Saving Energy with SIMATIC S7

PROFIenergy with ET200S (STEP 7 V5.5)

Application • November 2011

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SIMATIC PROFIenergy

Application of PROFINET profile "PROFIenergy"

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Preface

This application is part of our series

“Saving Energy with SIMATIC S7”.

Applications realized with STEP 7 V5.5 that have already been published:

- PROFIenergy with **ET 200S**
- PROFIenergy with the **I-Device**
- PROFIenergy with measuring devices **PAC3200 / PAC4200**

or with SCOUT:

- PROFIenergy with **SIMOTION**

The following applications have already been configured with **TIA Portal**:

- PROFIenergy with **ET 200SP**
- PROFIenergy with **Comfort panel**

The procedure and parameterization can also be used to migrate your PROFIenergy applications from STEP 7 V5.5 to TIA Portal.

Further information on the topic of energy efficiency is available on our website:

- Energy-efficient production

Validity

Valid for STEP 7 V5.5 and WinCC flexible 2008.

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1 Automation task

1.1 Overview

Introduction

The importance of energy management will grow in the future. To cut costs by saving energy in the production is an approach that has been used for quite some time already. Recently, short production-free times become center of the focus - from short pauses up to shifts off work.

Main switch turned off - the complete production stops and the lights in the hall go out. This is the common way in nearly each plant all over the world in production-free times like weekends or during plant vacation shutdown. But what happens during shorter pauses? Here, the plant proceeds and consumes energy without delivering productive results.

Is it not possible to put smaller units of the plant that are not needed over a certain period of time into an energy saving mode while the rest of the plant keeps on producing?

All this might considerably improve the energy balance of a production unit.

The currently used technology which isolates the production components from the mains via one or more main switches is inappropriate for that purpose as it deactivates production units in an undifferentiated way. Hard-wired switching paths for firmly defined production units are not flexible enough to make the grade concerning energy efficiency.

The decision for PROFINET already lays the foundations for a new and future-oriented energy management.

Future-oriented energy management means: Units are no longer switched off via the conventional method which uses the main switch, but in a better defined way via the network!

In doing so, the general power supply of the components remains activated and the components enter a defined energy-saving state - initiated by a command.

PROFIenergy is a profile defined by the PROFINET user organization which provides the prerequisites for a vendor-independent system that can be generally used to switch off individual consumers or complete production units in a flexible and intelligent way on a short-term base.

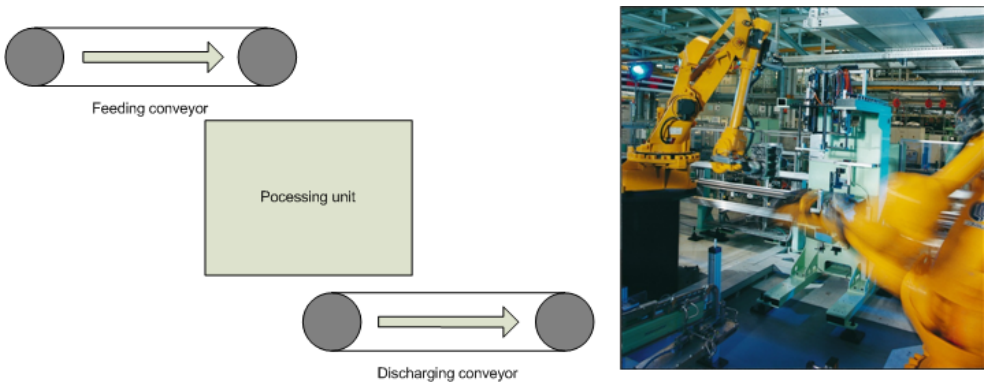
SIEMENS already supports PROFIenergy /1/ with first implementations into the automation system SIMATIC.

The following application shows step by step how such an application can be realised using the ET 200S with integrated PROFIenergy functionality.

Overview of the automation task

The following figure gives an overview of the automation task.

Figure 1-1



This application describes the switch-off of automation components using an example from production - here a production line with robots.

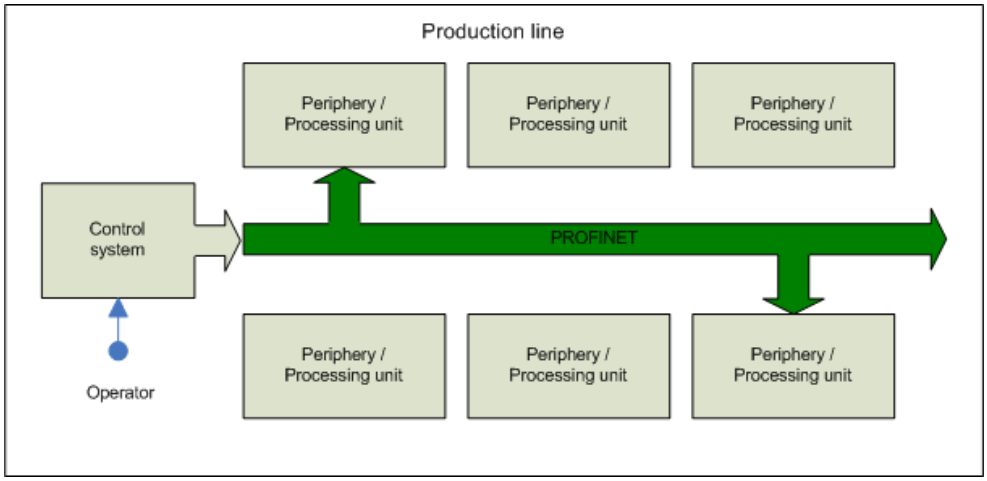
This plant consists of one feeding and one discharging conveyor belt and a processing unit. The belts are connected to an ET 200S; each with an own PROFIenergy-enabled power module. For reasons of clarification the processing unit is a "black box" that is switched on/off via an own ET 200S.

In terms of energy saving the PROFIenergy does not focus on the drive motors since these are switched off in case of a production stop. It rather concentrates on the numerous sensors and further electronic components.

Description of the automation task

During a pause the components of the automation component shall be switched off. The spontaneous or regularly planned pause can be initiated by the user via the control system. After the production has stopped parts of the decentral periphery are switched off via applicable PROFIenergy commands. Before the production is started again the necessary automation components are switched on again.

Figure 1-2



A variable table and an optional control panel serve to visualize and control.

1.2 Scenarios

Requirements of the automation task

This application example shall present the following switch-on and switch-off scenarios.

Table 1-1

Problem description	Explanation
Switch off the first components of the plant	If no staggered switch-off is required; which means that all parts are switched off at once
Switch off further components of the plant	Staggered switch-off Coordinated shut-down, i.e. necessary because of the technological process
Switch on individual components of the plant	Staggered switch-on
Switch on all / remaining components of the plant	Components of the plant that are not subject to a special switch-on sequence.

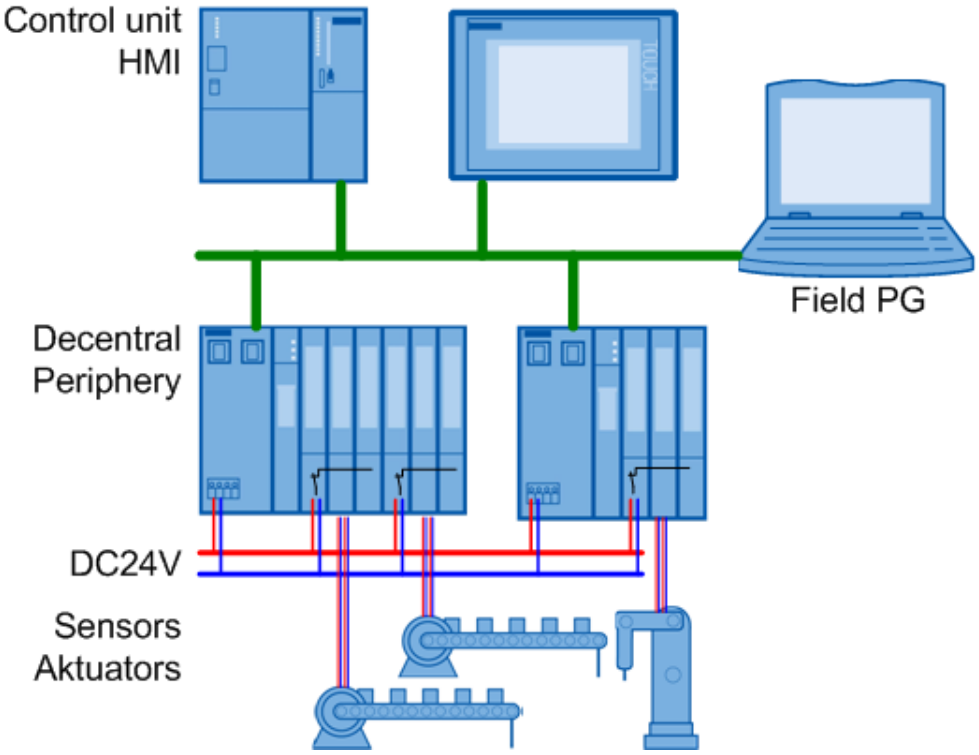
2 Automation solution

2.1 Overview of the overall solution

Layout

The following figure shows a layout of the most important components of the solution:

Figure 2-1



Structure

The plant described above is based in a decentral design. Via two ET 200S with several I/O groups (load groups) each, the CPU controls the plant. PROFIenergy-enabled power modules separate the I/O groups. The respective I/O modules have to supply the sensors and actuators with voltage to achieve appropriate energy savings. The energy is saved by switching off the supply voltage via the power modules.

A direct supply of the sensors and actuators via a "24V bus" would impede a selective switch-off and by that the saving of energy.

Input / visualization via HMI is offered as an option. The same information and input fields are available in a variable table. The panel itself can also be simulated on the PG via the WinCC flexible Runtime.

Topics not covered by this application

This application does not contain a description of how to switch off a plant. This is already implemented into existing plants and differs too much from plant to plant.

For the same reason there is no staggered switch-off of the components with PROFIenergy.

Hereafter, the basic functionality of the PROFIenergy profile and the respective function blocks for SIMATIC will be explained.

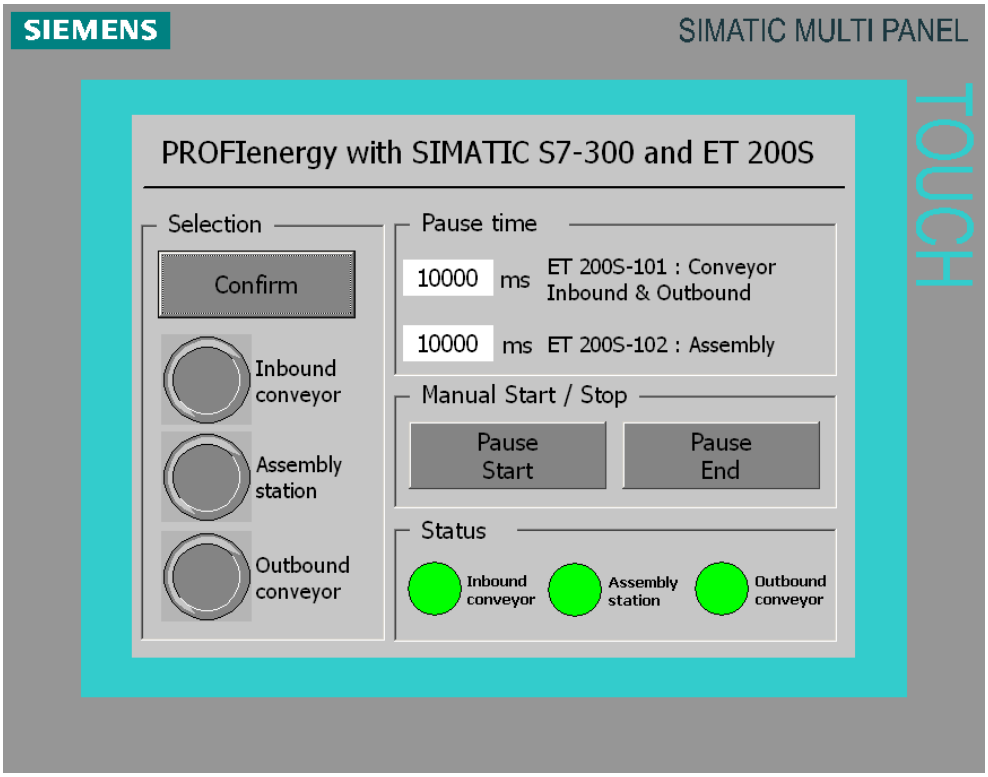
Required knowledge

It is assumed that the user has basic knowledge in automation, SIMATIC, PROFINET and project planning with STEP 7.

2.2 Description of the core functionality

Overview and description of the user interface

Figure 2-2



All used command bits refer directly to one or both instance data blocks (FB53 / FB815 for PROFIenergy device 1 and 2).

Selection determines the function of the power modules in the ET 200S. Confirm initiates the parameter transfer.

Pause Time determines the planned pause interval individually for each PROFIenergy device.

Manual Start/Stop initiates the start or stop command for both PROFIenergy devices.

Status shows the feedback of the DI modules.

2.3 Hardware and software components used

The application was created with the following components:

Hardware components

Table 2-1

Component	Qty.	MLFB/order number	Note
SIMATIC S7 -300, Profile rail	1	6S7 390-1AE80-0AA0	
SIMATIC S7-300 reg. power supply PS307, input : AC 120/230 V output DC 24 V/5 A	1	6ES7307-1EA01-0AA0	
SIMATIC S7-300 CPU 317-2 PN/DP, PROFINET	1	6ES7317-2EK14-0AB0	For all S7 CPU available as an option
SIMATIC S7, MMC Micro Memory CardS7-300, 2 MBYTE		6ES7953-8LL20-0AA0	
Profile rail EN60715	1	6ES5710-8MA11	
SIMATIC DP, interface module IM151-3 PN HF for ET 200S	2	6ES7151-3BA23-0AB0	firmware level V7.0 or higher required
ET 200SPower module PM-E DC24V/8A RO	3	6ES7138-4CA80-0AB0	
SIMATIC DP, electronic modules for ET 200S, 2 DI standard DC 24V, 5 pcs. per packaging unit	1(3)	6ES7131-4BB00-0AA0	Alternative I/O modules according to availability
SIMATIC DP, electronic modules for ET 200S, 2 DO standardDC 24V/0,5A, 5 pcs. per packaging unit	1(3)	6ES7132-4BB01-0AA0	Alternative I/O modules according to availability

Component	Qty.	MLFB/order number	Note
SIMATIC DP, terminal module TM-P15C23-A0 for power modules, clamp terminals	3	6ES7193-4CD30-0AA0	Alternative types available
SIMATIC DP, terminal module TM-E15S24-01 for electronic modules, screw terminals, 5 pcs. per packaging unit	2(6)	6ES7193-4CB20-0AA0	Alternative types available
SIMATIC Field PG M2	1	Configurator	Compatible PC
SIMATIC PROFINET cable and connectors			As alternative Ethernet patch cabel

Standard software components

Table 2-2

Component	Qty.	MLFB/order number	Note
STEP 7 V5.5	1	6ES7810-5CC10-…	
WinCC flexible 2008	1	6AV6613-0AA51-3CA5	Optional

Example files and projects

The list below includes all files and projects used in this example.

