Installation Guide - DC Temperature Controller | Issue 01

Description

Traditional fan speed controllers use voltage-chopping which can lead to reduced life expectancy, damage to motor electronics and reduced performance. The DC Temperature Controller regulates the electrical power supplied to the fan to maintain optimum performance and reliability.

- For temperature sensitive speed control of 12V, 24V and 48V ebm-papst DC compact fans*.
- Fan speed increases with temperature between 20°C and 40°C or 35°C and 55°C according to the selected profile.
- Alarm output through Open Drain connection or optional relay.
- Supplied complete with 2 metre long NTC thermistor.

Note: Due to variations in motor electronics, a small number of mainly high speed fans may not work correctly with this controller. A list of fans which have been tested for compatibility is attached to this document.

Specification

| Nominal data	Nominal voltage	Min voltage	Max voltage	Max current	Min ambient	Max ambient	Max humidity (non-condensing)	Open drain alarm Max current	Alarm Relay Max AC voltage	Max DC voltage	Max current	Max load
Type	VDC	VDC	VDC	mA	°C	°C	%RH	mA	VAC	VDC	A	W
12 volt	12	11.4	12.6	36	-20	75	95	500	50	50	1	20
24 volt	24	22.8	25.2	37	-20	75	95	500	50	50	1	20
48 volt	48	47.0	49.0	40	-20	75	95	500	50	50	1	20

⚠ CAUTION: During normal operation some controller components become very hot.

Operation

Fan speed is controlled according to the selected profile, as shown in the chart opposite.

The fan will run at approximately 15% of maximum speed below the minimum temperature and increase to 100% at the maximum temperature.

If preferred, DIP switch 4 can be used to switch the fan off below the set point.

Control Profiles
— 20°C to 40°C — 35°C to 55°C

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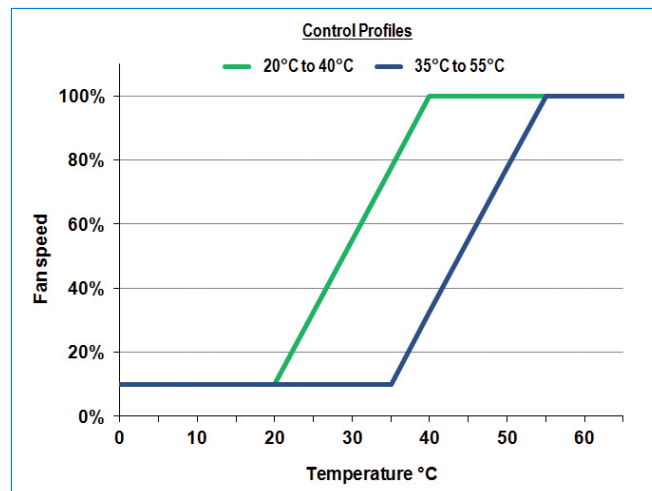
An alarm output is provided through either an Open Drain connection or a normally closed relay. The alarm is activated if the upper temperature limit is reached or if the controller detects an open or short circuit sensor on the NTC temperature input. Under sensor failure conditions the fan will run up to full speed. A fan fail alarm output can also be activated when using three wire fan types by monitoring the Tacho or Alarm output from the fan.

Note: The Tacho or Alarm output from only one fan can be monitored. Connection of multiple fans in this way will cause spurious alarm indications.

If the voltage input limit to the controller or the current output limit to the fan is exceeded, the controller and fan will switch off to prevent risk of damage and an alarm indication is given.

A yellow LED flashes during normal operation. A blue LED indicates an alarm condition.

