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DMA Profinet Manual

Revision History

Revision	Date	Description
R_1.0	09.06.2014	First printout
R_1.0	13.06.2014	Typo corrected
R_1.0	20.06.2014	Syntax correction, C2.07 Dead band compensation A
R_1.1	11.07.2014	Timing definition for command 6, section 3.4.1 added, edit features

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1 Features

- Meets the standard IEC 61158 and IEC 61784.
- Meets PNO standard Version V2.2
- LAN 10/100Base-T(X)
- 2 x RJ-45 LAN (Daisy Chain)
- Cycling data exchange RT and IRT with an PROFINET IO-Controller
- Sending and receiving of diagnostic- and process alarms.
- I&M0...4-data available
- Supporting of PROFINET Naming (device name) and TCP/IP addressing
- Shared Device supported
- Media Redundancy Protocol (MRP) supported

1.1 Used GSDML File

„GSDML-V2.2-HCS-DMA-XX_PN-…….xml “
“GSDML-01F0-0002-DMA1.bmp”

1.2 Supported DMA SW-versions

Version: V13.xxy, open loop, one valve with two solenoids.

1.3 Special information for Multi-Slave Nodes

In cases where a Profinet node has more than one slave (modules) connected all slaves must be active (connected to the power supply). The hardware enable is connected to all of the DMA modules. Other wise communication is not possible and the node-module will respond with a timeout error message.
The Profinet-Node connected to the PLC (Error LED is off).
If 3 modules are used then E22 must be set to „1“ for the first module on the left, to „2“ for the second module in the middle and to „3“ for the third module closest to the slave.

1.4 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 or slaves (module or modules in case of multi-slave version) 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.

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1.5 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 of a slave (module) at a node. The selected SADR in the telegram will define which slave is selected fort he communication. In the slave itself the address is set by parameter E22,
Special case: the Profinet node has only one slave (module) connected. In this case SADR is set to 1 (defined in parameter E22). SADR also could be set to any value between 1 and 32.
Theoretically up to 32 slaves (modules) can be connected to one of the Profinet nodes. Which of the slaves (modules) is selected for communication is again defined in the telegram by the SADR and in the slaves (modules) by setting of parameter E22. For more information please refer to section 3.4.

CMD = 3: Reading of one ore more parameters with parameter-ID in rising order. All other definitions from CMD = 6 are also applicable. For more information please refer to section 3.1.

CMD = 15: This instruction allows writing or reading of a (pre-defined) set of parameters. The set of parameters itself is depending on the software version of the slaves (modules); refer also to section 4.5.
With this instruction all slaves (modules) at a given node with the SADR from 1 to 5 can be reached. This instruction can not be used for slaves (modules) with a SADR > 5. In this case CMD = 3 and CMD = 6 must be used!
The best is to set SADR at the slaves in rising and consecutive order beginning with SADR =1 (E22 = 1).
In the telegram itself the number of slaves (modules) at the node is defined by SNUM. This at the same time will also define the length of the telegram itself (number of bytes in the telegram).
For more information please refer to section 4.

It is possible to „mix“ the instructions CMD = 3, CMD = 6 and CM = 15 for one node.
So for example the slaves (modules) with E22 =1, E22 = 2 and E22 = 3 are actuated by CMD =15 and/or CMD = 3 and/or CMD =6,
But another slave (module) with address E22 greater than 5 is only actuated either by CMD =3 or CMD = 6.

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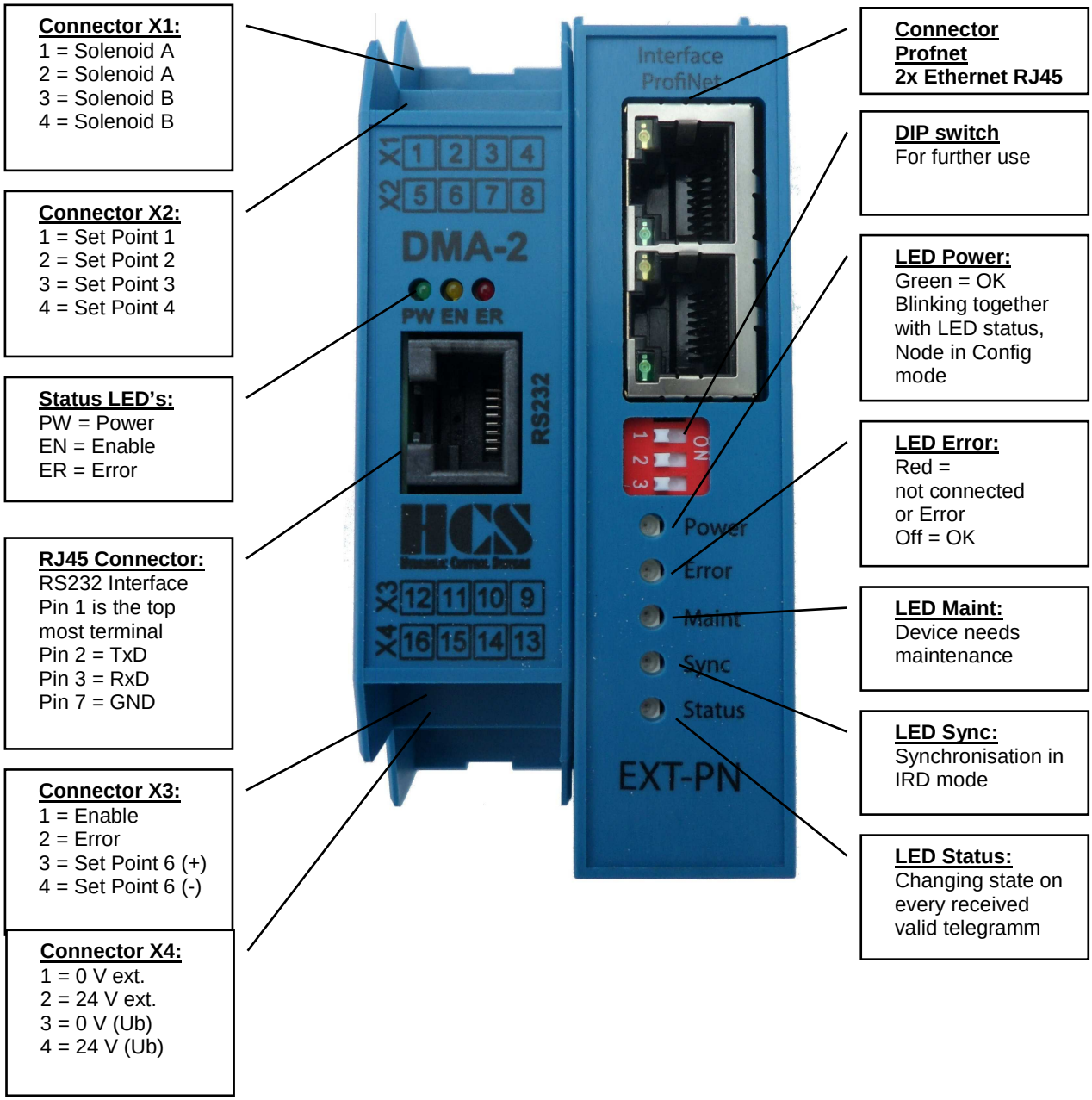
2 Front View: LED´s and connectors

