SIEMENS

Power management for PCS 7
SIMATIC PCS 7 powerrate

Programming and Operating Manual

V3.0

01 / 2009
A5E02306639A-01

Legal information

Warning notice system

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

⚠ DANGER

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

⚠ WARNING

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

⚠ CAUTION

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

CAUTION

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

NOTICE

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

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

Qualified Personnel

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

Proper use of Siemens products

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

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A5E02306639A-01
℗ 02/2009

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Introduction

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1.1 General

The SIMATIC PCS 7 powerrate (pre for short) software package V3.0 can be used in PCS 7 versions V6.1 SP1/SP2 and V7.0 SP1 and contains the following components:

- Block library with:
  - PRE_SYNC: Time synchronization
  - PRE_SUM: PCS 7 block for acquiring and processing energy
  - PRE_FIFO_DATA: Contains the FIFO data
  - PRE_AR_DATA: Data interface for sending the archive data
  - PRE_AR_SND: Archiving of measured values
  - PRE_LMGM: Load management for up to 100 loads
  - PRE_LMGM_75: Load management for up to 75 loads
  - PRE_LMGM_50: Load management for up to 50 loads
  - PRE_LMGM_25: Load management for up to 25 loads
  - PRE_LMGM_10: Load management for up to 10 loads
  - PRE_AS_SEND: Send block for AS-to-AS communication
  - PRE_AS_RECV: Receive block for AS-to-AS communication
  - PRE_SND_H: Send block for AS-4xxH to AS-400 communication
  - PRE_RCV_H: Receive block for AS-4xxH to AS-400 communication
  - PRE_BS: Calls the system block BSEND
  - PRE_BR: Calls the system block BRCV
  - PRE_SUMC: Block for batch-related energy acquisition
  - PRE_UA_S: Archive manager for writing archive data for load management and energy acquisition to the user archive
  - PRE_UA_R: Archive manager for reading archive data from the user archive
  - PRE_SWTCH: Block for general switch with integration via DI/DO
  - PRE_PAC: Block for basic functionality of the PAC3200 / PAC4200
  - PRE_CALC: Calculation block
  - PRE_FIFO_IO: Organizes the FIFObuffer
  - CFC templates for using the blocks
  - User objects and operating blocks for operating and observing energy acquisition data, load management, switches, and PAC3200 / PAC4200 energy acquisition devices on the OS

- powerrate Reports with the following functions
  - Reading the archive data from the WinCC tag logging archive and WinCC user archives to Excel
  - Further processing of archive data
  - Output of archive data in the form of Excel reports
  - Creation of automatic reports
- Online help in German and English

1.2 Installing the library

To start the installation, please insert the CD in the CD-ROM drive on your PG/PC and launch the "setup.exe" program. All the other information you need will be provided during the installation process. Please also read the information in the readme file.

Information about the library

2

2.1 Overview of the blocks

The library contains the following 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
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

Because the FBs PRE_BR, PRE_BS, the FCs and the UDTs are used internally, their numbers cannot be modified.

2.2 General information about OS typicals

2.2.1 Faceplates

Faceplates are configured with the Graphics Designer using the templates and PCS 7-specific standard views (Trend, Batch, and Alarm) provided by the Faceplate Designer. If other user objects are required, they can be added.

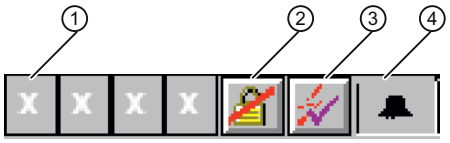
The faceplates described are provided as functional and tested examples and can be adapted by the user to reflect his or her own needs.

Icons are provided for the PRE_SUM energy acquisition block, the PRE_LMGM / PRE_LMGM_x load management blocks, the PRE_SWTCH switch block, and the block for the PRE_PAC PAC devices, with a group display in each case with all the necessary displays. The PRE_SUM, PRE_SWTCH and PRE_PAC blocks also have a loop display. The relevant group display is called using the icon.

A description that allows the user to adapt the faceplates (description of interface to the blocks, description of operating and display functions) is provided along with the faceplates.

Overview

The display forms part of the @PG_PRE_xxx_OVERVIEW.PDL / @PL_xxx_SUM_OVERVIEW.PDL basic displays.



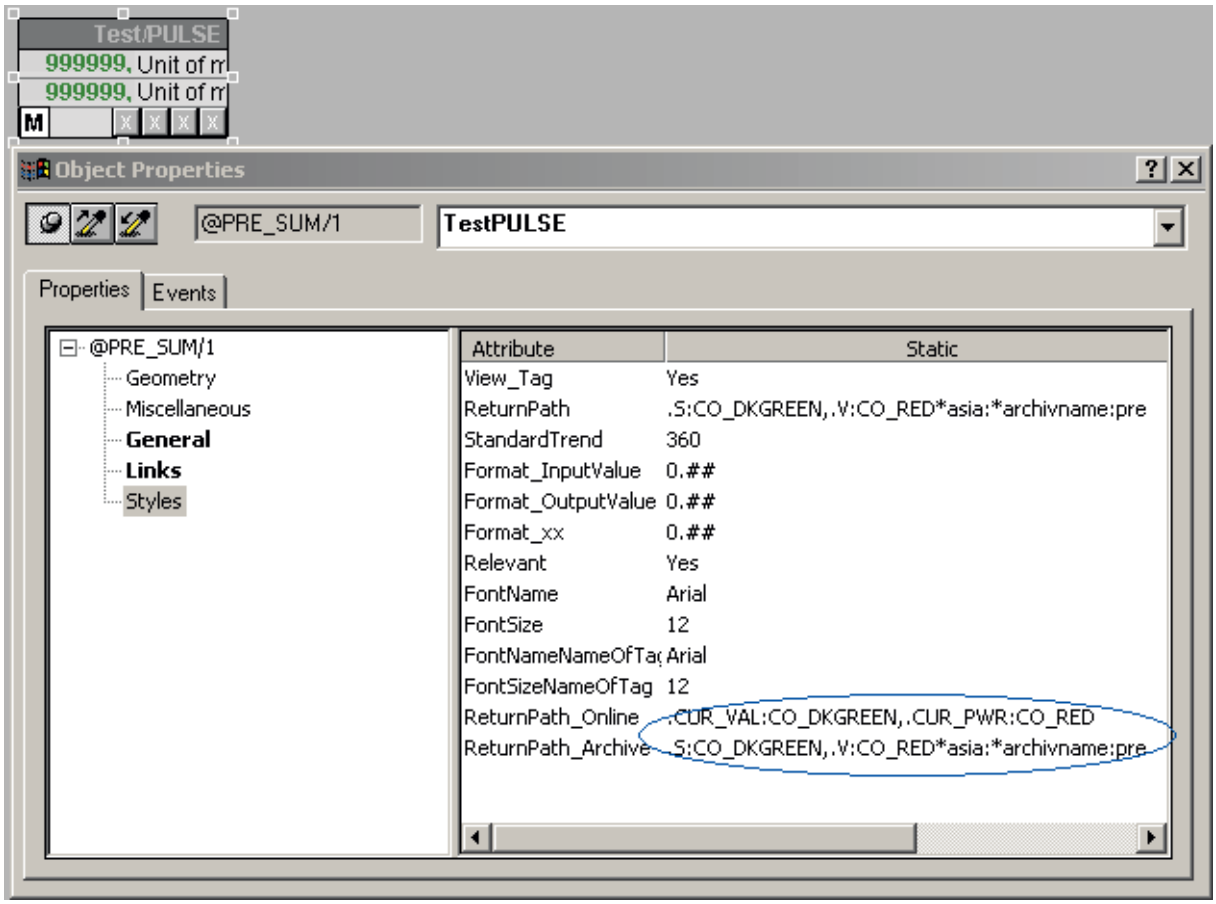
(1) Group display
(2) Message lock (MSG_LOCK)
(3) Message acknowledgment
(4) Message suppression (QMSG_SUP)

Trend (@PCS7_Trend.pdl)

The "ReturnPath" and "StandardTrend" properties must be parameterized on the icon to incorporate a trend in a faceplate.

• StandardTrend	2	Online values with 5-min time axis
	> 2	Archive values with time axis of the value entered (in min)
• ReturnPath	.S	Structural element name starting with a full stop
	:	Separator
	CO_GREEN	Color for trend
		Add the structural element name and color to other trends (e.g. .S:CO_GREEN,.V:CO_RED)
	*asia	Skip the server prefix in the archive tag name
	:	Separator
	*archivname:pre	Archive name of pre-archive

Since a dynamic selection is made for the PRE_SUM faceplate as regards whether the online values or archive tags will be accessed, the ReturnPath_Online (for online values)/ReturnPath_Archive (for archive tags) properties must be parameterized here.



Separate trends can be produced for other display types (e.g. comparison of a trend value over several time domains) with the help of the "Trends online" function.

The button from the bottom strip of buttons shown below is used for calling.

2.2.2 Symbols

The process display icons are based on the process symbols provided by the Faceplate Designer. The diagrams are schematic diagrams.

Template diagrams @PCS7Typicals_PRE.pdl / @Template_PRE.pdl

The block icons can be found in the template diagrams @PCS7Typicals_PRE.pdl and @Template_PRE.pdl. To be able to use the "Create / update block icons" function in the Graphics Designer, you have to copy the icons of the @Template_PRE.pdl file into @Template.pdl.

When using the "Create/Update Block Icons" function, PCS 7 accesses the file @PCS7Typicals_PRE.pdl.

When manually copying the icons into a process display, you must use the icons from the @Template_PRE.pdl file. When updating the icons, PCS 7 accesses the @Template.pdl file.

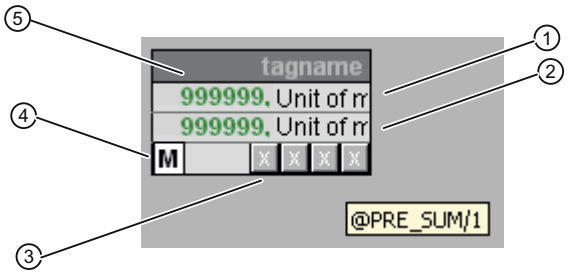
Different variants of block icons

There may be several variants of block icons for one measuring point. These variants are distinguished by the "type" attribute: The value of this attribute describes the variant. For example, if you look at a variant of the block icon for a measuring point for energy acquisition, you will find the value "@PRE_SUM/2". You use the part of the value displayed after the "/" to control which variant of the block icon is produced. You therefore have to enter this part in the object properties for the block instance. If you do not enter any parameters in the object properties for the block instance, the standard block icon is produced automatically: This is the block icon with the "/1" label for the "type" attribute, e.g. "@PRE_SUM/1".

Connection to the measuring point

For the different blocks, there is one icon that is linked to the associated measuring point using the "Connect picture block to tag structure" function.

The icons contain the following visible information:



(1) Energy (work) (CUR_VAL/Unit: CUR_VAL#unit)
(2) Power (CUR_PWR/Unit: CUR_PWR#unit)
(3) Group display (EventState)
(4) Mode (QMAN_AUT)
(5) Equipment identifier (tag name)

Description of blocks

3

3.1 PRE_SYNC: Time synchronization

FB1060

3.1.1 Calling OBs

The OB watchdog interrupt in which the block is installed (e.g. OB32). Also in OB100 (see start-up characteristics).

3.1.2 Called blocks

The block calls the following blocks:

SFC1	READ_CLK
SFC6	RD_SINFO
FC1	AD_DT_TM (IEC function from the STEP 7 Standard Library)
FC34	SB_DT_DT (IEC function from the STEP 7 Standard Library)

3.1.3 Function

The block acts as the clock for time synchronization for the PRE_SUM block for energy acquisition and other powerrate blocks.

The SYNC_OUT clock is triggered by an external synchronization signal (EXT_SYNC) or the internal CPU time.

If the external synchronization is deactivated (EXT_EN = FALSE), REQ_PER contains the period time for synchronization.

During external synchronization (EXT_EN = TRUE) the time stamp for the synchronization pulse (SYNC_TS) is rounded to the next whole time value (e.g. 15-minute value) according to the expected period time of the external synchronization signal (REQ_PER) and of the current CPU time stamp.

3.1.4 Message behavior

The block has no message behavior.

3.1.5 Error behavior

The QPARAMF error output is set when

- Synchronization period REQ_PER or synchronization pulse REQ_T ≤ 0
- Synchronization period REQ_PER is less than the period of synchronization pulse REQ_T
- Synchronization period REQ_PER is greater than one hour
- Synchronization period REQ_PER is not a whole second value
- Synchronization period REQ_PER is not a divisor of an hour

3.1.6 Start-up characteristics

The times are restarted during start-up.

3.1.7 Block parameters

Item	Data type	Type	Meaning	HMI
CUR_TS	DATE_AND_TIME	O	Current time stamp when block is called	
EXT_EN	BOOL	I	1 = Release for external synchronization	
EXT_SYNC	BOOL	I	External synchronization pulse	
QPARAMF	BOOL	O	1 = Parameterization error	
REQ_PER	REAL	I	Synchronization period in [s]	
REQ_T	REAL	I	Period of synchronization pulse in [s]	
SAMPLE_T	REAL	I	Sampling time in [s]	
SYNC_OUT	BOOL	O	Synchronization pulse	
SYNC_PER	REAL	O	Synchronization period in [s], copy of REQ_PER	
SYNC_TS	DATE_AND_TIME	O	Time stamp of synchronization pulse	

3.2 PRE_SUM: Energy acquisition and processing

FB1061

3.2.1 Calling OBs

The OB watchdog interrupt in which the block is installed (e.g. OB32). Also in OB100 (see start-up characteristics).

3.2.2 Called blocks

The block calls the following blocks:

SFB35	ALARM_8P
SFC6	RD_SINFO
FC1	AD_DT_TM (IEC function from the STEP 7 Standard Library)
FC14	GT_DT (IEC function from the STEP 7 Standard Library)
FC34	SB_DT_DT (IEC function from the STEP 7 Standard Library)
FC1061	PRE_CALC
FC1062	PRE_FIFO_IO

3.2.3 Function

The PRE_SUM block is used to acquire and process energy and it forms the interface to the OS.

Measured value acquisition

The block does not have a driver function, i.e. it is not dependent on the measuring instruments used.

Various types of signals are supported. They are selected using the INP_SEL switch. The table provides an overview of the various options.

INP_SEL	Signal type	Parameter	Quality code parameter	Normalization factor/calculation constants
0	Count pulse	VALUE_P	QC_P	WEIGHT_P
1	Integer count value	VALUE_D	QC_D	WEIGHT_A
2	Analog count value	VALUE_R	QC_R	WEIGHT_A
3	Energy value calculated using calculation function*	ACTUALx (x = 1 ... 3)	QC_ACTx (x = 1 ... 3)	CALC_Px (x = 0 ... 3), CALC_FN*

* See calculation algorithms contained in the PRE_CALC block ("PRE_CALC: Calculations (Page 109)")

- For signal type 0, the energy consumed (work) is established by adding together the weighted pulses.

  At the end of the acquisition period (PER_T), the power value (CUR_PWR) is calculated from the energy consumed (work).

- For signal types 1 and 2, the difference (normalized) between the current and last count value is the energy consumed (work).

  At the end of the acquisition period (PER_T), the power value (CUR_PWR) is calculated from the energy consumed (work).

- For signal type 3, the PRE_CALC function returns the current power value (CUR_PWR) which is converted into energy (time basis corresponds to processing cycle time of the block).

  If the power value is < ZERO_CUT, 0 is set for the value.

At the start of a synchronization period (SYNC_PER, SYNC_P = FALSE → TRUE) the current count value CUR_VAL = 0 is set. During the synchronization period, the energy values calculated are added to the CUR_VAL parameter in cycles.

At the end of the synchronization period (SYNC_PER), the average power value (AVG_PWR) is calculated from the energy consumed (work).

The change to the current energy value is extrapolated to the total synchronization period (EST_VAL). The expected, average power (EST_PWR) for the current synchronization period is determined from this.

Mode changeover for measured value acquisition

For signal types (INP_SEL) 1 and 2, the operator can use the AUT_ON_OP input to change over the mode for measured value acquisition if the corresponding releases (AUTOP_EN / MANOP_EN) are present. The mode selected is displayed at the QMAN_AUT parameter.

Automatic mode

In automatic mode (QMAN_AUT = TRUE), the energy value is formed from the corresponding VALUE_P or VALUE_R input.

Manual mode

In manual mode (QMAN_AUT = FALSE), the faceplate can be used to enter the energy value at the V_MAN parameter.

The value is then valid when V_MAN ≥ V_MAN_L1 (last valid manual value), taking into account the maximum counter value MAX_CNT (counter overflow) and the time stamp of the manual value (V_MAN_DATE, V_MAN_TIME) > time stamp of the last valid manual value (V_MAN_L1_DATE, V_MAN_L1_TIME).

The total energy consumed (CUR_VAL) and the average power values (AVG_PWR = CUR_PWR) for the acquisition period are calculated from the difference between the current and last manual value within the time entered (difference between current and last time stamp).

The expected energy and power values (EST_VAL / EST_PWR) are equated with the current values for the acquisition period (CUR_VAL / CUR_PWR).

Archiving

The parameters LAST_VAL (current saved energy value CUR_VAL at the end of the synchronization period SYNC_PER), AVG_PWR (average power value at the end of the synchronization period SYNC_PER) and, with signal type 1 and 2, VALUE_D or VALUE_R (absolute count value) are used for archiving.

In manual mode, the CUR_VAL (energy consumed within the time period stated) and AVG_PWR (average power value in time period stated) parameters are used for archiving. The values are given the time stamp entered.

The data awaiting archiving are written to the FIFO buffer using the PRE_FIFO_IO function. The PRE_AR_SND block is responsible for archiving.

Value archiving can be deactivated on an individual basis by setting the ARSNO_S parameter for the energy value, ARSNO_V for the power value, or ARSNO_C for the count value to 0.

Quality code

The QC_P, QC_D, QC_R, and QC_ACTx (x=1 ... 3) parameters contain the quality codes of the input signals and must be connected to the QUALITY output of the associated driver blocks when using the input signals selected.

Depending on the signal type, the corresponding inputs are used to form the quality codes for the output side: QC_LAST_VAL, QC_CUR_VAL, QC_EST_VAL, QC_AVG_PWR, QC_CUR_PWR, and QC_EST_PWR.

The following quality code data is evaluated:

Quality code = 16#60:	Simulation on driver block active (QSIM = TRUE)
Quality code = 16#80:	Valid value
Quality code <> 16#60 or <> 16#80:	Invalid value, external error (QBAD = TRUE)

In the event of an error, -1 is displayed at the outputs.

3.2.4 Message behavior

PRE_SUM issues the following messages:

Message block	Message number	Block parameter	Message text	Message class
MSG_EVID	1	QPARAMF	Parameterization error	PLC pr ctrl failure
	2	QPF_FIFO	FIFO parameterization error	PLC pr ctrl failure
	3	QOVL	FIFO buffer overflow	PLC pr ctrl failure
	4	QCALCERR	Error in calculation function	PLC pr ctrl failure
	5	QOP_ERR	Invalid manual value	OS pr ctrl failure
	6	QBAD	External error	PLC pr ctrl failure
	7	—	Free	—
	8	—	Free	—

3.2.5 Error behavior

The QPARAMF error output is set when

- The acquisition period PER_T ≤ 0
- The synchronization period SYNC_PER ≤ 0
- Normalization factor WEIGHT_P (when INP_SEL = 0) or WEIGHT_A (when INP_SEL = 1 or 2) ≤ 0.0
- The maximum counter value MAX_CNT <= 0.0
- The count input of the selected signal type (VALUE_D / VALUE_R) > MAX_CNT
- The limit for zero point power ZERO_CUT < 0
- Subnumber for archive tag (ARSNO_V / ARSNO_S / ARSNO_C) > 16#0FFF

The QPF_FIFO error output is set when the PRE_FIFO_IO function called internally for managing the FIFO buffer reports that

- The parameterized FIFO DB is not present
- The FIFO DB length is too short

The QCALCERR error output is set when the PRE_CALC calculation function called internally reports an error in the calculation.

The QOP_ERR error output is set for 1 cycle when one of the following is entered in manual mode

- An invalid time stamp
- A manual value < 0 or > maximum count value MAX_CNT

3.2.6 Start-up characteristics

During start-up, the accumulated values are reset, the times restarted, and the messages suppressed.

3.2.7 Block parameters

Item	Data type	Type	Meaning	HMI
ACTUALx	REAL	I	Current value x (x = 1 ... 3) for calculation*	
ARSNO_C	WORD	I	Subnumber for archive tag of count value .C	+
ARSNO_S	WORD	I	Subnumber for archive tag of accumulated value .S	+
ARSNO_V	WORD	I	Subnumber for archive tag of average power value .V	+
AUT_ON_OP	BOOL	IO	Mode selection for measured value acquisition: 0 = Manual , 1 = Automatic	+
AUTMAN_EN	BOOL	I	1 = Release for automatic changeover to manual in the event of an external error	
AUTOP_EN	BOOL	I	1 = Release for automatic operation	
AVG_PWR	REAL	O	Average power at end of synchronization period	+
CALC_FN	INT	I	Calculation function *	
CALC_Px	REAL	I	Parameter x (x = 0 ... 3) of calculation function *	
CSF	BOOL	I	1 = External error	
CUR_PWR	REAL	O	Current power at end of acquisition period	+
CUR_TS	DATE_AND_TIME	I	Current time stamp when block is called	
CUR_VAL	REAL	O	Current integrated value	+
EST_VAL	REAL	O	Probable value by end of acquisition period	+
EST_PWR	REAL	O	Average power by end of acquisition period	+
FIFO	INT	I	Link to FIFO data	
INP_SEL	INT	I	Selector for signal type: 0 = Pulse input, 1 = Integer count input, 2 = Analog count input, 3 = Result from calculation	+
LAST_VAL	REAL	O	Last archived, accumulated value	+
MANOP_EN	BOOL	I	1 = Release for manual operation	
MAX_CNT	REAL	I	Maximum counter value for signal types 1 and 2	+
MSG_ACK	WORD	O	Messages acknowledged, ALARM_8P block	
MSG_EVID	DWORD	I	Event ID of the ALARM_8P message block	
MSG_STAT	WORD	O	MESSAGE: STATUS output	
PER_T	REAL	I	Acquisition period for current power value in [s]	

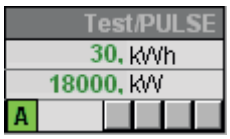
Item	Data type	Type	Meaning	HMI
QAUTOP	BOOL	O	1 = Release for automatic operation	+
QBAD	BOOL	O	1 = External error	
QC_ACTx	BYTE	I	Quality code for ACTUALx	
QC_AVG_PWR	BYTE	O	Quality code for AVG_PWR	
QC_CUR_PWR	BYTE	O	Quality code for CUR_PWR	
QC_CUR_VAL	BYTE	O	Quality code for CUR_VAL	
QC_D	BYTE	I	Quality code for VALUE_D	
QC_EST_PWR	BYTE	O	Quality code for EST_PWR	
QC_EST_VAL	BYTE	O	Quality code for EST_VAL	
QC_LAST_VAL	BYTE	O	Quality code for LAST_VAL	
QC_P	BYTE	I	Quality code for VALUE_P	
QC_R	BYTE	I	Quality code for VALUE_R	
QCALCERR	BOOL	O	1 = Error in calculation function	
QMAN_AUT	BOOL	O	Measured value acquisition mode: 0 = Manual , 1 = Automatic	+
QMANOP	BOOL	O	1 = Release for manual operation	+
QMSG_ERR	BOOL	O	1 = ALARM_8P error	
QMSG_SUP	BOOL	O	1 = Message suppression	+
QOP_ERR	BOOL	O	Operating error	
QOVL	BOOL	O	1 = FIFO buffer overflow	
QPARAMF	BOOL	O	1 = Parameterization error	
QPF_FIFO	BOOL	O	1 = Parameterization error FIFO	
QSIM	BOOL	O	1 = Simulation active	+
RESET	BOOL	IO	1 = Reset the accumulated value	
RUNUPCYC	INT	I	Number of startup cycles	
SAMPLE_T	REAL	I	Sampling time in [s]	
SET	BOOL	IO	Set manual value	+
SYNC_P	BOOL	I	Synchronization pulse	
SYNC_PER	REAL	I	Synchronization period in [s]	
SYNC_TS	DATE_AND_TIME	I	Time stamp of synchronization pulse	
V_MAN	REAL	IO	Current manual value	+
V_MAN_DATE	DWORD	IO	Time stamp for date of current manual value	+
V_MAN_Lx	REAL	IO	Last manual value x (x = 1 ... 3)	+
V_MAN_Lx_DATE	DWORD	IO	Time stamp for date of last manual value x (x = 1 ... 3)	+
V_MAN_Lx_TIME	DWORD	IO	Time stamp for time of last manual value x (x = 1 ... 3)	+
V_MAN_TIME	DWORD	IO	Time stamp for time of current manual value	+
VALUE_D	DINT	I	Integer count input	
VALUE_P	BOOL	I	Pulse input	
VALUE_R	REAL	I	Analog count input	
WEIGHT_A	REAL	I	Normalization factor for integer/analog count input	
WEIGHT_P	REAL	I	Normalization factor for pulse input	
ZERO_CUT	REAL	I	Limit for zero point during calculation	

* See calculation algorithms contained in the PRE_CALC block ("PRE_CALC: Calculations (Page 109)")

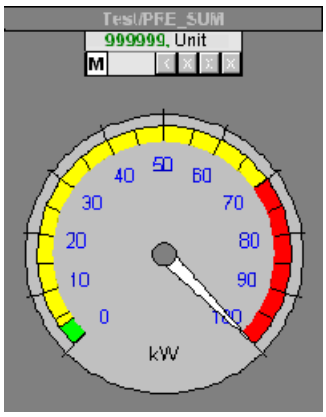
3.2.8 Description of icons and faceplate

Block icon

Variant 1



Variant 2



Faceplate

The faceplate available is described in this chapter.

The following views are available:

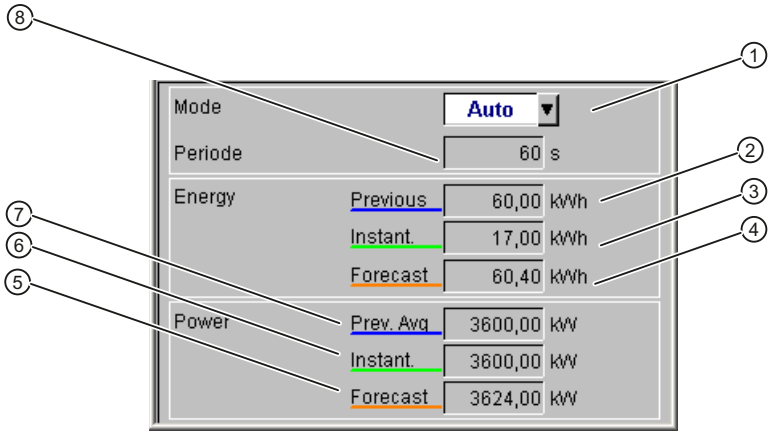
Overview	OVERVIEW
Standard	STANDARD
Table	TABLE
Input	EDIT
Maintenance	MAINTENANCE
Messages	
Trend	

The file name is composed as follows: @PG_PRE_SUM_<view>.PDL

The PCS 7 standard displays are used for the messages and trend views.

The structure of the individual views of faceplates is described below.

Standard (STANDARD)



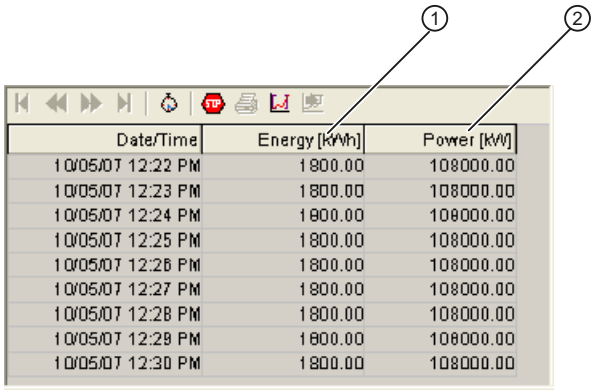
(1) QMAN_AUT / AUT_ON_OP
(2) LAST_VAL / Unit → LAST_VAL#unit
(3) CUR_VAL / Unit → CUR_VAL#unit
(4) EST_VAL / Unit → EST_VAL#unit
(5) EST_PWR / Unit → EST_PWR#unit
(6) CUR_PWR / Unit → CUR_PWR#unit
(7) AVG_PWR / Unit → AVG_PWR#unit
(8) SYNC_PER

Explanation of 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 (Work): 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

Table (TABLE)

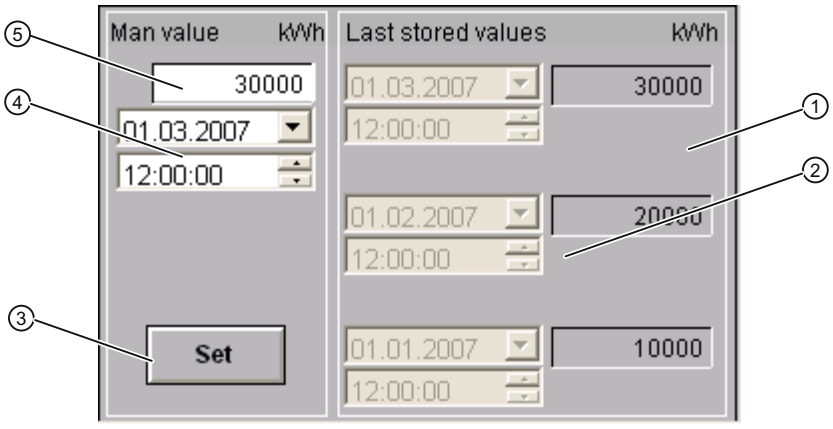
Display of archived, accumulated energy values and average power values from the database



(1) Archive tag S: Added energy value (LAST_VAL)

(2) Archive tag V: Average power value (AVG_PWR)

Edit (EDIT)



(1) V_MAN_Lx / Unit V_MAN_Lx#unit (x = 1 ... 3)

(2) V_MAN_Lx_DATE / V_MAN_Lx_TIME (x = 1 ... 3)

(3) SET / Text → SET#string_1

(4) V_MAN_DATE / V_MAN_TIME

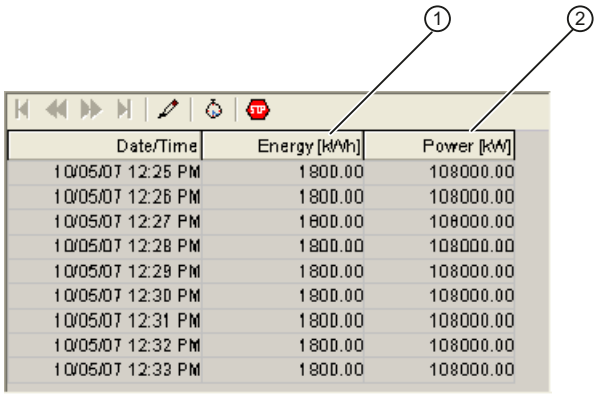
(5) V_MAN/Unit →V_MAN#unit

Maintenance (MAINTENANCE)

The accumulated energy values and average power values in the archive can be changed in this view.

Note

The changed values are not checked for consistency. The user is responsible for ensuring the values are correct.



(1) Archive tag .S: Added energy value (LAST_VAL)

(2) Archive tag .V: Average power value (AVG_PWR)

Trend (@PCS7_Trend)

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

If accumulated energy values are not activated, the trend view contains the CUR_VAL (current energy) and CUR_PWR (current power) online tags.

3.3 PRE_FIFO_DATA: FIFO buffer

FB1062

3.3.1 Calling OBs

The OB watchdog interrupt in which the block is installed (e.g. OB32). Also in OB100 (see start-up characteristics).

3.3.2 Called blocks

The block calls the following blocks:

SFC6	RD_SINFO
FC1062	PRE_FIFO_IO

3.3.3 Function

The PRE_FIFO_DATA block serves as a buffer for measured values to be archived and that supply the PRE_SUM FB and are sent by the PRE_AR_SND FB to WinCC.

It is used as a place holder for the buffer data block in CFC and is connected with the PRE_SUM and PRE_AR_SND blocks. Parameterization of data block numbers is therefore transferred to PRE_SUM and PRE_AR_SND.

The PRE_FIFO_IO function is responsible for organizing the cyclic buffer.

The source of the block is contained in the library. The user can thereby adjust the length of the buffer.

The number of elements inside the FIFO buffer can be changed in the NO_ITEMS constant.

```
    b_paramf          : BOOL;
END_VAR

//Constants

CONST
    NO_ITEMS := 1000;
END_CONST

//Static Variables

VAR
    FIFO_CTRL : UDT_PRE_FIFO;
    FIFO_DATA : ARRAY [1..NO_ITEMS] OF UDT_PRE_ITEM;
END_VAR
```

The buffer items are of data type UDT_PRE_ITEM (see "UDT_PRE_ITEM (Page 112)").

3.3.4 Message behavior

The block has no message behavior.

3.3.5 Error behavior

The block has no error behavior.

3.3.6 Start-up characteristics

The block initializes the PRE_FIFO_IO function during initial startup. When the CPU is started up subsequently, the pointers are retained.

3.3.7 Block parameter

Item	Data type	Type	Meaning	HMI
FIFO	INT	O	Number of the FIFO DB	
ITEM_LEN	INT	O	Length of an element	
ITEM_NO	INT	O	Number of elements	

3.4 PRE_AR_DATA: Data interface for sending the archive data

FB1063

3.4.1 Calling OBs

The OB watchdog interrupt in which the block is installed (e.g. OB32). Also in OB100 (see start-up characteristics).

3.4.2 Called blocks

The block calls the following blocks:

FB1064 PRE_AR_SND

3.4.3 Function

The PRE_AR_DATA function block contains the data interface for the archive data to be sent and calls the PRE_AR_SND block which sends the archive data to WinCC.

The memory area for telegram data is located in the instance DB.

The source of the block is contained in the library. The user can thereby adjust the length of the telegram data.

The number of elements inside the telegram data can be changed in the NO_ITEMS constant.

```
END_VAR

//Constants

CONST
    NO_ITEMS := 10;
END_CONST

//Static Variables

VAR
    AR_DATA     : ARRAY [1..NO_ITEMS] OF UDT_PRE_TLG;
    AR_SND      : PRE_AR_SND;
END_VAR
```

Please note the resource restrictions when using the S7 functions "AR_SEND" and "BSEND / BRCV" to communicate with an S7-400. No more than 16 Kbytes of data can be simultaneously sent by the AS to WinCC using the AR_SEND and/or BSEND/BRCV functions.

The message frame items are of data type UDT_PRE_TLG (see "UDT_PRE_TLG (Page 112)") and are 26 bytes in length.

3.4.4 Message behavior

The message behavior is programmed in the called block PRE_AR_SND. The interface to the messages is the PRE_AR_DATA FB.

PRE_AR_DATA issues the following messages:

Message block	Message number	Block parameter	Message text	Message class
MSG_EVID	1	QERR	Communication error	PLC pr ctrl failure
	2	QPARAMF	Parameterization error	PLC pr ctrl failure
	3	—	Free	—
	4	—	Free	—
	5	—	Free	—
	6	—	Free	—
	7	—	Free	—
	8	—	Free	—

3.4.5 Error behavior

The block has no error behavior.

3.4.6 Start-up characteristics

Messages are suppressed during startup.

3.4.7 Block parameter

Item	Data type	Type	Meaning	HMI
ACK_TEL	DWORD	IO	Acknowledgment frame	+
AR_EVID	DWORD	I	Archive number for archive send block AR_SEND	
AR_STAT	WORD	O	AR_SEND: STATUS Output	
FIFO	INT	I	Link to FIFO data	
MSG_ACK	WORD	O	Messages acknowledged, ALARM_8P block	
MSG_EVID	DWORD	I	Event ID of the ALARM_8P message block	
MSG_STAT	WORD	O	MESSAGE: STATUS Output	
QERR	BOOL	O	1 = Error when sending archive	
QMSG_ERR	BOOL	O	1 = ALARM_8P Error	
QMSG_SUP	BOOL	O	1 = Message suppression	
QPARAMF	BOOL	O	1 = Parameterization error	
RUNUPCYC	INT	I	Number of startup cycles	
SAMPLE_T	REAL	I	Sampling time in [s]	
SEND_T	REAL	I	Monitoring time send request	

3.5 PRE_AR_SND: Archiving measured values

FB1064

3.5.1 Calling blocks

The block is called by the PRE_AR_DATA FB.

3.5.2 Called blocks

The block calls the following blocks:

SFB35	ALARM_8P
SFB37	AR_SEND
SFC6	RD_SINFO
SFC24	TEST_DB
FC1062	PRE_FIFO_IO

3.5.3 Function

The PRE_AR_SND function block reads the values from the FIFO buffer, produces the telegram data for writing the values to the OS, and sends them to WinCC with SFB37 AR_SEND.

3.5.4 Message behavior

See "Message behavior (Page 31)" in "PRE_AR_DATA: Data interface for sending the archive data".

3.5.5 Error behavior

The QPARAMF error output is set when

- The parameterized archive DB is not present
- The archive DB length is too short

The QERR error output is set when

- An error has occurred while writing to WinCC.

3.5.6 Start-up characteristics

Messages are suppressed during startup.

3.5.7 Block parameter

Item	Data type	Type	Meaning	HMI
ACK_TEL	DWORD	IO	Acknowledgment frame	
AR_DB	INT	I	DB number for archive data	
AR_EVID	DWORD	I	Archive number for the AR_SEND archive send block	
AR_STAT	WORD	O	AR_SEND: STATUS Output	
FIFO_DB	INT	I	DB number for FIFO	
MSG_ACK	WORD	O	Messages acknowledged, ALARM_8P block	
MSG_EVID	DWORD	I	Event ID of the ALARM_8P message block	
MSG_STAT	WORD	O	MESSAGE: STATUS Output	
QERR	BOOL	O	1 = Error when sending archive	
QMSG_ERR	BOOL	O	1 = ALARM_8P Error	
QMSG_SUP	BOOL	O	1 = Message suppression	
QPARAMF	BOOL	O	1 = Parameterization error	
RUNUPCYC	INT	I	Number of startup cycles	
SAMPLE_T	REAL	I	Sampling time in [s]	
SEND_T	REAL	I	Monitoring time send request	

3.6 PRE_LMGM / PRE_LMGM_x: Load management

PRE_LMGM	FB1065
PRE_LMGM_75	FB1066
PRE_LMGM_50	FB1067
PRE_LMGM_25	FB1068
PRE_LMGM_10	FB1069

3.6.1 Calling blocks

The OB watchdog interrupt in which you install the block (e.g. OB32). Also in OB100 (see start-up characteristics).

