



Spartan Bus Fan Controller 016-20315 hardware user's guide

Over view

The controller sets the fan speed based on the engine temperature and the charge air temperature. The controller regulates the current to the proportional valve that sets the fan speed.

When the engine coolant temperature is less than minimum, the proportional valve current will vary from minimum to maximum as the charge air temperature varies from minimum to maximum. When the engine temperature is more than minimum, the current to the proportional valve will vary from minimum to maximum as the engine coolant temperature varies from minimum to maximum. The engine coolant temperature is adjusted by the retarder input before it is used in these equations. The temperature limits for the engine coolant and charge air are user programmable, as are the current limits.

A solenoid valve is hooked to the controller such that it is always on when power is applied to the controller.

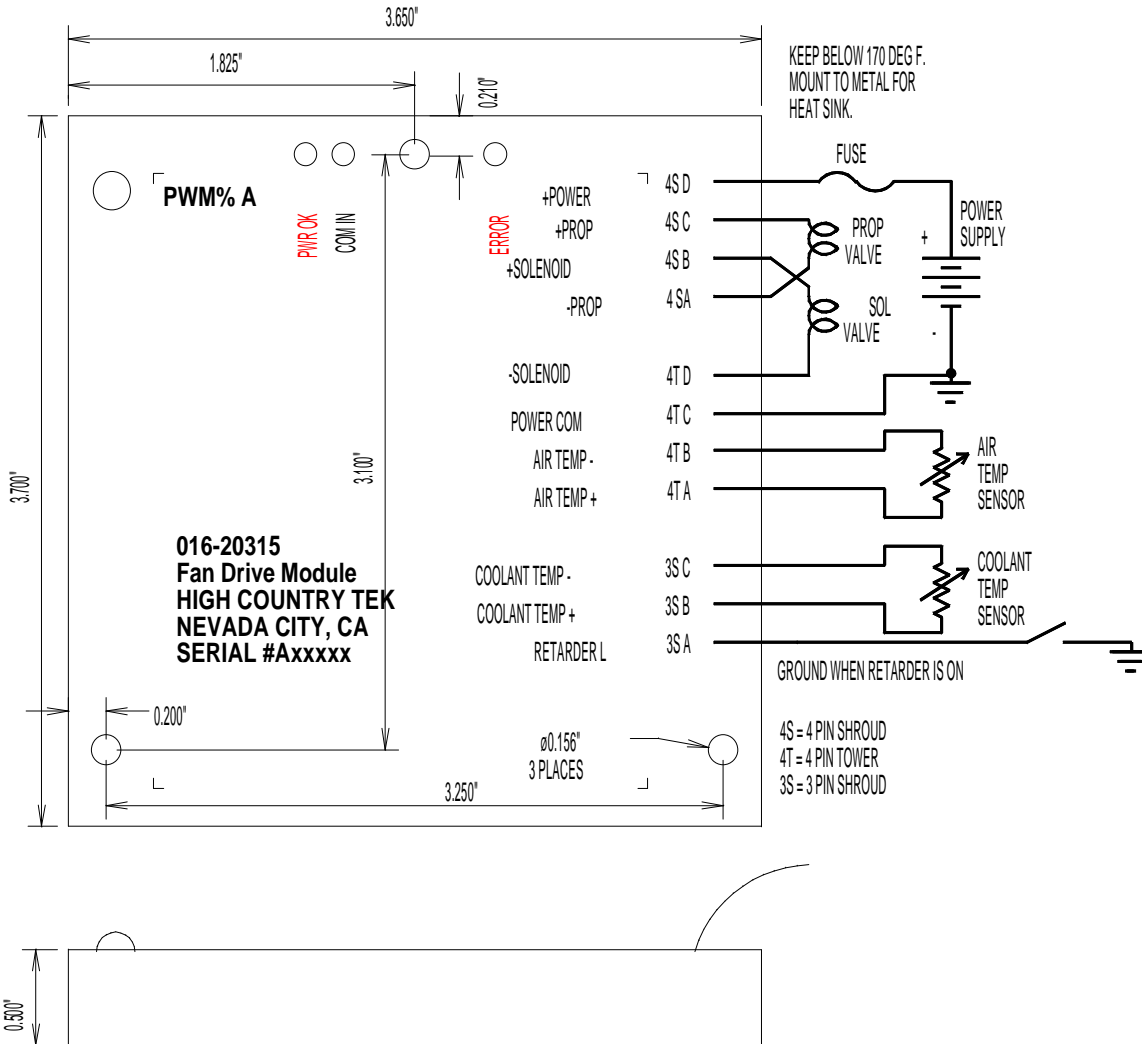
1. The retarder input adds an offset to the engine temperature sensor to bias the system toward making the fan speed higher. The offset is user programmable, with a default value of +4 F. The resulting temperature is called the effective coolant temperature, or Etemp.
2. When the Etemp is less than Low Coolant Temp (default = 180F), the current to the proportional valve will vary from Minimum Current (default = 0.1A) to Maximum Current (default = 1.1A) as the Charge Air Temp varies from Low Charge Temp (default =140F) to High Charge Temp (default = 150F).
3. When the Etemp is more than Low Coolant Temp, the current to the proportional valve will vary from Minimum Current to Maximum Current as the Etemp varies from Low Coolant Temp to High Coolant Temp (default = 200F).
4. When the Etemp is more than High Coolant Temp, the current to the proportional valve is Maximum Current.
5. Programmable Ramp Up and Ramp Down settings allow adjusting the rate of change in the current in response to changing inputs. Ramp rates of 0 to 60 (default = 0) second per amp may be selected. This feature can be disabled by setting the ramp values to zero. The regulation algorithm can cause the fan speed to go from Maximum Current for Etemp of 179F and Charge Temp of 150F to Minimum Current at Etemp of 180F. It may be possible for the Etemp to cycle across this boundary several times in a row. The ramp rates can be set to smooth out the transition and average out any cycling at the boundary.
6. Operating Ambient Temperature: -40 degrees Celsius to +77 degrees Celsius.
7. Power input: +8Vdc to +30Vdc. Reverse-polarity and transient protected.
8. A low-side PWM valve driver, labeled +PROP and -PROP is provided. It is short circuit protected and will detect open coils. It is intended for current up to 1.7A maximum.
9. Outputs hooked to input power and ground labeled +SOLENOID and -SOLENOID are brought out for connection to the Solenoid valve. No short protection or open detection is provided for this valve. An AGC 5 or equal fuse must be in series with the controller to avoid damage to the unit if the Solenoid valve is shorted.
10. The PWM% LED changes from all red at fully off (0A) to all green at fully on (maximum possible current). Shades of red, yellow and green indicate the PWM percentage and thus a rough approximation of coil current. The LED will flash red / off for a shorted coil, or green / off for an open coil.
11. A red PWR OK indicator comes on if the power supply is within the specified correct operation range.
12. A red ERROR indicator comes on if an error condition has been detected.
13. The ERROR LED blinks a code to indicate the type of error. Each blink is approximately one half second on then one half second off and is repeated approximately every 6 seconds.

