Parameter List and Manual for

DAC-4-x-PBDB-PPQ

Amplifier and Controller Card with Profibus Interface for
Pump Applications with PPQ-Function

To be used in conjunction with document: "DAC-4-x-PPQ Manual English R01 YYYYMMDD.pdf" (or newer versions)

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Revision History

Revision	Date	Description
Preliminary	09.10.2010	First revision based on DMA Profibus description
Preliminary	19.10.2010	Correction
R00	26.10.2010	First release
R01	25.10.2011	E08 adapted for selection master/slave mode pump; added parameter C4.xx for master/slave operation for pump; parameters C3.xx removed
R02	27.03.2014	Rework S7-implementation
R03	06.05.2016	Status and error parameter defined
R03	22.08.2016	GSD file HCS0220.gsd

Table of Content

1 Features

- Supports Profibus-DP Slave in accordance with IEC 61158
- Supports Profibus DPV1
- Maximum 244 Byte input and 244 Byte output data
- Supports up to 12 Mbaud (auto detect)
- Electrical isolated and opto-decoupled

1.1 Used GSD File

„HCS0220.GSD“

1.2 Supported DAC SW-versions

Version: V54.xx

1.3 General information about TADR (Telegram Address)

TADR is a value which may be written (changed) with each cycle but changing of this value is optional and not mandatory. The value will be defined by the DP-Master.
The purpose is to either check the telegrams by the master or also in order to force sending of a new telegram from the node.
The design of the node is made in a way that the slave are only responding if a received message from the master contains changed (different) data compared to the previous message.
So TADR can be used to force a response from a slave for example in order to get an update on the current status of the slave even if the other data in the message remain unchanged.
TADR value is valid in the range of 0 to 255 or in hexadecimal 0x00 to 0xFF.

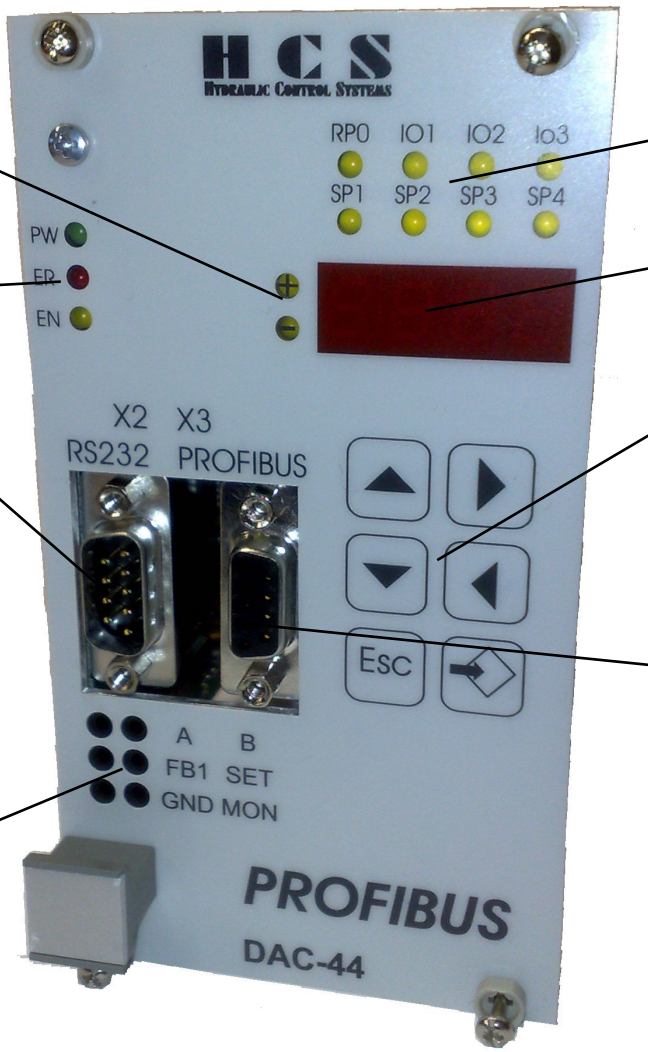
1.4 General information about CMD (Command) and SADR (Slave Address)

Different ways of communication between master and slaves (modules) are possible. The difference is in the CMD instruction.

CMD = 6:	Writing of a single parameter-ID. The selected SADR in the telegram will define which slave is selected for the communication. **Important note:** In case of the DAC-4 there is no slave address in the unit itself because each DAC-4 itself is a node. In order to avoid any conflicts this means that SADR always must be set to “0”!
CMD = 3:	Reading of one ore more parameters with parameter-ID in rising order. All other definitions from CMD = 6 are also applicable.

2 Front View, Address Selection and Connectors

2.1 Front View:



Status LED's:
"+"
"-"

Status LED's:
PW = Power
EN = Enable
ER = Error

Sub-D Connector:
9-pole male
RS232 Interface
Pin 1 = reserved
Pin 2 = RxD
Pin 3 = TxD
Pin 4 = con. to 6 + 8
Pin 5 = GND
Pin 6 = con. to 4 + 8
Pin 7 = Reserved
Pin 8 = con. to 4 + 6
Pin 9 = Reserved

