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.

VaporWorx Ally Auto-On Control System for Dual/Triple Fuel Pump Applications.

Thank you for your purchase of the VaporWorx fuel pump speed control system. This kit is intended for use with the OEM Fuel System Control Module / Fuel Pump Pressure Module when used with one or two additional high-power fuel pumps. The OEM FSCM will act as the master system controlling the primary pump. The VaporWorx controller will act as an "Ally", or piggyback, taking its commands from the FSCM. This allows the power burden to be shared by both controllers, hence reducing the chances of overpowering the FSCM if operating both pumps alone.

The purpose of the Ally system is to allow the FSCM to control one pump while the VaporWorx controller powers the other. When used in this manner the power output of the FSCM remains within factory thresholds, meaning that no reprogramming or special adders are usually needed.

The Ally works by using the FSCM positive output pulse to the pump as a guide for function. Both pumps, powered by separate sources, are thus under the single control of the OEM system. Hence, the OEM feedback and diagnostics remain in place. The VaporWorx controller turns on/off via the MAP sensor voltage signal. The VaporWorx controller provides true PWM control once turned on, not just a simple on/off switching function.

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 pump 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 and procedures should also be worn and utilized at all times. A minimum BC rated fire extinguisher must be within reach at all times. Wear protective gloves when handling fuels and do not smoke or have any sources of ignition anywhere in the working area. Support the vehicle using jackstands and appropriate lifting methods.

1) NOTE: The OEM fuel pressure sensor must remain in the pressurized fuel line near the outlet of the pumps, similar to how the OEM system is laid out.
2) Disconnect the battery from the vehicle.
3) For fuel pumps under PWM to function properly a small amount of fuel needs to move through the pump during operation. This amount of fuel is more than what is used during idle/cruise. The bypass can be done several different ways. Following are guidelines that will help ensure smooth pump operation.
   a) TI450 F90000267 and 274: A 0.041" x 1/8" long bypass hole. For Fore Innovations applications, a simple modification to the underside of the fuel hat can be done. Instructions can be downloaded from the VaporWorx website on the page where the Ally Auto-On controller is located. An external bypass fitting also available on the VaporWorx website in the Fittings and Hardware section, AN6. For Rick's tank applications, request from them the proper jet to install into the pump assembly.
   b) TI525 F90000285 and 295: Same as above but with a 0.051" x 1/8" long bypass.
   c) Stealth 340. Using the Aeromotive instructions, drill the pipe plug on the underside of the hat to 0.025". If using another type of pump hanger, a 0.025" hole can be drilled into the pressurized hardline tube that extends into the fuel tank to support the pump.
   d) A suggested plumbing layout is located on Page 5.The safety overpressure valve is required for any returnless system. It eliminates hot-start problems caused by engine heat soak, with resulting line pressures exceeding the injector ratings. The injectors lock up and the engine won't start This regulator is also needed on direct injection applications since line pressures will often exceed 200psi, making them unsafe for the lines and connection points.

4) Note that all of the wire braid included in the kit is much easier to work with if the ends are sealed with a soldering iron immediately after cutting. The braid can also be cut with a soldering iron.

5) 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 near sources of heat such as exhaust systems, radiators, etc. The cooler the electronics are during operation, the longer their expected life will be. #8 x ¾" screws are provided for mounting. Confirm that the screws will not penetrate fuel tanks, lines, electrical, or any other systems during installation.

6) See the Diagram on the last page for the following.

   Install grommets where the wiring passes through sheet metal or any sharp edged hole. Protect all wiring from sharp edges, moving equipment, and heat sources. Take care not to pinch the wires between the tank and trunk floor.

7) Connect the supplied black 4' long black wire from the controller BAT/PUMP- to the battery negative terminal. Do not chassis ground or controller malfunction will result. Excess wire length should be trimmed but allow for easy access, strain relief, routing, etc. Ring terminals are included in the kit and must be securely installed. Heat shrink tubing is provided to insulate the ring terminal crimp similar to 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 secondary pump will be attached later.