Table 2-3

Component	Note
41986454_PROFIenergy_ET200S_CODE_V12.zip	This zip file contains the STEP 7 project
41986454_PROFIenergy_ET200S _DOKU_V12_de.pdf	This document.

3 Basic information

This chapter explains the functions of PROFIenergy, especially the relation between the functional modules and the hardware.

3.1 PROFIenergy profile

The PROFIenergy profile presents methods and techniques for implementing energy-saving functions into PROFINET IO devices. And not only manufacturer-independently into simple I/O devices but also into intelligent and complex devices.

PROFIenergy consists of a group of methods that serve for parameter setting, the start and stop commands as well as registration of the energy consumption.

PROFIenergy is based on existing PROFINET mechanisms - changes are not necessary. This way users of PROFINET are able to integrate PROFIenergy into existing plants without basic changes of the plant.

PROFIenergy controller: This means a SPS, in this case the SIMATIC S7 CPU 317-2PN/DP. The user can decide whether to integrate the PROFIenergy management into an existing control or into an additional control.

PROFIenergy device: A PROFINET IO device with integrated PROFIenergy functionality. In this case a SIMATIC ET 200S consisting of a head module (IM151-3PN HF V7.0) and a switchable power module (PM-E DC24V/8A RO).

PROFIenergy is basically designed for several energy-saving states of the PROFIenergy devices. In the presented application the states OFF ("PAUSE") and ON ("READY") are realised. The state "OFF" provides the complete PROFINET communication ability. This is achieved as the interface module IM151 induces the selected power modules to switch off the supply voltage for the following electronic modules (here DI/DO).

3.2 Available hardware

PROFIenergy controller

There are blocks available that can be executed on all SIMATIC S7 CPUs.
The Step7 project which belongs to this application contains these blocks.

PROFIenergy device

ET 200S:

Head modules to process the profile

IM 151-3 PN IO High Feature: 6ES7 151-3BA23-0AB0, from firmware level V7.0

IM 151-3 PN IO High Feature, FO: 6ES7 151-3BB23, from firmware level V7.0

Can be upgraded from firmware level V6.0.
The latest firmware is available under the following link:
http://support.automation.siemens.com/WW/view/en/35934244

A head module that is compatible with PROFIenergy is required to process the PROFIenergy profile.

Switchable power module to switch off the sensor and load supply:

PM-E DC24V/8A RO: 6ES7 138-4CA80-0AB0

Up to 8 of these switchable PM-E can be plugged into an ET 200S.

Additional PM-E without PROFIenergy can be plugged at any number - of course according to the assembly guidelines ET 200S. These are recommended for F-modules for instance that shall not be switched off.

Switchable PM-E can be operated without PROFIenergy. Nevertheless, they occupy an address in the process image.

3.3 Required software

All required Step7 blocks are available for being downloaded. The following chapters describe their function and application.

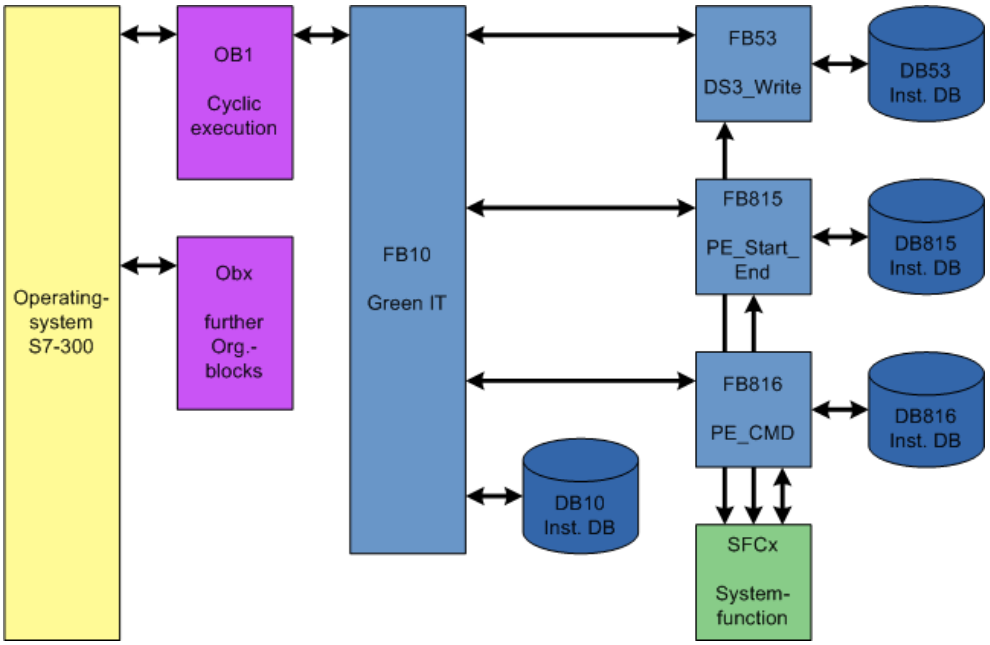
The software STEP 7 V 5.5 is required for engineering the ET 200S and the power module.

4 Function mechanisms of this application

4.1 Program overview

The following figure shows the basic structure of the program of this application.

Figure 4-1



The function block FB 10 "GreenIT" bundles the actual PROFIenergy block calls and provides a comfortable interface for the HMI via its instance data block.

FB53 "DS3_Write“: Sends the basic settings concerning the switching behavior of the power modules to the addressed ET 200S. This block is not part of the PROFIenergy profile but completes the SIMATIC-specific functions.

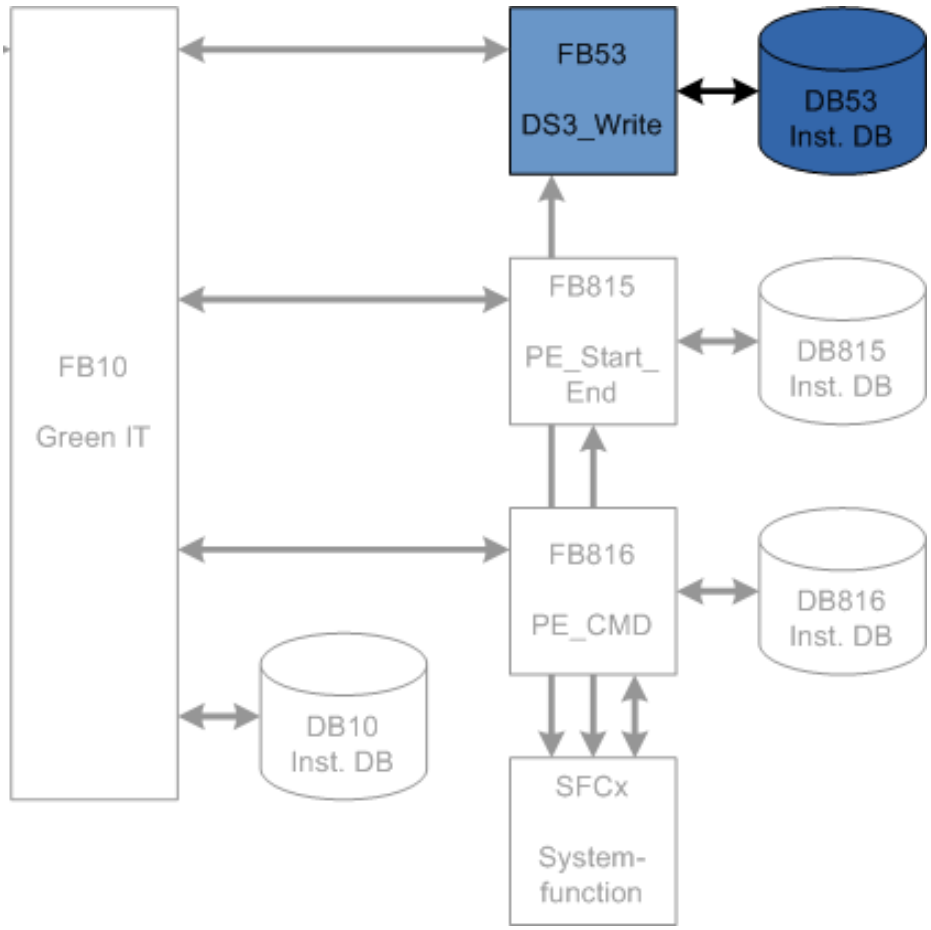
FB815 "PE_Start_End“: Starts and stops the pause at the selected ET 200S and transmits the wished pause time simultaneously. The reaction of the PM-E in this ET 200S was determined with the FB53.

FB816 "PE_CMD“: Executes all PROFIenergy commands. In this application the status values are read examplarily.

The selection display, the parameters, and the function of the individual PROFIenergy blocks are described in detail in the following chapters.

4.2 Functionality FB53 "DS3_Write“

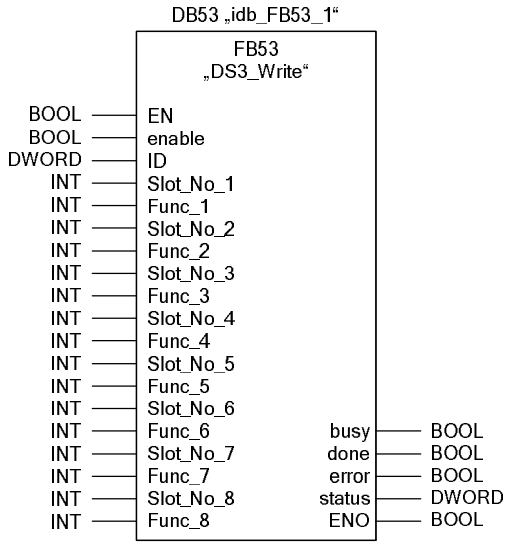
Figure 4-2



With the FB53 the switching behavior for up to 8 slots (here power modules) in a PROFINET IO device (here ET 200S) can be determined.

4.2.1 Program details for block FB53 "DS3_WRITE”

Figure 4-3



Input parameters

Table 4-1

Parameters	Data type	Initial value	Description
EN	BOOL	1	Enable Input
enable	BOOL	0	A positive edge initiates the transfer of the data set. The data set must be transferred again after voltage OFF/ON.
ID	DWORD	8178	Address of the PROFINET IO device (ET 200S, to be taken from the hardware configuration)
Slot_No_x	INTEGER	1(4)	Slot number of the x. switchable power module
Func_x	INTEGER	0	Function of the module in this slot Determination of the switching behavior of the PM-E: FALSE : PAUSE_START - does not influence PM-E, - PM-E remains ON PAUSE_STOP- switches PM_E ON again TRUE: PAUSE_START - switches PM_E OFF, PAUSE_STOP - switches PM-E ON again

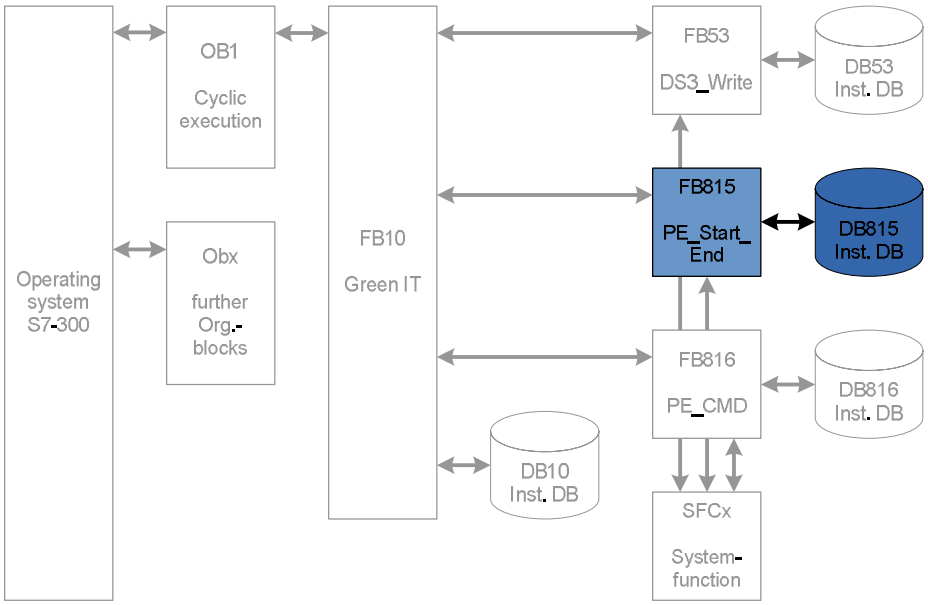
Output parameters

Table 4-2

Parameters	Data type	Initial value	Description
busy	BOOL	0	Transfer DS3 not completed
done	BOOL	0	Transfer DS3 completed without errors
error	BOOL	0	Transfer DS3 completed with error
status	DWORD	0	Error ID, see FB815
ENO	BOOL	0	Enable output

4.3 Functionality FB815 "PE_START_END“

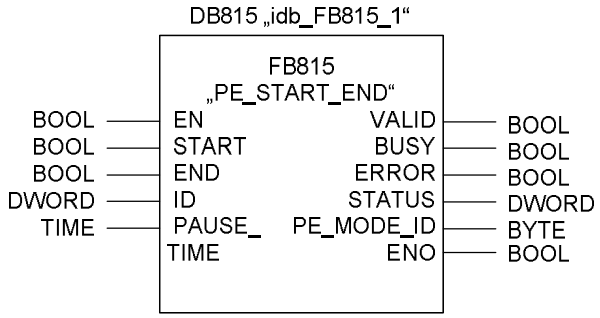
Figure 4-4



With the FB815 "PE_START_END“ the pause is started or stopped for the determined PROFINET IO device, here ET 200S. The switchable blocks behave according to the settings of the FB53 "DS3_WRITE“. The parameter PAUSE_TIME provides the switchable block with the planned pause time for control.
The following applies: PAUSE_TIME >= PM-E_Pause_Min
There is no automatic switch-on after the pause time is over; the module remains in the state OFF until the "END" command. This avoids uncontrolled switch-ons which finally might lead to unwanted load peaks.

4.3.1 Program details for block FB815 "PE_START_END“

Figure 4-5



Input parameters

Table 4-3

Parameters	Data type	Initial value	Description
EN	BOOL	0	Enable Input
START	BOOL	0	Send "START PAUSE“ to PROFINET IO device with address "ID“
END	BOOL	0	Send "END PAUSE“ to PROFINET IO device with address "ID“
ID	DWORD	8184	Address of the PROFINET IO device (ET 200S, to be taken from the hardware configuration)
PAUSE_ TIME	TIME	T#10000MS range: T#1MS to T#24D20H31 M23S647MS	Planned pause time. The ET 200S checks whether the planned pause time is longer or equal to the minimum pause time that is saved on the ET 200S. This is a fix time of 10s. If a smaller pause is started the PM-E remain switched on.