Test jacks:
Current A and B
Feedback 1
Command S6
GND
Monitor

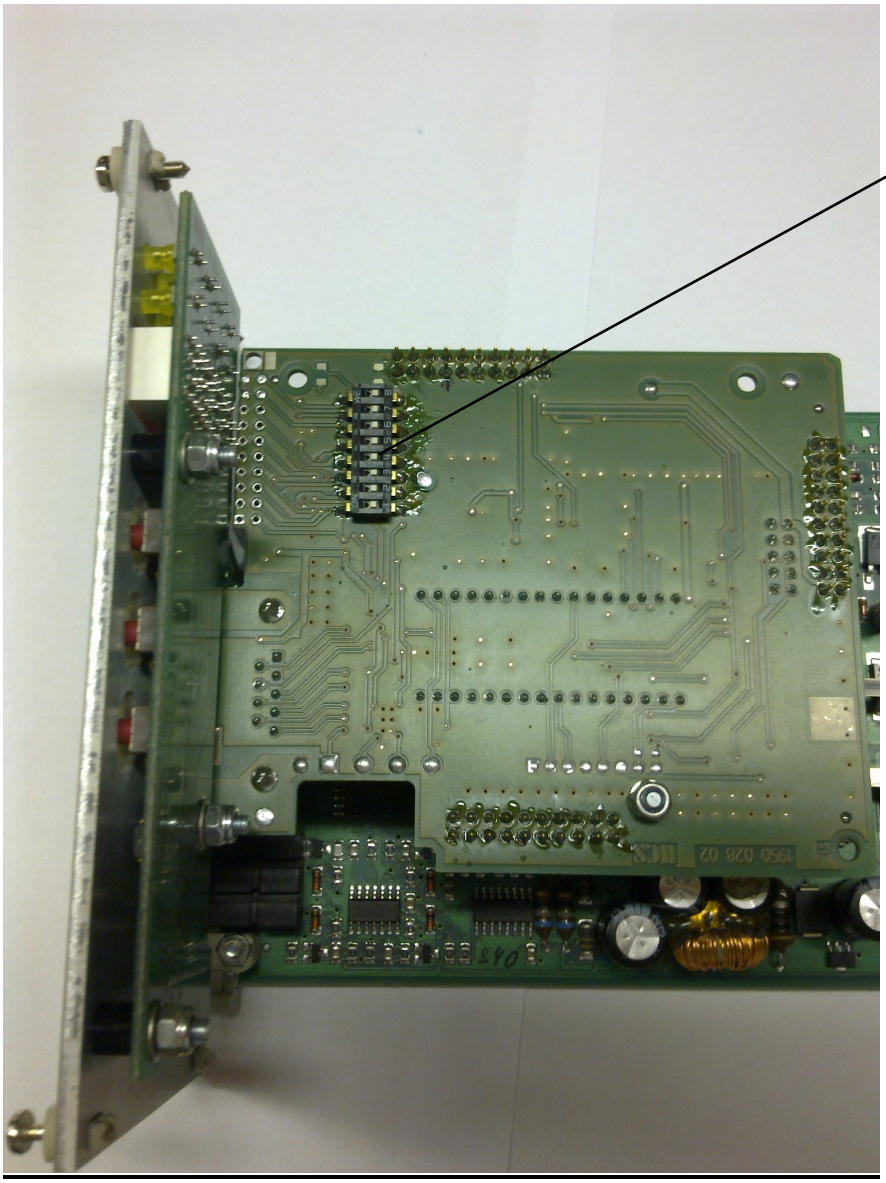
Status LED:
Digital Inputs

Display:
4-digit
7 segment

Keypad:
"up"
"down"
"left"
"right"
"Esc"
"Enter"

Connector Profibus DP:
1 = N/C
2 = N/C
3 = PB+
4 = PB-RTS
5 = PB-GND
6 = PB-5 V
7 = N/C
8 = PB-
9 = N/C

2.2 Address selection:



Address Selector:

1 = Bit 1
2 = Bit 2
3 = Bit 3
4 = Bit 4
5 = Bit 5
6 = Bit 6
7 = Bit 7
8 = not used

Simple commands

2.3 CMD = 3, Master Read parameters (7 bytes)

Write first…

Byte	Abbreviation	Description
0	TADR	Telegram address, defined by the user, Range 0..255, 0..0xFF
1	SADR	Slave address
2	CMD	Command: 3 = Read multiple parameters by the master
3	IDH	High byte parameter ID of first parameter
4	IDL	Low byte parameter ID of first parameter
5	N-high	High-Byte Number parameters
6	N-low	Low-Byte Number parameters

…Write last

TADR Telegram address, defined by the DP-Master.

SADR Slave address, if more than one Slave is connected to the Profibus port
For DAC-4 always = 0

CMD Command: 3 = Read parameter by the master

IDH,IDL H-Byte and Low-Byte of parameter-ID in HEX
0x0000 .. 0x00A2 = Valid ID-range

N-high High-Byte Number parameters (words), normally zero

N-low Low-Byte Number parameters (words), 1 to 8 (0x08)
(maximal 8 parameters readable at once)

2.4 CMD = 3, Response from Slave (4 + CNT bytes)

Write first…

Byte	Abbreviation	Description
0	TADR	Telegram address, defined by the user, Range 0..255, 0..0xFF
1	SADR	Slave address
2	CMD	Command: 3 = Read multiple parameters by the master
3	CNT	N*2, Number of data bytes
4	DAT1H	High byte value of first parameter
5	DAT1L	Low Byte value of first parameter

If CNT > 2: ……

CNT+2 = N	DATnH	High byte value of last (n)parameter
CNT+3 = N	DATnL	Low Byte value of last (n)parameter

…Write last

TADR Telegram address, defined by the DP-Master.

SADR Slave address, if more than one Slave is connected to the Profibus port
For DAC-4 always = 0

CMD Command: 3 = Read parameter by the master

CNT N*2, Number of data bytes (Maximal 16 data bytes)

IDH,IDL H-Byte and Low-Byte of parameter-ID in HEX
0x0000 .. 0x00B0 = Valid ID-Range

DAT1H.. DAT nH,
DAT1L.. DAT nL, Two data bytes in HEX, without decimal sign
0x7FFF == +32767
0x8000 == -32768

2.5 CMD = 3, Error from Slave (4 bytes)

Write first…

Byte	Abbreviation	Description
0	TADR	Telegram address, defined by the user, Range 0..255, 0..0xFF
1	SADR	Slave address
2	ERR	Error code
3	EXCE	Exception

…Write last

ERR Error code: 0x83 = Read failed

EXCE Exception:
1 = Command not supported
2 = Wrong ID
3 = CNT== 0 or CNT > 16 (0x10)
4 = Reading of ID failed
5 = timeout slave, address wrong or not installed or
Invalid number of connected slaves
6 = Internal checksum error (Modbus)

Example for error response:

Slave address is not valid. E.g. **SADR** in the master telegram is set to 3

Byte	Abbreviation	Abbreviation	Description
0	0x23	TADR	Response telegram address (defined by the user)
1	**0x03**	SADR	Actual slave address
2	0x86	ERR	Error, Bit „7“ with command 0x06 is set
3	0x05	EXCE	timeout slave, address wrong

2.6 CMD = 6, Master Write single parameter (7 bytes)

Write first…

Byte	Abbreviation	Description
0	TADR	Telegram address, defined by the user, Range 0..255, 0..0xFF
1	SADR	Slave address
2	CMD	Command: 6 = Write single parameter by the master
3	IDH	High byte parameter ID
4	IDL	Low byte parameter ID
5	DATH	High byte of parameter value
6	DATL	Low byte of parameter value

…Write last

TADR Telegram address, defined by the DP-Master.

