Using PROFIenergy with motor starters

ET 200S, ET 200pro, M200D

FAQ 66829209 • December 2012

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Question

How can PROFIenergy be used with motor starters?

Answer

To fully answer this question, follow the handling instructions and notes listed in this document.

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1 Area of application

PROFIenergy can only be used in conjunction with PROFINET.

PROFIenergy functionality is available when the following motor starters are used:

- ET 200S (DPV1-capable) 3RK1301-xxxxx-xAB4
- ET 200pro (all motor starters)
- M200D (power unit: 3RK1395-* with communications module: 3RK1335-0AS01-0AA0)

For ET 200S and ET 200pro, PROFIenergy functionality can only be obtained with a PROFINET interface module.
You can find the applicable interface modules in Service&Support at:

http://support.automation.siemens.com/WW/view/en/44383954

2 Available functions

2.1 Overview of the functions for motor starters

- Switch-on/switch-off pause time
- Readout of motor currents

A description of the PROFIenergy functions of the motor starters can be found in the individual manuals:

- ET 200S 6008567
- ET 200pro 22332388
- M200D 38823402

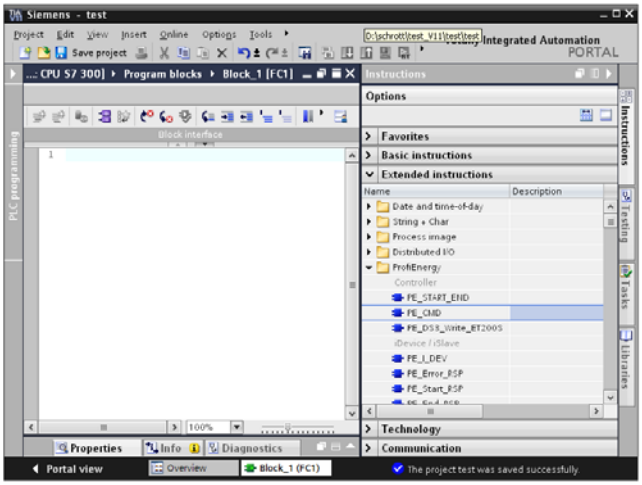
2.2 Overview of S7 function blocks

The following blocks are required for PROFIenergy functionality:

Block number	Description	Comment
FB815	PE_START_END	The block FB815 "PE_START_END" starts and ends the pause for the specified PROFINET IO device.
FB816	PE_CMD	FB 816 is used to transmit PROFIenergy commands to a PROFIenergy-capable device.

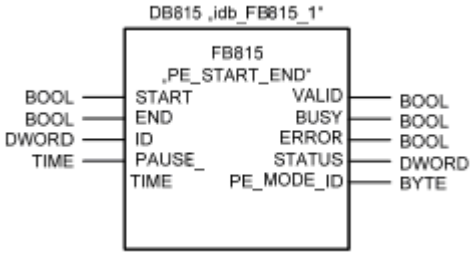
The description and codes of the blocks can be found online at:
http://support.automation.siemens.com/WW/view/en/41986454 (Step7 V5) or
http://support.automation.siemens.com/WW/view/en/58235225 (TIA)

The PROFIenergy blocks (PE_START_END und PE_CMD) find her in the TIA portal (Step7 V11+SP2)



2.3 Using Step 7 function blocks for motor starters

2.3.1 „PE_START_END“ FB815



Parameter	Data type	Comment
START	BOOL	Send "START PAUSE" to motor starter with the address "ID"
END	BOOL	Send "END PAUSE" to motor starter with the address "ID"
ID	DWORD	I/O address of the motor starter (take these from the hardware configuration; Fig. 1, Fig. 2) **NOTICE**: The input and output addresses must be identical
PAUSE_TIME	TIME	Planned pause time The motor starter verifies whether the planned pause time is greater than or equal to the minimum pause time stored in the motor starter. The minimum value is 100ms. For soft starter function, the minimum pause time is 100 ms + stopping time. If a shorter pause is started, then the motor starter remains switched on.

