Interface Specification
Profibus GMM

Profibus Parameter Specification for the Güntner Communication Module (GCM) of Güntner Hydro Management

(GMM EC, GMM sincon, GMM step and GMM phase cut)

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Contents

1 Manufacturer and supplier address

Should you have a problem with any of our equipment, or any questions, suggestions or special requests, simply contact

Güntner GmbH & Co. KG
Hans-Güntner-Strasse 2-6
D-82256 Fürstenfeldbruck, Germany

Service Telephone Germany:
0800 48368637
0800 GUENTNER

Service Telephone Worldwide:
+49 (0)8141 242-4815

Fax: +49 (0)8141 242-422
service@guentner.de
http://www.guentner.de

2 Introduction

This document contains the specification of Profibus communication as used in Güntner Motor Management systems (GMM), manufactured by Güntner GmbH & Co. KG.

This manual was written for automation technicians and engineers. It assumes the reader has comprehensive knowledge of the PROFIBUS-DP fieldbus and the programming of a PROFIBUS-DP master.

3 Registers

Following GSD-File has to be used: GCMP0D58.gsd

There are two possible ways to access the GMM by the Profibus:
1. Using two blocks of 122 Input Words and 122 Output Words
2. By using the Profibus parameters it is possible to define different block sizes for Input and Output

The first byte of each word (PAW = Peripherieausgabewort, PEW = Peripherieeingabewort) is the highbyte, the second byte is the lowbyte.
Following list gives an overview of all possible parameters. They will be explained in the following chapters.

3.1 Overview (GMM EC)

Function	Values	Address O-Word	Address I-Word
		GMM EC	
Control Value	1	PAW 0	PEW 0
Operating Mode	1	PAW 1	PEW 1
Control Parameter Kp1	1	PAW 2	PEW 2
Control Parameter Ti1	1	PAW 3	PEW 3
Control Parameter Td1	1	PAW 4	PEW 4
Control Parameter Kp2 (not yet implemented)	1	PAW 5	PEW 5
Control Parameter Ti2 (not yet implemented)	1	PAW 6	PEW 6
Control Parameter Td2 (not yet implemented)	1	PAW 7	PEW 7
Switching Control System (not yet implemented)	1	PAW 8	PEW 8
Setpoint 1	1	PAW 9	PEW 9
Setpoint 2	1	PAW 10	PEW 10
Watchdog	1	PAW 11	PEW 11
Used Refrigerant	1	PAW 12	PEW 12
Number of Motors of the GMM	1		PEW 13
Status of the digital inputs of the GMM	1		PEW 14
Function current input AI1 (4 .. 20 mA)	1		PEW 15
Raw Value AI1	1		PEW 16
Scaled Value AI1 (depending on the selected refrigerant)	1		PEW 17
Function current input AI2 (4..20mA)	1		PEW 18
Raw Value AI2	1		PEW 19
Scaled Value AI2 (depending on the selected refrigerant)	1		PEW 20
Function Resistor Input AI3 (GTF210) / Raw Value	1		PEW 21
AI3 Scaled Value (depending on the chosen function)	1		PEW 22
Function Voltage Input (0..10V)	1		PEW 23

Function	Values	Address O-Word	Address I-Word
	GMM EC		
Raw Value AI4	1		PEW 24
Scaled Value AI4 (depending on the chosen function)	1		PEW 25
Status Manual Mode	1		PEW 26
Control Value Manual Mode	1		PEW 27
Type of Motorcontrol	1		PEW 28
Current Energy Consumption of one Motor or in total	17		PEW 29
Motor temperature	16		PEW 46
Current speed of the motors in rpm of the Maximum Speed	16		PEW 62
Errors / Alarms of the GMM EC	17		PEW 78
Current Fanspeed as percentage of the Maximum Speed	16		PEW 95
Current Air Volume as percentage	1		PEW111
Handshake	1		PEW112

3.2 Overview of GMM sincon

Function	Values	Address A word	Address E word
	GMM sincon		
Control value	1	PAW 0	PEW 0
Operating mode	1	PAW 1	PEW 1
Control parameter Kp1	1	PAW 2	PEW 2
Control parameter Ti1	1	PAW 3	PEW 3
Control parameter Td1	1	PAW 4	PEW 4
Control parameter Kp2 (not yet implemented)	1	PAW 5	PEW 5
Control parameter Ti2 (not yet implemented)	1	PAW 6	PEW 6
Control parameter Td2 (not yet implemented)	1	PAW 7	PEW 7
Control system switchover (not yet implemented)	1	PAW 8	PEW 8
Setpoint 1	1	PAW 9	PEW 9
Setpoint 2	1	PAW 10	PEW 10
Watchdog	1	PAW 11	PEW 11
Refrigerant used	1	PAW 12	PEW 12
Number of frequency converters in the GMM sincon	1		PEW 13
Status of the GMM's digital inputs and outputs	1		PEW 14
Function current input AI1 (4 – 20 mA)	1		PEW 15
Raw value of AI1	1		PEW 16

