Applied Processor and Measurement, Inc.

Model 400
Pulse Width Modulation Driver / Controller

FEATURES

• signal conditioning style unit, small form factor

• lowest cost PWM Controller Model using accurate and reliable APM, Inc. digitally generated PWM technology

• function: analog in, PWM duty cycle out

• adjustable pulse width modulated output square wave with the following characteristics:
  ▪ frequency, user configured, 2 to 500 Hz
  ▪ analog control of 0 to 100% duty cycle output

• duty cycle output adjustable in 1.0%, 0.5%, or 0.2% (configurable) steps in proportion to 0 to 5V analog input

• configurable to operate with normal or reverse acting analog input, 0 to 5V for 0 to 100% out, or, 0 to 5V for 100 to 0% out

• differential analog input, over +/- 100V common mode rejection

• optically isolated output enable input – enable / disable PWM output from external source such as a PLC digital output

• output monitor and status/fault indicator LEDs

• power MOSFET output with low side load control - PWM output sinks up to 4A at 12V

• controller operates from 9V to 24V DC

• load may be operated with up to 50V DC

• remote operation and setup via RS-232 port
  ▪ set operating frequency
  ▪ enable / disable features
  ▪ readout current settings
  ▪ control output duty cycle via RS-232

• industrial temperature range, DIN rail mountable, rugged construction, multi-layer PCB, state of the art surface mount devices and assembly processes – designed for high reliability and long service life

APPLICATIONS

• analog to PWM output signal conditioner for PLC or Computer Control System to drive high current PWM controlled devices
  ▪ PWM drive for valves, actuators, solenoids
  ▪ solenoid life cycle testing
  ▪ signal generation
  ▪ lighting control / dimming

• RS-232 to PWM output signal conditioner

• programmable PWM signal generator

• cost sensitive, OEM / production applications

DESCRIPTION

The Model 400 Pulse Width Modulation Driver / Controller from Applied Processor and Measurement, Inc. generates a pulse width modulated, variable duty cycle, electrical switching signal. The product is used in automotive and industrial applications where valves, solenoids, actuators, or other magnetic / mechanical elements are developed, applied and / or tested. The Model 400 PWM Driver is a low cost, small form factor module designed for signal conditioning applications where computer based control systems or PLC's are used to drive elements containing PWM controlled valves or actuators. Its small size and low cost also make the Model 400 PWM Driver / Controller ideal for OEM and production applications.

The Model 400 PWM Driver / Controller contains microcontroller based circuitry which allows for precision generation of the output PWM carrier frequency and duty cycle. The output duty cycle is controlled by the Model 400 in proportion to a 0 to 5V analog input resolving in configurable duty cycle steps of 1.0%, 0,5%, or 0.2%. The PWM output frequency is also pre-configured using a PC Windows based configuration program and may be set to operate from 2 to 500 Hz. In addition to the analog input, there is an opto-isloated output enable input provided to disable the PWM output from a PLC digital output or any digital signal or manual switch. Built-in status LED indicators provide visual feedback of the output and controller status / fault conditions such as an open load or a blown output fuse.

A typical connection using the controller is shown in the diagram below. Using the analog input of the Model 400 PWM Controller allows the user to control the output duty cycle with an analog signal (0 to 5V). An external control system (for example: a PLC, or a PC with data acquisition cards) provides an analog output to the PWM Controller in order to control the duty cycle to the PWM device. In this manner, the PWM Controller is a signal conditioning element for the host computer and/or control system, which typically does not have a PWM output capability, or, the direct drive capability for supplying current for PWM controlled solenoids and actuators.
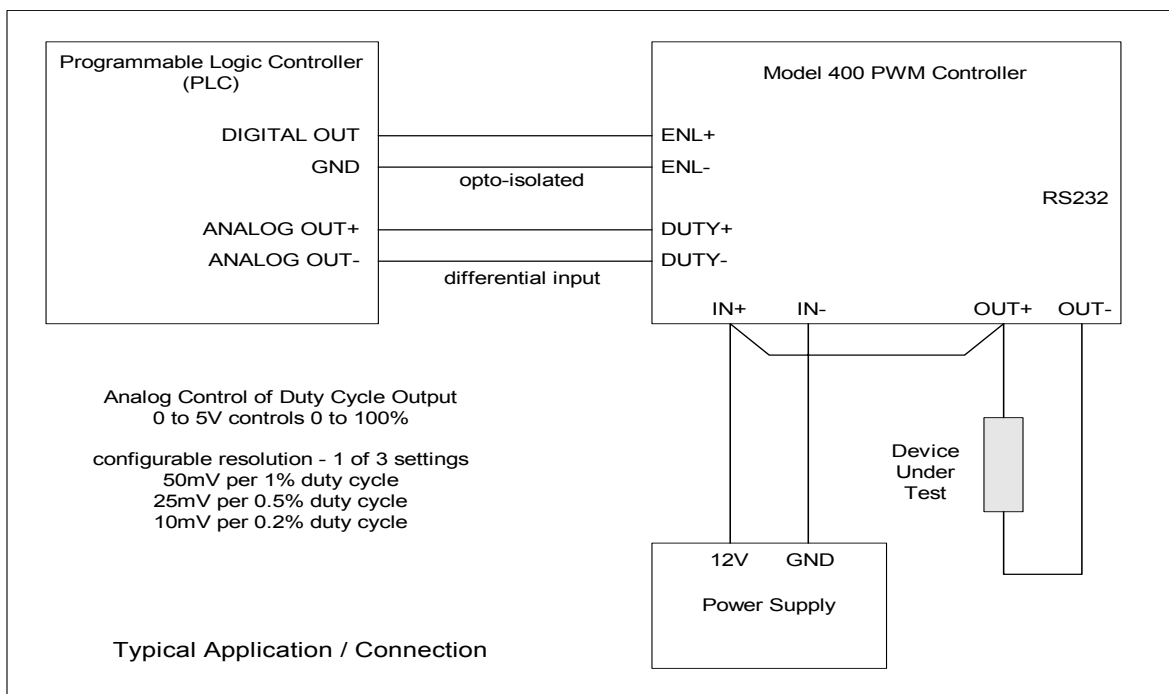
The PWM Controller output is an open drain power MOSFET output. This provides low side control of the load to be pulse width modulated. An external power source must be provided. This power source may be used to power both the load and the controller, however, the PWM Controller need not be powered by the same power source. This provides maximum flexibility since the load voltage can be set by the user using any variable power supply or it can derive power directly from the system under control (provided the controller is operated within the rated specifications). The Model 400 has a low operating current requirement and may be powered easily with a small, low-cost, unregulated wall type AC/DC adapter.