Output parameters

Table 4-4

Parameters	Data type	Initial value	Description
VALID	BOOL	0	Command send successfully
BUSY	BOOL	0	Command still in progress
ERROR	BOOL	0	An error occured during the process
STATUS	DWORD	0	block status/error number
PE_MODE _ID	BYTE	0	Energy saving level during the PAUSE
ENO	BOOL	0	Enable output

Error code

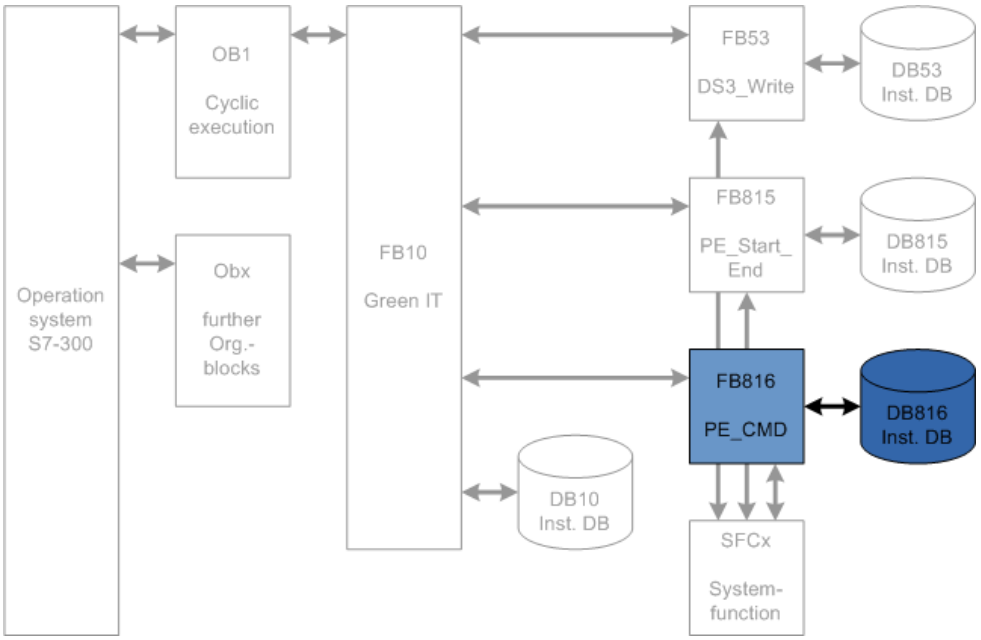
The output parameter STATUS contains error information. If it is interpreted as ARRAY[1...4] OF BYTE the error information is structured as follows:

Table 4-5

Array element	Name	Description
STATUS[1]	Function_Num	B#16#00: no error B#16#DE: Read error in data set B#16#DF: Write error in data set B#16#C0: PE-FB or SFB 52/53 discovered errors
STATUS[2]	Error_Decode	Place of error detection **80:** DPV1 - Error according to IEC 61158-6 or FB-specific FE:DP/PNIO Profile - PROFIenergy-specific error
STATUS[3]	Error_Code_1	(B#16#...) / (B#16#...): DPV1 Error_Decode 80: - 80: At the same time a rising edge at the input parameters "START” and "END” - 81: Length conflict for the parameters CMD_PARAM and CMD_PARAM_LEN 82-8F: further error messages Error_Decode FE: - 01: Invalid "Service Request ID” - 02: Wrong "Request_Reference” - 03: Invalid "Modifier” - 04: Invalid "Data Structure Identifier RQ” - 05: Invalid "Data Structure Identifier RS” - 06: "PE energy-saving modes” are not supported - 07: "Response” takes too long. The current "Response” exceeds the maximum length that can be transferred - 08: invalid "Count” - 50: No matching "energy mode” available - 51: given time value is not supported - 52: incorrect "PE_Mode_ID”
STATUS[4]	Error_Code_2	manufacturer-specific extension of the error detection

4.4 Functionality FB816 "PE_CMD“

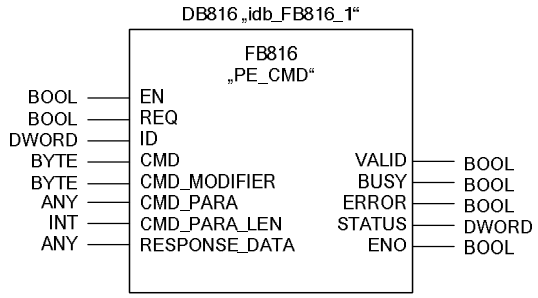
Figure 4-6



FB816 "PE_CMD" is a transparent block to illustrate the complete PROFIenergy standard. Due to its free parameter transfer the block is open for future extensions of the PROFIenergy profile. To use this block advanced knowledge of the PROFIenergy profile is required. That is why the reading of status information is shown exemplarily in this application.

4.4.1 Program details for block FB816 "PE_CMD“

Figure 4-7



With this FB 816 PROFIenergy commands are transferred to a PROFIenergy-enabled device. The input data are stored in the data range "CMD_PARA“ which is addressed by the ANY-pointer. The output data are stored in the data range RESPONSE_DATA which is addressed by the ANY-pointer.

The commands are transferred to the modules without plausibility check where they are processed. The feedback of this module is provided at the input data without any changes.

This block can also be used after the PROFIenergy profile has been extended by further commands in the future.

The following commands can be executed in the current PROFIenergy profile. They will be explained in the following chapters: ("COMMAND”)

- Query Modes
  - List of energy saving modes
  - Get mode
- PEM_Status
- Identify
- Query Measurements – (if appropriate modules are available)
  - Get measurement
  - Get measurement values

Input parameters

Table 4-6

Parameters	Data type	Initial value	Description
EN	BOOL	0	Enable Input
REQ	BOOL	0	Start job: Positive edge initiates the transfer of the command
ID	DWORD	0	Address of the PROFINET IO device (ET 200S, to be taken from the hardware configuration)
CMD	BYTE	0	Service RQ-ID from the PROFIenergy profile Commands: 01 Start_Pause 02 End_Pause 03 Query_Modes 04 PEM_Status 05 PE_Identify 16 Query_Measurement After an extension of the PROFIenergy profile further command IDs are available.
CMD_ MODIFIER	BYTE	0	Start_Pause Modifier: 00 End_Pause Modifier: 00 Query_Modes Modifier: - 01: List energy saving Modes - 02: Get Mode PEM_Status Modifier: 00 PE_Identify Modifier: 00 Query_Measurement Modifier: - 01: Get_Measurement_List, get all supported Measurement_IDs - 02: Get_Measurement_Values After an extension of the PROFIenergy profile further commands and modifiers are available.
CMD_ PARA	ANY	0	Parameter for: Get mode: PE_mode_ID Get measurement values: List of Measurement_Ids Maximum length: = 234 Byte The complete Service Data Request is registered
CMD_ PARA_LEN	INT	0	Real parameter length of the command. <= lenght in CMD_PARAM (is checked by the block) Maximum: = 234
RES- PONSE	ANY	0	PROFIenergy information; according to the command complete Response

Parameters	Data type	Initial value	Description
_DATA			Telegram in good and error cases including block header. Note: If the buffer is to small, only the number of bytes is registered that are indicated in the ANY protocol.

Output parameters

Table 4-7

Parameters	Data type	Initial value	Description
VALID	BOOL	0	Command sent successfully
BUSY	BOOL	0	Command still in progress
ERROR	BOOL	0	An error occurred during the process
STATUS	DWORD	0	Block status / error number, see FB815
ENO	BOOL	0	Enable Output

4.5 Response data

Table 4-8

Block definitions	Attributes	Value	Data type	Description
BlockHeader	BlockType	0x0801	Unsigned16	
	BlockLength		Unsigned16	without counting the fields BlockType and BlockLength
	BlockVersionHigh	0x01	Unsigned8	
	BlockVersionLow	0x00	Unsigned8	
Response Header	Service_Request_ID	0x01.. 0xFF	Unsigned8	0x01 Start_Pause 0x02 End_Pause 0x03 Query_Modes 0x04 PEM_Status 0x05 PE_Identify 0x06..0x09 reserved 0x10 Query_Measurement 0x11..0xCF reserved 0xD0..0xFF manufacturer_specific
	Request_Reference	0x01.. 0xFF	Unsigned8	unique identification number (mirrored in the response by server)
Service Header Response	State	0x01.. 0xFF	Unsigned8	0x00 - reserved 0x01 - ready 0x02 - ready_with_error 0x03 - data incomplete 0x04 .. 0xCF - reserved 0xD0.. 0xFF - depend on Service_Request_ID
	Data_Structure_Identifier_RS	0x01.. 0xFF	Unsigned8	0x00 - reserved 0x01..0xFF - Data structures dependent on the Service_Request_IDs 0xFF - error
Service Data Response				dependent on the Service_Request_IDs

This table shows how the fed back data is basically structured according to the PROFIenergy profile /1/. In the following chapters the individual commands and the resulting structure of the response data are listed.

4.5.1 PE command Start_Pause

Request

CMD = 1

CMD_ MODIFIER = 0

CMD_PARA_LEN = 4

CMD_PARA = Any-Pointer on the value for Pause_Time (unsigned32)

Service-Data-Response

Parameters	Value	Data type
PE_Mode_ID*	0x01..0xFF	Unsigned8
Reserved	0x00	Unsigned8

* identification number of the energy saving mode

4.5.2 PE command End_Pause

Request

CMD = 2

CMD_ MODIFIER = 0

CMD_PARA_LEN = 0

CMD_PARA = irrelevant

Service-Data-Response

Parameters	Value	Data type
Time_to_operate*		Unsigned32

* expected time for switching the PROFIenergy device to "ready_to_operate“

4.5.3 PE command Query Modes - List of energy saving modes

Request

CMD = 3

CMD_ MODIFIER = 1

CMD_PARA_LEN = 0

CMD_PARA = irrelevant

Service-Data-Response

Parameters	Value	Data type
Number_of_PE_Mode_IDs*	0x01	Unsigned8
PE_Mode_IDs		Unsigned8-Array of Number_of_PE_Mode_IDs (Unique ID for mode)

* number of energy saving modes

4.5.4 PE command Query Modes - Get mode

Request

CMD = 3

CMD_ MODIFIER = 2

CMD_PARA_LEN = 1

CMD_PARA = Any-Pointer on the value for PE_MODE_ID (unsigned8)

Service-Data-Response

Parameters	Value	Data type
PE_Mode_ID	0x01.. 0xFF	Unsigned8
PE_Mode_Attributes	0x00..0x01	Unsigned8
Time_min_Pause		Unsigned32
Time_to_Pause		Unsigned32
Time_to_operate		Unsigned32
Time_min_length_of_stay		Unsigned32
Time_max_length_of_stay		Unsigned32
Mode_Power_Consumption		Float32
Energy_Consumption_to_pause		Float32
Energy_Consumption_to_operate		Float32

4.5.5 PE command PEM_Status

Request

CMD = 4

CMD_ MODIFIER = 0

CMD_PARA_LEN = 0

CMD_PARA = irrelevant

Service-Data-Response

Parameters	Value	Data type
PE_Mode_ID_Source		Unsigned8
PE_Mode_ID_Destination		Unsigned8
Time_to_operate		Unsigned32
Remaining_time_to_destination		Unsigned32
Mode_Power_Consumption		Float32
Energy_Consumption_to_Destination		Float32
Energy_Consumption_to_operate		Float32

4.5.6 PE command PE_Identify

Request

CMD = 5

CMD_ MODIFIER = 0

CMD_PARA_LEN = 0

CMD_PARA = irrelevant

Service-Data-Response

Parameters	Value	Data type
Count *	6	Unsigned8
Start_Pause**	0x01	Unsigned8
End_Pause	0x02	Unsigned8
Query_Modes	0x03	Unsigned8
PEM_Status	0x04	Unsigned8
PE_Identify	0x05	Unsigned8
Query_Measurement***	0x10	Unsigned8

* number of supported PROFIenergy commands

** first supported Service_Request_ID

** last supported Service_Request_ID

4.5.7 PE command Query Measurement – Get measurement list

Request

CMD = 16

CMD_ MODIFIER = 1

CMD_PARA_LEN = 0

CMD_PARA = irrelevant

Service-Data-Response

Parameters	Value	Data type
Count *		Unsigned8
reserved		Unsigned8
Measurement_ID**		Unsigned16
Accuracy_Domain		Unsigned8
Accuracy_Class		Unsigned8
Range		Float32
…		
Measurement_ID***		Unsigned16
Accuracy_Domain		Unsigned8
Accuracy_Class		Unsigned8
Range		Float32

* number of measurement_IDs

** first supported measurement_ID

** last supported measurement_ID

4.5.8 PE command Query Measurement – Get measurement values

Request

CMD = 16

CMD_ MODIFIER = 2

CMD_PARA_LEN = length of the data structure in byte

CMD_PARA = Any-Pointer on data structure which should be structured as follows

Parameters	Value	Data type
Count *		Unsigned8
reserved	0x00	Unsigned8
Measurement_ID**		Unsigned16
...		
Measurement_ID***		Unsigned16

* number of measurement_IDs

** first requested measurement value

** last requested measurement value

Service-Data-Response

Parameters	Value	Data type
Count *		Unsigned8
reserved		Unsigned8
Lenght_of_Structure	0x0002...0xFFFF	Unsigned16
Measurement_Data_Structure_ID	1=simple value	Unsigned8
Measurement_ID**	0...FFFF	Unsigned16
Status_of_Measurement_Value	1=valid; 2=not supported; 3=not valid	Unsigned8
Transmission_Data_Type		Float32
End_of_demand (optional)		Unsigned32 + Unsigned16
…		
Lenght_of_Structure	0x0002...0xFFFF	Unsigned16
Measurement_Data_Structure_ID	1= simple value	Unsigned8
Measurement_ID***	0...FFFF	Unsigned16
Status_of_Measurement_Value	1=valid; 2=not supported; 3=not valid	Unsigned8
Transmission_Data_Type		Float32
End_of_demand (optional)		Unsigned32 + Unsigned16

* number of measurement values

** first supported measurement value

** last supported measurement value

NOTE See Annex A: Measurement list for the Measurement ID list.

Energy saving data

Parameters	Data type	Value			Description
PE_MODE_ID PE_MODE_ID_SOURCE PE_MODE_ID_DESTINATON	Unsigned8	0x00	PE_POWER_OFF		Coherent ID of the energy saving mode Source and destination of the PEM_STATUS
		0x01 – 0xFE	manufacturer-specific		
		0xFF	PE_READY_TO_OPERATE		
PE_MODE_ATTRIBUTES	Unsigned8	Bit 0	0	Only static time and consumption values available	Enum Byte
			1	Dynamic time and consumption values available	
		Bit 1 to Bit 7		reserved	
PAUSE_TIME_1	Unsigned32	Time interval			No absolute date
TIME_MIN_PAUSE_1	Unsigned32	Time interval			Minimum pause interval for this PE-energy saving mode. It is the sum of the three parameters: - Time_to_Pause -Time_to_operate - Time_min_length_of_stay
Time_to_Pause[1]	Unsigned32	Time interval			Time interval from the START edge until reaching the requested PE-energy saving mode
Time_to_operate[1]	Unsigned32	Time interval			Maximum time of switch-on until PE_ready_to_operate Time_to_operate can be used directly for the respective calculations. The value can be either a static MAX value or calculated dynamically by the PE device.

