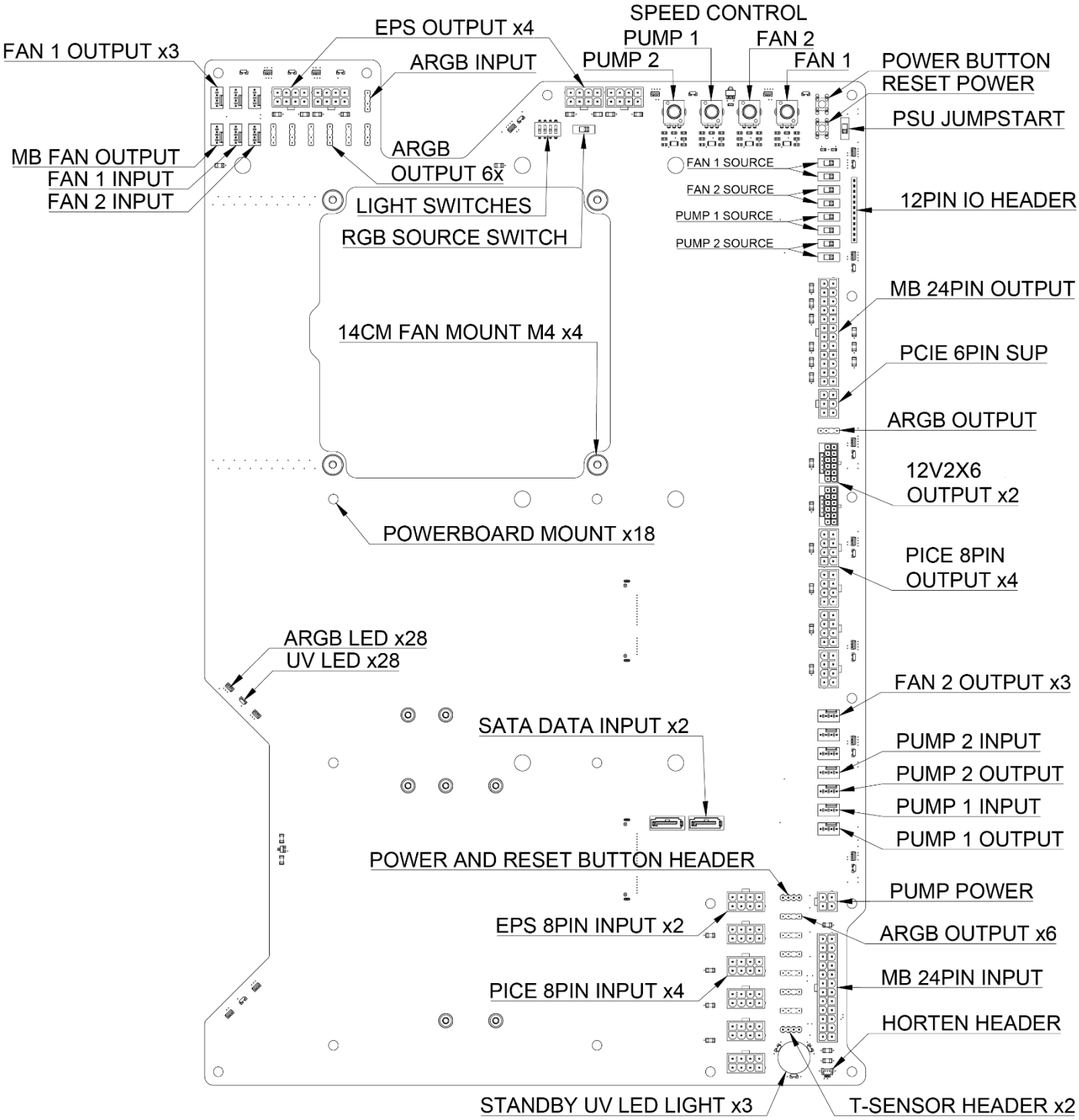
SPECTRE 4 | SPECTRE 4 AEVUM LIMITED EDITION

PowerBoard Manual

Revision 1.3

SINGULARITYCOMPUTERS



⚠ ***All PowerBoards need PowerBoard Linking Cables.***

Features

The PowerBoard is a PCB integrating 24pin, EPS, 12V2X6, PCIE, PWM and ARGB hubs, SATA, Power and Reset Buttons and built-in analogue coolant-temperature based speed control for the fans and pumps. The PowerBoard has x28 ARGB and x28 UV LEDs positioned around the external perimeter to optimally light up the distribution plate and the build, the LEDs can be switched on or off. Essentially the PowerBoard is a distribution plate for cables also integrating other features and functions. It is a new method for cables allowing standardisation of cable lengths and making cable management almost unnecessary. The PowerBoard also comes included with a standard set of black sleeved linking cables including 24pin x1, 8pin EPS x2, 8pin PCIE x3 or 1x 12V2X6 and unsleeved 50cm ARGB and sleeved PWM cables.