Configuration of the Model 400 PWM Driver / Controller is accomplished using PC based interface software (available from our website at no cost). The software communicates to the Model 400 unit via a serial port and stores the configuration settings to an EEPROM in the Model 400 unit. A kit is available which includes a Model 400 unit, a 12V AC/DC power adapter, and cabling enabling connection between the Model 400 and a PC.

A comprehensive User's Manual is provided on-line in PDF format which describes the operation and application of the PWM controller.

The Model 400 PWM Controller is packaged in a small, rugged, plastic enclosure and is also available for order with brackets for DIN rail mounting. Order numbers are provided below.

SPECIFICATIONS

- PWM Output: open drain Power MOSFET, maximum power dissipation 50W
    - ▪ up to 4A @ 12V, pulsed
    - ▪ must operate within safe area of IRLR2905
    - ▪ built-in fuse on output, standard value 4A
- PWM Output Operating Voltage: 50V maximum, 1V minimum
- Frequency: 2 to 500 Hz, configurable in 1 Hz resolution, typical error < +/- 0.2 Hz
- Duty Cycle: 0 to 100 %, adjustable in 1.0%, 0.5 %, or 0.2% steps, typical error < +/- 0.1% duty
- Analog Input: 0V to 5V DC, over +/- 100V common-mode voltage rejection
- External Enable / Digital Input: opto-isloated, 5V to 24V required to enable, 0V to disable
- Power: requires 9V to 24V DC, regulated or un-regulated external source
    - ▪ controller power consumption: 35 mA (approximate) at 12V DC
    - ▪ dual supply required for operating loads outside of 9V to 24V controller operating range
- RS-232: TX, RX, GND, 9600 baud, no parity, 8 data bits, 1 stop bit, 6 pin miniDIN connector
- Operating Temperature: -40 °C to +80 °C
- Size: 3.625 in. x 2.25 in. x 1 in. (1.25 in. height including I/O connectors)
- Warranty: 1 year, for manufacturing defects

ORDER NUMBERS

PWMC-400   Model 400 PWM Driver / Controller

PWMC-400-DIN   Model 400 PWM Driver / Controller, with clips for DIN rail mounting

PWMC-400-KIT   * Model 400 PWM Driver / Controller kit, includes:
    or   ▪ one Model 400 PWM Driver / Controller
PWMC-400-DIN-KIT   ▪ 12V DC, 500mA wall adapter in-line plug for connection to Model 400
                    ▪ cable adapter, miniDIN6 to DB-9M
                    ▪ cable, DB-9F to DB-9F
                    ▪ 5 replacement fuses for the PWM output, 4A rating

* The initial purchase of one kit is recommended since it provides all the cabling and equipment necessary to configure PWMC-400 units from any desktop or laptop PC prior to installation in the target system.

CUSTOM / SEMICUSTOM CONTROLLERS

All standard products from Applied Processor and Measurement, Inc. including the Model 400 PWM Driver / Controller are available for customization. The Model 400 can be designed to exacting specifications for your application, reducing cost for high volume applications, changing functionality, or adding features. For more information, contact APM, Inc. via our website, or, call to talk to one of our engineers. APM, Inc has been supplying embedded electronic controls for nearly 20 years for a wide variety of industrial, automotive and commercial applications.