3.6.2 Called blocks

The block calls the following blocks:

FC1	AD_DT_TM (IEC function from the STEP 7 Standard Library)
SFB31	NOTIFY_8P
SFB35	ALARM_8P
SFC6	RD_SINFO
SFC20	BLKMOV
SFC21	FILL
SFC51	RDSYSST

3.6.3 Function

In the context of power management systems, load management refers to monitoring the power limit agreed with the power supply company for each time interval. The time interval depends on the type of energy used; for electricity it is typically 15 minutes, for gas 1 hour.

The following general functions of the load management are implemented in powerrate:

- Calculating the difference in power based on actual consumption and the trend transferred to the PRE_SUM block at the end of the period
- Monitoring the reference limit
- Issuing a warning/alarm if a limit is about to be exceeded
- Archiving of supplementary information in the case of limit violations
- Generating a release/hold signal for every load, based on the priority list and taking the load's min./max. disconnect times and min. connect times into account

Blocks are provided for this with different quantity structures depending on the required number of loads:

The following blocks are available:

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

Only the block PRE_LMGM is listed in the remaining description. The function of the blocks is identical apart from the number of loads.

General information about the configuration

The load management configuration is stored in WinCC user archives. Please note that these archives must be licensed.

Load management is configured in the faceplate. By editing and saving the parameters in the different views, the data is loaded to the controller and also written to WinCC user archives.

To guarantee that the actual status of the priority list in the PLC is used for the configuration, the function "Load from PLC" in the faceplate view "Edit priolist" can be used.

Before performing a general download of the controller, it is advisable to read the program back in CFC so that the latest configuration will remain active after a CPU restart.

If readback is not possible, or if an old configuration is to be activated, the entire configuration can be loaded immediately from the faceplate view "Configuration" to the controller.

The most recent configuration can be identified by means of the config ID (if known) or the "start of configuration" and "end of configuration" time stamps (the latter will be empty).

Configuration of total energy consumption/total supply power

The PRE_SUM block is used to acquire the total energy (CUR_VAL) / the total supply power (CUR_PWR), including calculation of trends up to the end of the period (EST_VAL/EST_PWR) and the energy / average power value at the end of the period (LAST_VAL / AVG_PWR). The block parameters must be connected accordingly.

Configuration of loads

The block can manage up to 100 loads. The number of the highest input to which a load will be connected must be specified via the MAX_LOAD input. Settings can be made for each load. The associated parameters are described below, where x represents the number of the load and can be a value of 01 - 100.

The Px input contains the current load power. This input is only evaluated if the MODEx input (see below) has a value of 1.

The rated power is specified at the CAPx input. The rated power always serves as the basis for performing a calculation during connection. If MODEx = 2 or 3, it is assumed that the load will run at rated power when enabled.

The ONx input is connected to the load's switching state (only MODEx = 2).

The type of load is set via the MODEx input:

MODEx	Type of load
1	Actual power of the load is connected to the Px input
2	Switching state of the load is connected to the ONx input
3	Only the load's rated power is known

Depending on its type, a load will be considered to be disabled under the following conditions:

Type of load	Condition for "OFF"
MODEx = 1	Px < CAPx*MAX_STBY/100.0 Current load power is lower than maximum standby power of the load
MODEx = 2	ONx = FALSE Feedback "OFF"
MODEx = 3	QONx = FALSE Load not released by load management

A minimum connect time, a minimum disconnect time, and a maximum disconnect time are parameterized at the MIN_ONx, MIN_OFFx, and MAX_OFFx inputs for each load:

- Minimum connect time is how long the load must remain enabled following its release before it can be held again.
- Minimum disconnect time is the minimum length of time the load must be shed before it can be released again.
- Maximum disconnect time is the maximum length of time the load may be shed before it has to be re-enabled (MAX_OFFx = 0 means there is no max. disconnect time).

The block contains the SHED_Tx and EN_Tx output variables, which are of data type REAL, for each load. The time in seconds since the last connect/disconnect procedure is saved in these variables. A load cannot be held until the minimum connect time has elapsed, nor can it be released again until the minimum disconnect time has elapsed. Once the maximum disconnect time has elapsed without consideration of the SETTLE_T settling time, a shed load is automatically released without any other conditions being checked, unless it is in manual mode.

The value of the MAX_STBYx input is used to determine the maximum standby power of every load.

The load management block generates a hold/release signal, depending on the specified limit and the calculated trend.

A hold signal means that load management calculations have indicated that the load should be disabled. The hold signal can either disable a load directly, if it is connected accordingly, or the load can be linked to other conditions so that process boundary conditions can be taken into account. The same applies to the release signal, which indicates that a load should be enabled.

Where reference is made in the following to connection/disconnection or load shedding, it is assumed that the release/hold signals have caused the load to be enabled/disabled directly, but this does not necessarily have to be the case.

The difference in power is calculated from the difference between the specified power limit and the estimated average power at the end of the period (EST_PWR). The power limit value may take a hysteresis into account at the start of the period, if necessary. Load shedding takes place if the difference in power is lower than 0 and both the SUPP_T suppression time and the SETTLE_T settling time have elapsed. Released loads or groups of loads in the priority list are shed, starting with the highest priority loads and taking the minimum connect time into account, until the total shed power (current power Px or rated power CAPx for loads without power feedback) is greater than the difference in power. Loads with the same priority represent a group and will always be shed together. Following

load shedding, the SETTLE_T settling time is allowed to expire before a new load shedding procedure is executed or loads are reconnected, if required.

Requirements for load shedding:

Parameter	Meaning
EN_SHED = TRUE	General release for load shedding
EN_SHEDx = TRUE	Load is in load management mode, so is not deactivated
MANx = FALSE	Load is not in manual mode
P_DIFF < 0	Negative difference in power
QSUPP_T ≤ 0	Suppression time has elapsed
QSETTLE_T ≤ 0	Settling time has elapsed
QMIN_ONx = FALSE	Load's minimum connect time has elapsed

The QONx output is set to FALSE for shed loads.

Loads with status feedback

If load x does not have separate power feedback, but just ONx status feedback, and ONx = TRUE it is assumed that the load is running at its rated power CAPx; if ONx = FALSE it is assumed that no power is being used. A disabled load (ONx = FALSE) will also be shed, if it is next in line according to the priority list. However, no power is added in order to reach the difference in power.

Releasing shed loads

If loads have been shed and the P_DIFF difference in power is greater than 0 once the SETTLE_T settling time has elapsed, loads are released again. Shed loads or groups of shed loads are released, starting with the lowest priority loads and taking the minimum disconnect time into account, until the total released power (CAPx rated power) is greater than the difference in power. Loads with the same priority represent a group. Because of this, they always will be released together, if the load management allows this. It is not possible to release several loads within a group. Following release of a load, the SETTLE_T settling time is allowed to expire before a new load shedding procedure or release is executed, if required.

If a low-priority load cannot be released because its rated power is greater than the available difference in power, no high-priority load is released either.

If the settling time and maximum disconnect time (MAX_OFFx) of disconnected load x have elapsed, the load is released unconditionally.

The QONx output is set to TRUE for released loads.

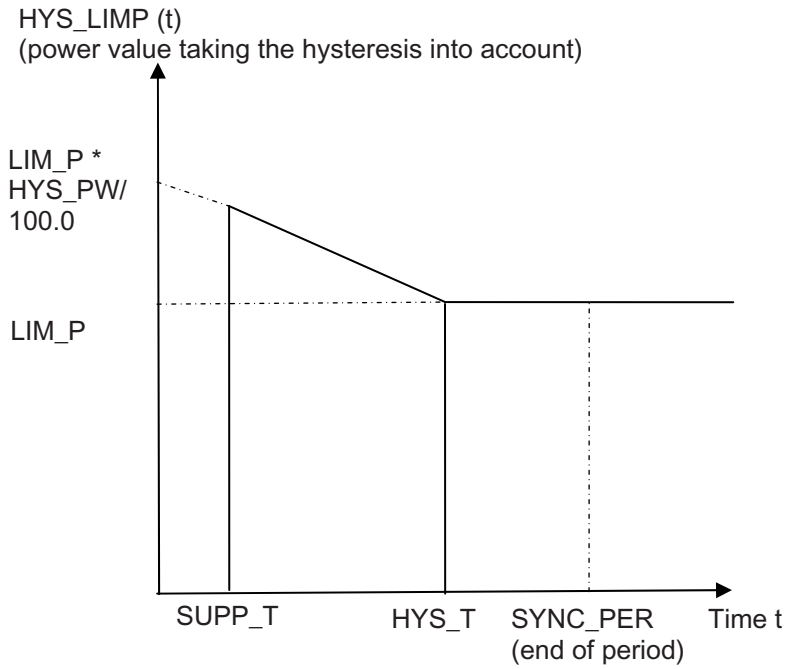
Load control

Hysteresis

To avoid switching operations occurring too frequently, particularly at the start of the period, a hysteresis aimed at increasing the limit at which load shedding is triggered (HYS_LIMP) can be configured in accordance with the algorithm shown below.

The block checks whether the value entered for the end of the hysteresis (HYS_T) is greater than zero and lower than the period time (SYNC_PER). If this is not the case, HYS_T is reset

to its previous value when a change is made. If the period time (SYNC_PER) is changed to a value lower than HYS_T, HYS_T is set to the new period time.



Calculation of HYS_LIMP(t)

t < HYS_T:

$$HYS\_LIMP(t) = -\frac{(LIM\_P * HYS\_PW/100.0 - LIM\_P)}{HYS\_T} * t + LIM\_P * HYS\_PW/100.0$$

t >= HYS_T:

HYS_LIMP(t) = LIM_P

Description of parameters

LIM_P	Power limit
HYS_LIMP	Current power limit, taking the hysteresis into account
HYS_PW	Hysteresis starting value as a % of the power or work maximum at the start of a period
HYS_T	Time after start of the period after which no hysteresis is to be taken into account any longer
t	Time since start of current period

Delay time (suppression time)

Another way of preventing unnecessary switching operations at the start of the period is to configure a delay time (suppression time) SUPP_T, during which no load shedding will be performed and the "limit about to be exceeded" warning/alarm messages will not be issued.

Idle time

An idle time can be configured to deal with the inertia of a load following a switching operation.

After load shedding or the release of loads due to the difference in power, the block waits for the SETTLE_T settling time to elapse before a new load shedding procedure or release is executed. (SETTLE_T = 0 means that no settling time will be taken into account).

If a load is connected because of the elapsed maximum disconnect time, the settling time does not have to elapse until another load is connected

Priority list

Assigning a priority

Each load has a PRIOx input, at which the load's priority is parameterized as a number (1 to 255). 1 is the highest priority, 0 means that the load is not participating in load management or that no load is present. Disconnection is performed from the highest priority down to the lowest, i.e. the load with priority 1 is disconnected first.

Loads with the same priority form a priority group.

The loads in the priority list must be deleted and reinserted by changing the connections in the CFC plan. A load is assigned to a priority group and/or a rolling group in the "Edit prio list" faceplate view in WinCC and loaded to the controller using "Save".

Note

If priorities (PRIOx) or assignments to rolling groups (ROLLx) have been changed in the CFC plan, it is essential that a recalculation is performed in the faceplate. The "Load from PLC" command must be executed in the "Edit prio list" faceplate view to transfer the modified values from the block to WinCC.

Rolling loads

Each load has an input named ROLLx, which defines whether the load is a rolling load within the priority group (ROLLx > 0) or not (ROLLx = 0). Rolling loads all have the same priority. The ROLLx parameter is used to specify the sequence in which these loads are disconnected.

This procedure means that the load disconnected for a particular priority is not always the same one; rather, it changes each time.

Groups can also be formed in order to switch loads together. Loads with the same priority and same ROLLx parameter form a group of loads, which are switched together. Several load groups may exist for the same priority.

If a group of loads with the same priority (= priority group) is shed, all non-rolling loads are shed, as are the rolling loads starting with the first ROLLx number.

Behavior of rolling load groups:

If several loads have the same ROLLx number, they cannot be shed until at least one load is in the load management and not in manual mode and its minimum connect time has elapsed. If the minimum connect time of all loads has not elapsed, an attempt is made to shed the next group of rolling loads.

If the maximum disconnect time of a load located within a group of rolling loads elapses, this load is reconnected (without consideration of the settling time). The next group of rolling loads is not disconnected until it is required due to the difference in power.

Rolling load groups are only ever connected as a group in the case of a positive difference in power, i.e. a single load will not be connected if the difference in power is only sufficient for it.

If the next group of rolling loads within a priority group cannot be disconnected because at least one load of the currently disconnected group has yet to be reconnected, loads of the next priority level will be disconnected to prevent a deadlock from occurring, if necessary. Irrespective of that, the next group of rolling loads will be connected as soon as all loads in the current group have been reconnected.

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.

The limit values can be defined either via the faceplate or the configurable inputs. You can switch between the operator-controllable limit values (LIM_L = FALSE) and the configurable limit values (LIM_L = TRUE) via the LIM_L input.

- LIM_W_H: Operator-controllable work limit for on-peak tariff
- LIM_W_L: Operator-controllable work limit for off-peak tariff
- LIM_W_SH: Operator-controllable work limit for Sunday or holiday tariff
- L_LIM_W: Configurable work limit

- LIM_P_H: Operator-controllable power limit for on-peak tariff
- LIM_P_L: Operator-controllable power limit for off-peak tariff
- LIM_P_SH: Operator-controllable power limit for Sunday or holiday tariff
- L_LIM_P: Configurable power limit

If SEL_PW = TRUE the limits must be defined as power values; if SEL_PW = FALSE , they must be defined as work limits.

The block receives the CPU's current UTC time via its CUR_TS input from the PRE_SYNC block, which is internally converted to local time. The block uses the BEG_HT (start time for on-peak tariff) and BEG_LT (start time for off-peak tariff) inputs to decide whether the limit for the on- or off-peak tariff should be applied.

- On-peak tariff applies when BEG_HT < BEG_LT and BEG_HT ≤ time ≤ BEG_LT, else off-peak tariff
- Off-peak tariff applies when BEG_LT < BEG_HT and BEG_LT ≤ time ≤ BEG_HT, else on-peak tariff
- Off-peak tariff applies, when both times are equal.

Setting the SH_ACT (Sunday or holiday active) input causes the Sunday or holiday tariff to be used for the next day (starting at 00:00). The SH_NUM input is used to set how many consecutive days the Sunday/holiday tariff will remain active before it is switched back to the on-/off-peak tariff.

The current work and power limits are displayed at the LIM_W and LIM_P outputs in each case.

Quality code

The validity of the CUR_PWR, CUR_VAL and EST_VAL parameters is monitored via their QC_CUR_PWR, QC_CUR_VAL and QC_EST_VAL quality codes. The same applies to the current power of the individual loads (Px)/their switching feedback (ONx), whose quality codes are connected to the QC_Px or QC_ONx inputs.

The quality code of the current power of the individual loads does not influence the choice of loads to be shed. In case of a bad quality code no power credit is granted for accomplishing the difference in power.

The following quality code data is evaluated:

Quality code = 16#80: Valid value

Quality code <> 16#80: Invalid value, external error or simulation

Archiving

Loading of data from the faceplate is initiated via the inputs S_CFG (overall configuration), S_PRIO (priority list) of the PRE_LMGM block, or when the block limit is exceeded. The PRE_LMGM block sends a request for archiving data via its output structure QREQ_S_ST to the block PRE_UA_S (archive manager for writing).

The archive manager informs the load management block that the job has been completed with or without errors via the input structure SND_ST.

The output ARCH_OK is set if the job has been saved and can be transferred to the archive manager. ARCH_OK is reset with the next archiving request.

A job is time-monitored by the PRE_LMGM block.

The number of the archive containing the configuration data of the block instance of the PRE_LMGM is defined at the input parameter ARCH_ID. For this reason, each instance of the PRE_LMGM block must be assigned a unique archive ID ARCH_ID > 0. (If the ARCH_ID has the value 3, for example, the data of the instance is contained in the PRE_LMGM_CONFIG_3, PRE_LMGM_PRIO_3 and PRE_LMGM_LIM_3 archives).

Structure of the user archives

The user archive PRE_LMGM_PRIO_x (Prioritätenliste) has the following data structure:

Field name	Data type	Block parameter	Meaning
NAME	STRING[32]	NAMEx	Load name
CAP	FLOAT	CAPx	Rated power (kW)
MODUS	INTEGER	MODEx	Mode
PRIO	INTEGER	PRIOx	Priority
ROLL_NO	INTEGER	ROLL_NOx	Rolling sequence
GRP	INTEGER	GRPx	Group
MIN_ON	FLOAT	MIN_ONx	Min. connect time [s]
MIN_OFF	FLOAT	MIN_OFFx	Min. disconnect time [s]
MAX_OFF	FLOAT	MAX_OFFx	Max. disconnect time [s]
MAX_STBY	FLOAT	MAX_STBY	Max. standby power [%]

The user archive PRE_LMGM_CONFIG_x (configuration) has the following data structure:

Field name	Data type	Block parameter	Meaning
SRT_T	DATE_AND_TIME	-	Start time of the configuration
END_T	DATE_AND_TIME	-	End time of the configuration
BEG_HT	STRING[8]	BEG_HT_S	Start time on-peak tariff
BEG_LT	STRING[8]	BEG_LT_S	Start time off-peak tariff
LIM_W_H	FLOAT	LIM_W_H	Energy limit on-peak tariff [kWh]
LIM_P_H	FLOAT	LIM_P_H	Power limit on-peak tariff [kW]
LIM_W_L	FLOAT	LIM_W_L	Energy limit off-peak tariff [kWh]
LIM_P_L	FLOAT	LIM_P_L	Power limit off-peak tariff [kW]
LIM_W_SH	FLOAT	LIM_W_SH	Energy limit holiday tariff [kWh]
LIM_P_SH	FLOAT	LIM_P_SH	Power limit holiday tariff [kW]
SEL_PW	INTEGER	SEL_PW	0 = Energy, 1 = Power
EN_SHED	FLOAT	EN_SHED	Release for load shedding
SETTLE_T	FLOAT	SETTLE_T	Settling time [s]
LIM_WRN	FLOAT	LIM_WRN	Warning threshold [%]
LIM_ALM	FLOAT	LIM_ALM	Alarm threshold [%]
HYS_PW	FLOAT	HYS_PW	Hysteresis start value [%]
HYS_T	FLOAT	HYS_T	Hysteresis time range [s]
SUPP_T	FLOAT	SUPP_T	Suppression time [min]
NAME	STRING[32]	NAMEx	Load
CAP	FLOAT	CAPx	Rated power (kW)
MODUS	INTEGER	MODUSx	Mode
PRIO	INTEGER	PRIOx	Priority
ROLL_NO	INTEGER	ROLL_NOx	Rolling sequence
GRP	INTEGER	GRPx	Group

Field name	Data type	Block parameter	Meaning
MIN_ON	FLOAT	MIN_ONx	Min. connect time [s]
MIN_OFF	FLOAT	MIN_OFFx	Min. disconnect time [s]
MAX_OFF	FLOAT	MAX_OFFx	Max. disconnect time [s]
MAX_STBY	FLOAT	MAX_STBYx	Max. standby power [%]
CONFIG_ID	INTEGER	-	Configuration ID

The user archive PRE_LMGM_LIM_x (limit violations) has the following data structure:

Field name	Data type	Block parameter	Meaning
DATE_TIME	DATE_AND_TIME	LT_DT	Local time
LIM_W	FLOAT	LT_LIM_W	Work limit of last period
LIM_P	FLOAT	LT_LIM_P	Power limit of last period
W	FLOAT	LT_W	Work in the last period
P	FLOAT	LT_P	Average power in the last period
SHED_POS	FLOAT	LT_SHED_POS	Number of loads which could be shed at end of last period
P_SHED_POS	FLOAT	LT_P_SHED_POS	Power of loads which could be shed at end of last period
LOAD_SHED	FLOAT	LT_LOAD_SHED	Number of switched-off loads at the end of the period
P_SHED	FLOAT	LT_P_SHED	Power of the switched-off loads at the end of the period

Archiving in the case of limit violations

When a limit is violated, an archiving request is issued at the end of the synchronization period. The load management block calculates and saves the time of the limit violation.

The current values archived in the user archive at the time of the limit violation are copied to their own outputs beginning with "LT_" (for LAST).

Archiving of the configuration

All the configuration data (tariffs, general parameters and priority list) is saved under a configuration ID (CONFIG_ID) in the user archive PRE_LMGM_CONFIG_x. Every time the configuration is saved, the configuration ID is incremented by 1 up to the value of the input CFG_MAX. Following this, the configuration is overwritten with ID 1. Each saved configuration contains the times at which the configuration was valid.

Saving of the configuration in the user archive is initiated either by the user from the faceplate view "Configuration" by pressing the "Load from PLC" button, or automatically after the tariff data, general parameters, or the priority list have been loaded into the controller.

When opening the "Configuration" faceplate view, the currently valid configuration is selected. Older configurations that can also be loaded into the controller (see below) are displayed by deleting or modifying the selection criterion.

Downloading the configuration to the controller

Configuration data can be transferred to the controller from the faceplate views "Parameters", "Tariffs", "Edit Priolist" and "Configuration".

With the "Save" button in the "Parameters" or "Tariffs" views, the data entered in the faceplate is written to the user archive PRE_LMGM_CONFIG_x and transferred from there to the controller. If the "Parameters" or "Tariffs" views are closed before saving the data, changes made here are lost, while the data in the "Edit Priolist" and "Configuration" views in the user archives is retained but not transferred to the controller.

Loading of data from the faceplate is initiated via the inputs R_CFG (overall configuration), R_PARA (parameters), R_TARIFF (tariffs) or R_PRIO (priority list) of the PRE_LMGM block. The PRE_LMGM block issues a request for reading data via its output structure QREQ_R_ST to the PRE_UA_R block (archive manager for reading). The archive manager informs the load management block that the job has been completed with or without errors via the input structure RCV_ST.

The NDR output is set when new data has been received. NDR is reset with the next request for reading data.

A job is time-monitored by the PRE_LMGM block.

The number of the archive from which the configuration data of the block instance of PRE_LMGM is read is defined at the input parameter ARCH_ID. For this reason, each instance of the PRE_LMGM block must be assigned a unique archive ID ARCH_ID> 0. (If the ARCH_ID has the value 3, for example, the data of the instance is contained in the PRE_LMGM_CONFIG_3, PRE_LMGM_PRIO_3 and PRE_LMGM_LIM_3 archives).

Every time configuration data is loaded, the current configuration is automatically saved in the configuration archive (PRE_LMGM_CONFIG_x).

Loads and load management on different PLCs

If loads and load management are running on different PLCs, the current load power (Px, QC_Px)/current switching state (ONx, QC_ONx) must be transferred to the controller on which the PRE_LMGM block is running, and information relating to releasing/shedding (QONx output) transferred to the controller on which the load is running.

The PRE_AS_SEND / PRE_AS_RECV (send/receive block for AS-to-AS communication) and PRE_SND_H / PRE_RCV_H (send/receive block for AS-4xxH to AS-400 communication) blocks supplied can be used for communication purposes.

3.6.4 Message behavior

PRE_LMGM issues the following messages:

Message block	Message number	Block parameter	Message text	Message class
MSG_EVID1	1	QLIM_WRN	Warning approaching of limit @1%.2f@ kWh/@3%.2f@ kW (limit @2%.2f@ kWh/@4%.2f@ kW)	WH
	2	QLIM_ALM	Alarm approaching of limit @1%.2f@ kWh/@3%.2f@ kW (limit @2%.2f@ kWh/@4%.2f@ kW)	AH
	3	QLIM_ERR	Exceeding of limit: @5%.2f@ kWh/@6%.2f@ kW (limit @2%.2f@ kWh/@4%.2f@ kW)	AH
	4	QSHED_IMP	No load available to shed	AH
	5	QLMGM_OFF	Load management deactivated	AH
	6	QELD_PARA	Monitoring error while loading parameters	AH
	7	QLIM_E	Invalid limit	AH
	8	QP_ERR	Invalid supply power	AH
MSG_EVID2	1	—	Reserved	—
	2	—	Reserved	—
	3	—	Reserved	—
	4	—	Reserved	—
	5	QPRIO_LST_E	Invalid priority list	AH
	6	QPARAMF	Parameterization error communication	PLC pr ctrl failure
	7	QERR_R	Invalid data from loading parameters	PLC pr ctrl failure
	8	QERR_S	Invalid data archiving	PLC pr ctrl failure
MSG_EVID3	1	QMONERR_S	Monitoring error archiving	PLC pr ctrl failure
	2	QOVL_LIM	Overflow of user archive for limit exceedings	PLC pr ctrl failure
	3	—	Free	—
	4	—	Free	—
	5	—	Free	—
	6	—	Free	—
	7	—	Free	—
	8	—	Free	—

Message block	Message number	Block parameter	Message text	Message class
MSG_EVID4	1	QSHED	Load @1%s@ has been shed	Status PLC
	2	QFREE	Load @2%s@ has been shed	Status PLC
	3	—	Free	—
	4	—	Free	—
	5	—	Free	—
	6	—	Free	—
	7	—	Free	—
	8	—	Free	—

The ALARM_8P auxiliary values are assigned as follows:

Message block	Auxiliary value	Parameter	Meaning
MSG_EVID1 MSG_EVID2 MSG_EVID3	1	EST_VAL	Estimated energy value at end of synchronization period
	2	HYS_LIMW	Current, work limit, taking the hysteresis into account
	3	EST_PWR	Average power value at end of synchronization period
	4	HYS_LIMP	Current, average power limit, taking the hysteresis into account
	5	LAST_VAL	Last archived, accumulated work value
	6	AVG_PWR	Average power at end of period
	7	—	Free
	8	—	Free
	9	—	Free
	10	—	Free

The NOTIFY_8P auxiliary values are assigned as follows:

Message block	Auxiliary value	Parameter	Meaning
MSG_EVID4	1	NAMEx	Name of the load which has been held
	2	NAMEx	Name of the load which has been released
	3	—	Free
	4	—	Free
	5	—	Free
	6	—	Free
	7	—	Free
	8	—	Free
	9	—	Free
	10	—	Free

3.6.5 Error behavior

Validity of input parameters

If the associated quality codes detect an invalid value at the CUR_PWR, CUR_VAL or EST_VAL input parameters, an "Invalid supply power" message is issued and load management is switched off.

An invalid value for load feedback will mean that, if the load is shed, no power will be used to compensate the difference in power for this load.

Switching load management off

Behavior of the PRE_LMGM block in the event of an error, i.e. if load management needs to be switched off:

- Load control remains in its current state until the end of the period, i.e. it is not connected or disconnected any more. However, the user can still perform a manual release/hold operation.
- If the error is still present once the period has ended, all loads are released, taking their hold times into account.
- If a trend can be calculated, this calculation is also performed and displayed. No overshoot alarms/warnings are issued, however.

Parameterization error

A parameterization error QPARAMF is generated when

- The monitoring time T_OUT_LD is ≤ 0
- ID ≤ 0
- ARCH_ID ≤ 0 or ARCH_ID not available, or
- The archive manager block for reading or writing signals QARCHERR when the block ID agrees

If the monitoring time is incorrect, a new request cannot be generated.

Error in communication with WinCC user archives

The QERR_R / QERR_S output is set when

- A read or write request has been issued to the archive manager and the parameter IDs JOB_ID and ARCH_ID do not agree between the request and the response of the archive manager.

The QERR_R / QERR_S output is not reset until a new request is pending or until the request agrees with the job data when the job is repeated (COUNT > 0).

If a valid response is not received from the archive manager within the monitoring time, the error output QELD_PARA / QMONERR_S is set. At the COUNT input, a number of job repetitions can be set before the occurred errors are output. If, for example, a monitoring time of 10 seconds is set and COUNT = 1, the monitoring error is not signaled until 20 seconds have elapsed. The parameterization error is an exception to this. This error is signaled immediately.

All errors remain pending until a new request is transmitted.

A job is always repeated when one of the errors described above has occurred.

3.6.6 Start-up characteristics

After a CPU restart, the PRE_SUM block does not provide a valid supply power at its CUR_VAL output until after the first synchronization pulse. Until this point, load management is not performed.

The following applies between a restart and the first synchronization pulse:

- All loads are released (QONx = TRUE).
- The time since the loads were released (EN_Tx) starts at 0. This time forms the basis for the minimum connect time.
- The outputs for limits which take the hysteresis into account (HYS_LIMW and HYS_LIMP) do not themselves take any hysteresis into account.
- All messages have the "sent" state.
- The balance time in the current period (BAL_TM and BAL_TS) is set to 0.
- The differences in work and power are set to 0.
- The available connection and disconnection power (P_ON and P_SHED) and the number of loads to be disconnected and connected (EN_POS and SHED_POS) are calculated now. The number of shed loads (LOAD_SHED) is 0.
- The available connection and disconnection work (W_ON and W_SHED) is set to 0, as the period's balance time is not known.
- The average power/work of the last period (LT_P and LT_W) is set to 0.
- Flags for the last rolling load (LAST_ROLLx) are set to 0.
- If necessary, the processes of editing and downloading a configuration from the faceplate are aborted (CFG_EDIT = FALSE and CFG_LOAD = FALSE).
- The remaining suppression time after the start of the period and settling time after load shedding (QSUPP_T and QSETTLE_T) are set to 0.

The following also applies after restart:

- The error outputs are reset.
- The output structures QREQ_R_ST and QREQ_S_ST for the read and write requests from/to user archives are reset.

3.6.7 Block parameters

General data

Item	Data type	Type	Meaning	HMI
BAL_TM	INT	O	Period's balance time in minutes	+
BAL_TS	INT	O	Period's balance time in seconds	+
CUR_TS	DT	I	Current time stamp when block is called	
DIFF_LOC	REAL	O	Difference between UTC and local time in [h]	
MAX_LOAD	INT	IO	Number of the highest input, which is connected to a load	+
MSG_ACKx	WORD	O	Messages acknowledged, ALARM_8P block x (x = 1 ... 3)	
MSG_EVIDx	DWORD	I	Event ID x (x = 1 ... 4) of message block ALARM_8P / NOTIFY_8P	
MSG_LOCK	BOOL	I	1 = Message suppression active	
MSG_STATx	WORD	O	MESSAGE x (x = 1 ... 4): STATUS Output	
QMSG_ERR	BOOL	O	1 = ALARM_8P / NOTIFY_8P Error	
QMSG_SUP	BOOL	O	1 = Message suppression	
RUNUPCYC	INT	I	Number of startup cycles	
SAMPLE_T	REAL	I	Sampling time in [s]	
SYNC_P	BOOL	I	Synchronization pulse	

Infeed

Item	Data type	Type	Meaning	HMI
AVG_PWR	REAL	I	Average power at end of synchronization period	
CUR_PWR	REAL	I	Current power at end of acquisition period	+
CUR_PWRHR	REAL	I	Bar graph upper limit, current power	+
CUR_VAL	REAL	I	Current integrated value	+
CUR_VALHR	REAL	I	Bar graph upper limit, current accumulated energy value	+
EST_PWR	REAL	I	Average power by end of acquisition period	+
EST_VAL	REAL	I	Probable value by end of acquisition period	+
LAST_VAL	REAL	I	Last archived, accumulated value	+
P_DIFFHLR	REAL	I	Bar graph upper limit, difference in power	+
QC_AVG_PWR	BYTE	I	Quality code for AVG_PWR	
QC_CUR_PWR	BYTE	I	Quality code for CUR_PWR	
QC_CUR_VAL	BYTE	I	Quality code for CUR_VAL	
QC_EST_PWR	BYTE	I	Quality code for EST_PWR	
QC_EST_VAL	BYTE	I	Quality code for EST_VAL	
QC_LAST_VAL	BYTE	I	Quality code for LAST_VAL	
W_DIFFHLR	REAL	I	Bar graph upper limit, difference in work	+

Load data

Item	Data type	Type	Meaning	HMI
CAPx	REAL	I	Rated power of the load x (x = 01 ... 10, 25, 50, 75 or 100)	
DUMMY_IN	STRUCT	I	Internal structure	
DUMMY_PARA	STRUCT	I	Internal structure	
DUMMY_OUT	STRUCT	O	Internal structure	
EN_SHEDx	BOOL	I	1 = Load x (x = 01 ... 10, 25, 50, 75 or 100) is in load management mode	
EN_Tx	REAL	O	Time elapsed since load x was released (x = 01 ... 100)	+
GR_NAMEx	STRING[32]	I	Name of load group x (x = 01 ... 20)	+
GRPx	BYTE	I	Allocation of the load x (x = 01 ... 10, 25, 50, 75 or 100) to a load group	
LAST_ROLLx	BOOL	I	Load x (x = 01 ... 10, 25, 50, 75 or 100): 1 = Last disconnected, rolling load	
MAN_ENx	BOOL	I	Manual mode (MANx = TRUE): 0 = Disable, 1 = Release	+
MANx	BOOL	I	1 = Load x (x =01 ... 100) is in manual mode	+
MAX_OFFx	REAL	I	Maximum disconnect time of the load x (x = 01 ... 10, 25, 50, 75 or 100) in [s]	
MAX_STBYx	REAL	I	Maximum standby power as a percentage of rated power of the load x (x = 01 ... 10, 25, 50, 75 or 100)	
MIN_OFFx	REAL	I	Minimum disconnect time of the load x (x = 01 ... 10, 25, 50, 75 or 100) in [s]	
MIN_ONx	REAL	I	Minimum connect time of the load x (x = 01 ... 10, 25, 50, 75 or 100) in [s]	
MODEx	BYTE	I	Type of load x (x=01..100): 0 = No load present, 1 = Actual power of the load is connected to the Px input 2 = Switching state of the load is connected at the ONx input 3 = Only the load's rated power is known	
NAMEx	STRING[32]	I	Name of load x (x=01..100)	
ONx	BOOL	I	1=Load x (x=01..100) is enabled with rated power CAPx	+
PRIOLSTx	DWORD	I	Priority list for load shedding entry x (x = 01 ... 10, 25, 50, 75 or 100)	
PRIOx	BYTE	I	Priority of the load x (x = 01 ... 10, 25, 50, 75 or 100) (1 = highest priority)	
Px	REAL	I	Current power of the load x (x = 01 ... 10, 25, 50, 75 or 100)	+
QC_ONx	BYTE	I	Quality code for ONx	
QC_Px	BYTE	I	Quality code for Px	
QMAX_OFFx	BOOL	O	1=Maximum disconnect time for load x has not yet elapsed (x = 01 ... 100)	+
QMIN_OFFx	BOOL	O	1=Minimum disconnect time for load x has not yet elapsed (x = 01 ... 100)	+
QMIN_ONx	BOOL	O	1=Maximum connect time for load x has not yet elapsed (x = 01 ... 100)	+
QMSG_OFFx	BOOL	O	1 = Hold message is sent to WinCC (x = 01 ... 10, 25, 50, 75 or 100)	

Item	Data type	Type	Meaning	HMI
QMSG_ONx	BOOL	O	1 = Release message is sent to WinCC (x = 01 ... 10, 25, 50, 75 or 100)	
QONx	BOOL	O	1=Load x is released, 0=Load x is shed (x=01..100)	+
ROLLx	BYTE	I	Load x (x=01..100): Number for rolling load	
SHED_Tx	REAL	O	Time elapsed since load x was held (x=01..100)	+

Load control

Item	Data type	Type	Meaning	HMI
Dx	BOOL	I	Internal tag (x = 101 ... 107 and 201 ... 207)	
EN_POS	INT	O	Number of loads which can be connected	
EN_SHED	BOOL	I	Load shedding release (loads disconnected)	
HYS_LIMP	REAL	O	Current, average power limit, taking the hysteresis into account	+
HYS_LIMW	REAL	O	Current work limit, taking the hysteresis into account: If HYS_LIMW < EST_VAL load shedding is performed	+
HYS_PW	REAL	I	Hysteresis starting value as a [%] of the power or work maximum at the start of a period	
HYS_T	REAL	I	Time after start of the period after which no hysteresis is to be taken into account any longer [min]	
LIM_ALM	REAL	I	Limit for alarm message indicating a limit is about to be exceeded as a [%] of LIM_W/LIM_P	
LIM_P	REAL	O	Current power limit without hysteresis	+
LIM_W	REAL	O	Current work limit without hysteresis	+
LIM_WRN	REAL	I	Limit for warning message indicating a limit is about to be exceeded as a [%] of LIM_W/LIM_P	
LOAD_SHED	INT	O	Number of shed loads by load management	
LT_DT	DT	O	Time stamp of last limit violation	
LT_LIM_P	REAL	O	Power limit of last period with limit violation	
LT_LIM_W	REAL	O	Work limit of last period with limit violation	
LT_LOAD_SHED	DINT	O	Number of shed loads at end of last period with limit violation	
LT_P*	REAL	O	Average power of last period with limit violation	
LT_P_SHED*	REAL	O	Power of shed loads at end of last period with limit violation	
LT_P_SHED_POS*	REAL	O	Power of sheddable loads at end of last period with limit violation	
LT_SHED_POS*	DINT	O	Number of sheddable loads at end of last period with limit violation	
LT_W*	REAL	O	Average work of the last period	
P_DIFF	REAL	O	Difference in power: HYS_LIMP – EST_PWR	+
P_ON_POS	REAL	O	Available connection power	+
P_SHED	REAL	O	Shed power	
P_SHED_POS	REAL	O	Available disconnection power	+
QC_W_DIFF	BYTE	O	Quality code for W_DIFF	
QC_P_DIFF	BYTE	O	Quality code for P_DIFF	
QFREE	BOOL	O	Load has been released	

Item	Data type	Type	Meaning	HMI
QLIM_ALM	BOOL	O	Alarm indicating a limit is about to be exceeded	
QLIM_E	BOOL	O	Invalid limit	
QLIM_ERR	BOOL	O	Limit overshoot	
QLIM_WRN	BOOL	O	Warning indicating a limit is about to be exceeded	
QLMGM_OFF	BOOL	O	1 = Load management deactivated	
QP_ERR	BOOL	O	Invalid supply power	
QPRIO_LST_E	BOOL	O	1 = Errored priority list	
QSETTLE_T	REAL	O	Remaining settling time after load shedding/release in [s]	+
QSHED	BOOL	O	Load has been held	
QSHED_IMP	BOOL	O	No load available to shed	
QSUPP_T	REAL	O	Remaining suppression time after start of period in [s]	+
SEL_PW	BOOL	I	Limit selector: 0=Setting of maximum average power (LIM_P_H, LIM_P_L and LIM_P_SH) within a period, 1=Setting of maximum work (LIM_W_H, LIM_W_L, and LIM_W_SH) within a period	
SETTLE_T	REAL	I	Settling time [s]	
SHED_POS	INT	O	Number of loads which can be switched	
SUPP_T	REAL	I	Suppression time [min]	
W_DIFF	REAL	O	Difference in work: HYS_LIMW - EST_VAL	+
W_ON_POS	REAL	O	Available connection work	+
W_SHED_POS	REAL	O	Available disconnection work	+

*These parameters are not evaluated or supplied in this version.