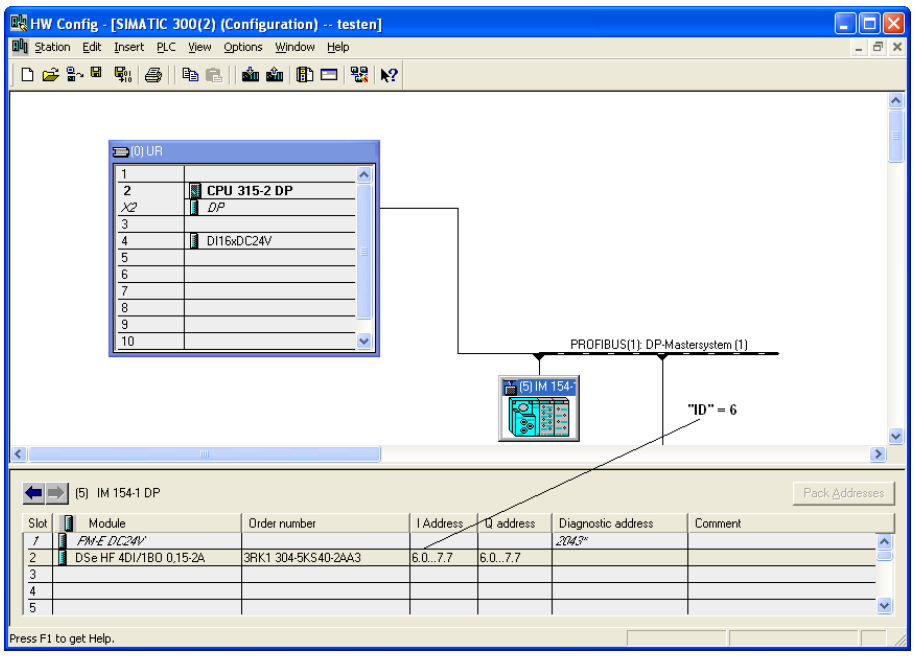


Bild 1: ID specification for V5.x

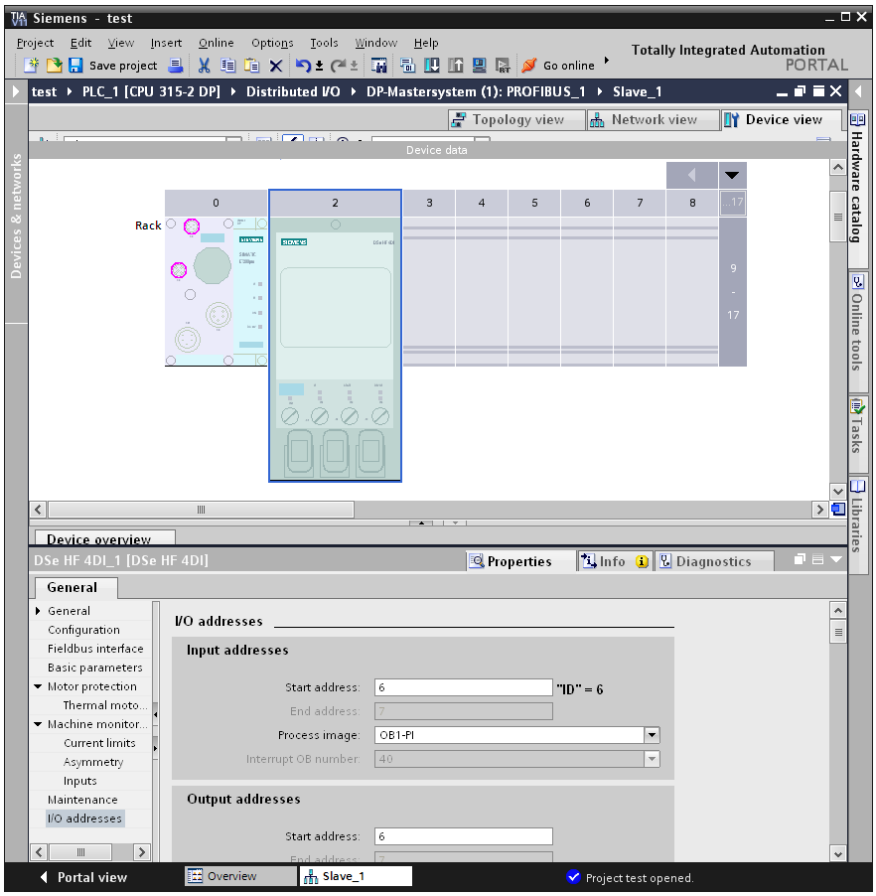
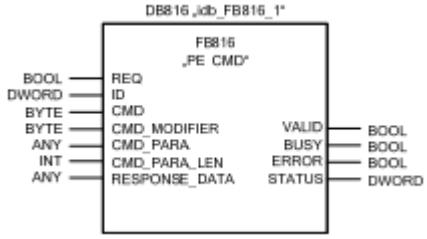


Bild 2: ID specification in TIA Portal

Parameter	Data type	Comment
VALID	BOOL	Command issued successfully
BUSY	BOOL	Command is still being processed
ERROR	BOOL	An error occurred during processing
STATUS	DWORD	Block status / Error number
PE_MODE_ID	BYTE	Energy saving level assumed during PAUSE

2.3.2 „PE_CMD“ FB 816



Parameter	Data type	Comment
REG	BOOL	Start job: A positive edge starts the command transmission
ID	DWORD	I/O address of the motor starter (take these from the hardware configuration; Fig. 1, Fig. 2) **NOTICE**: The input and output addresses must be identical
CMD	BYTE	Service RQ ID from PROFIenergy profile Command: 16 Query_Measurement
CMD_MODIFIER	BYTE	Query_Measurement Modifier: - 02: Get_Measurement_Values
CMD_PARA	ANY	Get measurement values: List of Measurement_Ids
CMD_PARA_LEN	INT	Actual length of the parameters to the command.
RESPONSE_DATA	ANY	PROFIenergy information, depending on complete command response frame for positive outcomes and in the event of an error incl. block header.