Function	Values	Address A word	Address E word
	GMM sincon		
Scaled value of AI1 (depends on the chosen refrigerant)	1		PEW 17
Function current input AI2 (4 – 20 mA)	1		PEW 18
Raw value of AI2	1		PEW 19
Scaled value of AI2 (depends on the chosen refrigerant)	1		PEW 20
Function resistance input AI3 (GTF210)/raw value	1		PEW 21
Scaled value of AI3 (depends on the selected function)	1		PEW 22
Function voltage input (0 – 10 V)	1		PEW 23
Raw value of AI4	1		PEW 24
Scaled value of AI4 (depends on the selected function)	1		PEW 25
Status of manual operation	1		PEW 26
Control value for manual operation	1		PEW 27
Type of motor control	1		PEW 28
Current energy consumption (of one frequency converter, or in total)	17		PEW 29
Temperature of heat sink (only for GMM sincon)	9		PEW 39
Faults/alarms from GMM sincon			PEW103
Faults/alarms from the frequency converters of GMM sincon	36		PEW 57
Current fan speed as a percentage of the maximum speed	9		PEW 93
Current air volume as a percentage of the maximum volume	1		PEW102
Handshake:	1		PEW112

3.3 Overview (GMM step basic/professional)

Function	Values	Address O-Word	Address I-Word
	GMM step basic/professional		
Control Value	1	PAW 0	PEW 0
Operating mode	1	PAW 1	PEW 1
Control Parameter Kp1	1	PAW 2	PEW 2
Control Parameter Ti1	1	PAW 3	PEW 3
Control parameter Td1	1	PAW 4	PEW 4
Control parameter Kp2 (not yet implemented)	1	PAW 5	PEW 5
Control parameter Ti2 (not yet implemented)	1	PAW 6	PEW 6
Control parameter Td2 (not yet implemented)	1	PAW 7	PEW 7
Switching Control System (not yet implemented)	1	PAW 8	PEW 8
Setpoint 1	1	PAW 9	PEW 9
Setpoint 2	1	PAW 10	PEW 10
Watchdog	1	PAW 11	PEW 11
Used Refrigerant	1	PAW 12	PEW 12
Number of motors of the GMM	1		PEW 13
Status of the digital inputs of the GMM	1		PEW 14
Function current input AI1 (4-20 mA)	1		PEW 15
Raw value AI1	1		PEW 16
Scaled value AI1 (depending on the selected refrigerant)	1		PEW 17
Function current input (4-20 mA)	1		PEW 18
Raw value AI2	1		PEW 19
Scaled value AI2 (depending on the selected refrigerant)	1		PEW 20
Function resistance input AI3 (GTF210) / Raw value	1		PEW 21
Scaled valuet AI3 (depending on the selected refrigerant)	1		PEW 22
Function voltage input (0-10V)	1		PEW 23
Raw value AI4	1		PEW 24
Scaled value AI4	1		PEW 25
Status manual mode	1		PEW 26
Control value manual mode	1		PEW 27
Type of motorcontrol	1		PEW 28
Fancycling	1	PAW 62	PEW 62
Hysteresis off	1	PAW 63	PEW 63
Status of steps	1		PEW 64
Number of error messages	1		PEW 65

Function	Values	Address O-Word	Address I-Word
	GMM step basic/professional		
Status of GIOD inputs	1		PEW 66
Status of GIOD outputs	1		PEW 67
Errors/Alerts of GMM step	1		PEW 78
Handshake	1		PEW112

3.4 Overview (GMM phasecut)

Function	Values	Address O-Wort	Address I-Wort
	GMM phasecut		
Control value	1	PAW 0	PEW 0
Operating mode	1	PAW 1	PEW 1
Control parameter Kp1	1	PAW 2	PEW 2
Control parameter Ti1	1	PAW 3	PEW 3
Control parameter Td1	1	PAW 4	PEW 4
Control parameter Kp2 (not yet implemented)	1	PAW 5	PEW 5
Control parameter Ti2 (not yet implemented)	1	PAW 6	PEW 6
Control parameter Td2 ((not yet implemented)	1	PAW 7	PEW 7
Switching Control System (not yet implemented)	1	PAW 8	PEW 8
Setpoint 1	1	PAW 9	PEW 9
Setpoint 2	1	PAW 10	PEW 10
Watchdog	1	PAW 11	PEW 11
Used Refrigerant	1	PAW 12	PEW 12
Number of motors of the GMM	1		PEW 13
Status of digital inputs/outputs of the GMM	1		PEW 14
Function current input AI1 (4-20 mA)	1		PEW 15
Raw value AI1	1		PEW 16
Scaled value AI1 (depending on the selected refrigerant)	1		PEW 17
Function current input AI2 (4-20 mA)	1		PEW 18
Raw value AI2	1		PEW 19
Scaled value AI2 (depending on the selected refrigerant)	1		PEW 20
Function resistor input AI3 (GTF210) /Raw value	1		PEW 21
Scaled value AI3 (depending on the selected refrigerant)	1		PEW 22
Function voltage input (0-10V)	1		PEW 23
Raw value AI4	1		PEW 24
Scaled value AI4	1		PEW 25
Status manual mode	1		PEW 26
Control value manual mode	1		PEW 27
Type of motorcontrol	1		PEW 28
Errors/Alerts of the GMM phasecut	1		PEW 78
Vurrent air volume as percentage	1		PEW111
Handshake	1		PEW112

