

SINAMICS G / MICROMASTER 4: Essentials for PROFIBUS- communication and PKW-mechanism

MICROMASTER 4 (MM4), SINAMICS G120/G120D
(CU240S/D, DP/DP-F, PN/PN-F/PN-F PP)

PROFIBUS communication, read and write of parameters

[FAQ • 01/2014](#)

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1 Commissioning of PROFIBUS and typical activation

Note

The descriptions of PROFIBUS in this chapter applies to MICROMASTER 4 und SINAMICS G120/G120D (CU240S/D, DP/DP-F).

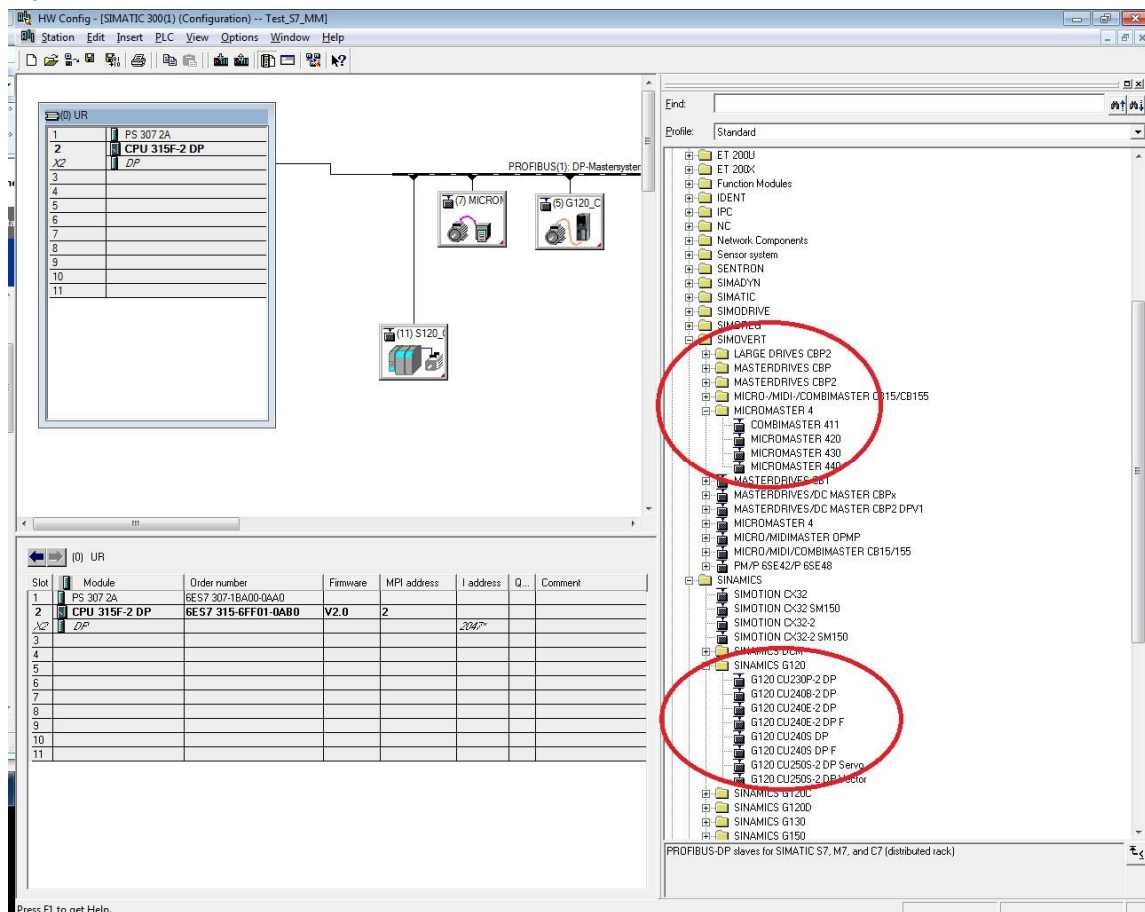
A knowledge of STEP 7 is assumed. This information does not detail the more advanced configurations that are available.

1.1 Configuration of MICROMASTER 4 / SINAMICS G120 with STEP 7

1.1.1 Connecting the inverter to the BUS

In the STEP 7 Hardware Configuration / HW-Config, call up MICROMASTER 4 from HW-catalogue PROFIBUS-DP > SIMOVERT > MICROMASTER 4 respectively G120 from HW-catalogue PROFIBUS-DP > SINAMICS > SINAMICS G120.

Figure 1-1



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If MICROMASTER 4 is not available in HW-catalogue PROFIBUS-DP > SIMOVERT > MICROMASTER 4 respectively G120 in HW-catalogue PROFIBUS-DP > SINAMICS > SINAMICS G120 it is necessary to update to the latest STARTER software.

You will find the latest STARTER software at Entry-ID: [26233208](#)

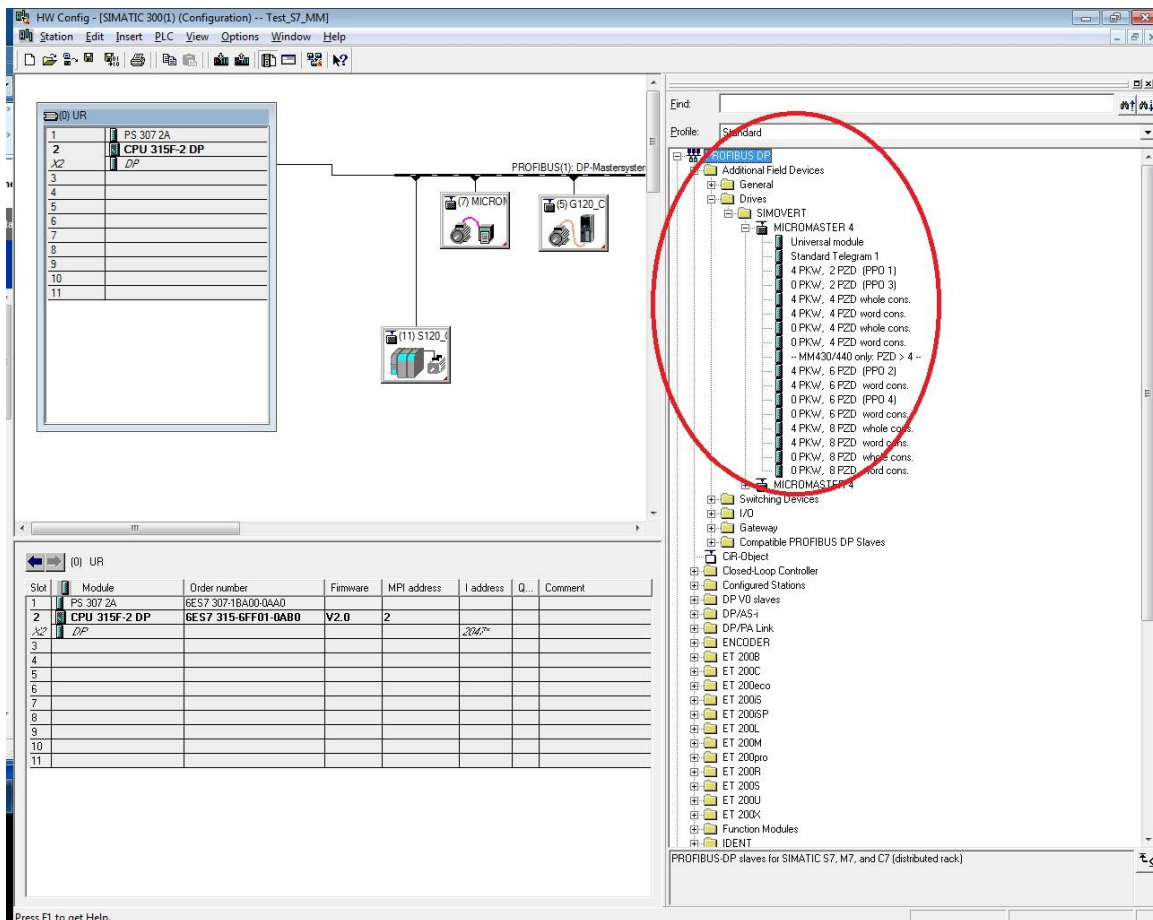
If this afford is to big you can alternative install the GSD-file. There see following articles:

- FAQ: Where can I find up to date GSD files for using PROFIBUS with MICROMASTER 4?; Entry-ID: [8718739](#)
- Amended PROFIBUS GSD files (inc. MICROMASTER 411, 420, 430 und 440); Entry-ID: [6567719](#)
- FAQ: Where can I find GSD files for using PROFIBUS with SINAMICS G120?; Entry-ID: [23450422](#)
- SINAMICS G120: PROFIBUS GSD files; Entry-ID: [23450835](#)
- SINAMICS G120D: PROFIBUS GSD files; Entry-ID: [60292521](#)
- SINAMICS G120: PROFINET GSDML files; Entry-ID: [26641490](#)

After installation of GSD-file you will find this in HW-catalogue PROFIBUS-DP > Additional Filed Devices > Drives > SIMOVERT for MICROMASTER 4.

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Figure 1-2



In first step you have to drag the MICROMASTER 4 inverter and drop it on the BUS. In second step you have to drag the favored telegram and drop it to the slot.

1.1.2 Selection of a proper telegram

The MICROMASTER 4 is controlled via the cyclical PROFIBUS-DP channel.

The user data structure for cyclical data traffic is divided into two areas which can be transmitted in each telegram:

Process data area (PZD), i.e. control words and setpoints, or status information and actual values

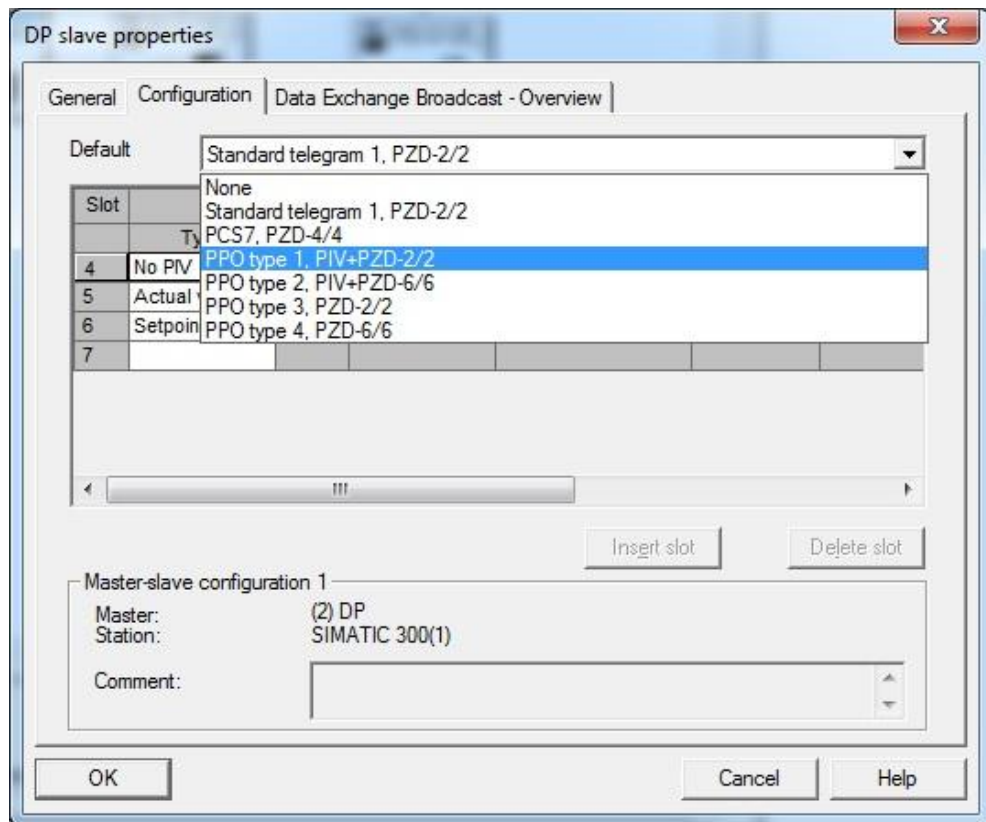
Parameter area (PKW) for reading/writing parameter values, e.g. reading out faults, or reading out information about the properties of a parameter such as, for example, min/max limits, etc.

Which type of Parameter Process data Object (PPO) for MICROMASTER 4 respectively Standard telegram for SINAMICS G120 (CU240x) is selected depends on the function of the drive in the automation network.

If you e. g. connect the MICROMASTER 440 from hardware catalogue to the PROFIBUS the telegrams in figure 1-3 are available.

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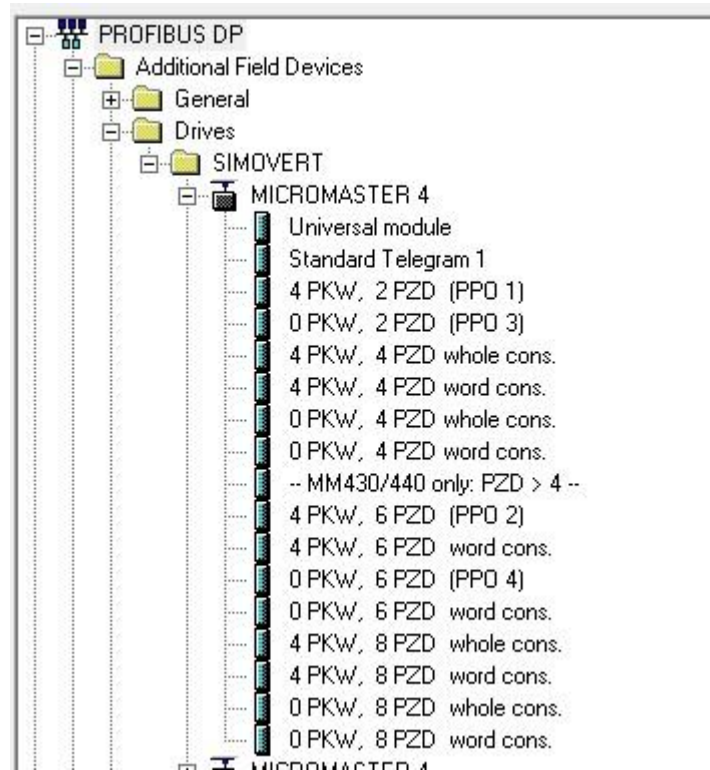
Figure 1-3



Depending on your application you can select a proper telegram. In case of connecting the MICROMASTER 4 via GSD file to the PROFIBUS, the telegrams in figure 1-4 are available.

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Figure 1-4



It must be pointed out the till MICROMASTER 420 you only have up to 4 PZD. For MICROMASTER 430 and 440 you can select up to 8 PZD. Further there are differences between “whole cons.” and “word cons.”

“Whole cons” means a data consistency in whole length. E.g. at 4 PZD all 4 words sent as one block. Therefore it is necessary using e.g. the SFC14/15 Bausteine.

“Word cons” means a data consistency of only a single word. In this case it is possible to use the standard Load and Transfer commands.