8) Perform the same for the BAT+ fused link included in the kit. Cut to the lengths needed and terminate the ends using the provided ring terminals and heat shrink like that in Step 7. Tighten the brass nut on the VaporWorx controller to 10inlbs. *Do not over-tighten the brass terminal nuts on the controller.*

9) Plug the three-cavity GT150 connector attached to the grey, orange/black, and light green wiring harness into the similar connector on the VaporWorx controller.

10) Route the 20ga grey wire to the FSCM/pump area. This wire will need to have protective braid installed, so loosely determine the length of the braid/wire install onto the grey wire. Slide two short pieces of heat shrink over the braid. Heat them to seal the ends after attaching the grey wire as noted in Step 8.

11) The 20ga grey wire in Step 10 ties in to the FSCM fuel pump + wire. This connection can be made anywhere along the heavy gauge wire, including the ring terminal at the pump if used.

12) Cut and strip the 20ga grey wire to the appropriate lengths, slip 2pcs ½" long shrink tubing onto the braid, then secure the wire to the FSCM grey wire by soldering. Seal the connection with heat shrink tubing provided. Heat the ½ long heat shrink pieces to the ends of the braid to keep them from fraying.

13) Route the orange/black and light green wires to the engine MAP sensor. This is the sensor on the pressurized side of the manifold. The orange/black needs to tie into the MAP wiring like that shown below Diagram 1. These connections can be made anywhere between the MAP sensor and the ECM. It is recommended to remove a small amount of the OE harness insulation (not cutting the OE wire), and then solder the VaporWorx wire to it. Re-seal the connection to protect it from weather and shorting. Be sure to install the protective braid and heat shrink before attaching the VaporWorx wires to the OE harness wires. Another option is to install a short pigtail to the OEM harness and install a two-pin connector in order to make servicing easier.

    NOTE: The VaporWorx controller is set to turn on the 2/3 pumps when the MAP sensor voltage is approximately 2.15v. The off voltage is 0.35v below the on point.

    LSA/LS9 12592525 MAP sensor: 3psi boost.
    LT4/LT5 TMAP sensor: 6psi boost.

    For other sensors the MAP voltage ramp rate must be verified for proper function. If different voltage turn-on/off points are needed, please contact VaporWorx.

14) As shown in the wiring diagram, route the OEM FSCM Pump + and Pump – to the primary fuel pump and make the needed connections.

NOTE: Please read the following instructions carefully before starting any cutting or final routing. If your routing takes the wiring through grommets or other areas where installing the wire braid will be difficult then it will be necessary to adjust the braid installation procedure. For example, it may require that the wiring be removed from the vehicle, braid installed, then the wire re-installed. The following a guideline.

Single pump connections to the VaporWorx controller follow. For dual VaporWorx pump connections, skip to Step 21

15) Route the long heavy gauge wiring from the VaporWorx controller to the pump area. The black wire attaches to the BAT/PUMP - terminal on the VaporWorx controller. The colored wire attaches to the Pump + terminal on the VaporWorx controller. Loosely attach the wires to the controller, then put a wrap of electrical tape around the two wires so that they do not shift their position to one another.

16) Remove the wires from the controller and slip the provided wire braid over the ends of the wires. The tape installed in Step 15 will help to keep the wires from shifting during braid installation. Continue to install the braid until the pump end is approximately 2" from final position. Cut the braid with a soldering iron, finish sliding it on to the wires, and heat shrink the end of the braid.

17) Install pump negative and positive wires back on to the VaporWorx controller and tighten the nuts to 10inlbs. Confirm all nuts on the controller are tight to 10inlbs.

18) Slide a piece of heat shrink on to the ends of the pump side wires. Do not yet set the heat shrink.

19) Trim the wires as needed and make final attachments to the fuel pump positive and negative connections. Seal the connections/crimps/etc. as needed.

20) Set the heat shrink on to the end of the braid. Check the work and set any loose heat shrink.

