

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.

Thank you for your purchase of the VaporWorx fuel module speed control system. These "Smart" returnless systems are designed to work with the GM Cadillac CTS-V dual pump fuel module. These are stand-alone systems and require minimal ECM commands: Only a 12+ turn on signal is needed in many cases. Hence, it will work with any EFI control system except FAST EFI. Please contact VaporWorx for FAST EFI options.

The purpose of the VaporWorx fuel module control system is to allow the fuel module pumps to adjust their speed based on the fuel demand. As fuel demand increases, the VaporWorx pulse width modulation controller will also increase the fuel pump speed. As fuel demand decreases, so will the pump speed. This allows a large pumping system like the CTS-V to run reliably with significantly reduced heat generation. It effectively makes a very large pump seem much smaller during cruise/low fuel demand conditions.

It is recommended that the minimum idle fuel pressure for the CTS-V fuel module be no less than 34psi. The maximum no more than 65psi. The CTS-V fuel module has a built-in safety valve that begins to open at 66-67psi.

In most cases vehicles that are using the stock GM G8 fuel module, engine re-tuning will not be required if the VaporWorx controller is set to supply a constant fuel pressure. If changes to the injectors, cam, etc. are performed then an ECM retune is needed. The factory fuel pressure setting for the G8 is 60psi constant.

The PressureWorx system can provide a 1:1 rate of fuel pressure change with manifold pressure if desired. For these systems initial fuel pressure can be as low as 34psi. Wiring connections to the engine MAP sensor are required, 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, just disconnect the MAP wiring to the VaporWorx controller and adjust the fuel pressure accordingly.

Unless otherwise specified the PressureWorx kits are tuned for 3-bar MAP sensors. Typical 3-bar sensors such as GM P/N 12592525 used on the LSA and ZR1 crate engines are a good choice.

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.

The fuel level sensor in Gen5 Camaros is not the same as the CTS-V sensor. A CTS-V sensor should be purchased. The Pontiac G8 sensor can be re-used if the modifications are made as noted in the following instructions.

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. For off road use only.

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, fire extinguishers, and repair procedures must also be worn and utilized at all times.

Instructions for modifying the Cadillac CTS-V fuel module GM P/N 19207950 to work with the Pontiac G8 and similar platforms.

The Cadillac CTS-V fuel module, when combined with the VaporWorx pulse width modulation fuel module control system, has proven to be a reliable and capable performer. With only a few modifications the CTS-V fuel module can be used with minimal changes to the chassis and OE wiring. The following instructions will serve as a guide, but like any installation project it is prudent to check what you find vs. the instructions. If you find discrepancies, please contact VaporWorx for suggestions.

Some GM owners modify the chassis by cutting a hole in the floorpan directly above the fuel module. Wretched Motorsports (found on g8board.com) has a very nice machined ring and bolted plate that makes the installation very clean and allows a bit more overhead room at the same time.

Adam at Ace Performance or Greg at Pace Performance can provide the necessary fuel plumbing fittings. These guys have done the homework to make sure that the installation is correct.

Be absolutely sure that when the fuel module is removed that the fuel level is below the module hat. If the fuel level is higher than the hat fuel will quickly rush out and flood the work area, possibly causing a fire. Often when the low-level fuel light comes the fuel height is barely low enough but care and verification must be done.

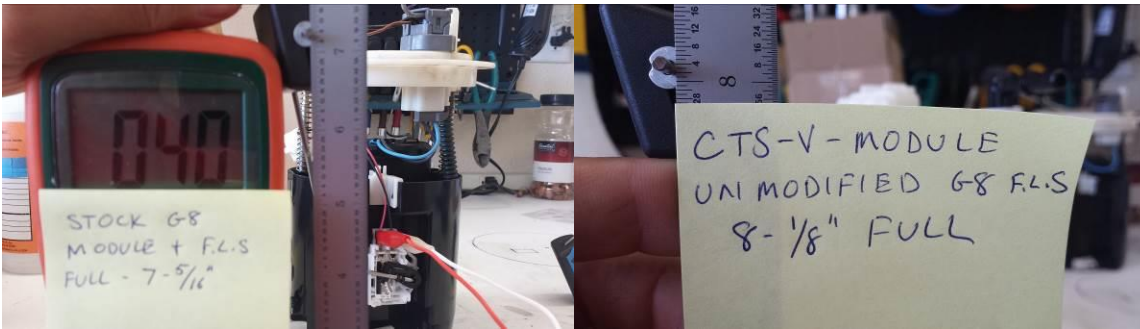
Fuel Level Sensor Mechanical Modifications (G8 only.) For CTS-V chassis installations, skip to Step 15.

