

Profinet supplement to the User Manual MPA41xx V2.0

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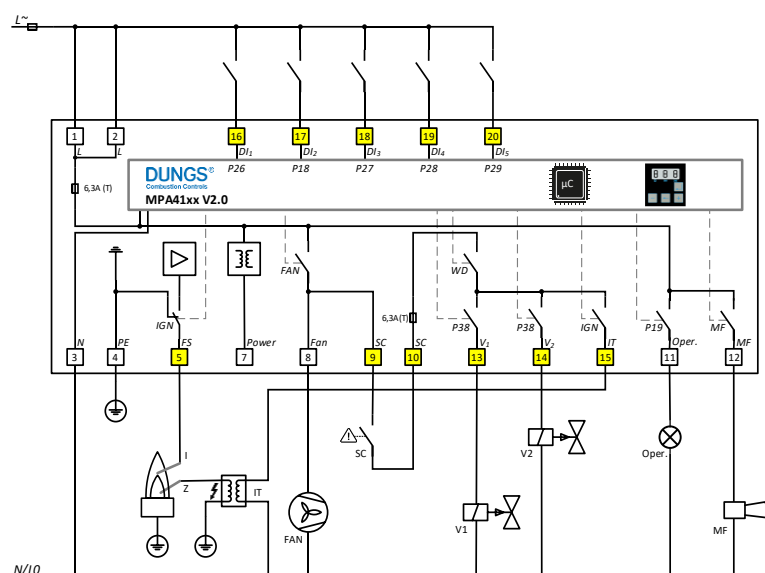
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1 Automatic burner control unit MPA 4112 and MPA 4114



1.1 Connection diagram MPA 4112 and MPA 4114



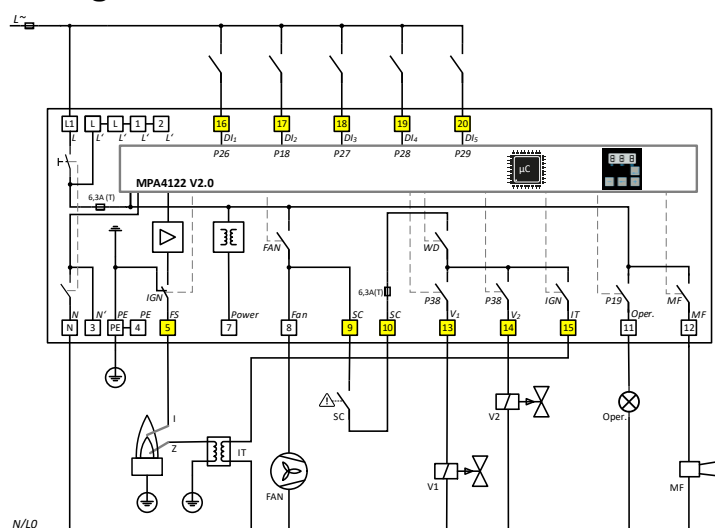
Connection terminals

Clamp	Description	Clamp	Description
1 L	Grid feed, phase	12 MF	Fault message output
2 L	Grid feed, phase	13 V ₁	Valve output V ₁
3 N	Mains supply, neutral conductor	14 V ₂	Valve output V ₂
4 PE	Mains supply, protective conductor	15 IT	Ignition transformer output
5 FS	Ionization signal input	16 DI ₁	Digital input 1 (parameter P26)
7 Power	Supply voltage UV/IR probe	17 DI ₂	Digital input 2 (parameter P18)
8 Fan	Combustion air fan output	18 DI ₃	Digital input 3 (parameter P27)
9 SC	Safety chain output	19 DI ₄	Digital input 4 (parameter P28)
10 SC	Input safety chain	20 DI ₅	Digital input 5 (parameter P29)
11 Opera.	Operation output (parameter P19)		

