

Installation Instructions



Part No	TMSB11111-01
Description	Thermal Management System TMS Development Kit



Issue	Date	Bug no	Comments
1	-	-	For Review
2	9 Oct 2012	1335	Updated with review comments
3	11 Oct 2012	1335	Reformatted, further review
4	11 Aug 2015	1831	Added reference website link for GUI and Terminal interface

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The controller must be connected and configured to suit the particular application, for full details see:
TMS Operation and Maintenance Instruction 210-OMI12093, 210-OMI13963, 210-OMI13962, downloadable from

www.ebmpapst.co.uk/instructions and www.ebmpapst.co.uk/tms

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Introduction

This highly configurable controller sets the speed of up to four fans, based on temperature. It is designed for use with four wire type fans (Power, 0V, Speed control, Tachometer/Alarm) on 12V, 24V or 48V systems. It can also be used with mains powered EC fans (EC Fan 10V output unused).

Each fan may be configured for a different speed/temperature profile, for 0-10V or Open Collector controlled fans. Compatible with Open Collector Tachometer, Open Collector Alarm or Relay Alarm type fans.

Configurable Alarm actions (fan speed change, Alarm relays operate), four Alarm Relay outputs, indicator LED's.

Configurable control response, Thermistor or 0-10V inputs, Switch inputs.

PC Interface for Configuration and Data Logging.

Specification

		TMSB00000-01
Supply Voltage	VDC	11-57VDC (also compatible with -48V supply)
Supply Current	A	25mA Controller only, 11A max. including Fans
Inputs		NTC Thermistors 2 off, Fan Tachometers 4 off, Switch Inputs 2 off
Outputs		Fan Power 4 off, Fan Speed Control 4 off, Alarm Relay 4 off (plus RS485 and Relay Expansion ebm-papst EC-Matrix, Reserved)
Configuration		PC Interface, electrically isolated, use ebm-papst cable 210-HAR11887
IP Rating		20
Environment	°C / RH	-40°C to 70°C / 0-95% Non Condensing at 40°C max
EMC Compliance		Radiated: Emissions BS EN55022:2006, Class B, Immunity EN61000-4-3:2002 +A1+A2 Fast Transient Bursts EN61000-4-4:2004, Conducted Immunity EN61000-4-6:2007
PCB		980-CAS11007
Accessories in Development Kit		Development Cable Set 210-HAR13100, Thermistor cable assembly 210-HAR12302, Configuration Cable Assembly 210-HAR11887

ESD

Many modern electronic components are susceptible to damage from Electro Static Discharge (Static Electricity).

During commissioning, avoid unnecessary contact with electronic components on PCB's.

PCB's which are Static Sensitive should be stored and transported in anti-static packaging until they are required to be installed.

Safety

- Compliant with EN60950.
- Installation must be by qualified personnel in accordance with local applicable standards.
- This appliance is intended to be enclosed in the equipment and not accessed by the user.
- Access is limited to service personnel only.
- Residual risk of contact with fan. Maintenance personnel should take due care and attention

Installation

See "Connection Details" below.

It is recommended that all sensor and control cables over 3m length be screened.

Route sensor and control wiring separately from DC power and AC mains wiring

Any connection to a DC Distribution Network should be made via an EN61000-4-5 compliant interface

Connect the supply, 11-57VDC. The controller must be powered from a 15A maximum fused supply.

Connect the Fans. If total fan current exceeds 11A (or 7.5A for cables 210-HAR13100) route power directly to the fans

Connect the Thermistor(s) e.g. 2m length cable 210-HAR12302, plus Alarm Outputs and Switch Inputs as required for the application.

Configure the TMS as required for the application, see ebm-papst OMI document 210-OMI12093 for details.