3.5 Data access by blocks

When the GMM Profibus module is installed in the system you can select individual data blocks. These blocks are described in the following list. When you have selected the desired blocks, you will need to calculate the words/bytes for the correct number of modules.

Block	Function	
Control parameter 1		
1	Control value	This block uses 7 words/14 bytes.
	Operating mode	
	Control system switchover (not yet implemented)	
	Setpoint 1	
	Setpoint 2	
	Watchdog	
	Refrigerant used	
Control parameter 2		
2	Control parameter Kp1	This block uses 6 words/12 bytes.
	Control parameter Ti1	
	Control parameter Td1	
	Control parameter Kp2 (not yet implemented)	
	Control parameter Ti2 (not yet implemented)	
	Control parameter Td2 (not yet implemented)	
Analogue inputs		
3	Function current input AI1 (4 – 20 mA)	This block uses 11 words/22 bytes.
	Raw value of AI1	
	Scaled value of AI1 (depends on the chosen refrigerant)	
	Function current input AI2 (4 – 20 mA)	
	Raw value of AI2	
	Scaled value of AI2 (depends on the chosen refrigerant)	
	Function resistance input AI3 (GTF210)/raw value	
	Scaled value of AI3 (depends on the selected function)	
	Function voltage input AI4 (0 – 10 V)	
	Raw value of AI4	

Block	Function	
	Scaled value of AI4 (depends on the selected function)	
Status data		
4	Number of motors – GMM EC Number of frequency converters – GMM sin-con Number of end stages – GMM phasecut Number of steps – GMM step	This block uses 8 words/16 bytes.
	Status of the GMM's digital inputs and outputs	
	Status of manual operation	
	Control value for manual operation	
	Type of motor control	
	Current energy consumption (total)	
	Faults/alarms from GMM	
	Current air volume as a percentage of the maximum volume	
Energy consumption		
5	Current energy consumption of motor 1	This block uses 16 words/32 bytes.
	Current energy consumption of motor 2	
	Current energy consumption of motor 3	
	Current energy consumption of motor 4	
	Current energy consumption of motor 5	
	Current energy consumption of motor 6	
	Current energy consumption of motor 7	
	Current energy consumption of motor 8	
	Current energy consumption of motor 9	
	Current energy consumption of motor 10	
	Current energy consumption of motor 11	
	Current energy consumption of motor 12	
	Current energy consumption of motor 13	
	Current energy consumption of motor 14	
	Current energy consumption of motor 15	
	Current energy consumption of motor 16	
Motor temperature		
6	Motor temperature (only for GMM EC) 1	This block uses 16 words/32 bytes.
	Motor temperature (only for GMM EC) 2	
	Motor temperature (only for GMM EC) 3	
	Motor temperature (only for GMM EC) 4	

Block	Function	
	Motor temperature (only for GMM EC) 5	
	Motor temperature (only for GMM EC) 6	
	Motor temperature (only for GMM EC) 7	
	Motor temperature (only for GMM EC) 8	
	Motor temperature (only for GMM EC) 9	
	Motor temperature (only for GMM EC) 10	
	Motor temperature (only for GMM EC) 11	
	Motor temperature (only for GMM EC) 12	
	Motor temperature (only for GMM EC) 13	
	Motor temperature (only for GMM EC) 14	
	Motor temperature (only for GMM EC) 15	
	Motor temperature (only for GMM EC) 16	
Peripheral input and output words (for GMM step)		
7	Fancycling	This block uses 16 words/32 bytes.
	Off hysteresis	
	Status of the steps	
	Number of fault reports	
	Digital inputs for GIOD	
	Digital outputs for GIOD	
Current speed in rpm		
7	Current speed of motor 1 in rpm	This block uses 16 words/32 bytes.
	Current speed of motor 2 in rpm	
	Current speed of motor 3 in rpm	
	Current speed of motor 4 in rpm	
	Current speed of motor 5 in rpm	
	Current speed of motor 6 in rpm	
	Current speed of motor 7 in rpm	
	Current speed of motor 8 in rpm	
	Current speed of motor 9 in rpm	
	Current speed of motor 10 in rpm	
	Current speed of motor 11 in rpm	
	Current speed of motor 12 in rpm	
	Current speed of motor 13 in rpm	
	Current speed of motor 14 in rpm	
	Current speed of motor 15 in rpm	
	Current speed of motor 16 in rpm	
Fault EC		

