Thermal Management System (TMS)

Modbus Interface Instructions (EN)

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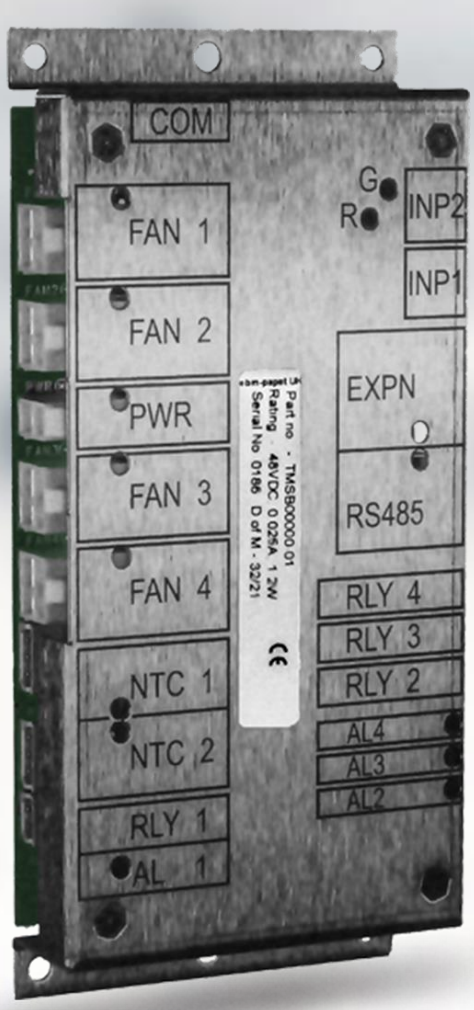

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Disclaimer

Contents of operating instructions

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Availability of operating instructions

The operating instructions must be available to the user at all times, to ensure the device is used safely. They must be kept at an easily accessible location at the place of installation, where they can be viewed at all times, or incorporated in overall product documentation where this product has been integrated.

Application

When using this device, it is essential that the safety regulations and the relevant operating instructions are observed. Read these operating instructions carefully before you start working with the device. Observe the hazard and warning notices to avoid the risk of injury or malfunctioning.

Subject to change.

1 Downloads and Other Documentation – READ THIS FIRST

Read the TMS OMI for general TMS information, 210-OMI12093, before reading this document, download link below:
http://ebmpapst.com/omi-tms-12093-uk

For information on the TMS Configuration Interface refer to documents:
TMS Text based user interface: 210-OMI13963
TMS GUI Graphical User Interface: 210-OMI13962
For information on the TMS Modbus interface refer to 210-OMI14013 (this document).
For Installation information refer to TMS Installation Instructions 210-OMI13192
For information on the TMS development kit refer to 210-OMI13191

These documents and GUI software may be downloaded from: http://ebmpapst.co.uk/instructions

For fan data including essential safety information refer to the datasheets for any connected fans.

2 Introduction

2.1 Foreword

These operating instructions outline the application possibilities, installation, operation, and programming of the device described on the title page.

When installing and operating the device, all the safety information listed in Chapter 3 must be adhered to. If used in other countries, local laws, guidelines, and regulations apply.

Read these operating instructions carefully before you start working with the device. Observe the following warning notices in order to avoid risk of injury or malfunction of the control electronics.

2.2 Target group

These operating instructions are only intended for skilled persons.

2.3 Written styles

In these operating instructions, the meaning of certain sections is indicated through various means. Descriptive text is shown without a preceding symbol.

- Text preceded by a dot (•) indicates a list introduced by a heading.

Underlined blue text indicates a cross reference, which can be clicked on in the PDF document. Upon doing so, the screen will jump to the relevant section of the document.

2.4 Warning notices and notices

Warning notices and notices are always shown before an instruction where carrying out the action could result in a hazard or material damage.

Important - See separate fan documentation for fan safety requirements.

In this documentation, the following warning notices are used:

DANGER

→ **Hazard**
→ This notice indicates a hazard with a high level of risk that will directly result in death or severe bodily injury if it is not avoided.
→ The arrow(s) highlight corresponding precautionary measures to prevent the hazard.

WARNING

Hazard

This notice indicates a hazard with a moderate level of risk that may possibly result in death or severe bodily injury if it is not avoided.

→ The arrow(s) highlight corresponding precautionary measures to prevent the hazard.

CAUTION

Hazard

This notice indicates a hazard with a low level of risk that may result in light or moderate bodily injury and material damage if it is not avoided.

→ The arrow(s) highlight corresponding precautionary measures to prevent the hazard.

Notices contain information that is particularly important at the relevant point or make the operating steps described easier. They are emphasized as follows:

NOTICE

This notice provides you with recommendations for use and helpful tips.

3 Safety Information

Important - See separate fan documentation for fan safety requirements.

The device has been developed based on engineering principles, as well as recognized guidelines for the safety and protection of users.

Read these operating instructions carefully before starting work on the device. Observe the following warnings to prevent malfunctions or danger to persons

These operating instructions are to be regarded as part of the device. The device is only to be sold or passed on together with the operating instructions. These operating instructions may be duplicated and distributed to inform about potential dangers and their prevention.

3.1 General safety information

Always observe the following safety information, regardless of the specific operating conditions:

→ Before you start working with the device, switch it off and isolate
→ Do not modify or fit any attachments without approval from ebm-papst.
→ Commissioning may only take place following full verification of compliance with all relevant legal requirements, guidelines, and application-related safety regulations.

→ The safety hazards associated with the device must be reassessed following installation in the end application.
→ Keep the workplace clean and tidy.

