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 a qualified automotive technician and/or safety official.

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

Thank you for your purchase of the VaporWorx fuel module speed control system for the VaporWorx modified KPM1500 fuel module. These are stand-alone systems that require minimal ECM commands: Only a 12+ turn on signal is needed for basic operation. Hence, it will work with most EFI control systems. NOTE: FAST XFI and some Edelbrock systems use a negative trigger for fuel pump turn-on. Please contact VaporWorx in this case as we have a solution for this application.

The purpose of the VaporWorx fuel module control system is to allow the fuel module pump(s) to adjust their speed based on the fuel demand. As fuel demand increases, the VaporWorx pulse width modulation control will also increase the fuel pump speed. As fuel demand decreases, so will the pump speed. This allows a large pumping system to run reliably with significantly reduced power and heat generation. It effectively makes a very large pump seem much smaller during cruise/low fuel demand conditions where minimal fuel volume is needed.

The PressureWorx system can provide either a constant or a 1:1 rate of fuel pressure change with manifold pressure. For these systems initial fuel pressure can be as low as 36psi. Wiring connections to the engine MAP sensor are required for manifold referenced fuel pressure, and the VaporWorx kits are specific to each MAP sensor, so ordering must be done accordingly (1bar, 2bar, or 3bar.) To use a PressureWorx system in constant fuel pressure mode, do not connect the MAP wiring to the VaporWorx controller and adjust the fuel pressure accordingly.

Unless otherwise specified the PressureWorx kits are tuned for the GM LSA/LS9 3-bar MAP sensors P/N 12592525. For any other sensors, please contact VaporWorx.

The choice between constant or manifold referenced fuel pressure should be decided between you and your engine tuner. The tuner is key to getting the engine running correctly, and his/her input in this matter is critical to making both of your jobs easier. However, for the KPM1500 manifold referenced fuel pressure is recommended. Final fuel pressure must be checked with a fuel pressure gauge.

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) Fittings to install the fuel pressure sensor near the outlet of the fuel pump. Fittings are available from VaporWorx in the Fittings and Hardware section.
3) Fuel lines. AN6 has been found to be sufficient for up to 800FWHP, AN8 up to 1200FWHP. There is no performance drawback to using a larger line. In other words, an AN8 line can be used in a low horsepower application without issue.
4) Teflon/PTFE flex lines are recommended for attachment to the engine and fuel pump outlet. All flex or a combination of flex/hardline can be used.

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 electronics 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. The Terms of Warranty and Service are as follows:

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 basic wiring layout for the PWKPM1500 VaporWorx stand-alone controller on the last page. The wiring may enter/exit the controller area as needed provided there is no chance of shorting between connections. The default MAP sensor that the VaporWorx controller is tuned for is the GM LSA 3bar 12592525/Bosch 0261230262 (others available.)

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 controllers 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. If possible, mount the controller such that heat from the controller can be absorbed by the chassis/sheetmetal.

7) Install the fuel pressure sensor into a 1/8"-NPT female fitting that is tapped into the fuel line near the fuel module outlet like that in Photo 1. The sensor must be mounted near the fuel module outlet so that pressure fluctuations due to fuel injector or mechanical pump operation are minimized. If the sensor is mounted in the engine fuel rail rapid pressure fluctuations may occur. Use a small amount of Teflon paste to seal *just the threads* of the sensor. If needed, VaporWorx carries a variety of AN fittings, like those shown below, for this purpose.

8) If desired the supplied braided loom can be installed over the fuel pressure sensor wiring. If so, slide two 1/2" pieces of heat shrink tubing on the wiring first, then install the loom. The heat shrink will secure the ends of the loom to the wiring near the plugs. The ECM fuel-enable wiring may also be integrated into this harness if desired. Sealing the ends of the braided loom with a soldering iron will help keep them from fraying. This wiring may be included in the same wiring harness as the main pump wiring.

   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.

9) Attach the three-cavity fuel pressure sensor plug into the fuel pressure sensor.

Photo 1. The fuel pressure sensor is installed into the fuel line near the outlet of the pump. The sensor may be mounted as far away as three feet from the pump. Do not mount the sensor near the engine. Wiring may route as needed to best fit into the car.

10) Route and secure the fuel pressure sensor wiring harness to the area where VaporWorx controller is mounted. Be sure to leave sufficient wire length so that there is no strain on the wiring near the connectors. Secure the harness to the vehicle away from where it may become damaged from heat, road hazards, rotating parts, exhaust, etc. and verify that the cable will not be chaffed or cut on sharp edges. Use rubber grommets to protect the wiring where needed.