Tariffs

Item	Data type	Type	Meaning	HMI
ADJ_D_H*	DWORD	I	Date on which the automatic on-peak tariff adjustment ends in [ddmmyyyy]	+
ADJ_D_L*	DWORD	I	Date on which the automatic off-peak tariff adjustment ends in [ddmmyyyy]	+
ADJ_D_SH*	DWORD	I	Date on which the automatic Sunday and holiday tariff adjustment ends in [ddmmyyyy]	+
ADJ_LIM*	BOOL	I	Limits adjusted automatically in the event of an overshoot	+
ADJ_TEOM*	BOOL	I	1 = The ADJ_TIME time does not start until the end of the month following limit adjustment	+
ADJ_TIME*	INT	I	Time in [months] for which a limit is valid following automatic adjustment	+
ADJ_VAL*	REAL	I	Percentage by which the limit is adjusted automatically following an overshoot	+
BEG_HT	DINT	I	Start time for on-peak tariff (local time) [ms]	
BEG_HT_S	STRING[8]	I	Start time for on-peak tariff (local time) [ms] as string	
BEG_LT	DINT	I	Start time for off-peak tariff (local time) [ms]	

Item	Data type	Type	Meaning	HMI
BEG_LT_S	STRING[8]	I	Start time for off-peak tariff (local time) [ms] as string	
EN_SCHEDULE*	BOOL	I	1= Load management active according to schedule	+
L_LIM_P	REAL	I	Configurable power limit	
L_LIM_W	REAL	I	Configurable work limit	
LIM_L	BOOL	I	1= configurable limits (L_LIM_P/L_LIM_W) active	
LIM_P_H	REAL	IO	Power limit for on-peak tariff	
LIM_P_L	REAL	IO	Power limit for off-peak tariff	
LIM_P_SH	REAL	IO	Power limit for Sunday or holiday tariff	
LIM_W_H	REAL	IO	Work limit for on-peak tariff	
LIM_W_L	REAL	IO	Work limit for off-peak tariff	
LIM_W_SH	REAL	IO	Work limit for Sunday or holiday tariff	
NT_END_D*	REAL	I	End date for next period in [ddmmyyyy]	+
NT_END_D*	REAL	I	End time for next period in [hhmm]	+
NT_P*	REAL	I	Maximum average power for next period	+
NT_SRT_D*	REAL	I	Start date for next period in [ddmmyyyy]	+
NT_SRT_T*	REAL	I	Start time for next period in [hhmm]	+
QADJ_LIM_H*	BOOL	O	1 = Automatic on-peak tariff adjustment executed	+
QADJ_LIM_L*	BOOL	O	1 = Automatic off-peak tariff adjustment executed	+
QADJ_LIM_SH*	BOOL	O	1 = Automatic Sunday and holiday tariff adjustment executed	+
QNXT_LE*	BOOL	O	No limit for next period	+
SH_ACT	BOOL	IO	1 = Sunday or holiday tariff active	+
SH_NUM	INT	IO	Number of days for which the Sunday and holiday tariff is valid if SH_ACT = TRUE	+

*These parameters are not evaluated or supplied in this version.

Archiving

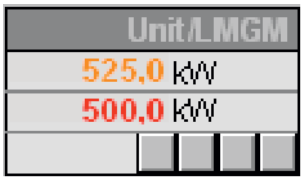
Item	Data type	Type	Meaning	HMI
ARCH_ID	INT	I	Archive ID	
ARCH_OK	BOOL	O	Job completion Ok	
CFG_CUR	INT	I	ID of the current configuration in the user archive	+
CFG_EDIT	BOOL	I	1 = Configuration being processed	+
CFG_MAX	INT	I	Maximum number of configurations in the user archive	+
CFG_READ	INT	I	ID of the configuration to be read in the user archive	
COUNT	INT	I	Number of job repetitions	
ID	INT	I	Block ID; unique number for this block	
NDR	BOOL	O	Receive new data	
QARCH_ID	INT	O	Archive ID	
QELD_PARA	BOOL	O	Monitoring error while loading parameters	
QERR_R	BOOL	O	Group error – receive job	
QERR_S	BOOL	O	Group error send job	
QMONERR_S	BOOL	O	Monitoring error send job	

Item	Data type	Type	Meaning	HMI
QMSG_ERR	BOOL	O	1 = Signal generation error	
QREQ_ACT	BOOL	O	Request pending	
QREQ_R_ST	UDT_PRE_REV_REQ	O	Request structure for receive request to archive manager	
QREQ_S_ST	UDT_PRE_SND_REQ	O	Request structure for send request to archive manager	
QOVL_LIM	BOOL	O	Overflow user archive limit violation	
QPARAMF	BOOL	O	Parameterization error	
QT_LD	REAL	O	Remaining time for loading parameters	
R_CFG	BOOL	IO	1 = Read all configuration data	+
R_PARA	BOOL	IO	1 = Read parameter	+
R_TARIFF	BOOL	IO	1 = Read tariffs	+
R_PRIO	BOOL	IO	1 = Read priority list	+
RCV_ST	UDT_PRE_RCV	I	Checkback signals from the receive job of the archive manager	
SCHED_CUR*	INT	IO	ID of the data record from the PRE_SCHEDULE user archive, which contains the currently valid limits	+
S_CFG	BOOL	IO	1 = Send all configuration data	
S_PRIO	BOOL	IO	1 = Send priority list	
SND_ST	UDT_PRE_SND	I	Checkback signals from the send job of the archive manager	
T_OUT_LD	REAL	I	Timeout for loading parameters	

*These parameters are not evaluated or supplied in this version.

3.6.8 Description of icons and faceplate

Block icon



The following parameters are displayed:

Item	Parameter	Description
Power – Trend	EST_PWR	The calculated trend at the end of the period
Limit	HYS_LIMP	The currently valid limit

Faceplate

The faceplate available is described in this chapter.

The following views are available:

Overview	OVERVIEW
Standard	STANDARD
Energy	ENERGY
Parameter	PARAMETERS
Bar para.	BAR_PARA
Tariffs	TARIFFS
Priority list	PRIOLIST
Edit list of prio	EDITPRIOLIST
Configuration	CONFIG
Limit exceedings	LIM_EXCEEDINGS
Messages	

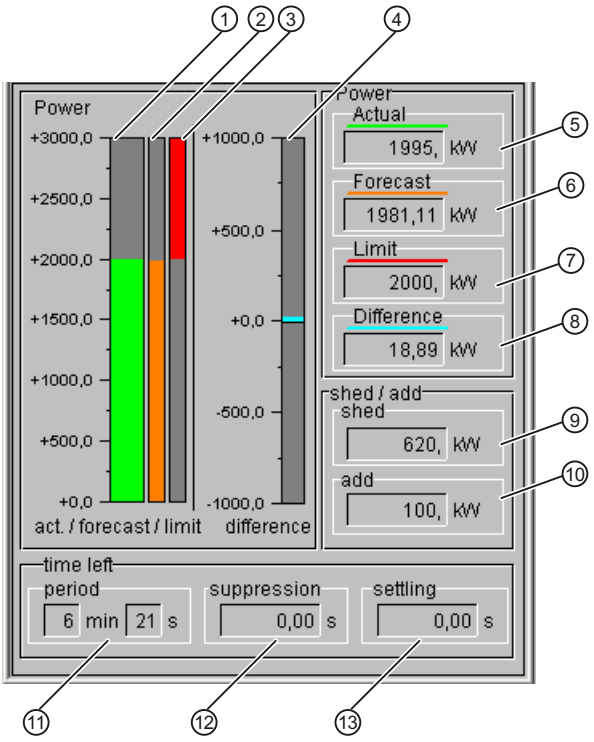
The file name is composed as follows: @PG_PRE_LMGM_<view>.PDL

The PCS 7 standard display is used for the messages view.

The structure of the individual views of faceplates is described below.

Standard (STANDARD)

This view shows the current load management status, based on calculated power values.

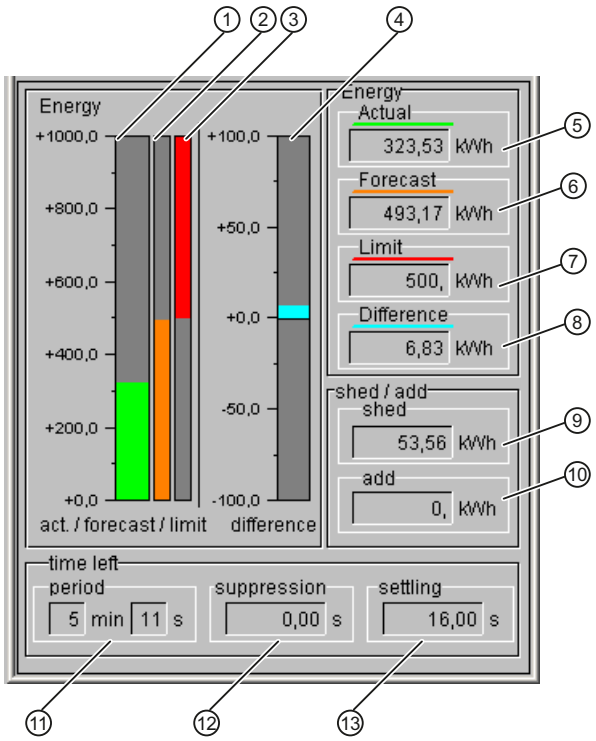


The following parameters are displayed:

	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)	shed	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

Energy (ENERGY)

This view shows the current load management status, based on calculated energy (work) values.



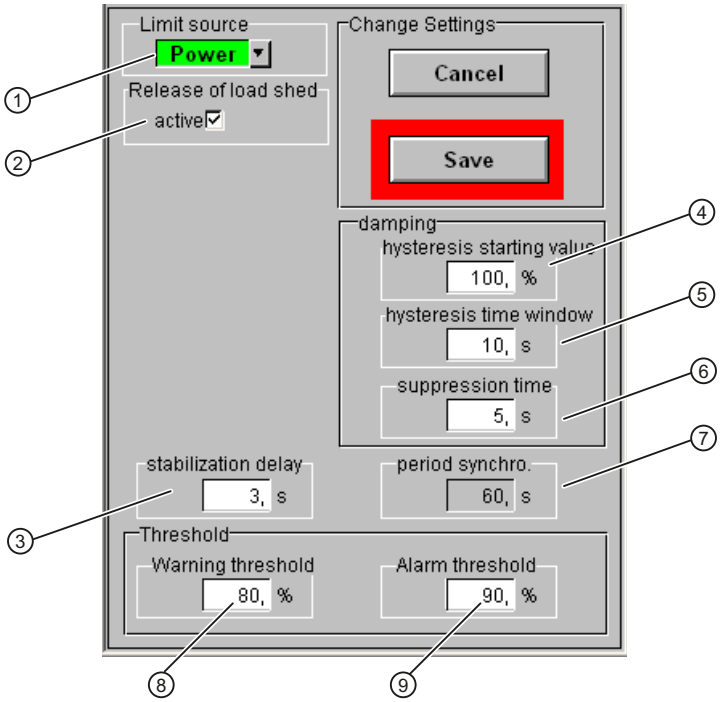
The following parameters are displayed:

	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)	shed	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		

	Item	Parameter	Description
(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 (PARAMETERS)

General load management parameters can be set in this view.



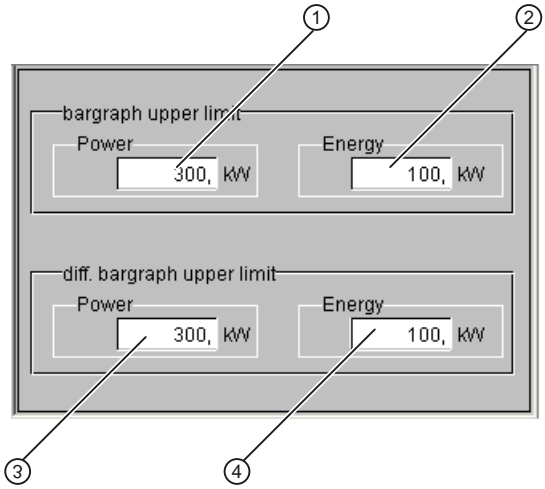
	Item	Parameter	Description
(1)	Limit source	SEL_PW	Specifies whether the limit will be defined as energy (work) or power.
(2)	Release of load shed	EN_SHED	If this box is checked, loads are released/held in accordance with the priority list. If the box is not checked, only a trend calculation and limit 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	Percentage 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.

	Item	Parameter	Description
(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 warning or alarm will be output. The values are given as percentages of the specified limit
(8)	Warning limit	LIM_WRN	Percentage value of the limit after which a warning message is issued indicating a limit is about to be exceeded
(9)	Alarm limit	LIM_ALM	Percentage value of the limit after which an alarm message is issued indicating a limit is about to be exceeded

The values in brackets are not accessed direct from the faceplate. When opening the faceplate, the values are read from the user archive PRE_LMGM_CONFIG_x. When saving the parameters, these values are first transferred to the user archive and then from there to the parameters of the PRE_LMGM block.

Bar para. (BAR_PARA)

The limits for bar graphs displayed in the standard view are specified in this view.

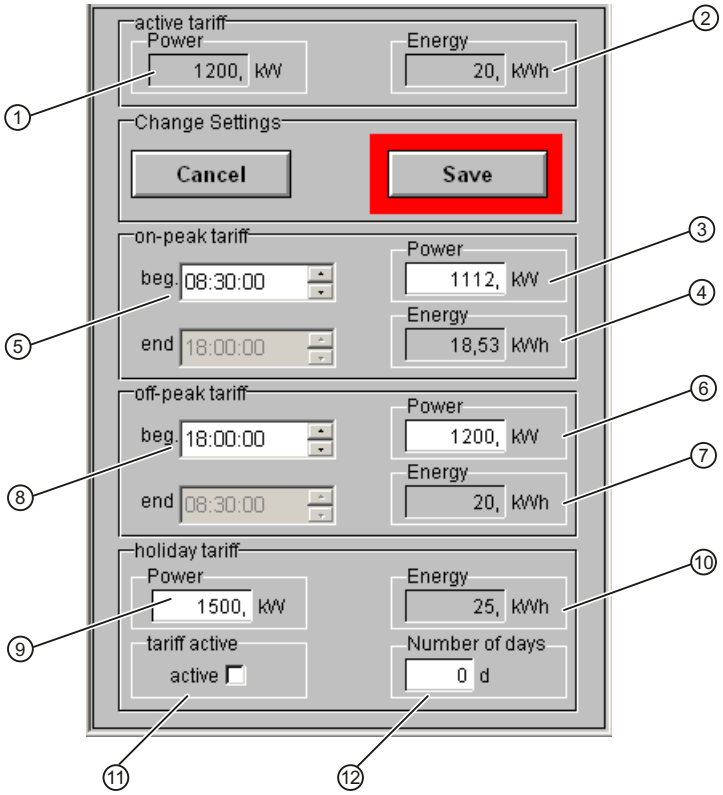


The following parameters are displayed:

	Item	Parameter	Description
	Bar graph upper limit		
(1)	Power	CUR_PWRHR	Bar graph upper limit for power
(2)	Energy	CUR_VALHR	Bar graph upper limit for energy
	Diff. bar graph upper limit		
(3)	Power	P_DIFFHLR	Bar graph upper limit for difference in power
(4)	Energy	W_DIFFHLR	Bar graph upper limit for difference in energy

Tariffs (TARIFFS)

This view shows the current tariff and enables the individual tariff limits to be changed.



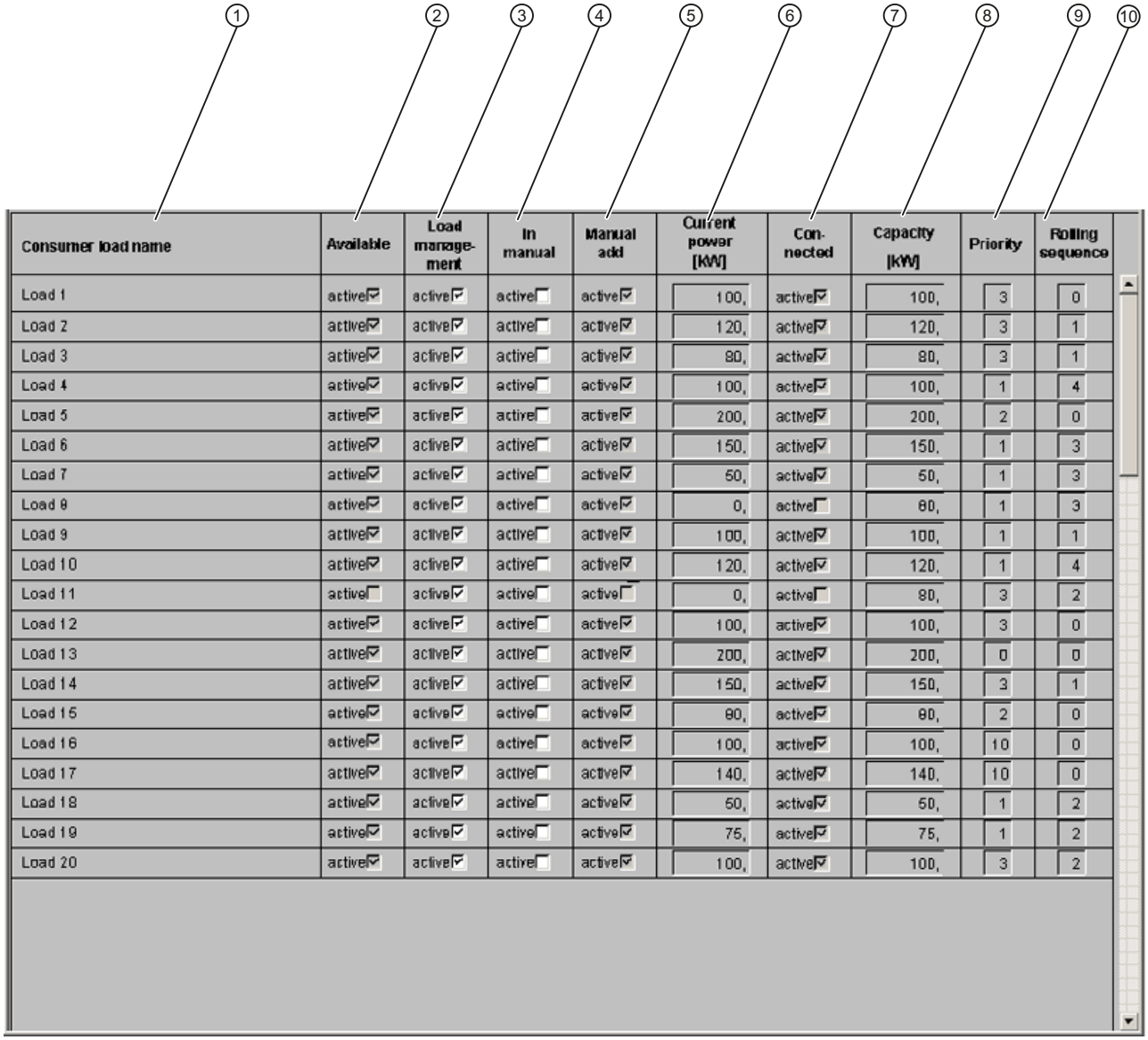
	Item	Parameter	Description
	Active tariff		
(1)	Power	LIM_P	Shows the currently valid tariff as power.
(2)	Energy	LIM_W	Shows the currently valid tariff as energy.
	On-peak tariff		
(3)	Power	LIM_P_H	Power limit for on-peak tariff
(4)	Energy	LIM_W_H	Energy limit for on-peak tariff
(5)	Start time on-peak 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

If power is selected as "type of limit" in the parameter view, only the power values can be edited, and if "work" is selected, only the work values can be edited. The other limit in each case is calculated on the basis of the period time when saving.

The values in brackets are not accessed direct from the faceplate. When opening the faceplate, the values are read from the user archive PRE_LMGM_CONFIG_x. When saving the parameters, these values are first transferred to the user archive and then from there to the parameters of the PRE_LMGM block.

Priority list (PRIOLIST)

This view shows the current status of the individual loads in load management mode and allows the user to remove certain loads from load management control and to release them manually.



Consumer load name	Available	Load manage-ment	In manual	Manual add	Current power [kW]	Con-nected	Capacity [kW]	Priority	Rolling sequence
Load 1	active	active	active	active	100,	active	100,	3	0
Load 2	active	active	active	active	120,	active	120,	3	1
Load 3	active	active	active	active	80,	active	80,	3	1
Load 4	active	active	active	active	100,	active	100,	1	4
Load 5	active	active	active	active	200,	active	200,	2	0
Load 6	active	active	active	active	150,	active	150,	1	3
Load 7	active	active	active	active	50,	active	50,	1	3
Load 8	active	active	active	active	0,	active	80,	1	3
Load 9	active	active	active	active	100,	active	100,	1	1
Load 10	active	active	active	active	120,	active	120,	1	4
Load 11	active	active	active	active	0,	active	80,	3	2
Load 12	active	active	active	active	100,	active	100,	3	0
Load 13	active	active	active	active	200,	active	200,	0	0
Load 14	active	active	active	active	150,	active	150,	3	1
Load 15	active	active	active	active	80,	active	80,	2	0
Load 16	active	active	active	active	100,	active	100,	10	0
Load 17	active	active	active	active	140,	active	140,	10	0
Load 18	active	active	active	active	50,	active	50,	1	2
Load 19	active	active	active	active	75,	active	75,	1	2
Load 20	active	active	active	active	100,	active	100,	3	2

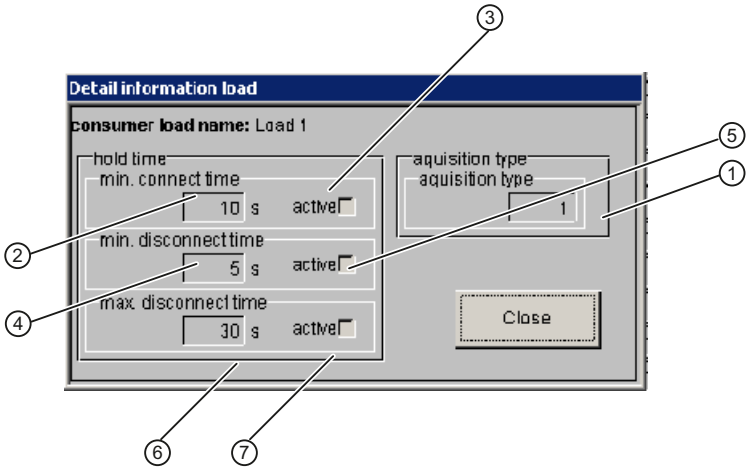
	Item	Parameter	Description
(1)	Load name	NAMEx	Shows the name of the load.
(2)	Available	QONx	Indicates whether the load is currently released via load management or not.
(3)	In load management	EN_SHEDx	Defines whether the load is included in load management control or not.
(4)	In manual	MANx	Defines 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)	Nominal power	Px	Shows the load's calculated power, provided it exists.
(7)	Connected	ONx	Shows the status of the load, provided the load has status feedback.
(8)	Capacity	CAPx	Contains the load's configured rated power.

	Item	Parameter	Description
(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

Detailed information about the load:

Detailed information is available for every load, including the configured hold times and the type of load, i.e. whether the load features power feedback (=1), status feedback (=2), or no feedback (=3). The window is displayed by clicking the name of the load.



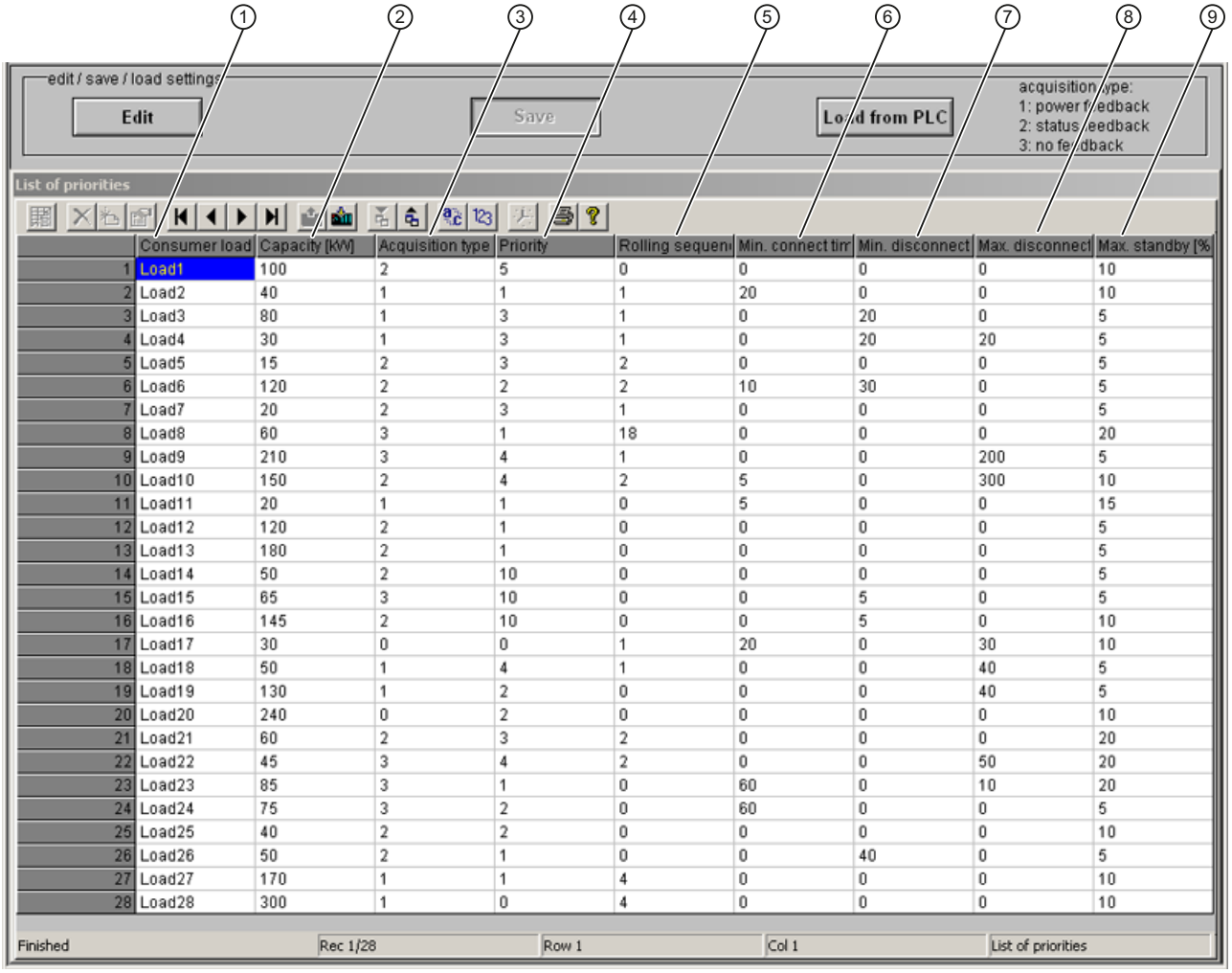
	Item	Parameter	Description
(1)	Type of load	MODEx	Load type/mode: 0 = No load present, 1 = Actual power of the load is connected to the Px input 2 = Switching state of the load is connected at the ONx input 3 = Only the load's rated power is known
(2)	Min. connect time	MIN_ONx	Minimum time the load must be released before it can be held again
(3)	Min. connect time active	QMIN_ONx	1 = Minimum connect time has not yet elapsed
(4)	Min. disconnect time	MIN_OFFx	Minimum time the load must be held before it can be released again
(5)	Min. disconnect time active	QMIN_OFFx	1 = Minimum disconnect time has not yet elapsed
(6)	Max. disconnect time	MAX_OFFx	Maximum time the load may be held
(7)	Max. disconnect time active	QMAX_OFFx	1 = Maximum disconnect time has not yet elapsed

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

The values in brackets are not accessed direct from the faceplate. When opening the faceplate, the values are read from the user archive PRE_LMGM_CONFIG_x.

Edit list of prio (EDITPRIOLIST)

This view allows the user to edit load parameters and to load the current configuration from the PLC.



	Item	Parameter	Description
(1)	Load	NAMEx	Name of the load
(2)	Capacity	CAPx	Load's rated power
(3)	Mode	MODEx	Load status feedback: 0: No load present 1: Power acknowledgment signal 2: Status acknowledgment signal 3: No acknowledgement signal
(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

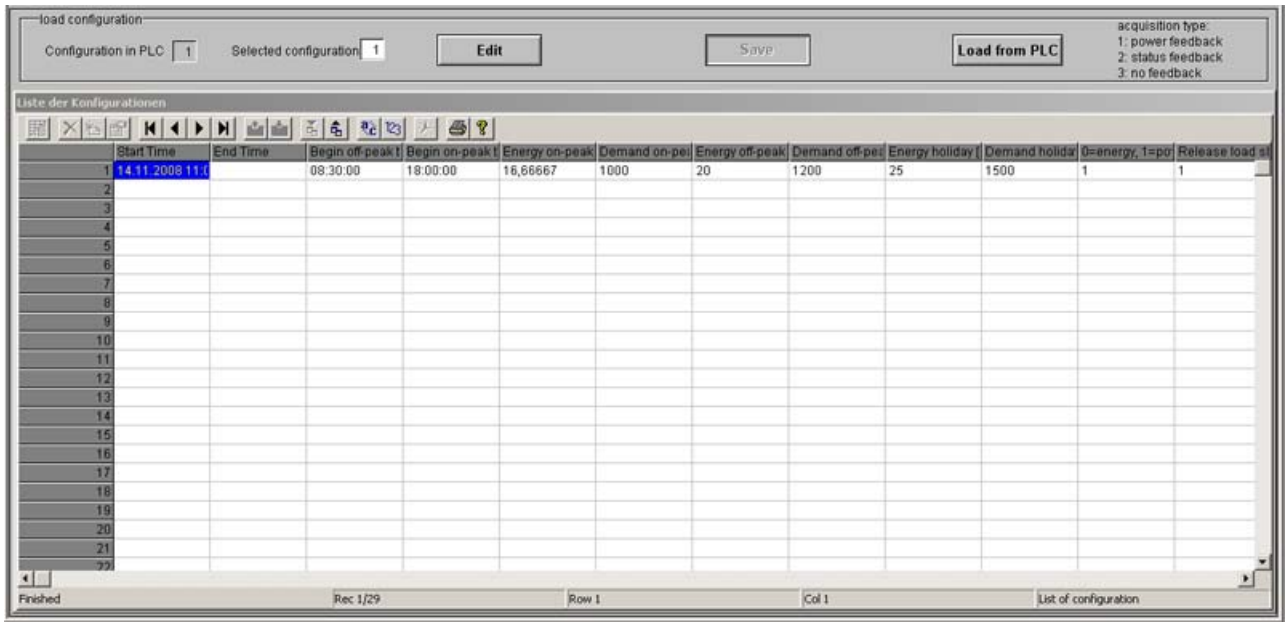
	Item	Parameter	Description
(7)	Min. disconnect time	MIN_OFFx	Minimum time the load must be held before it can be released again
(8)	Max. disconnect time	MAX_OFFx	Maximum time the load may be held
(9)	Max. standby	MAX_STBYx	Max. standby power of the load as a percentage of the rated power

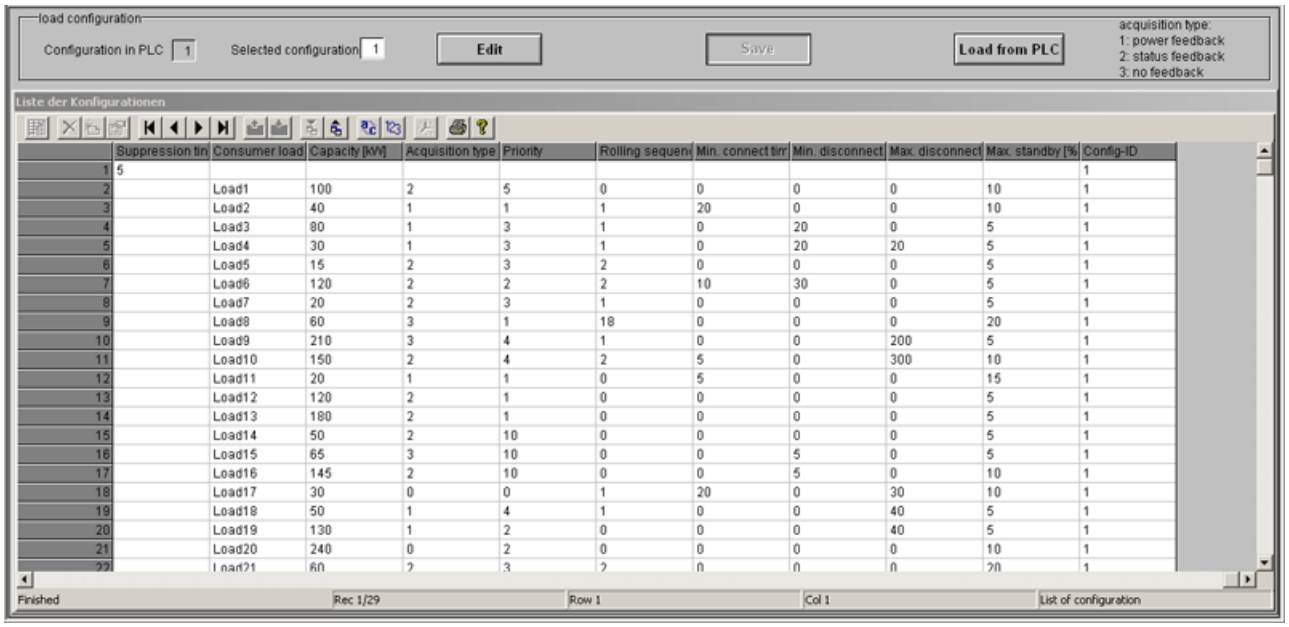
x = 01 to 10, 25, 50, 75 or 100

Configuration (CONFIG)

This list contains the current and the last CFG_MAX configurations of the load management (user archive PRE_LMGM_CONFIG_x). When openeing the faceplate view, the current configuration (CONFIG_ID = CFG_CUR) is always selected. By entering the CONFIG_ID, any configuration can be selected, and by entering a filter condition, all configurations can be selected.

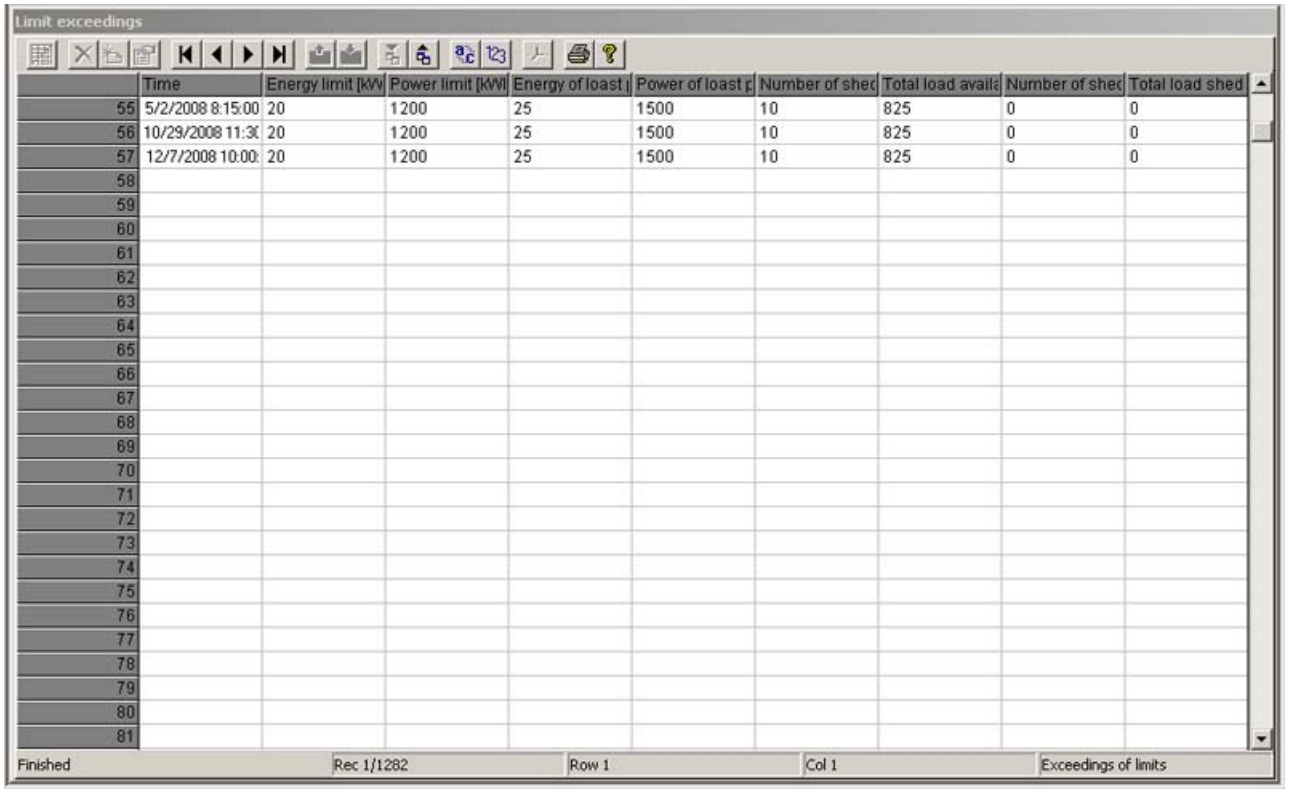
The configurations can be displayed, printed out, exported, imported, and loaded into the controller. As well as the time stamp of its validity, each configuration contains the values from the faceplate views "Parameters", "Tariffs" and "Edit Priolist".





Violations (LIM_EXCEEDINGS)

The archived limit violations (user archive PRE_LMGM_LIM_x) are displayed in this list. The list can be exported.



3.7 PRE_AS_SEND: AS-to-AS communication

FB1070

3.7.1 Calling blocks

The OB watchdog interrupt in which you install the block (e.g. OB32). Also in OB100 (see start-up characteristics).