Specifications

Included Items	Spectre 4.0 PowerBoard
Cables	PowerBoard Linking Cables: 18AWG wire black sleeved: 24pin x1. 8pin EPS x2. 8pin PCIE x3 or 12V2X6 x1. PWM Fan Linking Cable Black Sleeved 50cm. ARGB Linking Cable Black 50cm..
Electronics Integration	Inputs: 24pin x1. 8pin EPS x2. 8pin PCIE x4. PWM x4. ARGB x1. SATA x2. Outputs: 24pin x1. 8pin EPS x4. 8pin PCIE x4. 12V2X6 x2. SATA Direct Mount x2. PWM x8 (FANS x6 and PUMPS x2). ARGB x12. ARGB built-in LEDs x28 and UV built-in LEDs x28 with ON/OFF switch. Power and Reset Buttons built-in. Horten Module header for the touch button integration

PowerBoard PSU Cables

The stock cables that come with every power supply can be used, plug in as many cables as input connectors are available. Do not use components that have more connectors than Your power supply has cables for. For example, if Your power supply comes with a single 8pin EPS (4+4) plug and Your motherboard has 2X 8pin EPS connectors, than a better power supply needs to be used. Singularity Computers offers custom sleeved and shorter PSU cable kits that better fit in the PSU shroud area than stock cables.

PowerBoard Linking Cables

The Spectre 4.0 PowerBoard comes with a standard kit of PowerBoard Linking Cables which include 24pin MB x1, 8pin EPS x2 and 8pin PCIE x3 or 12V2X6 x1. The pinout of these Linking cables is mirrored and the lengths are custom to achieve an arch. The connectors are also female on both sides (refers to the pin and not to the connector housing). PWM and ARGB linking cables are also included to connect from your motherboard or controller to the PowerBoard PWM and ARGB inputs. Use our Cable setup guide if making custom Linking cables.

Power Connectors

The input and output power connectors are not wired directly together but they are shared, so if EPS-1-IN is plugged in then any of the EPS outputs can be used, it is not limited to EPS-1-OUT. The same applies to the 8pin PCIE inputs, they can be mixed and matched. The 12V2X6 outputs draw power from the 8pin PCIE inputs and is set to provide 600W of power, so even if the power supply doesn't have a 12V2X6 output a GPU with that connector can still be used as the PowerBoard does the conversion. There is a 6pin PCIE connector located next to the 24pin MB connector for motherboards that have a supplementary 6pin PCIE connector for additional power.

ARGB Connectors:

The PowerBoard has built-in ARGB lighting and acts as an ARGB hub. An ARGB source, like a motherboard ARGB header, must be connected to the ARGB-IN header on the PowerBoard. The

input header is marked with a white rectangle around it for easier identification. The PowerBoard uses this ARGB signal to light up the built-in LEDs and shares this signal to all ARGB outputs. What signal goes into the input will be displayed on the built-in LEDs and all LED strips attached to the ARGB outputs, in parallel. The PowerBoard does not show up as an individual component in ARGB controlling software, but it can be controlled by controlling the motherboard ARGB header, which will show up in software. The PowerBoard LEDs and headers are powered by the power supply 24pin connection, so they will only light up when the system is turned on but not when the system is turned off or is in stand-by mode. The ARGB headers are conveniently located where they are expected to be used, next to radiator mounts, GPU, and CPU waterblocks. Do not plug a 4pin/12V RGB device into the PowerBoard, only 3pin/5V ARGB/DRGB (addressable/digital RGB) devices are compatible.

PB ARGB Dip Switch

This switch connects/disconnects the ARGB control signal from the built-in LEDs on the perimeter of the PowerBoard. When turned ON, the LEDs will immediately light up. When turned OFF, the LEDs will not light up from the next time the system is turned ON from a cold boot. After turning the switch OFF, turn OFF the system, wait 5 seconds and turn the system ON again. This switch does not control ARGB headers, only the built-in LEDs on the PowerBoard.

PB UV Dip Switch

This switch enables/disables the built-in UV LEDs around the perimeter of the PowerBoard.

FAN/PUMP Connectors

The PowerBoard acts as a powered PWM hub. A PWM source, like a motherboard CPU Fan header, can be connected to the FAN-IN header on the PowerBoard. The PowerBoard shares this PWM signal to all related PWM outputs. What signal goes into the inputs will be the same control signal sent to fans connected to the PowerBoard. The PowerBoard does not show up as an individual component in fan controlling software, but it can be controlled by controlling the motherboard CPU FAN header, which will show up in software/BIOS. The PowerBoard PWM headers are powered by the power supply so there is no strain on the motherboard. Only the *-RPM designated headers monitor the speed of a connected fan which is reported back to the motherboard. If no fan is connected to this header, the motherboard will see zero RPM even if all other headers have fans connected to them, so populate FAN-*-OUT-RPM first with a fan that You would like to monitor the RPM of. The PWM headers are conveniently located where they are expected to be used, close to radiator mounts.

