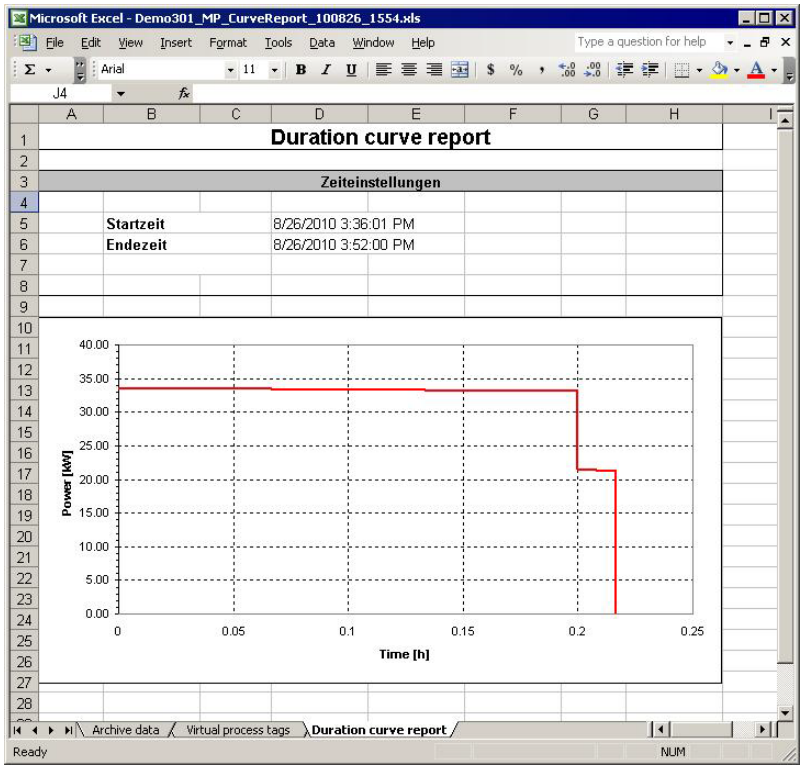
Select the archive tags and time period. Close the wizard by clicking the "Finish" button.



Result

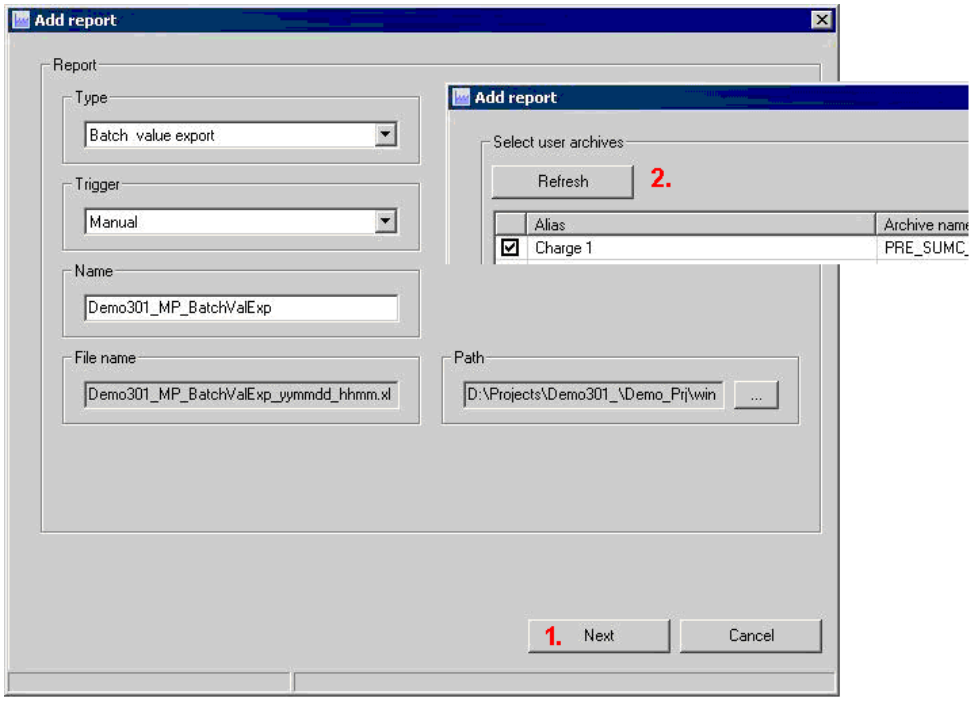
After successful generation the reports are located in the path configured.