The Pontiac G8 and CTS-V fuel modules, though they look similar, have differences that do not allow the OE G8 fuel level sensor (FLS) to have the same liquid level readings when mounted on the CTS-V module. In short, the FLS mounts higher on the CTS-V reservoir. These instructions will outline how to make small adjustments to the OE G8 FLS in order to obtain the correct fuel gauge readings without having to modify any ECM data.

In Photos 1-4 the full and empty readings of the OE G8 and CTS-V /G8 FLS can be seen. Note that the differences in height for both is approximately 7/8". **Verify your dimensions and compare/adjust as needed.**



Photos 1 and 2. Empty float height readings for Pontiac G8 / CTS-V fuel modules.



Photos 3 and 4. Full float height readings for Pontiac G8 / CTS-V fuel modules.

Since the height difference between both the empty and full readings is approximately $7/8$ ", what needs to happen is that when the G8 OE FLS is mounted on the CTS-V fuel module the float must move down a similar $7/8$ ".

Step 1: Note the bend in Photo 5. This bend will control the empty float height reading. Remove the float from the fuel module. Using a pair of Vice Grip™ pliers for support like that in Photo 6, slightly straighten this bend. Remount the FLS on to the module and measure the empty float height similar to that in Photo 1. Adjust the bend until an empty measurement of $1-1/8$ " is obtained. Small amounts of bend change will result in much larger changes at the float, so take your time and make small adjustments. Your empty height may differ.



Photos 5 and 6. Make the bend along the same axis as the OE bend. Do not allow bending loads to travel up to the fuel level sensor body.

Step 2: Note the bend in Photo 7. This bend will control the full float height reading. Remove the float from the fuel module. Using a pair of Vice Grip™ pliers like that in Photo 6, slightly increase this bend. Remount the FLS on to the module and measure the full float height similar to that in Photo 3. Adjust the bend until a full measurement of $7-5/16$ " is obtained. Small amounts of bend change will result in much larger changes at the float, so take your time and make small adjustments. Your full height may differ.

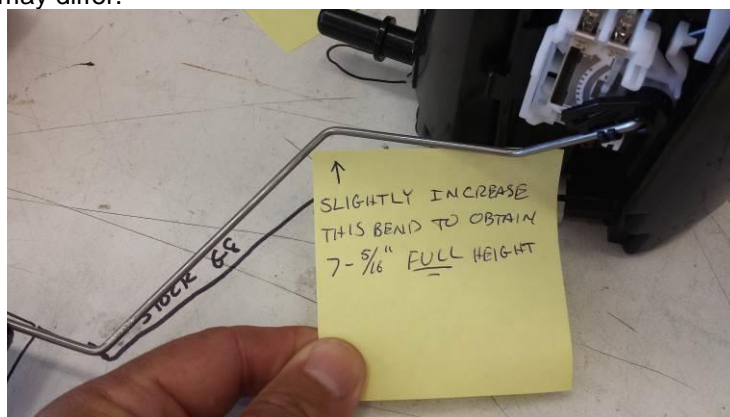


Photo 7. Full float height bend adjustment. Make the bend along the same axis as the OE bend. Do not allow bending loads to travel up to the fuel level sensor body.

Step 3: Recheck the empty float level measurement. Readjust float rod to obtain an empty float level reading of 1-1/8" if necessary. Small amounts of bend change will result in much larger changes at the float, to take your time and make small adjustments.

Fuel Level Sensor Electrical Modifications (FOR ALL NON-CTS-V VEHICLE APPLICATIONS USING GM FUEL LEVEL SENSOR.) For CTS-V chassis installations, skip to Step 15.