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Mechanical Outline

Enclosure Length = 143mm, Width = 65.5mm, Height = 23mm. Weight of PCB plus enclosure = 170g.
 Fixing Hole Size 3.5mm diameter (4 off), Fixing centres 134x55mm
 DIN mountable using appropriate fixings e.g. Weidmuller Snap-on mount bracket, part number 0687900000

Operation

The green Power LED will pulse slowly when power is connected.
 The Fan speed will be varied in response to Thermistor temperature, Switch Inputs or Alarms, as programmed.
 The Alarm Relay outputs and red Alarm LED's will indicate the alarm state, as programmed.
 Any Fan or Thermistor alarm will be indicated by the red LED adjacent to the Fan/Thermistor connector

Maintenance and Servicing

The TMS Alarm Relay outputs and LED's, Fan Alarm LED's and Thermistor Alarm LED's will indicate any faults with the connected equipment, depending on TMS configuration.
 The PCB has no replaceable parts, if a fault develops return the PCB to the manufacturer.


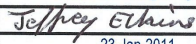
Declaration of Conformity



Part No - 980-CAS11007

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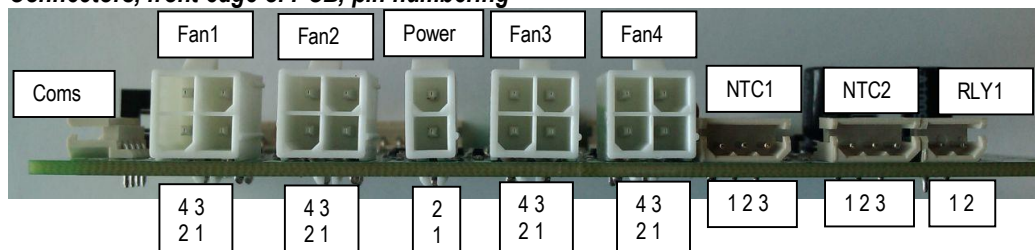
Certificate No - 980-CAS11007CE

CE DECLARATION OF CONFORMITY		
Declaration		
We, ebm-papst UK Ltd, Chelmsford Business Park, Chelmsford, Essex CM2 5EZ certify that the product(s) listed are in conformity with;		
Low Voltage Directive 2006/95/EC Electromagnetic Compatibility Directive 2004/108/EC		
	Declaration Approved	Technical File Compiled
Name	G. M. Lockwood	Jeff Elkins
Position	Technical Director	Electronics Design Engineer
Signature		
Date of Declaration	23-Jan-2011	23-Jan-2011
Part number:	980-CAS11007	
Description:	Fan speed controller and monitor, 48V DC	
The product(s) have been assessed by the application of the following Standards;		
BS EN 60950-1 - Information technology equipment. Safety. General requirements		
BS EN61000-6-3:2007 (emissions)		
BS EN61000-6-2:2005 (immunity)		
Radiated Emissions BS EN55022:2006, Class B		
Radiated Immunity EN61000-4-3:2002 +A1+A2		
Fast Transient Bursts EN61000-4-4:2004		
Conducted Immunity EN61000-4-6:2007		

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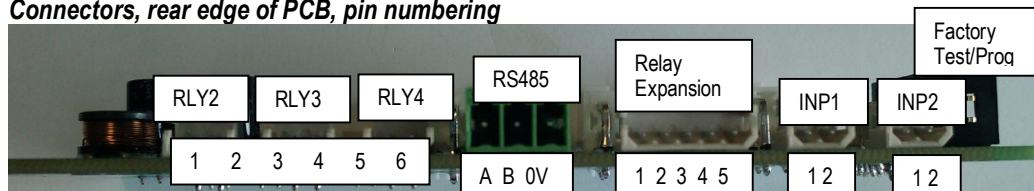
Connection Details

