



INSTALLATION INSTRUCTIONS

FUEL PUMP HANGER

08+ MITSUBISHI LANCER EVOLUTION X

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Document# 19-0116

WARNING: DO NOT EXPOSE WORK AREA TO ANY SPARKS OR FIRE. DO NOT SMOKE WHILE WORKING ON THE FUEL SYSTEM. CLEAN UP ALL FUEL SPILLS IMMEDIATELY. WORK IN A WELL VENTILATED AREA.

1. **Note:** It is highly recommended this install be done with no fuel in the tank to reduce fuel spills and make installation easier and safer. Draining the tank is recommended.

Remove the rear bench seat. Find the fuel pump access panel on the left hand side under the lower seat cushion. To remove, first disconnect the electrical loom clip (shown) then carefully pull upwards around the perimeter of the panel. It is fastened down with an adhesive caulking, but can be removed and reinstalled easily.

To depressurize the fuel system, first squeeze the tab and unplug the gray wiring connector on top of the pump housing (shown). Start the engine and allow it to stall. Remove the key from the ignition. Unscrew the gas tank filler cap temporarily to relieve any residual pressure.

RELEASE ELECTRICAL LOOM
CLIP FROM ACCESS PANEL



2. Dislodge the battery panel in the trunk and disconnect the negative terminal of the battery with a 10mm socket wrench. CAUTION: Disconnecting the battery may cancel fault memories of some control units. Consequently, before disconnecting the car's battery, always interrogate the fault memories.

As shown, it is recommended to clean the top of the fuel pump housing and the surrounding area. This will prevent loose dirt from falling into the gas tank.

To detach the pressure feed line, use a flat head screwdriver to dislodge the green plastic retaining clip upwards. Next, simply pull the connector away from the fitting. Use a rag to clean up any spilled fuel. Loosen the hose clamp on the return hose and remove it from the housing's barb fitting, as shown.

LOOSEN SPRING CLAMP
AND REMOVE HOSE

PRY TAB UP
TO UNLOCK



3. To release the OEM fuel pressure sensor, spread the two retaining tabs outwards and simultaneously pull upwards, as shown. Unplugging this connector is not necessary.

To allow extra room, the nearby rubber grommet can be removed and the OEM wiring harness can be pulled out for easier modification access later.

Using an 8mm wrench, loosen the six M5 nuts holding the retaining ring. Next, hold the fuel pump housing down with one hand and remove each nut one by one by hand as the housing is slightly spring-loaded.

Finally, remove the black steel retaining ring and set aside as it will be reused.

SPREAD TABS APART



4. Before removing the OEM fuel pump housing, place an empty bucket nearby, there will be residual fuel in the gas tank. Tilt the fuel pump housing towards the right side of the vehicle then pull up. Be careful not to damage the fuel level float arm. Using pliers, release the crossover hose, as shown. Pull the OEM fuel pump housing out and drain into the bucket.

Remove the large rubber gasket from the OEM fuel pump housing.

Clean the fuel pump housing and set it onto a workbench. There will be fuel in the OEM bucket. The only two parts that will be reused are the fuel level sender and temperature sensor.

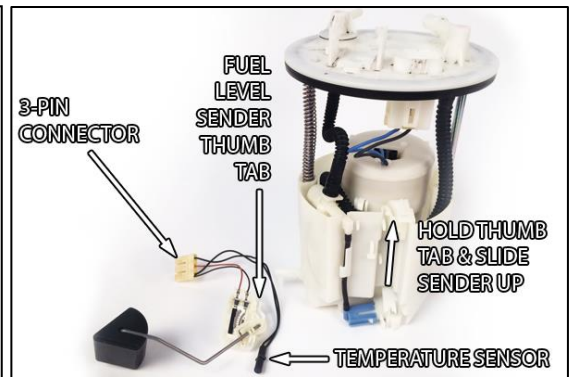


5. To remove the fuel level and fuel temperature sensors from the OEM fuel pump housing, first depress the thumb tab and unplug the 3-pin connector from underneath the top plate.

Next, pry and pop the fuel temperature sensor probe out of the securing tabs.

To remove the fuel level sender, press the upper right thumb tab inwards and simultaneously push the module up and out gently until it unlocks. Be careful not to damage the circuit board or bend the float arm.

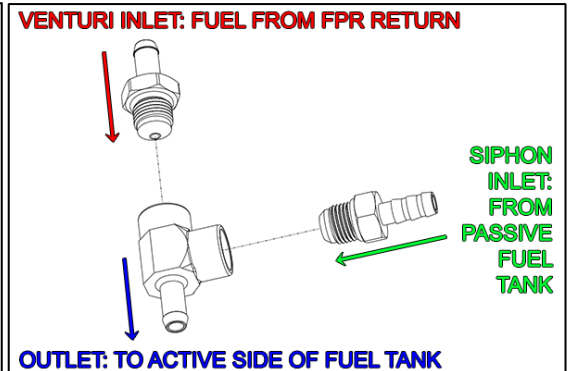
Finally, release the temperature probe wires from the fuel pump housing tabs to fully release the sensor assembly.