- 1) The following modifications are to be made while the Cadillac CTS-V2 fuel module is on the workbench. If the fuel module is in the car, follow the manufacturers' procedure for removal and drain the module of fuel.
- 2) The fuel level sensor (FLS) bulkhead terminals are like that shown in Photo 1. Note the order of the components. The components are installed on to the screw in the correct order.
 - a. Screw with ring soldered on.
 - b. Pressure sealing washer with round bore.
 - c. CTS-V fuel module hat.
 - d. Pressure sealing washer with triangular bore.
 - e. Flat washer.
 - f. Split lock washer.
 - g. Nut
 - h. Ring terminal for FLS wiring connection
 - i. Flat washer.
 - j. Star lock washer
 - k. Nut

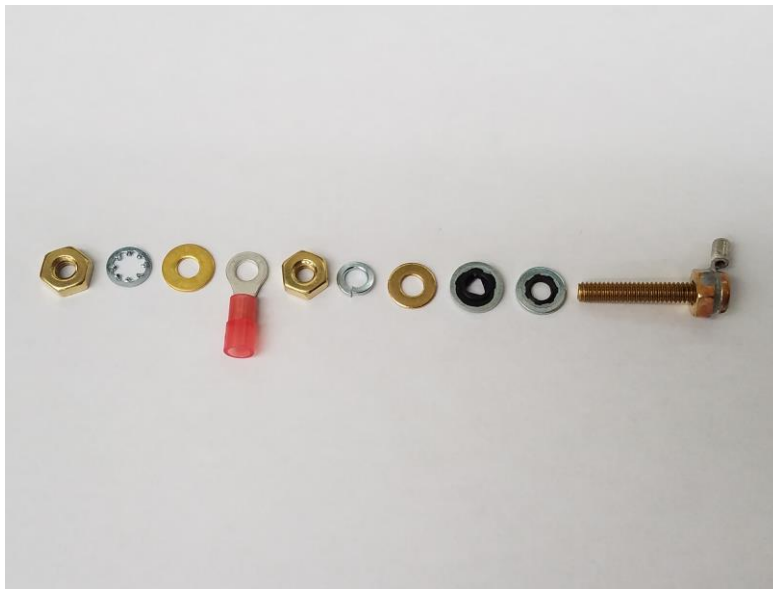


Photo 1. Note that the fuel module hat will be between the two silver pressure sealing washers.

- 3) Noting the position of the screws in Photo 2, use the drill bit provided to drill two holes as shown. The holes must be placed so that the sealing washer will seat flat and not on the ribbed surface. Using a Sharpie to put a dot on the underside of the hat and shining a flashlight up through the bottom of the hat will help identify the drilling location.
- 4) Very lightly deburr the edges of the hole, top and bottom. Only break the corner enough to remove the burr. If excessive material is removed the sealing washer will not seat as designed and possibly leak.
- 5) Inspect the top of the fuel module hat to insure that the area surrounding the hole is flat. If there are any protrusions/markings etc. then carefully remove them to make a flat surface.
- 6) Cut the wires from the stock G8 or CTS-V fuel level sensor near the plug in order to have sufficient length to reach the ring terminals ring once they are mounted in the holes made in the hat. Strip and crimp the black and pink wires to the soldered-on ring terminals.

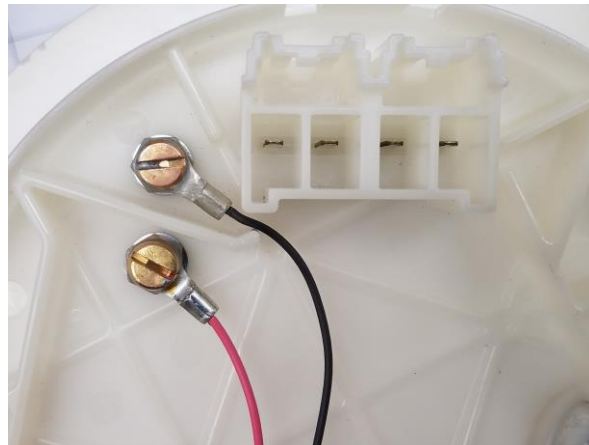


Photo 2: Note the holes are drilled to allow for a flat sealing surface. The black and pink wires go to the fuel level sensor.