2.1 Front View: Single Module Version (node with one module connected)

Example DMA-22-M1-01-PN-x



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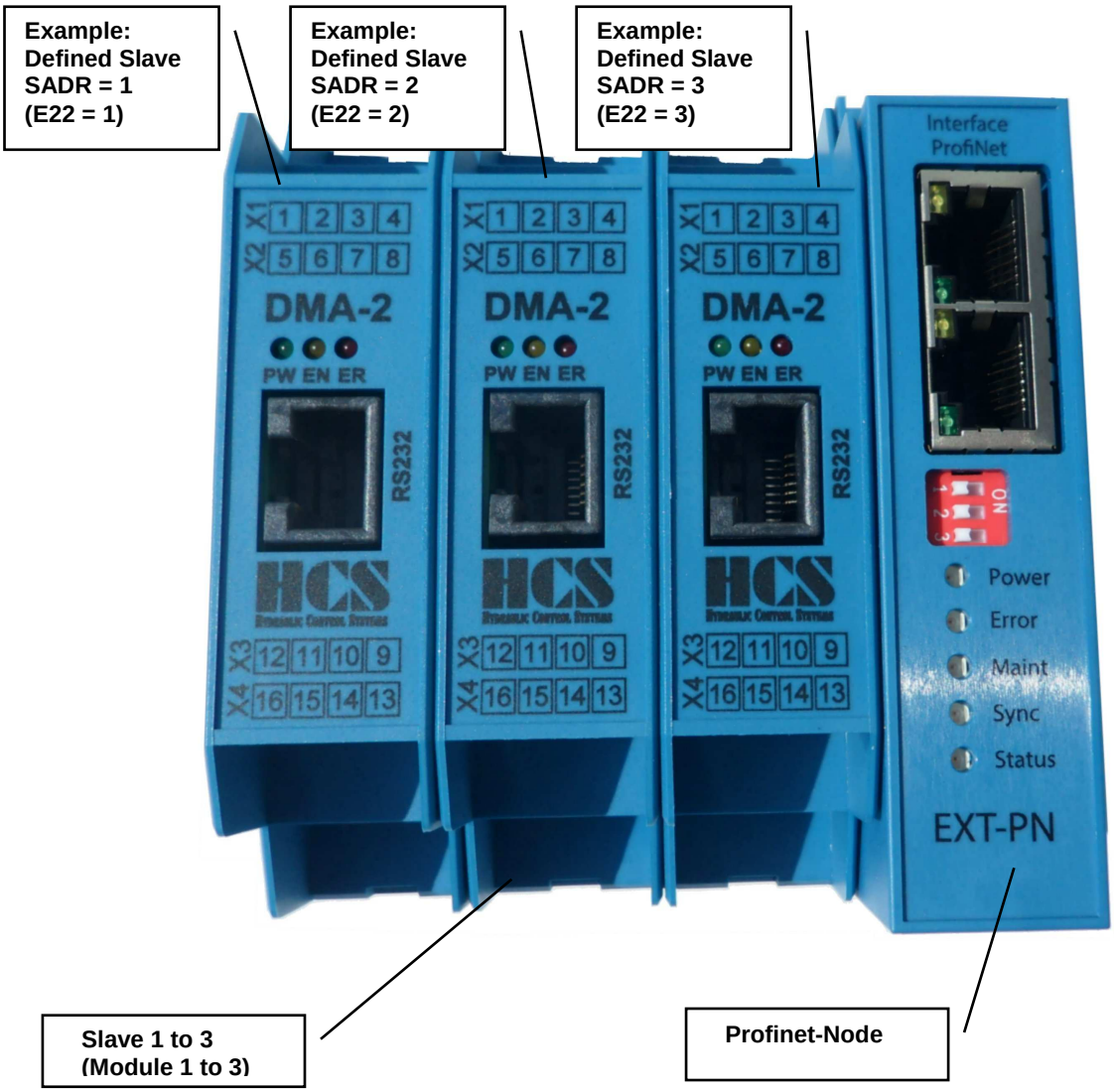
2.2 Front View: Multiple-Slave Version (node with multiple modules connected)

Example DMA-22-M3-010101-PN-x



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3 Simple commands

3.1 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.(Set by the User)

SADR Slave address, if more than one Slave is connected to the Profinet port
1 = standard (single slave)
2 to 32 = also possible (E22 defines the slave address)

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)

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

Write first…

Byte	Abbreviation	Description
0	TADR	Telegram address, defined by the read command, 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. (Set by the read command)

SADR Slave address, if more than one Slave is connected to the Profinet port
1 = standard (single slave)
2 to 32 = also possible (E22 defines the slave address)

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

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

Write first…

Byte	Abbreviation	Description
0	TADR	Telegram address, defined by the read command, 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:

Module 3 is not installed and **SADR** in the master telegram is set to 3

Byte	Abbreviation	Abbreviation	Description
0	0x23	TADR	Response telegram address (defined by the read command)
1	**0x03**	SADR	Actual slave address
2	0x83	ERR	Error, Bit „7“ with command 0x03 is set
3	0x05	EXCE	timeout slave, address wrong or not installed

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3.4 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.(Set by the user)

SADR Slave address, if more than one Slave is connected to the Profinet port
1 = standard (single slave)
2..32 = also possible (E22 defines the slave address)

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

3.4.1 Timing specification of CMD = 6:

When writing new set of parameter to the slave, please consider that storage to the internal EEPROM of the device needs up to 25ms per parameter. So the cycle time of writing new parameter to a slave should be greater than 30ms.

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

Write first…

Byte	Abbreviation	Description
0	TADR	Telegram address, defined by the write command, 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 second analogue value
6	DATL	Low byte of first analogue value

…Write last

TADR Telegram address, defined by the DP-Master.(Set by the write command)

SADR Slave address, if more than one Slave is connected to the Profinet port
1 = standard (single slave)
2..32 = also possible (E22 defines the slave address)

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

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

Write first…

Byte	Abbreviation	Description
0	TADR	Telegram address, defined by the write command, 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:

Module 3 is not installed and **SADR** in the master telegram is set to 3

Byte	Abbreviation	Abbreviation	Description
0	0x23	TADR	Response telegram address (defined by the write command)
1	**0x03**	SADR	Actual slave address
2	0x86	ERR	Error, Bit „7“ with command 0x06 is set
3	0x05	EXCE	timeout slave, address wrong or not installed

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3.7 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 = 0x01

Byte	Value	Abbreviation
0	0x23	TADR
1	0x01	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	0x01	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 = 0x01

Byte	Value	Abbreviation
0	0x24	TADR
1	0x01	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	0x01	SADR
2	0x03	CMD
3	0x02	CNT
4	0x01	DAT1H
5	0x33	DAT1L

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3.8 Additional examples CMD = 6

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

1.) Command signal 0.000 V = 0x0000:

Byte	Value	Abbreviation
0	0x12	TADR
1	0x01	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	0x01	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	0x01	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	0x01	SADR
2	0x06	CMD
3	0x00	IDH
4	0x27	IDL
5	0xD8	DATL
6	0xF1	DATH

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4 Complex commands

4.1 CMD = 15, Master writes multiple parameters (3+5·module bytes)

(Fast multi-slave command)

Parameter E22 in the related DMA-module has to be set to the correct value within the range of 1 to 5 depending on the number of connected slaves (modules). The slave at the left side has the address “1” and the slave closest to the Profinet node will have the highest address setting.

Example: If 3 modules are used than E22 must be set to „1“ for the first module on the left, to „2“ for the second module in the middle and to „3“ for the third module closest to the slave (refer also to 2.2).
Response telegrams are automatically multiplexed by the Profinet node (refer also to 4.4.2).