2 Automatic burner control unit MPA 4122



2.1 Connection diagram MPA 4122



Connection terminals

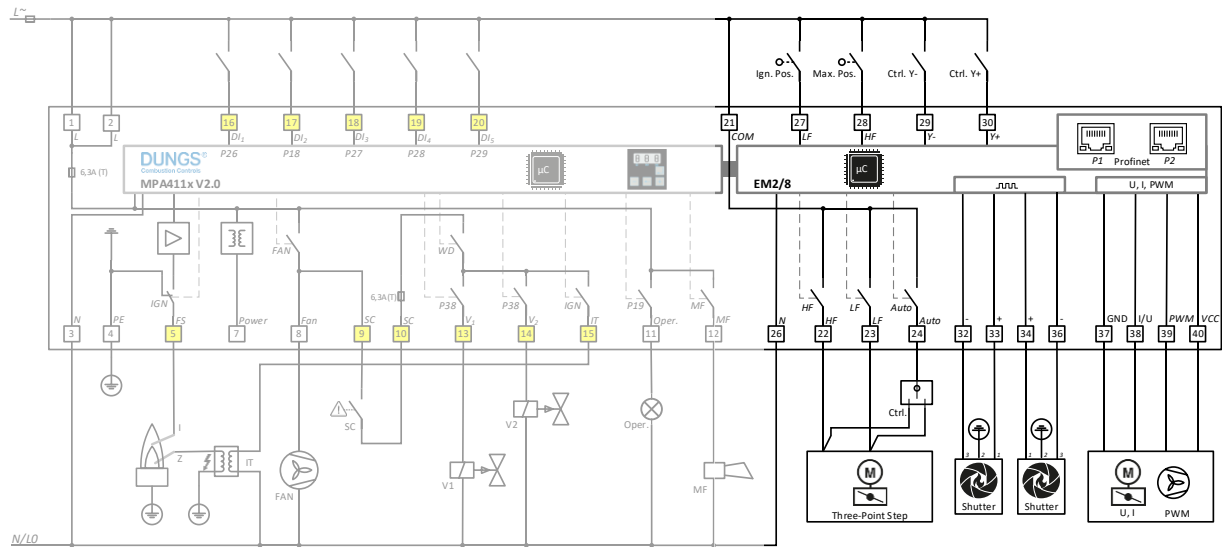
Clamp	Description	Clamp	Description
L1 L	Grid feed, phase	9 SC	Safety chain output
N N	Mains supply, neutral conductor	10 SC	Input safety chain
PE PE	Mains supply, protective conductor	11 Opera.	Operation output (parameter P19)
L L'	Switched phase after service switch	12 MF	Fault message output
L L'	Phase after service switch	13 V ₁	Valve output V ₁
1 L'	Phase after service switch	14 V ₂	Valve output V ₂
2 L'	Phase after service switch	15 IT	Ignition transformer output
3 N'	Neutral conductor after service switch	16 DI ₁	Digital input 1 (parameter P26)
4 PE	Protective conductor	17 DI ₂	Digital input 2 (parameter P18)
5 FS	Ionization signal input	18 DI ₃	Digital input 3 (parameter P27)
7 Power	Supply voltage UV/IR probe	19 DI ₄	Digital input 4 (parameter P28)
8 Fan	Combustion air fan output	20 DI ₅	Digital input 5 (parameter P29)

3.1 EM 2/9 extension module for MPA 411x



Clamp	Description	Clamp	Description
P1	Profinet Ethernet port 1	+	Shutter control, +24 V
P2	Profinet Ethernet port 2	-	Shutter control, ground

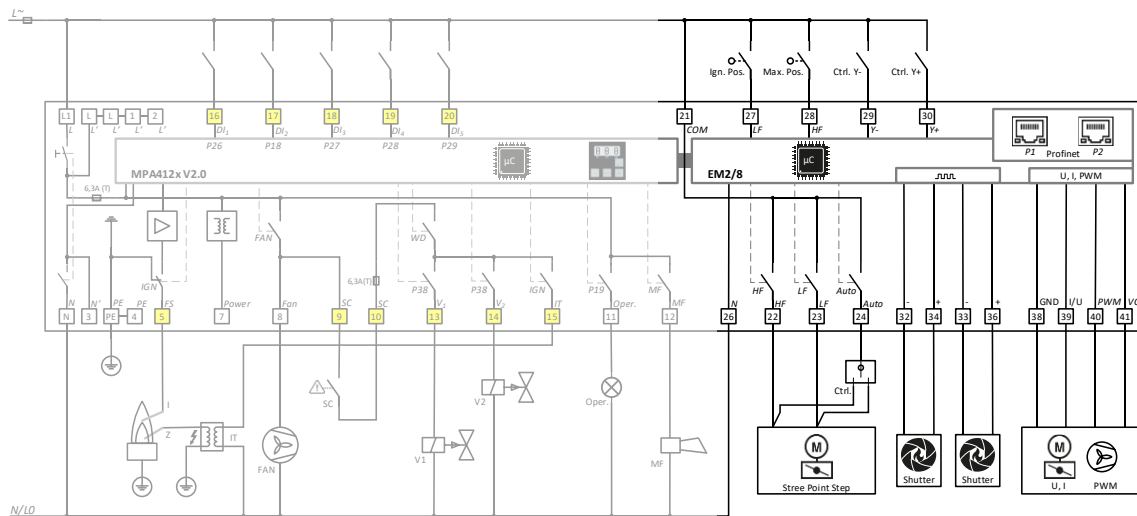
3.2 EM 2/8 extension module for MPA 411x