In chapter 2 you will find further detailed information for PKW mechanism.

1.2 Establish a PROFIBUS connection at MICROMASTER 4 / SINAMICS G120 (CU240x)

To establish a connection via PROFIBUS there are a view steps necessary.

- Start with the parametrization at the inverter. If necessary, set the default with p0010 = 30 and p0970 = 1.
- There are two ways of setting the bus address:
 - Via the seven DIP switches on the communication board. DIP-switch one is the lowest bit. DIP switch setting changes do not take effect until the PROFIBUS has been restarted cold.

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- Via parameter p0918. If address 0 is set on the DIP switches of the communication board (setting in delivery state), then the PROFIBUS address can be changed in parameter "P0918". Valid settings are 1 to 125 (default = 3).
- The control word and setpoint sources can be selected quickly in parameters P0700 (select command source) and P1000 (select frequency setpoint) respectively.
Command source from PROFIBUS: P0700 = 6
Frequency target value from PROFIBUS: P1000 = 6

1.3 Getting the MICROMASTER / SINAMICS G120 (CU240x) ready for operation

It is recommended you check the operation of the PROFIBUS control before trying to run the motor. Disconnect the motor cable from the U, V, and W terminals to do this, the output frequency can be seen on an AOP or BOP display panel.

If you want to run the motor at this stage, set P0010 = 1, and set all the commissioning parameters, as described in the MICROMASTER instruction manual or parameter list. Finish with P3900 = 3, which calculates the motor data. This sets parameter P0010 back to 0. The inverter cannot run when P0010 = 1.

Check that it is safe for the motor to turn.

1.4 Controlling the MICROMASTER / SINAMICS G120 (CU240x) from the PLC

If you have chosen PPO3 respectively Standard telegram 1, you will have 2 output words (PZD1 and PZD2) from the PLC, which correspond to the MICROMASTER / SINAMICS G120 (CU240x) control word and frequency setpoint, and 2 input words which are the status word and actual frequency.

If you chose PPO1, the first 4 input and output words are for parameter read/write data (PKW data). The PKW output words can be set to zero at this time. See also chapter 2.

The frequency setpoint and actual value are normalised such that 4000hex corresponds to 50Hz. The maximum value that should be sent is 7FFF. The normalisation frequency can be changed in P2000.

Here are some typical control and status words to get started. The status words assume the MICROMASTER has ramped up to its frequency setpoint (where applicable). The data sequence is control word, frequency setpoint, status word, actual frequency. Sending control word 047E followed by 047F is the key to getting the drive started.

Get drive ready to run forward:

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047E 0000 FA31 0000

Run drive at 12.5Hz forwards:

047F 1000 FB34 1000

Run drive at 50Hz forwards:

047F 4000 FB34 4000

Run drive at 12.5Hz reverse:

0C7F 1000 BB34 1000

Drive tripped on fault:

0C7F 1000 FA38 0000

Reset fault:

04FE 0000 FA31 0000

The structure of the control and status words is described in section 3.3 of the PROFIBUS Manual.

2 PKW mechanism for reading and writing parameters

Note

The descriptions of PKW-mechanism in this chapter applies to MICROMASTER 4 und SINAMICS G120/G120D (CU240S/D, DP/DP-F) and additional for PROFINET for SINAMICS G120/G120D (CU240S/D PN/PN-F).

2.1 User data structure

The structure of useful data for the cyclical channel of PROFIBUS DP/PROFINET is referred to as the Parameter Process data Object (PPO) for MICROMASTER 4 and Siemens Telegram for Control Units (CUs) CU240S/D DP/DP-F/PN/PN-F of the SINAMICS G120 and SINAMICS G120D.

User data structure according to PPOs / Siemens telegrams

The useful data structure for cyclical data traffic is divided into two areas, which can be transmitted in special telegrams as follows:

- Process data area (PZD), i.e. control words and setpoints, or status information and actual values
- Parameter area (PKW) for reading/writing parameter values, reading out faults, or reading out information about the properties of a parameter such as, for example, min/max limits, etc.

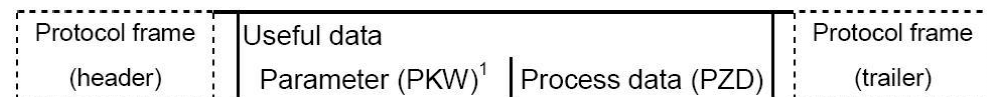
Process data is always transferred. It is processed as top priority in the shortest time slice in the drive.

Process data is used to control the drive in the automation network, On/Off commands, setpoint inputs, etc.

The parameter area enables the user to access all parameters stored in the inverter via the bus system. For example, to read out detailed diagnostic information, faults messages, etc.

Telegrams for cyclic data transmission thus have the following basic structure:

Figure 2-1



¹⁾ PKW: Parameter identifier value

2 telegram types are defined, that include the PKW component, for MICROMASTER 4 and CU240S/D DP/DP-F/PN/PN-F:

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Figure 2-2

PKW				PZD									
PKE	IND	PWVE		PZD1 STW1 ZSW1	PZD2 HSW HIW	PZD3	PZD4	PZD5	PZD6	PZD7	PZD8	PZD9	PZD10
1 st word	2 nd word	3 rd word	4 th word	1 st word	2 nd word	3 rd word	4 th word	5 th word	6 th word	7 th word	8 th word	9 th word	10 th word
PPO1 / Siemens telegram 353													
PPO2 / Siemens telegram 354													

Note:

MICROMASTER 420 only supports PPO1 of these two PPO types.

Note:

Telegram types 353 and 354 for Control Units CU240S/D DP/DP-F/PN/PN-F of the SINAMICS G120/G120D are only available from software version V3.0 onwards. This means that the PKW mechanism is only possible from SW3.0 onwards of the CUs of SINAMICS G120/G120D.

Parameter data area (PKW)

The PKW (parameter identifier value) telegram section can be used to monitor and/or change any parameter in the inverter.

Process data area (PZD)

Control words and setpoints (requests: Master -> inverter) and status words and actual values (responses: Inverter -> master) can be transmitted in the process data area.

2.2 PKW mechanism to process parameters

Parameter area (PKW)

Using the PKW mechanism you can process and monitor parameters (write/read) as described below:

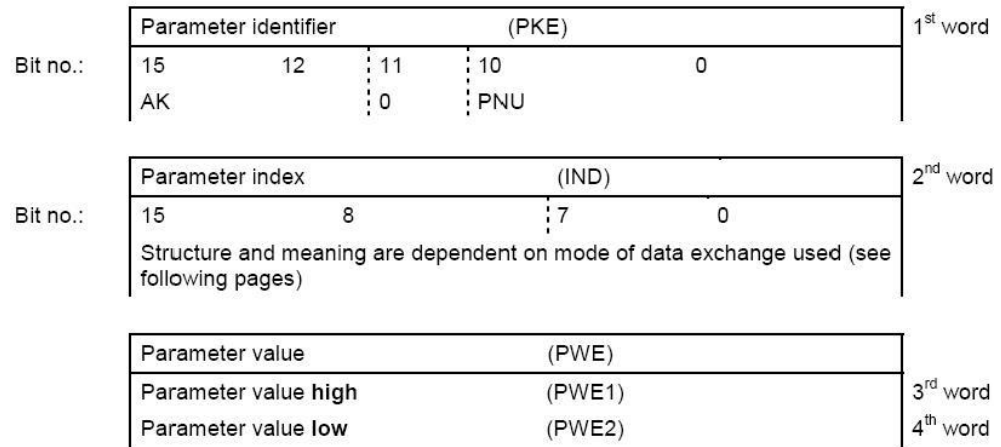
Precondition:

- PPO1 or 2 on MICROMASTER 4 or Siemens Telegramm 353 or 354 on Control Units CU240S/D DP/DP-F/PN/PN-F of the SINAMICS G120/G120D

The parameter area includes always 4 words.