- 7) Place the sealing washer with the round hole on to the screw and insert it in to the hole from the bottom side of the hat as shown in Photo 2.
- 8) Place the sealing washer with the triangular bore, then a flat washer, spring lock washer, and nut. Tighten to 12in-lbs.
- 9) Using the external brown wire supplied, crimp on end with a provided #8 ring terminal. Do the same for the violet wire.
- 10) Place the external brown wire on to the terminal that corresponds to the black wire from the FLS. The other end routes to the OE G8 plug and connects to the similar colored brown/yellow wire.
- 11) Place the external violet wire on to the terminal that corresponds to the red wire from the FLS. The other end routes to the OE G8 plug and connects to the similar colored violet wire.
- 12) Place the flat washer, star lock washer, and nut on to each terminal. Tighten the nuts to 10in-lbs each.
- 13) The stack assembly should look like that in Photos 3 and 4.



Photo 3. The stack assembly. Fuel level sensor wiring not yet connected.

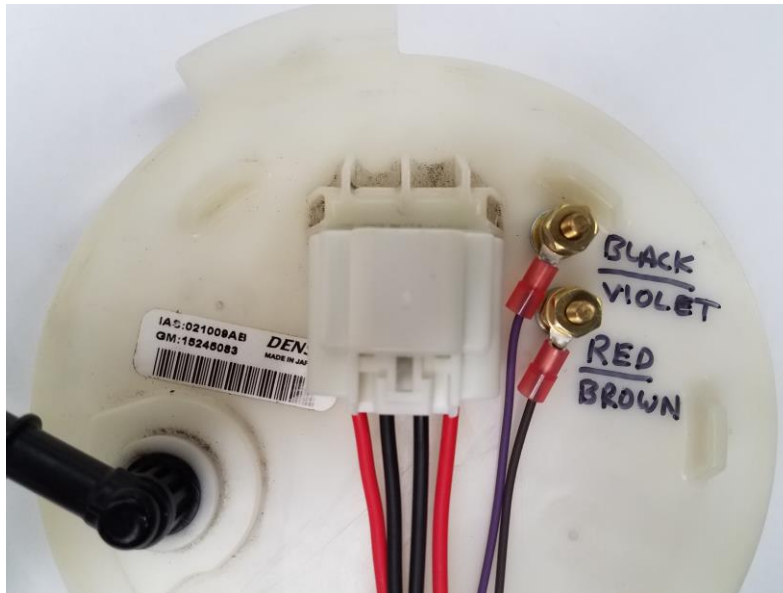


Photo 4. Note the violet wire routes to the fuel level sensor black, red to the fuel level sensor brown (G8 applications.)

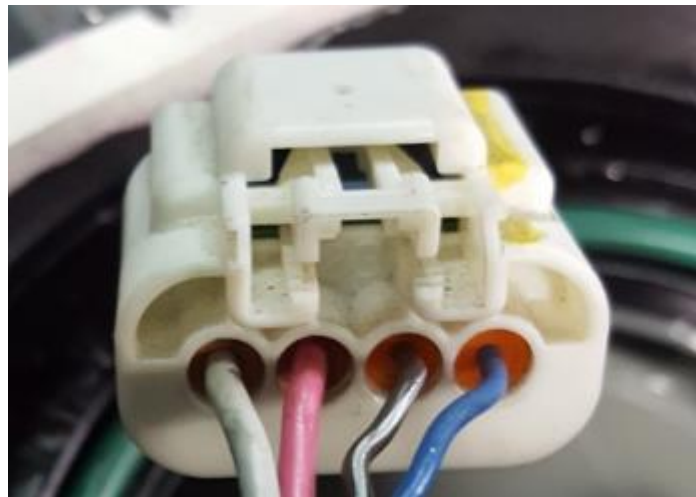


Photo 5. OE Gen5 fuel module wiring. The brown routes to the CTS-V fuel level sensor black, the blue to fuel level sensor pink.

Step 14: On the workbench, confirm that the VaporWorx harness plug wiring corresponds to the wiring on the bottom of the module hat. Harness red goes to pumps +, harness black goes to pumps -, violet goes to FLS pink, brown goes to FLS black.