Connection
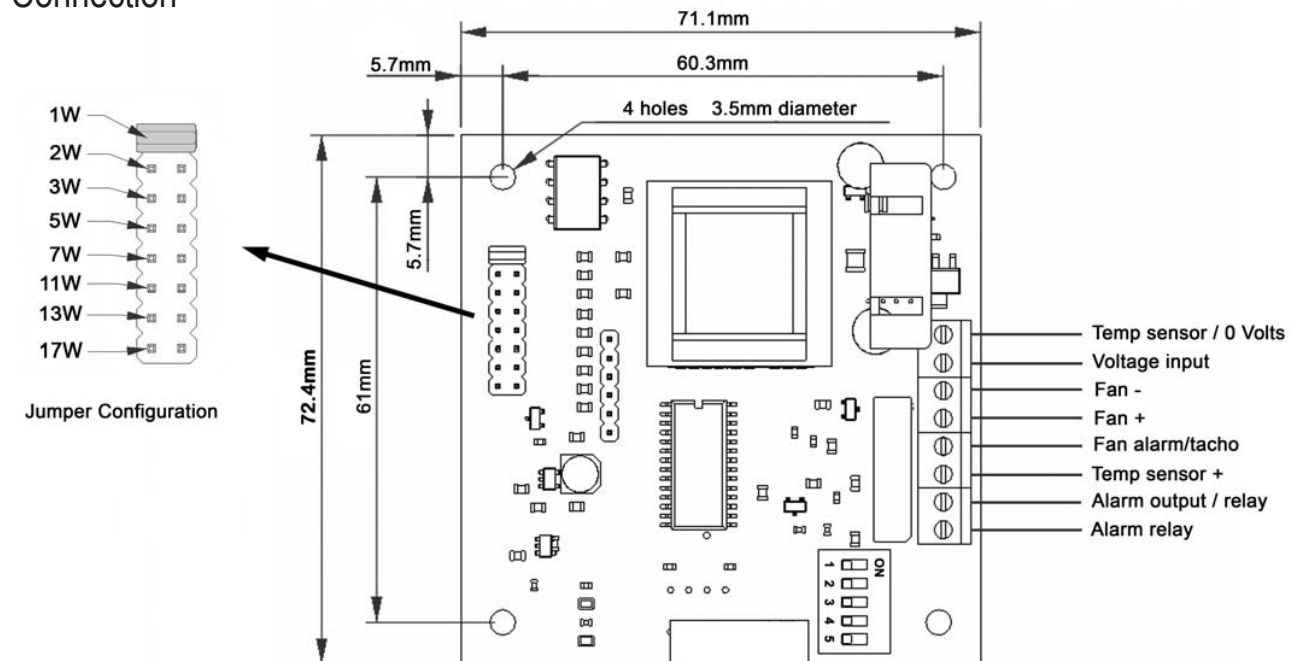
Notes

Open Drain Alarm Output: Connect the alarm output to the input of the monitoring device then connect a pull-up resistor (typically 100KΩ) between this connection and the supply voltage of the monitoring device. During normal operation the alarm output will be 0 volts. In an alarm condition the output will be the same as the supply voltage of the monitoring device.

Relay Alarm Output: This is a volt free contact that is held closed during normal operation and opens when an alarm condition is detected.

Temperature sensor: The 0 volt wire of the sensor must only be connected to the terminal provided on the controller and not to any other 0 volt source.

Fan Supply: The fan must be only by connected to the terminals provided on the controller or it will not be able to monitor and regulate the fan speed correctly.

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DIP Switch Settings

Dip Switch	OFF	ON
1	Profile 2: 35°C to 55°C	Profile 1: 20°C to 40°C
2	Enable Fan Alarm Logic[1]	Disable Fan Alarm Input[1]
3	Enable Fan Tacho Input[1]	Disable Fan Tacho Input[1]
4	15% fan speed at minimum set point	Fan off at minimum set point
5	Soft start on	Soft start off 1

[1] Only applicable to 3-wire fans with appropriate outputs. Alarm monitoring will not operate correctly if more than one sensing output wire from a 3-wire fan is connected with this function enabled.

Configuration

For optimum performance it is necessary to configure the controller to match the maximum total power requirements of all of the connected fans. The maximum power rating for each fan will be available on the fan label or datasheet.