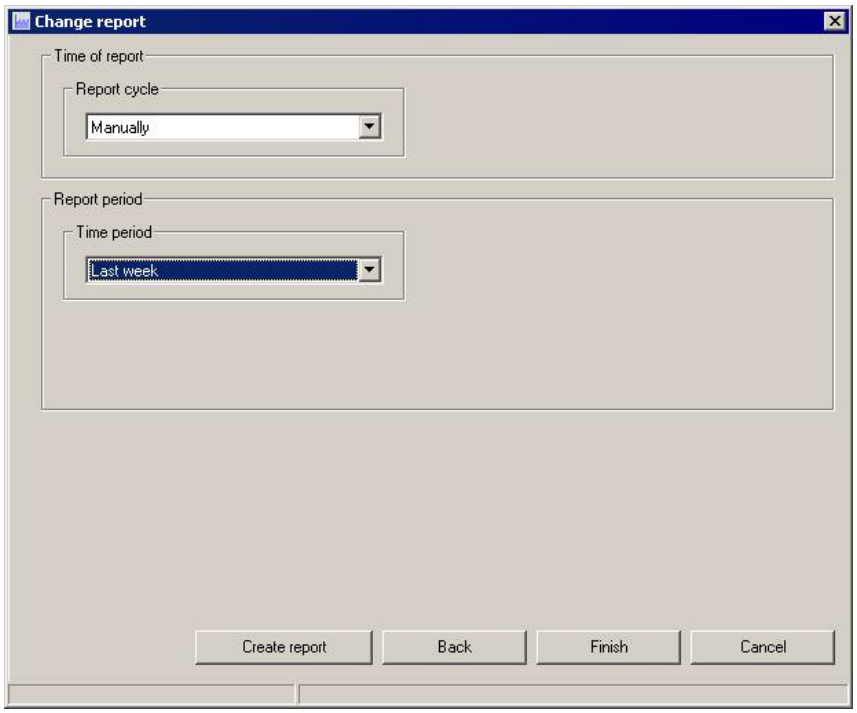
15.2.4 Adding Reports → Batch Value Export

Add a report of the "Batch Value Export" type and configure the parameters as shown in the figure below.



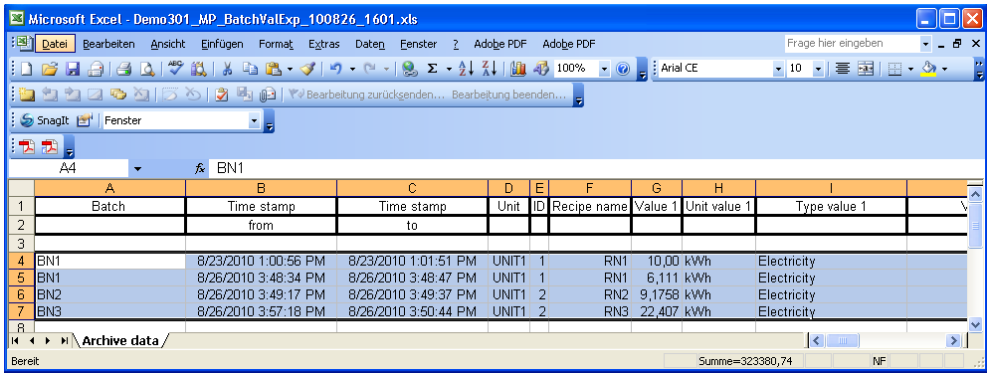
Time period

Select the report time period and close the wizard by clicking the "Finish" button.