3.7.2 Called blocks

The block calls the following blocks:

FB1074	PRE_BS
SFB35	ALARM_8P
SFC6	RD_SINFO

3.7.3 Function

The block uses S7 communication (BSEND) to send data to another S7 station (BRCV). A maximum of 30 REAL values and 30 binary values can be sent. Each value also has a binary quality code, which specifies whether the measured value is free of errors or not.

Quality code

The QC_Rx, und QC_Bx (x=1..30) parameters contain the quality codes of the input signals and must be connected to the QUALITY output of the associated driver blocks when using the input signals selected.

3.7.4 Message behavior

PRE_AS_SEND issues the following messages:

Message block	Message number	Block parameter	Message text	Message class
MSG_EVID	1	QERR	Communication error	PLC pr ctrl failure
	2	MSG_2	—	—
	3	MSG_3	—	—
	4	MSG_4	—	—
	5	MSG_5	—	—
	6	MSG_6	—	—
	7	MSG_7	—	—
	8	MSG_8	—	—

The auxiliary values of the message blocks are assigned as follows:

Message block	Auxiliary value	Parameter	Meaning
MSG_EVID	1	QSTATUS	Data transfer status
	2	AUX_PR02	Free
	3	AUX_PR03	Free
	4	AUX_PR04	Free
	5	AUX_PR05	Free
	6	AUX_PR06	Free
	7	AUX_PR07	Free
	8	AUX_PR08	Free
	9	AUX_PR09	Free
	10	AUX_PR10	Free

The auxiliary values (AUX_PRx, x = 02 to 10) of the message block can be freely assigned.

3.7.5 Error behavior

Monitoring the send process

The connection with the partner station is monitored. When an error is detected, the QERR output is set and a summary event is sent to the OS. The QSTATUS status is also sent as an auxiliary value, which indicates the precise cause of the error. A message is not generated until the SUPPTIME (suppression time) has elapsed. This parameter is adjustable.

The send error is reset when at least one telegram containing valid data has been successfully sent. If SUPPTIME < SAMPLE_T, the error message is generated immediately.

3.7.6 Start-up characteristics

The RUNUPCYC parameter can be used to set for how long (number of cycles) messages are to be suppressed.

RESTART = TRUE can be used to simulate a restart.

3.7.7 Block parameters

Item	Data type	Type	Meaning	HMI
AUX_PRx	ANY	IO	Auxiliary value 02 - 10	
BOOLx	REAL	I	BOOL values 1 - 30	
DONE	BOOL	O	Data transfer complete	
ERR_COUNT	DINT	IO	Error counter	
FIRST_VAR	BOOL	I	Start of send data	
HISTLAST_STATUS	WORD	O	Status of the last error	
HISTLAST_TIME_STAMP	DATE_AND_TIME	O	Time stamp of the last error	
HISTx_STATUS	WORD	O	Status of errors 1 - 4	
HISTx_TIME_STAMP	DATE_AND_TIME	O	Time stamp of errors 1 - 4	
ID	WORD	I	Connection ID	
L_MSGLCK	BOOL	I	Central message suppression can be connected	
LAST_VAR	BOOL	I	End of send data	
LEN_COUNT	DINT	IO	Integration of the sent data count	
MODE	BYTE	I	0=Send once 1=Send cyclically 2 – 255=Send every nth cycle	
MSG_ACK	WORD	O	Messages acknowledged	
MSG_EVID	DWORD	I	MESSAGE ID/ALARM_8P event ID	
MSG_STAT	WORD	O	STATUS output	
MSG_x	BOOL	I	Message input 2 ... 8	
QC_Bx	BYTE	I	Quality code BOOL value 1 – 30	
QC_Rx	BYTE	I	Quality code REAL value 1 – 30	
QERR	BOOL	O	1=Error during data transfer	
QLEN	INT	O	Length of the sent data	
QMSG_ERR	BOOL	O	ALARM_8P error	
QMSG_SUP	BOOL	O	Message suppression	
QSTATUS	INT	O	Data transfer status	
R_ID	DWORD	I	Request ID for connection	

Item	Data type	Type	Meaning	HMI
REALx	REAL	I	REAL values 1 - 30	
RES_HIST	BOOL	IO	Reset history	
RESTART	BOOL	I	Manual startup	
RUNUPCYC	INT	I	Number of startup cycles	
SAMPLE_T	REAL	I	Sampling time in [s]	
SUPPTIME	REAL	I	Suppression time in [s]	
SWITCH	BOOL	I	1 = Send	

Description of the status

xSTATUS	Description
11	Alarm: New job not active because the previous job is still busy.
25	Communication has started. The job is being processed.
1	Communication problems, e.g. connection description not loaded (local or remote), connection interrupted (e.g. cable, CPU off, CP in STOP mode)
2	Negative acknowledgment from partner SFB. The function cannot be executed.
3	R_ID is unknown on the connection specified by the ID or the receive block has not yet been called.
4	Error in the send area pointer SD_1 regarding data length or data type, or the value 0 was transferred with LEN.
5	Reset request was executed.
6	The status of the partner SFB is DISABLED (value of EN_R is 0).
7	The status of the partner SFB is not correct (receive block not called since last data transfer).
8	Access to remote object in the user memory was rejected: The destination area at the associated SFB13 "BRCV" is too small (ERROR = 1, STATUS = 4 is reported at the associated SFB13 "BRCV").
10	Access to local user memory not possible (for example, access to deleted DB).
12	When the SFB was called, an instance DB that does not belong to SFB12 was specified, a shared DB was specified instead of an instance DB, no instance DB was found (loading a new instance DB from the PG).
18	R_ID already exists in the connection.
20	Insufficient work memory
-1	Connection error FIRST_VAR and / or LAST_VAR
-2	Internal error SFC20 BLKMOV
-3	Internal error SFC20 BLKMOV: Destination area too small
-4	Internal error SFC6 RD_SINFO

3.8 PRE_AS_RECV: AS-to-AS communication

FB1071

3.8.1 Calling blocks

The OB alarm in which you install the block (e.g. OB32). Also in OB100 (see start-up characteristics).

3.8.2 Called blocks

The block calls the following blocks:

FB1075	PRE_BR
SFC6	RD_SINFO
SFB35	ALARM_8P

3.8.3 Function

The block uses S7 communication (BRCV) to receive data from another S7 station (BSEND). A maximum of 30 REAL values and 30 binary values can be sent Each value also has a binary quality code, which specifies whether the measured value is free of errors or not.

Quality code

The QC_Rx and QC_Bx (x=1..30) parameters contain the quality codes of the input signals and must be connected to the QUALITY output of the associated driver blocks when using the input signals selected.

In addition to the quality codes received, the quality code also provides the following information:

Quality code = 16#14: Communication error, last valid value

Quality code = 16#18: Communication error, no valid value available

3.8.4 Message behavior

PRE_AS_RECV issues the following messages:

Message block	Message number	Block parameter	Message text	Message class
MSG_EVID	1	QERR	Communication error	PLC pr ctrl failure
	2	MSG_2	—	—
	3	MSG_3	—	—
	4	MSG_4	—	—
	5	MSG_5	—	—
	6	MSG_6	—	—
	7	MSG_7	—	—
	8	MSG_8	—	—

The auxiliary values of the message blocks are assigned as follows:

Message block	Auxiliary value	Parameter	Meaning
MSG_EVID	1	QSTATUS	Data transfer status
	2	AUX_PR02	Free
	3	AUX_PR03	Free
	4	AUX_PR04	Free
	5	AUX_PR05	Free
	6	AUX_PR06	Free
	7	AUX_PR07	Free
	8	AUX_PR08	Free
	9	AUX_PR09	Free
	10	AUX_PR10	Free

The auxiliary values (AUX_PRx, x = 02 to 10) of the message block can be freely assigned.

3.8.5 Error behavior

Monitoring the receive process

The connection with the partner station is monitored. When an error is detected, the QERR output is set and a summary event is sent to the OS. The QSTATUS status is also sent as an auxiliary value, which indicates the precise cause of the error. A message is not generated until the SUPPTIME (suppression time) has elapsed. This parameter is adjustable. The send error is reset when at least one telegram containing valid data has been successfully sent.

If SUPPTIME < SAMPLE_T, the error message is generated immediately.

3.8.6 Start-up characteristics

The RUNUPCYC parameter can be used to set for how long (number of cycles) messages are to be suppressed.

RESTART = TRUE can be used to simulate a restart.

3.8.7 Block parameters

Item	Data type	Type	Meaning	HMI
AUX_PRx	ANY	IO	Auxiliary value 02 - 10	
BOOLx	REAL	O	BOOL values 1 - 30 for connection	
ERR_COUNT	DINT	IO	Error counter	
FIRST_VAR	BOOL	IO	Start of receive data	
HISTLAST_STATUS	WORD	O	Status of the last error	
HISTLAST_TIME_STAMP	DATE_AND_TIME	O	Time stamp of the last error	
HISTx_STATUS	WORD	O	Status of errors 1 - 4	
HISTx_TIME_STAMP	DATE_AND_TIME	O	Time stamp of errors 1 - 4	
ID	WORD	I	Connection ID	
IN_BOOLx	REAL	O	BOOL values 1 - 30 receive buffer	
IN_QC_Bx	BYTE	O	Quality code BOOL value 1 – 30 receive buffer	
IN_QC_Rx	BYTE	O	Quality code REAL value 1 – 30 receive buffer	
IN_REALx	REAL	O	REAL values 1 - 30 receive buffer	
L_MSGLCK	BOOL	I	Central message suppression can be connected	
LAST_VAR	BOOL	I	End of receive data	
LEN_COUNT	DINT	IO	Integration of the sent data count	
MSG_ACK	WORD	O	Messages acknowledged	
MSG_EVID	DWORD	I	MESSAGE ID/ALARM_8P event ID	
MSG_STAT	WORD	O	STATUS output	
MSG_x	BOOL	I	Message input 2 ... 8	
NDR	BOOL	O	Receive new data	
QC_Bx	BYTE	O	Quality code BOOL value 1 – 30	
QC_Rx	BYTE	O	Quality code REAL value 1 – 30	
QERR	BOOL	O	1=Error during data transfer	
QLEN	INT	O	Length of the received data	
QMSG_ERR	BOOL	O	ALARM_8P error	
QMSG_SUP	BOOL	O	Message suppression	
QSTATUS	INT	O	Data transfer status	
R_ID	DWORD	I	Request ID for connection	
REALx	REAL	O	REAL values 1 - 30 for connection	
RES_HIST	BOOL	IO	Reset history	
RESTART	BOOL	I	Manual startup	
RUNUPCYC	INT	I	Number of startup cycles	

Item	Data type	Type	Meaning	HMI
SAMPLE_T	REAL	I	Sampling time in [s]	
SUPPTIME	REAL	I	Suppression time in [s]	

Description of the status

xSTATUS	Description
11	Alarm: New job not active because the previous job is still busy.
17	Alarm: Block receiving data asynchronously.
25	Communication has started. The job is being processed.
1	Communication problems, e.g. connection description not loaded (local or remote), connection interrupted (e.g. cable, CPU off, CP in STOP mode)
2	The function cannot be carried out.
4	Error in the receive area pointer RD_1 regarding data length or data type (data block sent is longer than receive area).
5	Reset request received, incomplete transfer.
8	Access error in the corresponding SFB12 "BSEND": The data packet to be sent is larger than 452 bytes and after the first data segment is sent, ERROR = 1 and STATUS = 4 are reported.
10	Access to local user memory not possible (for example, access to deleted DB).
12	When the SFB was called, an instance DB that does not belong to SFB13 was specified. A shared DB was specified instead of an instance DB. No instance DB was found (loading a new instance DB from the PG).
18	R_ID already exists in the connection.
20	Insufficient work memory
-1	Connection error FIRST_VAR and / or LAST_VAR
-2	Internal error SFC20 BLKMOV
-3	Internal error SFC20 BLKMOV: Destination area too small
-4	Internal error SFC6 RD_SINFO

3.9 PRE_SND_H: AS-4xxH <> AS-4xx communication

FB1072

3.9.1 Calling blocks

The OB alarm in which you install the block (e.g. OB32). Also in OB100 (see start-up characteristics).

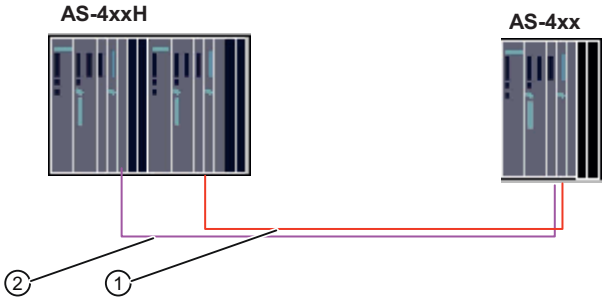
3.9.2 Called blocks

The block calls the following blocks:

FB1074	PRE_BS
SFB35	ALARM_8P
SFC6	RD_SINFO

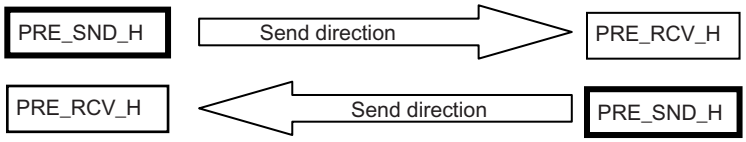
3.9.3 Function

The block coordinates the process of sending telegrams between a redundant and a non-redundant automation station by means of S7 communication (BSEND). A maximum of 30 REAL values and 30 binary values can be sent. Each value also has a binary quality code, which specifies whether the measured value is free of errors or not.



(1) Connection #1

(2) Connection #2



Quality code

The QC_Rx and QC_Bx (x=1..30) parameters contain the quality codes of the input signals and must be connected to the QUALITY output of the associated driver blocks when using the input signals selected.

3.9.4 Message behavior

PRE_SND_H issues the following messages:

Message block	Message number	Block parameter	Message text	Message class
MSG_EVID	1	QERR_1	Communication failure conn. 1	PLC pr ctrl failure
	2	QERR_2	Communication failure conn. 2	PLC pr ctrl failure
	3	QERR_1, QERR_2	Complete loss of communication	PLC pr ctrl failure
	4	MSG_4	—	—
	5	MSG_5	—	—
	6	MSG_6	—	—
	7	MSG_7	—	—
	8	MSG_8	—	—

The auxiliary values of the message blocks are assigned as follows:

Message block	Auxiliary value	Parameter	Meaning
MSG_EVID	1	QSTATUS_1	Data transfer status, connection 1
	2	QSTATUS_2	Data transfer status, connection 2
	3	AUX_PR03	Free
	4	AUX_PR04	Free
	5	AUX_PR05	Free
	6	AUX_PR06	Free
	7	AUX_PR07	Free
	8	AUX_PR08	Free
	9	AUX_PR09	Free
	10	AUX_PR10	Free

The auxiliary values (AUX_PRx, x = 03..10) of the message block can be freely assigned.

3.9.5 Error behavior

Monitoring the send process

The two connections to the receiving partner are monitored separately. The block usually sends data via both connections simultaneously.

When an error is detected, the QERR_1 / QERR_2 output is set and a summary event is sent to the OS. Following a total failure of both connections, the auxiliary value (quality code) supplied for every value is also activated. A message is not generated until the SUPPTIME (suppression time) has elapsed. This parameter is adjustable.

The send error is reset when at least one telegram containing valid data has been successfully sent. If SUPPTIME < SAMPLE_T, the error message is generated immediately.

3.9.6 Start-up characteristics

The RUNUPCYC parameter can be used to set for how long (number of cycles) messages are to be suppressed.

RESTART = TRUE can be used to simulate a restart.

3.9.7 Block parameter

Item	Data type	Type	Meaning	HMI
AUX_PRx	ANY	IO	Auxiliary value 03 - 10	
BOOLx	REAL	I	BOOL values 1 - 30	
DONE_x	BOOL	O	Data transfer complete, connection x	
ERR_CNT_x	DINT	O	Error counter, connection x	
FIRST_VAR	BOOL	I	Start of send data	
HISTLAST_STATUS	WORD	O	Status of the last error, connection x	
HISTLAST_TIME_STAMP_x	DATE_AND_TIME	O	Time stamp of the last error, connection x	
HISTx_STATUS_x	WORD	O	Status of errors 1 - 4, connection x	
HISTx_TIME_STAMP_x	DATE_AND_TIME	O	Time stamp of errors 1 - 4	
ID_1	WORD	I	Connection ID, connection 1	
ID_2	WORD	I	Connection ID, connection 2	
L_MSGLCK	BOOL	I	Central message suppression can be connected	
LAST_VAR	BOOL	I	End of send data	
LEN_CNT_x	DINT	O	Integration of the sent data count, connection x	
MODE	BYTE	I	0=Send once 1=Send cyclically 2 – 255=Send every nth cycle	
MSG_ACK	WORD	O	Messages acknowledged	
MSG_EVID	DWORD	I	MESSAGE ID/ALARM_8P event ID	
MSG_STAT	WORD	O	STATUS output	
MSG_x	BOOL	I	Message input 4 ... 8	
QC_Bx	BYTE	O	Quality code BOOL value 1 – 30	
QC_Rx	BYTE	O	Quality code REAL value 1 – 30	
QERR_x	BOOL	O	1=Error during data transfer, connection x	
QLEN_x	INT	O	Length of the sent data, connection x	
QMSG_ERR	BOOL	O	ALARM_8P error	
QMSG_SUP	BOOL	O	Message suppression	
QSTATUS_x	INT	O	Data transfer status, connection x	
R_ID_1	DWORD	I	Request ID for connection 1	

Item	Data type	Type	Meaning	HMI
R_ID_2	DWORD	I	Request ID for connection 2	
REALx	REAL	I	REAL values 1 - 30	
RES_HI_1	BOOL	IO	Reset history, connection 1	
RES_HI_2	BOOL	IO	Reset history, connection 2	
RESTART	BOOL	I	Manual startup	
RUNUPCYC	INT	I	Number of startup cycles	
SAMPLE_T	REAL	I	Sampling time in [s]	
SUPPTIME	REAL	I	Suppression time in [s]	
SWITCH	BOOL	I	1 = Send	

Description of the status

XSTATUS	Description
11	Alarm: New job not active because the previous job is still busy.
25	Communication has started. The job is being processed.
1	Communication problems, e.g. Connection description not loaded (local or remote), connection interrupted (e.g. cable, CPU off, CP in STOP mode)
2	Negative acknowledgment from partner SFB. The function cannot be executed.
3	R_ID is unknown on the connection specified by the ID or the receive block has not yet been called.
4	Error in the send area pointer SD_1 regarding data length or data type, or the value 0 was transferred with LEN.
5	Reset request was executed.
6	The status of the partner SFB is DISABLED (value of EN_R is 0).
7	The status of the partner SFB is not correct (receive block not called since last data transfer).
8	Access to remote object in the user memory was rejected: The destination area at the associated SFB13 "BRCV" is too small (ERROR = 1, STATUS = 4 is reported at the associated SFB13 "BRCV").
10	Access to the local user memory not possible (for example, access to a deleted DB).
12	When the SFB was called, an instance DB that does not belong to SFB12 was specified, a shared DB was specified instead of an instance DB, no instance DB was found (loading a new instance DB from the PG).
18	R_ID already exists in the connection.
20	Insufficient work memory
-1	Connection error FIRST_VAR and/or LAST_VAR
-2	Internal error SFC20 BLKMOV
-3	Internal error SFC20 BLKMOV: Destination area too small
-4	Internal error SFC6 RD_SINFO

3.10 PRE_RCV_H: AS-4xxH <> AS-4xx communication

FB1073

3.10.1 Calling blocks

The OB watchdog interrupt in which you install the block (e.g. OB32). Also in OB100 (see start-up characteristics).

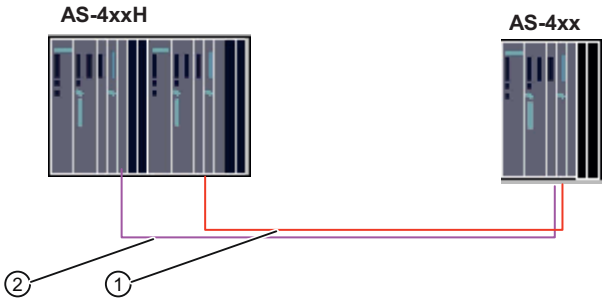
3.10.2 Called blocks

The block calls the following blocks:

FB1075	PRE_BR
SFB35	ALARM_8P
SFC6	RD_SINFO

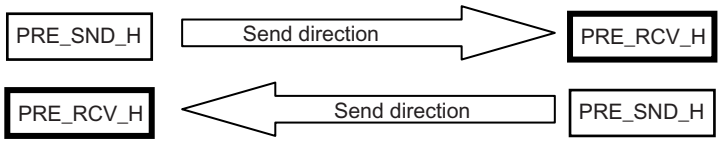
3.10.3 Function

The block coordinates the process of receiving telegrams between a redundant and a non-redundant automation station by means of S7 communication (BRCV). A maximum of 30 REAL values and 30 binary values can be sent. Each value also has a binary quality code, which specifies whether the measured value is free of errors or not.



(1) Connection #1

(2) Connection #2



Quality code

The QC_Rx and QC_Bx (x=1..30) parameters contain the quality codes of the input signals and must be connected to the QUALITY output of the associated driver blocks when using the input signals selected.

In addition to the quality codes received, the quality code also provides the following information:

Quality code = 16#14: Communication error, last valid value

Quality code = 16#18: Communication error, no valid value available

3.10.4 Message behavior

PRE_RCV_H issues the following messages:

Message block	Message number	Block parameter	Message text	Message class
MSG_EVID	1	QERR_1	Communication failure conn. 1	PLC pr ctrl failure
	2	QERR_2	Communication failure conn. 2	PLC pr ctrl failure
	3	QERR_1, QERR_2	Complete loss of communication	PLC pr ctrl failure
	4	MSG_4	—	—
	5	MSG_5	—	—
	6	MSG_6	—	—
	7	MSG_7	—	—
	8	MSG_8	—	—

The auxiliary values of the message blocks are assigned as follows:

Message block	Auxiliary value	Parameter	Meaning
MSG_EVID	1	QSTATUS_1	Data transfer status, connection 1
	2	QSTATUS_2	Data transfer status, connection 2
	3	AUX_PR03	Free
	4	AUX_PR04	Free
	5	AUX_PR05	Free
	6	AUX_PR06	Free
	7	AUX_PR07	Free
	8	AUX_PR08	Free
	9	AUX_PR09	Free
	10	AUX_PR10	Free

The auxiliary values (AUX_PRx, x = 03..10) of the message block can be freely assigned.

3.10.5 Error behavior

Monitoring the receive process

The two connections to the sending partner are monitored separately. If the process is functioning without errors, the receive data is transferred from the first connection; if one connection fails, the data is transferred from whichever of the two connections still exists.

When an error is detected, the QERR_1 / QERR_2 output is set and a summary event is sent to the OS. Following a total failure of both connections, the auxiliary value (quality code) supplied for every value is also activated. A message is not generated until the SUPPTIME (suppression time) has elapsed. This parameter is adjustable.

The send error is reset when at least one telegram containing valid data has been successfully sent. If SUPPTIME < SAMPLE_T, the error message is generated immediately.

3.10.6 Start-up characteristics

The RUNUPCYC parameter can be used to set for how long (number of cycles) messages are to be suppressed.

RESTART = TRUE can be used to simulate a restart.

3.10.7 Block parameter

Item	Data type	Type	Meaning	HMI
AUX_PRx	ANY	IO	Auxiliary value 03 - 10	
BOOLx	REAL	O	BOOL values 1 - 30 for connection	
DUMMY	WORD	IO	Dummy	
ERR_CNT_1	DINT	O	Error counter	
FIRST_VAR_1	BOOL	IO	Pointer initial value, connection 1	
FIRST_VAR_2	BOOL	IO	Pointer initial value, connection 2	
HISTLAST_STATUS_x	WORD	O	Status of the last error, connection x	
HISTLAST_TIME_STAMP_x	DATE_AND_TIME	O	Time stamp of the last error, connection x	
HISTx_STATUS_x	WORD	O	Status of errors 1 - 4, connection x	
HISTx_TIME_STAMP_x	DATE_AND_TIME	O	Status of errors 1 - 4, connection x	
ID_1	WORD	I	Connection ID, connection 1	
ID_2	WORD	I	Connection ID, connection 2	
IN_BOOLx_1	REAL	IO	BOOL values 1 - 30 for readback	
IN_BOOLx_2	REAL	IO	BOOL values 1 - 30 for readback	
IN_QC_Bx_1	BYTE	IO	Quality code BOOL value 1 – 30 for readback	
IN_QC_Bx_2	BYTE	IO	Quality code BOOL value 1 – 30 for readback	
IN_QC_Rx_1	BYTE	IO	Quality code REAL value 1 – 30 for readback	
IN_QC_Rx_2	BYTE	IO	Quality code REAL value 1 – 30 for readback	
IN_REALx_1	REAL	IO	REAL values 1 - 30 for readback	

Item	Data type	Type	Meaning	HMI
IN_REALx_2	REAL	IO	REAL values 1 - 30 for readback	
L_ACT_CON	BOOL	O	Last active connection: 0=Connection 1, 1=Connection 2	
L_MSGLCK	BOOL	I	Central message suppression can be connected	
LAST_VAR_1	BOOL	IO	End ID receive buffer readback, connection 1	
LAST_VAR_2	BOOL	IO	End ID receive buffer readback, connection 2	
LEN_CNT_1	DINT	O	Integration of the sent data count	
MSG_ACK	WORD	O	Messages acknowledged	
MSG_EVID	DWORD	I	MESSAGE ID/ALARM_8P event ID	
MSG_STAT	WORD	O	STATUS output	
MSG_x	BOOL	I	Message input 4 ... 8	
NDR_2	BOOL	O	Receive new data for connection 2	
QC_Bx	BYTE	O	Quality code BOOL value 1 – 30	
QC_Rx	BYTE	O	Quality code REAL value 1 – 30	
QERR_2	BOOL	O	1=Error during data transfer for connection	
QLEN_2	INT	O	Length of the received data for connection	
QMSG_ERR	BOOL	O	ALARM_8P error	
QMSG_SUP	BOOL	O	Message suppression	
QSTATUS_2	INT	O	Data transfer status for connection	
R_ID_1	DWORD	I	Request ID for connection 1	
R_ID_2	DWORD	I	Request ID for connection 2	
REALx	REAL	O	REAL values 1 - 30 for connection	
RES_HI_x	BOOL	IO	Reset history, connection x	
RESTART	BOOL	I	Manual startup	
RUNUPCYC	INT	I	Number of startup cycles	
SAMPLE_T	REAL	I	Sampling time in [s]	
SUPPTIME	REAL	I	Suppression time in [s]	

Description of the status

xSTATUS	Description
11	Alarm: New job not active because the previous job is still busy.
17	Alarm: Block receiving data asynchronously.
25	Communication has started. The job is being processed.
1	Communication problems, e.g. connection description not loaded (local or remote), connection interrupted (e.g. cable, CPU off, CP in STOP mode)
2	The function cannot be carried out.
4	Error in the receive area pointer RD_1 regarding data length or data type (data block sent is longer than receive area).
5	Reset request received, incomplete transfer.

xSTATUS	Description
8	Access error in the corresponding SFB 12 "BSEND": The data packet to be sent is larger than 452 bytes and after the first data segment is sent, ERROR = 1 and STATUS = 4 are reported.
10	Access to local user memory not possible (for example, access to deleted DB).
12	When the SFB was called, an instance DB that does not belong to SFB13 was specified. A shared DB was specified instead of an instance DB. No instance DB was found (loading a new instance DB from the PG).
18	R_ID already exists in the connection.
20	Insufficient work memory
-1	Connection error FIRST_VAR and/or LAST_VAR
-2	Internal error SFC20 BLKMOV
-3	Internal error SFC20 BLKMOV: Destination area too small
-4	Internal error SFC6 RD_SINFO

3.11 PRE_BS: Calling the BSEND system function block

FB1074

3.11.1 Calling blocks

The block is called internally.

3.11.2 Called blocks

The block calls the following blocks:

SFB12	BSEND
SFC1	READ_CLK
SFC6	RD_SINFO
SFC20	BLKMOV

3.11.3 Function

The block forms the internal interface for communication in the send direction.

3.12 PRE_BR: Calling the BRCV system function block

FB1075

3.12.1 Calling blocks

The block is called internally.

3.12.2 Called blocks

The block calls the following blocks:

SFB13	BRCV
SFC1	READ_CLK
SFC6	RD_SINFO
SFC20	BLKMOV

3.12.3 Function

The block forms the internal interface for communication in the receive direction.

3.13 PRE_SUMC: Batch-related energy acquisition

FB1077

3.13.1 Calling OBs

The OB watchdog interrupt in which the block is installed (e.g. OB32). Also in OB100 (see start-up characteristics).

3.13.2 Called blocks

The block calls the following blocks:

SFB35	ALARM_8P
SFC6	RD_SINFO
SFC20	BLKMOV
SFC21	FILL
SFC51	RDSYSST
FC1	AD_DT_TM (IEC function from the STEP 7 Standard Library)
FC28	NE_DT (IEC function from the STEP 7 Standard Library)

3.13.3 Function

The PRE_SUMC block adds the energy consumption for 5 energy types from each of 10 loads (VALx_y) with the same unit and allocates the entire energy consumption (CUR_VALx, LASTVALx) to one batch.

Recording of energy consumption is started and stopped with an input signal. The energy consumption recorded in this period is archived in WinCC user archives (PRE_SUMC_x) with the start and end point and information about the batch. Archiving is carried out with the archive manager block for writing PRE_UA_S.

The input signal for energy recording is independent of the synchronization pulse.

The PRE_SUM block supplies the work values of the individual loads.

Structure of the user archives

The user archive has the following data structure:

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 combines the consumption data pending at the inputs, with the exception of the start and end point. These data points are derived from the Boolean input signal ACTIVE.

The user archives have the name PRE_SUMC_x (x corresponds to the archive ID). A more meaningful name can be entered in the alias. This name can contain, for example, the designation of the PCELL that you can use as the filter criterion for export.

Archiving

In the case of a positive edge of ACTIVE, a start request is issued to the archive manager, and saved in the internal buffer if another job is still active. This is necessary to ensure no data is lost when jobs follow each other in quick succession. Only one job can be buffered.

The PRE_SUMC block calculates and saves the start time. The default end time is 01.01.1990 (corresponding to "0").

The archive manager informs the PRE_SUMC block that the job has been completed with or without errors via the input structure SND_ST.

The START_OK output is set if the job has been saved and can be transferred to the archive manager. START_OK is reset when the ACTIVE input returns to "0".

An end request is issued to the archive manager with a negative edge at the ACTIVE input. The block calculates the end time. The saved value of the start job is taken as the start time. The previously created data set is overwritten with the current data.

Further execution is identical to ACTIVE with a positive edge.

The data is written to the PRE_SUMC_x archive.

If you detect in WinCC that a change of month has taken place at the start of a batch and there are already 13 months available in the user archive, the data sets of the first month available in the user archive are deleted in the user archive. Archiving then continues. The data for the last 12 months + the current month is thus always available for analysis.

If the max. limit of 320,000 fields (corresponding here to 13,333 data sets) defined by WinCC is reached within one user archive, the block generates a message. No further archiving can be carried out until the user data sets have been deleted from the user archive.

To back up the old data, the reporting function integrated in powerrate can be used to execute cyclic exporting of the data to Excel before overwriting.

The ARCH_OK output is set if the job has been saved and can be transferred to the archive manager. ARCH_OK is reset with a positive edge on ACTIVE.

A job is time-monitored by the PRE_SUMC block.

3.13.4 Message behavior

PRE_SUMC issues the following messages:

Message block	Message number	Block parameter	Message text	Message class
MSG_EVID	1	QPARAMF	Parameterization error	PLC pr ctrl failure
	2	QMON_ERR	Monitoring error	PLC pr ctrl failure
	3	QERR	Invalid data	PLC pr ctrl failure
	4	QOVL	Overflow of user archive	PLC pr ctrl failure
	5	-	Free	-
	6	-	Free	-
	7	-	Free	-
	8	-	Free	-

3.13.5 Error behavior

A parameterization error QPARAMF is generated when

- The monitoring time TIME_MON is ≤ 0
- ID ≤ 0
- ARCH_ID ≤ 0 or ARCH_ID not available, or
- The archive manager block signals ID QARCHERR if the block ID agrees

If the monitoring time is incorrect, a new request cannot be generated.

The QERR output is set when

- A request has been issued to the archive manager and the parameters ID, JOB_ID and ARCH_ID do not agree between the request and the response of the archive manager.

The QERR output is not reset until a new request is pending or until the request agrees with the job data again when the job is repeated (COUNT > 0).

If a valid response is not received from the archive manager within the monitoring time, the QMON_ERR error output is set. At the COUNT input, a number of job repetitions can be set before the occurred errors are output. If, for example, a monitoring time of 10 seconds is set and COUNT = 1, the monitoring error is not signaled until 20 seconds have elapsed. The parameterization error is an exception to this. This error is signaled immediately.

All errors remain pending until a new request is transmitted.

A job is always repeated when one of the errors described above has occurred.

3.13.6 Start-up characteristics

During startup, the QREQ_ST output structure and the user data are reset and no job is executed.

3.13.7 Block parameter

Item	Data type	Type	Meaning	HMI
ACTIVE	BOOL	I	Batch active	
ARCH_ID	INT	I	Archive ID	
ARCH_OK	BOOL	O	Job completion OK	
BA_ID	DWORD	I	Batch ID	
BA_NA	STRING[32]	I	Batch name	
COUNT	INT	I	Number of job repetitions	
CUR_TS	DT	I	Current time stamp when block is called	
CUR_VALx	REAL	O	Current total work value x (x = 1 ... 5)	
ID	INT	I	Block ID; unique number for this block	
LASTVALx	REAL	O	Last archived, accumulated total work value x (x = 1 ... 5)	
MAX_VAL	REAL	I	Maximum number of work values	
MSG_ACK	WORD	O	Acknowledge status of the ALARM_8P block	
MSG_EVID	DWORD	I	Event ID for ALARM_8P block	
MSG_STAT	WORD	O	Status of the ALARM_8P block	
QARCH_ID	INT	O	Archive ID	
QERR	BOOL	O	Group error	
QMON_ERR	BOOL	O	Monitoring error	
QMSG_ERR	BOOL	O	1 = Signal generation error	
QMSG_SUP	BOOL	O	1 = Message suppression	
QOVL	BOOL	O	Overflow of user archive	
QPARAMF	BOOL	O	Parameterization error	
QREQ_ACT	BOOL	O	Request pending	
QREQ_ST	UDT_PRE_SND_REQ	O	Request structure for request to archive manager	
REC_NA	STRING[32]	I	Recipe name	
RUNUPCYC	INT	I	Number of startup cycles	
SAMPLE_T	REAL	I	Sampling time [s]	
SND_ST	UDT_PRE_SND	I	Acknowledgment signals from archive manager	
START_OK	BOOL	O	Batch start OK	
TIME_MON	REAL	I	Monitoring time [s]	
TYPEx	STRING[32]	I	Energy type x (x = 1 ... 5)	
UNIT	STRING[24]	I	System name	
VALUNITx	STRING[8]	I	Unit of the value of the energy type x (x = 1 ... 5)	
VALx_y	REAL	I	Current work value of the energy type of the load y (x = 1 ... 5, y = 1 ... 10)	

3.14 PRE_UA_S: Archive manager for writing archive data to the user archive

FB1078

3.14.1 Calling OBs

The OB watchdog interrupt in which the block is installed (e.g. OB32). Also in OB100 (see start-up characteristics).

3.14.2 Called blocks

The block calls the following blocks:

SFB12	BSEND
SFB35	ALARM_8P
SFC6	RD_SINFO
SFC20	BLKMOV

3.14.3 Function

The PRE_UA_S block (archive manager for writing) writes batch-related energy data for the PRE_SUMC archive block and detailed information on limit violations and configuration data for the PRE_LMGM archive blocks to WinCC user archives.

The blocks PRE_SUMC and PRE_LMGM send a request to the archive manager to write data to a WinCC user archive. The user data is transferred to the archive manager as a data array. For this, a pointer is transferred to the archive manager block. The pointer then copies the data with this information to its own instance data block. Only one archive manager block is provided per AS.

The archive manager block can process up to 128 jobs with up to 8 KB of user data.

Mode of operation

Data request from archive block

The archive block issues a request to the archive manager block. The data is available in the archive manager block in the form of an input structure.

Description of the structure:

ID	Block ID; used to assign the job data to the archive block.
JOB_ID	Job ID; specifies the job type: 1 = Append new data set to archive, 2 = Overwrite existing data set
RECORD_NO	Data set number; JOB_ID = 1: Number of the month of the last year of the data sets to be deleted JOB_ID = 2: Number of the data set to be overwritten
ARCH_TY	Archive type
ARCH_ID	Archive ID
REQ	Request for job
MON_ERR	Monitoring error
DATA	Pointer to the user data

After the archive data has been successfully written to the WinCC user archive, the successful execution of the job and the ID of the written data set is signaled to the archive block with JOB_ID = 1. The archive block then cancels the REQ request to the archive manager. When WinCC completes execution, a script sets the REQ_FIN parameter (job completed).

REQ_FIN is also set if the active job signals a runtime error, or if a positive edge is detected at the RESET parameter.

With this, the archive manager block is ready for a new job.

Requests to WinCC user archives

The archive manager block continuously scans its 128 request inputs for a pending request. If a request is pending and no other job is in progress, the user data is accepted and written to WinCC. Only one job can be processed at any time.

Request confirmation of WinCC

After a request has been sent to its WinCC transfer interface, the archive manager block expects confirmation that the data has been successfully written.

For this purpose, a check is made to see if the parameters ID, RECORD_NO and ARCH_ID of the request are identical with the sent data. If the result is positive, this is reported to the archive block with QDONE = TRUE, and the request to WinCC is canceled. In the event of an error, the outputs QERR, QARCHERR or QMON_ERR are set, enabling the archive block to repeat the job immediately or to cancel it.

In the case of JOB_ID = 1, the information RECORD_NO from WinCC is forwarded to the archive block. If the job has been completed, the achive block confirms this with the parameter REQ=FALSE.

If the REQ_FIN parameter from WinCC has been set to TRUE, a new job can be initiated. This parameter indicates that WinCC has detected the falling edge of REQ and execution of the job has been completed.