Dual pump connections to the VaporWorx controller follow:

21) Install the supplied colored wire “Y” to the Pump 1+ and Pump 2+ connections. The butt connector on the “Y” should be routed toward the VaporWorx controller. Slip a piece of heat shrink on to the two smaller wires long enough to seal the butt connector.

22) Install the supplied black wire “Y” to the fuel pump 1- and pump 2- connections. The butt connector on the “Y” should be routed toward the VaporWorx controller. Slip a piece of heat shrink on to the two smaller wires long enough to seal the butt connector.

23) Route the long heavy gauge wiring from the VaporWorx controller to the pump area. The black wire attaches to the BAT/PUMP - terminal on the VaporWorx controller. The colored wire attaches to the Pump + terminal on the VaporWorx controller. Loosely attach the wires to the controller, then put a wrap of electrical tape around the two wires so that they do not shift their position to one another.

24) Slip the provided wire braid over the ends of the wires. The tape installed in Step 23 will help to keep the wires from shifting during braid installation. Continue to install the braid until the pump end is approximately 1” from where the “Y” butt connector will be. Cut the braid with a soldering iron and finish sliding it on to the wires.

25) Install pump negative and positive wires back on to the VaporWorx controller and tighten the nuts to 10inlbs. Confirm all nuts on the controller are tight to 10inlbs.

26) Trim each wire as needed to properly fit to their respective “Y” butt connectors. Securely crimp each butt connector and seal it with heat shrink. Solder if necessary.

27) Slide the controller side wire braid so that it covers the heat shrink on the butt connectors. Confirm that the heat shrink well covers the ends of each butt so that shorting does not occur.

28) Slide a large piece of heat shrink on to the long wires, over the braid. This heat shrink will cover the butt connections + the “Y” joint being made in the next steps.

29) Using the leftover braid, cover the pump wires with braid and slip on heat shrink. Pump wires may be combined or run separately.

30) Set the heat shrink on to the end of the braid. Check the work and set any loose heat shrink.

Preparation Required Prior to Engine Startup

1) The VaporWorx controller is tuned to work with the OE FSCM. No further tuning is needed. The VaporWorx controller will activate the secondary pump at approximately 3psi of boost pressure (120kpa.)

2) Add fuel to the tank.

3) Insert the 40-60A fuse into the fuse link. A small spark may be noted and is normal during fuse insertion.

4) Confirm that all wiring is connected per the Diagram and that the fuel lines are properly attached and sealed.

5) Connect a fuel pressure gauge or monitor via the vehicle OBDII port.

6) Turn on the ignition switch. The fuel system should turn on for 1-2 seconds during the prime cycle. Turn off the ignition. Check for leaks and repair as needed. Repeat ignition cycling until all leaks are repaired.

7) If no leaks are found, start the engine and confirm the fuel pressure.

8) Depending on a variety of factors, some injectors may create very large pulses as they open/close. These pulses may cause a fluctuating fuel pressure noted in the OBDII fuel pressure log and/or pressure gauge. A fuel pressure damper by Radium Engineering has shown to be effective in these unusual cases and have cured idle difficulties in many traditional fuel systems as well.

