

D&D Motor Systems, Inc.

Motor Controller Software Installation and Programming

1. Software Use and Calibration

The interface, "WEBControllerPRO", is a utility program which operates on Windows NT/XP operating systems. The program provides a fairly intuitive way to tune and calibrate the motor controllers operating parameters. The controller uses either COM1 through COM7 serial port, RS-232 logic levels, 9600 baud, 8 data bits, 1 stop bit, no parity.

Use a standard DB-9 pin / RS-232 serial interface cable to connect the controller to the PC. If your computer is not provided with a DB-9 pin serial port a USB to RS-232 Serial adapter / converter is available through www.StarTech.com and other sources.

Note: the controllers RS-232 serial port is referenced to the B- battery connection.

Beware any possible ground loop faults which could damage both the Controller and PC, plus the person doing the work! Disconnect all battery charging sources while programming your Controller.

2. Software Programming Features for Series Motor Controllers

The user interface (WEBControllerPRO) is designed to run on a PC using Windows NT/ XP. Compatibility issues with Windows 95/98/2000/ ME are known to exist.

Hardware : The controller requires your computer be equipped with a 9 pin RS232 serial port or equivalent port expander. Some newer PC's only have USB serial ports, these will require a USB to Serial adapter. A 9 pin standard serial cable (DB-9 connector, male on one end, female on the other) up to 50 feet in length may be used to link the computer to the controller.

The controller must be powered before the WEBControllerPRO program will have any effect. When the controller is connected to the PC, and both units are energized, launch WEBControllerPRO.exe.

3. Software Installation

Installation Instructions:

1. Insert the CD into the CD Drive.
2. Click on the **My Computer** Icon.
3. Now Click on the appropriate Drive.
4. Single Click on the **WEBControllerPRO.exe** file, then drag it to your Desktop. This will install the WEBControllerPRO.exe file on your desktop. Double Click on the Icon to Run the Program

TroubleShooting:

If you see an error “Motor Controller Not Responding”, the serial port properties will need to be changed. Hit “OK”, and the Motor Control Monitor (“Monitor” hereafter) should be displayed.

Click Settings, Port... This allows you to tell your computer which of several available serial ports it should use to communicate with the controller. Trial and error selection will work if you don't know your computers port assignment. Select COM1, then OK. Select the “Control Panel” pane, and click “Refresh”. If the program pauses, then displays the error “Motor Controller Not Responding”, Repeat this step, selecting the next higher COM port number. If, after going through this the controller will still not establish communications with the PC, try changing the port COM address, then close the WEBControllerPRO program. Turn the controller off, then back on. Observe LED on controller went out, then came back on, indicating you cycled the power. Restart the WEBControllerPRO program. Repeat this sequence of events, changing the COM port address each time, until the controller establishes communications. When communications is established with the controller, a Model number (ex. AXE4844) should be displayed in the Control Panel pane, along with the current configuration of the motor controller. Once communications has been established, the program will subsequently recall the correct COM port on your computer. The top row of functions is Settings, Tools and Help. The normal parameters of the “settings, program...” portion of this program will enable the software to work on virtually any PC. However, in some very electrically noisy systems, it may be necessary to increase the write delay above 20mS or increase the number of retries, such that communications errors are eliminated.

4. Programming

Tools: This function of the program allows you to reprogram the main executable program that operates the controller (to modify the behavior of a standard controller by adding special features like increased throttle response speeds for go-karts) or extract an error log from the controller for diagnostics.

Upgrade: This function loads a new executable program into the controller.

Reset: Restarts the controller without cycling the power.

Write error log: This function downloads the last 32 (if any) errors that the controller has logged into it's EEPROM memory. These are things like HPD, hi/low battery voltage, and over/under temperature.

Main Function Panes of the WEBControllerPRO.exe Program Control Panel

This pane allows you to alter the operating characteristics of the controller. Changes made on this pane only take effect after the “SET” button is pressed. “Refresh” will read the current settings from the controller. After any changes have been “SET”, always click “REFRESH” to confirm the changes. Note HPD and Plug Brake switches only take effect at power up, the power to the controller will have to be cycled before these two controls have any effect on the machines operation. The “DEFAULTS” button will restore the factory default values of the sliders, note that SET must still be pressed for these parameters to be stored in the controller.

High Pedal Disable:

Checking this box enables HPD, which will prevent the controller from providing output power in the event the throttle is applied when the controller is powered on. When this box is clear, the controller will start up and provide output power, when KSI energized, regardless of initial throttle position.

Plug Brake:

Checking this box enable plug braking on those controllers equipped with an A2 bus bar terminal. Plug braking on controllers is proportional to throttle position, reaching full braking force at about 25% of throttle travel. Deselecting this box disable plug braking, the unit will apply normal power to motor if direction is reversed. (vehicle may jerk or spin tires if motor direction is reversed while in motion).

Maximum Output Current:

This slider adjusts the maximum output current that the controller can provide to the motor. Output current is adjusted as a percent of the maximum rating of the controller. For example, an 4844 will provide a maximum of 400A to the motor when this slider is set to 100%. A 75% setting on Maximum Output Current will limit the controller to 300A, 50% will limit the max output current to 200A and so forth.