Mode of operation in WinCC

Requests and data from the archive manager block

For each archive manager block there is a global C action (PRE_UA_S.pas) in WinCC that responds to a request (status change of the REQ parameter) of the associated archive manager block.

Using the JOB_ID, either a new data set is appended to the user archive (JOB_ID = 1) or an existing data set is overwritten with the RECORD_NO (JOB_ID = 2). If JOB_ID = 1, the newly generated data set number is saved in RECORD_NO and transferred to the archive manager.

If the data set has been written to the user archive, the job data is written to the transfer interface of the archive manager block.

Preprocessing of the archive data

There is a user archive for each type of archive block. The following nomenclature applies for the archive:

ARCH_TY = 0: General archive

PRE_+"ARCH_ID" e. g. PRE_1, PRE_2 to PRE_10

The meaning of the archives can be fixed here in the alias.

ARCH_TY = 1: Load management configuration

PRE_LMGM_CONFIG_+"ARCH_ID" e. g. PRE_LMGM_CONFIG_1

ARCH_TY = 2: Load management priority list

PRE_LMGM_PRIO_+"ARCH_ID" e. g. PRE_LMGM_PRIO_1

ARCH_TY = 3: Load management limit violation

PRE_LMGM_LIM_+"ARCH_ID" e. g. PRE_LMGM_LIM_1

ARCH_TY = 4: Batch-related energy recording

PRE_SUMC_+"ARCH_ID" e. g. PRE_SUMC_1

Return value for archive manager block

After the Write data set, the information ID, JOB_ID, RECORD_NO and ARCH_ID is written to the WinCC transfer interface of the archive manager block.

3.14.4 Message behavior

PRE_UA_S issues the following messages:

Message block	Message number	Block parameter	Message text	Message class
MSG_EVID	1	QPARAMF	Parameterization error	PLC pr ctrl failure
	2	QMON_ERR	Communication error	PLC pr ctrl failure
	3	QERR	Invalid data	PLC pr ctrl failure
	4	-	Free	-
	5	-	Free	-
	6	-	Free	-
	7	-	Free	-
	8	-	Free	-

3.14.5 Error behavior

If an error occurs in the C functions and WinCC cannot write the archive data (archive or data set not available, or the length of the user data of the archive manager does not agree with the actual length of the user archive), the QARCHERR error is set. This error is reported to the archive block. An error message is generated by the archive block.

If a request is issued to WinCC and the parameters ID, JOB_ID, ARCH_ID do not agree between the request and the reply from WinCC, QERR is set.

If ID, JOB_ID and ARCH_ID = 0, QARCHERR is set.

QERR and QARCHERR are not reset until no more requests are pending, or the request agrees with the job again, or valid data are available.

The QMON_ERR error is set if the internally called SFB BSEND cannot establish a connection to WinCC. The error is reset when it is again possible to establish the connection. The status of the system block is evaluated to monitor the connection via BSEND.

A parameterization error QPARAMF exists if the ID parameter in the REQx_ST input structures is not unique, or if no valid ID_1 / ID_2, and R_ID parameters (<>0) are available.

No new job is executed while QMON_ERR or QPARAMF are pending.

3.14.6 Start-up characteristics

The block has start-up characteristics. No job is executed during OB100 startup including RUNUPCYC.

3.14.7 Block parameters

Item	Data type	Type	Meaning	HMI
ARCH_ID	INT	IO	Archive ID	+
ARCH_TY	INT	IO	Archive type	+
ID	INT	IO	Block ID;	+
ID_1	WORD	I	Connection ID for BSEND_1	
ID_2	WORD	I	Connection parameter ID for BSEND_2	
JOB_ID	INT	IO	Job ID 1 = Append, 2 = Overwrite	+
MSG_ACK	WORD	O	Acknowledge status of the ALARM_8P block	
MSG_EVID	DWORD	I	Event ID for ALARM_8P block	
MSG_STAT	WORD	O	Status of the ALARM_8P block	
QARCH_ID	INT	O	Active archive ID	
QARCH_TY	INT	O	Archive type	
QARCHERR	BOOL	O	Error while writing the archive	
QERR	BOOL	O	Error	
QID	INT	O	Active ID	
QJOB_ID	INT	O	Active job ID	
QMON_ERR	BOOL	O	Monitoring error	
QMSG_ERR	BOOL	O	1 = Signal generation error	
QMSG_SUP	BOOL	O	1 = Message suppression	
QPARAMF	BOOL	O	Parameterization error	
QREC_NO	DINT	O	Active data set number	
QSND_ST	UDT_PRE_SND	O	Return value archiving	
R_ID	WORD	I	Connection parameter R_ID for BSEND	
RECORD_NO	DINT	IO	Data set number for overwriting	+
REQ	BOOL	IO	Request for archiving	+
REQ_FIN	BOOL	IO	1 = Job from OS completed	+
REQx_ST	UDT_PRE_SND_REQ	I	x. request (x = 001 ... 128)	
RESET	BOOL	IO	1 = Reset job	+
RUNUPCYC	INT	I	Number of startup cycles	

3.15 PRE_UA_R: Archive manager for reading archive data from the user archive

FB1079

3.15.1 Calling OBs

The OB watchdog interrupt in which the block is installed (e.g. OB32). Also in OB100 (see start-up characteristics).

3.15.2 Called blocks

The block calls the following blocks:

SFB13	BRCV
SFB35	ALARM_8P
SFC6	RD_SINFO
SFC20	BLKMOV

3.15.3 Function

The PRE_UA_R block (archive manager for reading) receives configuration data from WinCC user archives for the PRE_LMGM receive block.

The PRE_LMGM block sends a request to the archive manager to fetch data from the WinCC user archive. The data is provided as a data array for the receive block. For this, a pointer is transferred to the receive block, which then copies the data with this information to its own instance data block. Only one archive manager block is provided per AS.

The archive manager block can process up to 128 requests and can provide up to 8 KB of data.

Mode of operation

Data request from receive block

The receive block requests data from the archive manager block. The data is available in the archive manager block in the form of an input structure.

Description of the structure:

ID	Block ID; used to assign the job data to the archive block.
JOB_ID	Job ID
RECORD_NO	Data record number
ARCH_TY	Archive type
ARCH_ID	Archive ID
REQ	Data is requested
MON_ERR	Monitoring error

After the receive block has received the data, the REQ request is reset. WinCC confirms resetting of the request by setting the REQ_FIN parameter (job completed) in a script.

REQ_FIN is also set by the archive manager block if the active job reports a runtime error or a positive edge is detected at the RESET parameter.

This deletes the output structure and the archive manager block is ready for a new job.

Data request to WinCC user archives

The archive manager block continuously scans its 128 request inputs for a pending request. If a request is pending and no other job is in progress, the job data is accepted and transferred to WinCC. Only one job can be processed at any time.

Data from WinCC user archives

If a request has been issued to WinCC, WinCC sets the REQ_ACC parameter and writes the data to the transfer interface for the AS. The block waits until new data has arrived at the associated BRCV. To avoid jobs being lost, the request parameter REQ is not reset until REQ_ACC = TRUE is returned.

A check is then made to see if the parameters ID, RECORD_NO and ARCH_ID of the job are identical with the received data. If the result is positive, the user data is written to a static data area and the request to WINCC is canceled. The receive block is informed of the presence of new data via the outputs NDR, ID, RECORD_NO and ARCH_ID. In the event of an error, the outputs QERR, QARCHERR or QMON_ERR are set, enabling the receive block to repeat the job immediately or to cancel it.

If the data transfer is successful, the receive block can fetch the data from the archive manager with the transferred pointer. The data is not deleted until the receive block has acknowledged receipt of the data (parameter REQ → FALSE).

If the REQ_FIN parameter from WinCC has been set to TRUE, a new job can be initiated. This parameter indicates that WinCC has detected the falling edge of REQ and execution of the job has been completed.

Mode of operation in WinCC

Requests and data return from the archive manager block

For each archive manager block there is a global C action (PRE_UA_R.pas) in WinCC that responds to a request (status change of the REQ parameter) of the associated archive manager block.

Preprocessing of the data

There is a user archive for each type of receive block. The following nomenclature applies for the archive:

ARCH_TY = 0: General archive

PRE_+"ARCH_ID" e. g. PRE_1, PRE_2 to PRE_10

The meaning of the archives can be fixed here in the alias.

ARCH_TY = 1: Load management configuration

PRE_LMGM_CONFIG_+"ARCH_ID" e. g. PRE_LMGM_CONFIG_1

ARCH_TY = 2: Load management priority list

PRE_LMGM_PRIO_+"ARCH_ID" e. g. PRE_LMGM_PRIO_1

ARCH_TY = 3: Load management limit violation

PRE_LMGM_LIM_+"ARCH_ID" e. g. PRE_LMGM_LIM_1

ARCH_TY = 4: Batch-related energy recording

PRE_SUMC_+"ARCH_ID" e. g. PRE_SUMC_1

3.15.4 Message behavior

PRE_UA_R issues the following messages:

Message block	Message number	Block parameter	Message text	Message class
MSG_EVID	1	QPARAMF	Parameterization error	PLC pr ctrl failure
	2	QMON_ERR	Communication error	PLC pr ctrl failure
	3	QERR	Invalid data	PLC pr ctrl failure
	4	-	Free	-
	5	-	Free	-
	6	-	Free	-
	7	-	Free	-
	8	-	Free	-

3.15.5 Error behavior

If an error occurs in the C functions and WinCC cannot read out the requested archive data (archive or data set not available), only the parameters ID, RECORD_NO and ARCH_ID are sent to the the AS with the value 0. The block signals the QARCHERR error in this case. This error is reported to the receive block that generates an error message.

If a request is issued to WinCC and the parameters ID, RECORD_NO and ARCH_ID do not agree between the request and the response from WinCC, QERR is set and the received data is not forwarded.

If ID, RECORD_NO and ARCH_ID = 0, QARCHERR is set.

QERR and QARCHERR are not reset until no more requests are pending, or the request agrees with the job again, or valid data are available.

The QMON_ERR error is set if the internally called SFB BRCV cannot establish a connection to WinCC. The error is reset when it is again possible to establish the connection. The status of the system block is used to monitor the connection via BRCV.

A parameterization error QPARAMF exists if the ID parameter in the REQx_ST input structures is not unique, or if no valid ID_1 / ID_2, and R_ID parameters (<>0) are available.

No new job is executed while QMON_ERR or QPARAMF are pending.

3.15.6 Start-up characteristics

The block has start-up characteristics. During OB100 startup including RUNUPCYC, the RCV_ST output structure and the user data are reset and no job is executed.

3.15.7 Block parameters

Item	Data type	Type	Meaning	HMI
ARCH_ID	INT	IO	Archive ID	+
ARCH_TY	INT	IO	Archive type	+
ID	INT	IO	Block ID;	+
ID_1	WORD	I	Connection parameter ID for BRCV_1	
ID_2	WORD	I	Connection parameter ID for BRCV_2	
JOB_ID	INT	IO	Job ID	+
MSG_ACK	WORD	O	Acknowledge status of the ALARM_8P block	
MSG_EVID	DWORD	I	Event ID for ALARM_8P block	
MSG_STAT	WORD	O	Status of the ALARM_8P block	
QARCH_ID	INT	O	Archive ID	
QARCH_ID	INT	O	Active archive ID	
QARCH_TY	INT	O	Archive type	
QARCHERR	BOOL	O	Error while reading out the archive	
QERR	BOOL	O	Error	
QID	INT	O	Active ID	
QJOB_ID	INT	O	Job ID	
QMON_ERR	BOOL	O	Monitoring error	
QMSG_ERR	BOOL	O	1 = Signal generation error	
QMSG_SUP	BOOL	O	1 = Message suppression	
QPARAMF	BOOL	O	Parameterization error	
QRCV_ST	UDT_PRE_RCV	O	Recipe data	
QREC_NO	DINT	O	Active data set number	
R_ID	WORD	I	Connection parameter R_ID for BRCV	
RECORD_NO	DINT	IO	Data record	+
REQ	BOOL	IO	Data request	+
REQ_ACC	BOOL	IO	1 = Data accepted from OS	+
REQ_FIN	BOOL	IO	1 = Data completed by OS	+
REQx_ST	UDT_PRE_RCV_REQ	I	x. request (x = 001 ... 128)	
RESET	BOOL	IO	1 = Reset job	+
RUNUPCYC	INT	I	Number of startup cycles	

3.16 PRE_SWTCH: General switch

FB1750

3.16.1 Calling OBs

The OB watchdog interrupt in which the block is installed (e.g. OB32). Also in OB100 (see start-up characteristics).

3.16.2 Called blocks

The block calls the following blocks:

SFB31	NOTIFY_8P
SFB35	ALARM_8P
SFC6	RD_SINFO

3.16.3 Function

The PRE_SWTCH function block is used to display and operate a switch via digital inputs and outputs.

Status

The input parameters ON, OFF, TRIP and UNPLUG are used to generate the switch status.

The input parameters TRIP and UNPLUG are not evaluated if EN_TRIP or EN_UNPLUG = FALSE.

The following switch statuses are generated dependent on the inputs and displayed on the faceplate and icon:

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

Cells indicated with X are irrelevant in this status and are not evaluated. Statuses not available in the table are regarded as undefined and the QERR output is set.

Activation

Dependent on the status of the switch and the input parameter for operator control enabling (ON_OP_EN, OFFOP_EN) switching can be carried out via the faceplate (QON_OP, QOFFOP).

The output signals QON and QOFF are set in accordance with the operator input and then reset after the requested status has been reached or after the monitoring time has expired.

Monitoring

The QMON_ERR output parameter is set if the requested switching status has not been reached within the monitoring time set using TIME_MON. This monitoring is switched off with TIME_MON = 0 or MONITOR = FALSE.

The issued command is revoked.

QMON_ERR is reset if RESET or L_RESET is set.

3.16.4 Message behavior

PRE_SWTCH issues the following messages:

Message block	Message number	Block parameter	Message text	Message class
MSG_EVID1	1	QBAD	External error	PLC pr ctrl failure
	2	QSTATUS	Tripped	AH
	3	QSTATUS	Unplugged	WH
	4	QSTATUS	Undefined status	AH
	5	QMON_ERR / QON	Monitoring error On	AH
	6	QMON_ERR / QOFF	Monitoring error after Off	AH
	7	-	Free	-
	8	-	Free	-
MSG_EVID2	1	QSTATUS	On	Status PLC
	2	QSTATUS	Off	Status PLC
	3	QSTATUS	Operation On successful	Status PLC
	4	QSTATUS	Operation Off successful	Status PLC
	5	-	Free	-
	6	-	Free	-
	7	-	Free	-
	8	-	Free	-

3.16.5 Start-up characteristics

After startup, the messages are suppressed for the number of cycles parameterized in the RUNUPCYC value.

3.16.6 Block parameter

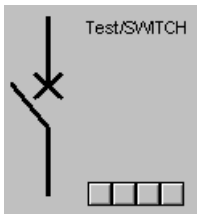
Item	Data type	Type	Meaning	HMI
CSF	BOOL	I	External error	
EN_TRIP	BOOL	I	1 = TRIP input available	+
EN_UNPLUG	BOOL	I	1 = UNPLUG input available	+
L_RESET	BOOL	I	Configurable input for resetting QMON_ERR	
MAN_ON	BOOL	IO	Control input: 0 = Off, 1 = On	+
MONITOR	BOOL	I	1 = Monitoring on	+
MSG_ACK1	WORD	O	Acknowledge status of the ALARM_8P block	
MSG_EVID1	DWORD	I	Event ID for ALARM_8P block	
MSG_EVID2	DWORD	I	Event ID for NOTIFY_8P block	
MSG_STAT1	WORD	O	Status of the ALARM_8P block	
MSG_STAT2	WORD	O	Status of the NOTIFY_8P block	
MT_TYPE	BOOL	I	Type of installation: 0 = Fixed installation, 1 = Withdrawable	+
OFF	BOOL	I	Switch off	
OFFOP_EN	BOOL	I	Operator authorization for off	
ON	BOOL	I	Circuit breaker CLOSED	
ON_OP_EN	BOOL	I	Operator authorization for on	
QBAD	BOOL	O	1 = External error	
QC_OFF	BYTE	I	Quality code for OFF	
QC_ON	BYTE	I	Quality code for ON	
QC_QOFF	BYTE	O	Quality code for QOFF	
QC_QOFF_I	BYTE	I	Quality code for QOFF input	
QC_QON	BYTE	O	Quality code for QON	
QC_QON_I	BYTE	I	Quality code for QON input	
QC_QSTATUS	BYTE	O	Quality code for QSTATUS output	
QC_TRIP	BYTE	I	Quality code for TRIP	
QC_UNPLUG	BYTE	I	Quality code for UNPLUG	
QERR	BOOL	O	1=Error	
QMON_ERR	BOOL	O	Monitoring error	
QMSG_ERR	BOOL	O	1 = Signal generation error	
QMSG_SUP	BOOL	O	1 = Message suppression	+
QOFF	BOOL	O	Control output for off	
QOFF_OP	BOOL	O	Operator authorization for off	+
QON	BOOL	O	Control output for on	
QON_OP	BOOL	O	Operator authorization for on	+
QSIM	BOOL	O	1 = Simulation active	+
QSTATUS	BYTE	O	Status of the switch	+
RESET	BOOL	IO	Control input for resetting QMON_ERR	+
RUNUPCYC	INT	I	Number of initial run cycles after CPU restart	
SAMPLE_T	REAL	I	Sampling time in [s]	

Item	Data type	Type	Meaning	HMI
STYPE	INT	I	Type of switch	+
TIME_MON	REAL	I	Monitoring time in [s]	+
TRIP	BOOL	I	Switch is tripped	
UNPLUG	BOOL	I	Switch withdrawn	

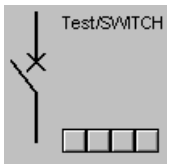
3.16.7 Description of icons and faceplate

Block icon

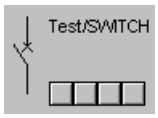
Variant 1



Variant 2



Variant 3



Faceplate

The faceplate available is described in this chapter.

The following views are available:

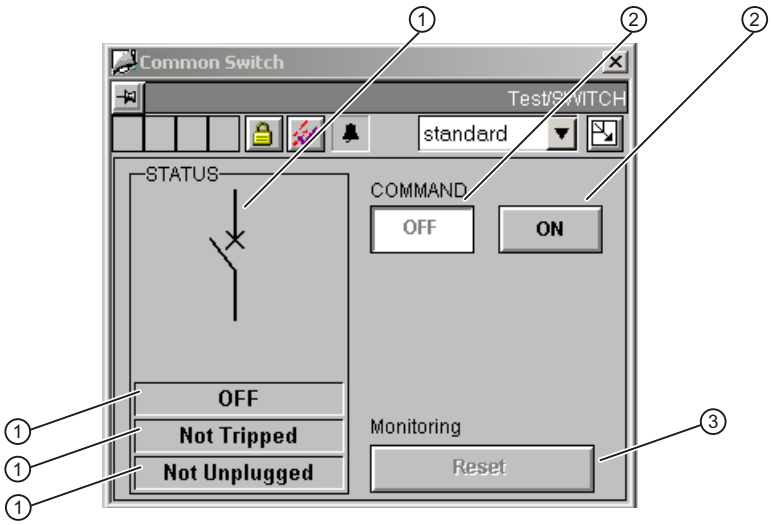
Overview	OVERVIEW
Standard	STANDARD
Messages	

The file name is composed as follows: @PG_PRE_SWTCH_<view>.PDL

The PCS 7 standard display is used for the messages view.

The structure of the individual views of faceplates is described below.

Standard (STANDARD)



The following parameters are displayed:

	Item	Parameter	Description
(1)	Status	QSTATUS	Circuit breaker state
(2)	Command	MAN_ON	0 = Off, 1 = On
(3)	Monitoring – Reset	RESET	Reset monitoring error

3.17 PRE_PAC: Basic functionality of the PAC3200/PAC4200

FB1751

3.17.1 Calling OBs

The block must be installed in the processing sequence in the following OBs:

OB1	Cyclic program
OB82	Diagnostic interrupt
OB83	Insert/remove interrupt
OB85	Program execution error
OB86	Rack failure
OB100	Warm restart

3.17.2 Called blocks

The block calls the following blocks:

SFB35	ALARM_8P
SFC6	RD_SINFO

3.17.3 Function

The function block PRE_PAC is used to display selected measured values and to report status information of the PAC3200 and PAC4200 Power Monitoring Devices.

Measured value display

Data of the basic type 1 and 2 can be selected for displaying measured values. However, when parameterizing the PAC in HW Config, you must make sure that the basic types whose data is to be displayed are configured in each case.

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

The measured value type is determined with the TYPE_x parameter.

Measured value 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 active energy is read out and displayed dependent on the EN_ACENER parameter.

Status information

The status information is output in the STATDIAG parameter. The bits relevant for the messages are also output at binary output parameters (see table).

Assignment of the status doubleword STATDIAG

Byte	Bit	Binary status information	Block parameter
0	0	No synchronization pulse	-
0	1	Local configuration active	-
0	2	Voltage overload	QE_VOLTOVER
0	3	Current overload	QE_CUROVER
0	4 ... 7	Reserved	-
1	0	Reserved	-
1	1	Maximum pulse rate exceeded	QE_PULSOVER
1	2 ... 7	Reserved	-
2	0	Relevant parameter changes	-
2	1	Upper/lower limit exceeded	-
2	2	Maximum pulse rate exceeded	QE_PULSOVER
2	3	Restart of the device	-
2	4	Resetting of energy counter by user	-
2	5 ... 7	Reserved	-
3	0 ... 7	Reserved	-

3.17.4 Message behavior

PRE_PAC issues the following messages:

Message block	Message number	Block parameter	Message text	Message class
MSG_EVID	1	QBAD	External error	PLC pr ctrl failure
	2	QPARAMF	Parameterization error	PLC pr ctrl failure
	3	QE_VOLTOVER	Voltage out of range	PLC pr ctrl failure
	4	QE_CUROVER	Current out of range	PLC pr ctrl failure
	5	QE_PULSOVER	Maximum pulse rate exceeded	PLC pr ctrl failure
	6	-	Free	-
	7	-	Free	-
	8	-	Free	-

3.17.5 Error behavior

The QPARAMF error output is set when

- A measured value TYPE_x < 1 or > 8 is entered or
- One of the UNITx parameters is set to an invalid value (see "Description of the icon and faceplate")

The VALUE_x measured value is set to 0 if the associated measured value type is invalid.

3.17.6 Start-up characteristics

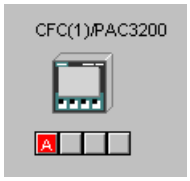
After startup, the messages are suppressed for the number of cycles parameterized in the RUNUPCYC value.

3.17.7 Block parameters

Item	Data type	Type	Meaning	HMI
AEIT1DW1	DWORD	O	Active energy import tariff 1 DWORD 1	+
AEIT1DW2	DWORD	O	Active energy import tariff 1 DWORD 2	+
BASADR1	INT	I	Basic address of the basic type 1	
BASADR2	INT	I	Basic address of the basic type 2	
CSF	BOOL	I	External error	
EN_ACENER	BOOL	I	1 = Active energy available	+
MSG_ACK	WORD	O	Acknowledge status of the ALARM_8P block	
MSG_EVID	DWORD	I	Event ID for ALARM_8P block	
MSG_STAT	WORD	O	Status of the ALARM_8P block	
QBAD	BOOL	O	1 = External error	
QE_CUROVER	BOOL	O	Current out of range	
QE_PULSOVER	BOOL	O	Maximum pulse rate exceeded	
QE_VOLTOVER	BOOL	O	Voltage out of range	
QMSG_ERR	BOOL	O	1 = Signal generation error	
QMSG_SUP	BOOL	O	1 = Message suppression	+
QPARAMF	BOOL	O	1 = Parameterization error	
RUNUPCYC	INT	I	Number of initial run cycles after CPU restart	
STATDIAG	DWORD	O	Device diagnostics and status	
TYPE_x	INT	I	Measured value type of VALUE_x (x = 1 ... 3)	+
UNITACENER	BYTE	I	Active energy units	+
UNITACPOW	BYTE	I	Active power units	+
UNITVOLT	BYTE	I	Voltage units	+
VALUE_x	REAL	O	Measured value x (x = 1 ... 3)	+

3.17.8 Description of icon and faceplate

Block icon



Faceplate

The faceplate available is described in this chapter.

The following views are available:

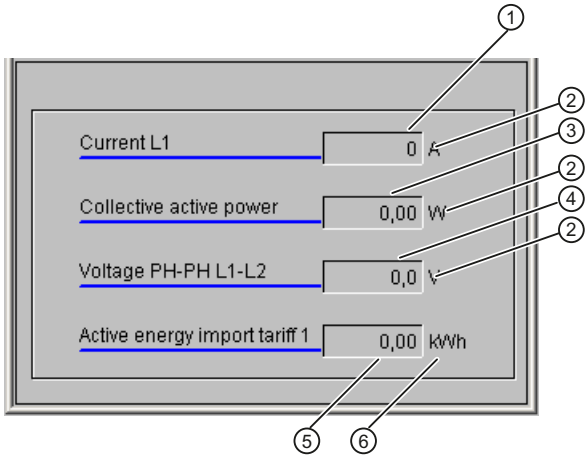
Overview	OVERVIEW
Standard	STANDARD
Parameter	PARAMETERS
Messages	

The file name is composed as follows: @PG_PRE_PAC_<view>.PDL

The PCS 7 standard display is used for the messages view.

The structure of the individual views of faceplates is described below.

Standard (STANDARD)



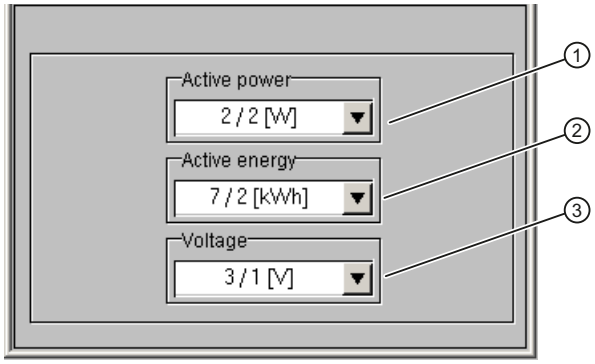
(1) VALUE_1
(2) UNITVOLT / UNITACPOW
(3) VALUE_2
(4) VALUE_3
(5) AEIT1DW1 / AE1T1DW2
(6) UNITACENER

The following parameters are displayed:

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.

Parameters (PARAMETERS)

The format (integer place/decimal place) and unit can be parameterized for the different measured value types.



	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]

3.18 PRE_CALC: Calculations

FC1061

3.18.1 Calling blocks

The block is called by the PRE_SUM FB.

3.18.2 Function

The PRE_CALC function contains the calculation algorithms which can be used when producing measured values for the FB PRE_SUM FB.

The function is a source in the library and the user can therefore add other calculations to it. The function interface must not be changed.

The following algorithms are implemented:

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

Assignment input parameters PRE_CALC to input parameters PRE_SUM:

PRE_CALC	PRE_SUM
CALC_FN	CALC_FN
INx	ACTUALx
Px	CALC_Px

3.18.3 Message behavior

The block has no message behavior.

3.18.4 Error behavior

The QERR error output is set when

- An error is established during the calculation (e.g. division by 0)

3.18.5 Start-up characteristics

The block has no start-up characteristics.

3.18.6 Block parameters

Item	Data type	Type	Meaning	HMI
CALC_FN	INT	I	Calculation function	
INx	REAL	I	Input value x (x = 1 ... 3)	
Px	REAL	I	Constant x (x = 0 ... 3)	
QERR	BOOL	O	1=Error	
OUT	REAL	O	Results	

3.19 PRE_FIFO_IO: Organization of FIFO buffer

FC1062

3.19.1 Calling blocks

The block is called by the PRE_SUM, PRE_FIFO_DATA and PRE_AR_SND FBs.

3.19.2 Called blocks

The block calls the following blocks:

SFC24 TEST_DB

3.19.3 Function

The PRE_FIFO_IO function organizes reading and writing access on the FIFO buffer, which is represented by the PRE_FIFO_DATA FB.

The FIFO contains the functionality of a cyclic buffer. Old data are overwritten when the buffer overflows.

The status of the FIFO buffer is displayed at the QEMPTY (buffer empty) and QFULL (buffer full) outputs.

3.19.4 Message behavior

The block has no message behavior.

3.19.5 Error behavior

The QPARAMF error output is set when

- the parameterized FIFO-DB is not present
- the FIFO-DB length is too short

3.19.6 Start-up characteristics

During initial startup, the block initializes the check data of the FIFO buffer. This call takes place in the PRE_FIFO_DATA FB.

When the CPU is started up subsequently, the pointers are retained.

3.19.7 Block parameters

Item	Data type	Type	Meaning	HMI
DONE	BOOL	O	1 = Job complete	
FIFO_DB	INT	I	DB number for FIFO	
FIFO_INIT	BOOL	I	1 = Initialize FIFO	
ITEM_LEN	INT	I	Length of element	
ITEM_MAX	INT	I	Maximum number of elements in FIFO	
ITEM_PTR	POINTER	I	Pointer to element	
ITEM_RD	BOOL	I	1=Read request	
ITEM_WR	BOOL	I	1 = Write request	
QEMPTY	BOOL	O	1 = FIFOBlank	
QFULL	BOOL	O	1 = FIFO full	
QPARAMF	BOOL	O	1 = Parameterization error	

3.20 UDT_PRE_FIFO

UDT1060

3.20.1 Description

The UDT_PRE_FIFO user data type contains internal check data for organizing the FIFO buffer.

The UDT is used internally.

3.20.2 Structure

Item	Data type	Meaning
FIFO_ST	DWORD	Pointer at start of FIFO
FIFO_END	DWORD	Pointer at end of FIFO
WR_POS	DWORD	Pointer at current write position
RD_POS	DWORD	Pointer at current read position
ITEM_CNT	INT	Counter for elements
LOCKED	BOOL	1=Access locked
SPARE	ARRAY[1 ... 4] of BYTE	Spare

3.21 UDT_PRE_ITEM

UDT1061

3.21.1 Description

The UDT_PRE_ITEM user data type contains the storage structure of a measured value.

The UDT is used internally.

3.21.2 Structure

Item	Data type	Meaning
TS	DATE_AND_TIME	Time stamp of measured value
VALUE	REAL	Measured value
AR_SNO	WORD	Subnumber for archive tag

3.22 UDT_PRE_TLG

UDT1062

3.22.1 Description

The UDT_PRE_TLG user data type contains the structure of a telegram element for sending into the WinCC Tag Logging archive.

The UDT is used internally.

3.22.2 Structure

Item	Data type	Meaning	Default
HEAD_TYPE	WORD	Header type	8 : With time stamp
CYCLE	TIME	Cycle	0 : Not relevant
U_TYPE	BYTE	Unit (type)	2 : Each process value has a time stamp
U_AREA	BYTE	Units (range)	0 : Not relevant
AR_SNO	WORD	Subnumber of archive tag	
DT_TYPE	INT	Data type of element	5 : Analog value
NO_ITEMS	INT	Number of elements to be sent	1
TS	DATE_AND_TIME	Time stamp of element	
VALUE	REAL	Measured value	

3.23 UDT_PRE_SND_REQ

UDT1063

3.23.1 Description

The user data type UDT_PRE_SND_REQ contains the structure for the request to write data to a WinCC user archive.

3.23.2 Structure

Item	Data type	Meaning
ID	INT	ID of the requesting function
JOB_ID	INT	Requested job number
ARCH_TY	INT	Requested archive type
ARCH_ID	INT	Requested archive ID
RECORD_NO	DINT	Data record number
REQ	BOOL	Request to write data to the archive
MON_ERR	BOOL	Monitoring error
DATA	UDT_PRE_ANY	Pointer to user data

3.24 UDT_PRE_SND

UDT1064

3.24.1 Description

The user data type UDT_PRE_SND contains the acknowledgment of the archive manager for the request to write data to a WinCC user archive.

3.24.2 Structure

Item	Data type	Meaning
ID	INT	ID of the requesting function
JOB_ID	INT	Requested job number
ARCH_TY	INT	Requested archive type
ARCH_ID	INT	Requested archive ID
RECORD_NO	DINT	Data record number
QERR	BOOL	Error
QARCHERR	BOOL	Error while writing to the archive
QMON_ERR	BOOL	Monitoring error
QDONE	BOOL	Archiving takes place

3.25 UDT_PRE_RCV_REQ

UDT1065

3.25.1 Description

The user data type UDT_PRE_RCV_REQ contains the structure for the request to read data from a WinCC user archive.

3.25.2 Structure

Item	Data type	Meaning
ID	INT	ID of the requesting function
JOB_ID	INT	Requested job number
ARCH_TY	INT	Requested archive type
ARCH_ID	INT	Requested archive ID
RECORD_NO	DINT	Data record number
REQ	BOOL	Request to read data from the archive
MON_ERR	BOOL	Monitoring error

3.26 UDT_PRE_RCV

UDT1066

3.26.1 Description

The user data type UDT_PRE_RCV contains the archive manager acknowledgment of the request to read data from a WinCC user archive.

3.26.2 Structure

Item	Data type	Meaning
ID	INT	ID of the requesting function
JOB_ID	INT	Requested job number
ARCH_TY	INT	Requested archive type
ARCH_ID	INT	Requested archive ID
RECORD_NO	DINT	Data record number
QERR	BOOL	Error
QARCHERR	BOOL	Error while writing to the archive
QMON_ERR	BOOL	Monitoring error
NDR	BOOL	New data present
DATA	UDT_PRE_ANY	Pointer to user data

3.27 UDT_PRE_ANY

UDT1067

3.27.1 Description

The user data type UDT_PRE_ANY contains the structure of the Any pointer. It is used as a transfer pointer to the send/receive areas for the archive manager.

3.27.2 Structure

Item	Data type	Meaning
SYNC	BYTE	Syntax ID
TYP	BYTE	Data type
LENGTH	WORD	Length
DB_NR	WORD	DB number
P	DWORD	Range pointer

Description of powerrate Reports

4

powerrate Reports offers functions for energy analysis and analysis for batch-related energy recording. In doing so, selected energy data is read from the tag logging archive and from user archives from the WinCC runtime database, and generated on the basis of Microsoft Excel reports.

4.1 Energy analyses

The following energy analyses can be carried out:

Export of archived measured values	Export of energy values from the Tag Logging archive to Excel without creating a report
Cost center report	Assigns energy values/costs to cost centers
Duration curve report	Represents average power values as a duration curve

Due to the system characteristics of WinCC, it is not currently possible to access swapped archives.

4.1.1 Export of archived measured values

The energy, power and counter values archived in the WinCC Tag Logging archive, and the values calculated from them, are exported as raw data to Excel using the function "Export of archived measured values".

The values from the tag logging archive are stored in the "Archive data" sheet, and calculated values (virtual process tags) are stored in the "Virtual process tags" sheet.

The generated export file can be used for further processing of the data by other applications.

Time stamp	ANALOG_COUNTER/PRE_SUM.S	INT_COUNTER/PRE_SUM.S
	[Wh]	[kWh]
12/11/2008 12:00:00 PM	437,66	3600,01
12/11/2008 12:15:00 PM	255,72	3599,83
12/11/2008 12:30:00 PM	514,31	3590,51

4.1.2 Cost center report

The reports "Cost center report table" and "Cost center report diagram" are generated to analyze energy values (.S tags in the Tag Logging). These reports are used to assign consumption data and costs to the relevant cost centers. When a report is created, the reporting period over which the evaluation is to be performed must be specified.

"Cost center report table" sheet

SIEMENS 1/9/2009

Cost center report

Time settings	
Start time	12/11/2008 12:00:00 PM
End time	12/18/2008 12:00:00 PM
Aggregation time	None

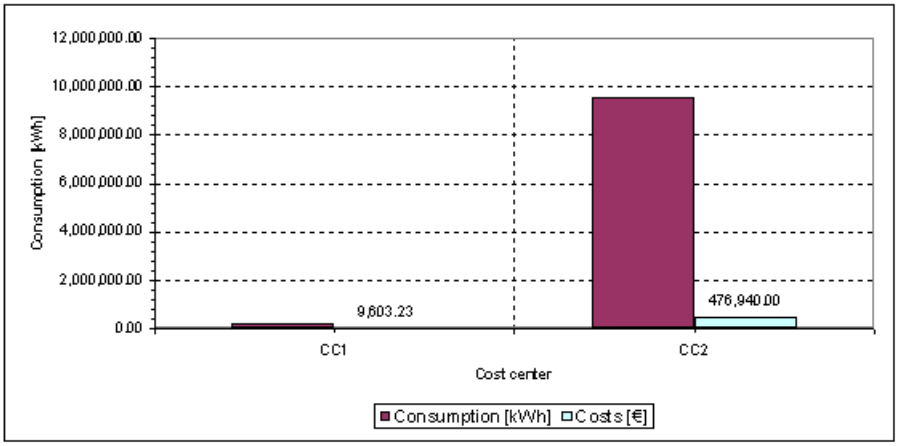
Cost center	Consumption [kWh]	Costs [€]
CC1	19,206.45	9,603.23
CC2	9,538,800.00	476,940.00
Total	973,086.45	486,543.23

"Cost center report diagram" sheet

SIEMENS 1/9/2009

Cost center report

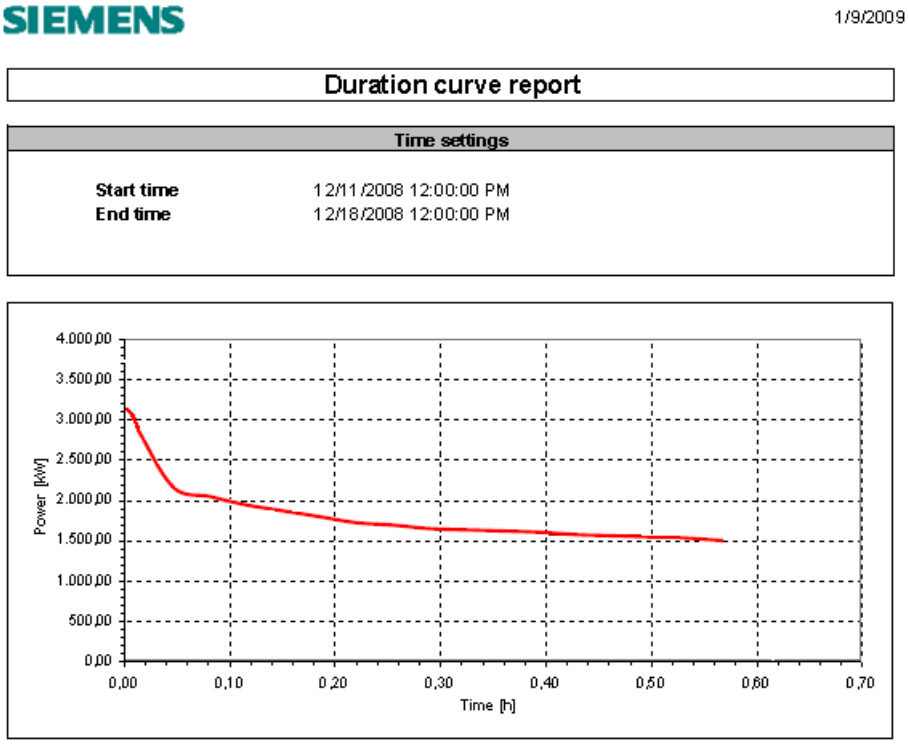
Time settings	
Start time	12/11/2008 12:00:00 PM
End time	12/18/2008 12:00:00 PM
Aggregation time	None



4.1.3 Duration curve report

The "Duration curve report" contains the average power values (.V tags in the Tag Logging archive). It shows the frequency with which particular average power values occur. This graphic can then be used to deduce whether temporary power peaks are present.