Remaining_ time_to_ destination [1]	Unsigned32	Time interval	Optional: remaining time until the requested PE mode. Dynamic value or static MAX value
Time_min_ length_of_ stay [1]	Unsigned32	Time interval	Minimum time interval the PE device must remain in this PE mode.
Time_max_ length_of_ stay [1]	Unsigned32	Time interval	Maximum time interval the PE device can remain in this PE mode.
Mode_Power_ Consumption [2]	Float32		Energy consumption in the current PE mode [kW]
Energy_ Consumption_ to_pause [2]	Float32		Energy consumption from PE_ready_to_operate until the current PE mode [kWh]
Energy_ Consumption_ to_operate [2]	Float32		Energy consumption from the current PE mode until PE_ready_to_operate [kWh]
Energy_ Consumption_ to_Destination [2]	Float32		Energy consumption until the requested PE mode [kWh]

[1] The PROFIenergy profile does not specify an invalid time format.

If the time interval is not limited, 0xFFFFFFFF can be indicated as maximum value. If the time interval is "Zero“, the value 0x00 can be used.

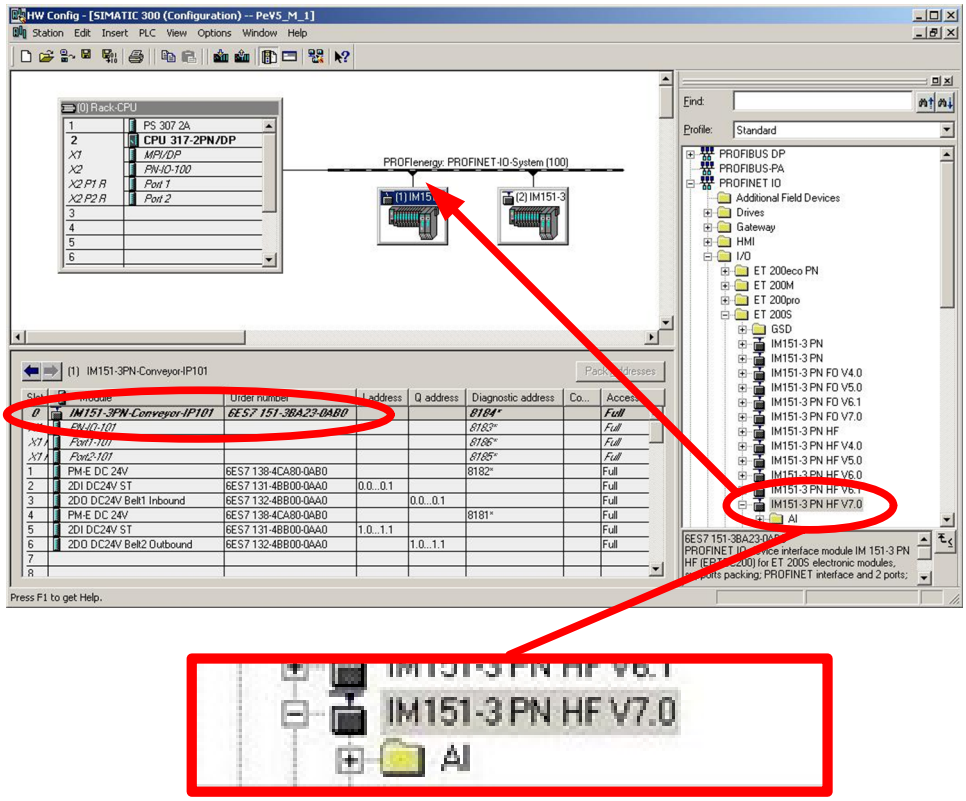
[2] If an energy consumption value is not defined, the value 0.0 (Float32) can be indicated.

5 Configuration and settings

At the moment only the head and power modules named above can be delivered with PROFIenergy functionality. You can adapt and change the delivered example program according to your needs and your hardware equipment. In the following chapters the crucial steps of the hardware configuration are described. If you want to integrate the PROFIenergy blocks into an existing software, you can rename them.

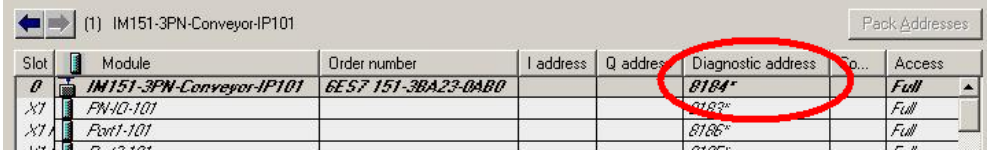
5.1 Configuration of the ET 200S head module

Figure 5-1



Select one of the PROFIenergy-enabled head modules (V7.0) and add it to the PROFINET thread.

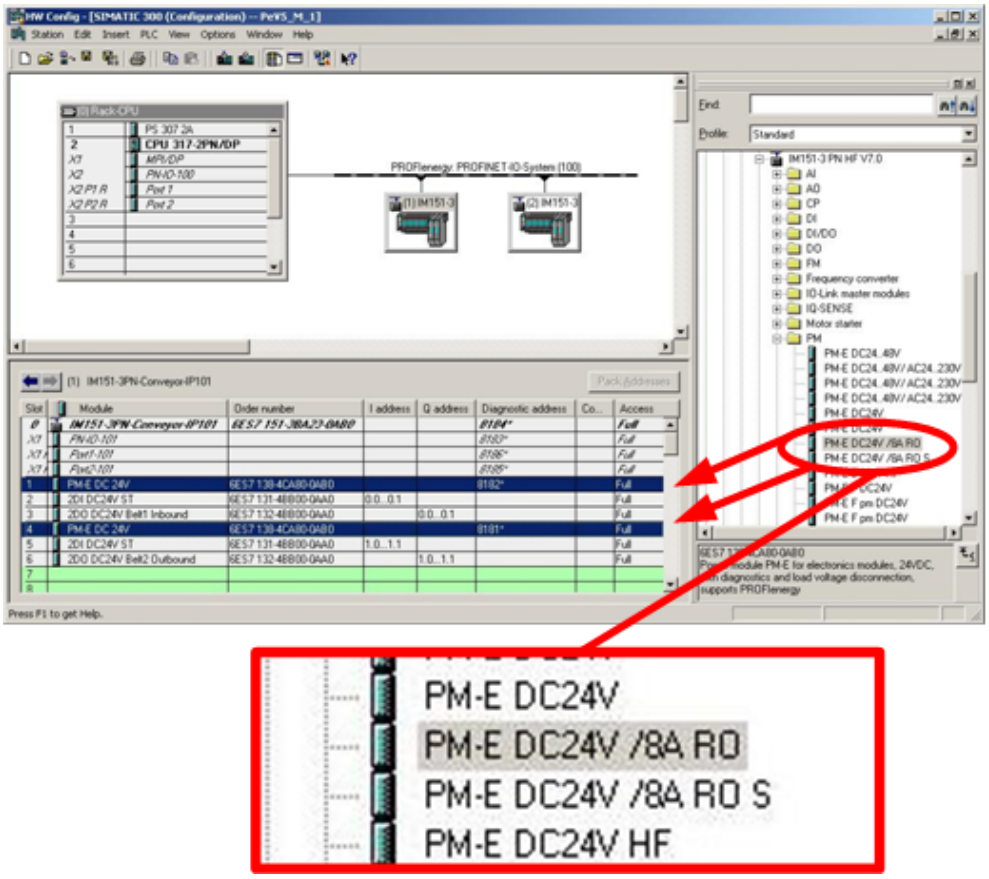
Figure 5-2



Later you will need the diagnosis address of the IM151 for setting the software.

5.2 Configuration of the ET 200S power module

Figure 5-3



Equip the ET 200 S with at least one PROFIenergy-enabled power module. You are free to select the further equipment. You can either select further PROFIenergy power modules or any other modules.

Note

Power module 6ES7 138-4CA80-0AB0

Record without "S": PM-E works according to the PROFIenergy standard and does not occupy any addresses

Record with "S": PM-E is located in the process image and can be switched directly via I/O

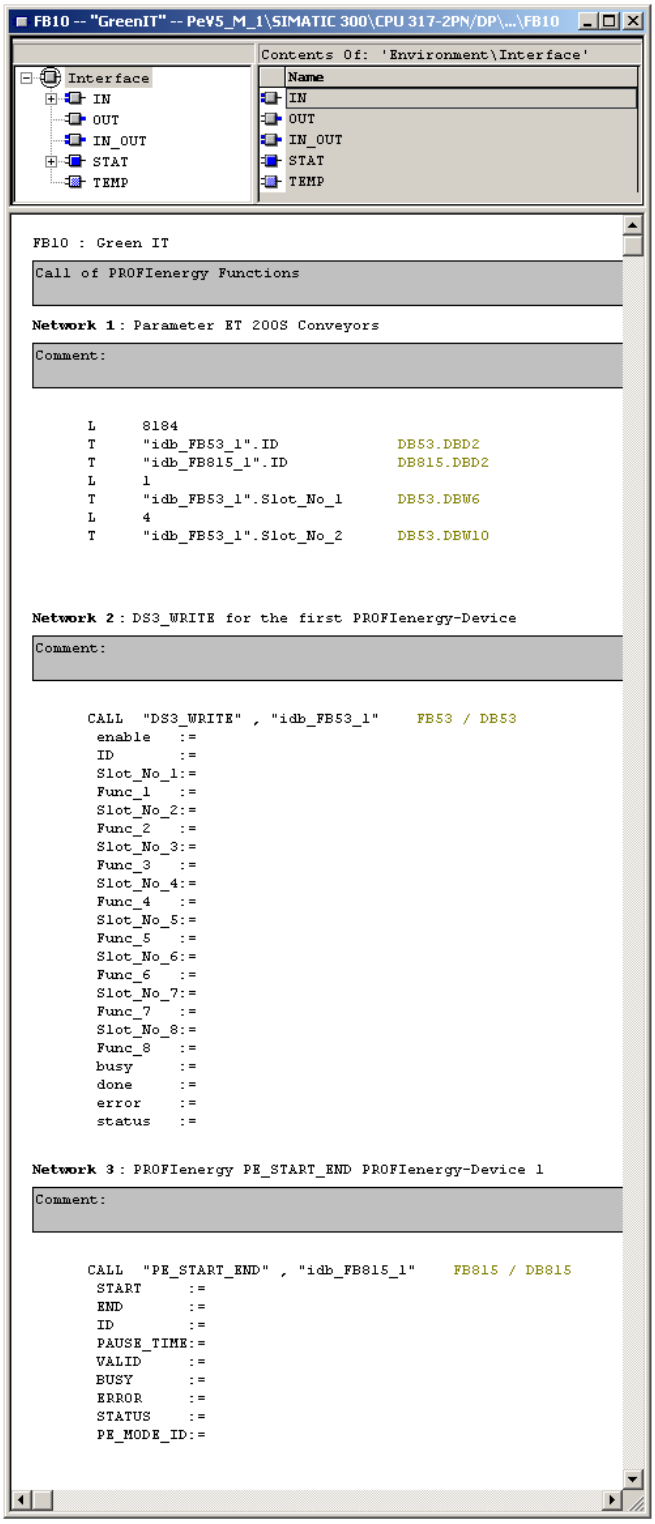
WARNING

All electronic modules that you plug after a PROFIenergy power module are switched off for this power module via the PAUSE command.

5.3 Setting of the PROFIenergy program

The FB 10 "Green IT" contains all PROFIenergy functions.

Figure 5-4



The following passages contain an explanation.

Figure 5-5

```
FB10 : Green IT
Call of PROFIenergy Functions
Network 1: Parameter ET 200S Conveyors
Comment:

      L     8184
      T     "idb_FB53_1".ID              DB53.DBD2
      T     "idb_FB815_1".ID             DB815.DBD2
      L     1
      T     "idb_FB53_1".Slot_No_1       DB53.DBW6
      L     4
      T     "idb_FB53_1".Slot_No_2       DB53.DBW10
```

The selection of the FB53 "DS3_WRITE“ is set via the instance data block DB53 "idb_FB53_1“ for the first PROFIenergy device.

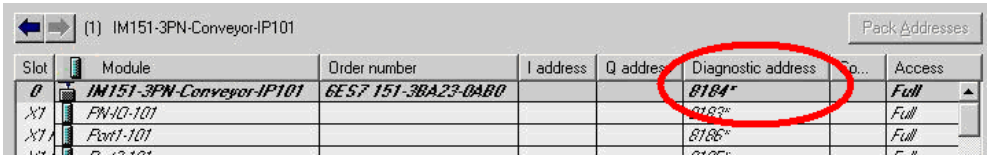
The selection of the FB815 "PE_START_END“ is set via the instance data blockDB815 "idb_FB815_1“ for the first PROFIenergy device.

DB54 and DB817 are the instance data blocks for the second PROFIenergy device which are explained under FB10.

In network 1 the static and the dynamic values are recorded consistently in the iDB.

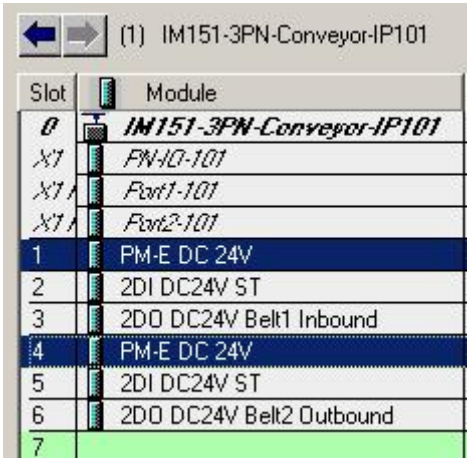
ID: Diagnosis address of the PROFIenergy device from the hardware configuration. Here 8184 for the first ET 200S

Figure 5-6



Slot_No_x : Slot number of a PROFIenergy-enabled power module. Here 1 and 4.

Figure 5-7



FB 53 "DS3_WRITE“

In network 2 the FB53 is selected for the first PROFIenergy device (first ET 200S).