Block	Function	
8	Fault EC 1	This block uses 16 words/32 bytes.
	Fault EC 2	
	Fault EC 3	
	Fault EC 4	
	Fault EC 5	
	Fault EC 6	
	Fault EC 7	
	Fault EC 8	
	Fault EC 9	
	Fault EC 10	
	Fault EC 11	
	Fault EC 12	
	Fault EC 13	
	Fault EC 14	
	Fault EC 15	
	Fault EC 16	
Fault frequency converter		
9	Fault code FU 1	This block uses 9 words/18 bytes.
	Fault code FU 2	
	Fault code FU 3	
	Fault code FU 4	
	Fault code FU 5	
	Fault code FU 6	
	Fault code FU 7	
	Fault code FU 8	
	Fault code FU 9	
Current speed in %		
10	Current fan speed as a percentage of the maximum speed for motor 1	This block uses 16 words/32 bytes.
	Current fan speed as a percentage of the maximum speed for motor 2	
	Current fan speed as a percentage of the maximum speed for motor 3	
	Current fan speed as a percentage of the maximum speed for motor 4	
	Current fan speed as a percentage of the maximum speed for motor 5	

Block	Function	
	Current fan speed as a percentage of the maximum speed for motor 6	
	Current fan speed as a percentage of the maximum speed for motor 7	
	Current fan speed as a percentage of the maximum speed for motor 8	
	Current fan speed as a percentage of the maximum speed for motor 9	
	Current fan speed as a percentage of the maximum speed for motor 10	
	Current fan speed as a percentage of the maximum speed for motor 11	
	Current fan speed as a percentage of the maximum speed for motor 12	
	Current fan speed as a percentage of the maximum speed for motor 13	
	Current fan speed as a percentage of the maximum speed for motor 14	
	Current fan speed as a percentage of the maximum speed for motor 15	
	Current fan speed as a percentage of the maximum speed for motor 16	
Handshake:		
11	Busy bit (handshake)	This block uses 1 word/2 bytes.

3.6 Output Words

3.6.1 Control value

Address: PAW 0

This parameter can be used to specify the control value. The control value gives the fan speed in the range 0 – 100%. This parameter is used only in operating mode 4 (see Operating mode, Page 17).

PEW 112 (busy bit) is set to 1 after the new control value has been programmed. It is reset to 0 when the GMM has acknowledged receipt.

3.6.2 Operating mode

Address: PAW 1

This parameter is used to program the operating mode of the GMM.

PEW 112 (busy bit) is set to 1 after the new operating mode has been programmed. It is reset to 0 when the GMM has acknowledged receipt.

You may use the following modes, which can also be set up from the GMM's Service menu.

ADVICE

Manual operation deactivates this mode.

3.6.2.1 Automatic internal

In this mode, GMM reacts automatically to the setpoint configured in the menu.

3.6.2.2 Automatic external analogue

In this mode, GMM reacts automatically to the setpoint defined via the external analogue input.
Which analogue input is to be used to input the setpoint is specified in the I/O configuration.

3.6.2.3 Automatic external bus

Some of the parameters, such as the desired setpoint, can be set up via the external bus. The external setpoint is written to the same register and (in other modes) can also be modified in the "Setpoints" menu.
If any problems are encountered during the communication, GMM will use the most recently transmitted setpoint.

3.6.2.4 Slave external analogue

The controller converts the external analogue signal one-to-one into a control value.
Which analogue input is to be used to specify the control value is set up in the I/O configuration.

3.6.2.5 Slave external bus

In this operating mode, internal control is deactivated. All the parameters can be modified, but only the external control value is used to set up the motor speed.
If the external communication breaks down, the controller uses the programmed setpoint (only if the watchdog is activated).

The following operating modes are available:

Value	Operating mode
0	Automatic internal
1	Automatic external analogue
2	Automatic external bus
3	Slave external analogue
4	Slave external bus

3.6.3 Control parameter Kp1

Address: PAW 2

This register is used to program the control parameter Kp1, which the PID controller uses for normal operation and emergency operation (see Watchdog). This is the value the controller uses if external communications breaks down. To achieve the necessary precision, the value must be multiplied by 10. The default value depends on the type of heat exchanger.

Value range: 0.1 – 100.0

PEW 112 (busy bit) is set to 1 after the new control parameter has been programmed. It is reset to 0 when the GMM has acknowledged receipt.

3.6.4 Control parameter Ti1

Address: PAW 3

This register is used to program the control parameter Ti1, which the PID controller uses for normal operation and emergency operation (see Watchdog). This is the value the controller uses if external communications breaks down. Setting this value to zero (Ti = 0) corresponds to deactivating the “I” component. The default value depends on the type of heat exchanger.