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Figure 2-3 Structure of parameter area (PKW)



AK: Request or response identifier
 PNU: Parameter number

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Parameter identifier (PKE), 1st word

The parameter identifier (PKE) is always a 16-bit value.

Bits 0 to 10 (PNU) contain the number of the relevant parameter.

Bit 11 is reserved.

Bits 12 to 15 (AK) contain the request or the response identifier.

The meaning of the request identifier for request telegrams (master → inverter) is shown in Table 2-1 Request identifier (master -> inverter). Request identifiers 11 to 14 are specific to a drive and not defined in the PROFIDrive Profile.

The meaning of the response identifier for response telegrams (inverter -> master) is shown in Table 2-2.

The request identifier will determine which response identifiers are possible. If the response identifier is 7 (cannot process request), then one of the fault numbers listed in Table 2-3 will be stored in parameter value 2 (PWE2).

Table2-1 Request identifier (master -> inverter)

Request identifier	Meaning	Response identifier	
		positive	negative
0	No request	0	7 / 8
1	Request parameter value	1 / 2	7 / 8
2	Modify parameter value (word)	1	7 / 8
3	Modify parameter value (double word)	2	7 / 8
4	Request descriptive element ¹	3	7 / 8
6	Request parameter value (array) ¹	4 / 5	7 / 8
7	Modify parameter value (array, word) ²	4	7 / 8
8	Modify parameter value (array, double word) ²	5	7 / 8
9	Request number of array elements	6	7 / 8
11	Modify parameter value (array, double word) and store in EEPROM ²	5	7 / 8
12	Modify parameter value (array, word) and store in EEPROM ²	4	7 / 8
13	Modify parameter value (double word) and store in EEPROM	2	7 / 8
14	Modify parameter value (word) and store in EEPROM	1	7 / 8

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Table 2-2 Response identifier (inverter -> master)

Response identifier	Meaning
0	No response
1	Transfer parameter value (word)
2	Transfer parameter value (double word)
3	Transfer descriptive element ¹
4	Transfer parameter value (array, word) ²
5	Transfer parameter value (array, double word) ²
6	Transfer number of array elements
7	Cannot process request (with error number)
8	No master control status for PKW interface

¹ The desired element of the parameter description is specified in IND (2nd word)

² The desired element of the indexed parameter is specified in IND (2nd word).

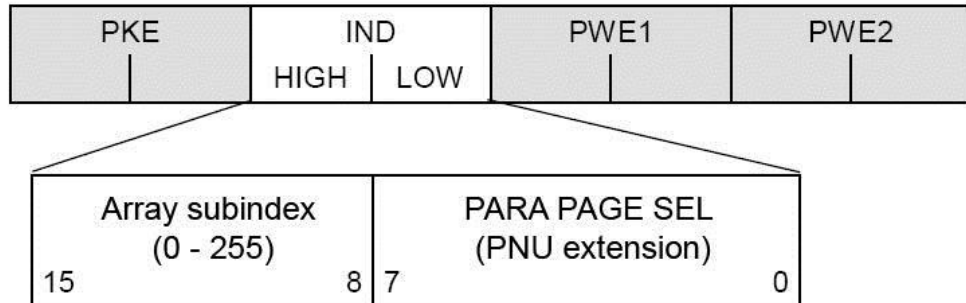
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Table 2-3 Fault numbers for "Cannot process request" response

No.	Significance	
0	Illegal parameter number (PNU)	Parameter does not exist
1	Parameter value cannot be modified	Parameter is a read-only parameter
2	Minimum/maximum not reached/exceeded	-
3	Faulty subindex	-
4	No array	Single parameter has been accessed with array request and subindex > 0
5	Incorrect data type	Mix-up between word and double word
6	Setting not allowed (resetting only)	-
7	Descriptive element cannot be modified	Description can never be modified
11	No status as master control	Modification request without status as master control (see P0927)
12	Key word missing	-
17	Request cannot be processed due to operating state	Current inverter status is not compatible with the received request
101	Parameter number currently deactivated	Dependent on inverter status
102	Channel not wide enough	Communication channel too small for response
104	Illegal parameter value	Parameter permits only certain values
106	Request not implemented	After request identifier 5, 10, 15
200/201	Modified minimum/maximum not reached/exceeded	Minimum/maximum can be further limited in operation
204	Available access authorization does not cover modification of parameters	-

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Parameter index (IND) 2nd word: Array Subindex – High Byte



The array subindex (referred to simply as Subindex in the PROFIDrive Profile) is an 8-bit value which is transferred in the high-order byte (bits 8 to 15) of the parameter index (IND) when data are transferred cyclically via PPOs /Siemens telegrams.

Function of the Array Subindex in IND

Array Subindex = 0...254

If the subindex is transferred with values between 0 and 254 in a request, the relevant parameter index is transferred in the case of an indexed parameter. For the meaning of the individual indices of a parameter, please refer to the parameter list in the inverter operating instructions.

In the case of a descriptive element, the number of the required element is transferred. The meaning of descriptive elements can be found in the PROFIDrive Profile, version 2.0.

Array Subindex = 255

A value of 255 for the array subindex is a MICROMASTER 4 / SINAMICS G120 / G120D -specific, special function. If the array index is transferred with 255, all the indices of an indexed parameter are transmitted simultaneously in one data block.

The function is meaningful only for acyclical data exchange mode using the data set DS47.

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Parameter index (IND) 2nd word: PARA PAGE SEL (Parameter Number Extension (PNU extension) – Low Byte

The low-order byte (bits 0 to 7) is not defined in PROFIDrive Profile version 2.0.

The low-order byte of the parameter index is used on MICROMASTER 4 and on CUs of the SINAMICS G120 / G120D to be able to switch between pages of the parameters and to address additional parameters with a number of >1999.

Function of PARA PAGE SEL

The byte to select the parameter page is only used to change the page of the parameter No. and has the following effect:

If this byte is set to one of the values for the Parameter No. extension (PNU extension) from Table 2-4, the Parameter No. (PNU) - transferred in the PKW request - is provided with an appropriate offset (P2000, P4000, P6000, P8000, P60000) in the frequency inverter and is then passed on.

Please take all values from Table 2-4 that can assume the least significant byte and are used to address a certain parameter area.

Table 2-4 PNU extension to address parameters > 1999

Parameter area	PNU extension (2 nd word (IND), lowbyte)	
	Binary	Hex
0...1999	00000000	00
2000...3999	10000000	80
4000...5999	00010000	10
6000...7999	10010000	90
8000...9999	00100000	20
60000...61999	01110100	74

Example coding for parameter no. in PKE and IND for P2016, index 3:

PKE		IND		PWE1		PWE2	
xx	10	03	80				

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Parameter value (PWE) 3rd and 4th word

The parameter value (PWE) is always transmitted as a double word (32-bit). Only one parameter value at a time can be transferred in a PPO / Siemens telegram.

A 32-bit parameter value comprises PWE1 (high-order word, 3rd word) and PWE2 (low-order word, 4th word).

A 16-bit parameter value is transferred in PWE2 (low-order word, 4th word). PWE1 (high-order word, 3rd word) must be set to 0 on the PROFIBUS-DP / PROFINET master in this case.