Error Condition	Blink Code	Unit behavior
Shorted PROP coil	two blinks	PROP valve off.
Open PROP coil	three blinks	PROP valve off.
Bad coolant sensor input	four blinks	Maximum Current.
Bad charge air sensor input	five blinks	Treat as Low Charge Temp.
Bad power supply	six blinks	PROP valve off.

14. Multiple fault conditions display only one error code. Turning off valves will take precedence over other fault behaviors.
15. Note that the bad valve must be on to detect a shorted or open coil. These fault conditions are cleared whenever the bad valve is no longer driven, or the fault goes away.
16. The coolant temperature sensor is considered bad if it is shorted or open. The unit detects a short for resistance below approximately 70 ohms, and open is detected for resistances over approximately 1.4 Mohms.



- 17. The charge air temperature sensor is considered bad if it is shorted or open. The unit detects a short for resistance below approximately 70 ohms, and open is detected for resistances over approximately 2.5 Mohms.
- 18. The RETARDER L input is provided to sense the RETARDER switch. This input is active when pulled to ground. A pull-up to 5V is provided on the card.



Wiring:

Standard WeatherPak connectors on 6 inch leads provide connection to this unit. Use 16 AWG wire for power, the proportional valve and the solenoid valve. Use shrouded coil connectors. The fuse should be located as close to the power supply as possible. This will protect the wiring and the unit. Use only an AGC-5 fuse. Failure to use a fuse invalidates the warranty.