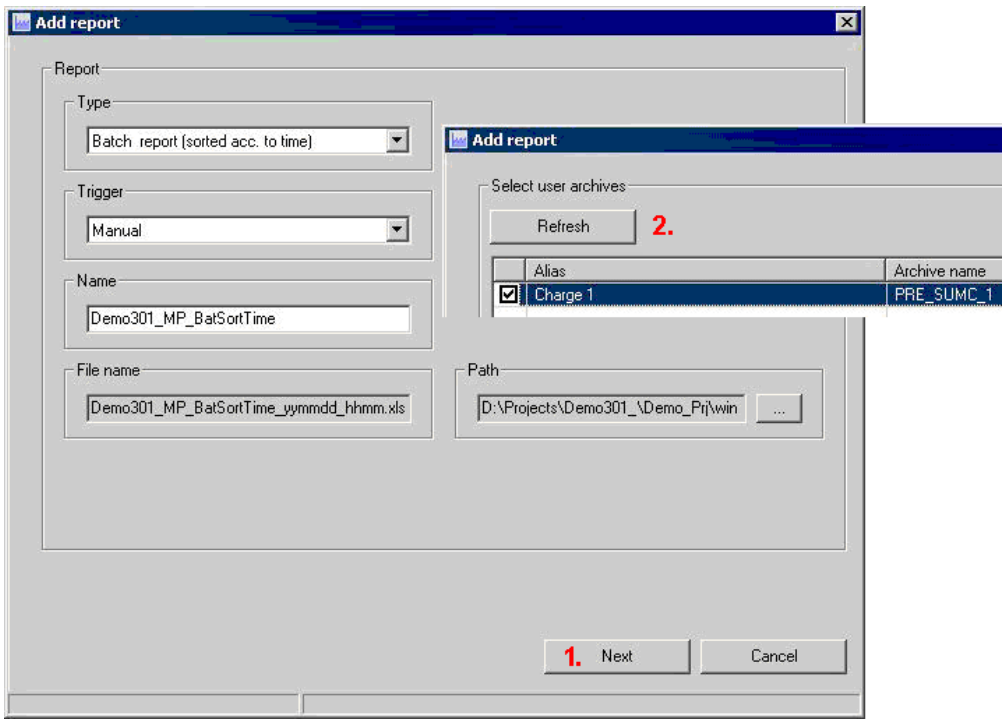
Result

After successful generation the reports are located in the path configured.



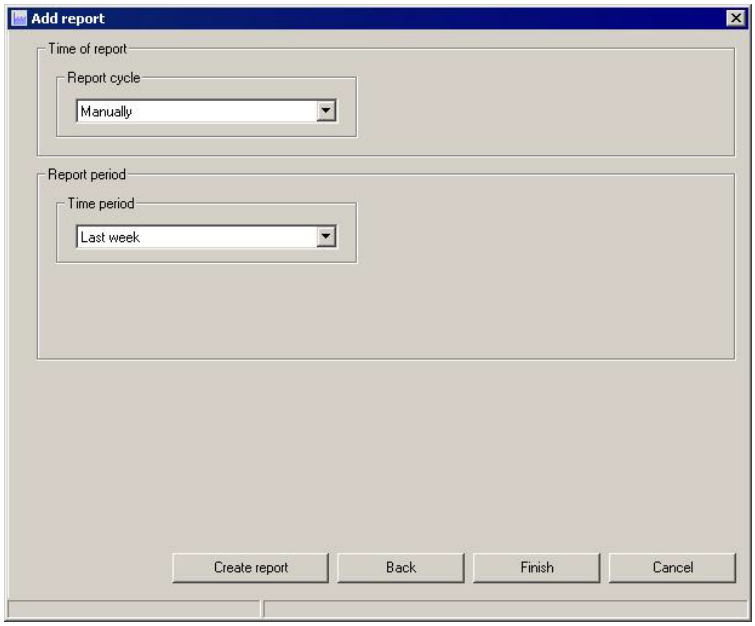
15.2.5 Adding Reports → Batch Report (sorted according to time)

Add a report of the "Batch Report (sorted according to time)" type and configure the parameters as shown in the figure below.