3.2 Personnel qualifications

The following qualification requirements are specified in these operating instructions:

→ Skilled person: person with relevant education and experience to enable him or her to analyse risks and avoid hazard. (source: EN 50110-1:2013 modified)

→ Instructed person: person adequately advised by a *skilled person* to enable him or her to avoid dangers. (source: EN50110-1:2013 modified)

Required skills and knowledge	
Tasks and activities	**Required skills and knowledge**
Installation	• Practical electrical training • Knowledge of the current electrical safety regulations • Knowledge of the relevant electrical safety regulations at the workplace
Configuration	• Basic knowledge of the structure and set-up of the described connections and interfaces • Basic knowledge of data transfer
Servicing	• Practical technical training • Knowledge of the relevant electrical safety regulations at the workplace

→ Only skilled persons are allowed to install the device, carry out the trial run and perform work on the electrical system.
→ Only instructed persons are allowed to transport, unpack, operate and service the device.

3.3 Electrical and electromagnetic safety

Risk of electric shock

→ The controller must be powered from a SELV (safety extra-low voltage) supply.

DANGER

Connected fans can start automatically at any time

Risk of injury

→ Keep out of the fan's danger zone
→ When working on a connected fan, isolate from the supply and ensure it cannot be switched back on
→ Wait until the fan comes to a stop
→ After working on the fan, remove any tools or other objects from the device.

CAUTION

→ Regularly check the device and connected cables for damage.
→ Only use cables and plug connections approved by ebm-papst.
→ Immediately replace defective cables and loose connections.

→ Ensure EMC capability in the end device/application/installation, e.g., with shielding.
→ Provide suitable measures for avoiding impermissible electromagnetic interference emissions, such as shielding.

3.4 Intended use

This device is intended solely for industrial use in other products and machines. The device is exclusively designed as a built-in device. Any other usage above and beyond this does not conform with the intended purpose and constitutes misuse of the device. The equipment into which this is integrated must be capable of withstanding the mechanical and thermal stresses that can arise from this product. This applies for the entire service life of the equipment in which this device is installed.

- Using the device only in power systems with grounded neutral (TN/TT power systems)
- The device is to be used in networks with network quality characteristics as per EN 50160
- Using the device only in stationary systems
- Performing all maintenance work
- Using the device within the permitted ambient temperature range; see
  - transport and storage
  - nominal data
- Operating the device with all protective devices
- Following the operating instructions

3.5 Improper use

Using the device in the following ways is prohibited and can be hazardous:

- Operation of the device in technical applications for which there are special requirements with regard to safeguarding against failure, for example
  - Operation in aircraft or spacecraft.
  - Operation in railway vehicles, motor vehicles, and ships.
  - Operation in potentially explosive atmospheres (explosion protection area).
  - Operation in medical equipment with a life-sustaining or life-support function.
  - Use as a safety component or to perform safety-related functions.
- Unfastening of connections (e.g., screws) during operation
- Operation with disassembled or manipulated protective devices
- Painting the device
- All other applications not listed as intended uses.

3.6 Conversions and modifications

Only operate the device in its original and faultless condition. Retrofitting, modifying, and converting is strictly prohibited. Any modifications you wish to make must always be agreed with ebm-papst first.

ebm-papst is not liable for any conversions and modifications carried out which have not been expressly approved by us. This also includes any damage resulting from the use of non-original parts or through operating the device outside of the agreed parameters.

3.7 Transport and storage

→ Always transport the device with care and in its original packaging.

CAUTION

- Store the device, partially or fully assembled, in a dry place, protected against the weather and free from vibration, in the original packaging in a clean environment. Even devices explicitly intended for outdoor use

- Protected from environmental influences and dirt until final installation.
- It is recommend storing the device for no longer than one year in order to guarantee trouble-free operation and the longest possible service life.
- If the device is stored for an extended period, it must be connected and started at least every year.

Maximum permitted temperature (°C)	+70
Minimum permitted temperature (°C)	-40

4 Technical Data

4.1 Summary

This Thermal Management System (TMS) controller sets the speed of up to four fans, based on e.g. temperature. It is designed for use with four wire type fans (Power, 0V, Speed control, Tachometer) on 12V, 24V or 48V systems. It can also be used with mains powered EC fans if a separate power supply is provided to the TMS.

- Each fan may be configured for a different speed/temperature profile.
- 0-10V or Open Collector speed-controlled type fans.
- Open Collector Tachometer, Open Collector Alarm or Relay Alarm type fans.
- Configurable Alarm actions (fan speed change, Alarm relays operate)
- Customer configurable or may be supplied programmed to required profile.
- Open Loop or Closed Loop control configurable option, Thermistor or 0-10V inputs.
- RS485 Modbus RTU interface.

4.2 Description

4.2.1 DC Supply

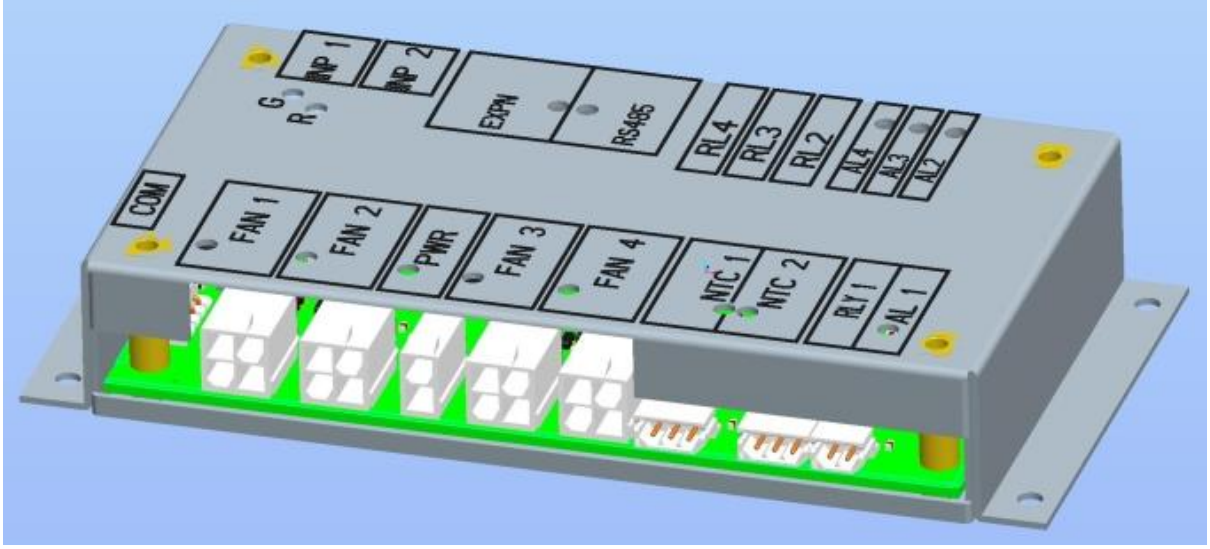
- Supply Voltage covers 12V, 24V and 48V ranges (11-57 VDC) SELV
- Supply reversal protection for controller circuitry.
- Earthing – no part of the controller or fan circuit is connected to Chassis/Earth.
- Suitable for use on positive or negative earth (-48VDC) systems.
- Green Power LED will pulse slowly when power connected.
- The Modbus interface is not isolated