Under Voltage:

This slider sets the undervoltage shutdown of the controller, in units of 1/10ths Volt. Generally speaking, it is undesirable to pull the terminal voltage of a 6V lead-acid battery below 4.0V, for example 24V on a 36V system.

Over Voltage: This slider sets the maximum operating voltage of the controller. If the voltage present across the B- to B+ bus bars exceeds this setting, the controller will not produce output, given that DC voltage is below the absolute ratings of the controller.

Throttle Up Rate:

This slider adjusts the rate at which the controller increases it's output current in response to an increase in throttle position. 1 is the slowest, 15 the fastest.

Throttle Down Rate:

This slider adjusts the rate at which the controller reduces it's output current in response to a decrease in throttle position. 0 is the slowest, 15 the fastest. It is recommended that this parameter typically be set to twice the value of the throttle up rate, when throttle up rate is less than 7. Lower values of Throttle Down Rate can result in the vehicle feeling as if their were a large flywheel connected to the motor.

Brake Current:

On those models equipped with a plug brake (suffix "P" in the model number), this slider adjusts the amount of brake current as a percent of maximum available brake current. Refer to specifications for maximum available brake current depending on the model of controller.

Throttle Response Pane:

This pane allows you to select which type of throttle position sensor the controller is working with and what type of throttle response profile to use with the sensor. Changes to throttle sensor type check boxes must be SET to take effect, and then only after the power to the controller has been cycled do they actually change the sensor type.

Throttle Sensor Type:

0-5K Ohm:

When selected, the controller interprets 0 ohms = full off throttle, 5K ohms equals full on. Specifically, Zero ohms to 180 ohms = full off, 4.7K to 5K = full on.

5K-0 Ohm:

When selected, the controller interprets 5K ohms = full off throttle, 0 ohms equals full on. Specifically, Zero ohms to 250 ohms = full on, 4.3K to 5K = full off.

0-5V:

This selects a voltage controlled type of throttle input. 0V = full off output from controller, 5V = full on. Actual operating range is 0.15 – 4.90V.

EZ Inductive:

This throttle sensor type is compatible with the EZ-Go type of inductive throttle position sensor (ITP).

MONITOR Pane:

This screen is the status monitor of the controller, it gives you the ability to measure and record numerous operating parameters of the motor controller and the vehicle in which it is installed. When used with a Notebook computer, both real-time data display and data logging may be performed while the vehicle is in use. This gives the vehicle designer significant insight to the interaction of the motor controller with other system components. Log files may be used for problem analysis and diagnostics. You can email the log file to sales@ddmotorsystems.com for a detailed analysis by our applications engineers.

Interval:

This checkbox selects the update rate, or frequency of data collection. For real time display, select continuous. When used in conjunction with “Log to File”, a slower update rate may be more desirable to reduce the amount of raw data being gathered.

Monitor:

Start/Stop: This starts and stops the data measurement process

Select All: Checks all the gauges

Clear All: Deselects all the gauges

Log to File:

This checkbox will log all of the selected gauge values to a file when selected. The file is in a comma delimited format (CSV) which can be imported into a spreadsheet program like Excel and viewed. The resulting file will be placed into a subdirectory called “Logs” in the same directory as the program WEBControllerPRO.exe.

Gauges:

These are the motor controller parameters which are to be monitored. Checking an adjacent box enables that measurement. Clicking “Refresh” will perform a one-time update to the gauges which are selected. It is generally recommended that you select all the gauges, as this will provide the most insight into the operation of the controller.

Throttle Position: This gauge displays the % modulation of the controllers PWM output. For example 50% would be ½ throttle. The displayed parameter is the actual throttle position, limited by the fact that the controller could be in current limit. If the controllers output current reaches the maximum rating, the throttle position won't advance any further, regardless if the throttle is floored.

Controller Temperature: This is the internal temperature of the controller, in Celsius.

Accuracy: +/- 5%.

Battery Voltage: This is the voltage present across the B+ and B- bus bars of the controller.

Exception: Club Car compatible models. This is the voltage present across the KSI input to B- bus bar of the controller. Accuracy: +/- 5%

Output Current: This is the measured output or motor current of the controller.

Accuracy +/-10%

Battery Current: This is the calculated input or battery current to the controller. It is calculated as: Battery current = motor current x throttle position %. It is accurate, given that motor current is continuous (which it generally is with any series motor), not discontinuous. Accuracy: +/- 10%

Error Flags: This register should display as 0x00 during normal operation. Any value greater than zero is an error, and the controller will not provide any output power. At the moment, this data is in hexadecimal format. If the two right-most hex digits (those to the right of 0x) are converted to an 8 bit binary value, the individual bit positions (with bit 0 being the right-most digit) when set represent the following error flags:

Bit 0 set = Throttle Position Sensor Over Range

Bit 1 set = Under Temperature. Controller below -25C

Bit 2 set = HPD. Throttle hasn't gone to zero during this power on cycle.

Bit 3 set = Over Temperature. Controller over 95C

Bit 4 set = unused

Bit 5 set = Battery Under Voltage detected. Battery V < undervoltage slider

Bit 6 set = Battery Over Voltage detected. Battery V > overvoltage slider

Bit 7 set = Controller in boot sequence. Occurs within 25mS of power up.

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