

PWM 50A w/LCD Controller

For a quick installation, we have provided these important notes:

There are two main parts to your PWM:

- 1) The LCD Display 'Controller'
and
- 2) the Constant Current PWM enclosed in the box with cooling fan.

You can refer to these as the 'Controller' and the 'PWM'.

For the Controller

Start by connecting the Cat-5 Computer Cable into the back of your LCD Controller.

Use the supplied screws to close the case.

Initially, you will want this nearby the HHO system, and later you can install it inside the vehicle.

For the PWM

There are four heavy gauge wires on the back of your unit.

The Red and Black are for the Battery terminals and the Green and White go to the positive and negative terminals of the fuel cell. It does not matter which you use for which.

The small, lighter gauge wire is the voltage sensing wire.

Connect this wire to a 'switched' ignition ON source wire.

Understanding the Pre-Programmed Menus

Once powered ON, the Display shows A-D and V-R.

These are for the LCD to show the (A) Amperage, (D) Duty Cycle, (V) Voltage and (R) - Fan RPMs.

Pressing the knob in once will bring the Display to MENU mode.

There are Seven (7) individual Menus to Review.

Rotating the knob will bring you to each menu, with the last selection being #7, the EXIT mode.

The two most important menus are #3 PWM Constant Amps and #4 Voltage Sensing.

3) PWM Constant Amps

This is set by default to 10 amps. Turn the knob to increase or decrease the value, then press the knob in to save the setting.

4) Voltage Sensing

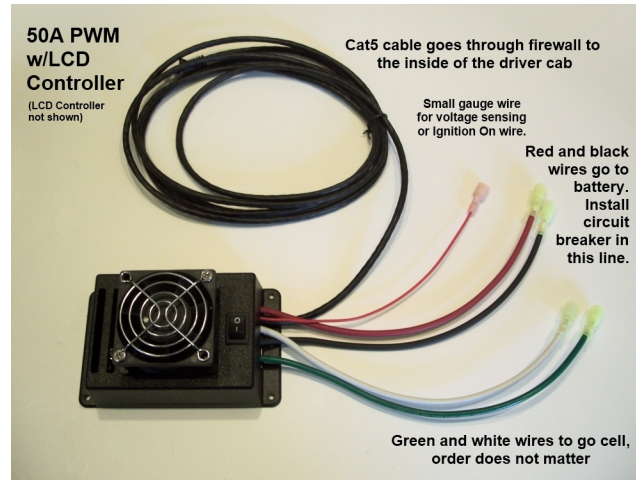
This is a very advanced feature of your PWM. The Factory default is 'N' for No or Off.

Advanced Notes on Voltage Sensing (Ok to read later)

Please note this feature can be confusing when first installing your PWM. The voltage sensing feature will not allow the PWM to turn on unless the vehicle is running, and therefore senses the alternator running at higher than the battery's standard 12 volts.

When you are ready to use this feature, Select 'Y' for Yes and the unit will automatically power on and off at specific voltage levels. The default settings are 13.5 Volts for turning ON, and the unit will automatically shut down when it senses only 12 Volts.

As with any of our products, if you have trouble please contact support@hydrogenmonkey.com.



Wiring the PWM

Refer to the picture above. The PWM has large wires for connections to the battery and the cells. These are colored red for battery positive, black for battery negative, and white and green for connections to the cells. Note the cells don't care which terminal gets white and which gets green, but the positive voltage from the PWM comes out on the white wire.

The small red wire should be connected to your fuel pump relay. This is a control wire that will only allow the PWM to operate when voltage is detected on this wire. Make the connections between the battery positive and the PWM, and between the PWM and ground. Use at least 12 gauge wire for 2 cell systems, we often ship with 10 gauge for extra reliability..

Next run the cables from the PWM to the cell(s). The connections to the cells are made at the tabs on the top of the cell. We provide 1/4" quick disconnects that you can crimp onto your wire for making these connections. One tab will get the PWM output positive, and the other will get the ground. It doesn't matter which goes to which tab. In fact, its a good idea to switch the connections every 6 months, to make the plates last longer.