Step 15: Install the fuel module with the DW300 pumps into the vehicle tank using a new GM green seal and OE cam ring.

Installing the VaporWorx controller main power and signal wiring:

This installation utilizes an existing rubber grommet (Photo 6) to route the VaporWorx power harness through the floorboard of the car and in to the passenger cabin. Route the harness accordingly so that it will not come into contact with sharp edges, heat, etc. Use additional loom and/or protection where needed to avoid damage to the wiring.

Step 1: Plug the white VaporWorx wiring harness plug into the CTS-V module plug.

Step 2: Connect the 14ga grey wire in the OE G8 harness to the grey 20ga pigtail that exits near the fuel pressure sensor plug. Solder the connection and use the included heat shrink tubing to seal the connection. This wire is grey on one end, blue on the other. This wire runs to Pin D on the sealed GT150 connector. It should align to the blue wire on the GT150 connector on the VaporWorx controller as well. Do not use the grey wire in the Gen5 Camaro fuel pump plug, or any other fuel system control module (FSCM/fuel computer) equipped vehicle.

Step 3: Connect the violet and brown wires from the fuel module hat to the similar violet and brown/yellow wires in the OE G8 harness. Solder the connections and use the included heat shrink tubing to seal the connections.



Photo 6. Note the how the woven braid routes through the OE grommet and then goes to the other side of the car. The pressure sensor must be placed near the outlet of the fuel module.

Step 4: Install the VaporWorx fuel pressure sensor into the fuel line similar to that shown in Photo 6. The nipple is 1/8"-NPT so a standard AN6 Male-Male union with an 1/8"-NPT on the side works well. Be sure to apply PTFE paste on just the threads. Arrange the fittings so that the sensor will stay as close to the module hat as practical.

WARNING: The fuel outlet on the module is made of plastic. It will break if excessive strain is applied and it cannot be replaced. Take precautions to not apply excessive strain during installation and confirm that there is sufficient support of the fuel lines once attachment is complete.

Step 5: Install the VaporWorx fuel pressure three-cavity sensor plug. Route the wiring for the sensor and pump power towards the battery keeping the routing loose for now. **Be very careful to not apply excessive strain to the wiring and fuel module outlet connection.**

Step 6: Finish all wiring and plumbing connections surrounding the fuel module but do not cover the access hole, if applicable.

Step 7: Route the wiring to the area near the black plastic amplifier bracket on the drivers side of the car.

Step 8: Remove the cover on the VaporWorx controller. The wiring from the fuel module should fit on to the controller as shown in Photo 7. The controller should mount on a flat surface. As shown in Photo 8, a typical Pontiac G8 will have the controller centered above the black plastic amplifier bracket. Use the power wiring from the fuel module as a guide to confirm sufficient wire length before drilling any holes. Install protective wire braid to the fuel module power wiring. **DO NOT YET CONNECT THE SIX-PIN DELPHI SEALED CONNECTOR.** If plugged in, and MAP sensor wiring then needs to be installed, the purple cap on the inside of the connector body must be released first. The purple cap is a terminal locking device.



Photos 7 and 8. The wiring from the battery enters from the LH side, to the pump and sensors exits to the right.

Step 9: Secure the VaporWorx controller as shown in Photo 8 (Pontiac G8). Gen5 Camaro mounts in the spare wheelwell. Screws are provided. **Confirm that the screws are not too long and that they will not contact the outside body panel, fuel tank, or other systems.**

Step 10: The VaporWorx GT150 six-pin connector provides fuel pressure sensor, fuel enable circuit, and MAP sensor connections. Using the terminals and seals provided as seen in Photo 9, crimp the terminals to the wires like that shown in Photo 18. Solder the terminals to the wires if needed.

- 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 (changes to grey to match the OE color G8 ONLY.)**
- E: Orange/Black 20ga from the engine MAP (-) sensor*
- F: Light green 20ga from the engine MAP (output) sensor* *Only needed for manifold referenced fuel pressure.