SADR Slave address, if more than one Slave is connected to the Profibus port
For DAC-4 always = 0

CMD Command: 6 = Write single parameter by the master

IDH,IDL H-Byte and Low-Byte of parameter-ID in HEX
0x0000 .. 0x00B0 = Valid ID-Range

DATH,DATL Two data bytes in HEX, without decimal sign
0x7FFF == +32767
0x8000 == -32768

2.7 CMD = 6, Response from Slave (7 bytes)

Write first…

Byte	Abbreviation	Description
0	TADR	Telegram address, defined by the user, Range 0..255, 0..0xFF
1	SADR	Slave address
2	CMD	Command: 6 = Write single parameter by the master
3	IDH	High byte parameter ID
4	IDL	Low byte parameter ID
5	DATL	High byte of second analogue value
6	DATH	Low byte of first analogue value

…Write last

TADR Telegram address, defined by the DP-Master.

SADR Slave address, if more than one Slave is connected to the Profibus port
For DAC-4 always = 0

CMD Command: 6 = Write single parameter by the master

IDH,IDL H-Byte and Low-Byte of parameter-ID in HEX
0x0000 .. 0x00A2 Valid ID-Range

DATH,DATL Two data bytes in HEX, without decimal sign
0x7FFF == +32767
0x8000 == -32768

2.8 CMD = 6, Error from Slave (4 bytes)

Write first…

Byte	Abbreviation	Description
0	TADR	Telegram address, defined by the user, Range 0..255, 0..0xFF
1	SADR	Slave address
2	ERR	Error code
3	EXCE	Exception

…Write last

ERR Error code: 0x86 = write failed

EXCE Exception:
1 = Command not supported
2 = Wrong ID
3 = Wrong Data Value
4 = Writing of ID failed
5 = timeout slave, address wrong or not installed or
Invalid number of connected slaves
6 = Internal checksum error (Modbus)

Example for error response:

Slave address is not valid. E.g. **SADR** in the master telegram is set to 3

Byte	Abbreviation	Abbreviation	Description
0	0x23	TADR	Response telegram address (defined by the user)
1	**0x03**	SADR	Actual slave address
2	0x86	ERR	Error, Bit „7“ with command 0x06 is set
3	0x05	EXCE	timeout slave, address wrong

2.9 Telegram example CMD = 6, CMD = 3

Master wants to write parameter "C1.07" with value 1.000 V:

ID = 0x0030
DATA = 0x3E8 (= 1000 in decimal)
TADR = 0x23
SADR = 0x00

Byte	Value	Abbreviation
0	0x23	TADR
1	0x00	SADR
2	0x06	CMD
3	0x00	IDH
4	0x30	IDL
5	0x03	DATL
6	0xE8	DATH

Response from slave (module), command was successful executed
ID = 0x0030
DATA = 0x3E8 (= 1.000 V)

Byte	Value	Abbreviation
0	0x23	TADR
1	0x00	SADR
2	0x06	CMD
3	0x00	IDH
4	0x30	IDL
5	0x03	DATL
6	0xE8	DATH

Master wants to read parameter "d1.07":

ID = 0x0007
N = 1, one parameter
TADR = 0x24
SADR = 0x00

Byte	Value	Abbreviation
0	0x24	TADR
1	0x00	SADR
2	0x03	CMD
3	0x00	IDH
4	0x07	IDL
5	0x00	N-high
6	0x01	N-low

Response from slave (module)
CNT = 2 (2 Bytes)
DATA = 0x0133 (==0.307Af)

Byte	Value	Abbreviation
0	0x24	TADR
1	0x00	SADR
2	0x03	CMD
3	0x00	CNT
4	0x01	DAT1H
5	0x33	DAT1L

2.10 Additional examples CMD = 6

Examples for set value via Profibus (ID = 0x0027):

1.) Command signal 0.000 V = 0x0000:

Byte	Value	Abbreviation
0	0x12	TADR
1	0x00	SADR
2	0x06	CMD
3	0x00	IDH
4	0x27	IDL
5	0x00	DATL
6	0x00	DATH

2.) Set value 5.000 V = 0x1388:

Byte	Value	Abbreviation
0	0x12	TADR
1	0x00	SADR
2	0x06	CMD
3	0x00	IDH
4	0x27	IDL
5	0x13	DATL
6	0x88	DATH

3.) Set value 9.999 V = 0x270F:

Byte	Value	Abbreviation
0	0x12	TADR
1	0x00	SADR
2	0x06	CMD
3	0x00	IDH
4	0x27	IDL
5	0x27	DATL
6	0x0F	DATH

4.) Set value –9.999 V = 0xD8F1

Byte	Value	Abbreviation
0	0x12	TADR
1	0x00	SADR
2	0x06	CMD
3	0x00	IDH
4	0x27	IDL
5	0xD8	DATL
6	0xF1	DATH

2.11 Profibus telegram definition

2.11.1 General

2.11.1.1 Error Message (indication by "Error occurred")

Errors which are indicated in the Bit (Error occurred) e.g. "over current" or "cable fracture" can be reset with the following action:

- Set input signal for the hardware enable at the according terminal 8d to "Low" and than go back to "High"
- Setting and resetting of the Bits (Parameter-id 0xC2) Bus-Disable.

Mandatory condition for resetting an error is that the failure causing the error has been cleared or removed.

If the Error-LED at the front plate is flashing then the Profibus cannot communicate with the DAC-4.
Check the Profibus address and the wiring.

Display	description of error
---1	Reserved
---2	Wire break swash plate position sensor X1 (FB1), only if C1.26 = 1
---3	Excess current or short circuit at the output stages
---4	Wire break sensor X2A (FB2), only if C2.26 = 1
---5	Wire break sensor X2B (FB2), only if C2.26 = 1
---6	Overload of current >22mA pressure sensor X2A (Input FB2)
---7	Overload of current >22mA pressure sensor X2B (Input FB2)
---c	Deficient communication between the display PCB and the main PCB has been recognized
---d	No communication between the display PCB and the main PCB possible

2.11.1.2 Explanation for "Hardware Enable" and "Software Disable":

Generally speaking the hardware enable must be present ("high" level) in order to get a signal (current) at the output stages. Besides the hardware enable a software disable can be used in order to "override" the hardware enable. So even if the hardware signal is present, with the according software command to the module can be disabled! (f.e. Writing 0x8000 to parameter-id 0xC2)

This means that the hardware enable can be hardwired and the software disable can be used in order to drop the output signal to zero or also in order to quit errors.

3 Description of additional parameters for Profibus version

3.1 d-Parameter d2.16

d2.16	Profibus address as selected *PB	---r	0001	0001	0254

Used in order to show the selected address on the selector switch which is not accessible when the board is plugged in.

3.2 E-Parameters E23 to E26

E23	Profibus telegram timeout window (if timeout is appeared the card will be disabled).	s	1	0	9.999	10 = 10 ms 0 = deactivated

Defines time until timeout error occurs after a telegram has been sent.