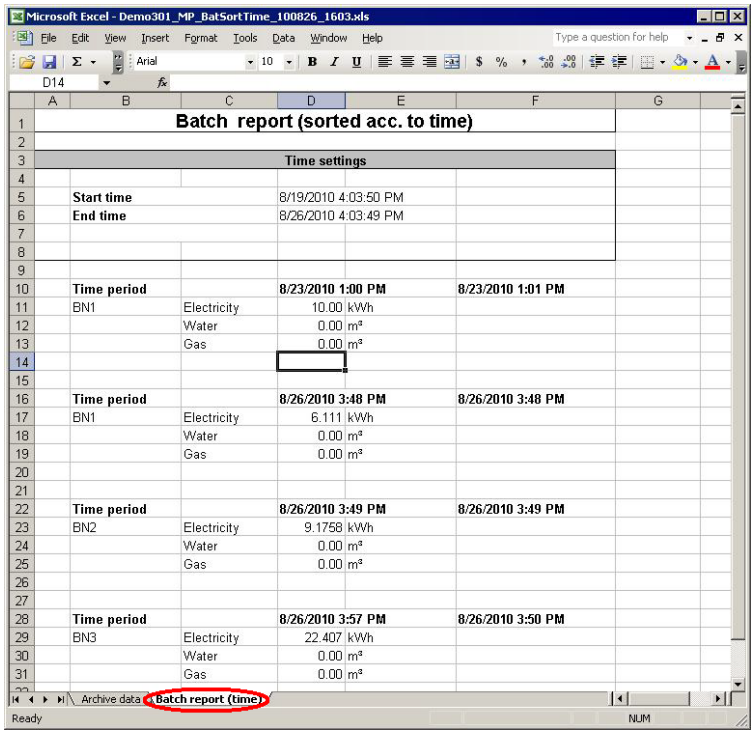
Time period

Select a time period and quit the wizard by clicking the "Finish" button.