Write first...

address	Byte	Structure					Abbreviation	Description
	0	0..0xFF					TADR	Telegram address, defined by the user, Range 0..255, 0..0xFF
	1	1	2	3	4	5	SNUM	Number of connected slaves (Maximum 5)
	2	15					CMD	Command: 15 = Write multiple parameter by the master
	3	1	1	1	1	1	DAT1.1	Byte for special functions
	4						DAT1.2H	High byte of first “analogue” value
	5						DAT1.2L	Low byte of first “analogue” value
	6						DAT1.3H	High byte of second “analogue” value
	7						DAT1.3L	Low byte of second “analogue” value
	8		2	2	2	2	DAT2.1	Byte for special functions
	9						DAT2.2H	High byte of first “analogue” value
	10						DAT2.2L	Low byte of first “analogue” value
	11						DAT2.3H	High byte of second “analogue” value
	12						DAT2.3L	Low byte of second “analogue” value
	13			3	3	3	DAT3.1	Byte for special functions
	14						DAT3.2H	High byte of first “analogue” value
	15						DAT3.2L	Low byte of first “analogue” value
	16						DAT3.3H	High byte of second “analogue” value
	17						DAT3.3L	Low byte of second “analogue” value
	18				4	4	DAT4.1	Byte for special functions
	19						DAT4.2H	High byte of first “analogue” value
	20						DAT4.2L	Low byte of first “analogue” value
	21						DAT4.3H	High byte of second “analogue” value
	22						DAT4.3L	Low byte of second “analogue” value
	23					5	DAT5.1	Byte for special functions
	24						DAT5.2H	High byte of first “analogue” value
	25						DAT5.2L	Low byte of first “analogue” value
	26						DAT5.3H	High byte of second “analogue” value
	27						DAT5.3L	Low byte of second “analogue” value
....Write last		8	13	18	23	28	Overall telegram length in bytes	

TADR Telegram address, defined by the DP-Master. (defined by the user) Range 0..255

SNUM Number of connected slaves (Maximum 5).
Here for multi slave operation the number of present slaves has to be set properly.

CMD Command: 15 = Write multiple parameters by the master

DATx[1].1 One data byte in HEX, for special functions
0x00 == 0
0xFF == 255

DATx[1].2H, DATx[1].2L Two data bytes in HEX, without decimal sign, for “analogue” values
0x7FFF == +32767
0x8000 == -32768

DATx[1].3H, DATx[1].3L Two data bytes in HEX, without decimal sign, for “analogue” values
0x7FFF == +32767
0x8000 == -32768

x[1].= Module address (set by parameter E22 in each DMA-Module) range 1 to 5.

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4.2 CMD = 15, Response from Slave (9 bytes)

Please pay attention to the fact that in case of multiple slave operation SADR will be changed automatically with each new response.

Example:
When using 3 slaves than the slave with the module address “1” (E22 = 1) will respond first. After the next “Master-Write” the slave with module address “2” (E22 = 2) will respond and finally the last slave with address “3” (E22 = 3). Then it starts again with slave “1”.

This means that the multiplexer for answering is implemented in the Profinet node. SADR indicates which of the modules has actually send the response.

Write first…

address	Byte	Structure	Abbreviation	Description
	0	Telegram header	TADR	Telegram address, defined by the user, Range 0..255, 0..0xFF
	1		SADR	Slave address
	2		CMD	Command: 15 = Write multiple parameter by the master
	3	Data of SADR	DAT.1H	High byte of module state
	4		DAT.1L	Low byte of module state
	5		DAT.2H	High byte of first “analogue” value
	6		DAT.2L	Low byte of first “analogue” value
	7		DAT.3H	High byte of second “analogue” value
	8		DAT.3L	Low byte of second “analogue” value

…Write last

TADR Telegram address, defined by the DP-Master.(set by the user)

SADR Slave address, if more than one Slave is connected to the Profinet port
1 to max 5 depending on number of slaves

CMD Command: 15 = Write multiple parameters by the master

DAT.1H,DAT.1L Two data bytes in HEX, , for module state
0x0000 == 0
0xFFFF == 65535

DAT.2H, DAT.2L, DAT.3H, DAT.3L Two data bytes in HEX, without decimal sign, for analogue values
0x7FFF == +32767
0x8000 == -32768

4.3 CMD = 15, Error from Slave (4 bytes)

Write first…

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

…Write last

ERR Error code: 0x8F = write failed

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

Example for error response:

Module 3 is not installed and SNUM in the master telegram is set to 3

Byte	Abbreviation	Abbreviation	Description
0	0x23	TADR	Response telegram address (defined by the write command)
1	**0x03**	SADR	Actual slave address
2	0x8F	ERR	Error, Bit „7“ with command 0x0F in decimal 15 is set
3	0x08	EXCE	timeout slave, address wrong or not installed

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4.4 Examples, CMD = 15

4.4.1 Single slave (SW Version 13.xxy)

The Profinet-Node is connected to the PLC (Error LED is off).
E22 of the DMA module is set to 1.
Hardware Enable is connected to the DMA module.

Master writes set value of 1.000 V to slave (module):

Byte	Abbreviation	Abbreviation	Description
0	0x23	TADR	Telegram address, defined by the user, Range 0..255, 0..0xFF
1	0x01	SNUM	0x01 means single slave
2	0x0F	CMD	0x0F in decimal 15
3	0x00	DAT1.1	Byte for special functions , 0x00 (default value, no bus-disable)
4	(1000)	DAT1.2H	Set Value A1.01
5		DAT1.2L	0x03E8 (= 1000 in decimal = 1.000V)
6	(0)	DAT1.3H	Set Value A1.02
7		DAT1.3L	0x0000 (= 0 in decimal = 0.000V)

Response slave (module) no.1:

Byte	Abbreviation	Abbreviation	Description
0	0x23	TADR	Response telegram address (defined by the write command)
1	0x01	SADR	Actual slave address
2	0x0F	CMD	0x0F in decimal 15
3	0x40	DAT1.1H	High byte of module state, Hardware Enable is active, no error
4	0x00	DAT1.1L	Low byte of module state, not used, in this case always zero
5	(0)	DAT1.2H	Actual current A
6		DAT1.2L	0x0000 (= 0 in decimal = 0.000A)
7	(270)	DAT1.3H	Actual current B
8		DAT1.3L	0x010E (= 270 in decimal = 0.270A)

(x) = value in decimal.

4.4.2 Multiple-slave (3 DMA modules, SW Version 13.xxy)

The Profibus-Node is connected to the PLC (Error LED is off).
E22 of the three modules is set to 1, 2, 3.
All modules are powered on, hardware enable is connected all of the DMA modules.

Master first write cycle: set value 1.000 V to slave1, 2.000 V to slave2 and - 3.000 V to slave3:

Byte	Abbreviation	Abbreviation	Description
0	0x23	TADR	Telegram address, defined by the user, Range 0..255, 0..0xFF
1	0x03	SNUM	0x03 means three slaves (modules) are connected
2	0x0F	CMD	0x0F in decimal 15
3	0x00	DAT1.1	Byte for special functions, 0x00 (default value, no bus-disable)
4	(1000)	DAT1.2H	Set Value A1.01
5		DAT1.2L	0x03E8 (= 1000 in decimal = 1.000V)
6	(0)	DAT1.3H	Set Value A1.02
7		DAT1.3L	0x0000 (= 0 in decimal = 0.000V)
8	0x00	DAT2.1	Byte for special functions, 0x00 (default value, no bus-disable)
9	(2000)	DAT2.2H	Set Value A1.01
10		DAT2.2L	0x07D0 (= 2000 in decimal = 2.000V)
11	(0)	DAT2.3H	Set Value A1.02
12		DAT2.3L	0x0000 (= 0 in decimal = 0.000V)
13	0x00	DAT3.1	Byte for special functions, 0x00 (default value, no bus-disable)
14	(-3000)	DAT3.2H	Set Value A1.01
15		DAT3.2L	0xF448 (= - 3000 in decimal = - 3.000V)
16	(0)	DAT3.3H	Set Value A1.02
17		DAT3.3L	0x0000 (= 0 in decimal = 0.000V)

(x) = value in decimal.