E24	Activation of analogue command signal flow (swash plate angle) *PB	---	1	0	1	0 = off; analogue input de-activated 1 = all inputs active
E25	Activation of analogue command signal pressure *PB	---	1	0	1	0 = off; analogue input de-activated 1 = all inputs active
E26	Activation of analogue command signal power limitation *PB	---	1	0	1	0 = off; analogue input de-activated 1 = all inputs active

Parameters E24 to E26 are used in order to activate or deactivate the analogue command signals in the Profibus version. If the command signal is provided via the Profibus than it is recommended to switch off the related analogue input

4 Siemens S7 implementation

4.1 Hardware configuration

Hardware configuration with program “HW KONFIG”, where you can find the DAC-4/DMA-2 Profibus node.

Select the right byte number of bytes for the output and input buffer depending on number of slaves used - for DAC-4 always = 0.
In this case the output buffer is fixed to 7 bytes, the input buffer to 7 bytes.

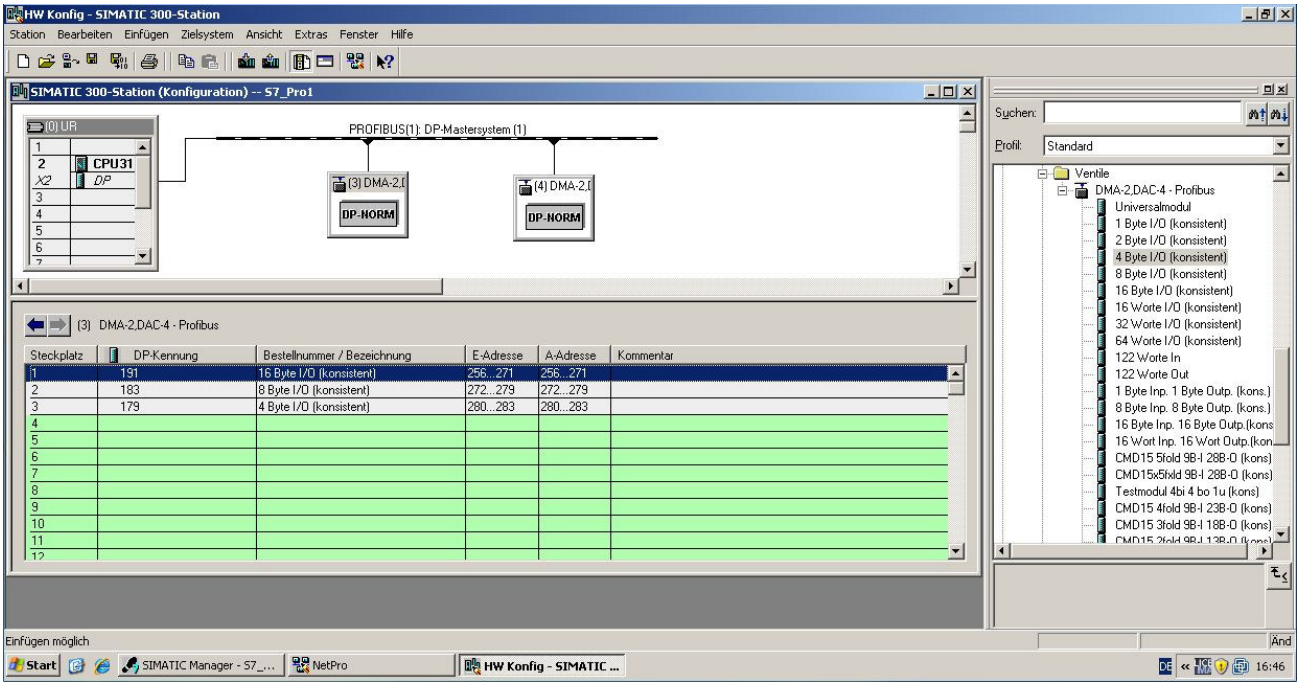
Valves (Ventile) → “DMA-2,DAC-4 - Profibus”. Chose for example the following profiles:
“16 Byte I/O (konsistent)” AND “8 Byte I/O (konsistent) AND “4 Byte I/O (konsistent)

Select the correct Profibus address, in this example #03 = 0x03.
Adjust the Profibus address at the daughter board of the DAC-4 (DIP-Switch).

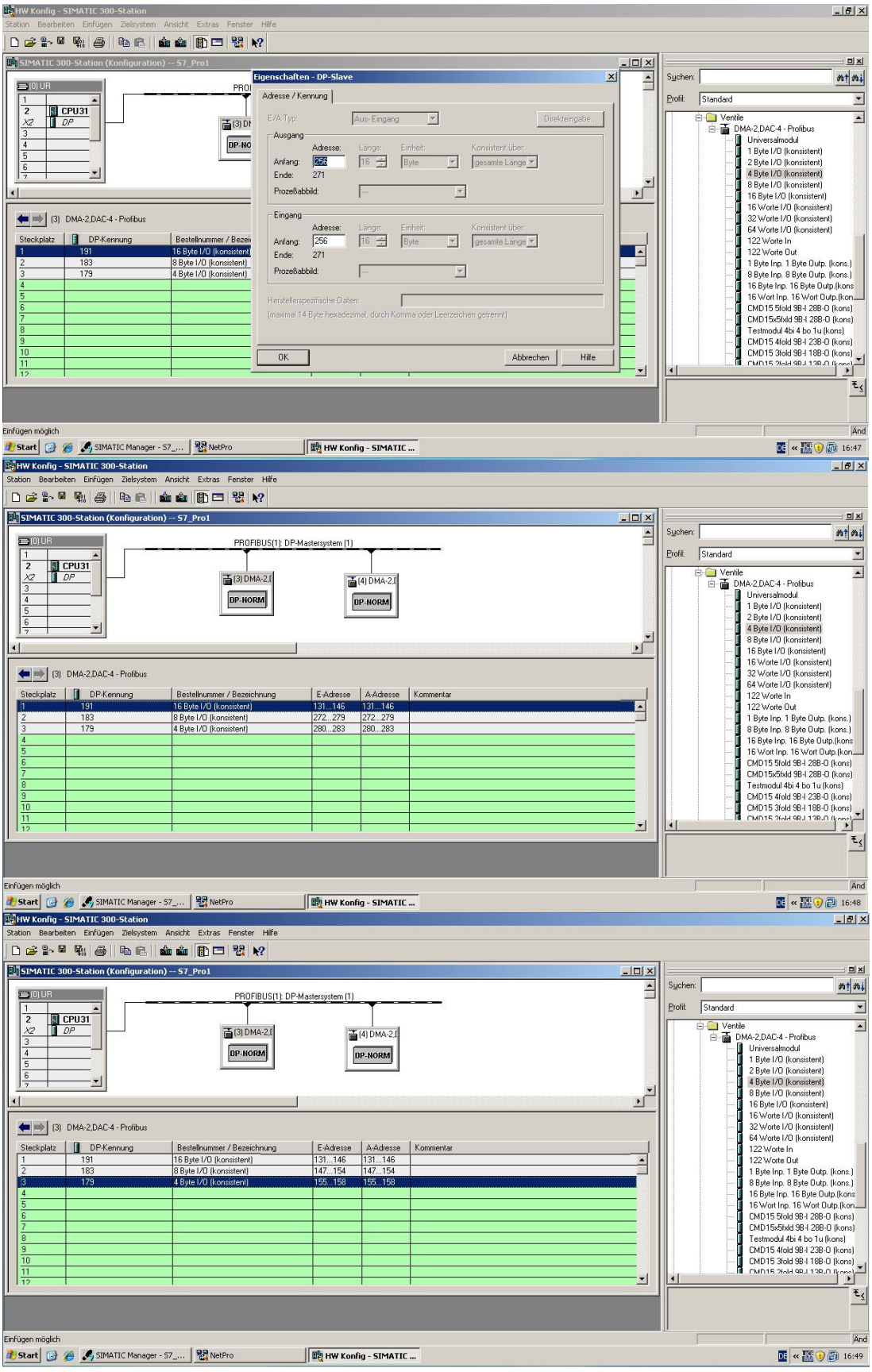
Important Note:

The DAC-4 uses the same GSD-File as the product line DMA with Profibus-Interface. This is the reason why the S7 implementation shows “DMA-2” and not “DAC-4”

Don’t use the “universal module” => This is not allowed.
(The universalmodule is displayed by the S7, even if not in the GSD-file)



adjust the E/A addresses:



5 List of parameters

All values in decimal, for usage as data values they must be converted into Hex
R = read only parameter.
X = implemented, but not active (no access)
W/R = writing and reading possible.

5.1 Parameter for set values

ID_{Hex}	ID_{dec}	W/R	Name	Function	Unit	Step	Min	Max	Description
0x1F	31	R/W	A1.01	Profibus set value (Flow)	V	1	-9999	9999	-1000 == -1.000 V; 1000 == 1.000 V This value is, when written, always active. Cleared by reset, or writing “0”. For switching off of the analogue set-value, set E24 = “0”
0x20	32	R/W	A1.02	Profibus set value (Pressure)	V	1	0	9999	0 == 0.000 V; 1000 == 1.000 V This value is, when written, always active. Cleared by reset, or writing “0”. For switching off of the analogue set-value, set E25 = “0”
0x27	39	R/W	A2.01	Profibus set value power B (positive)	V	1	0	9999	0 == 0.000 V; 1000 == 1.000 V This value is, when written, always active. Cleared by reset, or writing “0”. For switching off of the analogue set-value, set E26 = “0”
0x28	40	R/W	A2.02	Profibus set value power A (negative)	V	1	0	9999	0 == 0.000 V; 1000 == 1.000 V This value is, when written, always active. Cleared by reset, or writing “0”. For switching off of the analogue set-value, set E26 = 0”

5.2 Complete list

ID_{Hex}	ID_{dec}	W/R	Name	Function	Unit	Step	Min	Max	Description
0x00	0	R	Vers	Software version	**---**	---	xx.xx	xx.xx	Depends on HW
0x01	1	R	d1.01	Sum of analogue set value	V	1	-9999	9999	-1000 == -1.000 V; 1000 == 1.000 V
0x02	2	R	d1.02	Sum of all post ramp set values	V	1	-9999	9999	
0x03	3	R	d1.03	Set values after linearization	V	1	-9999	9999	
0x04	4	R	d1.04	Value after gain adjustment.	V	1	-9999	9999	
0x05	5	R	d1.05	Signal A	V	1	-9999	9999	
0x06	6	R	d1.06	Signal B	V	1	-9999	9999	
0x07	7	R	d1.07	Current A	A	1	0	5000	1000 == 1.000 A
0x08	8	R	d1.08	Current B	A	1	0	5000	
0x09	9	R	d1.09	Total current	A	1	0	5000	
0x0A	10	R	d1.10	Desired value	V	1	-9999	9999	-1000 == -1.000 V; 1000 == 1.000 V
0x0B	11	R	d1.11	Actual value, feedback value	V	1	-9999	9999	
0x0C	12	R	d1.12	Lag error	V	1	-9999	9999	
0x0D	13	R	d1.13	Controller output	V	1	-9999	9999	
0x0E	14	R	d2.01	Sum of analogue set value	V	1	-9999	9999	
0x0F	15	R	d2.02	Sum of all post ramp set values	V	1	-9999	9999	
0x10	16		d2.03	Reserved					
0x11	17		d2.04	Reserved					
0x12	18	R	d2.10	Desired value	V	1	-9999	9999	
0x13	19	R	d2.11	Actual value, feedback value	V	1	-9999	9999	
0x14	20	R	d2.12	Lag error	V	1	-9999	9999	
0x15	21	R	d2.13	Controller output	V	1	-9999	9999	
0x16	22	R/W	S1.01	Set Value1 (Flow)	V	1	-9999	9999	
0x17	23	R/W	S1.02	Set Value2 (Flow)	V	1	-9999	9999	
0x18	24	-	S1.03	Reserved					
0x19	25	-	S1.04	Reserved					
0x1A	26	-	S1.08	Reserved					