"Duration curve report" sheet



4.2 Batch analyses

powerrate Reports contains the following analyses of batch-related energy values:

Export of batch values	Export of the batch-related energy values from user archives to Excel without creating a report
Batch report (sorted acc. to time)	Sorting of the batch-related energy values according to start time
Batch report: (sorted acc. to name)	Sorting of the batch-related energy values according to batch name

4.2.1 Export of batch values

The data assigned to batches and archived in WinCC PRE_SUMC_x user archives is exported as raw data to Excel using the "Batch value export" function.

The generated export file can be used for further processing of the data by other applications.

Charge	Time stamp	Time stamp	Unit	ID	Recipe name	Value 1	Unit value 1	Type value 1
	from	to						
Charge_x	8/15/2008 8:31:00 AM	8/15/2008 12:10:00 PM	Unit 1	4660	Milk	720.00	kWh	Current
Charge_a	8/15/2008 12:20:00 PM	8/15/2008 3:33:00 PM	Unit 2	5660	Yoghourt	1,020.00	kWh	Current
Charge_f	8/15/2008 3:45:00 PM	8/15/2008 6:05:00 PM	Unit 3	6660	Cream	562.00	kWh	Current

4.2.2 Batch report

To analyze batch-related energy values (data from the PRE_SUMC_x user archives), a report with data sorted according to time (batch report (sorted acc. to time)) and a report with data sorted according to batches (batch report (sorted acc. to name)) can be generated. These reports are used to assign consumption data to the relevant batches. When a report is created, the reporting period over which the analysis is to be made must be specified.

"Batch report (time)" sheet

SIEMENS 1/9/2009

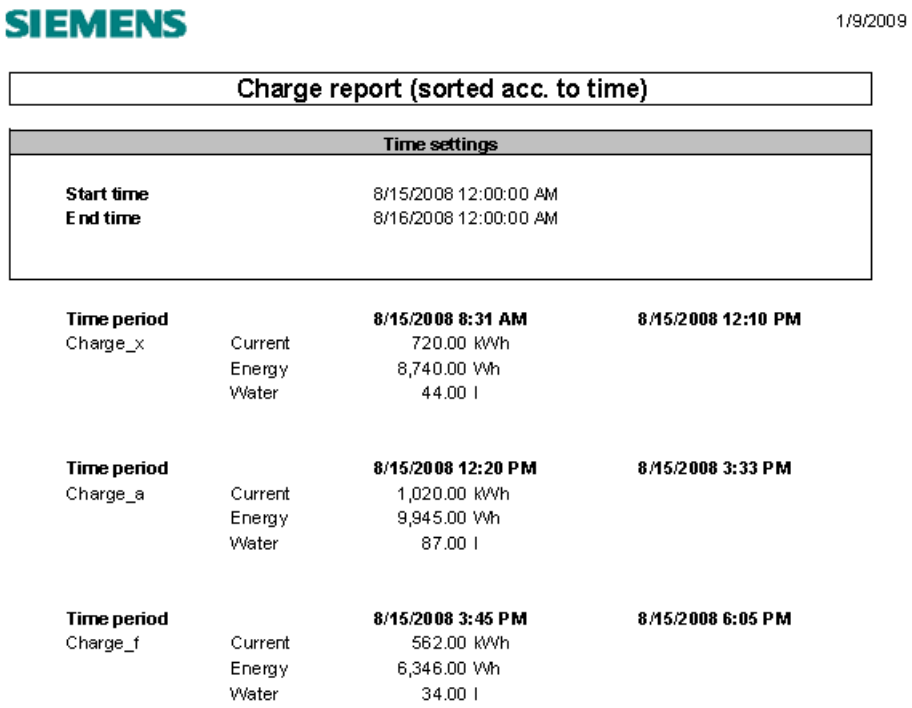
Charge report (sorted acc. to name)

Time settings

Start time 8/15/2008 12:00:00 AM
End time 8/16/2008 12:00:00 AM

From	To		Consumption
Charge_a			
8/15/2008 12:20 PM	8/15/2008 3:33 PM	Current	1,020.00 kWh
		Energy	9,945.00 Wh
		Water	87.00 l
Charge_f			
8/15/2008 3:45 PM	8/15/2008 6:05 PM	Current	562.00 kWh
		Energy	6,346.00 Wh
		Water	34.00 l
Charge_x			
8/15/2008 8:31 AM	8/15/2008 12:10 PM	Current	720.00 kWh
		Energy	8,740.00 Wh
		Water	44.00 l

"Batch report (name)" sheet



SIEMENS 1/9/2009

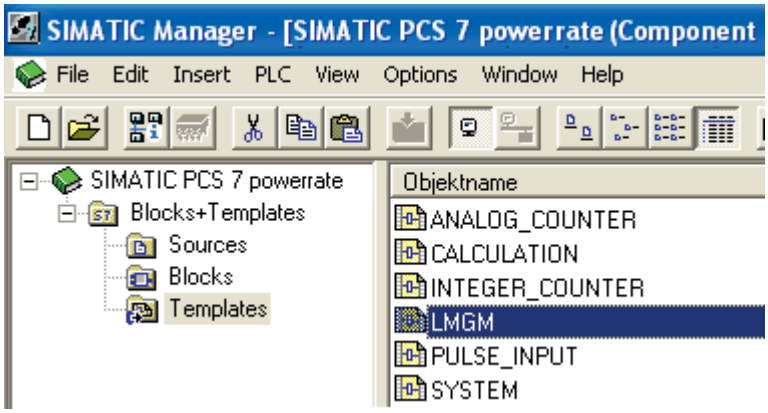
Charge report (sorted acc. to time)

Time settings	
Start time	8/15/2008 12:00:00 AM
End time	8/16/2008 12:00:00 AM

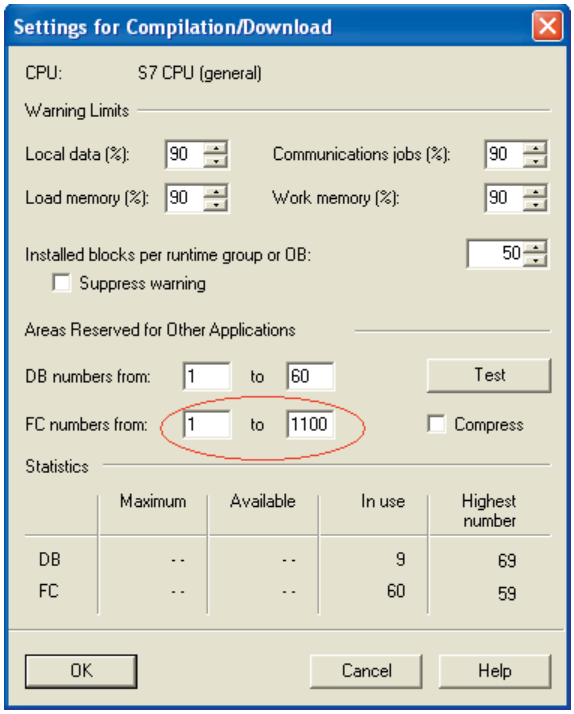
Time period		**8/15/2008 8:31 AM**	**8/15/2008 12:10 PM**
Charge_x	Current	720.00 kWh	
	Energy	8,740.00 Wh	
	Water	44.00 l	
Time period		**8/15/2008 12:20 PM**	**8/15/2008 3:33 PM**
Charge_a	Current	1,020.00 kWh	
	Energy	9,945.00 Wh	
	Water	87.00 l	
Time period		**8/15/2008 3:45 PM**	**8/15/2008 6:05 PM**
Charge_f	Current	562.00 kWh	
	Energy	6,346.00 Wh	
	Water	34.00 l	

A detailed description of powerrate Reports follows in "Configuring powerrate Reports (Page 145)".

The library contains pre-produced CFC templates, which can be used as templates. The CFC plans relevant in each case and the procedure for writing the program are described in the subsequent chapters.



Since blocks whose numbers are covered by the CFC by default are used, the settings for Compile/Download have to be adjusted in the CFC prior to compiling the program. These changes are carried out in the menu Options > Customize > Compile/Download.



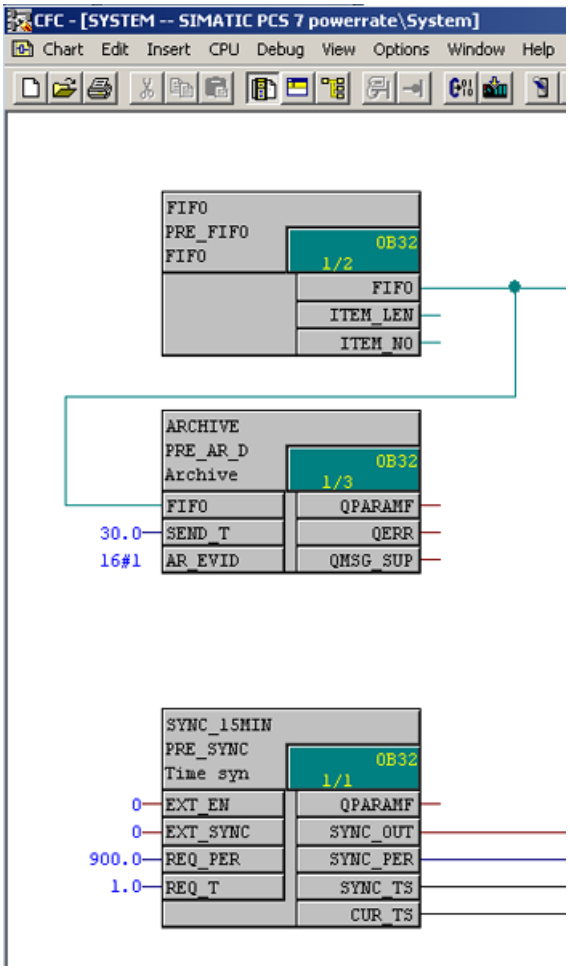
5.1 General settings

For correct archiving, use and calculation of times, the CPU time-of-day must be set to UTC time.

5.2 Configuring the process tags for recording energy/power

5.2.1 Creating the PLC program

The CFC chart "SYSTEM" contains on the first sheet the superordinate blocks that are responsible for time synchronization, data buffering and data archiving.



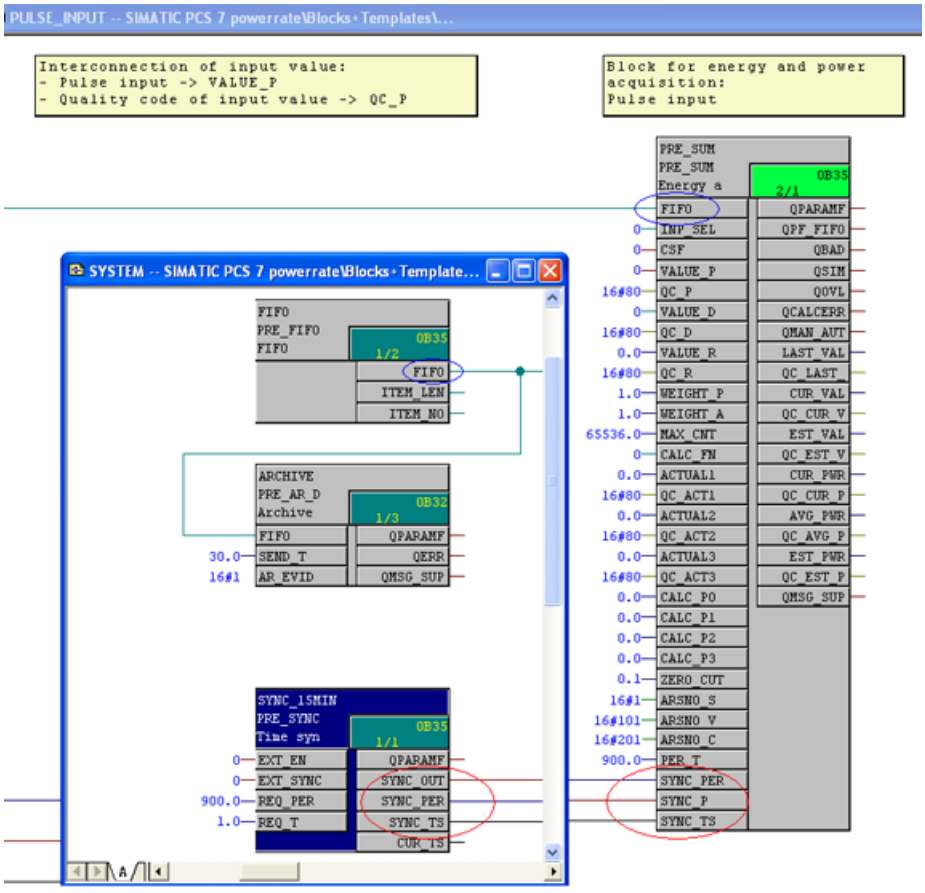
- Installation of PRE_SYNC block for different synchronization times
  - Parameterization of type of synchronization (internal/external)
  - Parameterization of synchronization periods
  - Parameterization of synchronization pulse periods
- Installation of PRE_FIFO_DATA block for FIFO buffer

- Installation of PRE_AR_DATA block for communication with WinCC Tag Logging archive
  - Connection with PRE_FIFO_DATA
  - Parameterization of the monitoring time for the send operation SEND_T:

    The monitoring time must be at least as long as the necessary power-up time of WinCC Runtime.

There is one CFC for each signal type:

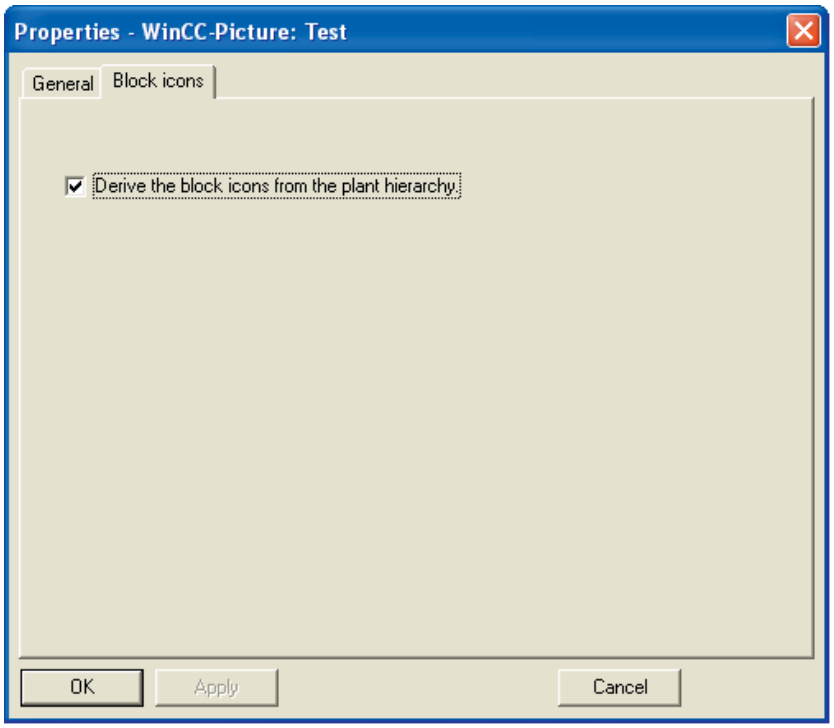
- Pulse input: PULSE_INPUT
- Integer counter: INTEGER_COUNTER
- Analog counter: ANALOG_COUNTER
- Calculation function: CALCULATION



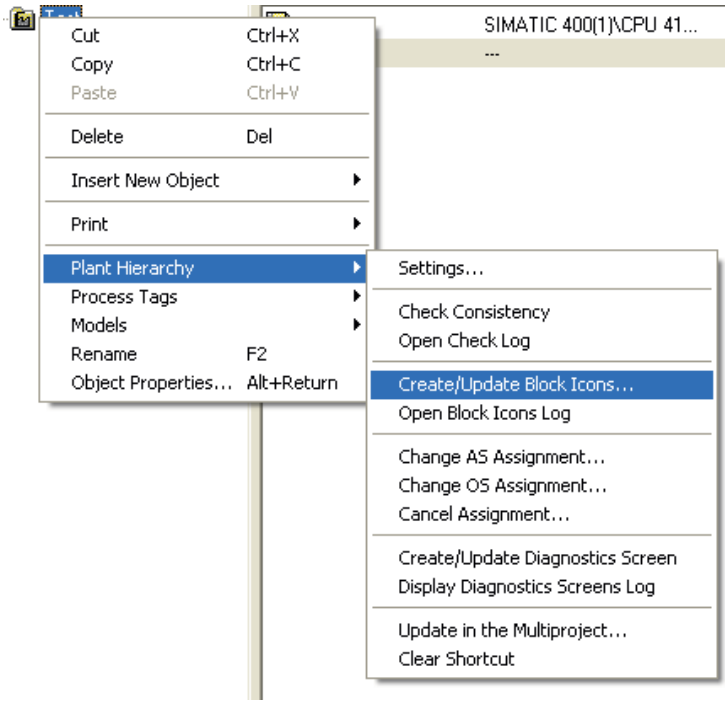
- Installation of PRE_SUM block for measuring point
  - Connection with measured value
  - Connection with PRE_SYNC block
  - Connection with PRE_FIFO_DATA
  - Parameterization of signal type/calculation parameter
  - Parameterization of subnumbers of archive tags

5.2.2 Connection to WinCC

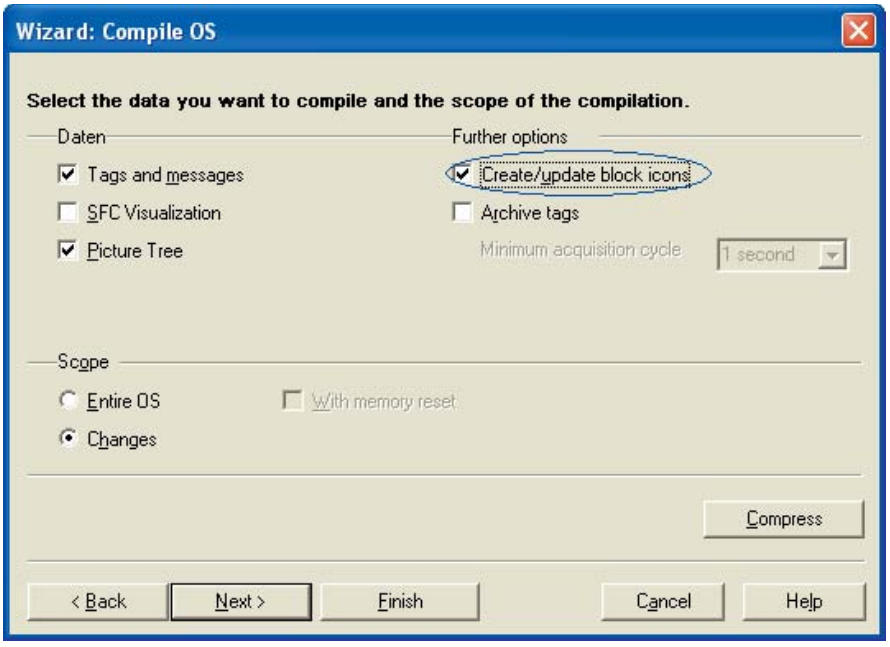
- The "Create/Update Block Icons" function
  - In the properties dialog box of the WinCC display, select "Derive the block icons from the plant hierarchy", and then generate the block icons manually or automatically



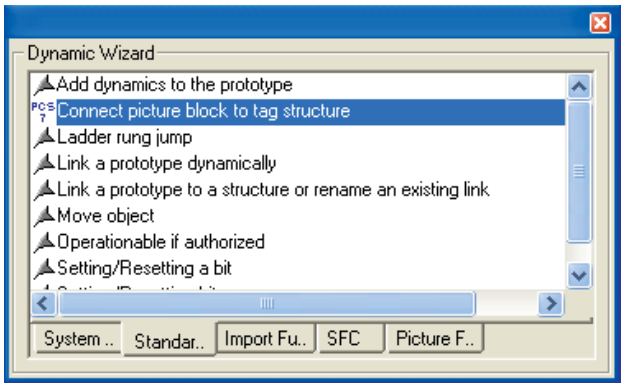
– Manually create/update in the SIMATIC Manager/Plant view by selecting the plant folder, menu Plant Hierarchy, then Create/Update Block Icons or



– Automatically create/update when compiling the OS

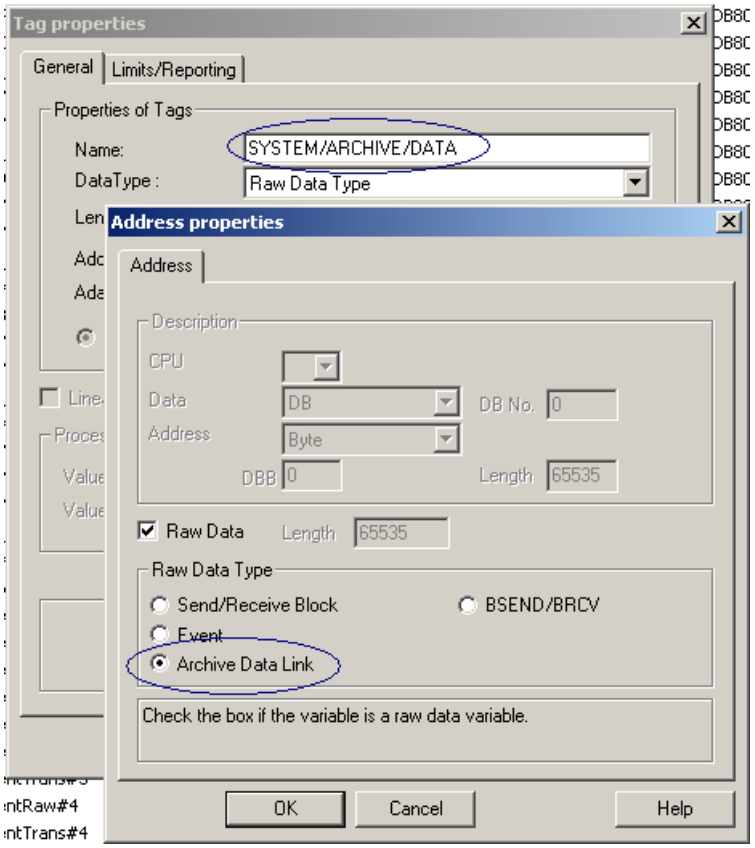


- Manually copy the user object from file @Template_PRE.pdl to process display and run the "Connect picture block to tag structure" Dynamic Wizard

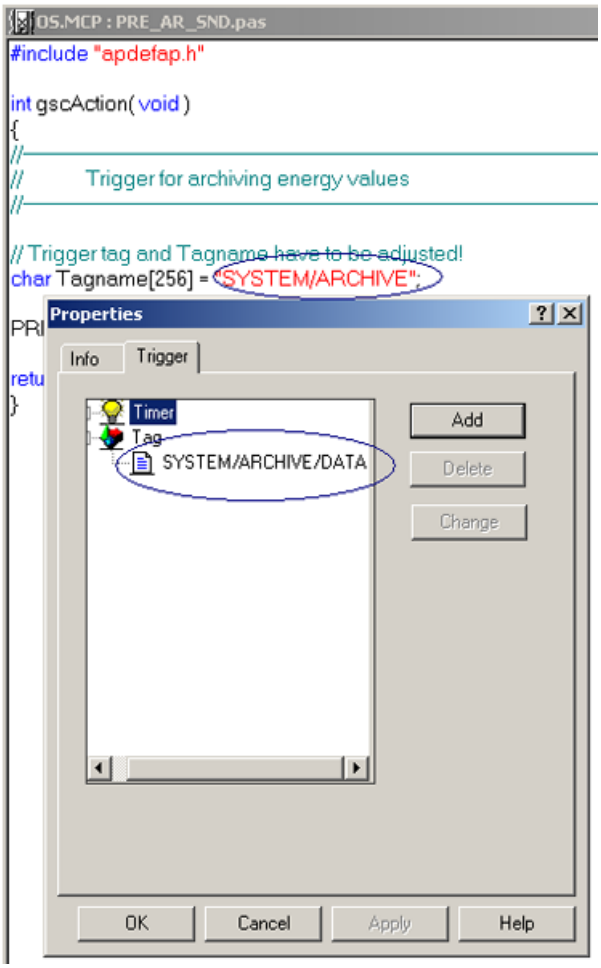


- Creation of one raw data variable per PRE_AR_DATA block for archiving in WinCC tag management with
  - the following tag name structure:

    WinCC tag name of the block PRE_AR_DATA + Suffix "/DATA"
  - of the type Archive Data Link



- Create C action for acknowledging the archiving:
  - Copy C action PRE_AR_SND.pas from the folder \WinCC\powerrate\archives to Projectdirectory\computer name\PAS of the project (for multi-user systems of the server project)
  - Adapt tag trigger to raw data variable for archiving
  - Adapt the tag connection in the C script to the tag name of the PRE_AR_DATA block

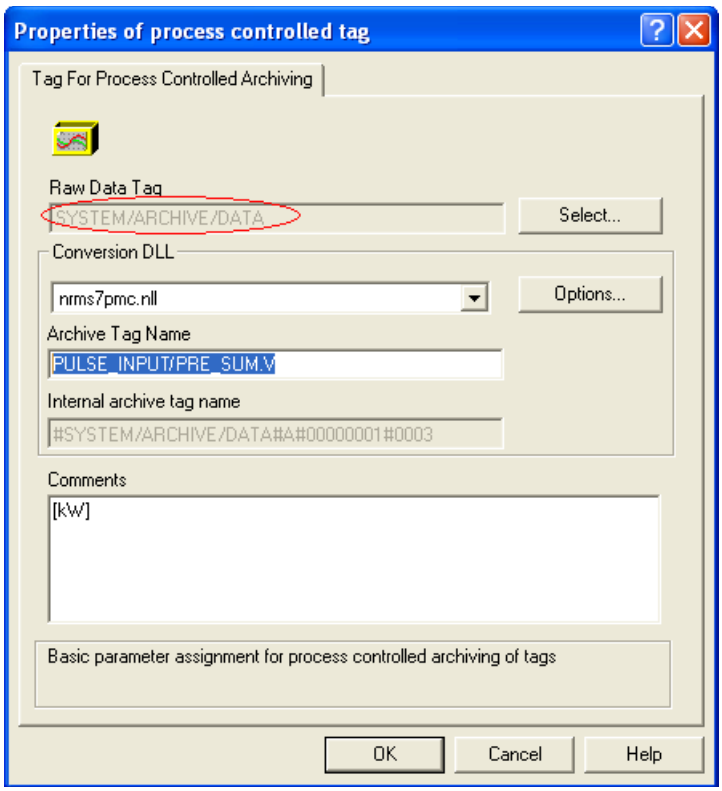


5.2.3 Configuring the process value archive

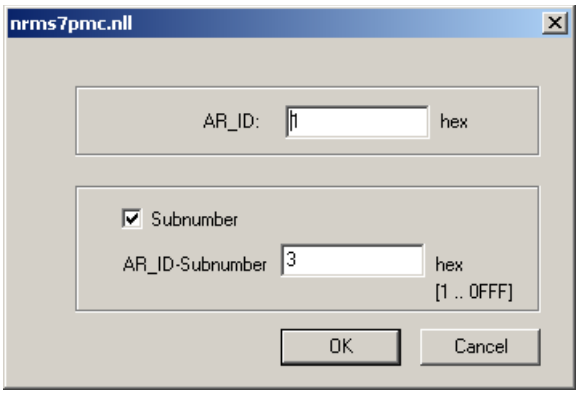
- Create a process value archive with the name pre
- Create two or three process-controlled archive tags for the PRE_SUM block
  - Assignment of the raw data variable of the associated block for archiving PRE_AR_DATA
  - The names of the archive tags have the following structure:

- Accumulated work value (LAST_VAL): tagname.S
- Average power value (CUR_PWR): tagname.V
- Absolute counter value (VALUE_D / VALUE_R) optional tagname.C

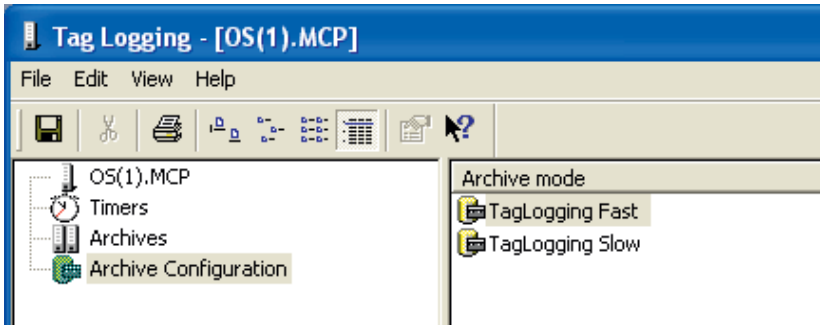
- tagname matches the tag name of the PRE_SUM block.
  - The names of the archive tags have to be unique throughout the project.
  - Enter the unit in [] in the comments box (e.g. [kWh])



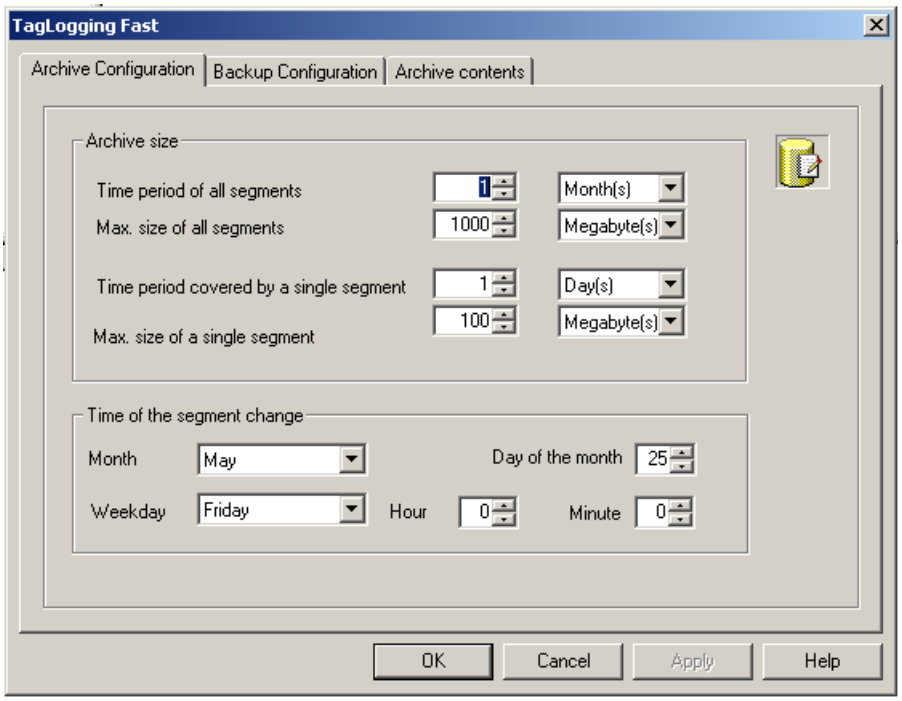
– Parameterization of AR_ID with AR_EVID parameter of associated PRE_AR_DATA archiving block
– Parameterization of subnumbers with parameters ARSNO_S (for work value) and ARSNO_V (for average power value) and ARSNO_C (for the absolute counter value, if available) of the associated energy recording block PRE_SUM



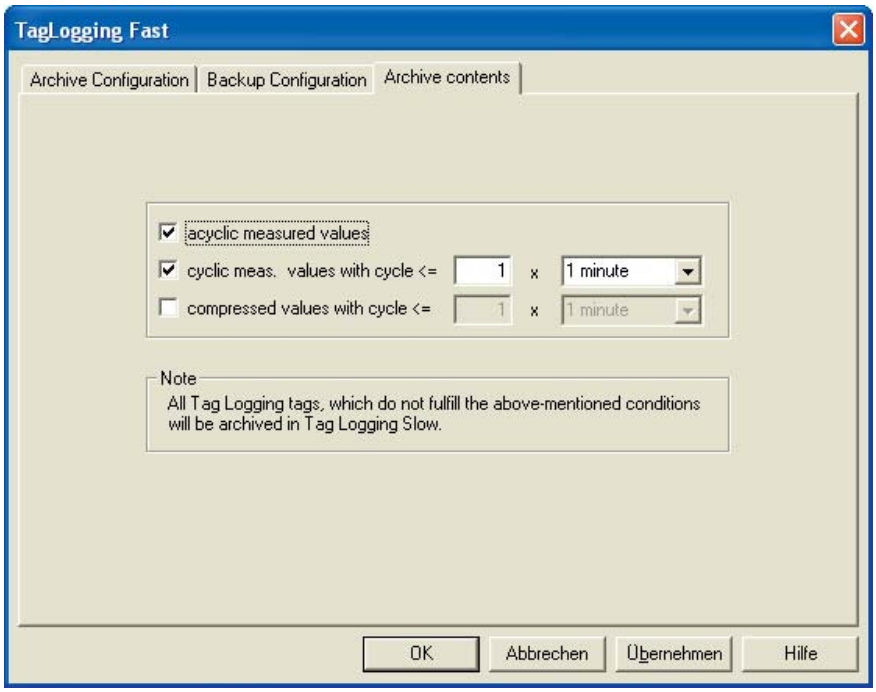
- Configuration of Tag Logging Fast:



Process-controlled archive tags are saved by WinCC in Tag Logging Fast. When configuring Tag Logging Fast it has to be taken into account that the application only accesses the runtime archive and archives which have not been swapped out.



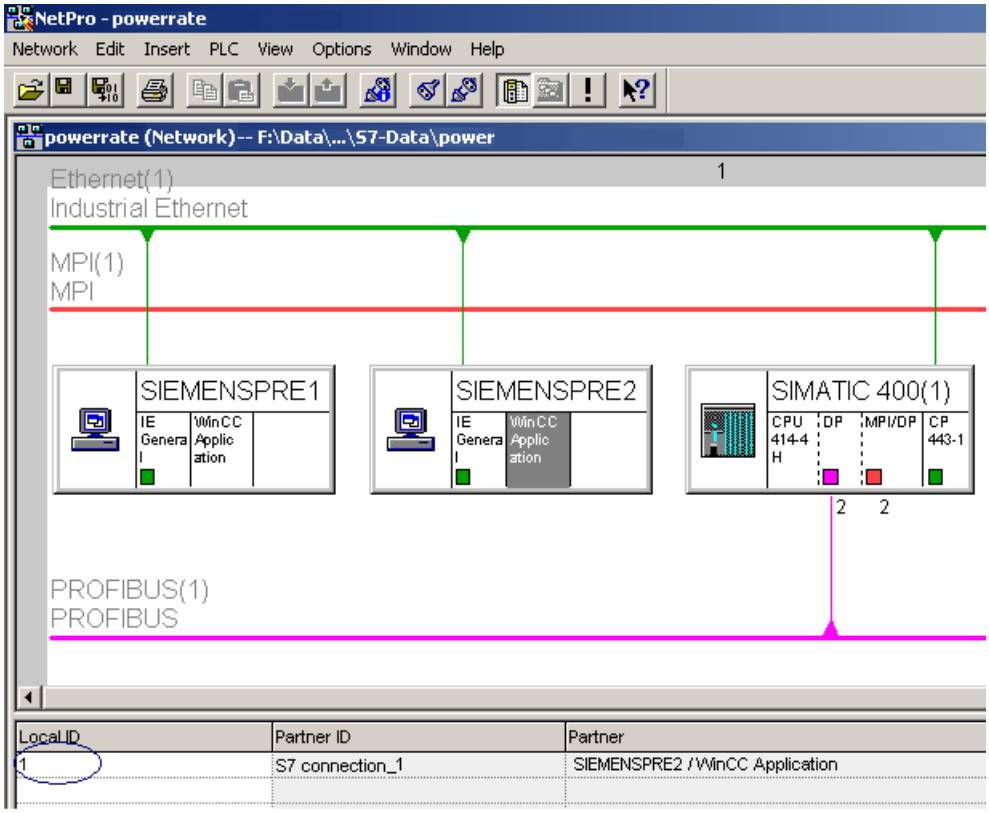
The memory requirement of a process-controlled archive tag depends on the archiving cycle. For a 15-minute archiving cycle, it is approx. 1 MB per year for one archive tag.



5.3 Configuring communication with WinCC user archives

5.3.1 Configuring the connection in NETPRO

Communication with the WinCC user archives is implemented via BSEND / BRCV. For this, a connection must be configured in NETPRO for each WinCC server. The same connection must be used here as when compiling the OS.

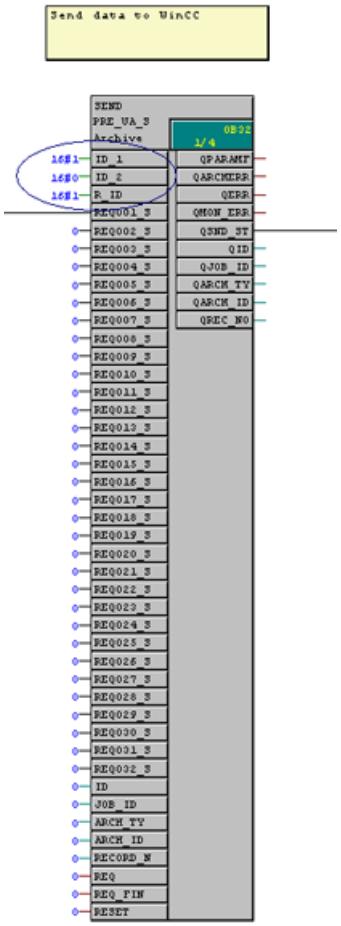


The marked ID is written to the parameters ID_1 / ID_2 of the archive manager block PRE_UA_S and PRE_UA_R.