4.2.2 Use with -48VDC supply

→ The RS485 Modbus interface is not isolated. Use caution especially on -48V systems. An isolated RS485 repeater may be necessary, especially on -48V systems.

CAUTION

4.3 Product drawing



4.4 Nominal data

Part number	TMSB00000-01
Nominal voltage (V DC)	12, 24, 48
Voltage range (V DC)	11-57
Frequency (Hz)	DC operation only
Inputs	Two off NTC Thermistor / 0-10V Inputs, two Switch inputs
Outputs	Four off 0-100% PWM, four off Alarm relays
Nominal power consumption (W)	0.5W
Nominal current (mA) TMS only	25mA max for controller only, typical 10mA running.
Nominal current (A) including fans	11A max steady state total current including fan supply
Power Cable and Power Connector	8A maximum using 20AWG wire & Crimp Molex 39-00-0038
	11A maximum using 16AWG wire & Crimp Molex 0457503112
Minimum ambient temperature (°C)	-40
Maximum ambient temperature (°C)	+70
Modbus Interface	RS485 Modbus RTU

5 Modbus Interface

Refer to https://modbus.org/ for full definition of Modbus RTU communications protocol standard.

5.1 TMS Software Version for Modbus Support

Modbus operation as defined in this document is supported by TMS software version 1.0.99 or later.

The software version may be determined from:

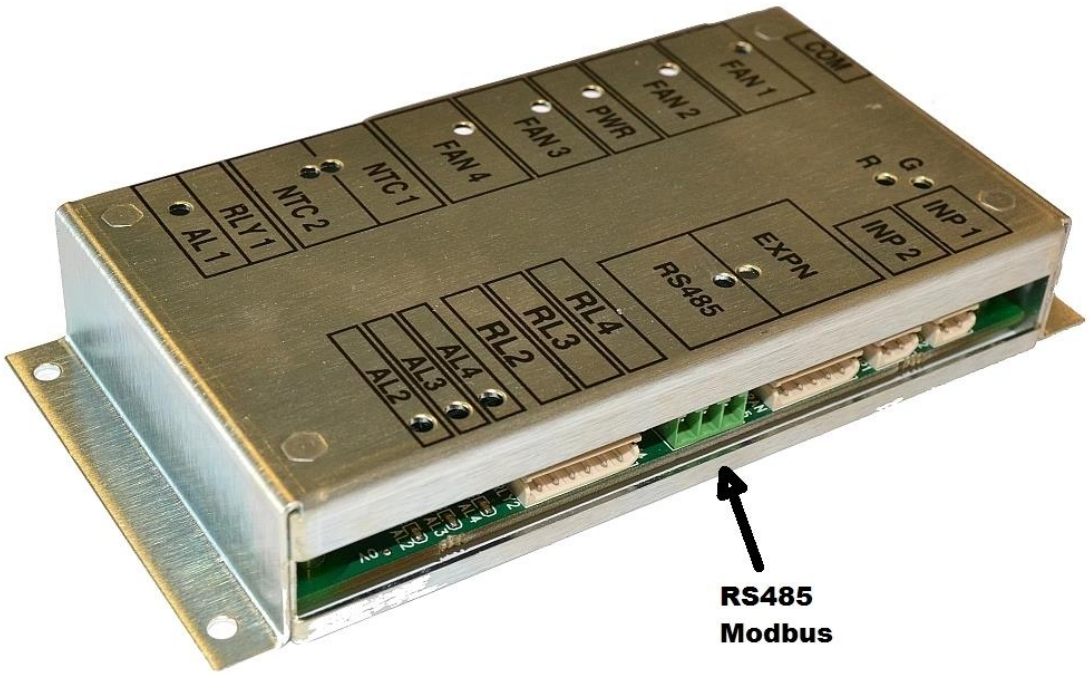
1) The identification label on the rear of the PCB.
2) The Terminal interface powerup message.
3) Modbus registers – see tables below.

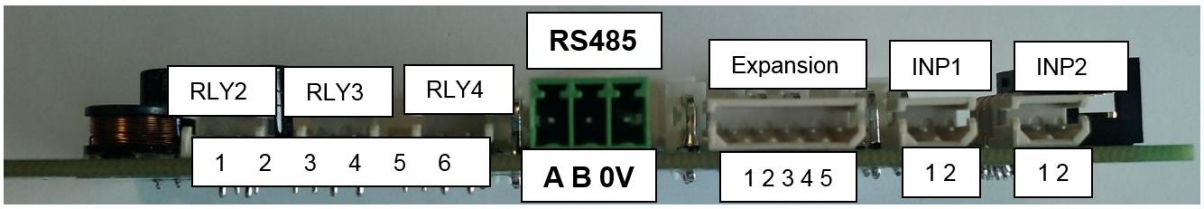
5.2 RS485 Modbus Connection

Connect to RS485 connector, pins A, B and 0V, see below.

Note: If the RS485 Modbus 0V reference connection is not made then Modbus communication may be unreliable or may become unreliable.

A compatible connector is: IMO Precision Controls - 20.1550M/3 - Terminal Block, 3.5MM, 3WAY





5.3 Modbus Interface Factory settings

Factory settings made for the device by ebm-papst, Modbus RS485.