Rules for processing requests/responses

1. A request or a response can only ever refer to one parameter.
2. The master must repeat a request continuously until it has received the appropriate response.
3. The master detects the response to a request it has sent by
 - evaluating the received word 1 - Parameter identifier (PKE):
 - evaluating the response identifier (AK),
 - evaluating the parameter number (PNU),
 - evaluating the received word 2 - Parameter index (IND) if necessary, or
 - evaluating the received words 3 and 4 - Parameter values PWE1 and PWE2 if necessary.
4. The complete request must be sent in one telegram. Request telegrams cannot be split. The same applies to responses.
5. In the case of response telegrams which contain parameter values, the drive always returns the momentary parameter value when repeating response telegrams.
6. If no information needs to be fetched from the PKW interface in cyclical operation (only PZD data are relevant), then the "No request" request telegram must be issued.

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2.3 Example for using the PKW mechanism via PROFIBUS and PROFINET

Overview

You will be shown how to read from and write to parameters of the MICROMASTER 4 (MM4) frequency inverter and Control Units CU240S/D DP/DP-F of the SINAMICS G120/G120D frequency inverter using PROFIBUS and Control Units CU240S/D PN/PN-F using PROFINET in the following examples.

S7 project examples will also be available that you can download from the same article.

Note

The correct GSD files must be installed and the necessary GSD files and telegram types must be configured in HW Config in order to use the project example.

You can download the GSD files See links at chapter 1.1.1

Note

GSD files for MM4 and CU240S DP-F and telegram types PPO1 for MM4 and Siemens telegram 354 for CU240S DP-F are used in the project examples.

If you wish to configure another frequency inverter / another CU - or another telegram - then make the appropriate changes in HW Config.

Note

Set the parameters P0700 = 6 and P1000 = 6, if you want to control the drive via PROFIBUS or PROFINET. The parameters P0700 and P1000 must not be changed, if you only want to read or write parameters of the drive. You can leave the old settings in this case.

Note

If you read-out or write parameters from / to the CUs of the SINAMICS G120/G120D, set the parameter to select the PROFIdrive standard telegram P0922 = 354 (Siemens telegram 354) before you use the project example.

More detailed information is provided in the Operating Instructions.

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2.3.1 Read parameters

Example 1: Read parameter P0700 (Selection of command source)

In order to read a parameter, the parameter value must be requested and the parameter number correctly addressed. The first PKW word is used for this purpose – Parameter identifier (PKE).

Use the Request identifier 1 = "request parameter value" to request the parameter values (Request identifier AK = Request parameter value = 1, AK = 1, refer to Table 2-1). The Request identifier 1 is written into bits 12 to 15 of the 1st word (refer to Fig. 2-1).

The Parameter number (PNU) must be converted into the hexadecimal format and written into bits 0 to 10.

Conversion: 700 dec = 2BC hex.

This means that the 1st word is: **12BC**.

Because we read-out index 0 of the parameter and the parameter number is < 1999 - then the 2nd word is: **0000**.

The 3rd and 4th words must be set to 0:

Request PROFIBUS / PROFINET => MM4 / CU240

And the request to read parameter P0700 is obtained:

1st word (PKE): **12BC**

2nd word (IND): **0000**

3rd word (PWE1): **0000**

4th word (PWE2): **0000**

Response MM4 / CU240 => PROFIBUS / PROFINET

The response:

1st word (PKE): **12BC**

2nd word (IND): **0000**

3rd word (PWE1): **0000**

4th word (PWE2): **0002**

- indicates that it is a word with the value 0002 (hex).

Result

P0700 = 2 (command source via terminal)

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Example 2: Read parameter P1082 (Max. frequency)

Example 2 shows, how to read P1082 (Max. frequency).

Request identifier AK: Request parameter value = 1

Conversion of the PNU: 1082 dec = 43A hex

Therefore the following is obtained for the 1st word: **143A**.

Because we read-out index 0 of the parameter and the parameter number is < 1999 - then the 2nd word is: **0000**.

The 3rd and 4th words must be set to 0.

Request PROFIBUS / PROFINET => MM4 / CU240

1st word (PKE): **143A**

2nd word (IND): **0000**

3rd word (PWE1): **0000**

4th word (PWE2): **0000**

- requests value of P1082.

Response MM4 / CU240 => PROFIBUS / PROFINET

The response:

1st word (PKE): **243A**

2nd word (IND): **0000**

3rd word (PWE1): **4248**

4th word (PWE2): **0000**

- indicates that it is a double word with the value 4248 0000 (IEEE floating value).

The IEEE floating format is as follows:

- Bit 31 = sign
- Bit 23 to Bit 30 = exponent
- Bit 0 to Bit 22 = mantissa specified by a decimal value:

Value = ((-1) to power of sign) x (2 to power of (exponent - 127)) x 1.mantissa.

For this example the

sign = 0,

exponent = 84 (hex) = 132,

and the

mantissa (1).900000 = [1 + 9/16 + 0/256 + ...]

giving (1) x (32) x (1.5625) = 50.00 [Hz]

For more information on converting floating-point numbers, please refer to the FAQ Entry-ID: [23803063](#) Converting floating-point numbers.

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Example 3: Read parameter P2000 (Reference frequency)

Example 3 shows, how to read P2000 (Reference frequency).

Request identifier AK: Request parameter value = 1

To read a parameter greater than P1999, you must set the PNU extension in the 2nd word (IND, refer to Table 2-4).

Depending on which page the parameter is required, an appropriate PNU extension must be selected and set in the 2nd word (IND). The parameter number (PNU) is then assigned an offset (P2000, P4000, P6000, P8000, P60000), that must be subtracted from the parameter number. The difference must be converted into the hexadecimal format.

Converting the PNU:

(PNU offset) = (2000 - 2000) dec = 0 dec = 0 hex

The following is obtained for the 1st word: **1000**.

The **PNU extension** for the parameter area 2000...3999 is **80** (see table 2-4).
Index 0 of parameter P2000 is read-out, therefore the **subindex** = 0.

Thus the following is obtained for the 2nd word: **0080**.

The 3rd and 4th words must be set to 0.

Request PROFIBUS / PROFINET => MM4 / CU240

1st word (PKE): **1000**
2nd word (IND): **0080**
3rd word (PWE1): **0000**
4th word (PWE2): **0000**
- requests the value from P2000.

Response MM4 / CU240 => PROFIBUS / PROFINET

The response:

1st word (PKE): **2000**
2nd word (IND): **0080**
3rd word (PWE1): **4248**
4th word (PWE2): **0000**
- indicates that it is a double word with the value 4248 0000 (IEEE floating value),
i.e. 50.00.

Result

the value is 50.00 [Hz].

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Example 4: Read parameter P9810 (PROFIsafe destination address) of the CU240S/D DP-F/PN-F

Example 4 shows how to read the parameter P9810 (PROFIsafe destination address) of the Safety Control Units CU240S/D DP-F/PN-F.

Request identifier AK: Request parameter value = 1

Converting the PNU:

(PNU offset) = (9810 - 8000) dec = 1810 dec = 712 hex

Thus the following is obtained for the 1st word: **1712**.

PNU extension: 20 (see table 2-4)

Subindex = 0, as parameter P9810 does not have an index assignment.

Thus the following is obtained for the 2nd word: **0020**.

The 3rd and 4th words must be set to 0.

Request PROFIBUS / PROFINET => CU240S/D DP-F/PN-F

1st word (PKE): **1712**

2nd word (IND): **0020**

3rd word (PWE1): **0000**

4th word (PWE2): **0000**

- requests the value from P9810.

Response CU240S/D DP-F/PN-F => PROFIBUS / PROFINET

The response:

1st word (PKE): **1712**

2nd word (IND): **0020**

3rd word (PWE1): **0000**

4th word (PWE2): **00C8**

- indicates that it is a word with value 00C8 hex = 200 dec.