Just line up the colors to those in the plug body on the controller

NOTE: For Gen5 Camaros, CTS-V's etc. with OE Fuel System Control Modules, do not use the grey wire on the factory fuel plug as an on/off trigger for the VaporWorx controller. Overheating will result. For these application use the 20ga green/grey wire on the FSCM plug. The FSCM will need to be disabled in the ECM and appropriate tuning performed.

The MAP sensor wiring will need to be connected only if manifold/boost referenced fuel pressure is desired. If the MAP sensor wiring will not be installed, insert the supplied green plugs into the empty GT150 six-pin plug cavities. Plug the two six-pin connectors together.

Using the ECM fuel pump circuit (G8 only) will allow the safety features of the ECM to remain functional. If only 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 imperative that these features remain functional for your safety.



Photo 9: The GT150 connector body, terminals, seals, and terminal positional assurance clip.

Step 11: Insert the wires into the Delphi GT150 female connector body as shown in Photo 11. The pinout schedule is listed below for the connector body. Capital letters can be found on the connector body on one side only near the wire insertion hole. Just align the colors to the VaporWorx connector.

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

NOTE: If a constant fuel pressure is desired do not connect the Orange/Black and Light Green MAP sensor wiring to the VaporWorx controller. A 58-60psi setting is typical but a pressure as low as 42psi can be used. The VaporWorx controller comes preset to approximately 60psi with no MAP sensor connection (constant pressure.) For manifold referenced applications, turning the fuel pressure adjustment screw four turns CCW will reduce the at-idle pressure to approximately 42psi with MAP wiring connected. The actual fuel pressure must be checked with a gauge or similar method.

Step 12: Re-verify that the wires have been properly placed in the connector and that the colors align. This is the single 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 very 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.

Step 13: Once the correct wiring has been confirmed, install the grey terminal position assurance clip as shown in Photo 4 and connect the two six-pin connectors together.

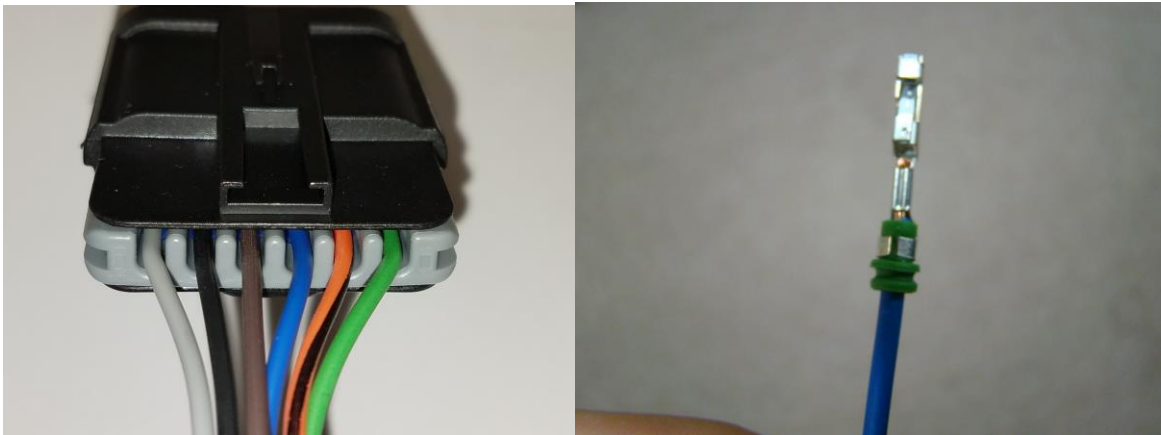


Photo 11-11A: The grey terminal position assurance clip is installed. Cavity E is Orange/Black MAP sensor low reference/ground (center pin on GM 12592525 3bar sensor), Cavity F Light Green MAP sensor output (Pin 3 on GM P/N 12592525.) Proper wire crimping assembly shown in Photo 11A.

See Diagram 1 or 2 for Steps 14-17

Step 14: The labels on the VaporWorx controller shows the input and output of the positive side of the controller. Using the supplied red insulated fused link and ring terminals, connect one end of the fused link directly to the battery positive and the other to the controller BAT+ input terminal. Tighten the brass nut to 10in-lbs. *Do not over-tighten the brass terminal screws on the controller.*

Step 15: Using the supplied heavy gauge black wire from the battery and ring terminals, route it to the controller BAT/PUMP - terminal. Do not yet tighten the brass nut on the controller.