11) If needed, connect the MAP sensor wiring to the engine MAP sensor and route to the VaporWorx controller using similar techniques as the fuel pressure sensor wiring. This option will provide a 1:1 manifold referenced fuel pressure when using the GM LSA/LS9 12592525 MAP sensor (please contact VaporWorx for other MAP sensor options.) This will allow for an approximate 43psi fuel pressure at idle/cruise, but will ramp up fuel pressure as engine power increases. It significantly reduces power to the pump(s) during idle/cruise vs. a constant 60psi setting. For servicing, it is helpful to add a pigtail and two-pin plug near the engine wiring harness for attaching the VaporWorx MAP wiring.

Helpful Tip: Install a three-wire connector and add in the fuel pump enable signal (ECM controlled turn-on wire).

12) Route the ECM fuel pump enable wire to the VaporWorx controller. From a diagnostics standpoint it may be preferable to run the same colored wire all the way to Pin D on the VaporWorx controller connector. The VaporWorx controller requires a 12v positive signal to operate. If a negative signal is used the system will not function (please contact VaporWorx for negative trigger options.)

For GM engine harnesses and power centers a 14ga gray power wire controlled by the ECM for the fuel pump is often used. This wire is used to tie into the blue 20ga wire on the VaporWorx controller. This is a low-power circuit, hence a 20 gauge wire may be used for the full run to the controller. DO NOT USE THIS WIRE TO PROVIDE BAT+ POWER TO THE VAPORWORX CONTROLLER. BAT+ MUST BE CONNECTED DIRECTLY TO THE BATTERY. DO NOT USE THE PWM OUTPUT FROM THE OEM FUEL SYSTEM CONTROL MODULE AS A FUEL PUMP ENABLE SIGNAL.

For Holley and Ford Coyote/Godzilla ECM's with a green fuel pump power wire:
This green wire is used to tie into the blue 20ga wire on the VaporWorx controller. This is a low-power circuit, hence a 20 gauge wire may be used for the full run to the controller. DO NOT USE THIS WIRE TO PROVIDE BAT+ POWER TO THE VAPORWORX CONTROLLER. BAT+ MUST BE CONNECTED DIRECTLY TO THE BATTERY. DO NOT USE THE PWM OUTPUT FROM THE OEM FUEL SYSTEM CONTROL MODULE AS A FUEL PUMP ENABLE SIGNAL.

13) The VaporWorx GT150 six-pin connector provides fuel pressure sensor, MAP sensor, and fuel pump enable signal connections. Using the terminals and seals provided as seen in Photo 2, crimp the terminals to the wires like that shown in Photo 3. Solder the terminals to the wires if needed. Slide heat shrink tubing over the harness braid(s) before installing terminals, but wait to heat shrink until all wires are installed into the plug.

A: Grey 20ga from the fuel pressure sensor
B: Black 20ga from the fuel pressure sensor
C: Brown 20ga from the fuel pressure sensor
D: Blue 20ga from the ECM fuel pump enable circuit (BAT+ signal)
E: Orange/Black 20ga from the engine MAP (-) sensor*
F: Light Green 20ga from the engine MAP (output) sensor* *Manifold referenced fuel pressure only.

Alternate ➔ Yellow for optional BAT- trigger signal for ECM fuel pump enable signal.
For constant (non-manifold referenced) fuel pressure, leave the Orange/Black and Lt. Green wires disconnected.

Using the ECM fuel pump enable circuit will allow the priming and safety features of the ECM to remain functional. If an IGN+ signal is used the fuel system may continue running after an accident. If the fuel lines, tank, fuel module, or other components are damaged, fuel may be pumped in an uncontrolled manner. Modern ECM's will shut down the fuel pump enable circuit if engine rotation is not sensed, hence making for a safer condition. It is the imperative that these features remain functional for your safety.