Result

PROFIsafe destination address of the Control Unit P9810 = 200

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Example 5: Read parameter P2010[1] (USS baudrate, USS on BOP link)

This example shows how to read the parameter P2010[1] (USS baudrate, USS on BOP link).

Request identifier AK: Request parameter value = 1

Converting the PNU:

(PNU offset) = (2010 - 2000) dec = 10 dec = A hex

Thus the following is obtained for the 1st word: **100A**.

To read the value of a parameter index you must define the index in bits 0 to 7 of the 2nd PKW word (IND):

Subindex = 1, as index 1 is read-out.

PNU extension: 80 (see table 2-4)

Thus the following is obtained for the 2nd word: **0180**.

The 3rd and 4th words must be set to 0.

Request PROFIBUS / PROFINET => MM4 / CU240

1st word (PKE): **100A**

2nd word (IND): **0180**

3rd word (PWE1): **0000**

4th word (PWE2): **0000**

- requests the value from P2010 index 1.

Response MM4 / CU240 => PROFIBUS / PROFINET

The response:

1st word (PKE): **100A**

2nd word (IND): **0180**

3rd word (PWE1): **0000**

4th word (PWE2): **0006**

- indicates that it is a word with the value 6 (hex).

Result

The value 6 (hex / dec) is equivalent to 9600 baud.

In this case, Request identifier 6: Request parameter value (array) could also be used. The send and receive data would then be:

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Request PROFIBUS / PROFINET => MM4 / CU240

1st word (PKE): **600A** (6: Request parameter value array)

2nd word (IND): **0180**

3rd word (PWE1): **0000**

4th word (PWE2): **0000**

- requests the value from P2010 index 1.

Response MM4 / CU240 => PROFIBUS / PROFINET

The response:

1st word (PKE): **400A** (4: Transfer parameter value array, word)

2nd word (IND): **0180**

3rd word (PWE1): **0000**

4th word (PWE2): **0006**

- indicates that it is a word with the value 6 (hex).

Result

The value 6 (hex / dec) is equivalent to 9600 baud.

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2.3.2 Write parameters

Example 6: Change the value of P1082 (Max. frequency)

To write to a parameter, you must know whether it has a word or double word parameter value and use the Request identifier 2 (Modify parameter value (word)) or 3 (Modify parameter value (double word)) appropriately.

To find this out, you can first read the parameter value via PROFIBUS/PROFINET (the information is also available in the Parameter List).

In this example the value of P1082 should be changed from 50.00[Hz] to 40[Hz], RAM only.

Read value (see also the example 2)

Request PROFIBUS / PROFINET => MM4 / CU240

1st word (PKE): **143A**

2nd word (IND): **0000**

3rd word (PWE1): **0000**

4th word (PWE2): **0000**

- requests value of P1082.

Response MM4 / CU240 => PROFIBUS / PROFINET

The response:

1st word (PKE): **243A**

2nd word (IND): **0000**

3rd word (PWE1): **4248**

4th word (PWE2): **0000**

- Response identifier 2 indicates that it is a double word. This means that we must use task the Request identifier 3: "change parameter value (double word), RAM only".

Change parameter value

Request identifier AK: Modify parameter value (double word) = 3

Converting the PNU: 1082 dec = 43A hex

Thus the following is obtained for the 1st word: **343A**.

Because we write index 0 of the parameter and the parameter number is < 1999, the 2nd word is: **0000**.

In order to change the parameter value to 40.00 (IEEE floating value = 4220 0000), the 3rd and 4th words must be correspondingly set to **4220** and **0000**.

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Request PROFIBUS / PROFINET => MM4 / CU240

1st word (PKE): **343A**

2nd word (IND): **0000**

3rd word (PWE1): **4220**

4th word (PWE2): **0000**

- changes the value of the P1082 to 40.00.

Response MM4 / CU240 => PROFIBUS / PROFINET

The response:

1st word (PKE): **243A**

2nd word (IND): **0000**

3rd word (PWE1): **4220**

4th word (PWE2): **0000**

- confirms that the value was changed.

Note

If modified values are to be saved in the EEPROM, then use the Request identifier 13 = D hex (Modify parameter value (double word) and store in EEPROM). This should not be permanently and cyclically repeated as otherwise the EEPROM could be damaged.

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Example 7: Evaluating an error response

In the example 6, it was assumed that the drive inverter is not running. If the correct change telegram is sent with the drive inverter running, the inverter responds with the Response identifier 7 "cannot process request", as P1082 cannot be changed while the inverter is running. The error number is in the parameter value range PWE2.

Request PROFIBUS / PROFINET => MM4 / CU240

1st word (PKE): **343A**

2nd word (IND): **0000**

3rd word (PWE1): **4220**

4th word (PWE2): **0000**

- an attempt to change the value of P1082 to 40.00.

Response MM4 / CU240 => PROFIBUS / PROFINET

1st word (PKE): **743A** (7: cannot process request)

2nd word (IND): **0000**

3rd word (PWE1): **0000**

4th word (PWE2): **0011** (Error number)

Result

The error number is 11 hex = 17 dec > "Request cannot be processed due to operating state: Current inverter status is not compatible with the received request".

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Beispiel 8: Setting P0845 (second source of OFF2)

Example 8 shows how to set P0845 (second source of OFF2) to 722.2.

Note

For CU240S/D DP/DP-F/PN/PN-F some parameters cannot be changed if the standard telegram is selected (P0700 = 6, P0922 = standard telegram, in the example – Siemens telegram 354), for example P0844 (first source of OFF2).

This sets digital input 3/2 for OFF2 (coast stop).

Requirement:

P0703 must be set to 99 (enable BiCo parameterization, digital input 3/2¹) to make 722.2 an available value in P0845.

Request identifier AK: Modify parameter value (double word) = 3

Converting the PNU: 845 dec = 34D hex

Thus the following is obtained for the 1st word: **334D**.

Because we write index 0 of parameter P0845 and the parameter number is < 1999, the 2nd word is: **0000**.

Conversion for PWE1 and PWE2: 722 dec = 2D2 hex; 2 dec = 2 hex

The 3rd and 4th words are thus given by: **02D2** and **0002**.

Request PROFIBUS / PROFINET => MM4 / CU240

1st word (PKE): 334D

2nd word (IND): 0000

3rd word (PWE1): 02D2

4th word (PWE2): 0002

¹ Digital input 3 – for MM4, digital input 2 – for CUs of the SINAMICS G120 and SINAMICS G120D

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Response MM4 / CU240 => PROFIBUS / PROFINET

The response:

1st word (PKE): **234D**

2nd word (IND): **0000**

3rd word (PWE1): **02D2**

4th word (PWE2): **0002**

- confirms that the value was changed.

Hint

P0845 = second source of OFF2 / 722.2 = Digital input 3/21.

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Example 9: Change the value of the parameter P2010[1] (USS baudrate, USS on BOP link)

This example shows how to change the value of the parameter P2010[1] (USS baudrate, USS on BOP link) from 6 (9600 Baud) to 8 (38400 Baud).

Request identifier AK: Modify parameter value (word) = 2

Converting the PNU:

(PNU offset) = (2010 - 2000) dec = 10 dec = A hex

Thus the following is obtained for the 1st word: **200A**.

To write the value of a parameter index you must define the index in bits 0 to 7 of the 2nd PKW word (IND):

Subindex = 1, as index 1 is written.

PNU extension: 80 (see table 2-4)

Thus the following is obtained for the 2nd word: **0180**.