Connectors, front edge of PCB, pin numbering



Connector	Pin	Description, connectors on front edge of PCB	
Power Input	1	Positive supply +11 to +57V	
	2	0V	
Fans	1	0V (connected to Power connector pin 2)	
	2	+11 to +57V Out (connected to Power connector pin 1)	
	3	PWM Output, Fan Speed Control	
	4	Tachometer Input (For Relay Alarm fans connect relay between this pin and 0V)	
NTC Thermistors or 0-10V Input	1	Thermistor terminal 1	(No connection for 0-10V in)
	2	(No thermistor connection)	0V
	3	Thermistor terminal 2	0-10V Input
Relay Outputs, Relay 1	1	Relay 1 terminal 1	
	2	Relay 1 terminal 2	

Connectors, rear edge of PCB, pin numbering



Connector	Pin	Description,, connectors on rear edge of PCB	
Relay Outputs, Relays 2-4	1	Relay 2 terminal 1	
	2	Relay 2 terminal 2	
	3	Relay 3 terminal 1	
	4	Relay 3 terminal 2	
	5	Relay 4 terminal 1	
	6	Relay 4 terminal 2	
RS485 (Reserved)	A	RS485 A	
	B	RS485 B	
	0V	0V	
Relay Expansion (Reserved)	1-5	Standard ebm-papst EC-Matrix compatible control interface pin-out, plus supply power on Pin 5 (connected to Power connector pin 1).	
Switch Inputs 1-2	1	Switch input (Volt Free or Open Collector Compatible). On-board pull-up resistor.	
	2	0V (connected to Power connector pin 2)	

Thermistors

NTC (Negative Temperature Coefficient) Thermistor, 100k Ohm at 25C. Thermistor manufacturer's part number Vishay 238164063104. Thermistor contacts must be insulated to prevent contact with chassis. The TMS is configurable to use either one or two thermistors. (Note – Thermistor type differs from HMS Controller).

Thermistor Cable Assembly Accessory



A thermistor cable assembly consists of a compatible insulated Thermistor, wired to NTC Thermistor Connector pins 1 and 3.

Thermistor Cable Assembly Part Number	Cable Length mm
210-HAR12280	120
210-HAR12145	300
210-HAR12302	2000

Configuration Cable Assembly Accessory



ebm-papst part number 210-HAR11887, type A USB to TTL serial data adapter, length 1.8m. Connects TMS to PC for configuration and data logging.

Development Cable Set Accessory



Development Cable Set Accessory ebm-papst part number 210-HAR13100. This consists of a TMS power cable, 4 off fan cables, alarm cable and switch input cables. The cables consist of the required mating connector for the TMS connection, the other end of the cable being unterminated to allow the user to connect as they require. This is intended for development or evaluation use, particularly by customers that do not have tools to fit the necessary connector crimps.

This cable set supports up to 7.5Amps total current. For higher current connect power directly to fans.

For data on constructing cables to support up to 11A see ebm-papst TMS OMI document 210-OMI12093.

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Fan Compatibility and example recommended settings

Four wire type fans (Power, 0V, Speed control, Tachometer/Alarm).

Fans may be a mix of 0-10V PWM type and Open Collector PWM speed controlled type.

PWM profile: The PWM output may be inverted, i.e. selectable between “PWM 0V out = fan off” and “PWM 0V out = fan full speed”.

Tachometer - the number of pulses per revolution may be set for each fan, 1-6 pulses/rev, Open Collector compatible interface.

The TMS may also be used with mains powered EC Fans with 4 wire control connection (10V, 0-10V speed control, Open Collector Tachometer, 0v connection), provided that a 12, 24 or 48V supply is provided for the TMS. Both the EC Fan 10V output and TMS Fan connector pin2 would be unused.

High current fans may be controlled (over 11A total current or over 7.5A for cables 210-HAR13100), route power directly to the fan.

All tachometer type fans to be controlled using "Temperature sets PWM Output (Open Loop)" or "0-10V input sets PWM Output (Open Loop)" modes must have an approximately linear internal control profile, i.e. 100% speed at 100% PWM, 50% speed at 50% PWM. Fans with an internal control profile that differs too far from this will generate spurious alarms.