Value range: 0 – 1000

PEW 112 (busy bit) is set to 1 after the new control parameter has been programmed. It is reset to 0 when the GMM has acknowledged receipt.

3.6.5 Control parameter Td1

Address: PAW 4

This register is used to program the control parameter Td1, which the PID controller uses for normal operation and emergency operation (see Watchdog). This is the value the controller uses if external communications breaks down. Setting this value to zero (Td1 = 0) corresponds to deactivating the “D” component. The default value depends on the type of heat exchanger.

Value range: 0 – 1000

PEW 112 (busy bit) is set to 1 after the new control parameter has been programmed. It is reset to 0 when the GMM has acknowledged receipt.

3.6.6 Control parameter Kp2

(not yet implemented)

3.6.7 Control Parameter Ti2

(not yet implemented)

3.6.8 Control Parameter Td2

(not yet implemented)

3.6.9 Switching Control System

(not yet implemented)

3.6.10 Setpoint 1

Address: PAW 9

This register is used to program setpoint 1, which is used by GMM for its internal control. You can specify in the Service menu how this value is to be interpreted (as a pressure or as a temperature). The following ranges are permitted:

Pressure: 1.0 – 50.0 bar (only if the setting “bar” has been selected for the refrigerant used).
Temperature: 0.0 – 100.0°C

To achieve the necessary precision, the value must be multiplied by 10.

PEW 112 (busy bit) is set to 1 after the new setpoint has been programmed. It is reset to 0 when the GMM has acknowledged receipt.

3.6.11 Setpoint 2

Address: PAW 10

This register is used to program setpoint 2, which is used by GMM for its internal control. You can specify in the Service menu how this value is to be interpreted (as a pressure or as a temperature). The following ranges are permitted:

Pressure: 1.0 – 50.0 bar (only if the setting “bar” has been selected for the refrigerant used)
Temperature: 0.0 – 100.0°C

To achieve the necessary precision, the value must be multiplied by 10.

PEW 112 (busy bit) is set to 1 after the new setpoint has been programmed. It is reset to 0 when the GMM has acknowledged receipt.

3.6.12 Watchdog

Address: PAW 11

Value range: 0 – 250 [s]

This parameter can be used to program the watchdog time. If Profibus communication breaks down, the internal PID controller takes over control. The system counts the elapsed time, in seconds, since the last Profibus message was received. The watchdog is deactivated by specifying the value 0.

PEW 112 (busy bit) is set to 1 after the new watchdog time has been programmed. It is reset to 0 when the GMM has acknowledged receipt.

3.6.13 Used Refrigerant

Address: PAW 12

This parameter sets the refrigerant which is used in the heat exchanger. The characterisitic curve of the used refrigerant is saved in the GMM. Consequently it is possible to convert pressure ←→ temperature.

The charateristic curves of the following refrigerants can be selected in the GMM:

Value	Refrigerant
0	bar
1	R134a
2	R290
3	R404A
4	R407C
5	R410A
6	R507
7	R717 (NH3)

Value	Refrigerant
8	R723
9	R744 (CO2)
10	R22

PEW 112 (Busybit) will be set to 1 after the new refrigerant is programmed. It will be resetted to 0 when the GMM confirmed the reception.

3.6.14 Fancycling

(GMM step only)

Address: PAW62

Value range: 0 – 1

When fancycling is active, the running times of all the fans will be balanced. This ensures that, on average, all the fans are subjected to the same load.

1 – switches fancycling on

0 – switches fancycling off

3.6.15 Hysteresis off

(GMM step only)

Address: PAW63

Value range: 1 – 50

A hysteresis is defined to prevent a given step from being switched on and off too frequently. This means that each stage switches off only when it reaches the corresponding threshold value minus the hysteresis.

3.7 Input Words

3.7.1 Number of load elements

Address: PEW 13

This register contains the following information, depending on the type of GMM:

GMM EC	– Number of fans
GMM sincon	– Number of frequency converters
GMM step	– Number of steps
GMM phasecut	– Number of end stages

3.7.2 Status of the GMM's digital inputs and outputs

Address: PEW 14

This register maps the status of the GMM's inputs and outputs. The following table shows the correlation between the individual bits of the register and the inputs and outputs.

Data	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
High byte	x	x	x	x	x	x	x	x
Low byte	DO4	DO3	DO2	DO1	x	DI3	DI2	DI1

x: Undefined

DI1-DI3 Digital inputs for GMM

DO1-DO4: Digital outputs for GMM

Example:
PEW 14 = 17 (10001 binary)
DI1 is at 24 V
DO1 is activated

3.7.3 Function current input AI1

(4 – 20 mA)

Address: PEW 15

This register contains the value returned by the function on the current input AI1. This function can be set up in the Service menu.