The node will only send a response if **any** data in the telegram received from the master has be changed! If the data in a telegram have to remain unchanged than a response from the node to a ”Master write” can be enforced due to a change of the data TADR.
The data of the write command will be immediately forwarded to all slaves (modules). Each response telegram to a write command will automatically contain “new data” from the next slave (module). The slaves are automatically multiplexed.

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Response telegrams are automatically multiplexed by the DMA-Profinet node.
In this example, module 1 answers first

Byte	Abbreviation	Abbreviation	Description
0	0x23	TADR	Response telegram address (defined by the write command)
1	**0x01**	SADR	Actual slave address
2	0x0F	CMD	0x0F in decimal 15
3	0x40	DAT1.1H	High byte of module state, Hardware Enable is active, no error
3	0x00	DAT1.1L	Low byte of module state, not used, in this case always zero
4	(0)	DAT1.2H	Actual current A, **d1.07 of module 1**
5		DAT1.2L	0x0000 (= 0 in decimal = 0.000A)
6	(270)	DAT1.3H	Actual current B, **d1.08 of module 1**
7		DAT1.3L	0x010E (= 270 in decimal = 0.270A)

(x) = value in decimal.

Change telegram address TADR to 0x24 and send same message as before. Next module no. 2 will answer.

Byte	Abbreviation	Abbreviation	Description
0	0x24	TADR	Response telegram address (defined by the write command)
1	**0x02**	SADR	Actual slave address
2	0x0F	CMD	0x0F in decimal 15
3	0x40	DAT1.1H	High byte of module state, Hardware Enable is active, no error
3	0x00	DAT1.1L	Low byte of module state, not used, in this case always zero
4	(0)	DAT1.2H	Actual current A, **d1.07 of module 2**
5		DAT1.2L	0x0000 (= 0 in decimal = 0.000A)
6	(540)	DAT1.3H	Actual current B, **d1.08 of module 2**
7		DAT1.3L	0x021C (= 540 in decimal = 0.540A)

(x) = value in decimal.

Change telegram address TADR to 0x25 and send same message as before. Next module no. 3 will answer.

Byte	Abbreviation	Abbreviation	Description
0	0x25	TADR	Response telegram address (defined by the write command)
1	**0x03**	SADR	Actual slave address
2	0x0F	CMD	0x0F in decimal 15
3	0x40	DAT1.1H	High byte of module state, Hardware Enable is active, no error
3	0x00	DAT1.1L	Low byte of module state, not used, in this case always zero
4	(810)	DAT1.2H	Actual current A, **d1.07 of module 3**
5		DAT1.2L	0x032A (= 810 in decimal = 0.810A)
6	(0)	DAT1.3H	Actual current B, **d1.08 of module 3**
7		DAT1.3L	0x0000 (= 0 in decimal = 0.000A)

(x) = value in decimal.

Change telegram address TADR to 0x26 and send same message as before. Next module no. 1 will answer.

Byte	Abbreviation	Abbreviation	Description
0	0x26	TADR	Response telegram address (defined by the write command)
1	**0x01**	SADR	Actual slave address
2	0x0F	CMD	0x0F in decimal 15
3	0x40	DAT1.1H	High byte of module state, Hardware Enable is active, no error
3	0x00	DAT1.1L	Low byte of module state, not used, in this case always zero
4	(0)	DAT1.2H	Actual current A, **d1.07 of module 1**
5		DAT1.2L	0x000 (= 0 in decimal = 0.000A)
6	(270)	DAT1.3H	Actual current B, **d1.08 of module 1**
7		DAT1.3L	0x10E (= 270 in decimal = 0.270A)

(x) = value in decimal.

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4.5 CMD = 15, structure of Profinet telegram definition, depending on SW Versions

4.5.1 General

4.5.1.1 Error Message (indication by "Error occurred")

Errors which are indicated in the Bit (Error occurred) like for example "Over Current" or "Cable Fraction" can be reset with the following action :

- Set input signal for the hardware enable at the according module at terminal X3/1 (9) to "Low" and than go back to "High"
- Setting and resetting of the Bits (0x80) Bus-Disable

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

Error numbers:
The corresponding error numbers can be found in the respective manual of the DMA-Modules.
Generally the following error table is valid:

Slave (Modul) Status		
Hi-Byte (DAT.1H)	Low-Byte (DAT.1L)	Description
0x0C	0x01	Error of Operation
0x0C	0x02	Wire break at set point S1.06 (current signal <2mA)
0x0C	0x03	Excess current or short circuit at the output stages (peak current >8A!)
0x0C	0x04	Wire break at set point S1.05 (current signal <2mA)
0x0C	0x05	Over current at set point S1.06 (current signal >25mA)
0x0C	0x06	Over current at set point S1.05 (current signal >25mA)
0x0C	0x07	Not applicable
0x0C	0x08	Over current, short circuit or open circuit at the output stages. The difference between the desired current and the actual current is outside of the defined range. Conditions for error triggering: I_{Error} > 250 mA for t_{Error} approx. 100 ms.
0x0C	0x09	Input signal @ set point S1.06 and selection E15 = 8 (5 …+/- 4,5 V) out of valid signal range (approx.. < 0,43 V / > 9,58 V
0x0C	0x0A	Timeout error -no Profinet command recognized- (defined with parameter E23)

Software versions which supports not the error "10" respectively "0x0A", react with a blinking enable LED about to long time between valid Profinet telegrams. Those versions continue with work if a new valid telegram is detected. No separate acknowledge with the enable signal is needed.

Software versions which supports the error "10" respectively "0x0A", react with a shining Error LED about to long time between valid Profinet telegrams. Those versions do not continue with work if a new valid telegram is detected. A separate acknowledge with the enable signal is needed.

Generally the electronic discards every set point in error case and the outputs will be disabled.

4.5.1.2 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 the module can be disabled!

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.

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4.5.1.3 Explanation of special functions and module state bits

Attention: Functions and module state bits depend on the used SW version

Enable active	The signal "D-In Enable" (HW Enable) is activated at the module.
Error	Error has occurred in the DMA module. Different possible problems can cause this. Please refer to the manual for the according DMA version
Bus-Disable	The Enable signal was reset by means of Profinet (DMA module is disabled).
Din_1	The "enable function" for the „remote loop controller" (function switches from open loop to closed loop) via the comparator „KOMP_1" is enabled and can be used. Additional mandatory condition: C1.00 must be set to 2 or 4! Remark: d1.12 and d1.13 remain at „0.000 V" as long as the condition for activation „Din_1" has not be set. This will prevent a premature activation of the comparator „KOMP_1".
Dout_1	Indicates that the function „remote loop controller" is active. The module is now working in closed loop mode. Additional mandatory conditions for transition from open loop to closed loop: C1.00 must be set to 2 or 4 Signal Din_1 must be present Comparator KOMP_1 has to be outside of the window, hence signal KOMP_1 = 0. The module will remain in closed loop operation as long as signal Din_1 stays on "High".
DKOMP_1	Output signal of comparator „KOMP_1", s used in order to monitor the signal defined by C1.25. This signal can also be used in order to switches over from open to closed loop: 0 = comparator is not active (out of the determined limits and time delays) 1 = comparator is active (inside the determined limits and time delays).
DKOMP_11	Output signal of comparator „KOMP_11", is used in order to monitor the signal defined by C1.32 0 = comparator is not active (out of the determined limits and time delays) 1 = comparator is active (inside the determined limits and time delays).
Din_2	The "enable function" for the „remote loop controller" (function switches from open loop to closed loop) via the comparator „KOMP_2" is enabled and can be used. Additional mandatory condition: C2.00 must be set to 2 or 4! Remark: d2.12 and d2.13 remain at „0.000 V" as long as the condition for activation „Din_2" has not be set. This will prevent a premature activation of the comparator „KOMP_2"..
Dout_2	Indicates that the function „remote loop controller" is active. The module is now working in closed loop mode. Additional mandatory conditions for transition from open loop to closed loop: C2.00 must be set to 2 or 4 Signal Din_2 must be present Comparator KOMP_2 has to be outside of the window, hence signal KOMP_2 = 0. The module will remain in closed loop operation as long as signal Din_2 stays on "High".
DKOMP_2	Output signal of comparator „KOMP_2", s used in order to monitor the signal defined by C2.25. This signal can also be used in order to switches over from open to closed loop: 0 = comparator is not active (out of the determined limits and time delays) 1 = comparator is active (inside the determined limits and time delays).
DKOMP_22	Output signal of comparator „KOMP_22", is used in order to monitor the signal defined by C2.32 0 = comparator is not active (out of the determined limits and time delays) 1 = comparator is active (inside the determined limits and time delays).