RS485 Modbus	Default
RS485 Modbus Network Address	1
RS485 Modbus Baud	19200
RS485 Modbus Parity	Even

Factory settings made for the device by ebm-papst, IoT data identification.

RS485 Modbus	Default
Customer Number	1
Site Number	1
Building Number	999
Unit Number	1

5.4 Modbus Interface Configuration

For TMS GUI Software version 2.3.1 or later, use the TMS GUI software to configure the parameters stated below. Instructions for use can be found in the TMS GUI interface guide (210-OMI11362).
Note that updated TMS software is required for TMS GUI Modbus configuration to work without the restart of the TMS.

For TMS GUI Software version 2.3.0 or earlier, use the TMS Terminal Interface (text-based interface) to configure these parameters. Terminal Interface operation is shown below:

```
Press [r] for RS485 Modbus menu

Modbus Configuration menu
 "a" to Change the Modbus Address, now=1
 "r" to change BaudRate 9600/19200, now=Baud=19200,
 "P" to change Parity, None/Even/Odd now=Parity=Even
 "c" to Change the Customer Number, now=1
 "s" to Change the Site Number, now=1
 "b" to Change the Building Number, now=999
 "u" to Change the Unit Number, now=1

 "d" to Display all Modbus Holding Registers
```

The Customer Number, Site Number, Building Number and Unit Number may be set to allow e.g. a Building Management Unit or IoT (Internet of Things) monitoring system to identify a TMS on the Modbus network.

The command "d", "`Display all Modbus Holding Registers`" displays the data that would be read by the Modbus interface, for all Holding Registers.

5.5 Modbus Register Functions

5.5.1 Modbus Supported Function Codes

Function Code Value (Decimal)	Description	Quantity of Registers affected
03	Read Holding Register	single or multiple
04	Read Input Register	single or multiple

All TMS Modbus registers are Holding Registers.

Input Register reads will be treated as Holding Register reads

Other Function Code Read or Write attempts will be rejected and an Exception Code returned.

5.5.2 Modbus Exception Codes

Function Code Received	Register Address	Exception Code returned
0x01, Read Coil	All	0x81
0x02, Read Discrete Input	All	0x82
0x03, Read Holding Register	Illegal Address	0x83
0x04, Read Input Register	Illegal Address	0x84

0x05, Write Single Coil	All	0x85
0x06, Write Single Register	All	0x86
0x0F, Write multiple coils	All	0x8F
0x10, Write Multiple Registers	All	0x90

5.5.3 Modbus TMS Read and Response Message Example

Example of a valid message
Note: all data shown in Hexadecimal form

BMS message to TMS: **01 03 00 68 00 01 05 d6**
TMS response to BMS: **01 03 02 04 29 7b 5a**

BMS message to TMS explanation:
01 – TMS Modbus Address
03 – Function Code “Holding Register Read”
00 – Register Address, high order bits of 16-bit value
68 – Register Address, low order bits of 16-bit value
00 – Quantity of Registers to read, high order bits of 16-bit value
01 – Quantity of Registers to read, low order bits of 16-bit value
05 – Checksum, high order bits of 16-bit value
D6 – Checksum, low order bits of 16-bit value

TMS response to BMS explanation:
01 – TMS Modbus Address
03 – Function Code “Holding Register Read”
02 – The number of data bytes to follow (two bytes for each register)
04 – Contents of register, high order bits of 16-bit value
29 – Contents of register, low order bits of 16-bit value
7b – Checksum, high order bits of 16-bit value
5a - Checksum, low order bits of 16-bit value

Summary:
Read TMS single Holding Register Address 68 Hex (104 Decimal), response shows that the register contains 429 Hex (1065 Decimal).

5.6 Modbus Register Addresses

5.6.1 System Design and Configurable Settings Registers

System Design and Configurable Settings:

Address (HEX)	Address (DEC)	Name	Default (Decimal)	Notes. (Numbers shown are Decimal)
64	100	Customer ID	**1**	Configurable, for identification of source of IoT data. For TMS GUI Software version 2.3.1 or later, use GUI Interface to configure these parameters. For TMS GUI Software version 2.3.0 or earlier, use Terminal Interface to configure these parameters
65	101	Site Number	**1**	
66	102	Building Number	**999**	
67	103	Unit Number	**1**	
68	104	Device ID	**1065**	The digits of the TMS part number CN1065.
69	105	Number of System Design Data and Configurable Parameters	**118**	Number of registers in this section
6A	106	Number of Controller Output signals and parameters	**14**	Number of Controller Outputs (PWM, 0-10V, Alarms) and Calculated parameters (Uptime, etc)
6B	107	Number of Power Up Parameters	**10**	e.g. Firmware issue, build date

Address (HEX)	Address (DEC)	Name	Default (Decimal)	Notes. (Numbers shown are Decimal)
6C	108	Number of Configurable Fans	**4**	The TMS is a Four Fan controller – fewer fans may be fitted for an application.
6D	109	Number of Parameters/Fan	**3**	Fan Fitted, RPM and Alarm
6E	110	Number of Sensors (Inputs)	**5**	Two off NTC/0-10V, supply volts, two off Switches
6F	111	Number of Parameters/Sensor	**1**	Temperature_x10 or 0-10V I/P level, 0-1023, Supply Voltage
70	112	Number of Output-Modules	**6**	Separate Alarms.
71	113	Number of Parameters/Output-Module	**19**	Each TMS Alarm has this number of configurable parameters.
72	114	Max. consecutive Modbus registers read/write	**14**	14, fixed
73	115	TMS Modbus Response Timeout, ms	**1000**	1000ms, fixed