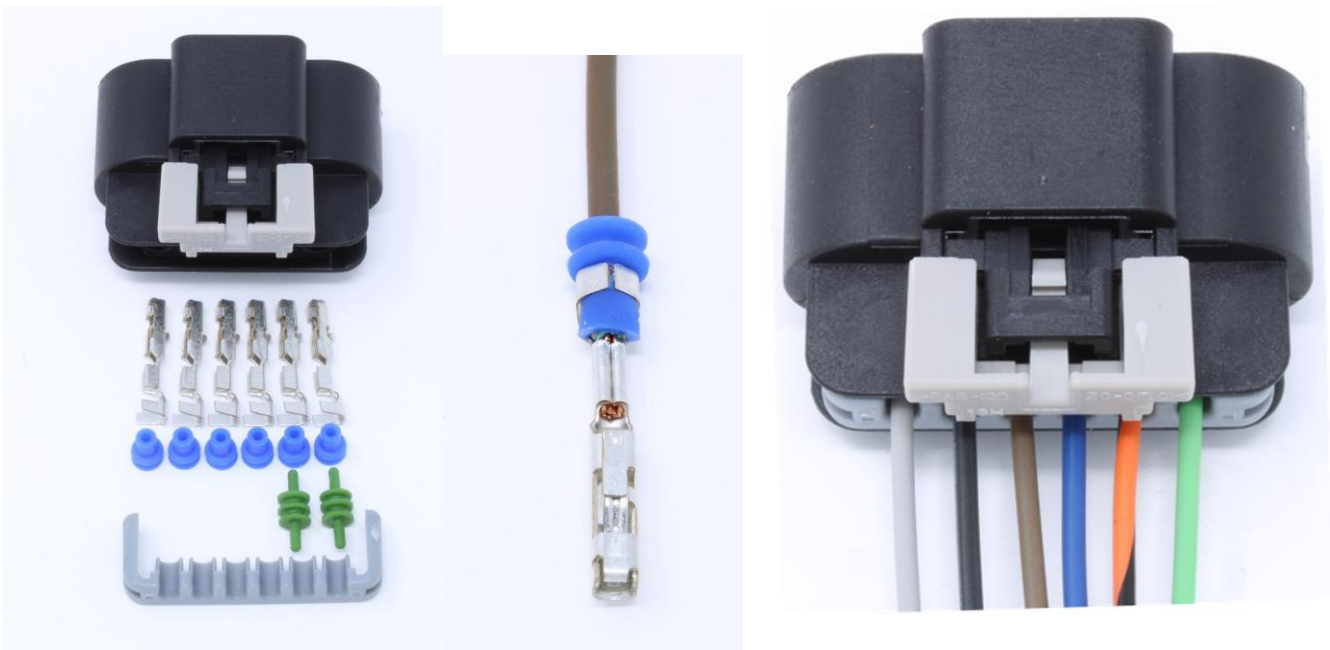## Pin A: Grey Pin B: Black Pin C: Brown Pin D: Blue Pin E: Orange/Black* Pin F: Lt. Green*

Photo 2 : The GT150 connector body, terminals, seals, plugs, and grey terminal positional assurance clip.
Photo 3. The terminal is crimped to the wire and seal. The part number for the Delphi terminal is 12191818. The seal is15366060. Spare parts are available from Vaporworx.
Photo 4: Delphi GT150 female connector assembly. Note that the colors must align to the controller plug. Delphi designates the gender of the connector assembly by the terminal used, not the gender of the plug body. Hence the plug that appears male uses a female terminal and is designated female by Delphi.

14) Insert the wires into the Delphi GT150 female connector body as shown in Photo 4. The pinout schedule is listed above for the connector body. Capital letters can be found on the connector body on one side only near the wire insertion holes. Just align the colors to the mating VaporWorx connector.

15) Re-verify that the wires have been properly placed in the connector and that the colors align. This is the most common assembly error, so please verify your work. If the wiring is incorrect, or the crimp not satisfactory, then the terminals will need to be removed and placed in the proper cavity. This can be done by removing the purple cap on the inside of the connector body face using a small screwdriver to pry up on the sides. The terminal can then be released by gently prying back on the locking tab that secures the terminal to the body. Once corrected re-install the purple connector body cap. NOTE: The purple cap acts as a terminal locking device. Once the cap is fully seated removal and installation of the terminals is very difficult. The cap has a pre-terminal installation position where it is located in the body but not fully seated. Fully seat the cap once terminal installation is completed.

16) Once the correct wiring has been confirmed, install the terminal position assurance clip as shown in Photo 3.

17) The labels on the top of the VaporWorx controller lid shows the inputs and outputs of the positive side of the controller. Note that the BAT+ side has two input terminal studs. Using the supplied "Y" connector with red wiring, attach it to the two BAT+ terminal studs. Tighten the nuts on the VaporWorx controller to 10inlbs maximum. *Do not over-tighten the brass terminal nuts on the controller / 10 in-lbs maximum torque.*

18) Using the supplied fused link and ring terminals, strip, crimp, and connect the short end directly to the battery positive lug. The other end of the fuse link goes to the butt connector on the "Y" and must be crimped into place. Use the provided heat shrink to seal the butt connector and crimped ends.

19) An 8ga x 4' black wire is provided to route from the BAT/PUMP- terminal on the controller to the battery negative post. Like the positive side, crimp and heat shrink the connections. Do not tighten the nut on the negative terminal on the controller since the fuel pump negative will also be attached.

20) Unwrap the long fuel pump power wiring harness. Attach the ¼" ring terminal on the 8ga black wire to the negative terminal stud on the top of the KPM pump hat. Plug the white fuel pump power plug into the KPM wiring plug. Route these wires back toward the VaporWorx controller.

21) Trim the black 8ga wire to the appropriate length to reach the center BAT/PUMP- terminal stud on the VaporWorx controller.

22) Trim the red and green/orange/or white 10ga wires to the appropriate lengths to reach the Pump 1+ (red wire) and Pump 2+ (green wire).

23) Install the supplied wire braid over the three power wires going to the KPM pump. Trim to length and slide two ½" pieces of heat shrink over the wire braid.