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4.5.2 Version: V13.xxy, open loop, one valve with two solenoids, , Mode 1

Telegram structure example with 1 DMA module (SNUM = 1),
Master writes multiple parameters (3+5·module bytes)

Write first…

Comment	Byte	Structure	Abbreviation	Description
	0	Telegram header	TADR	Telegram address, defined by User, Range 0..255, 0..0xFF
	1		SNUM	Number of connected slaves (Maximum 5)
	2		CMD	Command: 15 = Write multiple parameter by the master
	3	Module Data	DAT1.1	Byte for special functions
	4		DAT1.2H	**A1.01 Module 1**
	5		DAT1.2L	Set value input (Profinet)
	6		DAT1.3H	**A1.01 Module 1 (normally not used)**
	7		DAT1.3L	Set value input (Profinet)
….Write last		8	Overall telegram length in bytes	

Explanation of Byte for special functions

Description	Abbreviation	Function of each bit
Byte for special functions	DATx.1	0x80 = Bus-Disable (Module disable via Profinet)
		Reset = 0x00 (Enable inactive)

Response telegram:

Write first…

Comment	Byte	Structure	Abbreviation	Description
	0	Telegram header	TADR	Telegram address, defined by write command, Range 0..255, 0..0xFF
	1		SADR	Slave address
	2		CMD	Command: 15 = Write multiple parameter by the master
	3	Data of SADR Module	DAT.1H	High byte of module state
	4		DAT.1L	Low byte of module state
	5		DAT.2H	**d1.07 from module with related SADR**
	6		DAT.2L	Actual current A
	7		DAT.3H	**d1.08 from module with related SADR**
	8		DAT.3L	Actual current B
….Write last		9	Overall telegram length in bytes	

Explanation of High and low byte of module state:

Description	Abbreviation	Explanation of each bit
High byte of module state	DAT.1H	0x04 = Enable active 0x08 = Error 0x80 = Bus-Disable is set
Low byte of module state	DAT.1L	if “Error occurred” bit is set: error number otherwise: always zero

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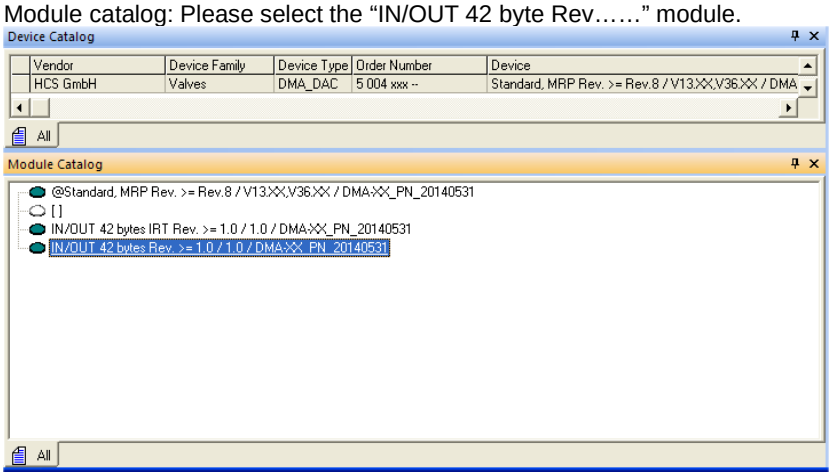
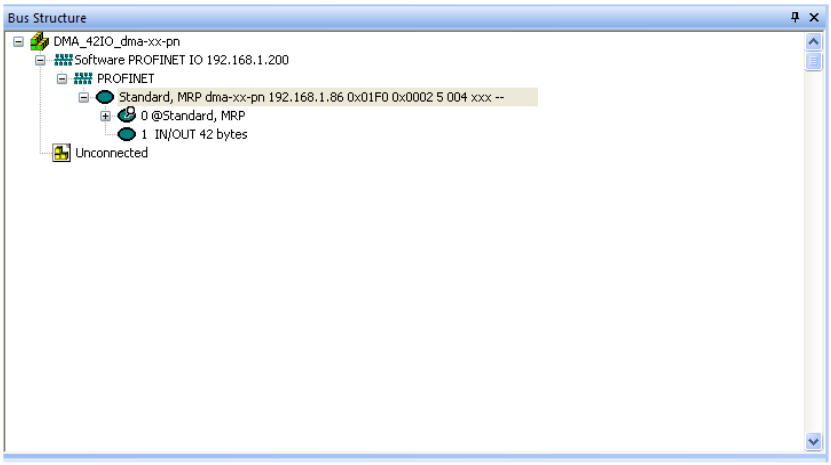
5 PLC configurator

Module catalog: Please select the “IN/OUT 42 byte Rev……” module.

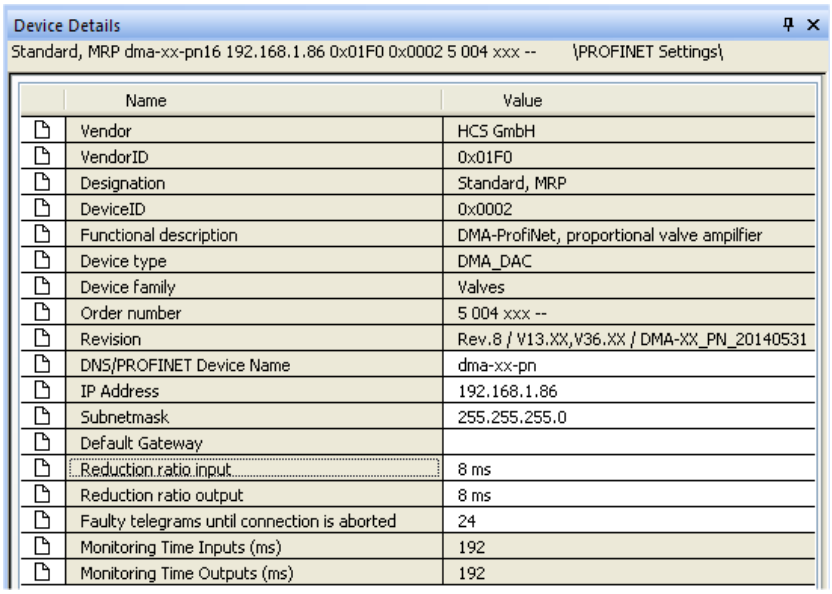


Automatically an 42 byte in- output buffer will be reserved.
So all kind of DMA module configuration can processed.

