



**Applied Processor and Measurement, Inc.**

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## **Model 205 PWM Controller Installation Guide Supplement**

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### **1.0 Summary**

The Model 205 PWM Controller has been updated to a new version of hardware (version 4 or V4) in 2022. The upgrade was necessary due to component shortages and obsolescence noting that the previous version controller (V3) was designed back in 2006.

This document describes the connections on the V4 Model 205.

### **1.1 Scope**

This document describes the connections of the Model 205 V4 (Version 4) controller released in 2022. For information on controllers purchased before 2022, please see the website for the Version 3 controller documentation.

The V3 and V4 controllers can be distinguished by the LCD display. The V3 controller has a 2 line by 16 character display whereas the V4 controller has a 4 line by 20 character backlit display.

### **1.2 Version 4 Hardware – Differences from the Version 3 Controller**

The Model 205 PWM Controller internal circuitry has been updated with recent integrated circuit technology, however, its performance, operation, and specifications meet or exceed the previous Model 205 unit. Major changes are listed below:

- a 4 line by 20 character backlit display
- it is no longer necessary to connect the input power (+) to the output (+), this connection is internally made
- a 5V only, PWM output signal is available for low-drive applications
- internal current sense circuitry is included which provides a voltage output proportional to the average PWM current output
- pluggable terminal strips for all I/O connections

The new unit is slightly larger than the current unit (8.66 in. x 4.33 in. x 1.76 in. compared to 7.5 in. x 4.0 in. x 2.25 in.).

There are no changes to the operation or serial port commands on the V4 unit.

## **2.0 System Connections**

### **2.1 Power and PWM Output Connections**

The table below describes the connections for the input power and PWM output.

Signal	Description
PWR+	Input power positive terminal, 7 to 28V DC
PWR-	Input power negative terminal, 0V, serves as controller ground (GND)
PWM OUT+	Voltage output to device / load
PWM OUT-	Open-Drain MOSFET output to device / load Note: the output is switched between open and GND

Connection notes:

1. Do not connect system ground to the PWMOUT- terminal. Also, do not connect the GND of an oscilloscope probe to PWMOUT-, use the PWR- (GND) terminal as the system ground point.

#### **2.1.1 Internal Diode**

An S2BA-13-F general purpose diode is internally connected across the PWMOUT+ and PWMOUT- terminals.

If your device has an internal diode, or your application requires a different diode, the S2BA-13-F may be removed from the circuit. To remove the diode from the circuit, open the back cover of the unit and remove the jumper at JP1 pins 1 and 2.

The default factory setting is that the jumper using the internal Model 205 diode is installed (jumper JP1 pins 1 and 2).

### **2.1.2 Internal Connection Between PWR+ and PWMOUT+ Terminals**

There is an internal jumper wire connected to a terminal block on the main circuit board that connects the PWR+ input to the PWMOUT+ output. This allows for the Model 205 internal current sense circuitry to operate, measuring the PWM average current and providing a proportional voltage output on the Signal Outputs connector.

This feature may only be used if the operating voltage is between 7V and 28V DC. The PWM output may be connected in a dual supply configuration with a PWM output ranging from 5V DC to 42V DC (see User Manual for dual supply connection configuration). For dual supply operation, the internal jumper **MUST BE REMOVED**. In this case, the Model 205 will not provide the current outputs on the Signal Outputs connector.

To remove the jumper, open the back of the unit. The terminal block (J11) is a 2 pin block with screw terminals and a white 20AWG jumper wire. Remove the wire and replace the back cover.

### **2.2 Control Inputs**

The V4 Model 205 has an 8 pin pluggable terminal block on the lower left side of the controller unit for control signal connections. Connections are as per the table below.

Pin Number	Signal Model PWMC-205	Signal Model PWMC-205-DF only
1	Frequency Control	Frequency Control +
2	Duty Cycle Control	Frequency Control -
3	No Connection	Duty Cycle Control +
4	No Connection	Duty Cycle Control -
5	5V Output (25mA maximum)	5V Output (25mA maximum)
6	GND (common to PWR- input terminal)	GND (common to PWR- input terminal)
7	Digital Input +	Digital Input +
8	Digital Input -	Digital Input -

Connection notes:

1. Standard Model 205 inputs are single-ended, with a 0 to 5V input signal allowed.  
**NOTE:** a system ground loop in a single-ended connection configuration may damage the Model 205 analog input.
2. Model 205-DF (differential inputs) are fully differential, 0 to 5V inputs. The '-' terminal is not connected to system GND (PWR- input terminal), i.e. there is no common ground on the analog control inputs to prevent any system ground loops.
3. The digital input is polarized as shown and is an optically isolated input capable of a 5 to 24V DC input.

### **2.3 Signal Outputs**

The V4 Model 205 has a 6 pin pluggable terminal block on the lower right side of the controller unit for output signal connections. Connections are as per the table below.

Pin Number	Signal	Notes
1	5V PWM Output	Low Level 5V signal PWM Output (25mA max)
2	GND	common with PWR- terminal
3	Average Current	(DC) Voltage Output Proportional to Average PWM Output Current
4	GND	common with PWR- terminal
5	Unfiltered Current Waveform	Voltage Output Waveform of PWM Output Current
6	GND	common with PWR- terminal

The average current output and unfiltered current output voltage are scaled to provide approximately 0.5V per 1A output. The maximum output range is 4A.

Note that the average current output provides a DC average of the PWM output current. The output is intended for high frequency PWM operation (>400Hz). Frequencies below 400Hz, loads with low current (<50mA), or signal driving applications only will not provide a usable average (or waveform) signal output.

### **3.0 Notes**

Refer to the Model 205 User Manual for complete information.

### **4.0 Revision History**

<u>Revision</u>	<u>Date</u>	<u>Description</u>
-	6/8/2022	original release

### **5.0 Contact Information**

For further information and controller purchase contact:

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