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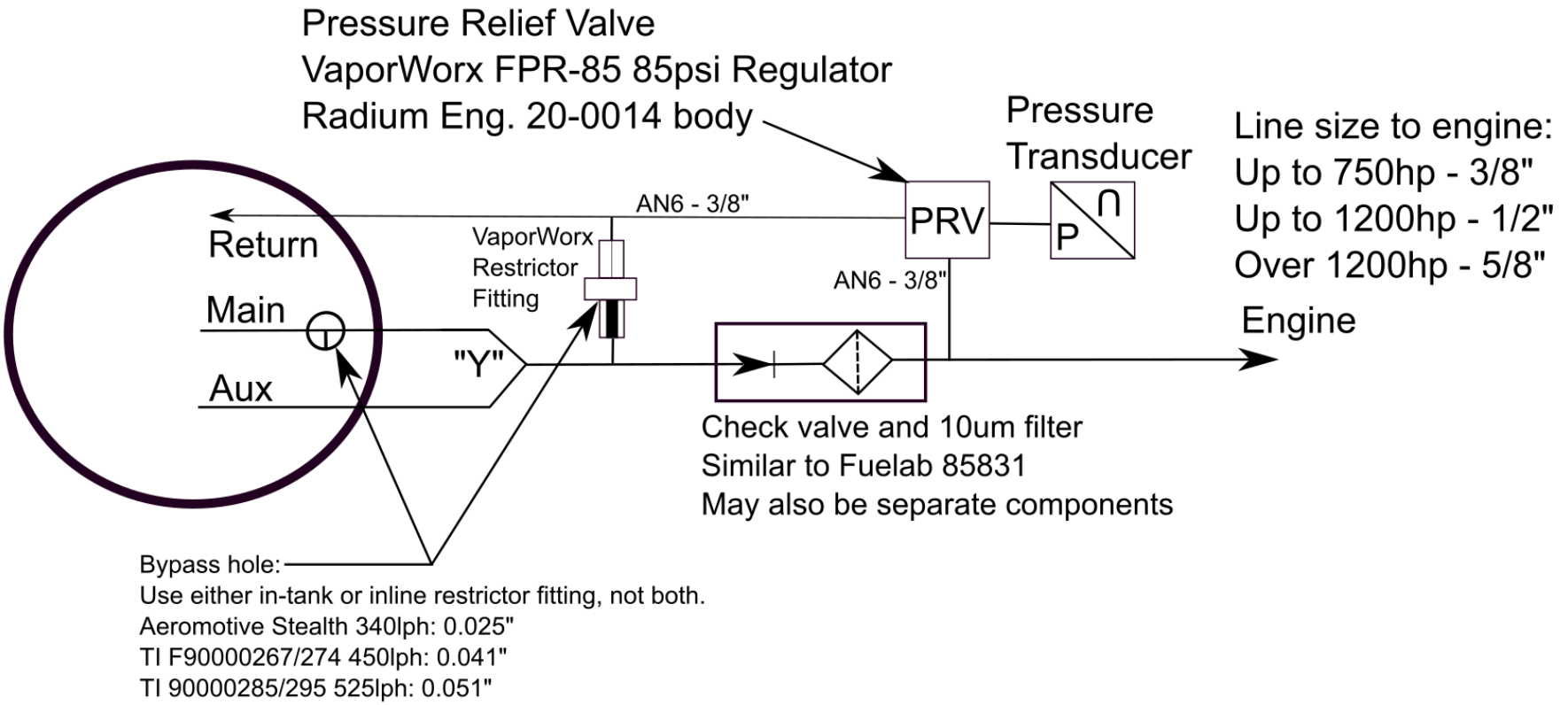
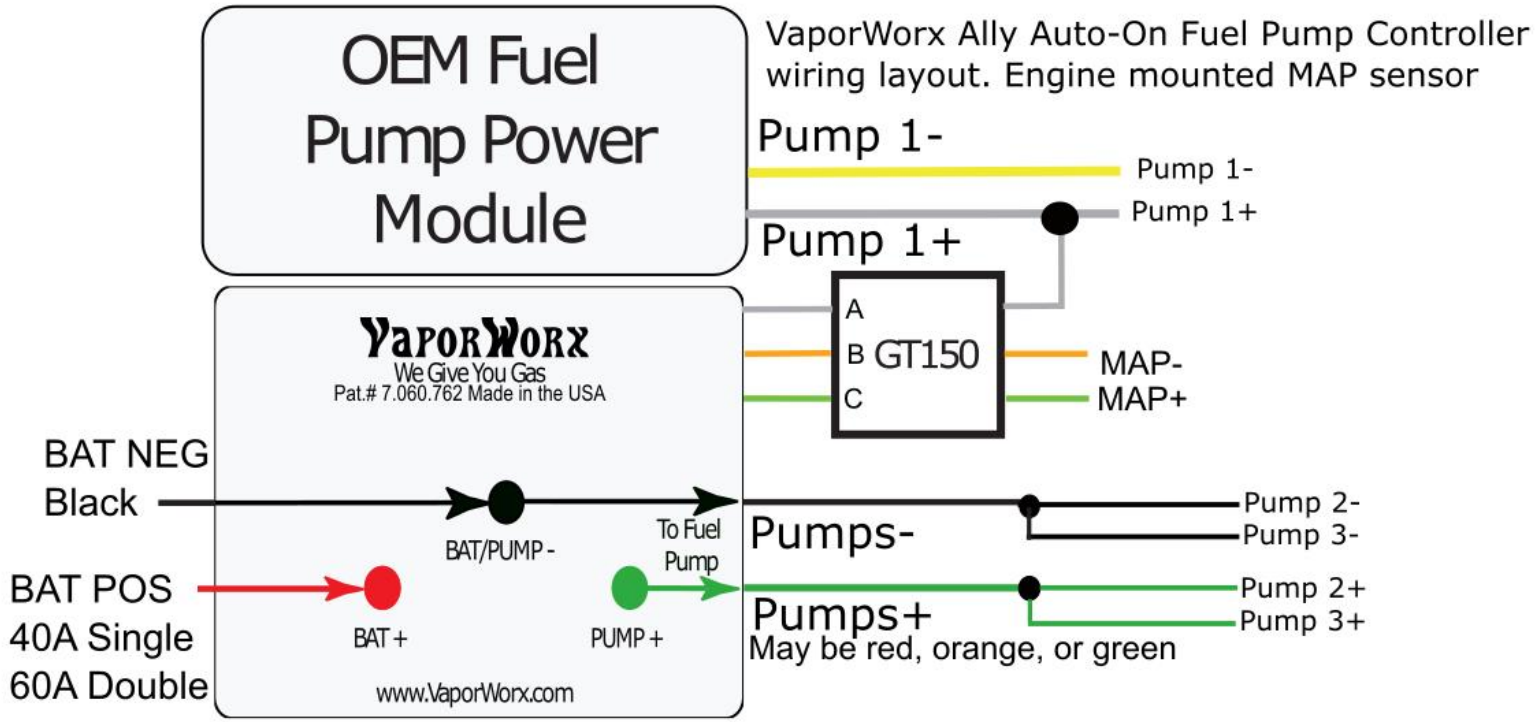
Typical plumbing layout for single or multi-pump hydraulic fuel systems
utilizing stand-alone or OEM/Crate Engine PWM Fuel System Control Module