24) Using the ring terminals provided, strip approximately 3/8" of the insulation from the end of the 8ga black wire, and ¼" from the red/green/orange/or white wires. Crimp on the #6 x 8g terminal to the black wire, and the #6 x 10ga terminals to the other wires. Use heat shrink to seal the crimps.

25) Install the black 8ga wire so it shares the same center BAT/PUMP- terminal stud as the battery negative wire. Tighten the nut on the VaporWorx controller to 10inlbs maximum. *Do not over-tighten the brass terminal nut on the controller / 10 in-lbs maximum torque.*

26) Install the red 10ga wire to the Pump 1+ terminal stud, and the green/orange/or white 10ga wire to the Pump 2+ terminal stud. Tighten the nuts on the VaporWorx controller to 10inlbs maximum. *Do not over-tighten the brass terminal nuts on the controller / 10 in-lbs maximum torque.*

27) Slide the heat shrink on the fuel pump power wire braid to each end and heat into place. Note Photo 1.

28) Confirm that all nuts on the VaporWorx controller are tightened to 10inlbs maximum.

29) Secure all wiring away from sources of heat, sharp edges, and any other potential damage points using grommets, clamps, zip ties, etc. Set all heat shrink.

30) Fuel level sensor terminals are included in the hardware kit. See the wiring diagram for the pinout. The VaporWorx controller does not need the sensor signal to operate. The OEM fuel level sensor range is 40F – 250E ohm range.

31) Confirm that the VaporWorx controller connections are complete and the power wiring nuts are tight.

Preparation Required Prior to Engine Startup

1) Re-connect the battery negative cable.

2) Install the supplied 60A fuse into the VaporWorx fuse holder. A small spark is normal and the fuel pump should not run.

3) Connect a fuel pressure gauge to the fuel rail or other port. An electronic gauge should also work.

4) The VaporWorx controller will be initially set to run using MAP sensor input, hence approximately 43psi at idle. This requires MAP sensor attachment. For constant pressure applications/no MAP sensor connection, turn the pressure adjustment screw on the controller two turns clockwise. **Final pressure must be verified with a mechanical gauge**.

5) Fill the fuel tank to 3/4-full minimum. Check for any leaks.

6) Disconnect the fuel line from the engine fuel rail. Route or extend this line to a fuel-rated and approved container. Secure the line to the container so that it will remain in place when fuel is pumped through the line. High-pressure fuel flow will cause a flexible line to whip if not secured.

7) Turn on the ignition switch. Fuel should begin to flow in several seconds. If the ECM controls the fuel turn-on circuit (blue wire) then it may take several cycles to flush the system. ECM's have a safety feature that turns off the fuel pump after 2-3 seconds if it does not sense that the engine is running. Do not run the pump for more than five seconds with the fuel line removed from the rail. After five seconds, allow at least one minute before repeating the turn-on cycle so that the fuel module reservoir can refill. NOTE: The fuel module venturi pumps do not work unless there is high fuel pressure. With the fuel line disconnected, no fuel pressure is available to power the venturi pumps. The pause between flushing cycles is to allow the module reservoir to refill with fuel.

In some cases, after several cycles the ECM may not turn the fuel circuit on until it senses engine rotation. In this case, if needed, 12v+ can be applied to the VaporWorx controller blue wire for a few seconds. The pump should begin to run. The fuel pressure sensor wiring must remain in place and not be disconnected.

Line flushing may be skipped if the lines were thoroughly cleaned before installation.

8) Reconnect the fuel line to the engine fuel rail.

9) Turn on the ignition switch but do not start the engine. The fuel pressure gauge should rise and settle near its pre-set value. Turn off the ignition key and inspect the fuel system for leaks. It is normal that the fuel pressure will spike after fuel system shutdown. Fuel pressure should return to normal after engine start-up. Like before, it may take several cycles to fill the fuel rails and create pressure.

10) If no leaks are found, start the engine. Fuel pressure may increase 2-3psi higher than what was observed during engine-off. Again, check for leaks and repair as needed.

11) On the top of the controller there is a small hole where the fuel pressure adjustment screw is located. Note the arrow on the lid of the controller. Inside the hole is a brass potentiometer screw that is used to adjust the fuel pressure. Using the supplied blue mini screwdriver, adjust the fuel pressure for constant pressure systems to 58psi/4bar, and approximately 43psi for manifold referenced. Pressure change, ½-turn = approximately 5psi pressure change.

Fuel pressure must be verified by either a mechanical or electric gauge.

12) Shut down the engine as soon as practical and check the fuel system for leaks. Repair any leaks.

13) Restart the engine. Quickly depress and release the throttle pedal. For constant pressure systems the fuel pressure should remain constant, with perhaps a small pressure drop-off. For manifold referenced, the fuel pressure should rise and fall with manifold pressure.