Parameter	Data type	Comment
VALID	BOOL	Command issued successfully
BUSY	BOOL	Command is still being processed
ERROR	BOOL	An error occurred during processing
STATUS	DWORD	Block status / Error number

2.3.2.1 CMD_PARA parameter structure

This parameter will indicate which of the measured values are to be read out.
There are four measured values for motor starters:

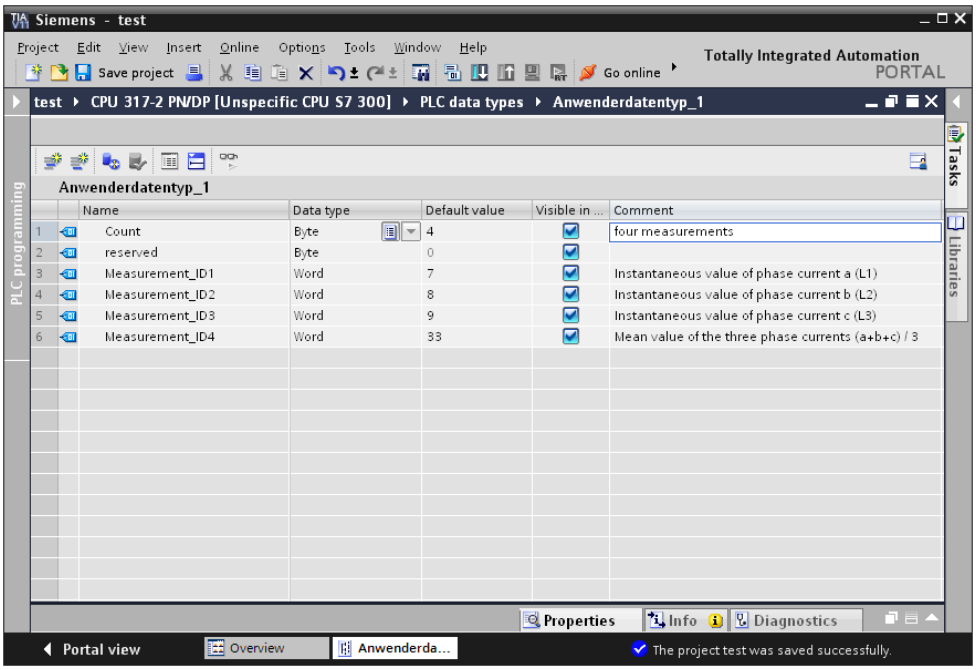
- ID = 7: Instantaneous value of phase current a (L1)
- ID = 8: Instantaneous value of phase current b (L2)
- ID = 9: Instantaneous value of phase current c (L3)
- ID = 33: Mean value of the three phase currents (a+b+c)/3 (instantaneous value)

Parameter	Wert	Datentyp
Count*		Unsigned8
reserved	0	Unsigned8
Measurement_ID**		Unsigned16
…		
Measurement_ID***		Unsigned16

* the number of measurement IDs
** first queried measurement value
*** last queried measurement value

Example (All four measured values given):

Address	Name	Type	Initial valu	Comment
0.0		STRUCT		
+0.0	Count	BYTE	B#16#4	four measurements
+1.0	reserved	BYTE	B#16#0	
+2.0	Measurement_ID1	WORD	W#16#7	Instantaneous value of phase current a (L1)
+4.0	Measurement_ID2	WORD	W#16#8	Instantaneous value of phase current b (L2)
+6.0	Measurement_ID3	WORD	W#16#9	Instantaneous value of phase current c (L3)
+8.0	Measurement_ID4	WORD	W#16#21	Mean value of the three phase currents (a+b+c)/3
=10.0		END_STRUCT		



2.3.2.2 RESPONSE_DATA parameter structure

The read data are stored in the data area indicated.

Content for four measured values:

Address	Parameter	Data type
0	Header	10 Byte
10	Count	Unsigned8
11	reserved	Unsigned8
12	Length_of_Structure	Unsigned16
14	Measurement_Data_Structure_ID	Unsigned8
15	Measurement_ID1	Unsigned16
17	Status_of_Measurement_Value	Unsigned8
18	**First measured value**	Float32
22	Length_of_Structure	Unsigned16
24	Measurement_Data_Structure_ID	Unsigned8
25	Measurement_ID2	Unsigned16
27	Status_of_Measurement_Value	Unsigned8
28	**Second measured value**	Float32
32	Length_of_Structure	Unsigned16
34	Measurement_Data_Structure_ID	Unsigned8
35	Measurement_ID3	Unsigned16
37	Status_of_Measurement_Value	Unsigned8
38	**Third measured value**	Float32
42	Length_of_Structure	Unsigned16
44	Measurement_Data_Structure_ID	Unsigned8
45	Measurement_ID3	Unsigned16
47	Status_of_Measurement_Value	Unsigned8
48	**Fourth measured value**	Float32
52	End	Unsigned32
56	end	Unsigned16