VaporWorx

We Give You Gas

WARNING

Working with fuel is dangerous. If fuel is handled improperly it can lead to fires and death. It is imperative above anything else that all appropriate safety measures be used to control the fuel and any ignition sources, including static electricity, heat, sparks, and any other sources. Proper high-pressure fuel lines and connections must be used in accordance to the manufacturer's specifications and routed away from any potential sources of heat, ignition, and protected from mechanical damage. If you are unsure about your work or safety, stop work immediately and consult with VaporWorx or a qualified automotive technician and/or safety official.

Instruction sheet for the KPM1500 Ally speed control system. For use only with the VaporWorx supplied KPM1500 fuel module only (not Streetfighter.)

The purpose of the "Ally" system is to allow the OEM Pulse Width Modulation Fuel System Control Module/Fuel Pump Pressure Module/Fuel Pump Driver Module/etc. to control one pump in the KPM fuel module while the VaporWorx controller powers the other. When used this way the power output of the FSCM typically remains within factory power thresholds, meaning that MIL codes are minimized. FSCM fuel system programming is done as normal since the Ally controller is transparent to the OEM system.

The Ally works by using any FSCM pulsed positive output as a guide for function. Both pumps, powered by separate sources, are under the single control of the FSCM. Hence, the OEM feedback and diagnostics remain in place. In this application, both pumps must together whenever the engine is on. The KPM1500 pumps do not have a built-in check valve, hence the second pump cannot be turned off since it will allow fuel to backfeed and cause a severe leak.

Voltage boosters can also be used subject to the maximum voltage that the OE FSCM can accommodate. Often the maximum voltage before trouble codes are noted is 16.5v. Note that voltage boosters are typically not effective with high-power pumps. Testing has shown that, for example, a JMS FuelMax will add only 1v at full power and is not considered a useful upgrade.

What other parts are needed?

1) An inline fuel filter with a 10um (micron) or smaller filtering element. Radium Engineering has excellent inline filters that use the modern microglass 6um filtering element that meets the stringent requirements for Bosch injectors (Injector Dynamics.) **Regular filter servicing is mandatory to prevent clogging which will lead to lean engine running conditions.** It is suggested to purchase a few extra filter elements as maintenance spares.

2) If changing to an AN-type line, new fittings to connect to the pump and install the OEM fuel pressure sensor will be needed. OEM 3/8" / 10mm lines have shown to be effective to 800-850fwhp on e85. ½" lines have shown to be effective to 1200fwhp.

VaporWorx was founded on Customer Satisfaction and Service. We strive to treat people and our products the way we would want others to treat us and the products we purchase. That is why our products are tested thoroughly before they are packaged and shipped. VaporWorx stands behind our products for one full year after purchase with a well-stocked repair facility and quick turnaround times. VaporWorx does not want to be the reason you cannot enjoy your car.

Limited Warranty

VaporWorx warrants its products to be free from defects in material and workmanship under normal use and if properly installed for a period of one year from date of purchase. If found to be defective as mentioned above, it will be replaced or repaired if returned along with proof of date of purchase. This shall constitute the sole remedy of the purchaser and the sole liability of VaporWorx to the extent permitted by law, the foregoing is exclusive and in lieu of all other warranties or representations whether expressed or implied, including any implied warranty of merchantability or fitness. In no event shall VaporWorx be liable for special or consequential damages. This warranty is only valid on products purchased from VaporWorx or their Authorized Dealers.

Service

In case of malfunction, your VaporWorx component will be repaired free of charges according to the terms of the warranty. When returning VaporWorx components for warranty service, Proof of Purchase must be supplied for warranty verification. After the warranty period has expired, repair service is charged based on a minimum and maximum charge rate. (Contact VaporWorx for current rates).

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The following steps will help to ensure good fuel module operation and long life. Careful attention to wire routing, protection, strain relief, connectors, crimps, etc. will lead to a longer lasting and more reliable installation. Appropriate safety equipment, lifting procedures, jacking, vehicle support/jackstands, PPE, and all other proper and safe work methods must be utilized at all times. It is your responsibility to protect yourself and others while working the car, so take time to prepare and confirm that your work areas in, around, and under the vehicle are safe. An appropriate ABC rated fire extinguisher must be at the ready at all times.

Note that the following instructions only apply to a VaporWorx supplied KMP1500 fuel module. If a KPM1500 fuel module that is not supplied by VaporWorx or not modified using VaporWorx supplied parts is used malfunction will result and possibly cause damage to the OEM and VaporWorx control systems and KPM pumps.