Connection terminals

Clamp	Description	Clamp	Description
21 COM	Voltage for relay outputs	32 -	Shutter control, ground
22 HF	Output OPEN for pre-rinse	33 +	Shutter control, +24 V
23 LF	Output CLOSED for ignition	34 +	Shutter control, +24 V
24 Car	Output control release	36 +	Shutter control, ground
26 N	Cover for terminals 27 - 30	37 GND	Ground for the U/I/PWM interface
27 LF	Input ignition position reached	38 I/U	Analog output 4-20 mA, 0-10 V (P248)
28 HF	Input pre-flushing position reached	39 PWM	PWM signal output
29 Y-	Reduce input power	40 VCC	Control voltage for PWM fan
30 Y+	Increase input power	P1	Profinet Ethernet port 1
		P2	Profinet Ethernet port 2

3.3 Extension module EM 2/8 for MPA 4122



Connection terminals

Clamp	Description	Clamp	Description
21 COM	Voltage for relay outputs	32 -	Schutter control, ground
22 HF	Output OPEN for pre-rinse	33 -	Schutter control, ground
23 LF	Output CLOSED for ignition	34 +	Schutter control, +24 V
24 Car	Output control release	36 +	Schutter control, +24 V
26 N	Cover for terminals 27 - 30	38 GND	Ground for the U/I/PWM interface
27 LF	Input ignition position reached	39 I/U	Analog output 4-20 mA, 0-10 V
28 HF	Input pre-flushing position reached	40 PWM	PWM signal output
29 Y-	Reduce input power	41 VCC	Control voltage for PWM fan
30 Y+	Increase input power	P1	Profinet Ethernet port 1
		P2	Profinet Ethernet port 2

4 Type code and variant overview MPA41xx

4.1 Type code

MPA 4112 PF V2.0 230 VAC EM2/4

Extension module (optional)

EM2/4 Shutter control, Profibus/Modbus communication

EM2/6 Shutter control, control for control damper or PWM fan, Profibus/Modbus communication

EM2/8 Shutter control, control for control damper or PWM fan, Profinet communication

EM2/9 Shutter control, Profinet communication

Mains voltage

230 Mains voltage 230 V 50/60 Hz

115 Mains voltage 150 V 50/60 Hz

Application

For continuously modulating operation

PF For intermittent operation

Base unit

4112 Plastic housing for top-hat rail mounting, IP54¹⁾
Seven-segment display and extended operation

4114 Plastic housing for top-hat rail mounting, IP54¹⁾
LED status display and reset button on the device²⁾

4122 Die-cast aluminum housing, IP65
Seven-segment display and extended operation

¹ With extension module EM2/8 or EM2/9 Protection class IP40

² MPA4114 can optionally be used with the remote control unit AM41

5 Fieldbus communication

Various fieldbus communication protocols are provided with the EM x/y extension modules. The MPA 41xx automatic burner control unit can communicate with a PLC or factory and machine automation system via Modbus, Profibus or Profinet. Fieldbus communication allows the automatic burner control unit to be controlled externally and status information to be queried.

The EM 2/4 and EM 2/6 extension modules provide an RS 485 communication interface. With these extension modules, the MPA 41xx automatic burner control unit can communicate either via Modbus RTU or Profibus. The desired communication protocol is set via a DIP switch on the circuit board of the extension module (see chapter ???)

The EM 2/8 and EM 2/9 extension modules each provide two Ethernet communication interfaces. With the EM 2/8 and EM 2/9 extension modules, the MPA 41xx automatic burner control unit can communicate with a PLC or factory and machine automation system via Profinet.

A bus connection is not required to operate the MPA. If no bus is connected, the MPA 41xx automatic burner control unit can only be started via a correspondingly parameterized hardware input. If a bus connection is available, recognizable by a flashing character on the display, the heat request is determined via bit 0 in AB0 and parameter P17. The current bus address can be viewed from the operating display using the ← button.