6. If the fuel pump hanger kit was purchased with pump(s) included, skip Steps 6-9.

The Radium fuel pump hanger kit comes with 2 different venturi jet pump orifice fittings. The **green** orifice is typically best for most applications. The **gold** orifice can be used in situations where back pressure in the return line needs to be reduced to a minimum. The proper size will be determined by the backpressure in the return line. This is dictated by many factors including the flow rate of the pump(s), if the pumps are staged, engine fuel consumption, the diameter and length of the return hose, etc.

To prevent failure, the venturi jet pump O-rings MUST be lubricated prior to assembly. Also, if installing fuel pumps, the jet pump and jet pump hose assembly can stay intact unless the orifice needs to be swapped.



7. To install pumps, the hanger must be partially disassembled. First, remove the 3 internal pump hanger bolts (pictured in blue) using a 4mm Allen wrench. For dual fuel pump applications, remove the port plug and replace with the included barb fitting (lubricate O-ring first). Note: The barb fittings (pictured in red) can be used in either port since they share the same outlet.

Cut the included submersible rubber hose to the specified length below for each pump used:

- * 2.25" (57mm) -> AEM 50-1000 / Walbro GSS342
- * 2.18" (55mm) -> AEM 50-1200 / Walbro F90000262
- * 1.97" (49mm) -> Walbro F90000274 E85

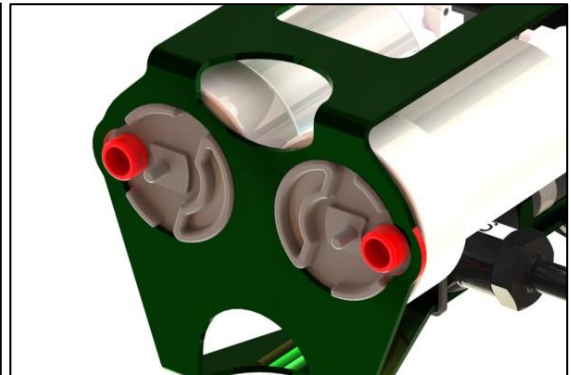
Before connecting the fuel pump hose(s), lubricate each barb with oil and install two EFI hose clamps per fuel pump. Do not tighten yet.



8. Rotate and align the fuel pump(s) concentrically with the cut-outs in the internal pump bracket, as shown in red. Tighten the EFI hose clamps after the alignment is complete. Reinstall the green internal pump bracket. Using 2 of the included zip ties, strap the jet pump body to the green bracket. Next, press the filter sock(s) onto each pump inlet and secure with the star washer.

NOTE: The Radium Fuel Pump Hanger was designed for a specific type of fuel pump sock filter. Large filter socks which have a rigid internal "skeleton" insert can be difficult since they cannot be formed inside the collector box. See below for filter socks that are recommended:

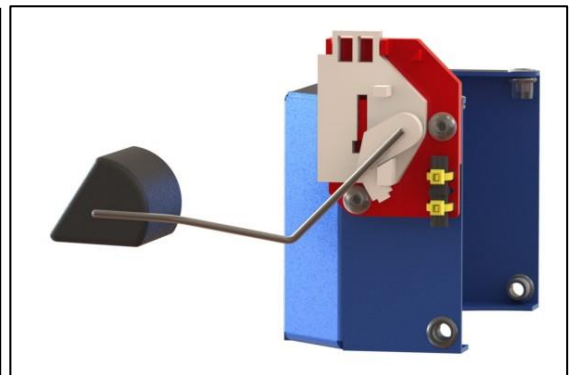
- RADIUM Engineering, P/N: 14-0143 Filter Sock
- AEM, P/N: 50-1000 (the filter sock that is provided in this fuel pump kit)
- AEM, P/N: 50-1200 (the filter sock that is provided in this fuel pump kit)



9. Find the Radium fuel sensor mount in the kit (shown in red). Slide the 2 included zip ties (shown in yellow) in and out of the 4 slotted holes and secure the OEM fuel temperature probe.

Next, carefully slide the OEM fuel level sensor downwards onto the mount until the tab locks into place.

Using a 3mm Allen wrench, secure the two M5 bolts through the fuel sensor mount into the collector box piece, shown in blue.



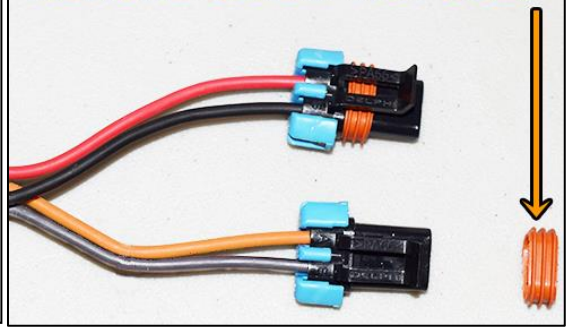
10. **Internal Wiring:** Find the hanging internal fuel pump connections from the Radium bulkhead connector. Plug these into the fuel pump(s).