For example, if running 4 fans rated at 2 Watts each, the total power requirement is 4 x 2 = 8 Watts. The controller must then be configured to the lowest setting which exceeds the total power. In this case, 11 Watts.

To configure the controller, set the jumper links shown as shown in the connection diagram.

Initial Start-up

Due to minor differences in motor types and electronics, some fans may work better than others with the default settings. If the fan or fans fail to run on initial start-up, first check the following;

Soft start setting

The recommended setting is for a soft start with the rate of fan speed increase being managed by the controller but a small number of fan types will only work with a faster ramp up speed. If the fan(s) fail to start properly, switch this function off using the DIP switch and try to start the fan. If it makes no difference, reset the dipswitch.

Power setting

The power requirement of some fans means that they may be on the borderline for a particular power configuration. A slight increase in demand during start-up for example, can be detected as an over current condition by the controller causing an alarm condition and shut down of the fan.

If the fan does not start or starts then stops, move the power configuration jumper link to the next highest setting. If it makes no difference, return it to the original setting.

If the controller still does not operate correctly, please refer to the troubleshooting guide.

A detailed technical specification for this controller and a list of ebm-papst fans which have been tested for compatibility is available at www.ebmpapst.co.uk/datasheets

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Troubleshooting

In normal operation, the yellow LED will flash and the blue LED will be off. The following section is to help diagnose common issues and interpret the different combinations of LED states.

Before referring to the guide, check that all connections are correct and secure and that the power setting jumper link and DIP switches are in the correct position. It is assumed that the fan is known to be serviceable and is correctly installed.

Symptom	LED status	Possible Reasons/Fixes
Fan not running at power on	Both Off	No power to controller, check connection and supply
	Both On	Fan not connected or connected in reverse polarity. Wattage jumper not fitted. Supply voltage too high.
	Both Flashing	Temperature is below minimum set point. Fan off at minimum set point selected on DIP switches.
Fan starts then stops	Both On	Selected power range too low. Soft start selected off.
Fan starts and runs near full speed	Yellow On Blue Flashing	Fan is drawing more power than expected during start up. Check power range selection and possible try next range up. Check Fans back pressure.
Fan running at full Speed	Both On	Temperature at maximum set point.
	Yellow On or Off Blue On	Temperature sensor open or short circuit.
Fan speed not in expected range	Yellow Flashing Blue Off	Wrong control profile selected. Temperature sensor poorly positioned in system.
Fan stops after running up	Yellow On Blue On	Excessive supply voltage or fan fault.
Fan stops then ramps up repeatedly	Yellow On Blue On when fan stops	Selected power range too low.
Fan running normally, Blue LED on	Yellow Flashing Blue On	Fan Alarm and/or Tacho input connection enabled on DIP switches, no connection to input terminals.
Inconsistent alarm indications	Yellow On Blue On	More than one fan connected to Alarm and/or Tacho input terminals.

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The DC temperature controller is suitable for use with most ebm-papst compact fans but there are a small number of high speed fans requiring surges of current in excess of 17 Watts which may not operate correctly.

The following ebm-papst fans have been tested for compatibility

252/2N	412	4212NGL
252N	412/2-036	4212NGM
3312	412F	4212NGN
3312L	412F/2H-038	4212NH
3314	412FH	4212NN
3318	412H	4214NGL
3412N	412J	4214NGM
3412N/2	412J/2HH	4214NGN
3412N2GLE454	412JH	4214NH
3412N2GLLE453	414	4214NN
3412NG	414F	4218NGN
3412NGH	414H	4312
3412NHH	414J	4312/2
3414N	414J/2H	4314
3414N/2	414J/2HH	8312
3414NG	414JH	8314
3414NGH	414JHH	8318
3414NGL	4182NGX	9956
3414NGM	4184NGX	
3414NHH		

An updated list of ebm-papst fans which have been tested for compatibility is available at www.ebmpapst.co.uk/datasheets

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