1) See the Wiring Diagram on the last page for reference.

2) Disconnect the negative cable from the battery.

3) Using the OEM shop manual as a guide, remove the fuel pump from the tank. This may require removal of the tank from the vehicle. Alternatively, a hole may be cut into the floorboard to allow top access to the fuel pump. Chassis specific access panels are available from a variety of sources that allow easier access to the fuel pump.

   Helpful tip: Wrenches for the large black fuel pump locking ring are available on Amazon for about what a lunch costs. It's well worth it vs. the internet "hack" using a hammer and punch.

4) Using the OEM shop manual as a guide, install the new VaporWorx supplied KPM1500 fuel pump module and new green sealing ring. A KPM-supplied fuel level sensor may also be used but is not needed for controller operation. The KPM sensor, like the OEM, has a 40F-250F ohm range.

5) Install an inline fuel filter of your choice. See the first page for suggested filters. The filter can be placed anywhere between the pump and engine. The lines must be cleaned/flushed before final attachment to the engine side.

6) Find a suitable **flat** surface to mount the VaporWorx pulse width modulation controller (black box) near the vehicle battery. It is imperative that the box be mounted as close and directly to the battery as practical. If not connected directly to the battery controller malfunction will result. Do not mount the controller and any wiring near sources of heat such as exhaust systems, radiators, etc. The cooler the electronics are during operation, the longer their expected life will be. Self-tapping screws are provided for mounting but other fastener mounting methods are acceptable. Heavy duty Velcro or double-sided tape can also be used. Confirm that the mounting screws will not penetrate fuel tanks, lines, electrical, body panels, or any other systems during installation.

7) Connect the supplied black 4' long wire from the controller BAT/PUMP- to the battery negative terminal. **Do not chassis ground.** Controller malfunction will result. Excess length should be trimmed to keep wiring lengths minimal. Ring terminals are included in the kit and must be securely installed. Heat shrink tubing is provided to insulate the ring terminal crimp area like that of the one already installed on the wire. Attach, but to not tighten the nut on the VaporWorx controller. The negative wire to the pump will be attached later.

8) Perform the same for the BAT+ fused link wire included in the kit. Connect the short end to the 12v+ terminal on the battery, and the long end to the VaporWorx controller. Cut to length and terminate the ends using the provided terminals and heat shrink like that for the negative wire. Confirm that the installed heat shrink does not wedge between the ring terminal and the controller stud. If it does, trim the heat shrink with a razor knife. Tighten the BAT+ nut on the VaporWorx controller to 10in-lbs. **DO NOT OVERTIGHTEN THE NUT.**

9) Plug the two-cavity GT150 connector with the grey wire into the mating connector on the VaporWorx controller. Install the protective braid and route the wire to the FSCM area or wherever the tie into the pump+ wire will occur. The red wire on the controller side of the plug will not be used. If preferred, this 20ga grey wire can be combined into the same harness as the VaporWorx fuel pump power wiring shown later in this instruction sheet (no small wire braid needed inside of the larger fuel pump wire braid).

10) The 20ga VaporWorx grey wire ties into the FSCM fuel pump+ wire. **It may be tied-in anywhere along the length of the FSCM pump+ wire. For this instruction sheet it will be shown with the connection made close to the fuel pump.** For GM chassis this is usually the heavy gauge grey wire that goes to the fuel module #1 plug cavity.

In some applications the FSCM fuel pump+ wire may be a different color or different position. Refer to the Shop Manual for your vehicle to confirm. See Photo 1.

Helpful Tip: The wire braid included in the kit is much easier to work with if cut and the ends are sealed with a soldering iron. Rolling the ends of the cooled wire braid between your fingers to break up the ends will make installing the braid over the ends of the wires easier. It may also be helpful to put a piece of blue painters tape over the end of the wire(s) to help make it easier to slide the braid on.