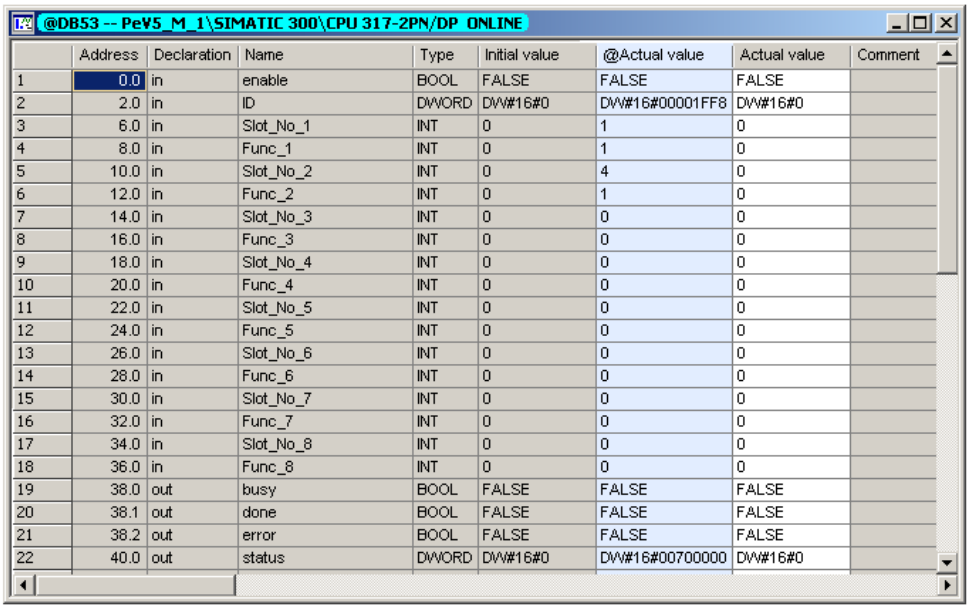
Figure 5-8

```
Network 2 : DS3_WRITE for the first PROFIenergy-Device
Comment:

CALL  "DS3_WRITE" , "idb_FB53_1"     FB53 / DB53
 enable    :=
 ID        :=
 Slot_No_1:=
 Func_1    :=
 Slot_No_2:=
 Func_2    :=
 Slot_No_3:=
 Func_3    :=
 Slot_No_4:=
 Func_4    :=
 Slot_No_5:=
 Func_5    :=
 Slot_No_6:=
 Func_6    :=
 Slot_No_7:=
 Func_7    :=
 Slot_No_8:=
 Func_8    :=
 busy      :=
 done      :=
 error     :=
 status    :=
```

Setting and operation via the corresponding instance data block DB53 "idb_FB53_1“ for the first PROFIenergy device.

Figure 5-9

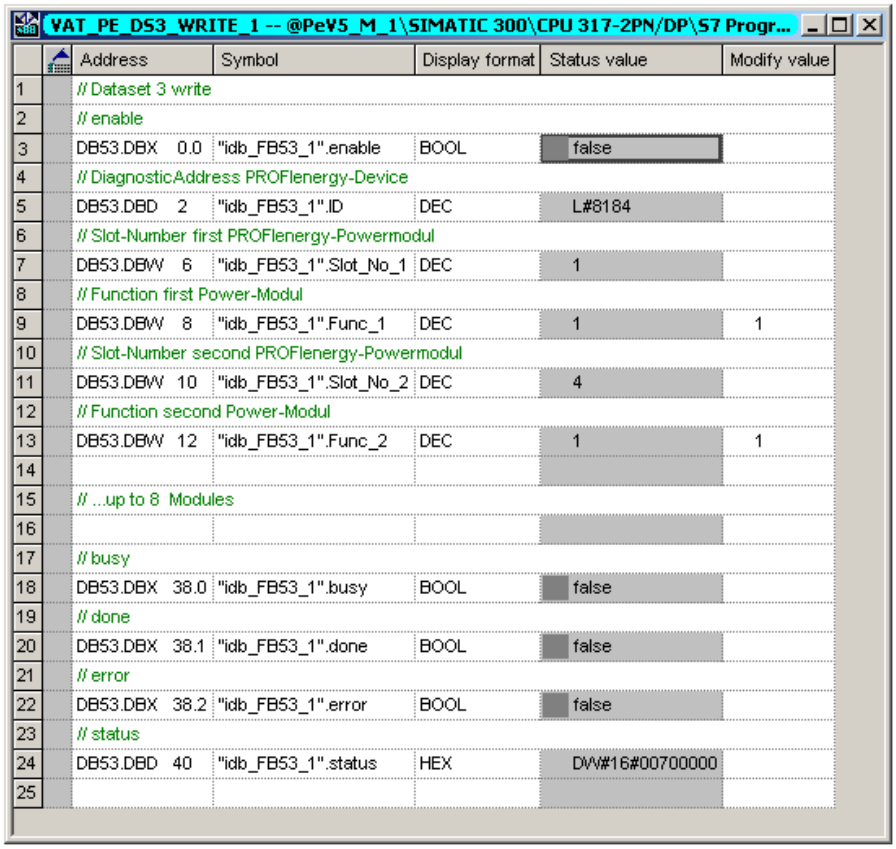


@DB53 -- Pe¥5_M_1\SIMATIC 300\CPU 317-2PN/DP ONLINE

	Address	Declaration	Name	Type	Initial value	@Actual value	Actual value	Comment
1	0.0	in	enable	BOOL	FALSE	FALSE	FALSE	
2	2.0	in	ID	DWORD	DW#16#0	DW#16#00001FF8	DW#16#0	
3	6.0	in	Slot_No_1	INT	0	1	0	
4	8.0	in	Func_1	INT	0	1	0	
5	10.0	in	Slot_No_2	INT	0	4	0	
6	12.0	in	Func_2	INT	0	1	0	
7	14.0	in	Slot_No_3	INT	0	0	0	
8	16.0	in	Func_3	INT	0	0	0	
9	18.0	in	Slot_No_4	INT	0	0	0	
10	20.0	in	Func_4	INT	0	0	0	
11	22.0	in	Slot_No_5	INT	0	0	0	
12	24.0	in	Func_5	INT	0	0	0	
13	26.0	in	Slot_No_6	INT	0	0	0	
14	28.0	in	Func_6	INT	0	0	0	
15	30.0	in	Slot_No_7	INT	0	0	0	
16	32.0	in	Func_7	INT	0	0	0	
17	34.0	in	Slot_No_8	INT	0	0	0	
18	36.0	in	Func_8	INT	0	0	0	
19	38.0	out	busy	BOOL	FALSE	FALSE	FALSE	
20	38.1	out	done	BOOL	FALSE	FALSE	FALSE	
21	38.2	out	error	BOOL	FALSE	FALSE	FALSE	
22	40.0	out	status	DWORD	DW#16#0	DW#16#00700000	DW#16#0	

The structure can be read better via the corresponding variable table.

Figure 5-10



VAT_PE_DS3_WRITE_1 -- @Pe¥5_M_1\SIMATIC 300\CPU 317-2PN/DP\S7 Progr...

	Address	Symbol	Display format	Status value	Modify value
1	// Dataset 3 write				
2	// enable				
3	DB53.DBX 0.0	"idb_FB53_1".enable	BOOL	false	
4	// DiagnosticAddress PROFIenergy-Device				
5	DB53.DBD 2	"idb_FB53_1".ID	DEC	L#8184	
6	// Slot-Number first PROFIenergy-Powermodul				
7	DB53.DBW 6	"idb_FB53_1".Slot_No_1	DEC	1	
8	// Function first Power-Modul				
9	DB53.DBW 8	"idb_FB53_1".Func_1	DEC	1	1
10	// Slot-Number second PROFIenergy-Powermodul				
11	DB53.DBW 10	"idb_FB53_1".Slot_No_2	DEC	4	
12	// Function second Power-Modul				
13	DB53.DBW 12	"idb_FB53_1".Func_2	DEC	1	1
14					
15	// ...up to 8 Modules				
16					
17	// busy				
18	DB53.DBX 38.0	"idb_FB53_1".busy	BOOL	false	
19	// done				
20	DB53.DBX 38.1	"idb_FB53_1".done	BOOL	false	
21	// error				
22	DB53.DBX 38.2	"idb_FB53_1".error	BOOL	false	
23	// status				
24	DB53.DBD 40	"idb_FB53_1".status	HEX	DW#16#00700000	
25					

Here you can see the firmly recorded address (8184) and the slot numbers (1;4) as well as the variable commands:

Func_1 : Function of the first PROFIenergy power module. Here "1" for participating in the pause. Insert "0" if the module shall not participate in a pause.

enable: is the start bit which transfers the data set to the PROFIenergy device.

You can change the variable commands here in the variable table or via the HMI.

FB815 "PE_START_END“

In network 3 the FB815 is selected for the first PROFIenergy device (first ET 200S).

Figure 5-11

```
Network 3 : PROFIenergy PE_START_END PROFIenergy-Device 1
Comment:

      CALL  "PE_START_END" , "idb_FB815_1"     FB815 / DB815
       START     :=
       END       :=
       ID        :=
       PAUSE_TIME:=
       VALID     :=
       BUSY      :=
       ERROR     :=
       STATUS    :=
       PE_MODE_ID:=
```

Setting and operation via the corresponding instance data block DB815 "idb_FB815_1“ for the first PROFIenergy device.

Figure 5-12

@DB815 -- PeV5_M_1\SIMATIC 300\CPU 317-2PN/DP ONLINE

	Address	Declaration	Name	Type	Initial value	@Actual value	Actual value	Comment
1	0.0	in	START	BOOL	FALSE	FALSE	FALSE	START PAUSE
2	0.1	in	END	BOOL	FALSE	FALSE	FALSE	END_PAUSE
3	2.0	in	ID	DWORD	DW#16#0	DW#16#00001FF8	DW#16#0	
4	6.0	in	PAUSE_TIME	TIME	T#0MS	T#10S	T#0MS	
5	10.0	out	VALID	BOOL	FALSE	FALSE	FALSE	
6	10.1	out	BUSY	BOOL	FALSE	FALSE	FALSE	
7	10.2	out	ERROR	BOOL	FALSE	FALSE	FALSE	
8	12.0	out	STATUS	DWORD	DW#16#0	DW#16#00000000	DW#16#0	
9	16.0	out	PE_MODE_ID	BYTE	B#16#0	B#16#01	B#16#0	

The structure can be read better via the corresponding variable table.

Figure 5-13

VAT_PE_START_END_1 -- @PeV5_M_1\SIMATIC 300\CPU 317-2PN/DP\S7 Progra...

	Address	Symbol	Display format	Status value	Modify value
1	// Start_Pause / End_Pause with FB 815 "PE_START_END"				
2	// Start_Pause				
3	DB815.DBX 0.0	"idb_FB815_1".START	BOOL	false	
4	// End_Pause				
5	DB815.DBX 0.1	"idb_FB815_1".END	BOOL	false	
6	// DiagnosticAddress PROFIenergy-Device				
7	DB815.DBD 2	"idb_FB815_1".ID	DEC	L#8184	
8	// PAUSE_TIME				
9	DB815.DBD 6	"idb_FB815_1".PAUSE_TIME	DEC	L#10000	L#10000
10					
11	// valid				
12	DB815.DBX 10.0	"idb_FB815_1".VALID	BOOL	false	
13	// busy				
14	DB815.DBX 10.1	"idb_FB815_1".BUSY	BOOL	false	
15	// error				
16	DB815.DBX 10.2	"idb_FB815_1".ERROR	BOOL	false	
17	// Status				
18	DB815.DBD 12	"idb_FB815_1".STATUS	HEX	DW#16#00000000	
19	// PE_MODE_ID				
20	DB815.DBB 16	"idb_FB815_1".PE_MODE_ID	HEX	B#16#01	
21					

Here you can see the firmly recorded address (8184) and the variable commands:

START: Command bit for starting the pause. The rising edge is analysed.

END: Command bit for stopping the pause. The rising edge is analysed.

PAUSE_TIME: The value must be higher than or equal to the minimum pause interval of the PROFIenergy device. Here 10 seconds each time (specification in milliseconds)

Tip

Tip: If you change the display format in the variable table to TIME you can insert the value directly in i.e. minutes.
T#10S, value range: T#1MS to T#24D20H31M23S647MS.

FB816 PE_CMD "open interface“

In network 7 the FB816 is selected. The addresses for additional command parameters CMD_PARA and for the Response_Data are default. The address for the PROFIenergy device is configured seperately for each job.

Figure 5-14

```
Network 7: PROFIenergy PE_CMD
Comment:

      CALL  "PE_CMD" , "idb_FB816"              FB816 / DB816
       REQ           :=
       ID            :=
       CMD           :=
       CMD_MODIFIER  :=
       CMD_PARA      :=P#M 240.0 BYTE 16
       CMD_PARA_LEN  :=
       VALID         :=
       BUSY          :=
       ERROR         :=
       STATUS        :=
       RESPONSE_DATA:=P#DB400.DBX0.0 BYTE 200
```

Configuration and operation via the corresponding instance data block DB816 "idb_FB816“.

Figure 5-15

@DB816 -- PE_ET2005_V11\SIMATIC 300\CPU 317-2PN/DP ONLINE

	Address	Declaration	Name	Type	Initial value	@Actual value	Actual value	Comment
1	0.0	in	REQ	BOOL	FALSE	FALSE	FALSE	Start-Auftrag
2	2.0	in	ID	DWORD	DW#16#0	DW#16#00001FF8	DW#16#0	
3	6.0	in	CMD	BYTE	B#16#0	B#16#01	B#16#0	
4	7.0	in	CMD_MODIFIER	BYTE	B#16#0	B#16#00	B#16#0	
5	8.0	in	CMD_PARA	ANY	P#P 0.0 VOID 0		P#P 0.0 VOID 0	
6	18.0	in	CMD_PARA_LEN	INT	0	0	0	
7	20.0	out	VALID	BOOL	FALSE	FALSE	FALSE	
8	20.1	out	BUSY	BOOL	FALSE	FALSE	FALSE	
9	20.2	out	ERROR	BOOL	FALSE	FALSE	FALSE	
10	22.0	out	STATUS	DWORD	DW#16#0	DW#16#00000000	DW#16#0	
11	26.0	in_out	RESPONSE_DATA	ANY	P#P 0.0 VOID 0		P#P 0.0 VOID 0	

The query's result is saved in the DB400 "Response_Data“. The requested data are stored starting from data byte 10. Structure and interpretation of this data area depend on the job.
See Chapter 4.4.