And insert this module into the bus structure.



Device details:



Name	Value
Vendor	HCS GmbH
VendorID	0x01F0
Designation	Standard, MRP
DeviceID	0x0002
Functional description	DMA-ProfiNet, proportional valve ampilfier
Device type	DMA_DAC
Device family	Valves
Order number	5 004 xxx --
Revision	Rev.8 / V13.XX,V36.XX / DMA-XX_PN_20140531
DNS/PROFINET Device Name	dma-xx-pn
IP Address	192.168.1.86
Subnetmask	255.255.255.0
Default Gateway	
Reduction ratio input	8 ms
Reduction ratio output	8 ms
Faulty telegrams until connection is aborted	24
Monitoring Time Inputs (ms)	192
Monitoring Time Outputs (ms)	192

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6 List of parameters

Parameters in grey letters are not yet implemented in the DMA Software.
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.

!! Writing parameter with CMD=6, please consider section 3.4.1

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	R	d2.03	Set values after linearization	V	1	-9999	9999	
0x11	17	R	d2.04	Value after gain adjustment.	V	1	-9999	9999	
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	

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ID_{Hex}	ID_{dec}	W/R	Name	Function	Unit	Step	Min	Max	Description
0x16	22	R/W	S1.01	Set Value1	V	1	-9999	9999	
0x17	23	R/W	S1.02	Set Value2	V	1	-9999	9999	
0x18	24	R/W	S1.03	Set Value3	V	1	-9999	9999	
0x19	25	R/W	S1.04	Set Value4	V	1	-9999	9999	
0x1A	26	X	S1.08	reserved					---
0x1B	27	R/W	r1.01	Ramp from 0 ⇒ -	s	1	0	3950	
0x1C	28	R/W	r1.02	Ramp from – ⇒ 0	s	1	0	3950	1 == 10ms 0 == Ramp function off
0x1D	29	R/W	r1.03	Ramp from 0 ⇒ +	s	1	0	3950	
0x1E	30	R/W	r1.04	Ramp from + ⇒ 0	s	1	0	3950	
0x1F	31	R/W	A1.01	Profinet set value (Branch 1)	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 E17 = "2"
0x20	32	R/W	A1.02	Profinet feedback value (Branch 1)	V	1	-9999	9999	-1000 == -1.000 V; 1000 == 1.000 V C1.09 has to be switched off in order to avoid interferences
0x21	33	R/W	S2.01	Set Value1 (Branch 2)	V	1	-9999	9999	-1000 == -1.000 V; 1000 == 1.000 V
0x22	34	R/W	S2.02	Set Value2 (Branch 2)	V	1	-9999	9999	
0x23	35	R/W	r2.01	Ramp from 0 ⇒ -	s	1	0	3950	
0x24	36	R/W	r2.02	Ramp from – ⇒ 0	s	1	0	3950	1 == 10ms 0 == Ramp function off
0x25	37	R/W	r2.03	Ramp from 0 ⇒ + (Branch 2)	S	1	0	3950	
0x26	38	R/W	r2.04	Ramp from + ⇒ 0 (Branch 2)	S	1	0	3950	
0x27	39	R/W	A2.01	Profinet set value (Branch 2)	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 E17 = "2"
0x28	40	R/W	A2.02	Profinet feedback value (Branch 2)	V	1	-9999	9999	-1000 == -1.000 V; 1000 == 1.000 V C2.09 has to be switched off in order to avoid interferences

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ID_{Hex}	ID_{dec}	W/R	Name	Function	Unit	Step	Min	Max	Description
0x29	41	R/W	C1.00	Controller selection	---	1	0	4	0 = off 1 = P-PT_1-I-DT_1 2 =Remote 3 =dff 4 =Remote + dff
0x2A	42	R/W	C1.01	Safety function	---	1	0	1	0 = off; 1 = on
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 and gain	V/V	1	-400	400	100 == Factor 1.00 Sign **and** gain!
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	0	12	0 = off (used for Profinet application) 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 K_{P1}	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	1000	100 == 1.00
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 K_{P2}	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	1000	100 == 1.00
0x3D	61	R/W	C1.20	Gain (C1.13 and C1.16)	V/V	1	1	32	2 = Factor 2.00
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

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ID_{Hex}	ID_{dec}	W/R	Name	Function	Unit	Step	Min	Max	Description
0x44	68	R/W	C2.00	Controller selection	---	1	0	4	0 = off 1 = P-PT_1-I-DT_1 2 =Remote 3 =dff 4 =Remote + dff
0x45	69	R/W	C2.01	Safety function	---	1	0	1	0 = off; 1 = on
0x46	70	R/W	C2.02	Linearization	---	1	0	5	0 = linear; 1 ... 5 = curve
0x47	71	R/W	C2.03	Gain A	V/V	1	0	200	100 == Factor 1.00
0x48	72	R/W	C2.04	Gain B	V/V	1	0	200	100 == Factor 1.00
0x49	73	R/W	C2.05	Set value sign and gain	V/V	1	-400	400	100 == Factor 1.00 Sign **and** gain!
0x4A	74	R/W	C2.06	Set value offset	V	1	-9999	9999	-1000 == -1.000 V; 1000 == 1.000 V
0x4B	75	R/W	C2.07	Dead band compensation A	V	1	0	9999	1000 == 1.000 V 9.999 V = max. current depending on solenoid selection
0x4C	76	R/W	C2.08	Dead band compensation B	V	1	0	9999	
0x4D	77	R/W	C2.09	Sensor type Attention: No negative controller output possible when 10, 11 or 12 is selected!	---	1	0	12	0 = off (used for Profinet application) 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
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 K_{P1}	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	1000	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 K_{P2}	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	1000	100 == 1.00
0x58	88	R/W	C2.20	Gain (C1.13 and C1.16)	V/V	1	1	32	2 = Factor 2.00
0x59	89	R/W	C2.21	Comparator upper level	V	1	-9999	9999	-1000 == -1.000 V; 1000 == 1.000 V
0x5A	90	R/W	C2.22	Comparator lower level	V	1	-9999	9999	
0x5B	91	R/W	C2.23	Comparator delay into window	S	1	0	9999	1 == 10 ms 0 == no delay
0x5C	92	R/W	C2.24	Comparator delay out of window	S	1	0	9999	
0x5D	93	R/W	C2.25	Comparator selection KOMP_2	---	1	0	3	0 = off 1 = Set value 2 = Actual value 3 =Lag error
0x5E	94	R/W	C2.26	Cable fracture detection feedback	---	---	0	1	0 = off; 1 = active