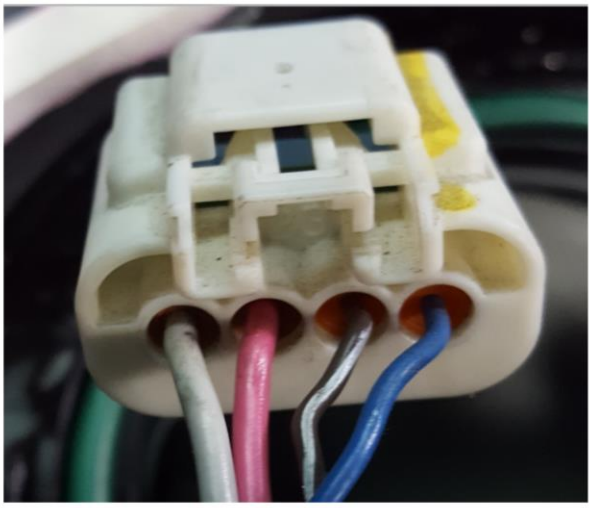


Photo 1. GM ZL1 Fuel Module Plug
Left to right:
Grey = Pump +
Pink = Pump -
Brown = Fuel level sensor low reference
Blue = Fuel level sensor output

Photo 1. FSCM wiring may be different colors. Refer to an OEM shop manual to determine the Pump+ and Pump– wiring colors.

11) Using Photo 2 as a guide, remove the Pump+ wire from the from the harness side electrical plug. The light blue end cap must be removed, and the terminal locking tab pried back with a miniature screwdriver. Only the Pump+ wire needs to be removed.

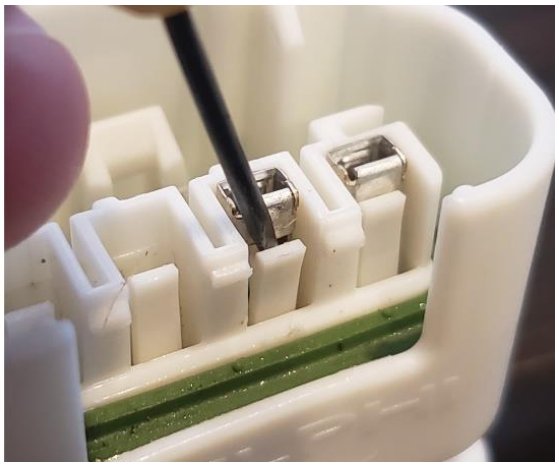
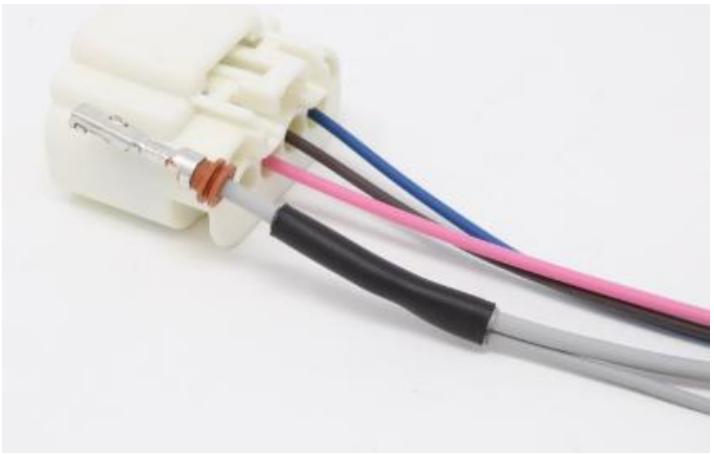


Photo 2. Gently pry the locking tab back to release the Pump+ terminal from the plug body. The wire and terminal will slide out the opposite side of the plug. Pump negative terminal shown for clarity.

12) Exercising caution, strip approximately ½" from the heavy gauge FSCM Pump + wire. Do not cut the FSCM wire.

13) Slide two ½" long pieces of small heat shrink on to the VaporWorx 20ga grey wire. Cut and strip the VaporWorx 20ga grey wire to the appropriate lengths, then secure the wire to the FSCM grey wire by soldering. Seal the connection with the supplied adhesive lined heat shrink. See Photos 3A and 3B.



Photos 3A and 3B. The VaporWorx 20ga grey wire is tied into the FSCM fuel pump+ wire. Use a small amount of solder to make the connection and seal with heat shrink or rubber self-sealing tape.

14) Re-install the Pump+ wire and light blue cap into the white fuel pump plug.

15) Slide the ½" pieces of heat shrink to the ends of the wire braid and heat to seal both ends.

16) Plug the white fuel pump power plug into the KMP1500 fuel pump hat plug.

17) There are two power studs on the top of the KPM1500 fuel pump hat. The stud with the red label is for VaporWorx Pump+, the stud with the black label is for VaporWorx Pump-. Using the hardware provided, attach the long 10ga VaporWorx wiring harness to the corresponding studs using the installed ¼" ring terminals.