Address (HEX)	Address (DEC)	Name	Default (Decimal)	Notes. (Numbers shown are Decimal)
74	116	BMS write enabled	0	set to 0 For TMS, Holding Registers **not** write enabled
ABOVE are System Design Parameters, fixed or set at Commissioning. BELOW are Configurable Settings				
75	117	Operating Mode	1	1 = default, "Temperature sets PWM Output" 2 = "Temperature sets Fan RPM" 3 = "0-10V input sets PWM Output" 4 = "0-10V input sets Fan RPM"
76	118	Dummy Links	0 (Not Enabled)	0 or 1, For "Fan provisioned but not fitted" function.
77	119	Daily Fan Run	0 (Not Enabled)	0 or 1, Disabled / Enabled
78	120	PWM Frequency, kHz	2	Default 2kHz, max 25kHz. If set higher, this gives lower PWM resolution
79	121	Virtual Alarms Enabled	0 (Not Enabled)	If "Virtual Alarms Enabled" then there are 6 total Alarms available for alarm logic, otherwise 4
7A	122	Fan1 used	1 (Fan Used)	**Start of Fan Data Configuration**
7B	123	Fan2 used	1 (Fan Used)	0 or 1, 0 = Unused
7C	124	Fan3 used	1 (Fan Used)	
7D	125	Fan4 used	1 (Fan Used)	
7E	126	Fan1 Pulses/Rev	2	Tachometer Pulses per Revolution
7F	127	Fan2 Pulses/Rev	2	
80	128	Fan3 Pulses/Rev	2	

Address (HEX)	Address (DEC)	Name	Default (Decimal)	Notes. (Numbers shown are Decimal)
81	129	Fan4 Pulses/Rev	2	
82	130	Fan1 O/C or 0-10V	1	1 = Open Collector, 0 = 0-10V
83	131	Fan2 O/C or 0-10V	1	
84	132	Fan3 O/C or 0-10V	1	
85	133	Fan4 O/C or 0-10V	1	
86	134	Fan1 Stationary PWM%	0	0 or 100
87	135	Fan2 Stationary PWM%	0	
88	136	Fan3 Stationary PWM%	0	
89	137	Fan4 Stationary PWM%	0	
8A	138	Fan1 Ramp Rate	10	0-100%, The maximum rate at which the TMS fan-speed control output varies.
8B	139	Fan2 Ramp Rate	10	

Address (HEX)	Address (DEC)	Name	Default (Decimal)	Notes. (Numbers shown are Decimal)
8C	140	Fan3 Ramp Rate	10	
8D	141	Fan4 Ramp Rate	10	
8E	142	Fan1 Max RPM	3000	As stated in fan Data Sheet. Note - this is NOT the TMS output set speed
8F	143	Fan2 Max RPM	3000	
90	144	Fan3 Max RPM	3000	
91	145	Fan4 Max RPM	3000	**End of fan data configuration**
92	146	Fan1 T_off	**5**	**Start of temperature profile (or 0-10V input profile)** **Proportional Band**
93	147	Fan2 T_off	5	Fan Off temperature, °C (if Fan Off at Low Temperature)
94	148	Fan3 T_off	5	
95	149	Fan4 T_off	5	
96	150	Fan1 T_on	6	Fan On temperature, °C (if Off at Low Temperature)
97	151	Fan2 T_on	6	
98	152	Fan3 T_on	6	
99	153	Fan4 T_on	6	
9A	154	Fan1 T_min	25	Temperature at bottom of proportional band, °C
9B	155	Fan2 T_min	25	
9C	156	Fan3 T_min	25	
9D	157	Fan4 T_min	25	

Address (HEX)	Address (DEC)	Name	Default (Decimal)	Notes. (Numbers shown are Decimal)
9E	158	Fan1_T2	32	**T2-T7 ignored unless multipoint**
9F	159	Fan2_T2	32	
A0	160	Fan3_T2	32	
A1	161	Fan4_T2	32	
A2	162	Fan1_T3	34	
A3	163	Fan2_T3	34	
A4	164	Fan3_T3	34	
A5	165	Fan4_T3	34	
A6	166	Fan1_T4	36	
A7	167	Fan2_T4	36	
A8	168	Fan3_T4	36	
A9	169	Fan4_T4	36	
AA	170	Fan1_T5	38	
AB	171	Fan2_T5	38	
AC	172	Fan3_T5	38	
AD	173	Fan4_T5	38	
AE	174	Fan1_T6	40	
AF	175	Fan2_T6	40	
B0	176	Fan3_T6	40	
B1	177	Fan4_T6	40	
B2	178	Fan1_T7	42	
B3	179	Fan2_T7	42	
B4	180	Fan3_T7	42	
B5	181	Fan4_T7	42	
B6	182	Fan1_T_max	50	Temperature (or 0-10V I/P) at top of proportional band, °C

Address (HEX)	Address (DEC)	Name	Default (Decimal)	Notes. (Numbers shown are Decimal)
B7	183	Fan2_T_max	50	
B8	184	Fan3_T_max	50	
B9	185	Fan4_T_max	50	
BA	186	Fan1 P_min	30	O/C or 0-10V PWM% Output at bottom of proportional band for Open Loop Modes, or RPM for Closed Loop Modes
BB	187	Fan2 P_min	30	
BC	188	Fan3 P_min	30	
BD	189	Fan4 P_min	30	
BE	190	Fan1_P2	30	P2-P7 ignored unless Multipoint
BF	191	Fan2_P2	30	
C0	192	Fan3_P2	30	
C1	193	Fan4_P2	30	
C2	194	Fan1_P3	30	
C3	195	Fan2_P3	30	
C4	196	Fan3_P3	30	
C5	197	Fan4_P3	30	
C6	198	Fan1_P4	30	
C7	199	Fan2_P4	30	
C8	200	Fan3_P4	30	
C9	201	Fan4_P4	30	
CA	202	Fan1_P5	30	
CB	203	Fan2_P5	30	
CC	204	Fan3_P5	30	
CD	205	Fan4_P5	30	
CE	206	Fan1_P6	30	
CF	207	Fan2_P6	30	