Step 16: Using the ring terminals provided, securely crimp, heat shrink, and attach the red wire from the fuel module wiring harness to the positive output PUMP 1 on the VaporWorx controller. Tighten the brass nut to 10in-lbs. *Do not over-tighten the brass terminal screws on the controller.*

Step 17: Similar to Step 16, attach the black wire from the fuel module wiring harness to the BAT/PUMP - terminal on the VaporWorx controller along with the wire from the battery. Tighten the brass nut to 10in-lbs. *Do not over-tighten the brass terminal screws on the controller.*

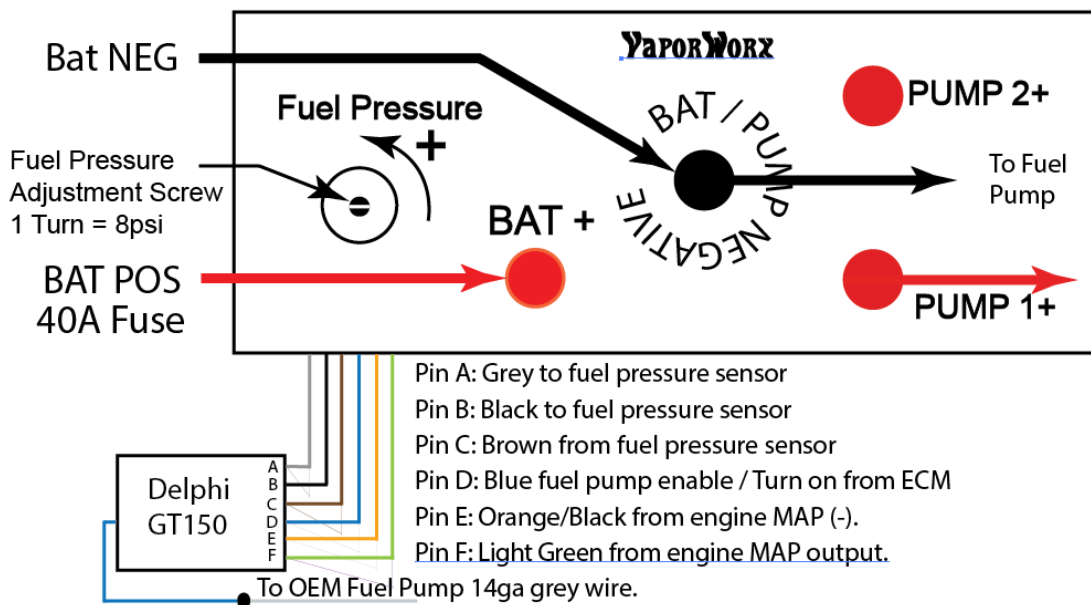


Diagram 1. Basic wiring layout for the VaporWorx controller for vehicles without a factory Fuel System Control Module (Pontiac G8). Use additional loom to protect wiring as needed. Do not use chassis grounds for BAT/PUMP NEGATIVE connection. NOTE: For GM LSA crate engine controllers use the 14ga grey fuel pump power wire to Pin D fuel pump enable.