Value	Function	Value	Function
0	No function	3	Setpoint 1
1	Current value 0..25 bar	4	Setpoint 2
2	Slave control value	7	Current value 0..40 bar

PEW 15 = 2

In this example the function "Slave control value" is selected for the current input.

3.7.4 Raw value of AI1

Address: PEW 16

This register contains the raw value of analogue input AI1 on the GMM. The permissible range for this analogue input is as follows: 0 – 25 mA To achieve the necessary precision, the value is multiplied by 10.

Example:
PEW 16 = 133
In this example the input current at AI1 is 13.3 mA.

3.7.5 Scaled value of AI1

(depending on the selected refrigerant)

Address: PEW 17

This register contains the value of analogue input AI1. You can specify in the Service menu how this value is to be interpreted (as a pressure or as a temperature). The following ranges are permitted:

Pressure: 1.0 – 50.0 bar (only if the setting “bar” has been selected for the refrigerant used).
Temperature: -50.0 – 100.0°C

To achieve the necessary precision, the value is multiplied by 10. If the value is negative, then the highest bit of the MSG is set. In this case the value must be calculated as follows:

PEW 17 = 65100

Value: 65536 – 65100 = 436 → 436/10 = -43.6°C

3.7.6 Function switchable input AI2

(4 – 20 mA)

Address: PEW 18

This register contains the value returned by the function on the current input AI2. This function can be set up in the Service menu.

Value	Function	Value	Function
0	No function	5	External temperature
1	Actual value	7	Current value 0..40 bar [4..20 mA]
2	Slave control value	8	Current temperature -30..+70°C [4..20 mA]
3	Setpoint 1	9	Current value GTF210 [KTY]
4	Setpoint 2		

Example:
PEW 18 = 2

In this example the function “Slave control value” is selected for the current input.

3.7.7 Raw value of AI2

Address: PEW 19

This register contains the raw value of analogue input AI2 on the GMM. The permissible range for this analogue input is as follows: 0 – 25 mA To achieve the necessary precision, the value is multiplied by 10.

Example:
PEW 19 = 133

In this example the input current at AI2 is 13.3 mA.

3.7.8 Scaled value of AI2

(depending on the selected refrigerant)

Address: PEW 20

This register contains the scaled value of analogue input AI2. You can specify in the Service menu how this value is to be interpreted (as a pressure or as a temperature). The following ranges are permitted:

Pressure: 1.0 – 50.0 bar (only if the setting “bar” has been selected for the refrigerant used)
Temperature: -50.0 – 100.0°C

To achieve the necessary precision, the value is multiplied by 10. If the value is negative, then the highest bit of the MSG is set. In this case the value must be calculated as follows:

PEW = 65100
65536 – 65100 = 436 => 436/10 = -43.6°C

Example:
PEW 20 = 389

In this example the temperature is 38.9°C.

3.7.9 Function resistance input

Address: PEW 21

This register contains the value returned by the function on the analogue input AI3. This function can be set up in the Service menu.

Value	Function
0	No function
1	Current value GTF 210
5	External temperature

Example:
PEW 21 = 1

In this example the resistance input has the function “Current value”.

3.7.10 Resistance input / raw value

(not yet implemented)

3.7.11 Scaled value of AI3

(GTF210)

Address: PEW 22

This register gives the scaled value of input AI3 (only when temperature sensor GTF210 is used). The settings in the Service menu determine how this value is interpreted (as a temperature on the Celsius scale or the Fahrenheit scale). To achieve the necessary precision, the value is multiplied by 10. If the value is negative, then the highest bit of the MSG is set. In this case the value must be calculated as follows:

Example:
PEW 22 = 65100
65536 – 65100 = 436 → 436/10 = -43.6°C

Example:
PEW 22 = 301
In this example the temperature is 30.1°C.

3.7.12 Function voltage input

(0-10 V)

Address: PEW 23

This register contains the value returned by the function on the analogue input AI3. This function can be set up in the Service menu.

Value	Function
0	No function
2	Slave control value
3	Setpoint 1
4	Setpoint 2
6	Current value 0...10 V

PEW 23 = 2

In this example the function “Slave control value” is selected for voltage input AI4.

3.7.13 Voltage input AI4 (0-10 V) / raw value

Address: PEW 24

This register contains the raw value of analogue input AI4 on the GMM. Value range of the analogue input: 0 – 10 V. To achieve the necessary precision, the value is multiplied by 10.

Example:
PEW 24 = 87

In this example the input voltage at AI4 is 8.7 V.

3.7.14 Voltage input AI4 / scaled value

(not yet implemented)

Address: PEW 25

3.7.15 Status of manual operation

Address: PEW 26

This register contains the status data for manual operation.

Value	Function
0	Manual operation deactivated
1	Manual mode active

Example:
PEW 26 = 0

In this example manual operation is deactivated.