Troubleshooting

1) Fuel pump runs at full speed when the engine is on:

   a. Adjust the fuel pressure via the small screw on the side of the box.
   b. Check fuel pressure sensor wiring connections. On the fuel pressure sensor plug Pin 1 = Brown, Pin 2 = Black, Pin 3 = Grey. Confirm that these wires align with the same wires on the controller GT150 plug. It is possible to crimp across the insulation of the wire and not obtain a good circuit pathway, hence, causing a controller malfunction.
   c. Confirm that the input and output main power wires from the battery and to the fuel module are correct/not reversed.

     d.   Confirm the controller is connected directly to battery power. **No chassis grounds.**

2) Fuel pump does not run:

     a.   Check the input fuse (60A)
     b.   Check fuel pressure sensor wiring connections. On the fuel pressure sensor plug Pin 1 = Brown, Pin 2 = Black, Pin 3 = Grey. Confirm that these wires align with the same wires on the controller GT150 plug. It is possible to crimp across the insulation of the wire and not obtain a good circuit pathway, hence causing a controller malfunction.
     c.   Confirm that a minimum of 10v is available to the VaporWorx blue wire Pin D. 12v + can be applied directly to the GT150 Pin D blue wire for testing only.
     d.   Check that the brass nuts for the battery and fuel module power wiring terminals are properly tightened and free of contamination and corrosion.
     e.   Check the bottom brass nuts that are under the battery and fuel module ring terminals. The shoulder washers that act as an insulator may relax over time. Retighten to 10 in-lbs maximum and test.
     f.   Excessive fuel pressure due to engine shutoff. After ignition shutoff the injectors shut but the pump still spins, causing a pressure spike. This is normal, but until the pressure drops below the set pressure, the controller will not send power to the fuel module.
     g.   Check the temperature of the VaporWorx controller black aluminum lid. If the lid is over 225*F the controller will shut down.
     h.   Confirm that the battery and butt-joint connections are good. Use a volt-ohm meter to check connections.
     i.   Confirm that the input and output main power wires from the battery and to the fuel module are correct/not reversed.
     j.   Confirm the controller is connected directly to battery power. **No chassis grounds.**

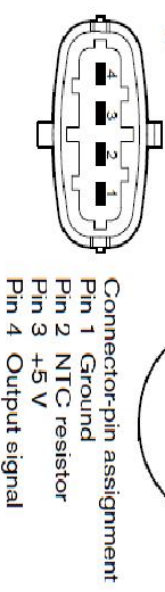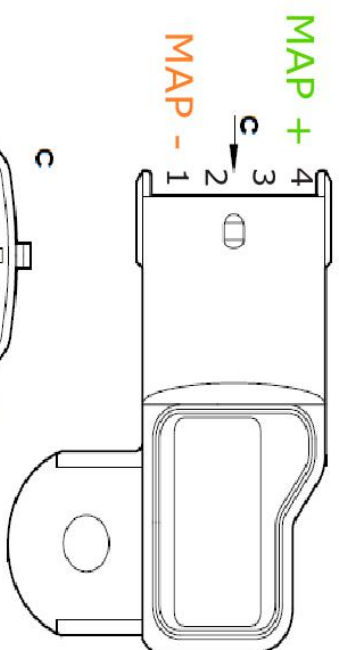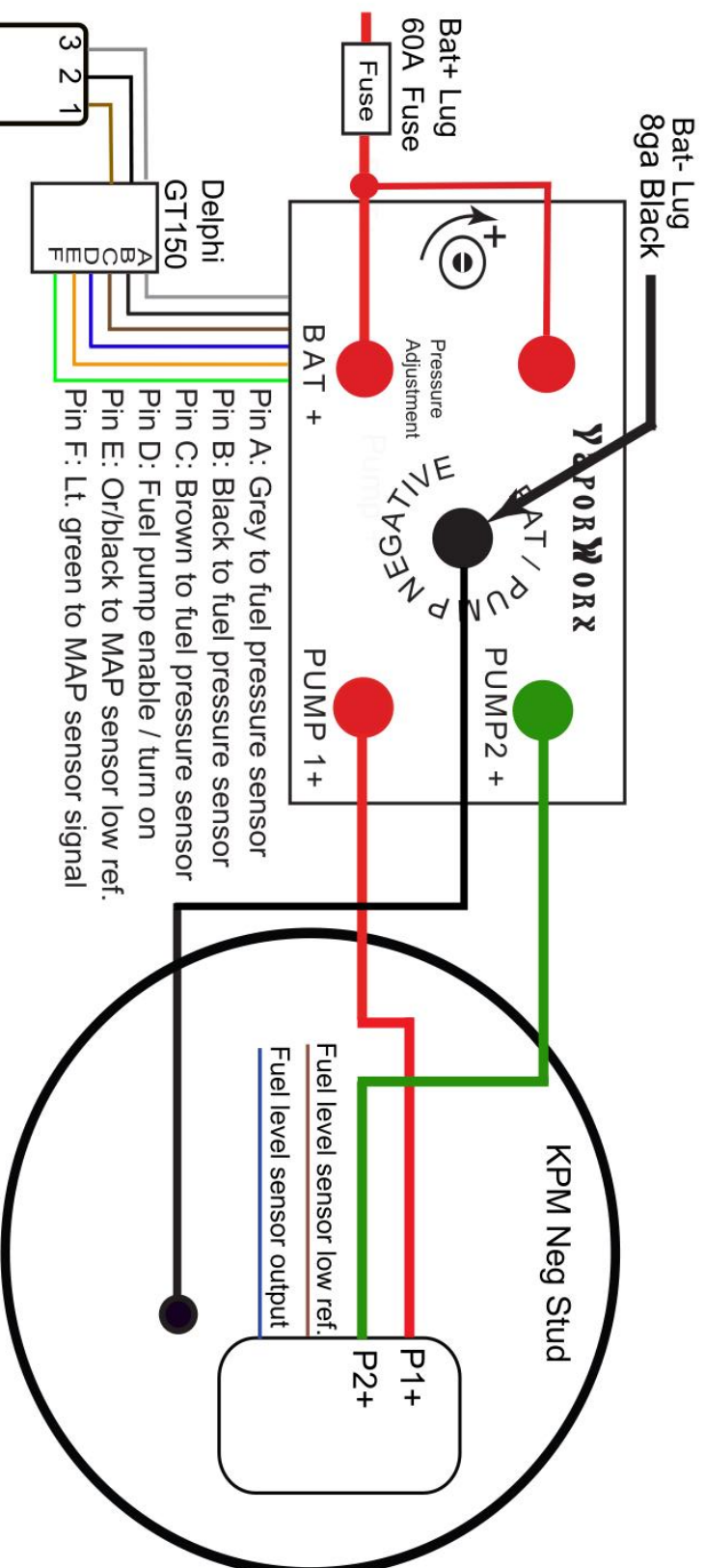3) The fuel pressure rapidly fluctuates, especially at idle:

     a.   The fuel pressure sensor is too close to the fuel rail or a pressure damper is needed. The VaporWorx system can react fast enough to chase individual injector pulses at idle, hence causing rapid fuel pressure gauge readings. Once engine speeds increase this tendency reduces. Move the fuel pressure to as close to the fuel module as practical. In some case where a very short primary fuel line is used, a longer line from a "T" may be needed to install the fuel pressure sensor into. This extra head length acts a damping system for the injector pulses. A Radium pressure damper has also shown to be effective in reducing pressure pulses.

4) Fuel pump does not have adequate pressure:

     a.   Turn the fuel pressure adjustment screw inside the hole on the side of the controller. A small eyeglass screwdriver can be used, as well as the tool supplied in the kit.
     b.   Remove the power wiring from the brass terminals on the top of the controller. Confirm that the lower brass nuts are tight.
     c.   Check that the connections from the VaporWorx controller to the fuel module are good.
     d.   Using a heavy gauge jumper wire, connect the BAT+ to the PUMP+ on the VaporWorx controller. If the fuse is good the pump should run. If the pump is running but little or no fuel pressure exists, then either the fuel module is internally damage (broken plastics), the fuel pump(s) have been damaged, or there is a massive leak. The most common cause of fuel pump damage is running the pumps dry. Fuel is the life blood for pumps. If the pump does not run then there is a problem with the electrical wiring at the module connection.
     e.   Monitor the output voltage of the VaporWorx controller. During idle/cruise the output voltage should be in the 6-9v range. If the output voltage of the controller is at the system voltage of the car when the pressure is falling, then the pump(s) may not have sufficient capacity, or there is internal damage to the module/pumps,

Fuel Module Output Testing

One question that often arises is how to monitor pump output. This is good to know in order to determine if the pump is adequate for the power produced. To test this, connect a digital voltmeter to the BAT (+) and Pump 1+ terminals. These connections must be made on the controller terminals. In a safe and legal way, have an assistant watch the meter as the car is driven at wide open throttle/maximum fuel demand. Once the voltage is less than 0.2volts, the controller is effectively sending maximum power to the pump(s). After this point is reached fuel pressure will begin to fall due to a pump over-capacity condition.

VaporWorx KPM1500 Stand-Alone Pump and Control System Layout

MAP -
MAP +

Fuel Pressure Sensor
ACDELCO 12592525
LSA/LS9 3bar Map Sensor

3 2 1

Delphi
GT150

A
B
C
D
E
F

Pin A: Grey to fuel pressure sensor
Pin B: Black to fuel pressure sensor
Pin C: Brown to fuel pressure sensor
Pin D: Fuel pump enable / turn on
Pin E: Or/black to MAP sensor low ref.
Pin F: Lt. green to MAP sensor signal

Bat+ Lug
60A Fuse

Fuse

BAT +

Pressure
Adjustment

+
⊙

BAT / PUMP NEGATIVE

VaporWorx

PUMP 1+

PUMP2 +

Bat- Lug
8ga Black

MAP -
MAP +

C

LT-Series 3bar Map Sensor

MAP -
1
2
3
4

C

Connector-pin assignment
Pin 1 Ground
Pin 2 NTC resistor
Pin 3 +5 V
Pin 4 Output signal

Fuel level sensor output
Fuel level sensor low ref.