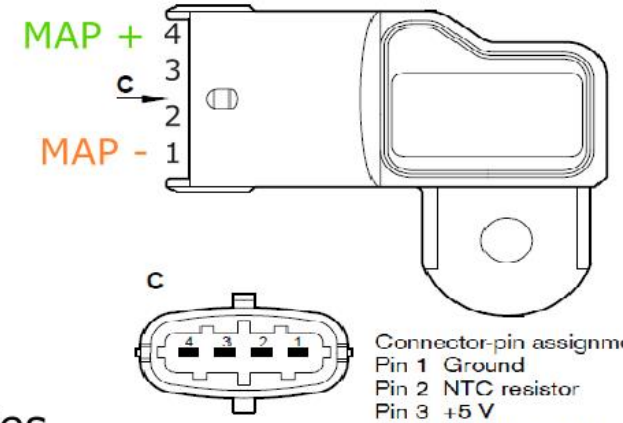
Note: All returnless fuel systems require a bypass (controlled leak) for smooth pump operation during low fuel demand. This bypass may be done via an intank method or a restrictor fitting installed externally. Internal methods are preferred due to reduced plumbing, costs, space demands, and safety. This bypass is not needed with OEM fuel modules, just stand-alone pump(s).



Wiring schematic for the Ally Auto-On engine mounted MAP sensor control system.

ACDELCO 12592525
LSA/LS9 3bar Map Sensor

LT-Series 3bar Map Sensor



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

MAP Sensor Pinout Schedules.