Address (HEX)	Address (DEC)	Name	Default (Decimal)	Notes. (Numbers shown are Decimal)
D0	208	Fan3_P6	30	
D1	209	Fan4_P6	30	
D2	210	Fan1_P7	30	
D3	211	Fan2_P7	30	
D4	212	Fan3_P7	30	
D5	213	Fan4_P7	30	
D6	214	Fan1_P_max	90	O/C or 0-10V PWM% Output at top of proportional band for Open Loop Modes, or RPM for Closed Loop Modes
D7	215	Fan2_P_max	90	
D8	216	Fan3_P_max	90	
D9	217	Fan4_P_max	90	

5.6.2 Power-Up Data Registers

Register Address (HEX)	(DEC)	Parameter	Notes (Numbers shown are Decimal)
FA	250	Controller part number	1065
FB	251	Firmware part number	11016
FC	252	Firmware Issue	Example: 1099 register contents for s/w Issue 1.0.99
FD	253	Microcontroller RCON Register Content	Cause of program restart, e.g. Power Cycle, Software Watchdog, etc
FE	254	Firmware build year 4 digits	
FF	255	Firmware build month 1-12	
100	256	Firmware build day 1-31	
101	257	Firmware build hour 0-23	
102	258	Firmware build minute 0-59	
103	259	Firmware build second 0-59	

5.6.3 Controller Output signals and parameters Registers

Register Address (HEX)	(DEC)	Parameter	Notes (Numbers shown are Decimal)
12C	300	Configuration Changed	Configuration data changed flag
12D	301	Controller Uptime, top 16 bits of 32bit unsigned integer.	(Decrease = Restart flag)
12E	302	Controller Uptime, lower 16 bits of 32bit unsigned integer.	(Decrease = Restart flag)
12F	303	Logging or BMS Status	Logging or BMS Status - written by BMS / MIU (future use)
130	304	pwm_output_0_1000, Fan1	50%PWM output level shown as 500
131	305	pwm_output_0_1000, Fan2	
132	306	pwm_output_0_1000, Fan3	
133	307	pwm_output_0_1000, Fan4	
134	308	Alarm1 Active	1=Active, 0=Inactive
135	309	Alarm2 Active	0 or 1
136	310	Alarm3 Active	0 or 1
137	311	Alarm4 Active	0 or 1
138	312	Alarm5 Active	1=Active, 0=Inactive, if 5 & 6 enabled
139	313	Alarm6 Active	0 or 1

5.6.4 Fan Data Registers

Register Address (HEX)	(DEC)		Parameter	Notes (Numbers shown are Decimal)
CB00	51968	Fan 1	RPM	Fan 1 RPM
CB01	51969	Fan 2	RPM	Fan 2 RPM
CB02	51970	Fan 3	RPM	Fan 3 RPM
CB03	51971	Fan 4	RPM	Fan 4 RPM
CB04	51972	Fan 1	Alarm	0=Fan-Alarm-Inactive, 1= Fan-Alarm-Active

Register Address (HEX)	(DEC)		Parameter	Notes (Numbers shown are Decimal)
CB05	51973	Fan 2	Alarm	0 or 1
CB06	51974	Fan 3	Alarm	0 or 1
CB07	51975	Fan 4	Alarm	0 or 1
CB08	51976	Fan 1	Link fitted	Dummy-Fan link if found, 0=No-Link, 1=Link-Detected
CB09	51977	Fan 2	Link fitted	0 or 1
CB0A	51978	Fan 3	Link fitted	0 or 1
CB0B	51979	Fan 4	Link fitted	0 or 1

5.6.5 Sensor Data Registers

Register Address (HEX)	(DEC)		Notes (Numbers shown are Decimal)
FD00	64768	Sensor 1	NTC 1 Temperaturex10, OR 0-10V_IP1x10, dependent on Mode setting above
FD01	64769	Sensor 2	NTC 2 Temperaturex10, OR 0-10V_IP2x10, dependent on Mode setting above
FD02	64770	Sensor 3	Switch Input 1, 0=Open, 1=Closed
FD03	64771	Sensor 4	Switch Input 2
FD04	64772	Sensor 5	Supply Voltsx10

5.6.6 Alarm Configuration Registers

Default:

1) All alarm inputs ignored by default, no TMS alarm actions. User to configure any alarm inputs to trigger TMS Alarm action, where required for the application.
2) Alarms 5 and 6 (Virtual Alarms for additional Alarm Logic) not enabled by default.

Register Address (HEX)	Register Address (DEC)	TMS Alarm 1-6	Alarm Parameter 1-19	Parameter State for Alarm Input: Trigger Alarm or Ignored. Numbers shown are Decimal
FE80	65152	Alarm 1	1	Switch Input 1, Trigger Hi=1, Trigger Low=0, Ignored=65365

Register Address (HEX)	Register Address (DEC)	TMS Alarm 1-6	Alarm Parameter 1-19	Parameter State for Alarm Input: Trigger Alarm or Ignored. Numbers shown are Decimal
FE81	65153	Alarm2	1	Switch Input 1
FE82	65154	Alarm3	1	Switch Input 1
FE83	65155	Alarm4	1	Switch Input 1
FE84	65156	Alarm5	1	Switch Input 1
FE85	65157	Alarm6	1	Switch Input 1
FE86	65158	Alarm1	2	Switch Input 2, Trigger Hi=1, Trigger Low=0, Ignored=65365
FE87	65159	Alarm2	2	Switch Input 2
FE88	65160	Alarm3	2	Switch Input 2
FE89	65161	Alarm4	2	Switch Input 2
FE8A	65162	Alarm5	2	Switch Input 2
FE8B	65163	Alarm6	2	Switch Input 2
FE8C	65164	Alarm1	3	Fan1 Alarm, Trigger=1, Ignored=65365
FE8D	65165	Alarm2	3	Fan1 Alarm
FE8E	65166	Alarm3	3	Fan1 Alarm
FE8F	65167	Alarm4	3	Fan1 Alarm
FE90	65168	Alarm5	3	Fan1 Alarm
FE91	65169	Alarm6	3	Fan1 Alarm
FE92	65170	Alarm1	4	Fan2 Alarm, Trigger=1, Ignored=65365
FE93	65171	Alarm2	4	Fan2 Alarm
FE94	65172	Alarm3	4	Fan2 Alarm
FE95	65173	Alarm4	4	Fan2 Alarm
FE96	65174	Alarm5	4	Fan2 Alarm
FE97	65175	Alarm6	4	Fan2 Alarm
FE98	65176	Alarm1	5	Fan3 Alarm, Trigger=1, Ignored=65365
FE99	65177	Alarm2	5	Fan3 Alarm
FE9A	65178	Alarm3	5	Fan3 Alarm