The PowerBoard also has newly developed, built-in analogue 4-channel fan speed control technology. There are 2 independent channels for the 2 sets of fans aimed for the top and the front radiators and also 2 independent channels for the 2 pumps in the main and dual-loop side panel distros. The speed curve is based on the coolant temperature and up to 2 temperature sensors can be used for a dual loop setup and each can have its own speed curve. All channels can be controlled by a motherboard signal or a temperature signal, and all channels can choose which temperature sensor to use. This way a CPU loop can have a 100% independent fan and pump speed from the GPU loop. Another reason to use the coolant temperature sensors to define fan and pump speeds is to finally be able to use the GPU's heat output to define fan speeds without using any software.

The base functionality is based on this specification:

The minimum speed for the FAN channels is 30% and for the PUMP channels it is 50%. The reason for these minimum values is that there is no reason to go below 30% for the fans since in this range most fans are inaudible already and lower speeds might stop some fans, while for pumps below 50% there is an increasing risk for not moving the coolant with sufficient flow.

The speed of the fans and pumps are kept at the set minimum speed below 25°C coolant temperature and it is linearly increased to 100% above 45°C. With this control structure the fans and pumps will slowly and gradually increase their speed so there will be no sudden ramp up and ramp downs when the CPU or GPU gets only momentarily loaded. The aim of this built-in speed controller was to simplify and compartmentalise the cooling functionality of Spectre 4.0 from software and to eliminate guess-work from setting up the ideal noise-to-performance ratio. The fan curve can be adjusted live so if the system is running too hot or too loud it can instantly be corrected.

SATA Connectors

Connect the SATA inputs into the SATA outputs on the motherboard and install 2.5"/3.5" drives onto the PowerBoard. There is no need to connect a SATA power cable to the drives, they are powered directly from the PowerBoard. The drives attach to the PowerBoard with the included 3D-printed brackets, M3 8mm and #6-32 ¼" fasteners.

Power buttons and switches

The Spectre 4.0 PowerBoard has built in POWER and RESET buttons in the top right corner and also a PSU JUMPSTART switch to power the connected fans and pumps without the need to turn on the motherboard and boot the system. Disconnect the MB 24pin Linking Cable to prevent powering the motherboard while using the PSU JUMPSTART switch. As long as the switch is in the ON position the power supply will enable all of its power rails, but the motherboard will not turn on automatically. The fans and pumps will turn on and if the speed control source is set to the PowerBoard then the PWM signal can be controlled during the filling, bleeding and initial testing process. Controlling the speed of the pumps while filling the loop makes it possible to fill the loop in one try, since the pump can be set to a low-speed operation. This way there is no need to repeatedly turn the system ON and OFF to fully fill the loop with coolant.

12PIN I/O Header

The PowerBoard exposes the voltages of the power rails and other basic information through this header for monitoring. These voltages can be measured manually or with a custom microcontroller as a DIY project. The pinout is as follows from top to bottom:

1. GND
2. 12V
3. 5V
4. 3V3
5. ARGB (2nd control signal input)
6. T1 (temperature readout of the T1 sensor as voltage)
7. T2 (temperature readout of the T2 sensor as voltage)
8. F1R (RPM readout of FAN-1-OUT-1-RPM header)
9. F2R (RPM readout of FAN-2-OUT-1-RPM header)
10. P1R (RPM readout of PUMP-1-OUT header)
11. P2R (RPM readout of PUMP-2-OUT header)
12. GND

Pins 1, 2, 3, 4 and 12 can be used to power the microcontroller or other circuits. Pin 5 is an additional ARGB control signal input that can be selected using the ARGB SOURCE switch in the “PB” position.

POWER and RESET button header (JP1)

Connect the included PWR_BTN and RST_BTN linking cables to this header and to the motherboard's front panel headers.

T-SENSOR header (JP2)

Connect standard 10K NTC Thermistor-based temperature sensors to this header, up to 2. The widely available temperature sensors in stop-fittings are compatible.

HORTEN header

Connect the included HRTN cable here and to the Horten Module to enable the front panel's touch button functionality.

Stand-by UV logo

UV21, UV22 and UV23 LEDs are part of the built-in stand-by lighting effect that's visible on the rear side of Spectre 4.0 as the Singularity Computers triangular logo. This logo lights up as a greenish blue colour while the system is in stand-by mode or is turned on. Can be disabled via the “SB UV” dip switch.

PUMP-PWR

Dedicated power header for connecting up to 2 pumps. Pins 1 and 2 are GND, 3 and 4 are +12V. With this header the pump is directly connected to the PowerBoard so the PSU can be swapped to another brand without having to change the pinout or redo the custom sleeve and crimps.
A breakout cable will be available for purchase with 2x 4pin MOLEX and 2x SATA power connectors.

14cm fan cutout

Mount a 14cm class fan using 4x M4 30mm fasteners for a 25cm thick fan or 4x 35mm fasteners for a 30cm thick fan. Route the fan cable through the cutout before installing the fan to hide it. Connect the cable to the FAN-1-OUT-BACK header and its speed is controlled by the FAN-1 hub.