KPM Neg Stud

P1+
P2+

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Instruction sheet for the KPM1500 high-pressure regulator and secondary pump electrical wiring changes

This instruction sheet is for use only with the KMP1500 fuel pump module. It does not apply to any other KPM pump versions.

For use above 50psi the pressure regulator in the KPM1500 must be changed. The provided regulator will allow for OEM Fuel System Control Modules and for VaporWorx stand alone controller systems to operate properly. For more information visit the KPM fuel pump section on the VaporWorx website for your application.

For applications that will be using an OEM FSCM and VaporWorx controllers, modifications are needed to add a secondary pump positive post to the top hat. The OEM FSCM cannot share a ground that is connected to either the chassis or the battery, like the VaporWorx Ally controller is. The FSCM wiring must only go to one pump while the VaporWorx Ally goes to the other. No sharing of grounds or else the FSCM will throw MIL codes.

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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 the KPM1500 fuel module.

Fuel Pressure Regulator Change

Note: VaporWorx supplied KPM1500 fuel pump modules, unless otherwise specified, will have the high pressure regulator already installed.

The pressure regulator change is needed whenever a fuel pressure higher than 50psi is required and/or a returnless PWM control system is used. This means that just about every application outside of Australia will need to have the regulator changed.

32) Set the fuel pump on a thick padded surface, like a large folded towel, to provide a soft working surface.

33) Note along the top edge of the white surge tank the four retaining tabs. Using care to not over-bend the tabs, release all four so that the pumping section can be separated from the surge tank. It may be helpful to place strips of thin metal, long screwdrivers, etc. to keep the pumping section separated from the surge tank by about 1". See Photo 1.

Photo 1. Release the four retaining tabs to separate the surge tank from the pumping section.

34) Using needle nose pliers, pull the regulator retaining wire out and remove the ground strap. Note that the retaining wire is held down by the wire. See Photo 2.
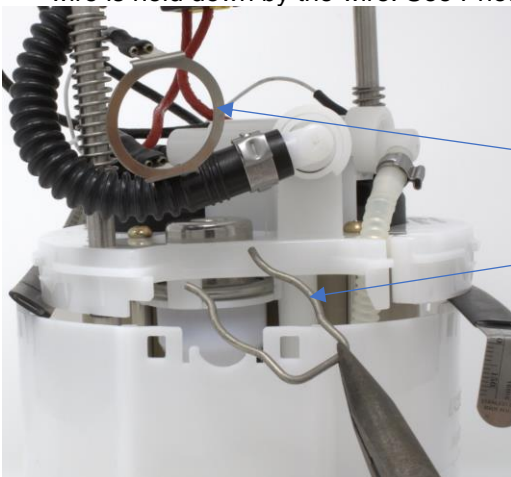

Photo 2. Remove the wire retainer and ground strap.

Ground strap
Wire retainer

35) Using a small flat screwdriver, insert the blade between the regulator base and the white plastic. Gently work the regulator loose and remove from the pump assembly. See Photo 3.
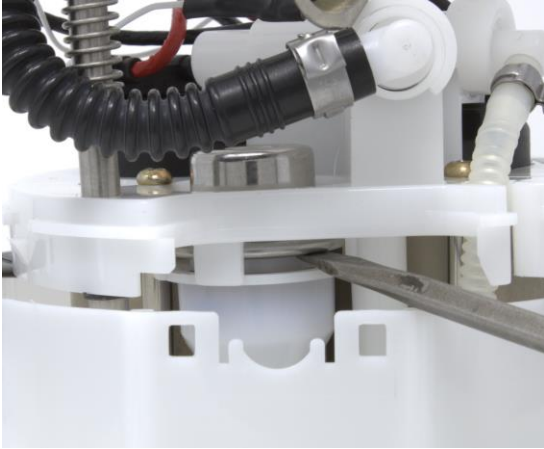

Photo 3. Work the regulator loose and remove from the pump assembly.

36) Apply oil to both o-rings on the VaporWorx supplied high-pressure regulator. Insert it into the pump and press it down until it fully seats like the removed regulator is shown in Photo 2.

37) Slide the ground strap over the regulator body and re-install the wire retaining clip.

38) Set the pumping section back into the surge tank and verify that the four retaining tabs are fully seated.

Wiring changes for OEM Fuel System Control Modules and VaporWorx Ally PWM Control systems. Not required for stand-alone PWM control systems.

VaporWorx supplied KPM1500 fuel pump modules, unless otherwise specified, will have the secondary wiring already installed.