The 3. word **PWE1 = 0000**, because we write the parameter value of the type word.

Conversion vor PWE2: 8 dec = 8 hex.

Thus the following is obtained for the 4th word: **0008**.

Request PROFIBUS / PROFINET => MM4 / CU240

1st word (PKE): **200A**

2nd word (IND): **0180**

3rd word (PWE1): **0000**

4th word (PWE2): **0008**

- changes the value of P2010[1] to 8.

Response MM4 / CU240 => PROFIBUS / PROFINET

The response:

1st word (PKE): **100A**

2nd word (IND): **0180**

3rd word (PWE1): **0000**

4th word (PWE2): **0008**

- confirms that the value was changed.

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In this case, Request identifier 7: Request parameter value (array) could also be used. The send and receive data would then be:

Request PROFIBUS / PROFINET => MM4 / CU240

1st word (PKE): **700A** (7: Modify parameter value array, word)

2nd word (IND): **0180**

3rd word (PWE1): **0000**

4th word (PWE2): **0008**

- changes the value of P2010[1] to 8.

Response MM4 / CU240 => PROFIBUS / PROFINET

The response:

1st word (PKE): **400A** (4: Transfer parameter value array, word)

2nd word (IND): **0180**

3rd word (PWE1): **0000**

4th word (PWE2): **0008**

- confirms that the value was changed.

2.4 Using the project examples

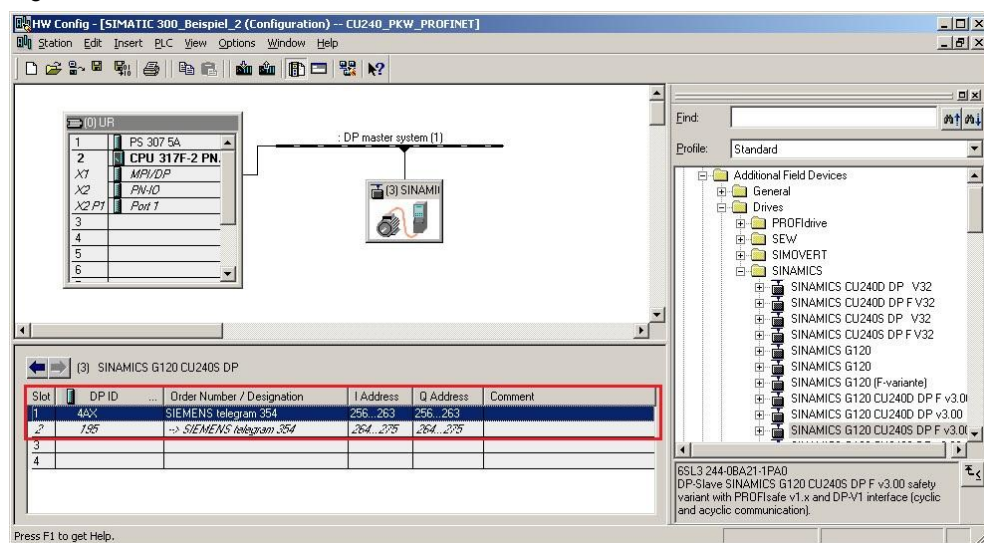
Information and instructions when configuring in HW-Config

Please note that when configuring a PROFIBUS module (CU240S/D DP/DP-F) of the SINAMICS G120/G120D frequency inverter with GSD files and when setting-up Siemens telegrams 354 or 353 **two** separate **slots** exist for the PKW and PZD areas (refer to Fig. 2-4) and when configuring a PROFINET module (CU240S/D PN/PN-F) of the SINAMICS G120/G120D frequency inverter with GSD files and setting-up the Siemens telegram 354 or 353 only **one slot** is available for the PKW and PZD areas (refer to Fig. 2-5).

This special feature impacts the way in which the request and response tasks are sent to the drive and must be received from the drive if data exchange is established between the drive and an S7 control. For instance, using the standard S7 functions – SFC14 and SFC15.

When exchanging data with a PROFIBUS module (CU240S/D DP/DP-F) the request and response tasks for the PKW and PZD areas must be separately sent with the SFC14 and SFC15 (received). In so doing the I/O start addresses and the lengths of the telegram sections for the PKW and PZD areas must be observed.

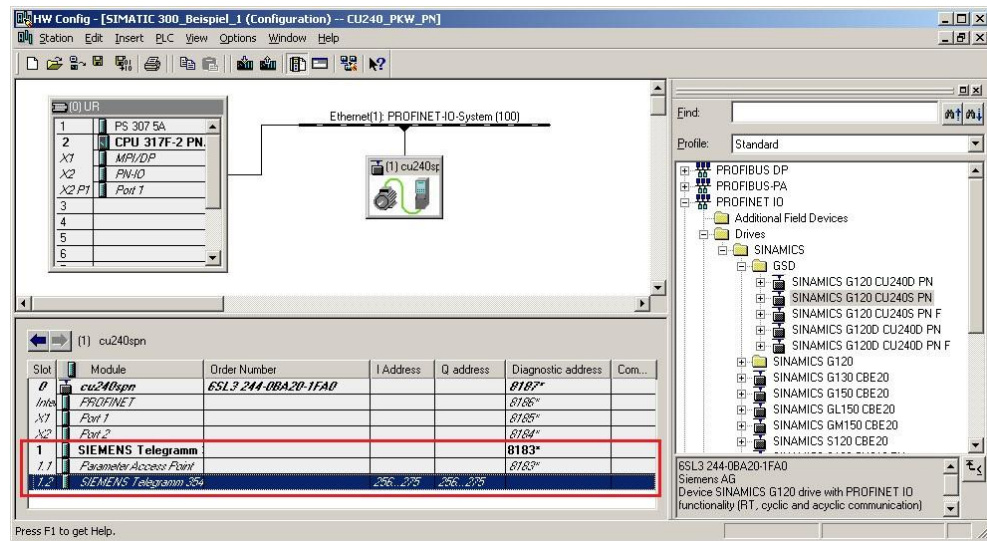
Figure 2-4



When exchanging data with a PROFINET module (CU240S/D PN/PN-F) the request and response tasks for the PKW and PZD areas must be sent together with the SFC14 and SFC15 (received). In so doing, only the I/O start addresses and the length of the complete telegram have to be observed.

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Figure 2-5



For instance, if Siemens telegram 354 is set-up for data exchange, then for PROFIBUS modules- first 4 PKW words (8 bytes) and then 6 PZD words (12 bytes) should be sent to the module in two separate request tasks. In the same way - 4 PKW words (8 bytes) and 6 PZD words (12 bytes) should be received from the module in two separate response tasks. This means that each of the SFC14 and SFC15 functions are called twice in the program. If only the PKW area of the frequency inverter has to be read-out or only the drive controlled - then only one area can be addressed (PKW or PZD) with the corresponding I/O addresses. Each of the SFC14 and SFC15 are only called once.

For PROFINET modules and data exchange using telegram 354, 4 PKW words (8 bytes) and 6 PZD words (12 bytes), i.e. 10 words (20 bytes) should be sent as a total to the module in a request task. 10 words (20 bytes) are also received in one response task from the module. This means that each of the SFC14 and SFC15 functions are only called once in the program. If only the PKW area of the frequency inverter is to be read-out, or only the drive control - then zeros should be assigned to the words of the area not used (PKW or PZD). The I/O start addresses for the complete telegram must in any case always be used.

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Handling the project examples

Variable tables are used to handle the project examples. Here, the 4 PKW words should be entered for the task (request) and the response from the drive read-out. It is also possible to control the drive using the variable table and to receive diagnostic and status information & data from the drive – that is then displayed.