ID_{Hex}	ID_{dec}	W/R	Name	Function	Unit	Step	Min	Max	Description
0x1B	27	R/W	r1.01	Ramp from 0 □ - (Flow)	s	1	0	3950	1 == 10ms 0 == Ramp function off
0x1C	28	R/W	r1.02	Ramp from – □ 0 (Flow)	s	1	0	3950	
0x1D	29	R/W	r1.03	Ramp from 0 □ + (Flow)	s	1	0	3950	
0x1E	30	R/W	r1.04	Ramp from + □ 0 (Flow)	s	1	0	3950	
0x1F	31	R/W	A1.01	Profibus set value (Flow)	V	1	-9999	9999	-1000 == -1.000 V; 1000 == 1.000 V This value is, when written, always active. Cleared by reset, or writing “0”. For switching off of the analogue set-value, set E24 = “0”
0x20	32	R/W	A1.02	Profibus set value (Pressure)	V	1	0	9999	0 == 0.000 V; 1000 == 1.000 V This value is, when written, always active. Cleared by reset, or writing “0”. For switching off of the analogue set-value, set E25 = “0”
0x21	33	R/W	S2.01	Set Value1 (Pressure)	V	1	-9999	9999	-1000 == -1.000 V; 1000 == 1.000 V
0x22	34	R/W	S2.02	Set Value2 (Pressure)	V	1	-9999	9999	
0x23	35	R/W	r2.01	Ramp from 0 □ - (Pressure)	s	1	0	3950	1 == 10ms 0 == Ramp function off
0x24	36	R/W	r2.02	Ramp from – □ 0 (Pressure)	s	1	0	3950	
0x25	37	R/W	r2.03	Ramp from 0 □ + (Pressure)	S	1	0	3950	
0x26	38	R/W	r2.04	Ramp from + □ 0 (Pressure)	S	1	0	3950	
0x27	39	R/W	A2.01	Profibus set value power B (positive)	V	1	0	9999	0 == 0.000 V; 1000 == 1.000 V This value is, when written, always active. Cleared by reset, or writing “0”. For switching off of the analogue set-value, set E26 = “0”
0x28	40	R/W	A2.02	Profibus set value power A (negative)	V	1	0	9999	0 == 0.000 V; 1000 == 1.000 V This value is, when written, always active. Cleared by reset, or writing “0”. For switching off of the analogue set-value, set E26 = 0”
0x29	41	R/W	C1.00	Controller selection	---	1	0	4	0 = off 1 = P-PT1-I-DT1
0x2A	42	R/W	C1.01	Hysteresis for command signal flow	---	1	0	9999	1000 == 1.000 V
0x2B	43	R/W	C1.02	Linearization	---	1	0	5	0 = linear; 1 ... 5 = curve
0x2C	44	R/W	C1.03	Gain A	V/V	1	0	200	100 == Factor 1.00
0x2D	45	R/W	C1.04	Gain B	V/V	1	0	200	100 == Factor 1.00
0x2E	46	R/W	C1.05	Set value sign		1	- 1	+ 1	- 1 = negative 0 = off + 1 = positive
0x2F	47	R/W	C1.06	Set value offset	V	1	-9999	9999	-1000 == -1.000 V; 1000 == 1.000 V
0x30	48	R/W	C1.07	Dead band compensation A	V	1	0	9999	1000 == 1.000 V 9.999 V = max. current depending on solenoid selection
0x31	49	R/W	C1.08	Dead band compensation B	V	1	0	9999	
0x32	50	R/W	C1.09	Sensor type Attention: No negative controller output possible when 10, 11 or 12 is selected!	---	1	1	12	1 = 0 ... 20 mA 2 = 4 ... 20 mA 3 = 12 mA □ 8 mA 4 = 0 ... 10 V 5 = 0 ... □ 10 V 6 = 6 V □ 2,5 V 7 = 7,5 V □ 2,5 V 8 = 6 V □ 5 V 9 = 7,5 V □ 5 V 10 = 0 ... 20 mA 11= 4 ... 20 mA 12 = 0 ... 10 V
0x33	51	R/W	C1.10	Actual value gain	V/V	1	0	400	100 == Factor 1.00
0x34	52	R/W	C1.11	Actual value offset	V	1	-9999	9999	-1000 == -1.000 V; 1000 == 1.000 V
0x35	53	R/W	C1.12	Actual value sign	---	---	- 1	+ 1	- 1 = negative 0 = off + 1 = positive
0x36	54	R/W	C1.13	P-Portion KP1	V/V	1	0	400	100 == Factor 1.00
0x37	55	R/W	C1.14	T-Portion for PT1 (to C1.16)	S	1	0	400	100 == 1.00

ID_{Hex}	ID_{dec}	W/R	Name	Function	Unit	Step	Min	Max	Description
0x38	56	R/W	C1.15	Threshold (C1.13, C1.16)	V	1	0	9999	1000 == 1.000 V
0x39	57	R/W	C1.16	P-Portion KP2	V/V	1	0	400	100 == Factor 1.00
0x3A	58	R/W	C1.17	I-Portion	V/s	1	0	4000	1000 == 1.000
0x3B	59	R/W	C1.18	D-Portion	Vs	1	0	400	100 == 1.00
0x3C	60	R/W	C1.19	T-Portion for DT1	S	1	0	400	100 == 1.00
0x3D	61	R/W	C1.20	Gain (C1.13 and C1.16)	V/V	2n	1	32	2↑1 = Factor 2.00 Only values 2n are allowed, other values are internal set to factor 1.0
0x3E	62	R/W	C1.21	Comparator upper level	V	1	-9999	9999	-1000 == -1.000 V; 1000 == 1.000 V
0x3F	63	R/W	C1.22	Comparator lower level	V	1	-9999	9999	
0x40	64	R/W	C1.23	Comparator delay into window	S	1	0	9999	1 == 10 ms 0 == no delay
0x41	65	R/W	C1.24	Comparator delay out of window	S	1	0	9999	
0x42	66	R/W	C1.25	Comparator selection KOMP_1	---	1	0	3	0 = off 1 = Set value 2 = Actual value 3 =Lag error
0x43	67	R/W	C1.26	Cable fracture detection feedback	---	---	0	1	0 = off; 1 = active
0x44	68	R/W	C2.00	Controller selection	---	1	0	2	0 = off 1 = active 2 = remote by means of DIO1
0x45	69	R/W	C2.01	Command signal minimum pressure	V	1	0000	9999	1000 == 1.000 V
0x46	70	R/W	C2.02	Q limitation activation level based on pressure rise gradient	bar/s	1	0000	9999	1000 == 1000 bar/s
0x47	71	R/W	C2.03	Q reference value during active Q limitation	%	0.01	0.00	99.99	1000 == 10.00 %
0x48	72	R/W	C2.04	Q limitation activation level based on pressure ratio of pressure actual/command value	%	0.01	0.00	99.99	1000 == 10.00 %
0x49	73	R/W	C2.05	Positive I-portion output limitation	V	1	0000	9999	1000 == 1.000 V
0x4A	74	R/W	C2.06	Command signal offset	V	1	-9999	9999	-1000 == -1.000 V; 1000 == 1.000 V
0x4B	75	R/W	C2.07	Limitation for pressure decrease (Displacement opposite of flow command)	V	1	0000	9999	1000 == 1000 bar/s
0x4C	76	R/W	C2.08	Q filter function for activation level C2.02	---	1	0	8	---
0x4D	77	R/W	C2.09	Pressure sensor type Attention: No negative controller output possible when 10 or 11 is selected!	---	-	1	1,2, 10,11	1 = 0 ... 20 mA 2 = 4 ... 20 mA 10 = 0 ... 20 mA 11 = 4 ... 20 mA Only this values are valid Other values produces undefined states
0x4E	78	R/W	C2.10	Actual value gain	V/V	1	0	400	100 == Factor 1.00
0x4F	79	R/W	C2.11	Actual value offset	V	1	-9999	9999	-1000 == -1.000 V; 1000 == 1.000 V
0x50	80	R/W	C2.12	Actual value sign	---	---	- 1	+ 1	- 1 = negative 0 = off + 1 = positive
0x51	81	R/W	C2.13	P-Portion KP1	V/V	1	0	400	100 == Factor 1.00
0x52	82	R/W	C2.14	T-Portion for PT1 (to C1.16)	S	1	0	400	100 == 1.00
0x53	83	R/W	C2.15	Threshold (C1.13, C1.16)	V	1	0	9999	1000 == 1.000 V
0x54	84	R/W	C2.16	P-Portion KP2	V/V	1	0	400	100 == Factor 1.00
0x55	85	R/W	C2.17	I-Portion	V/s	1	0	4000	1000 == 1.000
0x56	86	R/W	C2.18	D-Portion	Vs	1	0	400	100 == 1.00
0x57	87	R/W	C2.19	T-Portion for DT1	S	1	0	400	100 == 1.00
0x58	88	R/W	C2.20	Gain (C2.13 and C2.16)	V/V	2n	1	32	2↑1 = Factor 2.00 Only values 2n are allowed, other values are