5.1 Profinet communication with EM 2/8 and EM 2/9

The EM 2/8 and EM 2/9 extension modules are each equipped with two Ethernet ports. This allows the PMA 41xx automatic burner control unit to be integrated into a Profinet field bus system.

The MPA 41xx automatic burner control unit acts as a Profinet device. The details of the address setting are described in the following examples.

Ethernet redundancy protocol

The EM 2/8 and EM 2/9 expansion modules support the MRP - Media Redundancy Protocol

PROFINET system redundancy

PROFINET NAP S1 is supported by every standard IO device and therefore also by the EM 2/8 and EM 2/9 expansion modules. It has no influence on the availability of a system configuration. Other PROFINET system redundancy protocols are not supported by the EM 2/8 and EM 2/9 expansion modules.

IP address:

The IP address (IPv4) of the MPA41xx automatic burner control unit is set with parameters P11, P60, P61 and P62.

Example:

173	115	119	50	Param:	Value range:
└─┘	└─┘	└─┘	└─┘	P11	0...254, 255 = OFF
└─┘	└─┘	└─┘	└─┘	P62	0...255
└─┘	└─┘	└─┘	└─┘	P61	0...254
└─┘	└─┘	└─┘	└─┘	P60	0...254

Profinet communication is deactivated if parameter P11=255 is set.

Subnet mask:

The subnet mask of the MPA41xx automatic burner control unit is set with parameters P106 and P107.

Example:

172	86	50	150	#	Conversion:	Parameters:
└─┘	└─┘	└─┘	└─┘	0	150 _{DEC} = 96 _{HEX} (X)	P107 = 3296 _{HEX} = 12950 _{DEC}
└─┘	└─┘	└─┘	└─┘	1	50 _{DEC} = 32 _{HEX}	
└─┘	└─┘	└─┘	└─┘	2	86 _{DEC} = 56 _{HEX}	P106 = AC56 _{HEX} = 44118 _{DEC}
└─┘	└─┘	└─┘	└─┘	3	172 _{DEC} = AC _{HEX}	

Standard gateway:

The standard gateway of the MPA41xx automatic burner control unit is set with parameters P108 and P109.
Example:

172	86	50	150	#	Conversion:	Parameters:
				0	150 _{DEC} = 96 _(HE) (X)	P109 = 3296 _{HEX} = 12950 _{DEC}
				1	50 _{DEC} = 32 _{HEX}	
				2	86 _{DEC} = 56 _{HEX}	P108 = AC56 _{HEX} = 44118 _{DEC}
				3	172 _{DEC} = AC _{HEX}	

Profinet device name:

The Profinet device name of the MPA41xx automatic burner control unit can be set with parameter P105. In this case, the device name is made up of the default prefix **mpa41xx-id-** and the numerical value set in parameter P105. The permissible value range of the numerical value in parameter P105 is from 0 to 65534

Example: P105 = 205 ⇒ Profinet device name: **mpa41xx-id-00205**

In contrast to the Profinet device name setting described above, it is also possible to assign a user-specific device name. In this case, the device name must be entered externally (programming tool of the Profinet master or similar). A user-specific device name may consist of a maximum of 25 characters! In this case, the MPA automatically enters parameter P105=65565.

Note:

When assigning a user-specific, free Profinet device name, please note that this is only saved in the EM x/x extension module of the MPA 41xx automatic burner control unit. It is therefore not part of the device parameterization and is not taken into account when reading out the parameters and is also not displayed!

A common GSD file is provided for the EM 2/8 and EM 2/9 extension modules. The various Profinet I/O modules and their address ranges are described below.

5.1.1 Cyclic Profinet output signals EM 2/8 and EM 2/9 (Controller ⇒ Device)

The Profinet output modules are data that the Profinet controller sends cyclically to the MPA 41xx automatic burner control unit (Profinet device).