#	Operand	Symbol	Anzeigeformat	Statuswert	Steuerwert
1	// PKW mechanism request				
2	DB1.DBW 0	"REQ_RES_DB".Request_PKW_PKE	HEX	VW#16#334D	VW#16#334D
3	DB1.DBW 2	"REQ_RES_DB".Request_PKW_IND	HEX	VW#16#0000	VW#16#0000
4	DB1.DBW 4	"REQ_RES_DB".Request_PKW_PWE1	HEX	VW#16#02D2	VW#16#02D2
5	DB1.DBW 6	"REQ_RES_DB".Request_PKW_PWE2	HEX	VW#16#0002	VW#16#0002
6					
7	// PKW mechanism response				
8	DB1.DBW 20	"REQ_RES_DB".Response_PKW_PKE	HEX	VW#16#234D	
9	DB1.DBW 22	"REQ_RES_DB".Response_PKW_IND	HEX	VW#16#0000	
10	DB1.DBW 24	"REQ_RES_DB".Response_PKW_PWE1	HEX	VW#16#02D2	
11	DB1.DBW 26	"REQ_RES_DB".Response_PKW_PWE2	HEX	VW#16#0002	
12					
13					
14	// PZD: Send Control Word 1 and Main Setpoint to the drive				
15	DB1.DBW 8	"REQ_RES_DB".Request_Send_STW1_PZD1	HEX	VW#16#047F	VW#16#047F
16	DB1.DBW 10	"REQ_RES_DB".Request_Send_HSW_PZD2	HEX	VW#16#1000	VW#16#1000
17					
18	// PZD: Receive diagnostic and status information from the drive				
19	DB1.DBW 28	"REQ_RES_DB".Response_Rec_ZSW1_PZD	DEZ	-5321	
20	DB1.DBW 30	"REQ_RES_DB".Response_Rec_HIW_PZD2	DEZ	4090	
21	DB1.DBW 32	"REQ_RES_DB".Response_PZD3	HEX	VW#16#05C7	
22	DB1.DBW 34	"REQ_RES_DB".Response_PZD4	HEX	VW#16#04E5	
23	DB1.DBW 36	"REQ_RES_DB".Response_PZD5	HEX	VW#16#0000	
24	DB1.DBW 38	"REQ_RES_DB".Response_PZD6	HEX	VW#16#0000	
25					

PKW mechanism request:
 1st word PKE: DB1.DBW 0
 2nd word IND: DB1.DBW 2
 3rd word PWE1: DB1.DBW 4
 4th word PWE2: DB1.DBW 6

PKW mechanism response:
 1st word PKE: DB1.DBW 20
 2nd word IND: DB1.DBW 22
 3rd word PWE1: DB1.DBW 24
 4th word PWE2: DB1.DBW 26

Controlling the drive via PZD:

- Control word 1 (STW1): DB1.DBW 8
- Main setpoint (HSW): DB1.DBW 10

Receive diagnostic and status information from the drive:
 PZD1: DBW 28
 PZD2: DBW 30
 PZD3: DBW 32
 PZD4: DBW 34
 PZD5: DBW 36
 PZD6: DBW 38

Upper section – 1. PKW mechanism Request

The 4 words (PKE, IND, PWE1 and PWE2) of the PKW request are entered in the upper section.

Center section – 2. PKW mechanism Response

The PKW response from the drive is shown in the center section 2 of the variable table.

Center section – 3rd controlling the drive via PZD

The center section 3 of the variable table is used to control the drive. The control word 1 (STW1: DB1.DBW 8) and main setpoint (HSW: DB1.DBW 10) are sent to the drive. The drive is started by sending control word 047E, followed by 047F (edge of bit 0: ON). The main setpoint HSW = 4000 (hex) corresponds to 50 Hz.

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Lower section – 4th receiving diagnostics information from the drive

The diagnostic and status information & data received from the drive are displayed in the lower section 4 of the variable table. The number of PZD words, used to transfer diagnostic and status information & data depends on the telegram type that has been selected.

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3 Example programs for PROFIBUS communication

Note

This chapter refers to the PROFIBUS communication with the MICROMASTER PROFIBUS optional board. In the manual of the MICROMASTER PROFIBUS optional board you will find some example programs which are attached in this FAQ at "attachment example programs referring chapter 3".

Description

PROFIBUS allows extremely fast data transfer between the SIMATIC & MICROMASTER 440 systems.

The MICROMASTER4 control is realized along the cyclic channel of PROFIBUS-DP.

In addition, parameters can also be exchanged along this channel.

Further, it is also possible to read-out (upload) detailed diagnostic information

You'll find a description from Chapter 3.4 "PKW mechanism to process parameters" under "PKW-Mechanismus.zip". Parameters can be handled and visualized (read/write) using the PKW mechanism.

You can find information on how to use PZD words to transfer parameter values, used to diagnose/troubleshoot the drive inverter state (inverter temperature, actual frequency, torque, output current etc.) under the following:

(The projects with comments in the English language)

- Diagn_wd_en.zip: > extended configuration: 0 PKW words, 8 PZD words, "Word Consistency", standard load/transfer commands
- Diagn_wh_en.zip: > extended configuration: 0 PKW words, 8 PZD words, "Whole Consistency", system functions SFC 14, SFC 15
- Diagn_pkw_en.zip: > extended configuration: 4 PKW words, 8 PZD words, "Whole Consistency", system functions SFC 14, SFC 15, using the PKW mechanism to change parameter P2051

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Futher information

- You find further information at [http://support.automation.siemens.com/WW/news/en/Applications & Tools](http://support.automation.siemens.com/WW/news/en/Applications%20&%20Tools) => Drive Technology => folder "Application Examples"
- FAQ: Which parameters can be read-out using PZD?; Entry-ID: [23642364](#)

4 Appendix

Internet links

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

	Topic	Title
\1\		Siemens Customer Support
\2\	Manual	MICROMASTER PROFIBUS Optional Board; Entry-ID: 6586565
\3\	Manuals	MICROMASTER 4
\4\	Manuals	SINAMICS G120
\5\	Manuals	SINAMICS G120D
\6\	FAQ	Reading the status of digital inputs over PROFIBUS; Entry-ID: 9774774
\7\	FAQ	PROFIBUS STW2 (Control Word 2); Entry-ID: 14412495
\8\	FAQ	Converting floating-point numbers; Entry-ID: 23803063
\9\	FAQ	Reading individual parameters of the SINAMICS G120 using SFC58 & SFC 59; Entry-ID: 23990917
\10\	FAQ	What are the differences in the representation of the actual state of the MICROMASTER 4 and SINAMICS G120/G120D frequency inverters after Power on and ON/OFF1 command?; Entry-ID: 28518735
\11\	Application	Acyclic reading and writing parameters of the frequency inverters via PROFINET and PROFIBUS; Entry-ID: 29157692
\12\	Application	Closed-Loop Controlled Positioning of an Axis with S7 300 CPU 314C-2 DP, MICROMASTER 440 and SIMATIC Easy Motion Control; Entry-ID: 21669390
\13\	Application	Data exchange using cross-traffic with a DP Master; Entry-ID: 22421343
\14\	Download	Amended PROFIBUS GSD files (inc. MICROMASTER 411, 420, 430 und 440); Entry-ID: 6567719
\15\	Download	SINAMICS G120: PROFIBUS GSD files; Entry-ID: 23450835
\16\	Download	SINAMICS G120: PROFINET GSDML files; Entry-ID: 26641490

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5 History

Tabelle 5 History

Version	Date	Changes
V4.0	01/2014	Summarised issue