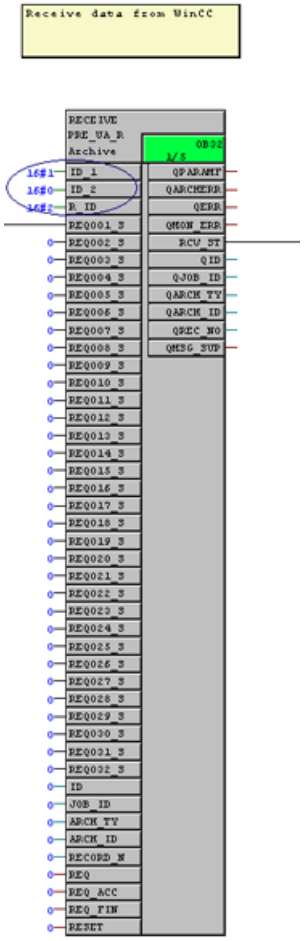
5.3.2 Creating the PLC program

The CFC chart "SYSTEM" contains on the second sheet the call of the PRE_UA_S block (archive manager for writing), and on the third sheet, the call of the PRE_UA_R block (archive manager for reading).

- Integration of the PRE_UA_S block for communication with WinCC in the write direction
  - Parameterization of the connection IDs ID_1 / ID_2 (ID_2 only has to be parameterized when using redundant WinCC servers) with the local ID of the connection created in NETPRO (see figure in "Configuring the connection in NETPRO (Page 133)")
  - Parameterization of the request ID R_ID (unique ID for identifying the communication job)



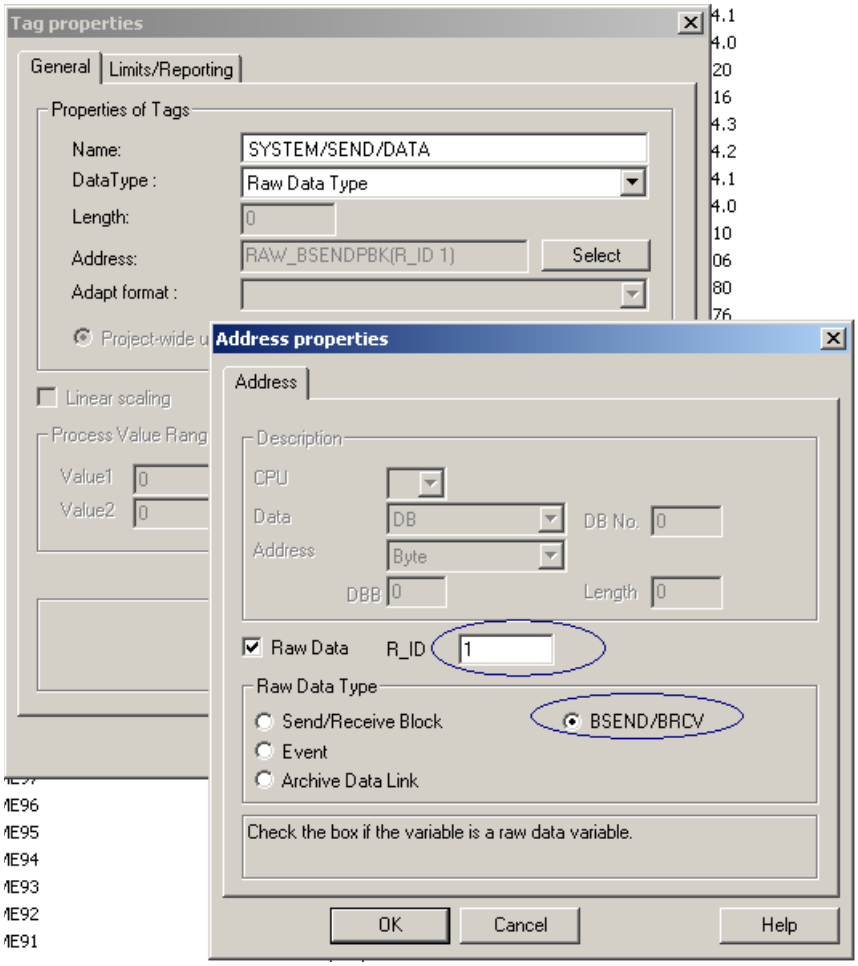
- Integration of the PRE_UA_R block for communication with WinCC in the read direction
  - Parameterization of the connection IDs ID_1 / ID_2 (ID_2 only has to be parameterized when using redundant WinCC servers) with the local ID of the connection created in NETPRO (see figure in "Configuring the connection in NETPRO (Page 133)")
  - Parameterization of the request ID R_ID (unique ID for identifying the communication job)



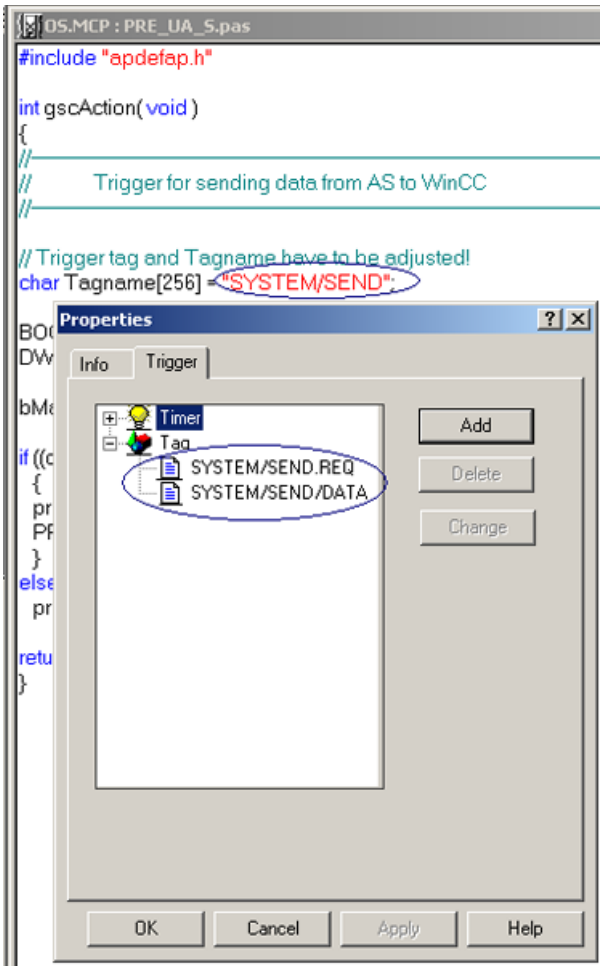
5.3.3 Configuring communication in WinCC

- Creation of one raw data variable per archive manager block PRE_UA_S / PRE_UA_R in WinCC tag management for the configured connection with
  - the following tag name structure:

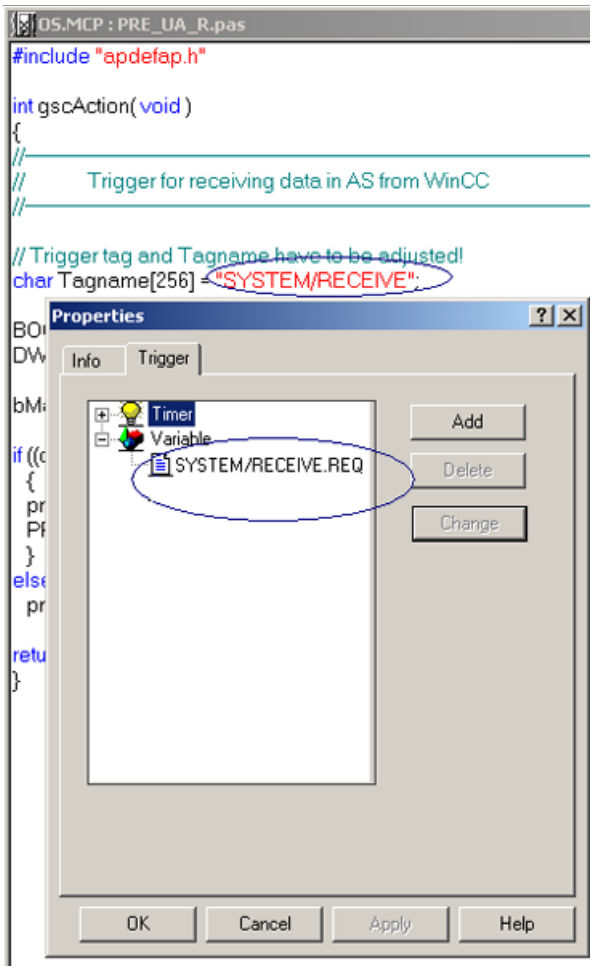
  WinCC tag name of the archive manager block PRE_UA_S / PRE_UA_R + suffix "/DATA"
  - of the type BSEND / BRCV
  - R_ID of the associated archive manager block PRE_UA_S / PRE_UA_R (see "Creating the AS program (Page 134)")



- Creation of one C action per archive manager block PRE_UA_S
  - Copy C action PRE_UA_S.pas from the folder \WinCC\powerrate\archives to Projectdirectory\computer name\PAS of the server project
  - Adapt tag connection to tag name of the archive manager block PRE_UA_S
  - Adapt tag trigger to associated raw data variable and the .REQ tag



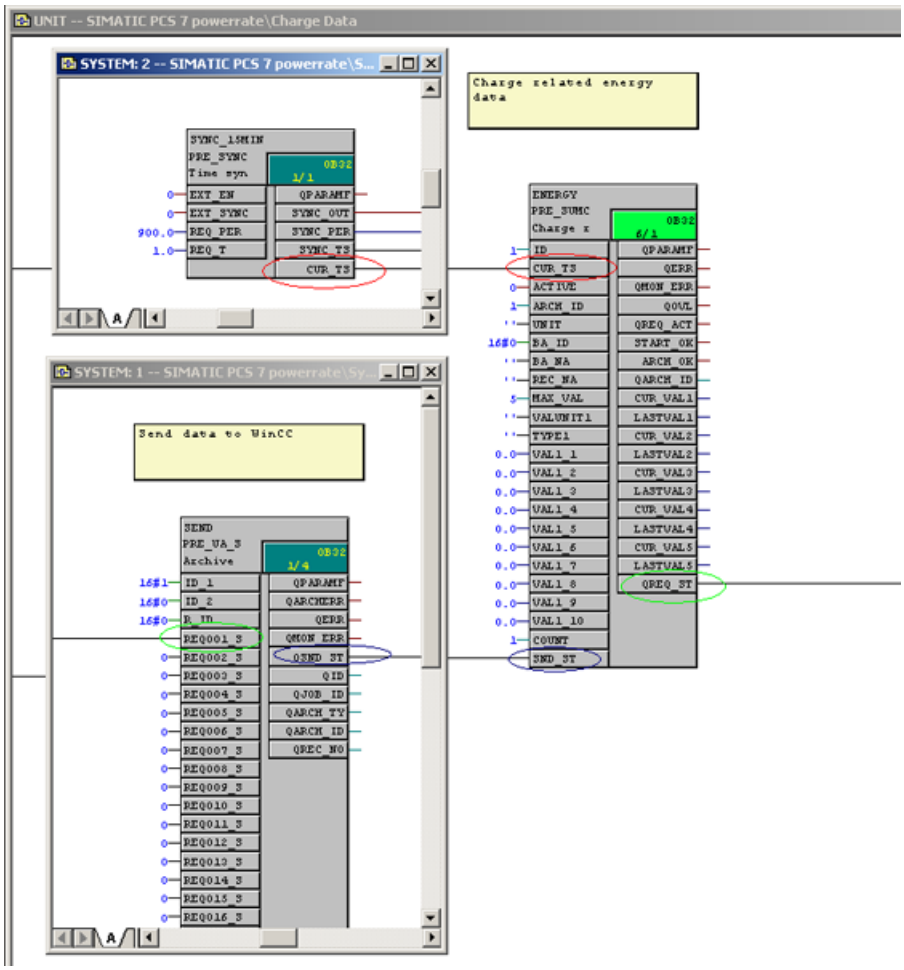
- Creation of one C action per archive manager block PRE_UA_R
  - Copy C action PRE_UA_R.pas from the folder \WinCC\powerrate\archives to Projectdirectory\computer name\PAS of the server project
  - Adapt tag connection to tag name of the archive manager block PRE_UA_R
  - Adapt tag trigger to REQ tag



5.4 Configuring batch data

5.4.1 Creating the PLC program

The CFC chart "UNIT" contains the call of the PRE_SUMC block that collects the data for batch-related energy recording, combines that data for archiving in the WinCC user archive, and forwards it.



- Integration of the PRE_SUMC block for batch-related energy acquisition
  - Interconnection of the CUR_TS input with the CUR_TS output of the PRE_SYNC block
  - Interconnection of the SND_ST input structure with the QSND_ST output structure of the PRE_UA_S block (archive manager for writing)
  - Interconnection of the QREQ_ST output structure with a REQx_ST input structure of the PRE_UA_S block (archive manager for writing)
  - Parameterization of the ID (unique identifier of the block)
  - Parameterization of the ARCH_ID (archive ID)

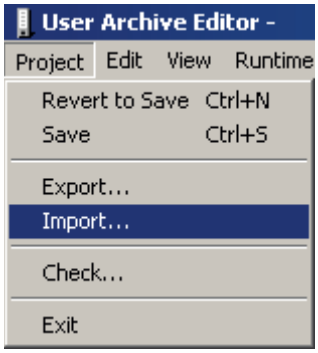
– Parameterization/interconnection of the parameters UNIT, BA_ID, BA_NA and REC_NA for the batch data
– Parameterization/interconnection of the parameters VALUNITx, TYPEx, VALx_y

5.4.2 Configuring the user archive in WinCC

Configuration files are provided for the user archives. The batch-related energy data can be stored in these files.

The files are located in the installation directory of WinCC in the powerrate\Config folder. Different files are available for English and German. Only one language can be used.

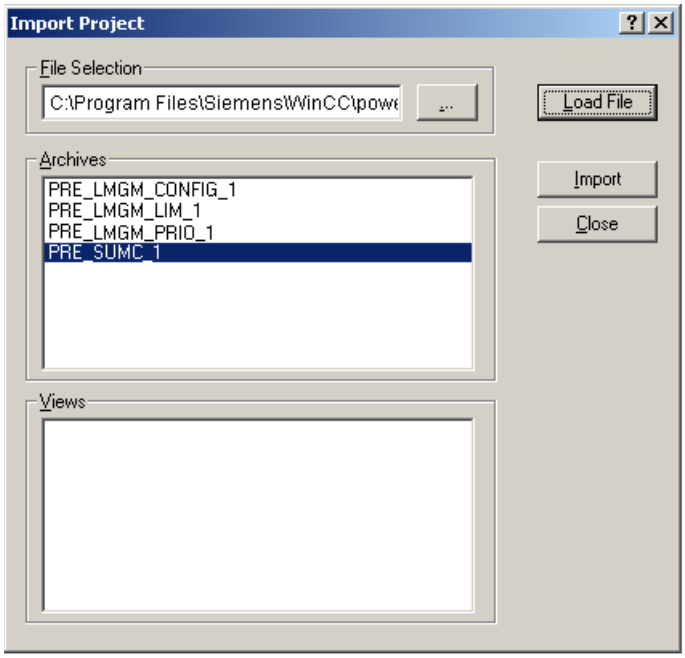
- Importing the configuration



Please use the following files:

German: UserArchiveKonfigurationDeutsch.uap

English: UserArchiveConfigurationEnglish.uap



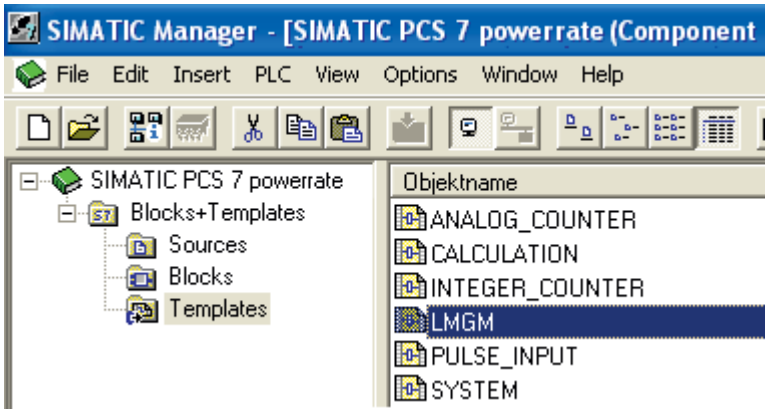
A user archive is created:

– PRE_SUMC_1: user archive with batch-related energy data (1 corresponds to the archive ID (ARCH_ID parameter in the PRE_SUMC block, can be changed)

5.5 Configuring load management

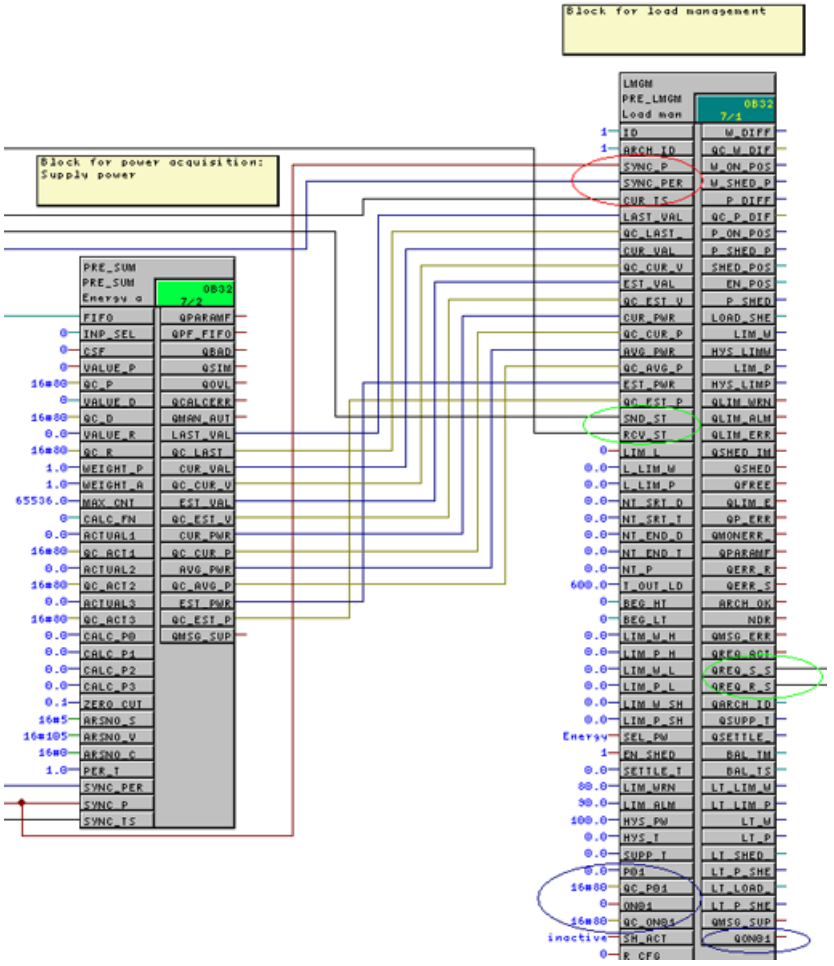
5.5.1 Creating the PLC program

The library contains a pre-produced "LMGM" CFC template, which can be used as a template. The CFC plans and the procedure for writing the load management program are provided below.



- Installation of PRE_LMGM block for load management
  - Connection of CUR_VAL, CUR_PWR, EST_VAL, EST_PWR, LAST_VAL, AVG_PWR with PRE_SUM block for supply
  - Connection with PRE_SYNC block
  - Connection of load inputs with status (ONx)/power (Px), if these are present
  - Connection of load release signal outputs (QONx) with load's switching logic
  - Interconnection of the SND_ST input structure with the QSND_ST output structure of the PRE_UA_S block (archive manager for writing)
  - Interconnection of the QREQ_S_ST output structure with a REQx_ST input structure of the PRE_UA_S block (archive manager for writing)
  - Interconnection of the RCV_ST input structure with the QRCV_ST output structure of the PRE_UA_R block (archive manager for reading)
  - Interconnection of the QREQ_R_ST output structure with a REQx_ST input structure of the PRE_UA_R block (archive manager for reading)
  - Parameterization of the ID (unique identifier of the block)
  - Parameterization of the ARCH_ID. . The ARCH_ID determines the number of the user archive in WinCC in which the data of the block instance is stored. Each block instance must be assigned a unique ARCH_ID.

In the example, a PRE_SUM block is available in the "LMGM" CFC for acquiring the supply power. This block can also be installed in a separate CFC plan.



5.5.2 Connection to WinCC

See "Connection to WinCC (Page 126)"

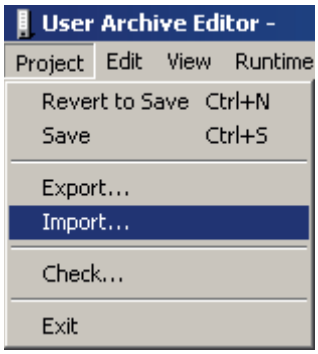
Loads and limits are parameterized in WinCC (see "Description of icon and faceplate (Page 55)").

5.5.3 Configuring the user archives in WinCC

Configuration files are provided for the user archives required by load management.

The files are located in the WinCCinstallation directory, in the powerrate\Config folder, and are available in English and German. Only one language can be used.

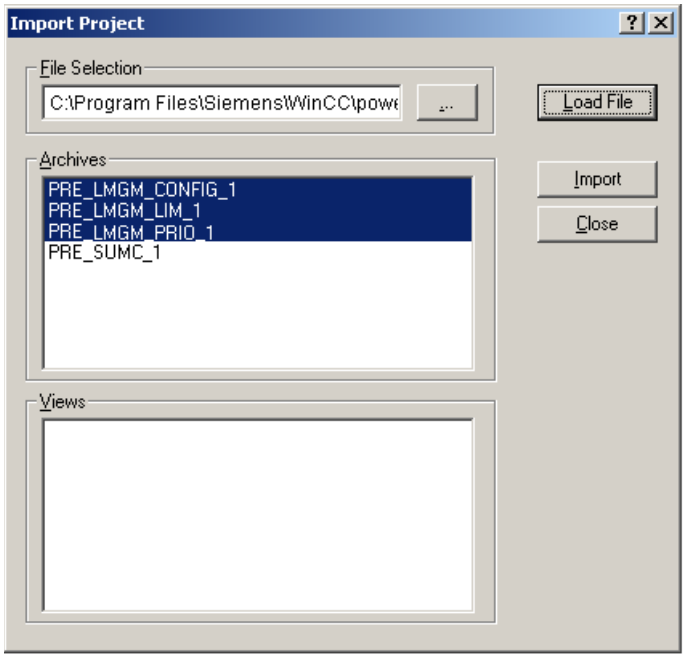
- Importing the configuration



Please use the following files:

German: UserArchiveKonfigurationDeutsch.uap

English: UserArchiveConfigurationEnglish.uap



Three user archives are created:

– PRE_LMGM_CONFIG_1: List of previous configurations

– PRE_LMGM_PRIO_1: Priority list

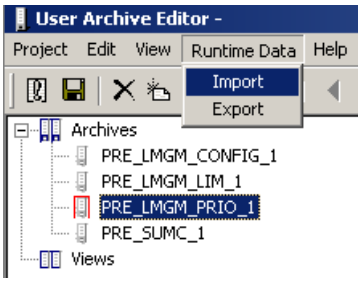
– PRE_LMGM_LIM_1: Limit violations

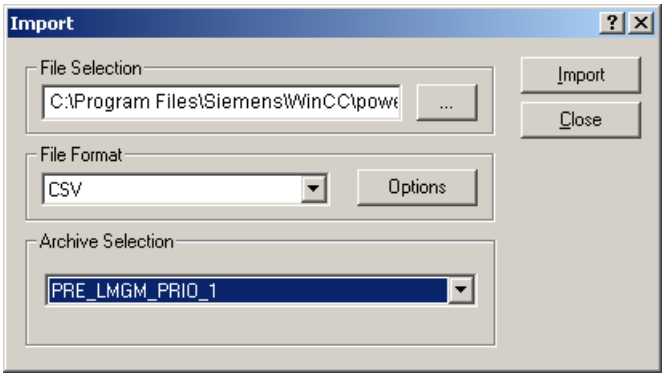
  (1 corresponds to the archive ID (ARCH_ID parameter in the PRE_LMGM block, can be changed)

- Importing runtime data for making priority list default settings

  A file (PRE_LMGM_PRIO_Deutsch.csv / PRE_LMGM_PRIO_English) containing archive default settings is provided for the PRE_LMGM_PRIO_1 archive.

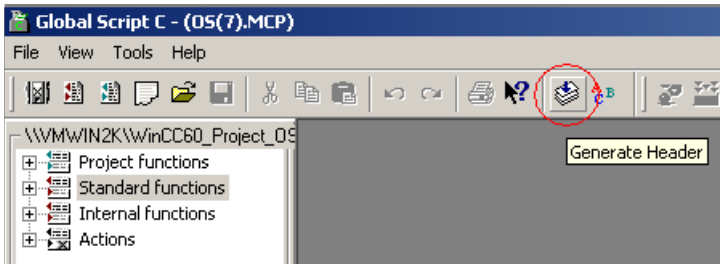
  This file can be edited in Excel, if desired, then imported.





5.6 Configuring the Web Navigator

- Adaptation of all WinCC projects (server and client projects) for use on the Web Navigator:
  - Moving the C functions from the folder \WinCC\aplib\powerrate to Projectdirectory\library
  - Generation of header files in the global script editor



- Installation of the powerrate Web plug-in on the Web client

5.7 Configuring powerrate Reports

The detailed description of configuring powerrate Reports contains the following:

- Calling powerrate Reports
- General configurations
- Configuration of the reports
- Configuration of the times

5.7.1 Calling powerrate Reports

There are two methods of starting powerrate Reports.

- Calling via the Start menu via SIMATIC > powerrate > Reports or
- using a button in WinCC. This button is found on the @Template_pre.pdl template display. It must be incorporated in a display on the computer on which the application has been installed.

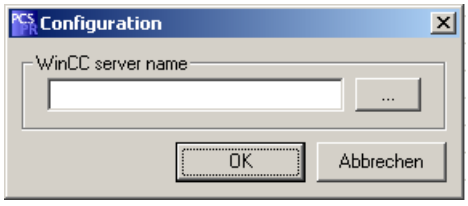
- Incorporating call button in process display
- Pressing the button

A check is made to determine whether or not powerrate is installed. If this is not the case, an error message appears.

5.7.2 General configurations

5.7.2.1 Configuring the server name

On first opening powerrate Reports from the start menu, the computer name of the WinCC server must be entered. The name of the WinCC server can be changed using the menu item Settings > WinCC Server.



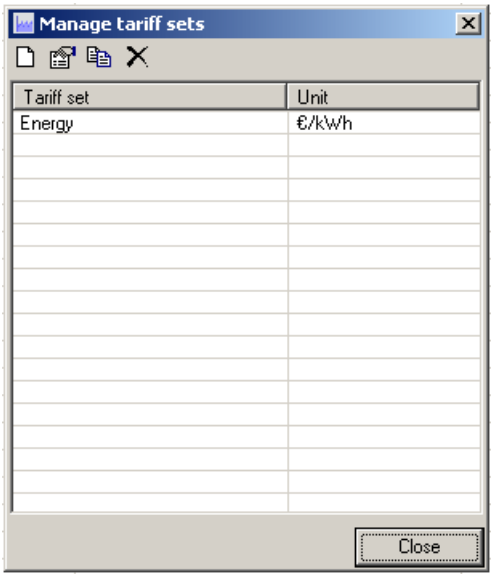
When opening powerrate Reports from WinCC, the computer name of the server is automatically transferred to the application and does not have to be configured.

If a connection to the database of a WinCC project cannot be established, or if there is no license for powerrate on the WinCC server, an error message appears.

5.7.2.2 Configuring tariffs

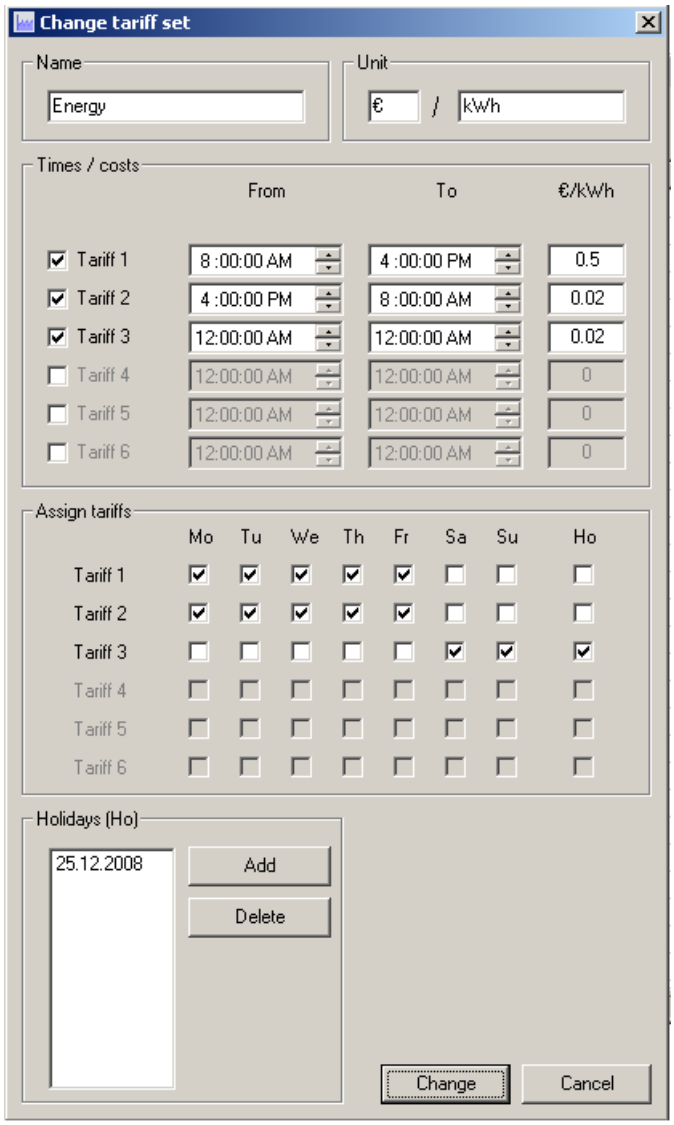
To calculate costs when creating cost center reports, different tariffs can be defined that are each assigned to a physical variable. The tariffs are assigned to the cost center report when they are created (see "Cost center report (Page 150)" in "Reports for energy analyses").

They are defined using the menu item Settings > Tariffs.



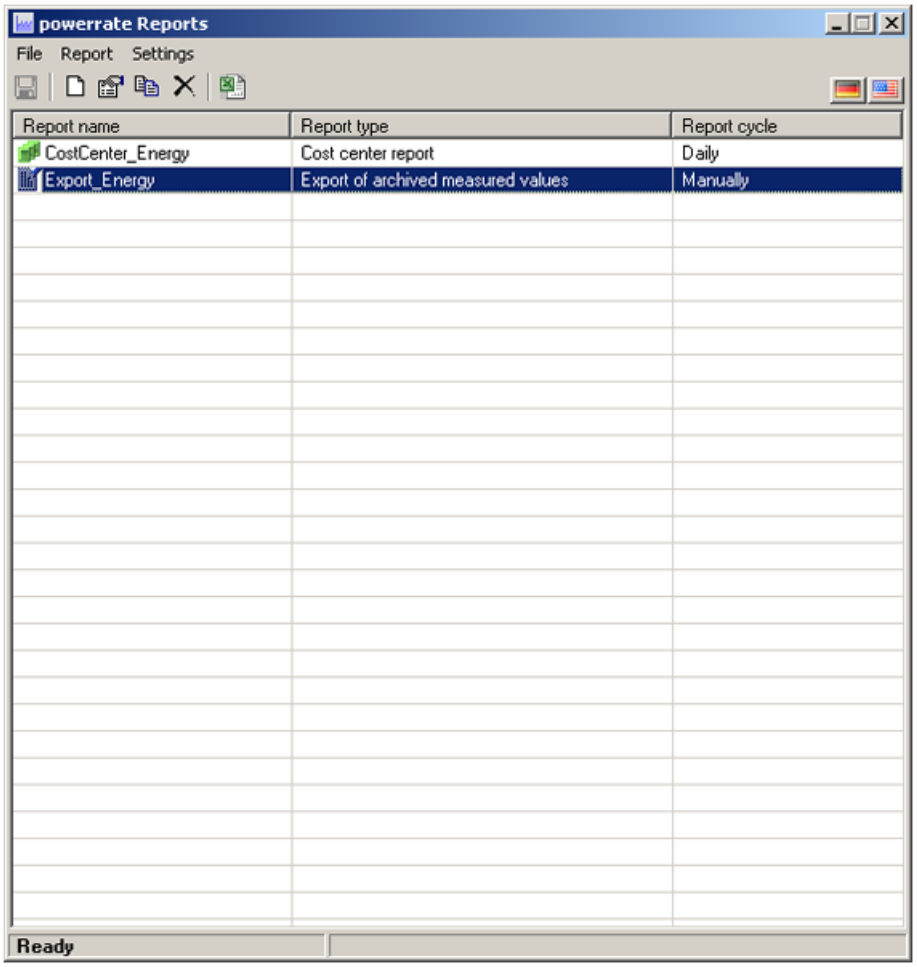
A maximum of 6 tariffs can be defined. These can be assigned to a time-of-day and to weekdays/holidays. Only whole hours can be entered for time specifications.

You must ensure that the times of the defined tariffs have no gaps or overlaps.



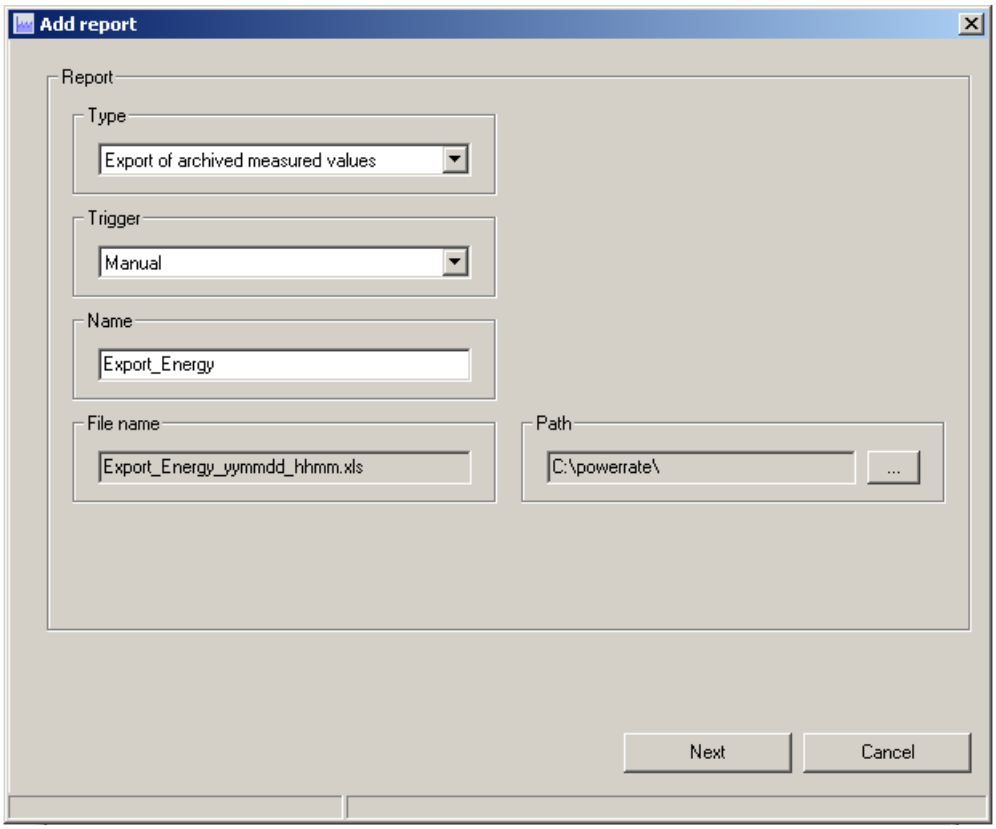
5.7.3 Configuration of the reports

Manual and automatic reports can be created in the start window of powerrate Reports.



The report wizard is started using the menu item Report > Add.

The type, method of creation (manual/automatic), name, and storage location of the report are defined in the first window.



Automatic reports can only be generated on a WinCC computer (client or server).

Note

Automatic reports are initiated using C actions. To prevent the C actions from being deleted when loading the OS, they must be copied to the relevant WinCC project on the ES.

Note

After creating or changing automatic reports, the new C actions must be compiled and saved in the Global Script Editor so that they can be activated.

When continuing the wizard, different data content will be offered for selection for reporting purposes, depending on the type of report.

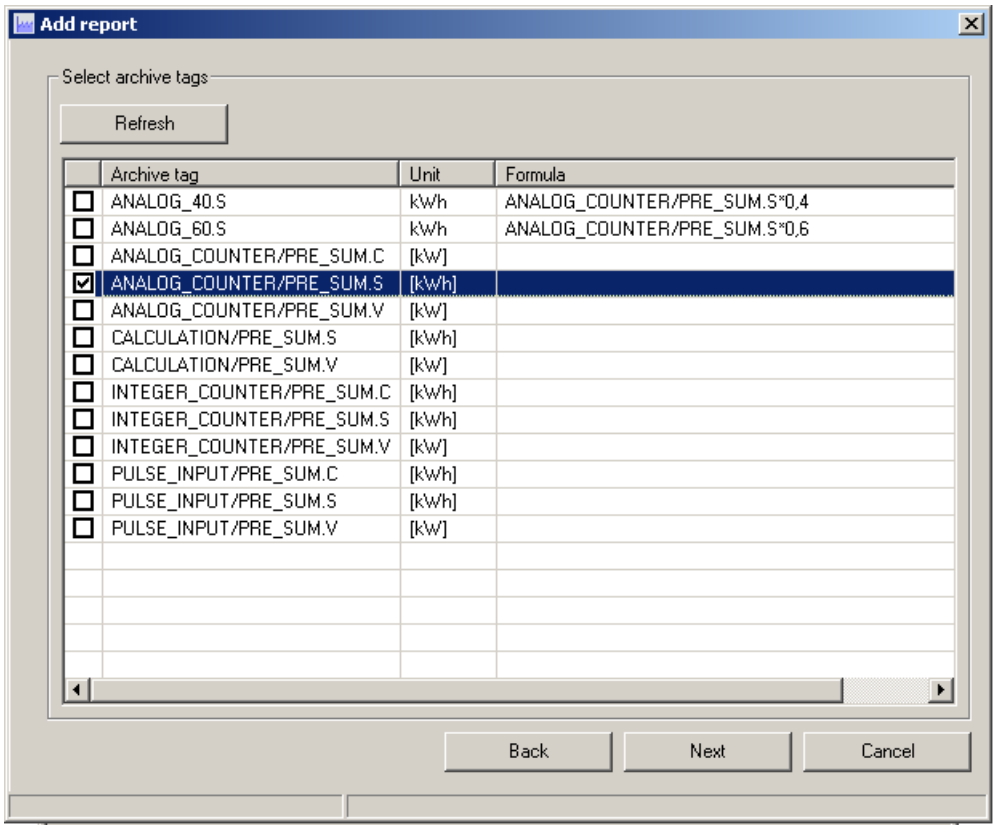
For reports that are generated, the template file pre_Reports.xlt is available in the directory \Siemens\powerrate\bin\config. This file can be edited with standard Excel resources and adapted without any problem to existing requirements .