18) Using a backup wrench to keep the studs from spinning, tighten each nut to 5 ft-lbs/60in-lbs. **Do not allow the studs to rotate.** Route the wires as needed to make a smooth and tidy installation toward the VaporWorx controller. The basic attachments should look like those in Photo 4, but your application may require a different routing path.

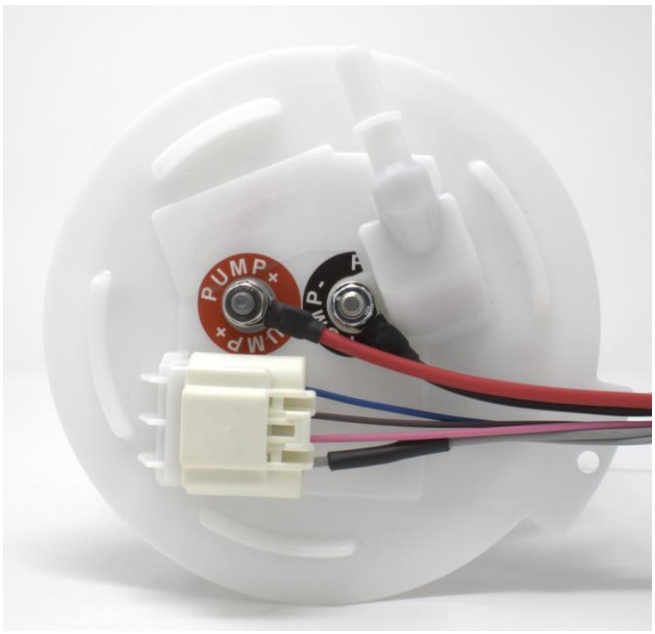


Photo 4. Note the VaporWorx controller 10ga black routes to the stud with the black PUMP- label, and the red wire to the red PUMP+ label. Use a backup wrench on the stud when tightening the top nut so that the stud does not spin. Route the wiring as needed to make a good routing path back to the VaporWorx controller.

19) Route the black and red VaporWorx 10ga wires from the KPM1500 fuel module to the VaporWorx controller. Use rubber grommets, clamps, zip ties, etc. to protect and support the wiring where needed. Do not route near sources of heat, rotating components, or other objects that may cause wire damage.

20) Cut the 10ga wires to the appropriate lengths allowing for movement and strain relief. Install the provided wire braid and cut to length. Slip two ½" long pieces of heat shrink on to the braid. If desired, the grey 20ga wire may also be included in this wire braid. Taping the ends the wires with painters tape may make braid installation easier.

21) Strip the black 10ga wire insulation ¼" and crimp the supplied 10ga x #6 ring terminal. Install heat shrink over the crimped section of the terminal. Install the ring terminal on to the VaporWorx controller BAT / PUMP– terminal stud and tighten the nut to 10in-lbs. **DO NOT OVERTIGHTEN THE NUT.**

22) Strip the red 10ga wire insulation ¼" and crimp the supplied 10ga x #6 ring terminal. Install heat shrink over the crimped section of the terminal. Install the ring terminal on to the VaporWorx controller PUMP+ terminal stud and tighten the nut to 10in-lbs. **DO NOT OVERTIGHTEN THE NUT.**

23) Confirm that the installed heat shrink does not wedge between the ring terminal and the controller stud. If it does, trim the heat shrink with a razor knife.

24) Slide the heat shrink to the ends of the wire braid and heat to shrink.

25) Secure all wiring using zip ties, clamps, etc.

Preparation Required Prior to Engine Startup

1) The VaporWorx controller is calibrated to work with the OEM FSCM. No further adjustment is needed.

2) Insert the 40A fuse into the fuse link. A small spark during insertion is normal if the battery is connected. The pump should not be running.

3) Confirm that all wiring is connected per the diagram on the last page and that the fuel lines have been properly filtered, cleaned, attached, and sealed.

4) Put fuel into the tank.

5) Re-attach the battery negative cable.

6) Connect a pressure gauge to the engine fuel rail or monitor via the vehicle OBDII port.

7) Turn on the ignition switch. The fuel system should turn on for 1-2 seconds during the prime cycle. Turn off the ignition and check for leaks. Repair as needed.