5.1.1.1 Module: Output Basic_1

Byte n			EM2/8	EM2/9
Bit	Description	Explanation		
0	Heat requirement	Heat request via BUS, depending on parameters P17 and P64	•	•
1	Valve V ₂ cycles	Valve output V ₂ clocking via BUS, depending on the parameters P38=4 and P64	•	•
2	Remote release	Remote unlocking via BUS Signal duration >0.5s and <5s	•	•
3	Switching output X11	If parameter P19=8, the signal output X11 is controlled	•	•
4	Cooling / pre-rinse	Ventilation/cooling via fan output (X8). (Parameters P18, P26, P27, P28, P29 and P64)	•	•
5	Main burner On	This signal starts the main burner.	•	•
6	Start release	Start enable via (Parameters P18, P26, P27, P28, P29 and P64)	•	•
7	Free		•	•

5.1.1.2 Module: Output extension module_1 (EM2/8 only)

Byte n			EM2/8	EM2/9
Bit	Description	Explanation		
0	Power +/- via bus	Activation of power adjustment via bus using control signals Y+ and Y-	•	
1	Performance +	Control signals Increase power (Ctrl. Y+)	•	
2	Performance -	Reduce power control signal (Ctrl. Y+)	•	
3	Absolute power adjustment	Activation of power adjustment via the absolute value specified in output register 1 (output level Y, 0-100 %)	•	
4	Free		•	
5	Free		•	
6	Free		•	
7	Free		•	

Byte n+1			EM2/8	EM2/9
Bit	Description	Explanation		
0-8	Output level Y	Output level Y as absolute value in 0.5 % steps Data format: 0-200 (UINT) = 0-100 %	•	

5.1.2 Cyclic Profinet input signals EM 2/8 and EM 2/9 (Device⇒ Controller)

The Profinet input modules are data that the Profinet controller receives cyclically from the MPA 41xx automatic burner control unit (Profinet device).

5.1.2.1 Module: Input Basic_1

Byte n			EM2/8	EM2/9
Bit	Description	Explanation		
0	Flame 1	Signal status Flame signal 1 detected	•	•
1	Flame 2 NO	Signal status flame 2 NO input (parameters P18, P26, P27, P28, P29)	•	•
2	Flame 2 NC	Signal status flame 2 NC input (parameters P18, P26, P27, P28, P29) or combination of flame 2 NC or GDW or POC, depending on parameter P104 (V1.1 compatibility mode)	•	•
3	Evaluation Flame signal	Signal status of the flame signal evaluation; depending on the current program step and parameters P33 + P36	•	•
4	Air pressure monitor 1	Signal status air jolt monitor 1 (parameters P18, P26, P27, P28, P29)	•	•
5	Heat requirement	Signal status heat request from HW input (parameters P18, P26, P27, P28, P29)	•	•
6	Valve output V ₁	Signal status at valve output V ₍₁₎ (X13)	•	•
7	Valve output V ₂	Signal status at valve output V ₍₂₎ (X14)	•	•

Byte n+1			EM2/8	EM2/9
Bit	Description	Explanation		
0	Ignition transformer	Signal status ignition transformer output (X15)	•	•
1	Manual operation	Manual mode active	•	•
2	Blower	Signal status fan output (X8)	•	•
3	Free		•	•

Byte n+1			EM2/8	EM2/9
Bit	Description	Explanation		
4	Evaluation of heat requirement	Evaluation of heat request, depending on parameterization P17	•	•
5	Free		•	•
6	Warning connection failure	The internal connection between the MPA motherboard and the EMx/y expansion module has been interrupted for 0.5 s	•	•
7	Malfunction	Signal status of the MPA fault message	•	•

5.1.2.2 Module: Input State or error code_1

Byte n			EM2/8	EM2/9
Bit	Description	Explanation		
0-7	State number or error code	Current state number or error code in the event of a fault Data format: 0-255 (USINT) Display state numbers in DEC and the error codes in HEX		

5.1.2.3 Module: Flame quality_1 input

Byte n		
Bit	Description	Explanation
0-7	Flame signal strength	Flame signal strength Data format: Digits: 0-59 (USINT) = 0-59 digits or μA: 0-150 (USINT) = 0-15 μA depending on parameter P104 (V1.1 compatibility mode)

5.1.2.4 Module: Input extension module_1 (EM2/8 only)

Byte n		
Bit	Description	Explanation
0	Input Y+	Signal status at input Ctrl. Y+
1	Input Y-	Signal status at input Ctrl. Y-
2	Input HF	Signal status at input HF
3	Input LF	Signal status at input LF
4	Signal error Y+/Y-	Warning, Ctrl. Y+ and Ctrl. Y- high signal at the same time
5	Free	
7	Free	

Byte n+1		
Bit	Description	Explanation
0 1	Switching outputs LF, HF and Auto	Signal status of the switching outputs LF, HF and Auto 00 _{BIN} = Off, 01 _{BIN} = Auto relay On , 10 _{BIN} = LF relay On 11 _{BIN} = HF relay On
2	Signal error LF/HF	Warning, inputs LF and HF simultaneously high signal
3	Free	
4	Free	
5	Free	
7	Free	