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ID_{Hex}	ID_{dec}	W/R	Name	Function	Unit	Step	Min	Max	Description
0x5F	95	R	E00	Operation mode (depends on HW + SW version)	---	1	1	8	1 = Open loop one valve 2 = Open loop two valves 3 = Closed loop one valve 4 = Closed loop on application 6 = Closed loop valve/application 8 = Closed loop application/ application
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
0x61	97	R/W	E02	Push-Pull function	---	---	0	1	0 = off 1 = active 2 = common "+" for solenoids (Remark: only for max 0,8 A current) 3 = full bridge 4 = off + solenoid monitoring
0x62	98	R/W	E1.03	Solenoid selection A	---	1	1	7	1 = 0,8 A 2 = 1,1 A 3 = 1,3 A 4 = 1,6 A 5 = 2,4 A 6 = 2,7 A 7 = 3,5 A
0x63	99	R	E1.04	P-Portion current contr. Energization A	---	1	0	9999	Default for 2,700 A solenoid
0x64	100	R	E1.05	I-Portion current contr. Energization A	---	1	0	9999	
0x65	101	R	E1.06	P-Portion cur. contr. de- energization A	---	1	0	9999	
0x66	102	R	E1.07	I-Portion cur. contr. De- energization A	---	1	0	9999	
0x67	103	R/W	E08	Ramp selection	---	1	0	2	0 = digital set v. (time constant) 1 = all set v. (rise constant.)
0x68	104	R/W	E09	Time delay enable signal	s	1	0	9999	1 = 1.00s
0x69	105	R/W	E1.10	Solenoid current adaptation A	---	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	E1.13	Dither Amplitude A	V	1	0	3000	
0x6D	109	R/W	E1.14	Dither Frequency A	Hz	1	1	300	---
0x6E	110	R/W	E15	Selection set point S1.06 (U/I)	---	1	0	6	0 = S1.06 voltage input active 1 = 0 … 20 mA w/o cable fract. det. 2 = 10 mA ± 10 mA w/o cable fract. det. 3 = 4 … 20 mA w/o cable fract. det. 4 = 4 …. 20 mA with cable fract. det. 5 = 12 mA +- 8 mA w/o cable fract. det. 6 = 12 mA +- 8 mA with cable fract. det.
0x6F	111	R/W	E16	Selection set point S1.05 (U/I)	---	1	0	6	0 = S1.05 voltage input active 1 = 0 … 20 mA w/o cable fract. det. 2 = 10 mA ± 10 mA w/o cable fract. det. 3 = 4 … 20 mA w/o cable fract. det. 4 = 4 …. 20 mA with cable fract. det. 5 = 12 mA +- 8 mA w/o cable fract. det. 6 = 12 mA +- 8 mA with cable fract. det.
0x70	112	R/W	E17	Set value activation mode	---	1	0	2	0 = 4 digital, 1 analogue active 2 = only 4 digital active

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0x71	113	R/W	E18	Error/Comparator Output (from V32.09*)	---	1	0	8	0 = Error 1 = Comp1. positive logic 2 = Comp1. negative logic 3 = Comp2. positive logic 4 = Comp2. negative logic 5 = Dout_1 positive logic 6 = Dout_1 negative logic 7 = Dout_2 positive logic 8 = Dout_2 negative logic
0x72	114	R/W	E19	Reserved					
0x73	115	R/W	E20	Reserved					
0x74	116	R/W	E21	Reserved					
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					

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ID_{Hex}	ID_{dec}	W/R	Name	Function	Unit	Step	Min	Max	Description
0x9A	154	R	So.in	Indicator for activated digital set values (depends on HW Version)	---	---	0	1234	1xxx = S1.01 active x2xx = S1.02/S2.01 active xx3x = S1.03 active xxx4 = S1.04 active
0x9B	155	R/W	E2.03	Solenoid selection B	---	1	1	7	1 = 0,8 A 2 = 1,1 A 3 = 1,3 A 4 = 1,6 A 5 = 2,4 A 6 = 2,7 A 7 = 3,5 A
0x9C	156	R	E2.04	P-Portion current contr. Energization B	---	1	0	9999	Default for 2,700 A solenoid
0x9D	157	R	E2.05	I-Portion current contr. Energization B	---	1	0	9999	
0x9E	158	R	E2.06	P-Portion cur. contr. de- energization B	---	1	0	9999	
0x9F	159	R	E2.07	I-Portion cur. contr. De- energization B	---	1	0	9999	
0xA0	160	R/W	E2.10	Solenoid current adaptation B	---	1	50	110	Variable adjustment of max. current 100 == Factor 1.00
0xA1	161	R/W	E2.13	Dither Amplitude B	V	1	0	3000	3000 V = 30 % of max. rated current
0xA2	162	R/W	E2.14	Dither Frequency B	Hz	1	1	300	---
0xA3	163	R/W	E 22	Profinet Slave Address	---	1	0	32	0 = No bus function 1 = Standard (Profinet, CanOpen) 1..5 = Multiple Slave (Profinet)
0xA4	164	R/W	C1.27	Hysteresis command A	V	1	-9999	9999	-1000 == -1.000 V; 1000 == 1.000 V
0xA5	165	R/W	C2.27	Hysteresis command B	1	1	-9999	9999	
0xA6	166	R/W	C1.28	Comparator upper level	V	1	-9999	9999	-1000 == -1.000 V; 1000 == 1.000 V
0xA7	167	R/W	C1.29	Comparator lower level	V	1	-9999	9999	
0xA8	168	R/W	C1.30	Comparator delay into window	S	1	0	9999	1 == 10 ms 0 == no delay
0xA9	169	R/W	C1.31	Comparator delay out of window	S	1	0	9999	
0xAA	170	R/W	C1.32	Comparator selection KOMP_11	---	1	0	3	0 = off 1 = Set value 2 = Actual value 3 =Lag error
0xAB	171	R/W	C2.28	Comparator upper level	V	1	-9999	9999	-1000 == -1.000 V; 1000 == 1.000 V
0xAC	172	R/W	C2.29	Comparator lower level	V	1	-9999	9999	
0xAD	173	R/W	C2.30	Comparator delay into window	S	1	0	9999	1 == 10 ms 0 == no delay
0xAE	174	R/W	C2.31	Comparator delay out of window	S	1	0	9999	
0xAF	175	R/W	C2.32	Comparator selection KOMP_22	---	1	0	3	0 = off 1 = Set value 2 = Actual value 3 =Lag error
0xB0	176	R/W	-	Internal Digital Switches (Read/Set)	---	---	0	8191 0x1FFF	0x0001 = Din_1 active (Read/Write) 0x0002 = Dout_1 active (Read only) 0x0004 = DKOMP_1 active (Read only) 0x0008 = DKOMP_11 active (Read only) 0x0010 = Din_2 active (Read/Write) 0x0020 = Dout_2 active (Read only) 0x0040 = DKOMP_2 active (Read only) 0x0080 = DKOMP_22 active (Read only) 0x0400 = Enable active 0x0800 = Error 0x8000 = Bus Disable Card (Read/Write)
0xB1	177	R/W	E 23	Profinet telegram timeout window	S	1	0	9999	1 == 10 ms 0 == function deactivated
0xB2	178	X	-	Reserved					
0xB3	179	R/W	C1.33	I-portion limitation	V	1	0	9999	0 == 0.000 V; 9999 == 9.999 V
0xB4	180	R/W	C2.33	I-portion limitation	V	1	0	9999	0 == 0.000 V; 9999 == 9.999 V
0xB5	181	X	-	Reserved					