ID_{Hex}	ID_{dec}	W/R	Name	Function	Unit	Step	Min	Max	Description
									internal set to factor 1.0
0x59	89	R/W	C2.26	Cable fracture detection feedback	---	---	0	1	0 = off; 1 = active
0x5A	90	R/W	C6.00	Mode of operation power limiter		1	0	3	0 = off 1 = active 2 = remote by means of DIO2 3 = on 100%, analogue inputs de-activated
0x5B	91	R/W	C6.01 C2.29	Pressure sensor range	[bar]	1	100	600	
0x5C	92	R/W	C6.02 C2.30	Rated pressure pump	[bar]	1	100	600	
0x5D	93	R/W	C6.03	Drive rpm	1/ min	1	500	2000	
0x5E	94	R/W	C6.04	Maximum pump displacement	[cc/rp m]	1	130	750	
0x5F	95	R	E00	Operation mode (depends on HW + SW version)	---	1	14	15	14 = Closed circuit pump 15 = Open circuit pump
0x60	96	R/W	E01	Analogue output	---	---	1 and 14	13 and 21	1 = d1.01 to 13 = d1.13 and 14 = d2.01 to 21 = d2.13 22 = d2.14 23 = d6.01 24 = d6.02 25 = d6.03 26 = d6.04 27 = d2.15 (d6.05)
0x61	97	R/W	E02	Output stages mode	---	---	3	3	3 = servo valves
0x62	98	R/W	E03	Solenoid selection	---	1	1	7	1 = 100 mA 2 = 137 mA/ 3 = 162 mA 4 = 200 mA 5 = 300 mA 6 = 337 mA 7 = 437 mA
0x63	99	R	E04	P-Portion current contr. energization	---	1	0	9999	Default for 100 mA solenoid
0x64	100	R	E05	I-Portion current contr. energization	---	1	0	9999	
0x65	101	R	E06	P-Portion cur. contr. de- energization	---	1	0	9999	
0x66	102	R	E07	I-Portion cur. contr. de- energization	---	1	0	9999	
0x67	103	R/W	E08	Master / Slave pump operation mode		1	0	2	0 = Master mode selected 1 = Slave mode selected C4.xx activated 2 = Input “Ramp 0” = high => slave mode pump selected; C4.xx activated
0x68	104	R/W	E09	Time delay enable signal	s	1	0	9999	1 = 1.00s
0x69	105	R/W	E10	Solenoid current adaptation	---	1	50	110	Variable adjustment of max. current 100 == Factor 1.00
0x6A	106	R/W	E11	Initial current solenoid A	V	1	0	3000	3.000 V = 30 % of max. rated current
0x6B	107	R/W	E12	Initial current solenoid B	V	1	0	3000	
0x6C	108	R/W	E13	Dither amplitude	V	1	0	3000	
0x6D	109	R/W	E14	Dither frequency	Hz	1	1	300	---
0x6E	110	R/W	E15	I-portion output limitation (flow) in open circuit operation	V	1	0	1000	---
0x6F	111	R/W	E16	Reserved					
0x70	112	R/W	E17	Reserved					
0x71	113	R/W	E18	Break output	---	1	0	5	0 = Break off, Comp. positive logic 1 = Break on, Comp. positive logic 2 = Break follows Comp. output 3 = Break not, Comp. positive logic 4 = Break and Comp. negative logic

ID_{Hex}	ID_{dec}	W/R	Name	Function	Unit	Step	Min	Max	Description
									5 = Break not, Comp. negative logic
0x72	114	R/W	E19	Output factor for analogue output	---	1	0.00	2.00	---
0x73	115	R/W	E20	Reserved					
0x74	116	R/W	E21	Password	---	1	0000	9999	---
0x75	117	X	FB1M	Reserved					
0x76	118	X	FB1o	Reserved					
0x77	119	X	FB1f	Reserved					
0x78	120	X	DOUT	Reserved					
0x79	121	X	D_IO	Reserved					
0x7A	122	X	D_IN	Reserved					
0x7B	123	X	Uout	Reserved					
0x7C	124	X	Umon	Reserved					
0x7D	125	X	1_E4	Reserved					
0x7E	126	X	1_E5	Reserved					
0x7F	127	X	1_E6	Reserved					
0x80	128	X	1_E7	Reserved					
0x81	129	X	2_E4	Reserved					
0x82	130	X	2_E5	Reserved					
0x83	131	X	2_E6	Reserved					
0x84	132	X	2_E7	Reserved					
0x85	133	X	3_E4	Reserved					
0x86	134	X	3_E5	Reserved					
0x87	135	X	3_E6	Reserved					
0x88	136	X	3_E7	Reserved					
0x89	137	X	4_E4	Reserved					
0x8A	138	X	4_E5	Reserved					
0x8B	139	X	4_E6	Reserved					
0x8C	140	X	4_E7	Reserved					
0x8D	141	X	5_E4	Reserved					
0x8E	142	X	5_E5	Reserved					
0x8F	143	X	5_E6	Reserved					
0x90	144	X	5_E7	Reserved					
0x91	145	X	6_E4	Reserved					
0x92	146	X	6_E5	Reserved					
0x93	147	X	6_E6	Reserved					
0x94	148	X	6_E7	Reserved					
0x95	149	X	7_E4	Reserved					
0x96	150	X	7_E5	Reserved					
0x97	151	X	7_E6	Reserved					
0x98	152	X	7_E7	Reserved					
0x99	153	X	User	Reserved					
0x9A	154	R	d2.14	Pressure actual value (filtered)	V	1	-9999	9999	
0x9B	155	R	d6.01	Command signal power B (positive)	V	0.018	-9999	9999	
0x9C	156	R	d6.02	Command signal power A (negative)	V	0.018	-9999	9999	
0x9D	157	R	d6.03	Command signal power [%]	V	C001	3FFF	FFFF	
0x9E	158	R	d6.04	Nominal power [V]	V	1	-9999	9999	
0x9F	159	R	d2.15 d6.05	Actual value pressure [bar]	bar	C001	0	Max	Maximum value, defined in C2.29
0xA0	160	X	C3.00	Reserved					