Byte n+2		
Bit	Description	Explanation
0-7	Output level Y	Output level Y as absolute value in 0.5 % steps Data format: 0-200 (UINT) = 0-100 %

5.1.2.5 Module: Input Counter_1

Byte n...n+3		
Bit	Description	Explanation
0-31	Operating hours counter	Operating hours counter (resettable) Data format: 4294967295 (DEC) = 4294967295 s

Byte n+7...n+7		
Bit	Description	Explanation
0-31	Start-up counter	Start-up counter (resettable) Data format: 4294967295 (DEC) = 4294967295 s

Byte n+8...n+11		
Byte	Description	Explanation
0-31	Switching cycles V ₂	Switching cycle counter output V ₂ Data format: 4294967295 (DINT) = 4294967295

Byte n+12...n+15		
Byte	Description	Explanation
0-31	Operating hours V ₂ Byte n	Operating hours counter of output V ₂ Data format: 4294967295 (DINT) = 4294967295

5.1.2.6 Module: Input Error-Info_1

Byte n		
Byte	Description	Explanation
0-7	Additional error code 1	Additional error codes 1 Data format: 0-255 (USINT) = 0-FF (HEX)

Byte n+1		
Byte	Description	Explanation
0-7	Additional error code 4	Output of the additional error code 4 Data format: 0-255 (USINT) = 0-FF (HEX)

Byte n+2		
Bit	Description	Explanation
0-7	Error status	Status in which the pending error was triggered Data format: 0-255 (USINT)

5.1.2.7 Module: Input Extended_1

Byte n		
Bit	Description	Explanation
0	Gas pressure switch min.	Signal status from HW input gas pressure monitor min.
1	POC V ₁	Signal status from HW input POC V ₁
2	POC V ₂	Signal status from HW input POC V ₂

Byte n		
Bit	Description	Explanation
3	Start release	Signal status from HW input Start enable interlock
4	Valve V ₂ cycles	Signal status from HW input V ₂ Clocking
5	Main burner ON	Signal status from HW input main burner ON
6	Air valve on V ₂ ON	Signal status from HW input air valve to V ₂ ON
7	Cooling / pre-rinse	Signal status from HW input cooling / pre-purge via X8

Byte n+1		
Bit	Description	Explanation
0	Air pressure fault	Air pressure fault during cooling/pre-purge
1	Switching output X11	Signal status from HW signal output X11
2	MPA temp. > max.	Warning message MPA temperature > 83°C
3	Air pressure monitor 2	Signal status from HW input air pressure monitor 2
4	Free	
5	Free	
6	Free	
7	Free	

Byte n+2		
Bit	Description	Explanation
0-7	MPA internal temperature	Internal appliance temperature Data format: 0-255 (USINT) -50*1= 0-255°C *1Offset of 50 must be subtracted

Byte n+3...n+6		
Bit	Description	Explanation
0-31	Fan switching cycles	Switching cycle counter Fan output (X8) Data format: 0-4294967296 (DINT) = 0-4294967296

Byte n+7		
Bit	Description	Explanation
0-7	Free	

5.1.3 Acyclic Profinet input signals EM 2/8 and EM 2/9 (Device⇒ Controller)

Index: 0		
DWORD	Description	Explanation
0	Operating hours counter	Operating hours counter (resettable) Data format: 4294967295 (DINT) = 4294967295 s
1	Start-up counter	Start-up counter (resettable) Data format: 4294967295 (DINT) = 4294967295 s
2	Switching cycles V ₂	Switching cycle counter output V ₂ Data format: 4294967295 (DINT) = 4294967295
3	Operating hours V ₂	Operating hours counter output V ₂ Data format: 4294967295 (DINT) = 4294967295 s

Index: 1		
Byte	Description	Explanation
0	Additional error code 1	Output of the additional error code 1 Data format: 0-255 (USINT) = 0-FF (HEX)
1	Additional error code 4	Output of the additional error code 4 Data format: 0-255 (USINT) = 0-FF (HEX)
2	Error status	Status in which the pending error was triggered Data format: 0-255 (USINT)

Index: 2		
Byte	Description	Explanation
0	Device variant	Output of the device variant and EM assembly Data format: 0-255 (USINT) Example: MPA 411x + EM 2/8 = 55 _{HEX} MPA 411x + EM 2/9 = 50 _{HEX} MPA 412x + EM 2/8 = 59 _{HEX}