



Voltage to PWM to Voltage (VPV) Converter

P/N 236-803 Rev 3

Introduction

This device is a voltage to pulse width modulation (PWM), or PWM to voltage converting module for use in an HVAC system. In V-P configuration, the output PWM duty cycle is directly proportional to the applied input voltage. Likewise, in P-V configuration, the output voltage is directly proportional to the PWM input. This allows a controller producing a voltage output to drive an ECM type fan motor requiring a PWM input or a controller producing PWM ECM output to drive a variable speed fan with a 0-10V drive signal. The converter detects the type of signal from the controller, and creates the appropriate output to drive the fan. There is a switch closure between pins 12 and 13 which is closed when the G line is active, and is open when the G line is inactive.

Inputs

- 0.5V - 10V DC
- 12V DC PWM

Outputs

- PWM, 12V DC
- 0 - 10V DC
- "G" Line
- Relay closure

Pin 1 is in the upper-right corner when the VPV is viewed with connector pin-latch up and the label at the top.

| Pin Connections | | | | | |
|-----------------|-------------------------------------|----------|-----------|---------------------------------|--|
| | Output Common | 1 | 9 | 24V AC Common | |
| | | 2 | 10 | 24VAC | |
| | Input Common | 3 | 11 | Output Common | |
| TOP | 12V DC PWM <i>or</i> 0-10V DC Input | 4 | 12 | External Supply Switched Output | |
| | Factory use only | 5 | 13 | External Supply For Switch | |
| | Factory use only | 6 | 14 | 12V DC PWM Output | |
| | Factory use only | 7 | 15 | "G" Output | |
| | Factory use only | 8 | 16 | 0-10V DC Output | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | BOTTOM | |

NOTE: Pins 1, 3, 9, and 11 are tied together within the converter.

Operational Information

The converter pauses for one second before initial turn on. This allows the unit to stabilize before beginning the conversion process. After one second, the converter will function normally.

The converter uses analog and digital filters which helps it to reject line noise and respond only to the actual input signal. This slows the response of the converter when the input signal's magnitude is changed quickly. Therefore, when changing from off to high speed or vice versa, it will typically take about eight seconds for the converter to synchronize with the new input signal. This is hardly noticeable though because the converter reacts more quickly than the slew rate of a typical ECM fan.

There are three LEDs in this unit. One LED is by itself and the other two are together. The lone LED is a power indicator, and illuminates whenever 24VAC is applied to the device. The LED pair illuminates to indicate the output condition. When the pair of LEDs are out, there is 0V out on the DC output pin, 0V on the G output, 0V on the PWM output, and the pin 12 to 13 switch is open. When the pair are full brightness, there is 10V on the DC output, 12V on the G output, and 12V on the PWM output. Any other time when the device is operating, one in the pair of LEDs will be full brightness, which indicates the G output is at 12V and the pin 12 to 13 switch is closed. The other

LED will be dimmer, and is an indicator of the 0-10V output or the duty cycle of the PWM output depending on the configuration in which the device is being used (V-PWM or PWM-V).

Operating Specifications (Ta=25C)

| Power Requirement | | |
|--------------------------|-------------------------|-------------|
| Voltage | 24VAC | |
| Current | 55mA Typ | |
| DC Input | | |
| Step Response | 10s Max | |
| Turn-on Threshold | 0.5V +/-0.1V | |
| Tolerance | +/-1.5% Typ | +/-2.5% Max |
| PWM Input | | |
| Frequency Response | 20 - 20,000Hz | |
| Voltage Output | | |
| Tolerance | +/-1% Typ | +/-2% Max |
| PWM Output | | |
| Frequency | 125Hz Typ | |
| Duty Cycle | 5 - 100% | |
| Amplitude | 0 - 12V DC | |
| "G" Output | | |
| Voff | 0V DC | |
| Von | 12V DC | |
| Relay Closure | | |
| Vmax | 40V DC | 28V AC |
| Imax | 250mA | |
| Environmental | | |
| Operating Temperature | 10 - 50C | |
| Humidity | 5 - 95%, non-condensing | |