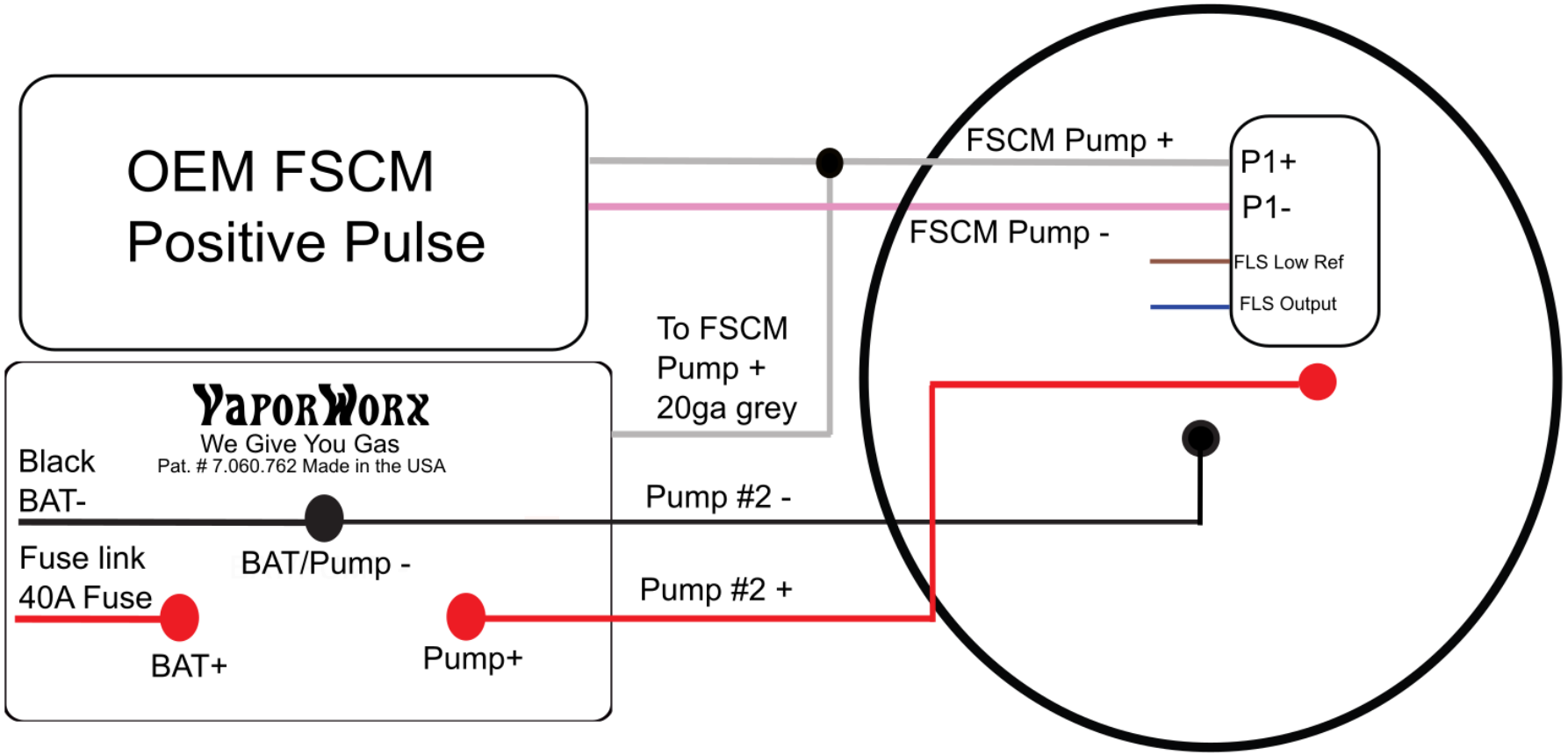
8) If the fuel level in the tank is above the white bucket reservoir (usually 3+ gallons for modern OEM tanks), you may immediately cycle the ignition on again to continue to prime the fuel system. Continue cycling until pressure is obtained.

9) If the fuel level in the tank is below the top of the white bucket/reservoir, after the first prime cycle wait 30 seconds before cycling again. Repeat the 30 second cycle until pressure is obtained.

10) Check for leaks and repair as required.

11) If no leaks are found, start the engine and confirm the requested fuel pressure is obtained.

12) If a very large injector is used (100#/hr+) it is possible that the OEM FSCM may react to the pulses generated by injectors as they open and close. Often the FSCM smooths out the pulses from a functional standpoint. However, visually using a gauge or via HPTuners/OBDII datalogging, large pressure spikes may be seen. These spikes make it difficult to determine actual fuel pressure. A fuel pulse damper offered by Radium Engineering has shown to reduce the pulses.



Wiring Diagram for the VaporWorx modified KPM1500 Pump and Ally Control System