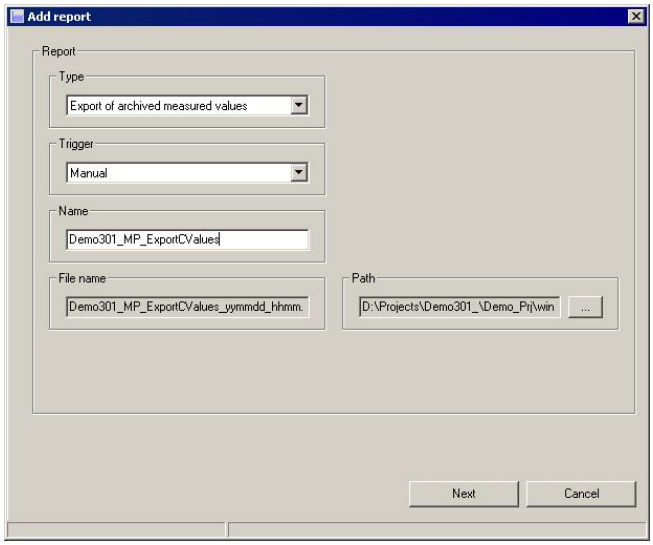
Result

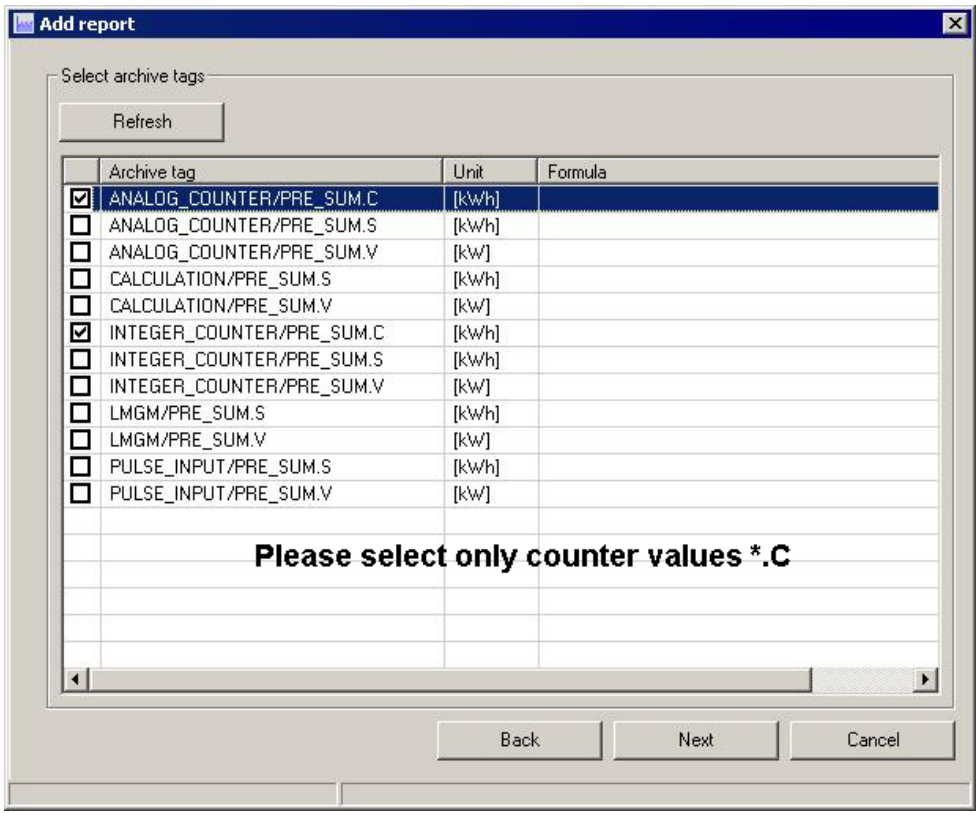
After successful generation the reports are located in the path configured. Batch reports (sorted according to name) are configured in the same way as Batch reports (sorted according to time).



15.2.6 Adding Reports →Counter Values

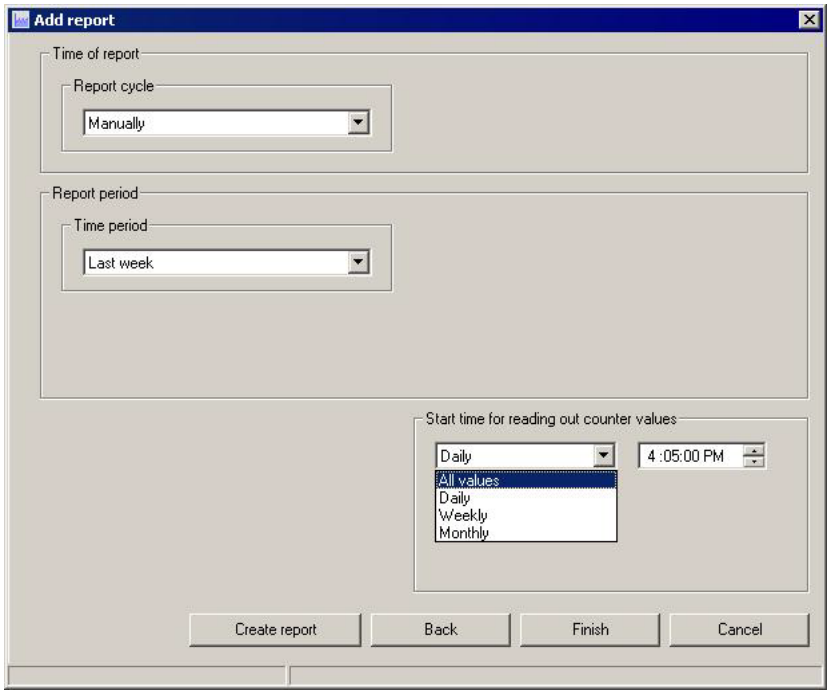
Add a report of the "Export of archived measured values" type and configure the parameters as shown in the figure below.