Register Address (HEX)	Register Address (DEC)	TMS Alarm 1-6	Alarm Parameter 1-19	Parameter State for Alarm Input: Trigger Alarm or Ignored. Numbers shown are Decimal
FE9B	65179	Alarm4	5	Fan3 Alarm
FE9C	65180	Alarm5	5	Fan3 Alarm
FE9D	65181	Alarm6	5	Fan3 Alarm
FE9E	65182	Alarm1	6	Fan4 Alarm, Trigger=1, Ignored=65365
FE9F	65183	Alarm2	6	Fan4 Alarm
FEA0	65184	Alarm3	6	Fan4 Alarm
FEA1	65185	Alarm4	6	Fan4 Alarm
FEA2	65186	Alarm5	6	Fan4 Alarm
FEA3	65187	Alarm6	6	Fan4 Alarm
FEA4	65188	Alarm1	7	NTC1 Open or Short, Trigger=1, Ignored=65365
FEA5	65189	Alarm2	7	NTC1 Open or Short
FEA6	65190	Alarm3	7	NTC1 Open or Short
FEA7	65191	Alarm4	7	NTC1 Open or Short
FEA8	65192	Alarm5	7	NTC1 Open or Short
FEA9	65193	Alarm6	7	NTC1 Open or Short
FEAA	65194	Alarm1	8	NTC2 Open or Short, Trigger=1, Ignored=65365
FEAB	65195	Alarm2	8	NTC2 Open or Short
FEAC	65196	Alarm3	8	NTC2 Open or Short
FEAD	65197	Alarm4	8	NTC2 Open or Short
FEAE	65198	Alarm5	8	NTC2 Open or Short
FEAF	65199	Alarm6	8	NTC2 Open or Short
FEB0	65200	Alarm1	9	NTC1 Low Temp, Trigger=Temperature, Ignored=65365
FEB1	65201	Alarm2	9	NTC1 Low Temp
FEB2	65202	Alarm3	9	NTC1 Low Temp
FEB3	65203	Alarm4	9	NTC1 Low Temp
FEB4	65204	Alarm5	9	NTC1 Low Temp

Register Address (HEX)	Register Address (DEC)	TMS Alarm 1-6	Alarm Parameter 1-19	Parameter State for Alarm Input: Trigger Alarm or Ignored. Numbers shown are Decimal
FEB5	65205	Alarm6	9	NTC1 Low Temp
FEB6	65206	Alarm1	10	NTC2 Low Temp, Trigger=Temperature, Ignored=65365
FEB7	65207	Alarm2	10	NTC2 Low Temp
FEB8	65208	Alarm3	10	NTC2 Low Temp
FEB9	65209	Alarm4	10	NTC2 Low Temp
FEBA	65210	Alarm5	10	NTC2 Low Temp
FEBB	65211	Alarm6	10	NTC2 Low Temp
FEBC	65212	Alarm1	11	NTC1 Hi Temp, Trigger=Temperature, Ignored=65365
FEBD	65213	Alarm2	11	NTC1 Hi Temp
FEBE	65214	Alarm3	11	NTC1 Hi Temp
FEBF	65215	Alarm4	11	NTC1 Hi Temp
FEC0	65216	Alarm5	11	NTC1 Hi Temp
FEC1	65217	Alarm6	11	NTC1 Hi Temp
FEC2	65218	Alarm1	12	NTC2 Hi Temp, Trigger=Temperature, Ignored=65365
FEC3	65219	Alarm2	12	NTC2 Hi Temp
FEC4	65220	Alarm3	12	NTC2 Hi Temp
FEC5	65221	Alarm4	12	NTC2 Hi Temp
FEC6	65222	Alarm5	12	NTC2 Hi Temp
FEC7	65223	Alarm6	12	NTC2 Hi Temp
FEC8	65224	Alarm1	13	T1 & T2 Alarm Threshold Hysteresis, Temperature Default=1°C
FEC9	65225	Alarm2	13	T1 & T2 Alarm Threshold Hysteresis,
FECA	65226	Alarm3	13	T1 & T2 Alarm Threshold Hysteresis
FECB	65227	Alarm4	13	T1 & T2 Alarm Threshold Hysteresis
FECC	65228	Alarm5	13	T1 & T2 Alarm Threshold Hysteresis
FECD	65229	Alarm6	13	T1 & T2 Alarm Threshold Hysteresis
FECE	65230	Alarm1	14	T1-T2 Differential Alarm, Trigger=Temperature, Ignored=65365 (default)