1) Set the fuel pump on a thick padded surface, like a large folded towel, to provide a soft working surface.

2) Using Photo 1 as a guide, note the black dot. This is where the hole for the VaporWorx supplied Pump 2+ positive bulkhead connection will be made. Using the VaporWorx supplied drill bit, carefully drill the hole in the "dot" location. The drill bit will try to grab once it breaks the plastic surface, so be careful to not allow the bit to deeply go below the hat.
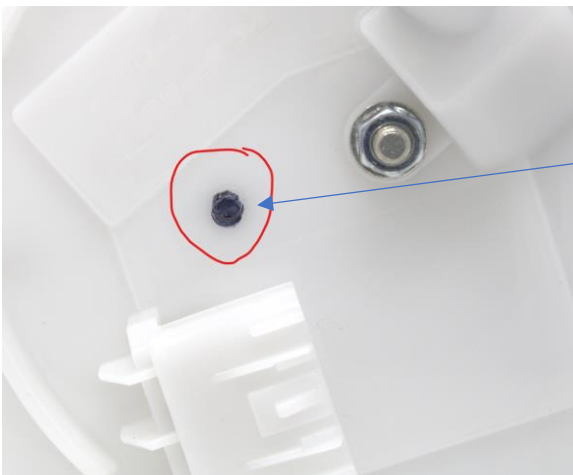

Photo 1. Drill hole for the power bulkhead at the location shown by the black dot. Confirm that the location will allow for the bulkhead stud and seal to seat on flat surfaces.

3) If needed, remove any burrs from both sides of the hole. Insert the bulkhead power feed stud into the hat like that shown in Photos 2 and 2A.

Photo 2 and 2A. The bulkhead stud must have the rubber embossed sealing washer under the head. The wire colors will be red, not black, as shown.

4) Install the large flat washer on to the bulkhead stud on the underside of the KPM1500 hat. Apply threadlocker to just a few threads near the washer. The intent is to cover only the threads that will come into contact with the flanged nut. See Photo 3.

Photo 3. The large flat washer goes on first, then apply thread locking compound to the threads where the nut will be final set. The thread locking compound is for the serrated nut only. Do not apply excessive thread locking compound.

5) Using a backup wrench on the top hex of the stud, tighten the flanged nut to 60in-lbs. Do not allow the stud to rotate, hence the use of the backup wrench. This minimizes the chances of damaging the rubber sealing washer. See Photo 4.

Photo 4. Using a backup wrench to prevent the stud from spinning, tighten the underhat hex flanged nut to 60in-lbs.

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6) Remove the black power plug from under the KPM1500 hat. Remove the yellow Terminal Position Assurance clip. Using a very small screwdriver in the location shown in Photo 5, remove both red wires from the black plug.

Photo 5. Remove both terminals from the black underhat plug. There is a small retaining tab inside the plug that need to be pried away from the terminal. Be cautious here, over-bending the tab may cause it to break.

7) In Photo 6 note that the pump on the left will be referred to as Pump 1, the right Pump 2. Cut the black negative wire from Pump 1 on the left close to the underhat stud like that shown in Photo 6.

Photo 6. Pump 1 is on the left, Pump 2 on the right. Cut the black wire coming from the left side Pump 1- near where it crimps to the KPM bulkhead stud. The cut wire does not need to be insulated.

8) Take the negative and positive wires from Pump 1 and lightly pull them toward the area where the underhat plug receptacle is located. Cut the black wire so that it is about ½" shorter than the red. Strip the end of the black wire and crimp the VaporWorx provided MetriPack 280 terminal to the black wire. See Photo 7

Photo 7. Pump 1 black negative wire is about ½" shorter than the red positive wire when extended as shown. These two wires will go into the removed black plug.

9) Insert the Pump 1+ red wire into the A cavity on the black plug that was removed earlier. Insert the Pump 1- black wire into the B cavity. Re-install the yellow Terminal Position Assurance clip, and insert the plug back into the underhat receptacle. The final assembly must look like Photo 8.

Photo 8. Note that the Pump 1+ red wire goes to the outside cavity, the Pump 1- next to it. The idea here is that both wires from the pump go to the black plug. The bulkhead studs will provide power for Pump 2.

10) Take the red wire from Pump 2 and cut the terminal off leaving as much wire length as possible. Strip ¼" of insulation and crimp the ¼" ring terminal to the wire. See Photo 9.

Photo 9. The Pump 2+ wire has the ¼" ring terminal installed.

11) Route the Pump 2+ wire toward the bulkhead power stud installed earlier. Using the provided hardware, install the ring terminal, star washer, and nut. Tighten the nut to 60in-lbs using a backup wrench like earlier to keep the stud from spinning. See Photo 10.

Photo 10. The Pump 2+ red wire is attached to the earlier installed bulkhead stud.

12) Apply the supplied Pump + and Pump – labels as shown in Photo 11.

Photo 11.