Note:

- Assignment of the cells within the report is fixed.

5.7.3.1 Reports for energy analyses

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



The archive tags for which the type of report selected is meaningful are offered for reading out.

The following types of archive tags are analyzed:

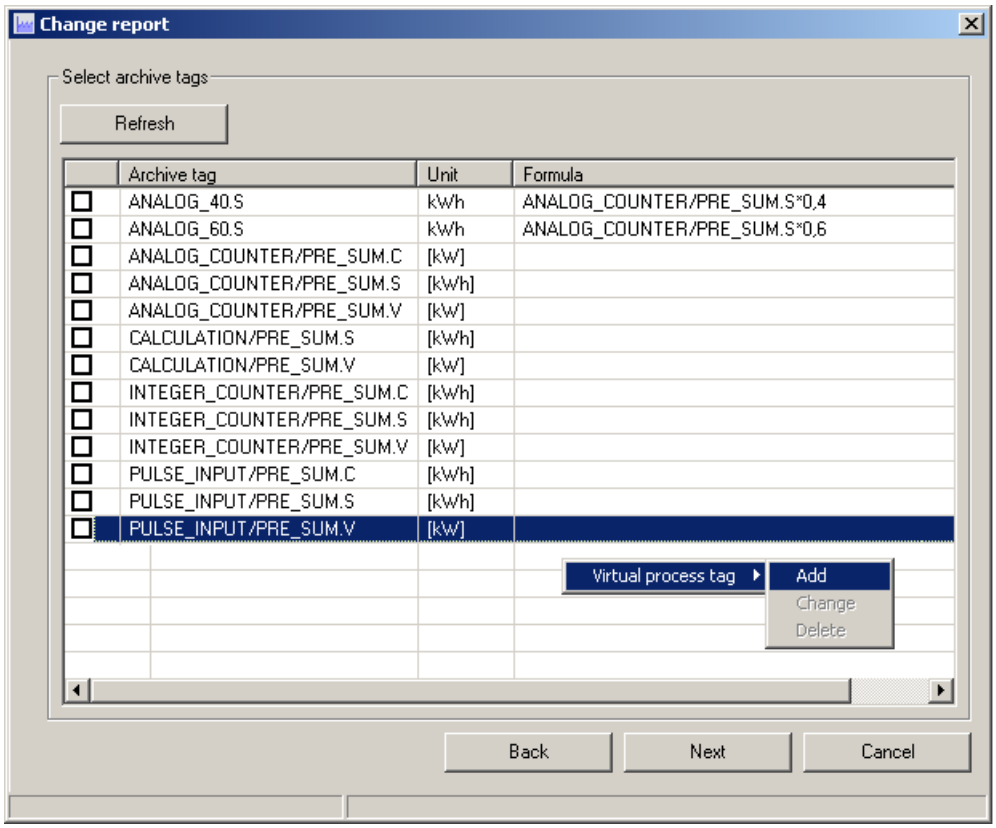
Archive tag name extension	Meaning
.C	Absolute counter value
.S	Energy value
.V	Power demand

The archive tags can be read out of the WinCC Tag Logging archive again using the update button.

Virtual process tags

For energy analyses, formulas can also be edited for the archived tags. These formulas can be used, for example, for converting the unit, or for distributing the energy value across different cost centers.

A tag is created by right-clicking on the form and selecting Virtual process tag > Add.

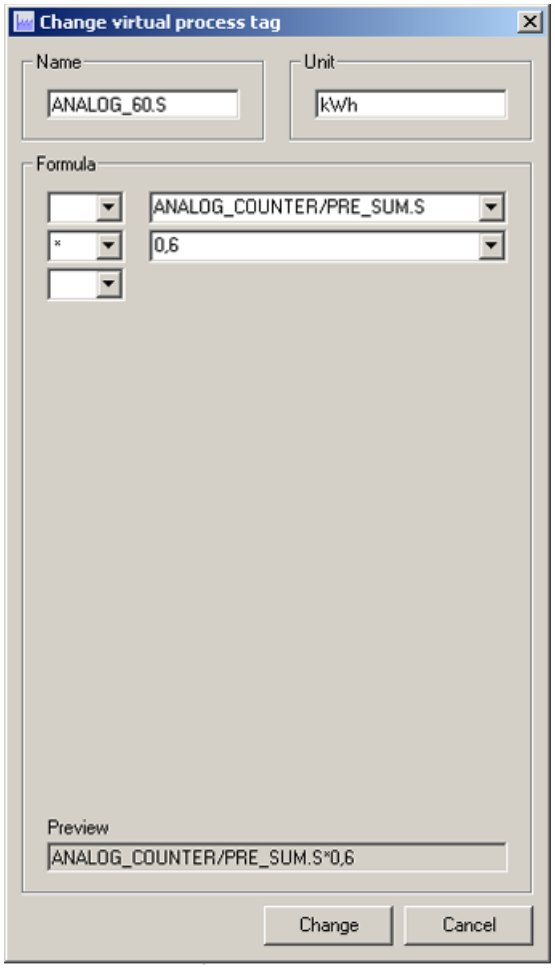


A screen form appears in which the name, unit and calculation formula for the virtual process tag can be entered.

In the formula, the existing archive tags can be selected in the combobox for the operands.

When naming the virtual process tags, you must note that depending on the value, the extensions ".C", ".S" and ".V" must be used so that they can be correctly taken into account in the different report types (see above and the descriptions of the different report types).

The formula entered is displayed in the preview field as a support.



An incorrect formula will be rejected at transfer.

Export of archived measured values

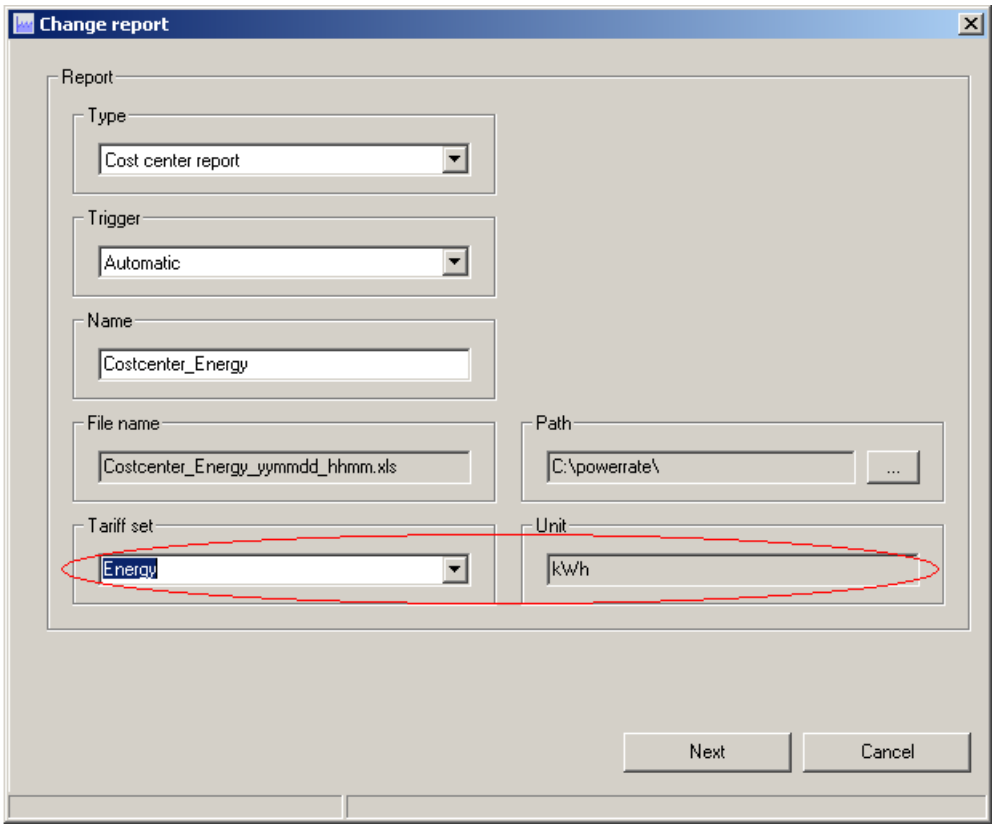
All archive tags stored in the WinCC Tag Logging pre archive are offered for exporting archived measured values.

Cost center report

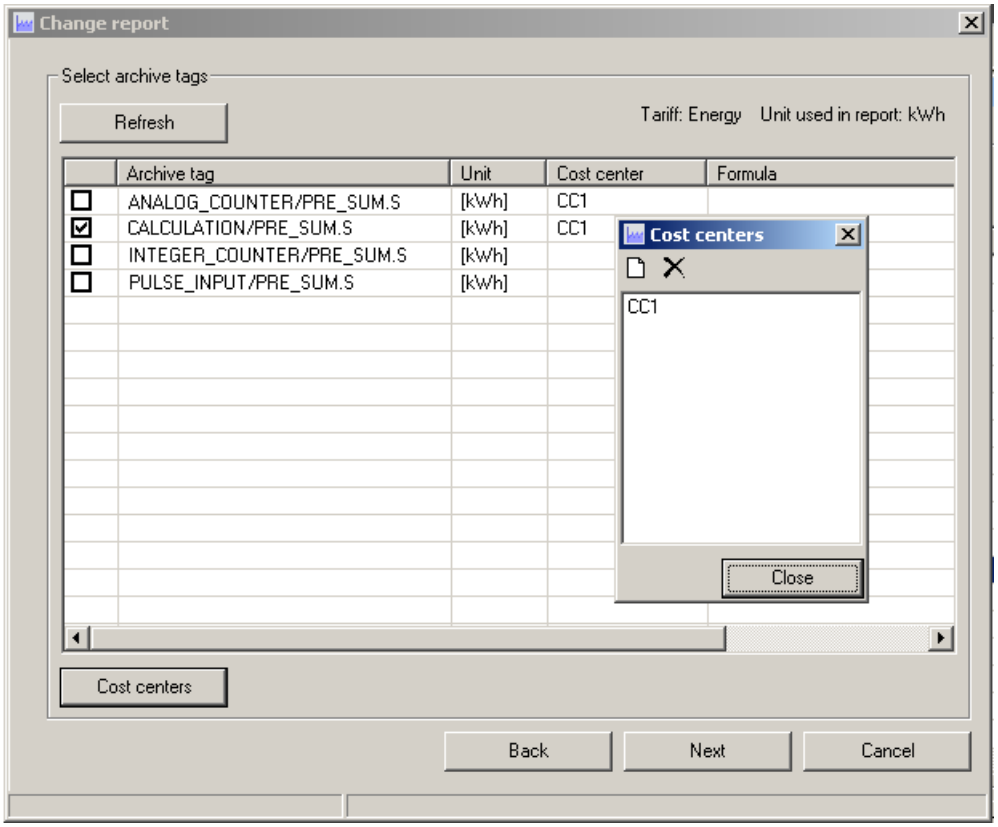
The cost center report only takes energy values into account. The application identifies such values by the ".S" extension added to the archive tag name.

The following configurations and settings must be made:

- Definition and assignment of a tariff (see "Configuring tariffs (Page 146)"). The tariff also defines the unit for the energy values to be analyzed.



- Definition of virtual process tags, if relevant (see "Virtual process tags (Page 150)" in "Reports for energy analyses")
- Definition of cost centers



Note

The cost centers are not present in the WinCC data storage.

- Assignment of the cost centers to the archive tags (right-click on the archive tag and select the cost center with "Assign cost center")

  Tags which are not assigned to a cost center are not taken into account in the report.

  Since in the case of virtual process tags the archive tags used in the formula must also be read, these archive tags must not be assigned a cost center if they are not to appear in the report.
- Selection of the archive tags for reading

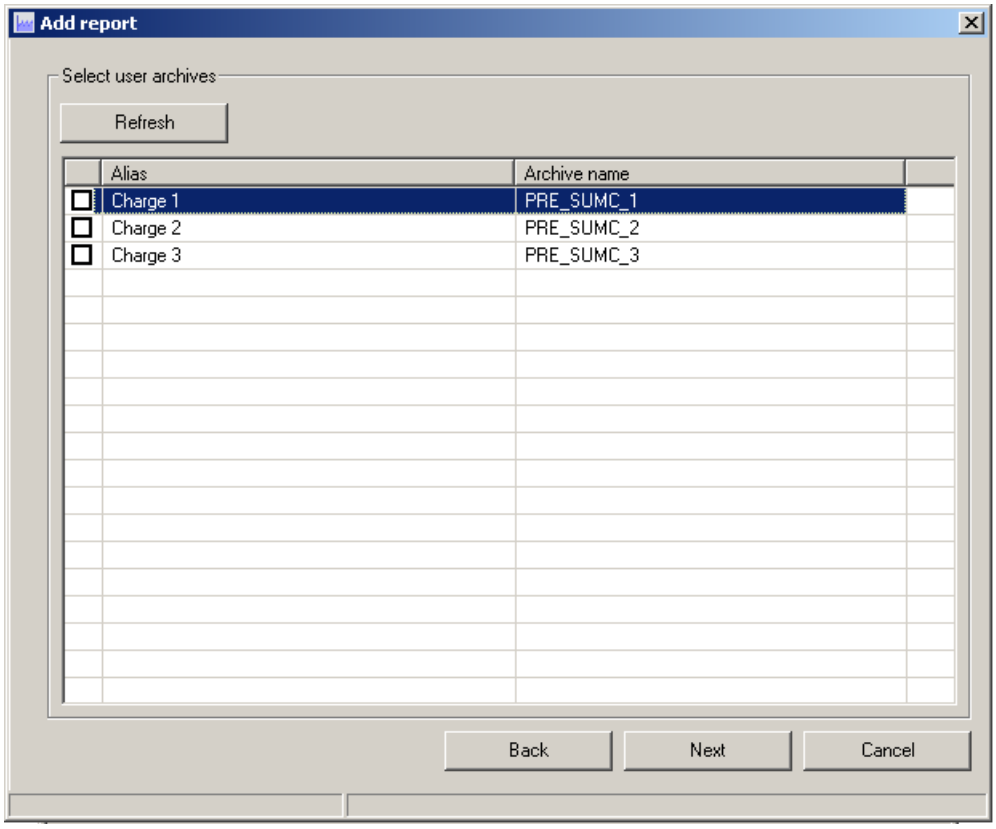
Duration curve report

The duration curve report only takes power values into account. The application identifies such values by the ".V" extension added to the archive tag name.

Only 1 tag may be selected. This tag must have been archived during the reporting period with a uniform archiving cycle.

5.7.3.2 Batch analyses

When selecting a report for batch analyses (export of batch values, batch report (sorted according to time), batch report (sorted according to name)), the names and aliases of the user archives whose names begin with PRE_SUMC_ are displayed from the WinCC database.



The names of the user archives can be read out of the WinCC database again using the update button.

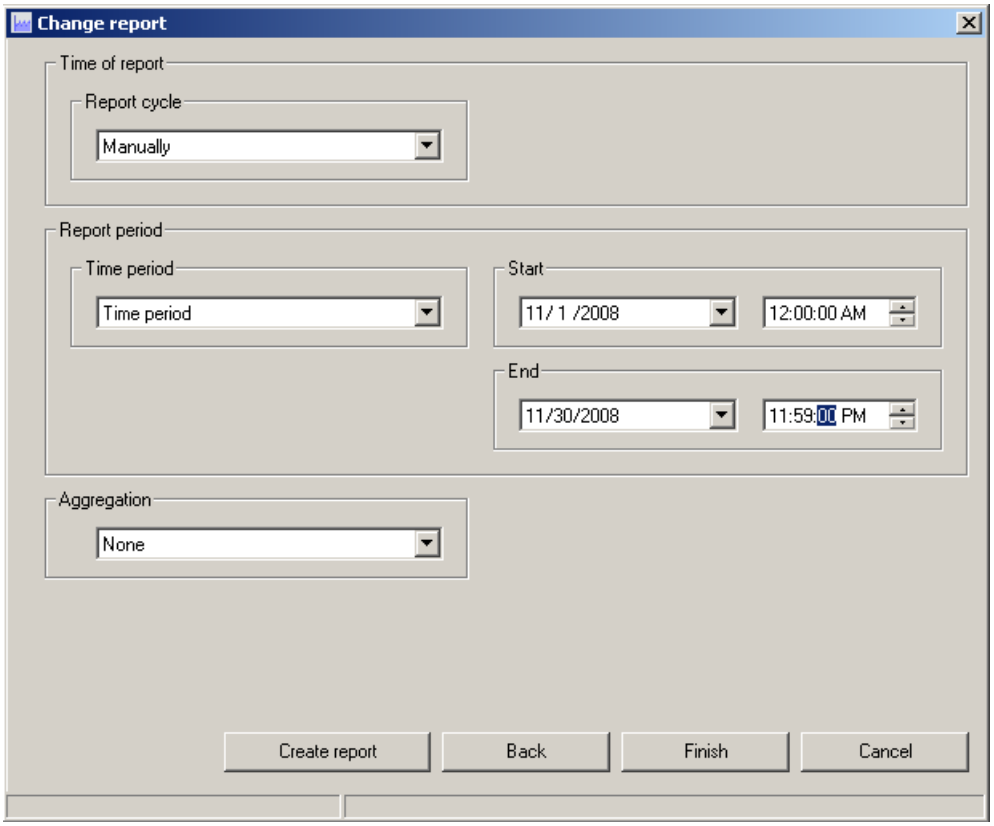
5.7.4 Configuration of the times

5.7.4.1 Configuration of report time and report period

Depending on the type of the report and the setting for execution, different settings can be made for the report time and the report period.

Manual report

For manual reports, the start and end times of the archive data are specified as the report period.



Manual reports are initiated either direct in the wizard or in the main window using the menu item Report > Generate.

Automatic report

Automatic reports can only be created on a WinCC computer (client or server).

The following report cycles are available:

- Daily

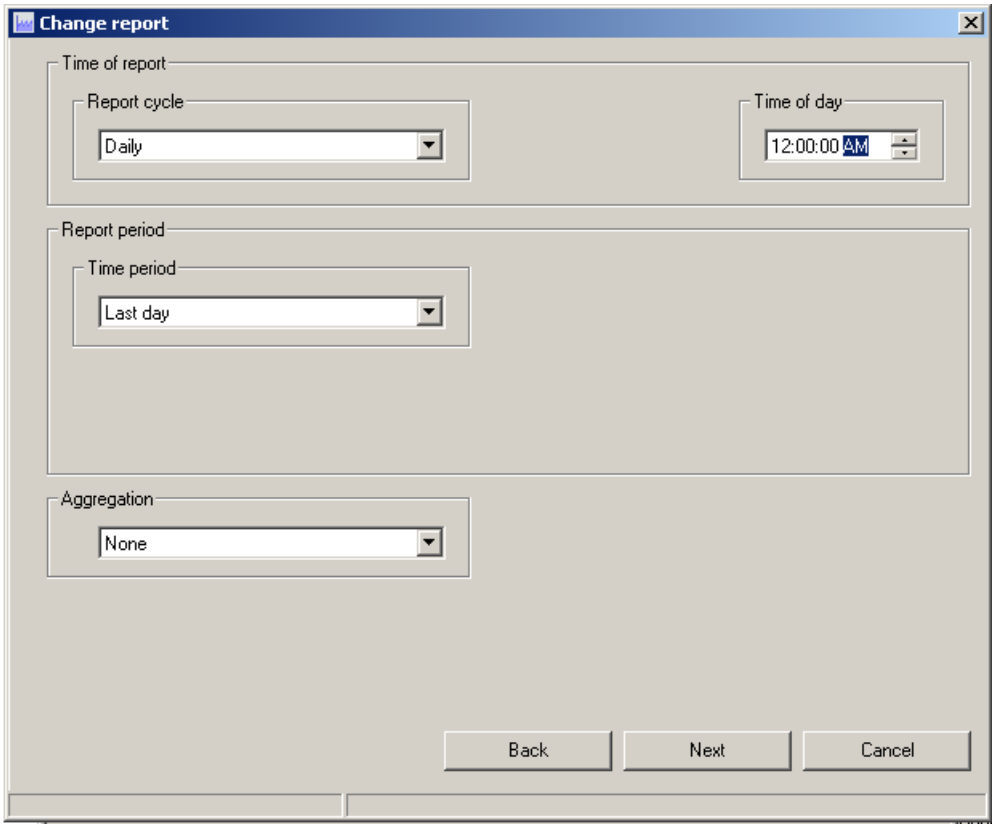
  The start time of report creation is specified by the time-of-day (hour, minute and second).

  The following can be set as the time range for the report period:

  – Time range: Start time - End time

  – Last day: The time is counted backwards from the report time.

  – Expired day (00:00 – 24:00): The entire last day prior to generation of the report is taken.

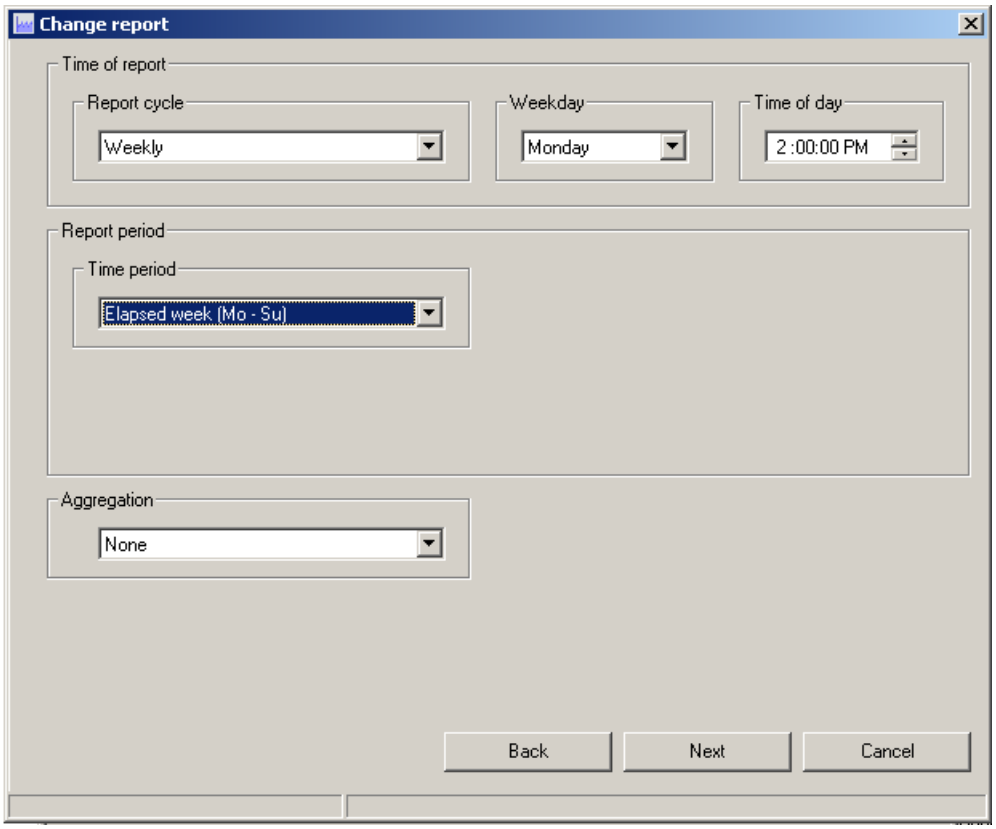


- Weekly

  The time of report generation is specified by the weekday and the time-of-day.

  The following can be set as the time range for the report period:

  – Last week: The time is counted backwards from the report time.
  – Expired week (Mon – Sun): The entire last week prior to generation of the report is taken.

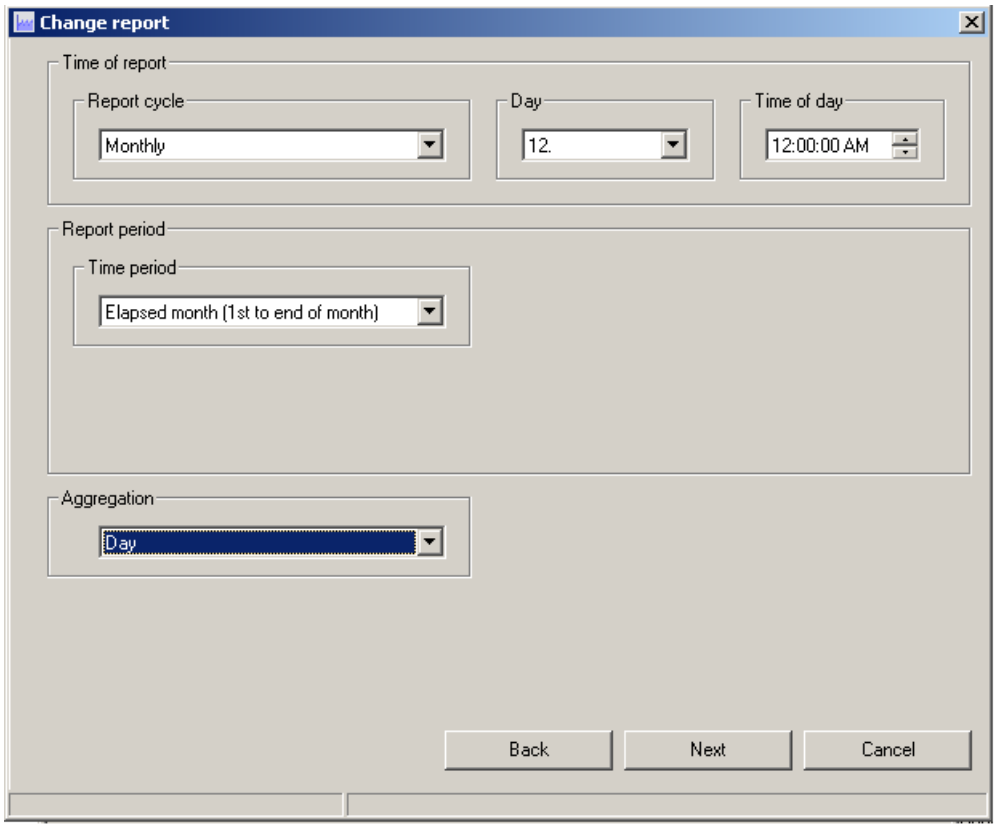


- Monthly

  The time of report generation is specified by the day and time-of-day.

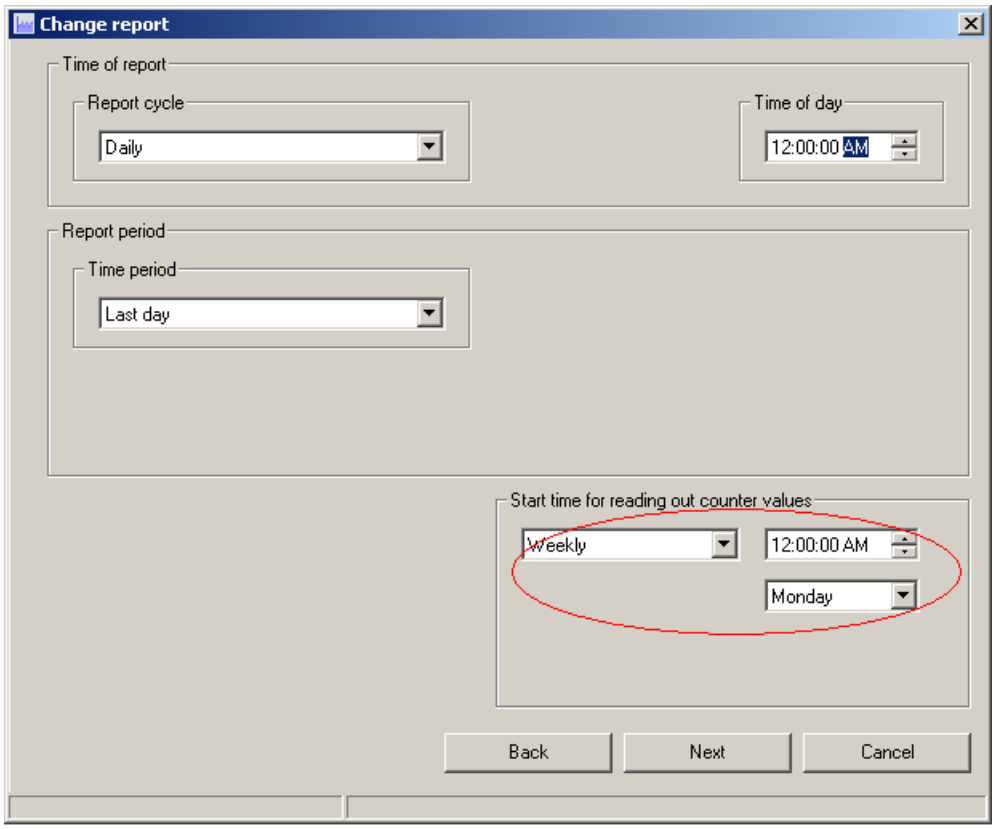
  The following can be set as the time range for the report period:

  – Last month: The time is counted backwards from the report time.
  – Expired month (1st – end of the month): The entire last month prior to generation of the report is taken.



Export counter values

If only absolute counter values (archive tags with the extension ".C") have been selected when exporting archived measured values, the time of readout must be specified.



The following setting options are available for the readout time:

- Daily

  The time stamp of the value to be read out is specified by the time-of-day (hour, minute and second).

- Weekly

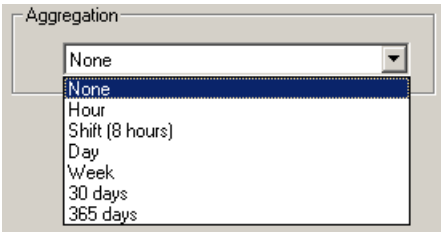
  The time stamp of the value to be read out is specified by the weekday and time-of-day.

- Monthly

The time stamp of the value to be read out is specified by the end of the month – number of days and time-of-day.

Aggregation

Aggregation times can be entered for reports for energy analyses. The export of counter values (archive tags ".C") and the duration curve report are exceptions to this.



Note:

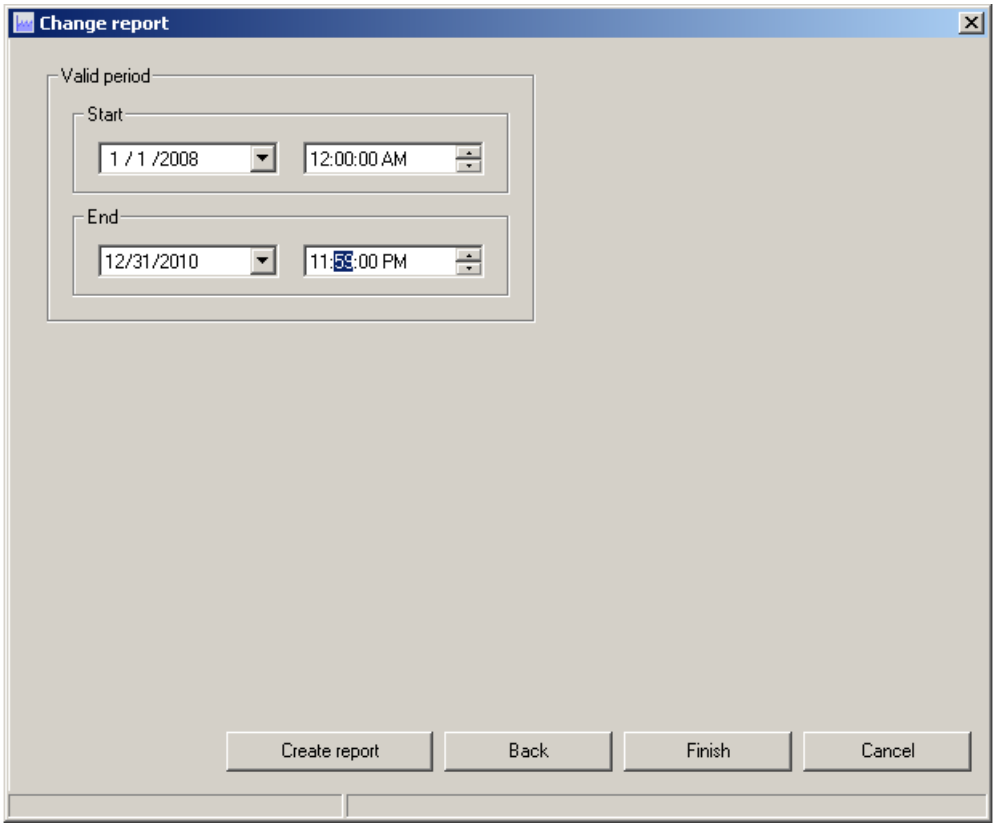
- The aggregation time must not be less than the archiving cycle of the archive tags, otherwise invalid values could be displayed. This applies in particular to energy values which are entered manually.

The aggregation time must not be greater than 1 hour, so that the different tariffs can be accurate to one hour in the cost center report.

5.7.4.2 Configuration of the validity period

The period of validity of a report is only relevant for automatic reports.

The period within which the reports are generated is defined here.



When the validity period has expired, the C actions in WinCC that initiate reporting are deleted from the WinCC project.

If generation of the report is to continue, the validity period must be adapted.

Technical data

6

The following meanings apply:

Block type name

The symbolic identifier in the library's icon table for the relevant FB. It must be unique to the project.

Object name

Consists of the type of block (FB) and the number.

Block length in load/work memory

Memory requirement of program code, once per block type.

Length of instance data in load/work memory

Memory requirement of an instance DB.

Temporary memory

The local data memory needed when calling the block in an execution level. This is limited depending on the CPU. If exceeded, you must check this in the CPU configuration and, if necessary, redistribute to OBs of the size actually needed.

Called blocks

The blocks stated here are used by the block in question and must be located in the user program. They are saved in the same library.

Block (type name)	Number	Block length in the load/ work memory (bytes)	Length of instance data in the load/ work memory (bytes)	Temporary memory (bytes)	Called blocks
PRE_SYNC	FB1060	1302 / 1100	238 / 92	70	FC1 FC34 SFC1 SFC6
PRE_SUM	FB1061	6766 / 5882	912 / 456	92	FC1 FC14 FC34 FC1061 FC1062 SFB35 SFC6
PRE_FIFO_DATA*	FB1062	470 / 322	14206 / 14066	54	FC1062 SFC6
PRE_AR_DATA*	FB1063	528 / 244	796 / 518	22	FB1064
PRE_AR_SND	FB1064	1866 / 1518	480 / 210	102	FC1062 SFB35 SFB37 SFC6 SFC24
PRE_LMGM	FB1065	33370 / 25312	16902 / 9874	310	FC1 SFB31 SFB35 SFC6 SFC20 SFC21 SFC51
PRE_LMGM_75	FB1066	26448 / 19814	13478 / 7874	310	FC1 SFB31 SFB35 SFC6 SFC20 SFC21 SFC51
PRE_LMGM_50	FB1067	25022 / 19814	10052 / 5874	310	FC1 SFB31 SFB35 SFC6 SFC20 SFC21 SFC51

Block (type name)	Number	Block length in the load/ work memory (bytes)	Length of instance data in the load/ work memory (bytes)	Temporary memory (bytes)	Called blocks
PRE_LMGM_25	FB1068	23558 / 19774	6628 / 3874	310	FC1 SFB31 SFB35 SFC6 SFC20 SFC21 SFC51
PRE_LMGM_10	FB1069	22672 / 19774	4202 / 2334	310	FC1 SFB31 SFB35 SFC6 SFC20 SFC21 SFC51
PRE_AS_SEND	FB1070	2174 / 1430	1878 / 1156	44	FB1074 SFB35 SFC6
PRE_AS_RECV	FB1071	5616 / 4334	3008 / 1996	46	FB1075 SFB35 SFC6
PRE_SND_H	FB1072	3010 / 2070	2692 / 1782	44	FB1074 SFB35 SFC6
PRE_RCV_H	FB1073	9820 / 7806	4592 / 3460	44	FB1075 SFB35 SFC6
PRE_BS	FB1074	2052 / 1758	792 / 594	38	SFB12 SFC1 SFC6 SFC20
PRE_BR	FB1075	1846 / 1590	1374 / 1192	36	SFB13 SFC1 SFC6 SFC20
PRE_SUMC	FB1077	11810 / 11012	514 / 226	362	FC1 FC28 SFB35 SFC6 SFC20 SFC21 SFC51

Block (type name)	Number	Block length in the load/ work memory (bytes)	Length of instance data in the load/ work memory (bytes)	Temporary memory (bytes)	Called blocks
PRE_UA_S	FB1078	8618 / 4310	26994 / 22804	84	SFB12 SFB35 SFC6 SFC20
PRE_UA_R	FB1079	6814 / 4160	22778 / 20254	80	SFB13 SFB35 SFC6 SFC20
PRE_SWTCH	FB1750	2312 / 1836	676 / 326	44	SFB31 SFB35 SFC6
PRE_PAC	FB1751	2052 /1702	450 / 212	64	SFB35 SFC6
PRE_CALC*	FC1061	358 / 270	—	12	-
PRE_FIFO_IO	FC1062	1070 / 914	—	22	SFC24

* The technical data relate to the condition of the blocks on delivery. If modified by the user, the data may differ from those provided.

Service and support information

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Up-to-the-minute information

You can obtain further assistance by calling the following numbers:

Technical Assistance:

Telephone:	+49 (0) 911-895-5900 (8°°--- 17°° CET)
Fax:	+49 (0) 911-895-5907
Internet:	(http://www.siemens.de/lowvoltage/technical-assistance)
Email:	(mailto:technical-assistance@siemens.com)