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ID_{Hex}	ID_{dec}	W/R	Name	Function	Unit	Step	Min	Max	Description
0xB5	181	X	-	Reserved					DHCP unterstützung
0xB6	182	X	-	Reserved					
0xB7	183	X	-	Reserved					
0xB8	184	X	-	Reserved					
0xB9	185	X	-	Reserved					
0xBA	186	X	-	Reserved					
0xBB	187	X	-	Reserved					
0xBC	188	X	-	Reserved					
0xBD	189	R/W	E 24	DHCP support (only EthIP)		1	0	1	1 == active 0 == deactivated
0xBE	190	R/W	E 25	IP address setting (only EthIP)		1	0	255	Setting “aaa” from “aaa.bbb.ccc.ddd”
0xBF	191	R/W	E 26	IP address setting (only EthIP)		1	0	255	Setting “bbb” from “aaa.bbb.ccc.ddd”
0xC0	192	R/W	E 27	IP address setting (only EthIP)		1	0	255	Setting “ccc” from “aaa.bbb.ccc.ddd”
0xC1	193	R/W	E 28	IP address setting (only EthIP)		1	0	255	Setting “ddd” from “aaa.bbb.ccc.ddd”
0xC2	194	R/W	E 29	Input buffer length in byte (only EthIP)		1	0	32	Input buffer
0xC3	195	R/W	E 30	Output buffer length in byte (only EthIP)		1	0	32	Output buffer”
0xC4	196	R/W	C1.37	Spool overlap compensation A	V	1	0	9999	0 == 0.000 V; 9999 == 9.999 V
0xC5	197	R/W	C1.38	Spool overlap compensation B	V	1	0	9999	0 == 0.000 V; 9999 == 9.999 V
0xC6	198	R/W	L1.x0	Linearisation Point X0 (Loop1)	V	1	0	0	(fixed value)
0xC7	199	R/W	L1.y0	Linearisation Point Y0	V	1	0	9999	0 == 0.000 V; 9999 == 9.999 V
0xC8	200	R/W	L1.x1	Linearisation Point X1	V	1	0	9999	0 == 0.000 V; 9999 == 9.999 V
0xC9	201	R/W	L1.y1	Linearisation Point Y1	V	1	0	9999	0 == 0.000 V; 9999 == 9.999 V
0xCA	202	R/W	L1.x2	Linearisation Point X2	V	1	0	9999	0 == 0.000 V; 9999 == 9.999 V
0xCB	203	R/W	L1.y2	Linearisation Point Y2	V	1	0	9999	0 == 0.000 V; 9999 == 9.999 V
0xCC	204	R/W	L1.x3	Linearisation Point X3	V	1	0	9999	0 == 0.000 V; 9999 == 9.999 V
0xCD	205	R/W	L1.y3	Linearisation Point Y3	V	1	0	9999	0 == 0.000 V; 9999 == 9.999 V
0xCE	206	R/W	L1.x4	Linearisation Point X4	V	1	0	9999	0 == 0.000 V; 9999 == 9.999 V
0xCF	207	R/W	L1.y4	Linearisation Point Y4	V	1	0	9999	0 == 0.000 V; 9999 == 9.999 V
0xD0	208	R/W	L1.x5	Linearisation Point X5	V	1	0	9999	0 == 0.000 V; 9999 == 9.999 V
0xD1	209	R/W	L1.y5	Linearisation Point Y5	V	1	0	9999	0 == 0.000 V; 9999 == 9.999 V
0xD2	210	R/W	L1.x6	Linearisation Point X6	V	1	0	9999	0 == 0.000 V; 9999 == 9.999 V
0xD3	211	R/W	L1.y6	Linearisation Point Y7	V	1	0	9999	0 == 0.000 V; 9999 == 9.999 V
0xD4	212	R/W	L1.x7	Linearisation Point X7	V	1	0	9999	0 == 0.000 V; 9999 == 9.999 V
0xD5	213	R/W	L1.y7	Linearisation Point Y7	V	1	0	9999	0 == 0.000 V; 9999 == 9.999 V
0xD6	214	R/W	L1.x8	Linearisation Point X8	V	1	0	9999	0 == 0.000 V; 9999 == 9.999 V
0xD7	215	R/W	L1.y8	Linearisation Point Y0	V	1	0	9999	0 == 0.000 V; 9999 == 9.999 V
0xD8	216	R/W	C2.37	Spool overlap compensation A	V	1	0	9999	0 == 0.000 V; 9999 == 9.999 V
0xD9	217	R/W	C2.38	Spool overlap compensation B	V	1	0	9999	0 == 0.000 V; 9999 == 9.999 V
0xDA	218	R/W	L2.x0	Linearisation Point X0 (loop2)	V	1	0	0	(fixed value)
0xDB	219	R/W	L2.y0	Linearisation Point Y0	V	1	0	9999	0 == 0.000 V; 9999 == 9.999 V
0xDC	220	R/W	L2.x1	Linearisation Point X1	V	1	0	9999	0 == 0.000 V; 9999 == 9.999 V
0xDD	221	R/W	L2.y1	Linearisation Point Y1	V	1	0	9999	0 == 0.000 V; 9999 == 9.999 V
0xDE	222	R/W	L2.x2	Linearisation Point X2	V	1	0	9999	0 == 0.000 V; 9999 == 9.999 V
0xDF	223	R/W	L2.y2	Linearisation Point Y2	V	1	0	9999	0 == 0.000 V; 9999 == 9.999 V
0xE0	224	R/W	L2.x3	Linearisation Point X3	V	1	0	9999	0 == 0.000 V; 9999 == 9.999 V
0xE1	225	R/W	L2.y3	Linearisation Point Y3	V	1	0	9999	0 == 0.000 V; 9999 == 9.999 V
0xE2	226	R/W	L2.x4	Linearisation Point X4	V	1	0	9999	0 == 0.000 V; 9999 == 9.999 V
0xE3	227	R/W	L2.y4	Linearisation Point Y4	V	1	0	9999	0 == 0.000 V; 9999 == 9.999 V
0xE4	228	R/W	L2.x5	Linearisation Point X5	V	1	0	9999	0 == 0.000 V; 9999 == 9.999 V

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0xE5	229	R/W	L2.y5	Linearisation Point Y5	V	1	0	9999	0 == 0.000 V; 9999 == 9.999 V
0xE6	230	R/W	L2.x6	Linearisation Point X6	V	1	0	9999	0 == 0.000 V; 9999 == 9.999 V
0xE7	231	R/W	L2.y6	Linearisation Point Y7	V	1	0	9999	0 == 0.000 V; 9999 == 9.999 V
0xE8	232	R/W	L2.x7	Linearisation Point X7	V	1	0	9999	0 == 0.000 V; 9999 == 9.999 V
0xE9	233	R/W	L2.y7	Linearisation Point Y7	V	1	0	9999	0 == 0.000 V; 9999 == 9.999 V
0xEA	234	R/W	L2.x8	Linearisation Point X8	V	1	0	9999	0 == 0.000 V; 9999 == 9.999 V
0xEB	235	R/W	L2.y8	Linearisation Point Y0	V	1	0	9999	0 == 0.000 V; 9999 == 9.999 V

7 Troubleshooting

7.1 General

The green “Power”-LED at the DMA slave module is permanent off:
=> Are all modules supplied with power ? (Supply 24V / Supply 0V)

The yellow “Enable”-LED at the DMA slave module is permanent off:
=> Are all modules powered with the opto decoupled supply? (Ext.24V / Ext.0V)
=> Is the Enable input powered with Ext.24V ?
=> Is the Software enable switched off? (See the special byte in CMD-15-mode)

The current of the solenoid did not reach the desired value:
=> Could the power supply provide enough power?
=> Is the selected type of solenoid type correct?

The red “Error”-LED of one of the DMA slave modul is on:
=> The slave module is in error state, to acknowledge this error the enable signal of the modul must e switched off/on- Than the error must disappear.

7.2 No Profinet communication is possible

The red LED “Error” of the Profinet node is on:
=> Check the wiring of the Profinet. Check the device name defined in the PLC project.

7.3 Communication ok, but current outputs are inactive

Could the set point/feedback-value be monitored by the DMA module? (parameter d1.11, d1.01, d1.02):
Yes => Please check the setting of the Ex.xx Cx.xx parameters.
Check also the “Bus slave address” E22 of each module.
No => Apply a manual signal to the analogue inputs, please be sure that the parameter E17 is set to “off”. Otherwise analogue inputs would be ignored.

Are the set point/feedback-value now visible?
Yes => The PLC don’t send a correct telegram. Please check you PLC program, and modify the PLC commands in your program.
No => Check general errors under 7.1

END of document