Time period

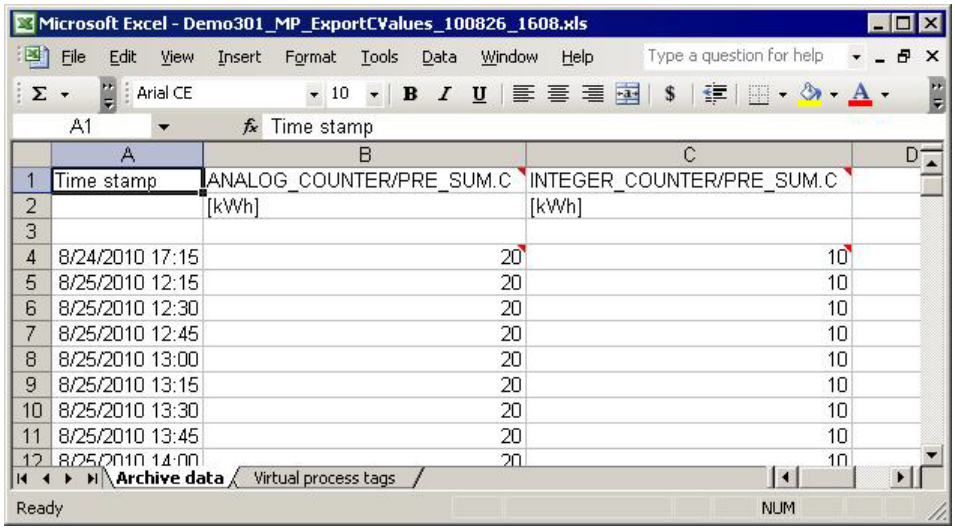
Select a time period and end the wizard by clicking the "Finish" button.



Note Different views for the time period are displayed depending on the “Start time..." parameter.

Result

After successful generation the reports are located in the path configured.



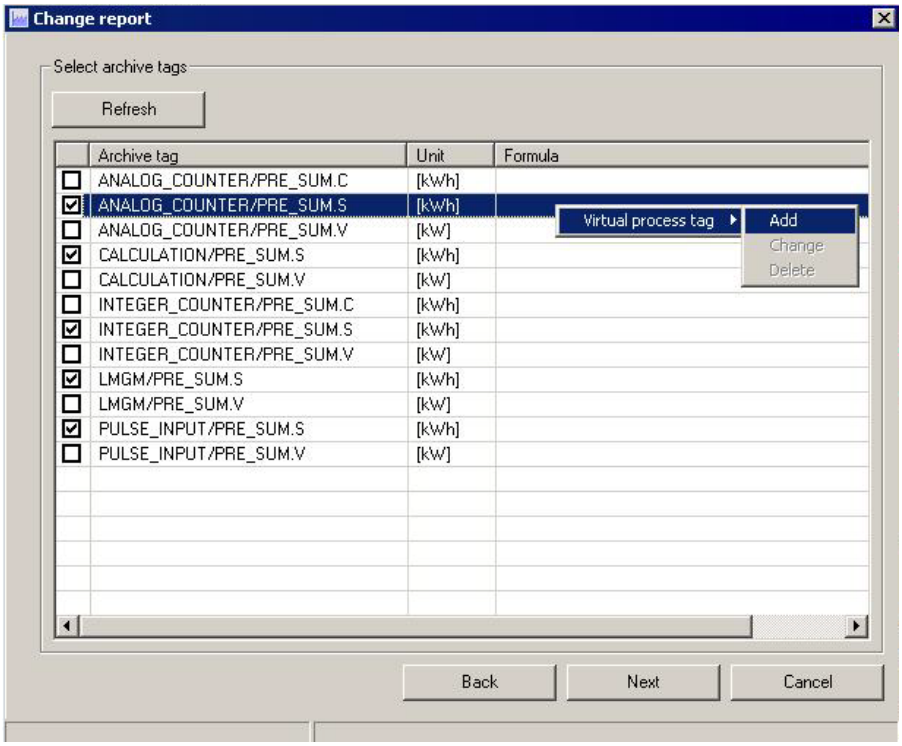
15.2.7 Adding Reports → Virtual Measuring Points

Virtual measuring points are possible for:

- Duration curve report
- Export of archived measured values
- Cost center report