Figure 5-16

@DB400 -- "Response_Data" -- Pe¥5_M_1\SIMATIC 300\CPU 317-2PN/DP\...\DB400 ONLINE

Address	Name	Type	Initial valu	Actual valu	Comment
0.0	header.Blocktype	WORD	W#16#0	W#16#0801	
2.0	header.Blocklength	WORD	W#16#0	W#16#0028	
4.0	header.Blockversion	WORD	W#16#0	W#16#0100	
6.0	header.Service_Request_ID	BYTE	B#16#0	B#16#03	
7.0	header.Request_Reference	BYTE	B#16#0	B#16#CC	
8.0	header.Status	BYTE	B#16#0	B#16#01	
9.0	header.Data_Structure_Ident	BYTE	B#16#0	B#16#02	
10.0	Data[0]	BYTE	B#16#0	B#16#01	vorläufige Platzk
11.0	Data[1]	BYTE	B#16#0	B#16#00	
12.0	Data[2]	BYTE	B#16#0	B#16#00	
13.0	Data[3]	BYTE	B#16#0	B#16#00	
14.0	Data[4]	BYTE	B#16#0	B#16#27	
15.0	Data[5]	BYTE	B#16#0	B#16#10	
16.0	Data[6]	BYTE	B#16#0	B#16#00	
17.0	Data[7]	BYTE	B#16#0	B#16#00	
18.0	Data[8]	BYTE	B#16#0	B#16#00	
19.0	Data[9]	BYTE	B#16#0	B#16#00	
20.0	Data[10]	BYTE	B#16#0	B#16#00	
21.0	Data[11]	BYTE	B#16#0	B#16#00	
22.0	Data[12]	BYTE	B#16#0	B#16#27	
23.0	Data[13]	BYTE	B#16#0	B#16#10	
24.0	Data[14]	BYTE	B#16#0	B#16#00	
25.0	Data[15]	BYTE	B#16#0	B#16#00	
26.0	Data[16]	BYTE	B#16#0	B#16#00	
27.0	Data[17]	BYTE	B#16#0	B#16#00	
28.0	Data[18]	BYTE	B#16#0	B#16#FF	
29.0	Data[19]	BYTE	B#16#0	B#16#FF	
30.0	Data[20]	BYTE	B#16#0	B#16#FF	
31.0	Data[21]	BYTE	B#16#0	B#16#FF	
32.0	Data[22]	BYTE	B#16#0	B#16#00	
33.0	Data[23]	BYTE	B#16#0	B#16#00	
34.0	Data[24]	BYTE	B#16#0	B#16#00	
35.0	Data[25]	BYTE	B#16#0	B#16#00	
36.0	Data[26]	BYTE	B#16#0	B#16#00	
37.0	Data[27]	BYTE	B#16#0	B#16#00	
38.0	Data[28]	BYTE	B#16#0	B#16#00	
39.0	Data[29]	BYTE	B#16#0	B#16#00	
40.0	Data[30]	BYTE	B#16#0	B#16#00	
41.0	Data[31]	BYTE	B#16#0	B#16#00	
42.0	Data[32]	BYTE	B#16#0	B#16#00	
43.0	Data[33]	BYTE	B#16#0	B#16#00	

The structure can be read better via the corresponding variable table. We prepared variable tables (VAT) for some sample jobs; here the PROFIenergy command "Query Modes - Get mode“ is explained.

Figure 5-17

VAT_PE_CMD_Get_Mode -- @PE_ET200S_V11\SIMATIC 300\CPU 317-2PN/DP\S7 Program...

	Address	Symbol	Display format	Status value	Modify value
1	// FB816 PE_CMD open interface				
2	// REQ enable				
3	DB816.DBX 0.0	"idb_FB816".REQ	BOOL	false	
4	// ID Diagnosticaddress PE-Device 1: "8184" or 2:"8178"				
5	DB816.DBD 2	"idb_FB816".ID	DEC	L#8184	L#8184
6	// CMD				
7	// 1 = Start Pause 2 = End Pause				
8	// 3 = Query Modes 4 = PEM Status				
9	// 5 = PE Identify 16 = Query Measurment				
10	DB816.DBB 6	"idb_FB816".CMD	DEC	3	3
11	// CMD_MODIFIER Command Modifier				
12	DB816.DBB 7	"idb_FB816".CMD_MODIFIER	DEC	2	2
13	// CMD_PARA Command Parameter Pointer to Array MB240 - 255				
14	// "1" for Mode 1				
15	MB 240		DEC	1	1
16	// CMD_PARA_LEN Command length				
17	DB816.DBW 18	"idb_FB816".CMD_PARA_LEN	DEC	1	1
18	// VALID				
19	DB816.DBX 20.0	"idb_FB816".VALID	BOOL	false	
20	// BUSY				
21	DB816.DBX 20.1	"idb_FB816".BUSY	BOOL	false	
22	// ERROR				
23	DB816.DBX 20.2	"idb_FB816".ERROR	BOOL	false	
24	// STATUS				
25	DB816.DBD 22	"idb_FB816".STATUS	HEX	DW#16#00000000	DW#16#00000000
26					
27	// RESPONSE_DATA				
28	// PE_MODE_ID				
29	DB400.DBB 10	"Response_Data".Data[0]	DEC	1	0
30	// PE_MODE_Attributes				
31	DB400.DBB 11	"Response_Data".Data[1]	DEC	0	0
32	// Time_min_Pause				
33	DB400.DBD 12		DEC	L#10000	L#0
34	// Time_to_Pause				
35	DB400.DBD 16		DEC	L#0	L#0
36	// Time_to_operate				
37	DB400.DBD 20		DEC	L#10000	L#0
38	// Time_min_length_of_stay				
39	DB400.DBD 24		DEC	L#0	L#0
40	// Time_max_length_of_stay				
41	DB400.DBD 28		HEX	DW#16#FFFFFFFF	DW#16#00000000
42	// Mode_Power_Consumption				
43	DB400.DBD 32		FLOATING_P...	0.0	0.0
44	// Energy_Consumption_to_Pause				
45	DB400.DBD 36		FLOATING_P...	0.0	0.0
46	// Energy_Consumption_to_Operate				
47	DB400.DBD 40		FLOATING_P...	0.0	
48					

Insert the address of the selected PROFIenergy device into line 5 "ID". Activate the control values. Response data are preassigned with "0". Start the query with an edge on line 3 "REQ".

See also Chapter 4.4

Request data:

CMD = 3 "Query Mode“

CMD_ MODIFIER = 2 "Get Mode“

CMD_PARA_LEN = 1 one further parameter in CMD_PARA

CMD_PARA = 1 PE_MODE

Response_Data in the DB400 starting from DW10:

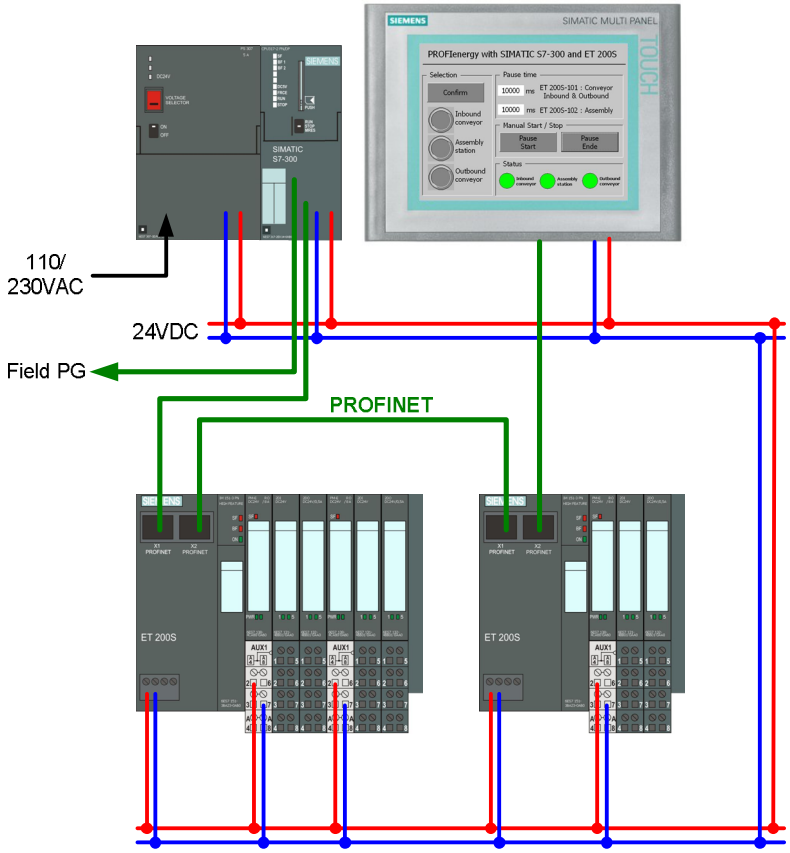
Parameters	**Value**	**Data type**
PE_Mode_ID	0x01	Unsigned8
PE_Mode_Attributes	0x00	Unsigned8
Time_min_Pause	10000	Unsigned32
Time_to_Pause	0	Unsigned32
Time_to_operate	10000	Unsigned32
Time_min_length_of_stay	0	Unsigned32
Time_max_length_of_stay	FFFFFFFF	Unsigned32
Mode_Power_ Consumption	0.0	Float32
Energy_ Consumption_to_pause	0.0	Float32
Energy_ Consumption_to_operate	0.0	Float32

6 Installation

6.1 Installation of the hardware

The figure below shows the hardware setup of the application.

Figure 6-1



Note The setup guidelines /3/ for SIMATIC S7 and ET200S must generally be followed.

You need a MMC memory card to operate the S7 CPU; the ET200S can be operated without.

CAUTION **For multi-range power supplies you must pay attention to the correct setting of the selector switch for the input voltage.**

Sensors and actuators can be connected to the I/O modules; additionally they can be connected to the respective inputs and outputs to serve as feedback. A power supply for the connected sensors and actuators has to be wired from the corresponding I/O module.

6.2 Installing the software

You need STEP 7 Version 5.5 to configure the ET 200S and the PROFIenergy-enabled power module. Install them according to the delivered installation instructions. Further software packages or special settings for PROFIenergy are not required.

If you want to operate the system via a panel or the corresponding Runtime you should install the current WinCC flexible Version 2008. This is optional as PROFIenergy runs independently from WinCC flexible.

To integrate PROFIenergy the following blocks and corresponding SFBs are required:

- FB 815 "PE_START_END“
- FB 816 "PE_CMD“
- FB 53 "DS3_WRITE“

You find all blocks in the STEP 7 project of the application example. You can copy all delivered blocks into an user-specific project and, if required, rename them. You can use all PROFIenergy blocks without a licence.

6.3 Installing the application software

Download the application project from our Service & Support Portal. You find the link to the site at the beginning of this document. Copy the project (STEP 7 archive in zip-format) to the configuration computer (SIMATIC Field PG) and open it in the SIMATIC Manager via the menue "File->Retrieve...".

7 Commisioning of the application

7.1 Preparation

Table 7-1

No.	Action	Note
1	Make sure that the hardware structure and configuration correspond.	
2	Check the settings of the voltage supply. Switch on the plant.	Pay attention to all necessary provisions and safety regulations.
	If necessary, download the latest firmware for the CPU and the IM-151 from our Service & Support portal and update the modules.	In doing so, pay attention to the corresponding manuals and enclosed instructions.
3	Connect the SIMATIC Field PG to the plant and select the correct interface via the function "Select PG/PC interface...".	You find these settings, among others, under "Extras" in the main menu.

7.2 Commissioning

Table 7-2

No.	Action	Note
1	Assign the device names and the IP addresses to the stations. S7-CPU 317 X2 PN-IO: Name: PN-IO-100, IP-Adr.: 192.168.1.100 ET 200S "Conveyor“: Device name: IM151-3PN-Conveyor-IP101 IP-Adr.: 192.168.1.101 ET200S "Assembly“ : Device name: IM151-3PN-Assembly-IP102 102, IP-Adr.: 192.168.1.102	For that purpose use the function in the hardware configuration under "PLC“ -> "Ethernet“: - edit Ethernet nodes and - assign device names
2	Download the hardware configuration to the CPU.	
3	Download the application program to the CPU.	
4	If no errors occured and the CPU is set to "RUN", two outputs of the first ET200S "Conveyor" should blink and one output of the second ET200S "Assembly" should be set to "ON".	
5	If you have WInCC flexible, open the SIMATIC HMI station and the WinCC flexible project, now.	
6	If you do not have a panel, you can directly start the Runtime.	Via "Project"->"Generator"->"Start Runtime"
7	If you have a panel, set "Ethernet" and the IP address, now. 192.168.1.103	Via "Control Panel"->"Transfer"->"Advanced"->"LAN"
8	Set the panel to "Transfer" and load the project from the PG to the panel.	

8 Operating the application

8.1 Overview

There are three options for operating the plant:

- HMI Panel
- HMI Runtime (equivalent to the panel)
- Variable table in STEP 7

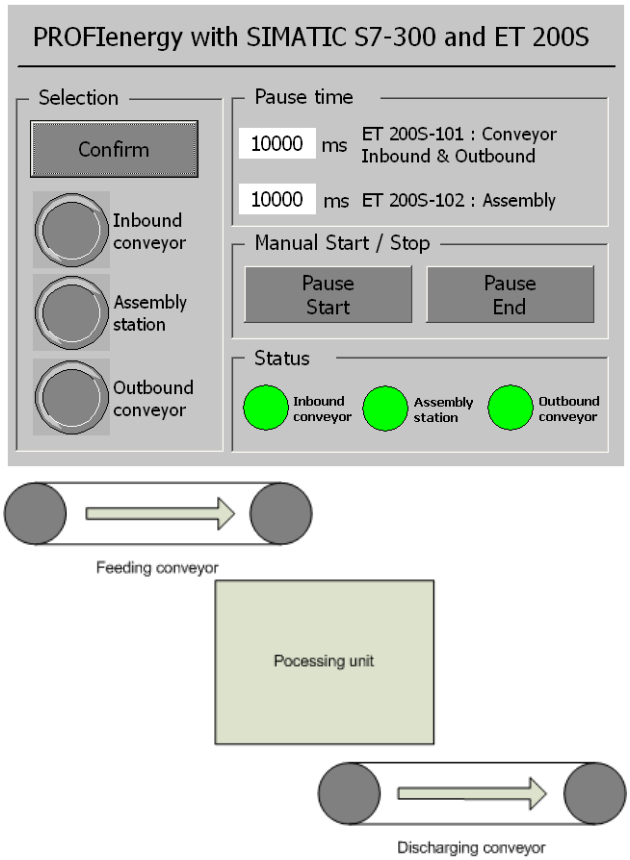
There are no functional differences; exclusively the way how control bits are set differs. In a real application a time- or event-controlled program would set the corresponding control bits.

Recall:

If we talk in the following about switching off the PROFIenergy power module or about the "Discharging" etc. this does not mean the drives of the plant, but via the DI/DO, the sensors and actuators, so actually the limit switches, monitors for belt-misalignment and secondary drives in neutral. As mentioned already the very functions (belt drive) have to be switched off regularly before.