Register Address (HEX)	Register Address (DEC)	TMS Alarm 1-6	Alarm Parameter 1-19	Parameter State for Alarm Input: Trigger Alarm or Ignored. Numbers shown are Decimal
FECF	65231	Alarm2	14	T1-T2 Differential Alarm
FED0	65232	Alarm3	14	T1-T2 Differential Alarm
FED1	65233	Alarm4	14	T1-T2 Differential Alarm
FED2	65234	Alarm5	14	T1-T2 Differential Alarm
FED3	65235	Alarm6	14	T1-T2 Differential Alarm
TMS Alarm Trigger settings above, TMS Alarm Outputs below – Alarm Relay Actions, and Fan Alarm RPM's if configured				
FED4	65236	Alarm1	15	0=Relay Opens for Alarm (default), 1=Relay Closes for Alarm
FED5	65237	Alarm2	15	0=Relay Opens for Alarm, 1=Relay Closes for Alarm
FED6	65238	Alarm3	15	0=Relay Opens for Alarm, 1=Relay Closes for Alarm
FED7	65239	Alarm4	15	0=Relay Opens for Alarm, 1=Relay Closes for Alarm
FED8	65240	Alarm5	15	0=Relay Opens for Alarm, 1=Relay Closes for Alarm
FED9	65241	Alarm6	15	0=Relay Opens for Alarm, 1=Relay Closes for Alarm
FEDA	65242	Alarm1	16	Fan1 Alarm PWM (or RPM for closed loop modes), Ignored=65365 (default)
FEDB	65243	Alarm2	16	Fan1 Alarm PWM (or RPM for closed loop modes)
FEDC	65244	Alarm3	16	Fan1 Alarm PWM (or RPM for closed loop modes)
FEDD	65245	Alarm4	16	Fan1 Alarm PWM (or RPM for closed loop modes)
FEDE	65246	Alarm5	16	Fan1 Alarm PWM (or RPM for closed loop modes)
FEDF	65247	Alarm6	16	Fan1 Alarm PWM (or RPM for closed loop modes)
FEE0	65248	Alarm1	17	Fan2 Alarm PWM (or RPM for closed loop modes), Ignored=65365 (default)
FEE1	65249	Alarm2	17	Fan2 Alarm PWM (or RPM for closed loop modes)
FEE2	65250	Alarm3	17	Fan2 Alarm PWM (or RPM for closed loop modes)
FEE3	65251	Alarm4	17	Fan2 Alarm PWM (or RPM for closed loop modes)
FEE4	65252	Alarm5	17	Fan2 Alarm PWM (or RPM for closed loop modes)
FEE5	65253	Alarm6	17	Fan2 Alarm PWM (or RPM for closed loop modes)
FEE6	65254	Alarm1	18	Fan3 Alarm PWM (or RPM for closed loop modes), Ignored=65365 (default)
FEE7	65255	Alarm2	18	Fan3 Alarm PWM (or RPM for closed loop modes)

Register Address (HEX)	Register Address (DEC)	TMS Alarm 1-6	Alarm Parameter 1-19	Parameter State for Alarm Input: Trigger Alarm or Ignored. Numbers shown are Decimal
FEE8	65256	Alarm3	18	Fan3 Alarm PWM (or RPM for closed loop modes)
FEE9	65257	Alarm4	18	Fan3 Alarm PWM (or RPM for closed loop modes)
FEEA	65258	Alarm5	18	Fan3 Alarm PWM (or RPM for closed loop modes)
FEEB	65259	Alarm6	18	Fan3 Alarm PWM (or RPM for closed loop modes)
FEEC	65260	Alarm1	19	Fan4 Alarm PWM (or RPM for closed loop modes), Ignored=65365 (default)
FEED	65261	Alarm2	19	Fan4 Alarm PWM (or RPM for closed loop modes)
FEEE	65262	Alarm3	19	Fan4 Alarm PWM (or RPM for closed loop modes)
FEEF	65263	Alarm4	19	Fan4 Alarm PWM (or RPM for closed loop modes)
FEF0	65264	Alarm5	19	Fan4 Alarm PWM (or RPM for closed loop modes)
FEF1	65265	Alarm6	19	Fan4 Alarm PWM (or RPM for closed loop modes)

6 Maintenance, malfunctions, possible causes and remedies

Do not perform any repairs on your device. Send the device to ebm-papst for repair or replacement.

WARNING

If control voltage or a stored speed set value is applied, fans will restart automatically, e.g., after a power failure.

Risk of injury

- → Keep out of any connected fan's danger zone.
- → When working on the device, switch off the supply voltage and ensure that it cannot be switched back on.
- → Wait until any connected fans come to a stop.
- → After working on the device, remove any tools or other objects from the device.

Malfunction/fault	Possible cause	Possible remedy
TMS not responding to Modbus Holding Register read attempt from PC	Incorrect PC Port assignment or RS485 interface driver.	Check settings and correct if necessary. Check operation using another RS485 Modbus node.
TMS not responding to Modbus Holding Register read attempt from BMS	BMS not configured for RS485 Modbus RTU.	Check settings and correct if necessary. Check operation using another RS485 Modbus node.
TMS not responding to Modbus Holding Register read attempt	Incorrect Modbus Address, Baud Rate or Parity setting	Check settings and correct if necessary
TMS not responding to Modbus Holding Register read attempt	Modbus address already assigned to another node.	Ensure all nodes have unique Modbus address assigned.
TMS not responding to Modbus Holding Register read attempt, or Intermittent operation.	Incorrect RS485 Modbus connector wiring	Check connections and correct if necessary
TMS not responding to Modbus Holding Register read attempt, or Intermittent operation.	No 0V (Ground) reference connection, signal outside Common Mode Range of RS485 receiver (-7V to +12V)	Add 0V (Ground) reference connection to all nodes in the system.
TMS not responding to Modbus Holding Register read attempt, or Intermittent operation.	Unsuitable data cable.	For optimum performance, twisted pair cable should be used, screened if the environment has a high level of electrical interference.
TMS not responding to Modbus Holding Register read attempt, or Intermittent operation.	Incorrect transmission line termination.	For optimum performance, the two ends of the wiring route should each be fitted with a termination resistance equal to the characteristic impedance of the cable used.
TMS not responding to Modbus Holding Register read attempt, or Intermittent operation.	Poor wiring layout plan	For optimum performance, wiring should be a single route from first node to final node, with minimal stubs and no loops or stars. Keep data cable away from mains cable
TMS not responding to Modbus Holding Register read attempt, or Intermittent operation.	BMS timeout set too short	Allow up to 1s for TMS response
TMS not responding to Modbus Holding Register read attempt, or Intermittent operation.	BMS polling speed set too high	Set BMS to maximum individual TMS repeated read rate of 1s.

Disposal / End of Life / Take Back Policy

Refer to document: TMS Operation and Maintenance Instruction 210-OMI12093,
downloadable from: www.ebmpapst.co.uk/instructions

www.ebmpapst.co.uk

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