ID_{Hex}	ID_{dec}	W/R	Name	Function	Unit	Step	Min	Max	Description
0xA1	161	X	C3.01	Reserved					
0xA2	162	R/W	C6.05	Maximum drive power	kW	1	10	999	
0xA3	163	R/W	C6.06	Actual value filter for power limiter		1	0	8	
0xA4	164	X	E 22	Reserved					
0xA5	165	R/W	E 23	Profibus telegram timeout window (if timeout is appeared the card will be disabled).	s	1	0	9.999	10 == 10 ms 0 == function deactivated
0xA6	166	R/W	E 24	Activation of analogue set value (Flow)		1	0	1	0 == analogue input deactivated 1 == Set value via Profibus, digital and analogue input
0xA7	167	R/W	E 25	Activation of analogue set value (Pressure)		1	0	1	0 == analogue input deactivated 1 == Set value via Profibus, digital and analogue input
0xA8	168	R/W	E 26	Activation of analogue set value (Power)		1	0	1	0 == analogue input deactivated 1 == Set value via Profibus, digital and analogue input
0xA9	169	X	Oper	Reserved					
0xAA	170	R	-	Internal Digital Switches (Read/Set)	---	---	0	8191 0x8FFF	0x0004 = DKOMP_1 active 0x0400 = Card enable active 0x8000 = Bus Disable Card 0x08xx = Error xx = no. of error, see errorlist
0xAB	171	R/W	C2.27	Deactivation hysteresis (difference to activation) for the pressure and flow limiter	%	0.01	0.00	99.99	1000 == 10.00 %
0xAC	172	R/W	C2.28	Ramp Flow limitation, from limit --> Q-set (leaving pressure limit)	s	0.001	0.000	9.999	In seconds
0xAD	173	R/W	C4.01	Hysteresis for command signal flow	---	1	0	9999	1000 == 1.000 V
0xAE	174	R/W	C4.05	Set value sign		1	- 1	+ 1	- 1 = negative 0 = off + 1 = positive
0xAF	175	R/W	C4.06	Set value offset	V	1	-9999	9999	-1000 == -1.000 V; 1000 == 1.000 V
0xB0	176	R/W	C4.13	P-Portion KP1	V/V	1	0	400	100 == Factor 1.00
0xB1	177	R/W	C4.14	T-Portion for PT1 (to C4.16)	S	1	0	400	100 == 1.00
0xB2	178	R/W	C4.15	Threshold (C4.13, C4.16)	V	1	0	9999	1000 == 1.000 V
0xB3	179	R/W	C4.16	P-Portion KP2	V/V	1	0	400	100 == Factor 1.00
0xB4	180	R/W	C4.17	I-Portion	V/s	1	0	4000	1000 == 1.000
0xB5	181	R/W	C4.18	D-Portion	Vs	1	0	400	100 == 1.00
0xB6	182	R/W	C4.19	T-Portion for DT1	S	1	0	400	100 == 1.00
0xB7	183	R/W	C4.20	Gain (C4.13 and C4.16)	V/V	2n	1	32	2↑1 = Factor 2.00 Only values 2n are allowed, other values are internal set to factor 1.0
0xB8	184	R/W	--	Reserved					
0xB9	185	R/W	--	Reserved					
0xBA	186	R/W	--	Reserved					
0xBB	187	R/W	--	Reserved					
0xBC	188	R/W	--	Reserved					
0xBD	189	R/W	--	Reserved					
0xBE	190	R/W	--	Reserved					
0xBF	191	R/W	--	Reserved					
0xC0	192	R/W	--	Reserved					
0xC1	193	R/W	--	Reserved					
0xC2	194	R	d2.16	Profibus address	---	1	1	126	

ID_{Hex}	ID_{dec}	W/R	Name	Function	Unit	Step	Min	Max	Description
0xC3	195	R/W	-	Indicator for activated digital inputs. To disable the Card, send 0x8000	---	---	0	0xFFFF	0x0001= S1.01 active, activation 0x0002= S1.02 active, activation 0x0004= S2.01 active, activation 0x0008= S2.02 active, activation 0x0010= Direction + , active activation 0x0020= Direction - active, activation 0x0040= Ramp0 active, activation 0x0100= DIO1 active, activation 0x0200= DIO2 active, activation 0x0400= DIO3 active, activation 0x1000 =Q-set value direction S1(read only) 0x2000 = HW Input enable active (only read) 0x4000 = Card enable active (only read) 0x8000 = Bus Disable Card
0xFF	255	R	-	Status word (operation mode and error)	---	1	0	0xFFFF	0x1000= Q control is active 0x2000= p (pressure) limitation is active 0x4000= P (power) limitation is active 0x8000= Slave Mode is active 0x0800= Error is detected. 0x0400= Card enable active 0x0200= Warning is detected (E.g. pressure Sensor failure in slave mode) 0x00xx= xx is the error/warning number 01 = General failure 02 = Wire break at yoke angle Sensor FB1 03 = Overvoltage or short circuit at solenoid connections 04 = Wire break at pressure sensor FB2 (side A) 05 = Wire break at pressure sensor S7 (side B) 06 = Overload of current >22mA pressure sensor FB2 (Side A) 07 = Overload of current >22mA pressure sensor S7 (Side B) 0C = failure in communication between amplifier and computer / operation panel 0D = Communication between amplifier and computer / operation panel not possible

END of Document