3.7.16 Control value for manual operation

Address: PEW 27

This register contains the control value for manual operation (in %).

Example:
PEW 27 = 60

In this example the control value for manual operation is set to 60%.

3.7.17 Type of motor control

(EC, sincon, step, phasecut)

Address: PEW 28

This register specifies which type of motor control is connected to the GRC.

The following types of motor control are possible:

00 = EC controller
02 = sincon
03 = step basic
04 = phasecut
05= step professional
FF = no motor control

Example:
PEW 28 = 02

In this example a frequency converter (sincon) is connected to the GRC.

3.7.18 Current energy consumption of an individual motor, or in total

(GMM EC only)

Address: PEW 29 to PEW 45

This register gives the fans' current energy consumption:

PEW 29: Total energy consumption [W]
PEW 30 to PEW 45: Individual energy consumption [W], where PEW 30 = fan 1 to PEW 45 = fan 16

Example:
The current energy consumption of fan 9 is given.

PEW 38 = 214

In this example the current energy consumption of fan 9 is 214 W.

3.7.19 Current energy consumption of an individual frequency converter, or in total

(GMM sincon only)

Address: PEW 29 to PEW 38

This register gives the frequency converters' current energy consumption:

PEW 29: Total energy consumption [W]
PEW 30 to PEW 38: Individual energy consumption [W], where PEW 30 = frequency converter 1 to PEW 38 = frequency converter 9

The range of registers depends on the number of frequency converter attached.

Example:
The current energy consumption of frequency converter 9 is given.

PEW 38 = 214

In this example the current energy consumption of frequency converter 9 is 214 W.

3.7.20 Motor temperature

(GMM EC only)

Address: PEW 46 to PEW 61

These registers contain the fan temperatures (the motor temperature and the temperature of the electronic circuitry. The lowest permissible temperature is 0°C.

PEW 46 to PEW 61: PEW 46 = fan 1 to PEW 61 = fan 16

High byte: Motor temperature (unit used is °C)
Low byte: Temperature of the fan's electronic circuitry (unit used is °C)

Example:
PEW 54 = 13345

In this example the motor temperature of fan 9 is 52°C and the temperature of the electronic circuitry is 33°C.

ADVICE

The motor temperature is present only for 3-phase units. Single-phase units return values higher than 158°C. The temperature of the electronic circuitry is present only for 3-phase units. Single-phase units return values higher than 145°C.

3.7.21 Temperature of heat sink

(GMM sincon only)

Address: PEW 39 to PEW 47

This register gives the temperature of the frequency converters' heat sink:

PEW 39 to PEW 47: PEW 39 = frequency converter 1 to PEW 47 = frequency converter 9

Example:
PEW 39 = 31

In this example the motor temperature of the frequency converter is 31°C.

3.7.22 Status of steps

(only GMM step)

Address: PEW 64

This register contains the information about the status of the steps of the GMM step:

1 = step active

0 = Step inactive

PEW 64	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
High Byte	x	x	x	x	x	x	x	step 9
Low Byte	step 8	step 7	step 6	step 5	step 4	step 3	step 2	step 1

x: not defined

3.7.23 Number of fault reports

(only GMM step)

Address: PEW 65

Range: 0 - 9

This register contains information about the number of fault messages.

3.7.24 Digital inputs of the GIOD

(only GMM step)

Address: PEW 66

This register contains the information about the status of the digital inputs of the GIOD.

1 = Input is switched with 24V

0 = no voltage at the input

PEW 66	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
High Byte	DI16	DI15	DI14	DI 13	DI 12	DI 11	DI 10	DI 9
Low Byte	DI 8	DI 7	DI 6	DI 5	DI 4	DI 3	DI 2	DI 1

DI 1 – DI 16: digital input of the GIOD

3.7.25 Digital outputs of the GIOD

(only GMM step)

Address: PEW 67

This register contains the information about the status of the digital outputs of the GIOD.

1 = switched output

0 = Not switched output

PEW 66	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Low Byte	DO 8	DO 7	DO 6	DO 5	DO 4	DO 3	DO 2	DO 1

DO 1 – DO 8: digital outputs of the GIOD

3.7.26 Current fan speed [in rpm]

(GMM EC only)

Address: PEW 62 to PEW 77

This register contains the current speed of the connected fans in rpm.

PEW 62 = fan 1 to PEW 77 = fan 16

Example:
PEW 62 = 453

In this example the current speed of fan 1 is 453 rpm.

3.7.27 Faults/alarms from GMM EC / GMM step / GMM phasecut

(faults in sensor inputs and units)

Address: PEW 78

This register contains information about the status of the GMM.