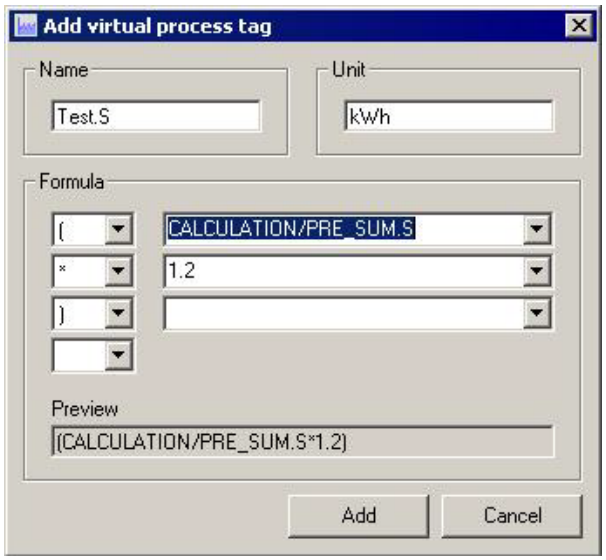
Add a virtual measuring point

Select **Virtual measuring point** in the pop-up menu.



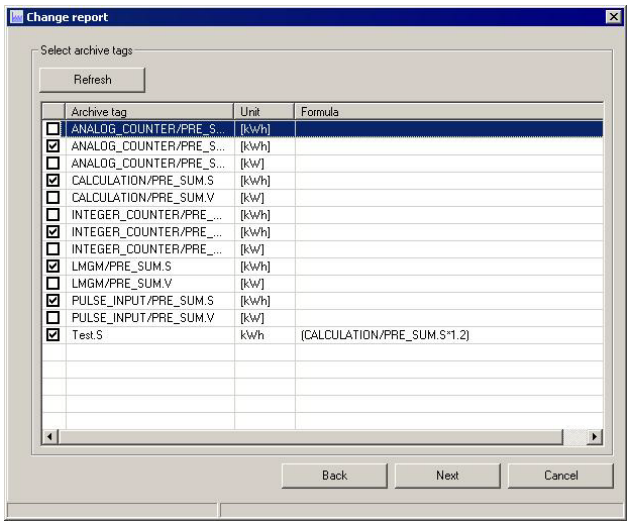
Configure a virtual measuring point

Configure the virtual measuring point. If you use energy values (*.S) in your formula, then you must also use .S for the name of your virtual measuring point.



Result

The virtual measuring point is created.

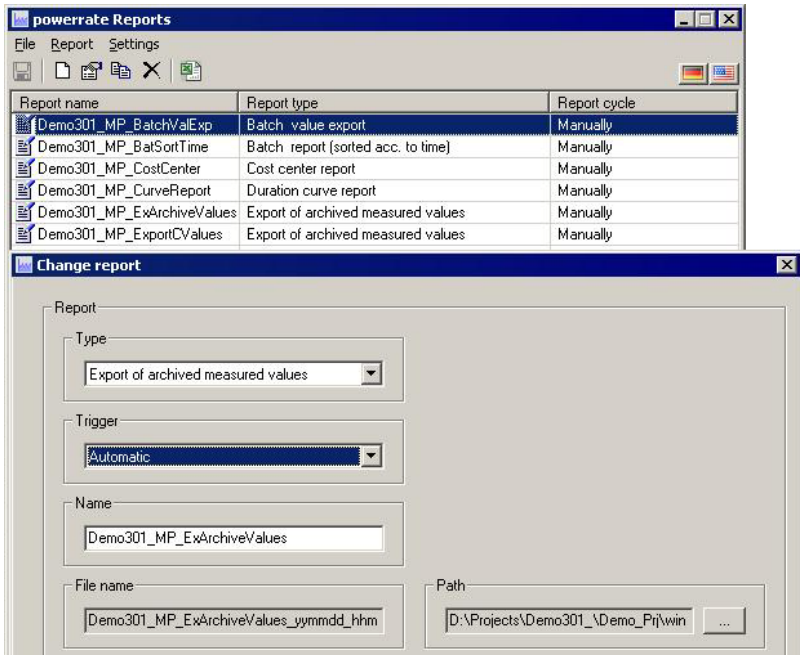


Note

When you assign a name for the virtual measuring point, you must make sure that you use the extensions ".C", ".S" or ".V" depending on the value so that the measuring point is used correctly in the different types of report.