8.2 Operation with HMI

Figure 8-1



Scenario "All OFF“

Table 8-1

No.	Action	Note
1	Select a pause interval of 10,000 ms for both ET200S.	The ET200S accept a minimum pause time of 10 seconds (10,000 ms). Otherwise the power modules remain switched on.
2	You select all three switches in the field "Select".	All groups (PROFIenergy power module) shall participate in the pause.
3	Click the “Confirm” button.	The parameters are sent to the ET200S.
4	Click the “Pause Start” button.	The PROFIenergy command is triggered.
5	The feedbacks in the field "Status" are permanently switched OFF; the in- and outputs at the ETs are also switched OFF.	It is pause! The outputs of the IO groups are switched off, the LEDs go out.
6	Click the “Pause End” button.	The pause ends for all selected PM-E.
7	The field "Status" now shows the feedbacks again	State of the DI/DO

Scenario "Selective Switch-off"

Table 8-2

No.	Action	Note
1	Select a pause interval of 10,000 ms for both ET200S.	The ET200S currently only accept a minimum pause time of 10 seconds (10,000 ms). Otherwise the power modules remain switched on.
2	In the field "Select" you only activate the switch for the group "feeding conveyor belt"; switch OFF the two other switches.	Only the first group (PROFIenergy power module) of the first ET 200S shall participate in the pause. The feeding conveyor belt was switched off (at another place); now the corresponding I/O shall be switched off.
3	Click the “Confirm” button.	The parameters are sent to the ET200S.
4	Click the “Pause Start” button.	The PROFIenergy command is triggered.
5	In the field "Status" the feedback for the feeding and the procession is still switched on; only the discharging conveyor belt is permanently switched OFF.	Only the group Feeding pauses. After the belt has been switched off the remaining I/O of the belt can be switched-off as well.
6	In the field "Select" you activate now the switch for the group "Processing" as well.	In addition, now the first group (PROFIenergy power module) of the second ET 200S shall participate in the pause.
7	Click the “Confirm” button.	The parameters are sent to the ET200S.
8	Click the “Pause Start” button.	The PROFIenergy command is triggered.
9	In addition there are no feedbacks of the "Processing"	After the processing has been completed, the corresponding I/O can be switched off.
10	Now, repeat steps 6 to 8 for "Discharging"	Now the complete I/O is switched OFF
11	You can switch on the I/O of the complete plant by pressing the button "Pause End"	If you want to switch on the I/O step by step analogously to the switch-on sequence you omit this step and go ahead with the next scenario which is "Selective switch-on"

Scenario "Selective switch-on"

Table 8-3

No.	Action	Note
1	Deactivate the switch for the group "Discharging" in the field "Select"; the two other switches remain active.	Then plant shall be switched on against conveying direction; for this purpose first of all the sensors of the discharging conveyer belt must be switched on.
2	Click the “Confirm” button.	The parameters are sent to the ET200S.
3	Click the “Pause Start” button.	The discharging conveying shall no longer participate in the pause and is switched on again.
5	Now, repeat steps 1 to 3 for "Processing“.	The I/O of the "Processing" are switched on again.
6	Either - you repeat the steps 1 to 3 now for "Feeding" or - you click the “Pause End” button.	- The last group is switched on as well or - all groups that are still in the pause mode are switched on again.

Scenario "Pause interval too short"

Table 8-4

No.	Action	Note
1	Change the pause interval for "Processing" to 5,000 ms.	Due to its long heating time the processing shall pause only for 5 seconds
2	You select all three switches in the field "Select".	
3	Click the “Confirm” button.	
4	Click the “Pause Start” button.	
5	The two groups "Transport" are switched off; the group "Processing" remains switched ON	The required pause interval of 5 seconds is shorter than the minimum pause interval that is default on the IM151-3 PN IO. This PROFIenergy device **cannot** participate in the pause.

8.3 Operating with a variable table (VAT)

In the following the command bits of the variable tables are described that correspond to the commands triggered above.

Selection:

Click: idb_FB53_1.enable und idb_FB53_2.enable

Feeding conveyor belt: idb_FB53_1.Func_1

Edit: idb_FB53_2.Func_1

Discharging conveyor belt: idb_FB53_1.Func_2

Pause interval:

Belts: idb_FB815_1.PAUSE_TIME

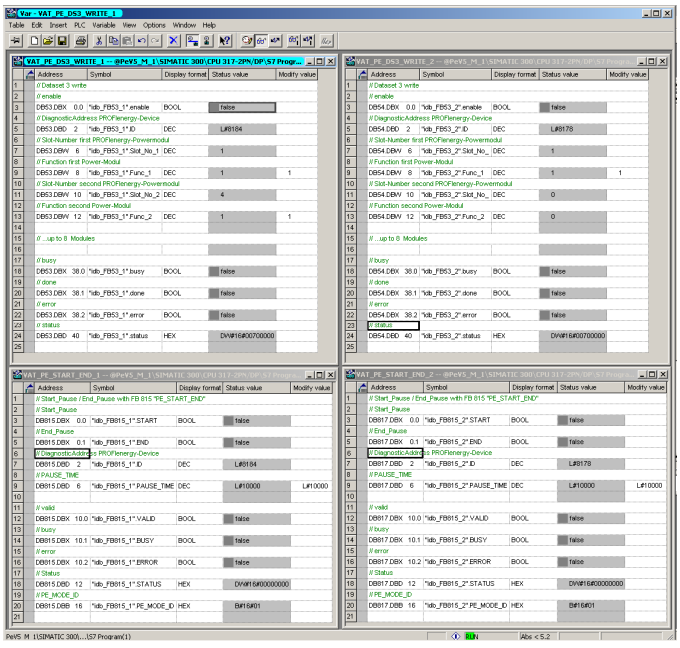
Processing: idb_FB815_2.PAUSE_TIME

Manual operation:

Pause Start: idb_FB815_1.START and idb_FB815_2.START

Pause End: idb_FB815_1.END und idb_FB815_2.END

Figure 8-2

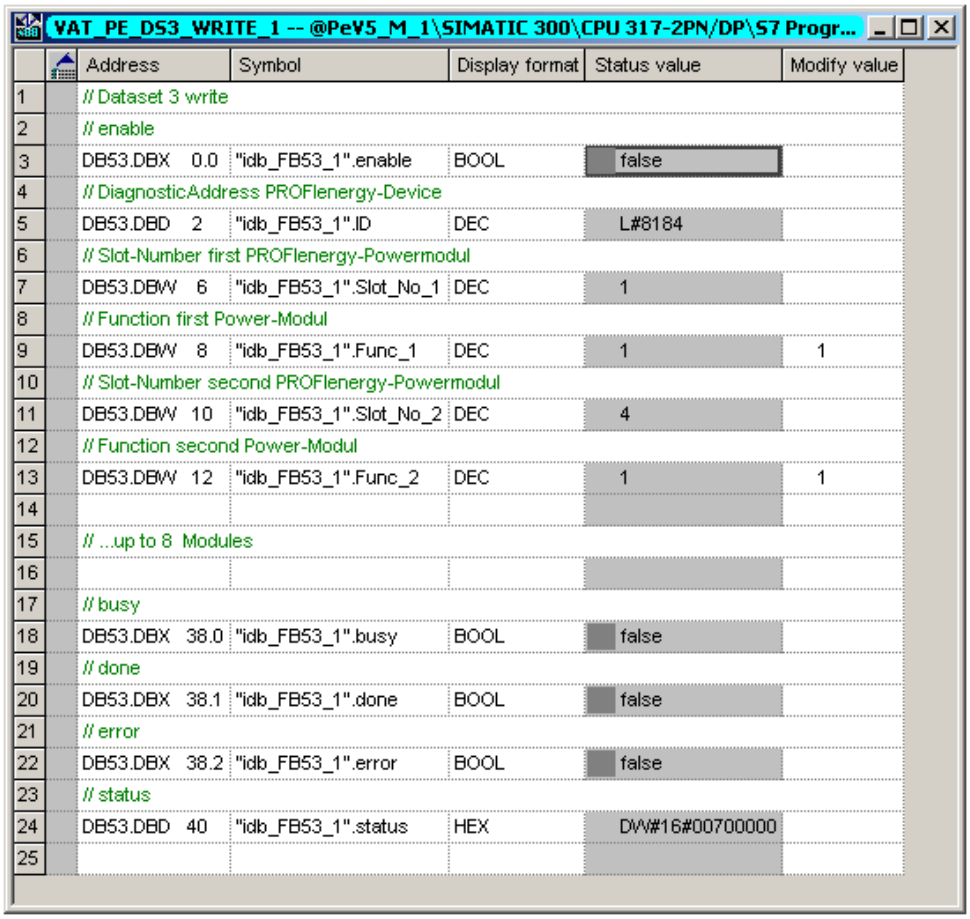


All the four required variable tables fit into one window. You can also delete not required lines and combine the variables in one table.

In the following paragraphs the individual tables are explained.

VAT_PE_DS3_WRITE_1 for the first PROFIenergy device

Figure 8-3



VAT_PE_DS3_WRITE_1 -- @PeV5_M_1\SIMATIC 300\CPU 317-2PN/DP\S7 Progr...

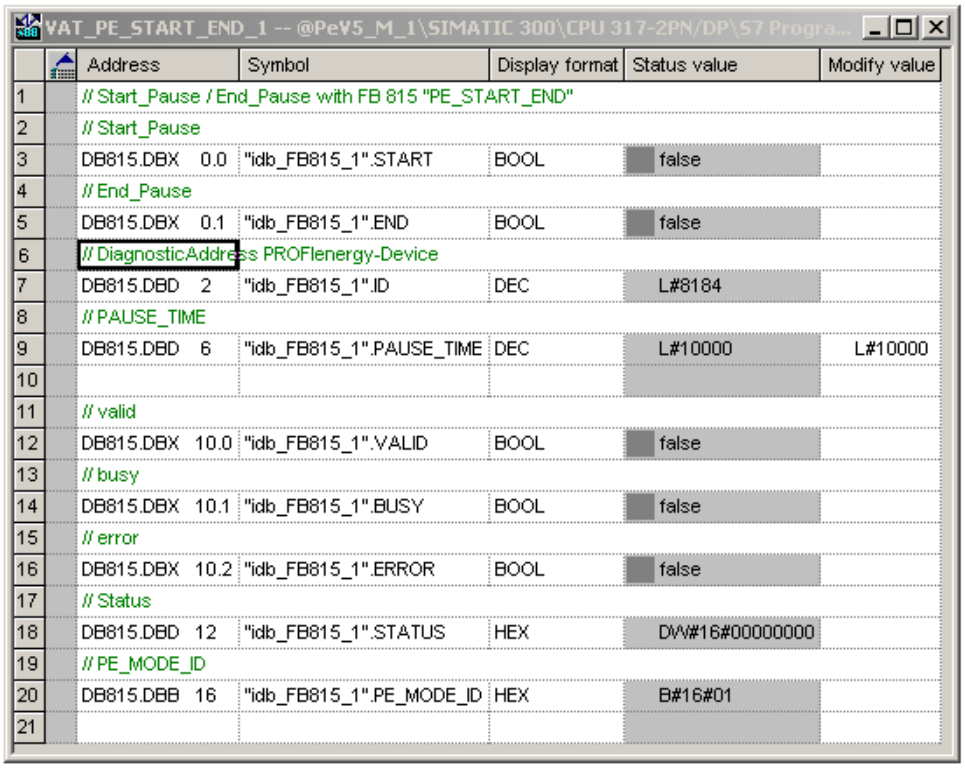
	Address	Symbol	Display format	Status value	Modify value
1	// Dataset 3 write				
2	// enable				
3	DB53.DBX 0.0	"idb_FB53_1".enable	BOOL	false	
4	// DiagnosticAddress PROFIenergy-Device				
5	DB53.DBD 2	"idb_FB53_1".ID	DEC	L#8184	
6	// Slot-Number first PROFIenergy-Powermodul				
7	DB53.DBW 6	"idb_FB53_1".Slot_No_1	DEC	1	
8	// Function first Power-Modul				
9	DB53.DBW 8	"idb_FB53_1".Func_1	DEC	1	1
10	// Slot-Number second PROFIenergy-Powermodul				
11	DB53.DBW 10	"idb_FB53_1".Slot_No_2	DEC	4	
12	// Function second Power-Modul				
13	DB53.DBW 12	"idb_FB53_1".Func_2	DEC	1	1
14					
15	// ...up to 8 Modules				
16					
17	// busy				
18	DB53.DBX 38.0	"idb_FB53_1".busy	BOOL	false	
19	// done				
20	DB53.DBX 38.1	"idb_FB53_1".done	BOOL	false	
21	// error				
22	DB53.DBX 38.2	"idb_FB53_1".error	BOOL	false	
23	// status				
24	DB53.DBD 40	"idb_FB53_1".status	HEX	DW#16#00700000	
25					

You change the values Func_x via the field "Select" in the HMI. If the module shall participate in the pause, you enter "1"; otherwise you enter "0". "idb_FB53_1“.Func_1 is the feeding conveyor belt, "idb_FB53_1“.Func_2 is the discharging conveyor belt, "idb_FB53_2“.Func_1 (in VAT_PE_DS3_WRITE_2) is processing.

The button "Confirm" corresponds to the commands "idb_FB53_1“.enable and "idb_FB53_2“.enable. Of course, you only have to trigger the command "enable" if you wish to change this device. The block reacts to a positive edge which means that you should reset the command immediately.

VAT_PE_START_END_1 for the first PROFIenergy device

Figure 8-4



VAT_PE_START_END_1 -- @PeV5_M_1\SIMATIC 300\CPU 317-2PN/DP\S7 Progra...

	Address	Symbol	Display format	Status value	Modify value
1	// Start_Pause / End_Pause with FB 815 "PE_START_END"				
2	// Start_Pause				
3	DB815.DBX 0.0	"idb_FB815_1".START	BOOL	false	
4	// End_Pause				
5	DB815.DBX 0.1	"idb_FB815_1".END	BOOL	false	
6	// DiagnosticAddress PROFIenergy-Device				
7	DB815.DBD 2	"idb_FB815_1".ID	DEC	L#8184	
8	// PAUSE_TIME				
9	DB815.DBD 6	"idb_FB815_1".PAUSE_TIME	DEC	L#10000	L#10000
10					
11	// valid				
12	DB815.DBX 10.0	"idb_FB815_1".VALID	BOOL	false	
13	// busy				
14	DB815.DBX 10.1	"idb_FB815_1".BUSY	BOOL	false	
15	// error				
16	DB815.DBX 10.2	"idb_FB815_1".ERROR	BOOL	false	
17	// Status				
18	DB815.DBD 12	"idb_FB815_1".STATUS	HEX	DW#16#00000000	
19	// PE_MODE_ID				
20	DB815.DBB 16	"idb_FB815_1".PE_MODE_ID	HEX	B#16#01	
21					

Enter the pause interval via "idb_FB815_1“.PAUSE_TIME. You can enter larger intervals easily via the display "Time".

"idb_FB815_1“.START initiates the pause.

"idb_FB815_1“.END stops the pause

Always via a positive edge for the first PROFIenergy device "belts".

The second PROFIenergy device "Processing" is controlled via the variable table "VAT_PE_START_END_2" with the "idb_FB815_2“.

8.4 Reading parameters with the FB816 "PE_CMD“

As the interpretation of the read data depends on the PROFIenergy command here the open command interface is operated exclusively via variable tables. All commands that are currently available are listed in chapter 4. In the STEP 7 project for the application example you find some prepared variable tables (VAT) for the PROFIenergy commands; here the PROFIenergy command "Query Modes - Get mode“ is explained.