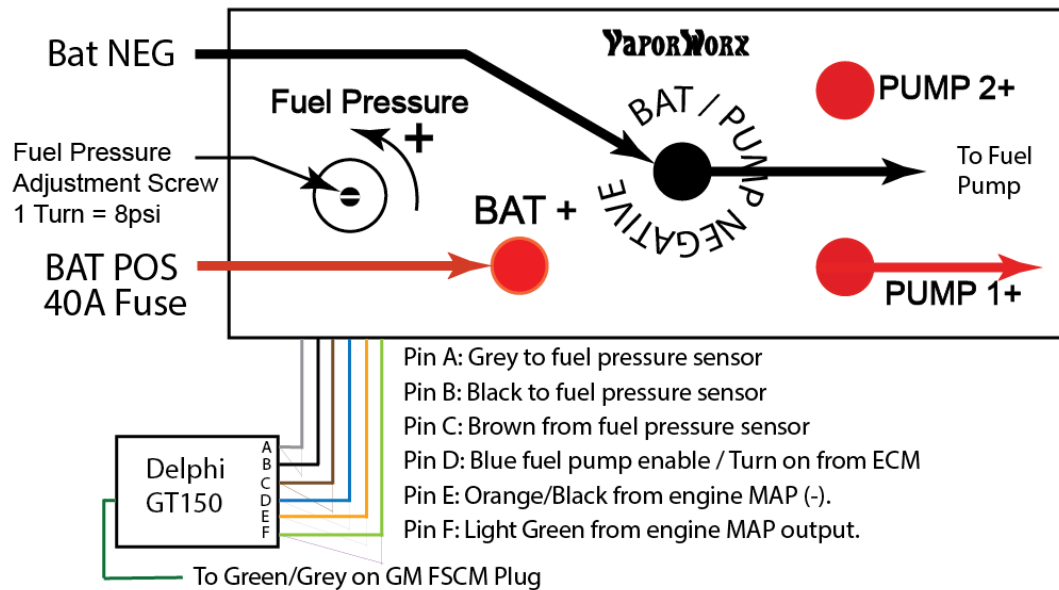


Diagram 2: For vehicles with an installed Fuel System Control Module (Gen5 Camaro, Gen2 CTS-V, etc.) use the green/grey wire in the FSCM plug to turn on/off the VaporWorx controller. Do not use the fuel pump + wire on the OEM harness plug. Do not use chassis grounds for BAT/PUMP NEGATIVE connection.

Step 18: Secure the power harness from the fuel module to the VaporWorx controller. Confirm that it will not rub, chafe, etc. It should appear similar to Photo 12.



Photo 12: The VaporWorx power harness routing along the under-seat well (G8).

Preparation Required Prior to Engine Startup

- 1) Add some fuel to the tank so that the fuel level will be higher than the module reservoir but not as high as the module hat. This will allow for quick module refilling during the flushing process. Check for any leaks.
- 2) 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.
- 3) Insert the 40A fuse into the fuse link.

- 4) 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. Most ECM's have a safety feature that turns off the fuel pump after 1-2 seconds if it does not sense that the engine is running. Do not run the pump for more than 2-3 seconds with the fuel line removed from the rail. 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 20ga GT150 connector 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.

- 5) Reconnect the fuel line to the engine fuel rail and attach a fuel pressure gauge to the engine fuel rail.
- 6) 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 and engine fuel rails 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.
- 7) 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.
- 8) On the inside lid 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 smaller exposed blade on the supplied blue trimmer tool, adjust the fuel pressure for constant pressure systems to 58psi/4bar, and 42psi for manifold referenced. If access is tight, cut the plastic tool shorter to fit. CW = Pressure decrease. One turn = approximately 8psi pressure change.
- 9) Shut down the engine as soon as practical and check the fuel system for leaks. Repair any leaks before continuing. If a hole was cut in the floorboard cover it securely with a metal plate and seal it to prevent air, water, and contamination entry.
- 10) Restart the engine. Quickly depress and release the throttle pedal. For constant pressure systems the pressure should remain constant, with perhaps a small pressure drop-off. For manifold referenced systems, the fuel pressure should rise and fall with manifold pressure.

Maintenance

After 3-6 months check the torque of the nuts on the VaporWorx controller that are underneath the ones installed in the above instructions. Remove the 40A fuse and power wiring from the controller. Tighten the lower nuts to 10in-lbs. Re-install the power wiring and fuse. This does not need to be done again.

No other periodic maintenance is needed.

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. No chassis grounds.
- 2) Fuel pump does not run:

- a. Check the input fuse.
 - 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 not corroded.
 - e. Check the brass nuts that are under the 10ga battery and fuel module ring terminals. These may loosen over time. Retighten them and test the system.
 - 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. No chassis grounds.
- 3) The fuel pressure rapidly fluctuates, especially at idle:
- a. The fuel pressure sensor is too close to the fuel rail. 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.
- 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. Confirm that the CTS-V underhat wiring is correct.
 - e. 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.

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 voltmeter to the BAT + and PUMP + output of the VaporWorx controller. 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 reaches 0.2volts, the controller is effectively sending maximum power to the pump(s).