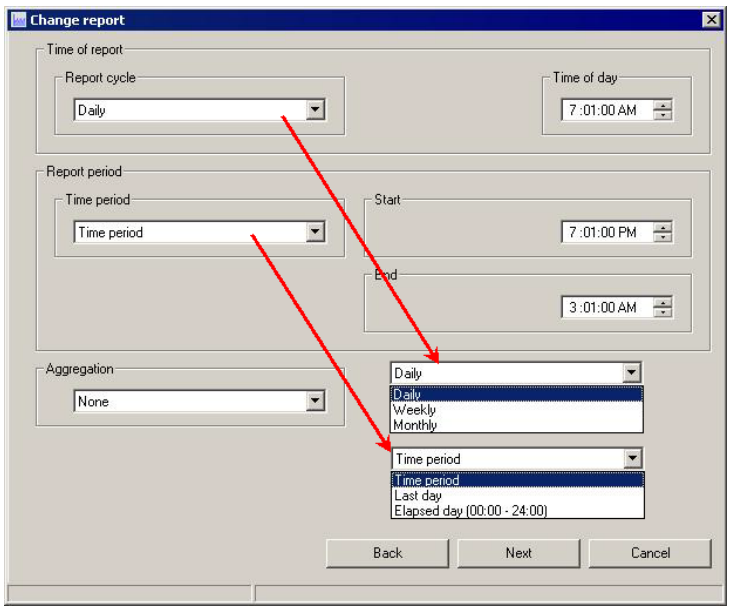
15.2.8 Adding Reports → Automatic Execution

Double-click the report to change the settings. Set the "Trigger" parameter to "Automatic".



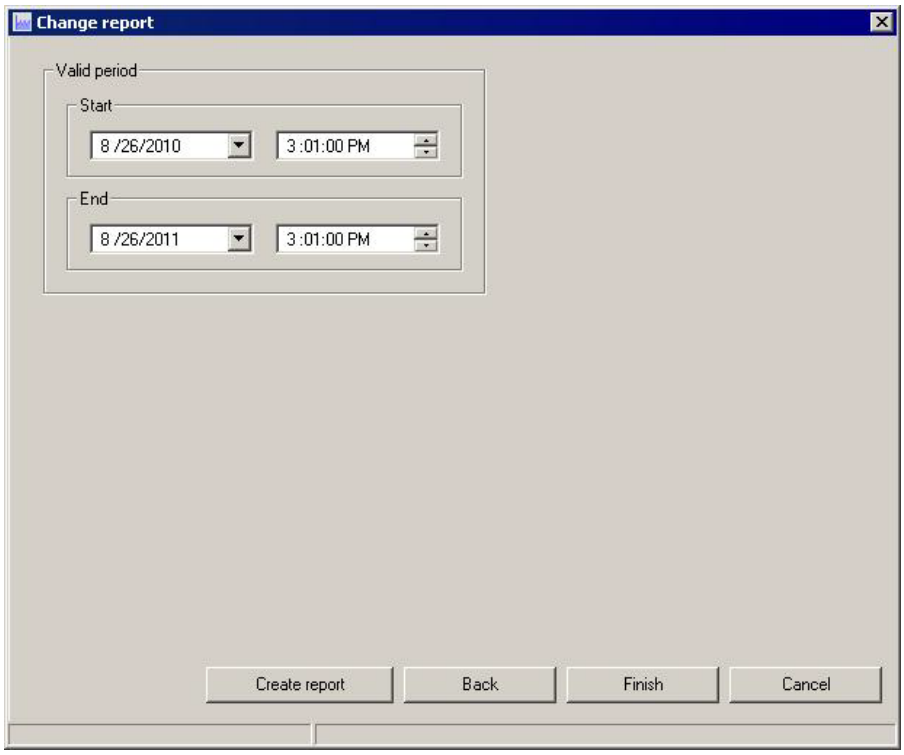
Define the time period

Select the time period according to your requirements. See the figure for the possible settings.



Define valid period

You define the valid period according to your requirements. See the figure for the possible settings.



Result

After configuration the report is marked green so that you can pick it out better from the others.