PEW 78 GMM system status

GMM system status

PEW 78	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
High byte	Device err	Status NOK	GIOD NOK	x	x	x	x	x
Low byte	No sen-sor	x	x	End stage NOK	Erro-rAI4	Erro-rAI3	Erro-rAI2	ErrorAI1

ErrorAI1	Fault on current input AI1
ErrorAI2	Fault on current input AI2
ErrorAI3	Fault on resistance input AI3
ErrorAI4	Fault on voltage input AI4
End stage NOK	Endstage not OK (only for GMM phasecut)
No sensor	No sensor selected
GIOD NOK	GIOD not OK (only for GMM step professional)
Status NOK	No further status word received from load element (only for GMM EC)
DeviceErr	Device fault/failure of all fans

3.7.28 Faults/alarms from GMM EC fans

Address: PEW 79 to PEW 94

This register contains information about the status of the fans.

PEW 79: fan 1 to PEW 94: fan 16

Fan status:

PEW79 – PEW64	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
High byte	x	x	x	SID	Under-voltage	Over-voltage	Brake	Int temp
Low byte	Hall sensor	Wrong fan	Motor block	Cable break	Fan fault	Power	Elec temp	Motor temp

SID	Communications breakdown between master and slave fan controller
Undervoltage	The internal rectified voltage is too low.
Overvoltage	The internal rectified voltage is too high.

Brake	When externally driven, this is activated in the contrary direction.
Int temp	The internal temperature is too high.
Hall sensor	Failure of Hall sensor
Wrong fan	Wrong fan, or the VT number does not agree with the system.
Motor block	Fan is jammed
Cable break	The RS485 connection to the fan is interrupted.
Fan fault	This is always displayed together with a fault.
Network	Network failure
Elec temp	Temperature of electronic circuitry is too high
Motor temp	Motor overheated

Example:
PEW 83 = 9

In this example there is a problem with the motor temperature of fan 5 (Fan fault + Motor temp).

3.7.29 Faults/alarms from GMM sincon

(faults in sensor inputs and units)

Address: PEW 103

This register contains information about the status of the GMM.

PEW 103 GMM system status

GMM system status

PEW 103	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
High byte	De-vice err	x	x	x	x	x	x	x
Low byte	x	x	x		Error AI4	Error AI3	Error AI2	Error AI1

Error AI1	Fault on current input AI1
Error AI2	Fault on current input AI2
Error AI3	Fault on resistance input AI3
Error AI4	Fault on voltage input AI4
Device err	Device fault/failure of all fans

3.7.30 Faults/alarms from GMM sincon frequency converter

Address: PEW 57 to PEW 65

This register contains information about the status of the frequency converters.

PEW 57 Frequency converter 1
to
PEW 65: Frequency converter 9

The system status of the frequency converters is contained in two bytes.
For example, the register PEW 57 contains the system status of frequency converter 1.

The low byte contains the error code-

Error code	Significance
0x0001	Collective fault
0x0002	Undervoltage switch-off, brief mains outage
0x0003	Overcurrent switch-off
0x0004	Overvoltage switch-off
0x0005	Ixlxt motor switch-off
0x0006	Ixt frequency converter switch-off
0x0007	Frequency converter overheating
0x0008	Fault detected in CAN Bus of frequency converter
0x0009	Detected interruption of CAN bus connection between controller and frequency converter. The frequency converter is not responding or has no power

The high byte contains information about the digital outputs of the frequency converter.

High byte	Significance
Bit	
0	Status of input ENPO (HW enable)
1	Status of output OSD00 (controller protection)
2	Status of output OSD01 (reset freezer endstage)
3	Status of output OSD02 (threshold value)
4	Status of input ISD03 (free)
5	Status of input ISD02 (motor circuit breaker OK)
6	Status of input ISD01 (freezer output circuit breaker OK)
7	Status of input ISD00 (rotary field OK)

3.7.31 Thermal output

(not yet implemented)

3.7.32 Current fan speed as a percentage of the maximum speed

Address: PEW 95
(GMM EC)

Address: PEW 93
(GMM sincon)

This register gives the current fan speed as a percentage of the maximum speed.

PEW 95 = fan 1 to PEW 110 = fan 16 (GMM EC)
PEW 93 = FU 1 to PEW101=FU 9 (GMM sincon)

The range of registers depends on the number of frequency converter attached.

Example:
PEW 100 = 50

In this example the current speed of fan 6 is 50% of its maximum speed.

3.7.33 Current air volume as a percentage

Address: PEW 111
(GMM EC)

Address: PEW 111
(GMM phasecut)

Address: PEW 102
(GMM sincon)

This register contains the current air volume as a percentage.

Example:
PEW 111 = 50

In this example the current air volume is 50%.

3.7.34 Busy bit

Address: PEW 112

This register contains the busy bit. This bit is always set when a PAW value is being written. Once the GMM has placed the value in its register the busy bit is reset. Note: The busy bit is also reset if it is not possible to set the register (for instance if an incorrect operating mode is selected).

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