There is a 5th wire that is labeled "ignition on" or "fuel pump relay". This wire needs to have 12 volts provided to it in order for the system to come on. This can be connected to any circuit that is only hot when the engine is actually running. We almost always use the fuel pump relay for this, but you should test the circuit on your vehicle. Make sure the fuel pump relay only provides voltage when the engine is running. When the engine is off, and you turn the car key to the "ACC" position, the circuit will possibly activate momentarily, but will otherwise be off. This is what you are looking for. Its very important that the system not make gas unless the engine is actually running. If your fuel pump relay won't work, another good circuit to try is your oil pressure sending unit.

With all of the above being said, the PWM also has a voltage sensing function. The directions for setting up this function will be described in the programming section below. But, when this function is turned on, if the voltage drops below a preset level, the PWM will turn off. It will only be on if the voltage is above its "on preset" level. These presets can be adjusted to your engine's electrical environment. But for example if the "on preset" is at 13.5 volts, the PWM will not come on until that voltage is achieved. This basically means that the alternator must be going to get the voltage higher than 12 volts, and therefore we know the engine is running.

If the "off preset" is set to 12 volts, the PWM will not turn off until the alternator has stopped turning, and the voltage at the battery drops back down. Once you have your presets set for your engine environment, this provides an extra margin of safety. But I always use the fuel pump relay connection too, so I have both safety

measures working for me. *Failure to employ these safety measures can create a situation whereby HHO gas is being made and accumulating under your hood, and this can lead to a dangerous explosion.*

Since it's part of the PWM wiring, I'll also describe how to install the controller/display unit. I recommend holding off on this step until later, so you can make sure everything is working properly. Once that occurs, you can run the cable through your firewall and mount your display in the engine compartment. To do this, you must remove the back of the display box. There are 4 screws on the back. Then unplug the connector that plugs into the circuit board. Note that this is an 8 pin computer connector that you have probably seen in your home computer and internet network. There is a tab that must be depressed to let the connector come out of the socket, but the tab is hidden under the connector, so you must carefully depress it with a small screwdriver or similar tool before attempting to pull the connector out. Once that's done, you can route the cable through a hole in the firewall, and then plug it back into display.

Programming the PWM

Get power to your PWM. To do this, turn on the engine and let it idle. This will activate the control circuit and allow the PWM to power up. This will also light up the display/controller unit. You'll see some statistics for your PWM on the screen after a short intro.

Press the knob once to enter setup. Now you can turn the knob to cycle through the different functions that can be set up. When you get to one you want to change, press the knob once, and you'll enter that setup screen. Turn the knob to make any changes you want, then press the knob again to accept the setting. Some screens have multiple settings, and you turn the knob to make any needed changes, and press the knob to accept each setting. Finally, none of your changes will remain in memory unless you turn the knob to the final screen that is labeled, "Exit". You must press the knob at this screen for your changes to be recorded in memory.

Now lets go through the screens:

1. Set Intro. This just sets whether you will see the opening screen with the software version information when you first start up the PWM. Settings are "Y" and "N"
2. Lifetime timer. There is nothing to set for this one, but it will show you the number of hours the PWM has been running. Press the knob again to exit this screen.
3. PWM Constant Amps. Use this screen to set the maximum amps that the PWM will allow. This should be set for 12 amps for 1 cell systems and 24 amps for 2 cell systems. We do not recommend putting any more than 12 amps per cell as overheating can occur and damage the cell.
4. Volt Sensing. This item has several settings. The first is "Y" or "N", and sets whether volt sensing is activated. If not activated, the system will not shut down on low voltages, and will only shut down if turned off by the switch or if 12 volts is removed from the control wire. If "Y" is selected then the next 2 screens will allow you to adjust the On and Off voltages. Start out with 13.5 volts for your "on voltage" and 12 volts for your "off voltage". You may need adjust these later, but this will be a good starting point.
5. Level alarm. This is a new function that will cause the display to sound an alarm when the level gets too low. It requires some additional setup of your reservoir, and is not yet fully implemented. For now, set this to "N".
6. Calib amp meter. This is used to calibrate the amp meter. Before pushing the button on this setting, you must disconnect the cells from the PWM. Just unplug them. We want 0 amps to be passing through the PWM. Then press the button. The controller will then calibrate itself.
7. Exit. If any changes are made in the above steps, you must turn to this function and press the button. This will cause your settings to be saved.

When in normal run mode, the display shows some key operating statistics. The top line, labeled "A" and "D", stands for amperage and duty cycle. You will see these values in real time to the right. The next line has "V" and "R", and these show system voltage and fan revolutions.