Figure 8-5

VAT_PE_CMD_Get_Mode -- @PE_ET200S_V11\SIMATIC 300\CPU 317-2PN/DP\S7 Program...

	Address	Symbol	Display format	Status value	Modify value
1	// FB816 PE_CMD open interface				
2	// REQ enable				
3	DB816.DBX 0.0	"idb_FB816".REQ	BOOL	false	
4	// ID Diagnosticaddress PE-Device 1: "8184" or 2:"8178"				
5	DB816.DBD 2	"idb_FB816".ID	DEC	L#8184	L#8184
6	// CMD				
7	// 1 = Start Pause 2 = End Pause				
8	// 3 = Query Modes 4 = PEM Status				
9	// 5 = PE Identify 16 = Query Measurment				
10	DB816.DBB 6	"idb_FB816".CMD	DEC	3	3
11	// CMD_MODIFIER Command Modifier				
12	DB816.DBB 7	"idb_FB816".CMD_MODIFIER	DEC	2	2
13	// CMD_PARA Command Parameter Pointer to Array MB240 - 255				
14	// "1" for Mode 1				
15	MB 240		DEC	1	1
16	// CMD_PARA_LEN Command length				
17	DB816.DBW 18	"idb_FB816".CMD_PARA_LEN	DEC	1	1
18	// VALID				
19	DB816.DBX 20.0	"idb_FB816".VALID	BOOL	false	
20	// BUSY				
21	DB816.DBX 20.1	"idb_FB816".BUSY	BOOL	false	
22	// ERROR				
23	DB816.DBX 20.2	"idb_FB816".ERROR	BOOL	false	
24	// STATUS				
25	DB816.DBD 22	"idb_FB816".STATUS	HEX	DW#16#00000000	DW#16#00000000
26					
27	// RESPONSE_DATA				
28	// PE_MODE_ID				
29	DB400.DBB 10	"Response_Data".Data[0]	DEC	1	0
30	// PE_MODE_Attributes				
31	DB400.DBB 11	"Response_Data".Data[1]	DEC	0	0
32	// Time_min_Pause				
33	DB400.DBD 12		DEC	L#10000	L#0
34	// Time_to_Pause				
35	DB400.DBD 16		DEC	L#0	L#0
36	// Time_to_operate				
37	DB400.DBD 20		DEC	L#10000	L#0
38	// Time_min_length_of_stay				
39	DB400.DBD 24		DEC	L#0	L#0
40	// Time_max_length_of_stay				
41	DB400.DBD 28		HEX	DW#16#FFFFFFFF	DW#16#00000000
42	// Mode_Power_Consumption				
43	DB400.DBD 32		FLOATING_P...	0.0	0.0
44	// Energy_Consumption_to_Pause				
45	DB400.DBD 36		FLOATING_P...	0.0	0.0
46	// Energy_Consumption_to_Operate				
47	DB400.DBD 40		FLOATING_P...	0.0	
48					

See also Chapter 4.4

Insert the address of the selected PROFIenergy device into line 5 "ID". Activate the control values; response data are set to "0". Start the query with a positive edge on line 3 "REQ".

Request data:

CMD = 3 "Query Mode“

CMD_ MODIFIER = 2 "Get Mode“

CMD_PARA_LEN = 1 one further parameter in CMD_PARA

CMD_PARA = 1 PE_MODE

Response_Data in the DB400 starting from DW10:

Parameters	Value	Data type
PE_Mode_ID	0x01	Unsigned8
PE_Mode_Attributes	0x00	Unsigned8
Time_min_Pause	10000	Unsigned32
Time_to_Pause	0	Unsigned32
Time_to_operate	10000	Unsigned32
Time_min_length_of_stay	0	Unsigned32
Time_max_length_of_stay	FFFFFFFF	Unsigned32
Mode_Power_Consumption	0.0	Float32
Energy_Consumption_to_pause	0.0	Float32
Energy_Consumption_to_operate	0.0	Float32

9 Annex

9.1 Annex A: Measurement list

The supported measurement values are hardware specific. This list is taken from Technical Specification PROFIenergy (Table 10-1).

9.1.1 Instantaneous measurements

Table 9-1

Measurement ID	Measurements	Unit	Phase	Aggregation	Duration
1	Voltage	V	a-n	rms	
2	Voltage	V	b-n	rms	
3	Voltage	V	c-n	rms	
4	Voltage	V	a-b	rms	
5	Voltage	V	b-c	rms	
6	Voltage	V	c-a	rms	
7	Current	A	a	rms	
8	Current	A	b	rms	
9	Current	A	c	rms	
10	Apparent Power	VA	a	Sliding Demand	200 ms
11	Apparent Power	VA	b	Sliding Demand	200 ms
12	Apparent Power	VA	c	Sliding Demand	200 ms
13	Active Power	W	a	Sliding Demand	200 ms
14	Active Power	W	b	Sliding Demand	200 ms
15	Active Power	W	c	Sliding Demand	200 ms
16	Reactive Power Qn	var	a	Sliding Demand	200 ms
17	Reactive Power Qn	var	b	Sliding Demand	200 ms
18	Reactive Power Qn	var	c	Sliding Demand	200 ms
19	Power factor	non	a	Sliding Demand	200 ms
20	Power factor	non	b	Sliding Demand	200 ms
21	Power factor	non	c	Sliding Demand	200 ms
22					
…					
29					
30	Frequency	Hz	total	Sliding Demand	10 s
31	Voltage	V	average-ph-n	rms	
32	Voltage	V	average-ph-ph	rms	
33	Current	A	average-abc	rms	
34	Reactive Power Qn	W	total	Sliding Demand	200 ms
35	Active Power	var	total	Sliding Demand	200 ms
36	Apparent Power	VA	total	Sliding Demand	200 ms

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37	Power factor	non	total	Sliding Demand	200 ms
38					
39					
Maximum					
40	Maximum Voltage	V	a-n	rms	
41	Maximum Voltage	V	b-n	rms	
42	Maximum Voltage	V	c-n	rms	
43	Maximum Voltage	V	a-b	rms	
44	Maximum Voltage	V	b-c	rms	
45	Maximum Voltage	V	c-a	rms	
46	Maximum Current	A	a	rms	
47	Maximum Current	A	b	rms	
48	Maximum Current	A	c	rms	
49	Maximum Apparent Power	VA	a	Sliding Demand	200 ms
50	Maximum Apparent Power	VA	b	Sliding Demand	200 ms
51	Maximum Apparent Power	VA	c	Sliding Demand	200 ms
52	Maximum Active Power	W	a	Sliding Demand	200 ms
53	Maximum Active Power	W	b	Sliding Demand	200 ms
54	Maximum Active Power	W	c	Sliding Demand	200 ms
55	Maximum Reactive Power Qn	var	a	Sliding Demand	200 ms
56	Maximum Reactive Power Qn	var	b	Sliding Demand	200 ms
57	Maximum Reactive Power Qn	var	c	Sliding Demand	200 ms
58	Maximum Power factor	non	a	Sliding Demand	200 ms
59	Maximum Power factor	non	b	Sliding Demand	200 ms
60	Maximum Power factor	non	c	Sliding Demand	200 ms
61	Maximum Frequency	Hz	total	Sliding Interval	10 s
62	Maximum Voltage	V	average-ph-n	rms	

63	Maximum Voltage	V	average-ph-ph	rms	
64	Maximum Current	A	average-abc	rms	
65	Maximum Active Power	W	total	Sliding Demand	200 ms
66	Maximum Reactive Power Qn	var	total	Sliding Demand	200 ms
67	Maximum Apparent Power	VA	total	Sliding Demand	200 ms
68	Maximum Power factor	non	total	Sliding Demand	200 ms
Minimum					
70	Minimum Voltage	V	a-n	rms	
71	Minimum Voltage	V	b-n	rms	
72	Minimum Voltage	V	c-n	rms	
73	Minimum Voltage	V	a-b	rms	
74	Minimum Voltage	V	b-c	rms	
75	Minimum Voltage	V	c-a	rms	
76	Minimum Current	A	a	rms	
77	Minimum Current	A	b	rms	
78	Minimum Current	A	c	rms	
79	Minimum Apparent Power	VA	a	Sliding Demand	200 ms
80	Minimum Apparent Power	VA	b	Sliding Demand	200 ms
81	Minimum Apparent Power	VA	c	Sliding Demand	200 ms
82	Minimum Active Power	W	a	Sliding Demand	200 ms
83	Minimum Active Power	W	b	Sliding Demand	200 ms
84	Minimum Active Power	W	c	Sliding Demand	200 ms
85	Minimum Reactive Power Qn	var	a	Sliding Demand	200 ms
86	Minimum Reactive Power Qn	var	b	Sliding Demand	200 ms
87	Minimum Reactive Power Qn	var	c	Sliding Demand	200 ms
88	Minimum Power factor	1	a	Sliding Demand	200 ms
89	Minimum Power factor	1	b	Sliding Demand	200 ms
90	Minimum Power factor	1	c	Sliding Demand	200 ms

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91	Minimum Frequency	Hz	total	Sliding Demand	10 s
92	Minimum Voltage	V	average-ph-n	rms	
93	Minimum Voltage	V	average-ph-ph	rms	
94	Minimum Current	A	average-abc	rms	
95	Minimum Active Power	W	total	Sliding Demand	200 ms
96	Minimum Reactive Power Qn	var	total	Sliding Demand	200 ms
97	Minimum Apparent Power	VA	total	Sliding Demand	200 ms
98	Minimum Power factor	non	total	Sliding Demand	200 ms

9.1.2 Demand measurements

Demand measurements are averages over a certain time.

Table 9-2

Measurement ID	Measurements	Unit	Phase	Aggregation	Duration [1)]	Subblock [1)]	End_time [1)]
150	Voltage	V	a-n	Sliding Demand	3 s	not defined	not defined
151	Voltage	V	b-n	Sliding Demand	3 s	not defined	not defined
152	Voltage	V	c-n	Sliding Demand	3 s	not defined	not defined
153	Voltage	V	a-b	Sliding Demand	3 s	not defined	not defined
154	Voltage	V	b-c	Sliding Demand	3 s	not defined	not defined
155	Voltage	V	c-a	Sliding Demand	3 s	not defined	not defined
156	Current	A	a	Sliding Demand	600 s	not defined	not defined
157	Current	A	b	Sliding Demand	600 s	not defined	not defined
158	Current	A	c	Sliding Demand	600 s	not defined	not defined
160	Voltage	V	average -ph-n	Sliding Demand	3 s	not defined	not defined
161	Voltage	V	average -ph-ph	Sliding Demand	3 s	not defined	not defined
162	Current	A	average -abc	Sliding Demand	600 s	not defined	not defined
163	Active Power	W	total	Sliding Demand	900 s	not defined	not defined
164	Reactive Power Qn	var	total	Sliding Demand	900 s	not defined	not defined
165	Apparent Power	VA	total	Sliding Demand	900 s	not defined	not defined
166	Power factor	1	total	Sliding Demand	not defined	not defined	not defined
167							

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Maximum							
170	Maximum Voltage	V	a-n	Sliding Demand	3 s	not defined	not defined
171	Maximum Voltage	V	b-n	Sliding Demand	3 s	not defined	not defined
172	Maximum Voltage	V	c-n	Sliding Demand	3 s	not defined	not defined
173	Maximum Voltage	V	a-b	Sliding Demand	3 s	not defined	not defined
174	Maximum Voltage	V	b-c	Sliding Demand	3 s	not defined	not defined
175	Maximum Voltage	V	c-a	Sliding Demand	3 s	not defined	not defined
176	Maximum Current	A	a	Sliding Demand	600 s	not defined	not defined
177	Maximum Current	A	b	Sliding Demand	600 s	not defined	not defined
178	Maximum Current	A	c	Sliding Demand	600 s	not defined	not defined
Minimum							
180	Minimum Voltage	V	a-n	Sliding Demand	3 s	not defined	not defined
181	Minimum Voltage	V	b-n	Sliding Demand	3 s	not defined	not defined
182	Minimum Voltage	V	c-n	Sliding Demand	3 s	not defined	not defined
183	Minimum Voltage	V	a-b	Sliding Demand	3 s	not defined	not defined
184	Minimum Voltage	V	b-c	Sliding Demand	3 s	not defined	not defined
185	Minimum Voltage	V	c-a	Sliding Demand	3 s	not defined	not defined
186	Minimum Current	A	a	Sliding Demand	600 s	not defined	not defined
187	Minimum Current	A	b	Sliding Demand	600 s	not defined	not defined
188	Minimum Current	A	c	Sliding Demand	600 s	not defined	not defined

190	Apparent power	VA	total	Fixed Block	900 s	1	jj.mm.dd.hh. min.sec
191	Active power import	W	total	Fixed Block	900 s	1	jj.mm.dd.hh. min.sec
192	Reactive power import	var	total	Fixed Block	900 s	1	jj.mm.dd.hh. min.sec
193	Active power export	W	total	Fixed Block	900 s	1	jj.mm.dd.hh. min.sec
194	Reactive power export	var	total	Fixed Block	900 s	1	jj.mm.dd.hh. min.sec
195	Maximum Active power with in demand	W	total	Fixed Block	900 s	1	jj.mm.dd.hh. min.sec
196	Minimum Active power with in demand	W	total	Fixed Block	900 s	1	jj.mm.dd.hh. min.sec
197	Maximum Reactive power with in demand	var	total	Fixed Block	900 s	1	jj.mm.dd.hh. min.sec
198	Minimum Reactive power with in demand	var	total	Fixed Block	900 s	1	jj.mm.dd.hh. min.sec

1) These are typical attributes for demand measurements. They may be defined vendor specific. The Transmission Data Type for all demand measurements will be Float32 in first step

9.1.3 Energy measurements

Table 9-3

Measurement ID	Measurements	Unit	Phase	Tariff
200	Active Energy Import	V	total	User defined
201	Active Energy Export	V	total	User defined
202	Reactive Energy Import	V	total	User defined
203	Reactive Energy Export	V	total	User defined
204	Apparent Energy	V	total	User defined

10 Links & Literature

Literature

The following list is by no means complete and only provides a selection of appropriate sources.

Table 10-1

	Topic	Title
\1\	PROFIenergy profile	Common Application Profile PROFIenergy; Technical Specification for PROFINET; Version 1.0; January 2010; Order No: 3.802

Internet Links

The following list is by no means complete and only provides a selection of appropriate sources.

Table 10-2

	Topic	Title
\1\	Reference to this entry	http://support.automation.siemens.com/WW/view/en/41986454
\2\	Siemens Industry Online Support	http://support.automation.siemens.com
\3\	Decentral I/O system ET200S - Manual	http://support.automation.siemens.com/WW/view/en/1144348
\4\	FW download	http://support.automation.siemens.com/WW/view/en/35934244

11 History

Table 11-1

Version	Date	Changes
V1.0	10.08.2010	First issue
V1.1	29.06.2011	New PE-Block version, Annex A added
V1.2	01.09.2011	Security note added