This restriction does not apply to Relay Alarm type fans or when using the "Temperature sets Fan RPM (Closed Loop)" or "0-10V input sets Fan RPM" (Closed Loop)" modes.

Recommended Fan Settings

For full details see: **TMS Operation and Maintenance Instruction 210-OMI12093**, downloadable from www.ebmpapst.co.uk/instructions

The following information is presented as a guide, in all cases the latest issue of the fan data sheet should be consulted.

For ebm-papst St.Georgen fans only (identified by “St.Georgen” on the fan rating label), the Tachometer Pulses per Revolution may be determined by these rules :

- 1) Part numbers ending with the letter “O” always have three Tachometer Pulses per Revolution and are 0-10V control input. This rule overrides all other rules below.
- 2) Part numbers 4100 NH7 and NH8 e.g. 4114N/2HP8 have three Tachometer Pulses per Revolution.
- 3) All TD part numbers excluding 6400 TD have six Tachometer Pulses per Revolution.
- 4) All other St.Georgen fans have two pulses per revolution
- 5) Note - after 2012 consult the updated catalogue.

The speed control input is 0-10V for part numbers ending with the letter “O”, others are Open Collector.

For ebm-papst Mulfingen fans (identified by “Mulfingen” on the fan rating label), the speed control input is normally 0-10V, Tachometer output either 1, 2 or 3 pulses / revolution.

Some example fan settings are shown in the table below. These fans have been tested and confirmed to be compatible with the TMS controller.

Failure to set configuration correctly can lead to spurious alarm generation and anomalous fan behaviour.

Fan Type	Voltage	Tachometer Pulses per Revolution	Maximum RPM setting	PWM Frequency kHz	Control Type 0-10V or Open Collector
2214F/2TDHHO	24	3	5000	2kHz	0-10V
2214F/2TDHO	24	3	4250	2kHz	0-10V
2218F/2TDH4P	48	6	6500	2kHz	Open Collector
2218F/2TDHHO	48	3	5000	2kHz	0-10V

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3212J/2H4P	12	2	13000	2kHz	Open Collector
3214J/2H4P	24	2	13000	2kHz	Open Collector
3218J/2H4P	48	2	13000	2kHz	Open Collector
4114N/2H7P	48	3	9500	2kHz	Open Collector
4114N/2H8P	24	3	11000	2kHz	Open Collector
4118N/2H7P	24	3	9500	2kHz	Open Collector
4118N/2H8P	48	3	11000	2kHz	Open Collector
5312/2TDHP	12	6	6000	2kHz	Open Collector
5314/2TDHHP	24	6	7000	2kHz	Open Collector
5314/2TDHP	24	6	6000	2kHz	Open Collector
5318/2TDH4P	48	6	9200	2kHz	Open Collector
6312/2TDHP	12	6	5500	2kHz	Open Collector
6314/2TDHHP	24	6	7000	2kHz	Open Collector
6314/2TDHP	24	6	5500	2kHz	Open Collector
6318/2TDH4P	48	6	9200	2kHz	Open Collector
6318/2TDHHP	48	6	7000	2kHz	Open Collector
6318/2TDHP	48	6	5500	2kHz	Open Collector
8212J/2H4P	12	2	14000	2kHz	Open Collector
8214J/2H4P	24	2	14000	2kHz	Open Collector
8218J/2H4P	48	2	14000	2kHz	Open Collector
8412N/2GHP	12	2	3600	25kHz	Open Collector
8414N/2HP	24	2	3600	25kHz	Open Collector
G1G108-AB17-02	24	2	3000	2kHz	0-10V
R1G175-AF29-04	48	2	4000	2 kHz	0-10V
K1G190-AB25-02	48	2	2950	2 kHz	0-10V
RER175-42/18/2TDMP	48	6	4800	2 kHz	Open Collector
R1G310-AA33-52	48	3	1520	2 kHz	0-10V
D3G133-BF03-06	230VAC	1	1260	2kHz	0-10V