For single fuel pump applications, leave the Orange and Gray wires disconnected. For Walbro F90000262 Gas fuel pump applications ONLY, use heat shrink to protect the exposed terminals.

NOTES:

1. For single Walbro F90000274 E85 pump applications ONLY, remove the orange rubber seal from the unused connector, as shown.
2. For older AEM 50-1200 E85 fuel pump internal wiring, see the information at the back of this manual.

REMOVE SEAL IF NOT USED



11. To internally connect the 2 sensors, cut the 4 wires at the white OEM 3-pin connector allowing as much slack as possible. Strip all wires. Next, crimp the 4 included terminals to each wire using a tool such as Molex 63811-1000. Picture shows proper insertion of terminals into connectors.

Note: the OEM fuel temperature sensor does not have polarity so wires can be crossed and the readings are unaffected.



12. Reach in the gas tank and find the short rubber crossover hose. It attaches to a hard tube towards the left rear of the vehicle with a spring clamp.

Loosen the clamp and rotate the rubber crossover hose so that the end points toward the right side of the vehicle, as shown. This can typically be done by hand but pliers can be used if necessary.

**ROTATE CROSSOVER HOSE SO
END FACES THIS DIRECTION**



13. Be sure the ball check valves are installed into the collector box pieces with the green fitting on the outside. Unscrew the four M5 button head bolts in the rivet nuts and set aside.

Insert both sections of the 2-piece collector box into the gas tank disassembled. **Note: The collector box will not fit through the tank opening if preassembled.**

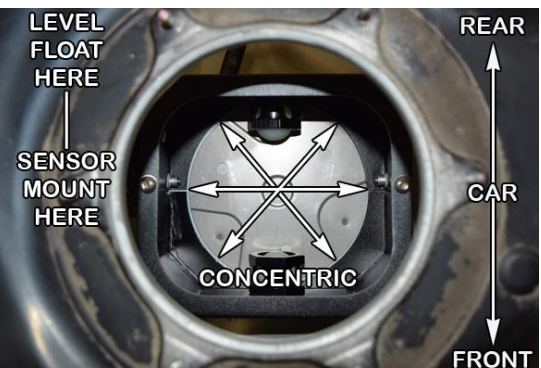
To assemble the collector box, rotate the 2 pieces around inside the gas tank to easily access the 4 connection areas. Using a 3mm Allen wrench, loosely secure the provided M5 bolts through the one piece and into the rivet nuts of the other piece. Once all 4 bolts have been started, tighten them down.



14. Observe the orientation of the collector box in the picture at right.

The fuel level sender should towards the rear of the vehicle and the collector box's large half circles should be concentric with the tank's circular bottom plate.

This is the orientation that the collector box should be sitting just before the fuel pump hanger assembly is lowered into the gas tank.



15. Install and fully seat the OEM rubber gasket underneath the fuel pump hanger top plate, as shown.

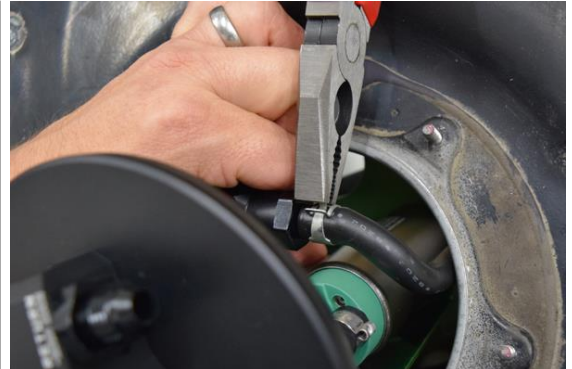
SEATING THE OEM RUBBER GASKET



16. Lower the fuel pump hanger assembly close to the gas tank hole. From the collector box, bring the 2 connectors for the fuel level and temp sensor up and out of the tank. Assemble the 2 included mating connectors so the wires attach as follows. Position the wire slack so the wires will sit towards the front of the gas tank when lowered down.

OEM Fuel Level Sensor (Red Wire) ----->	Radium Connector1 (Blue Wire)
OEM Fuel Level Sensor (Black Wire) ----->	Radium Connector1 (Brown Wire)
OEM Fuel Temp Sensor (Black Wire) ----->	Radium Connector2 (White Wire)
OEM Fuel Temp Sensor (Black Wire) ----->	Radium Connector2 (Green Wire)

Lubricate the jet pump barb with light oil. Reach in to pull the crossover hose out and slide it over the jet pump barb. Secure the OEM spring clamp using pliers, as shown.



17. Wrap the OEM retaining ring around the hanger top and then carefully drop the hanger down onto the tank.

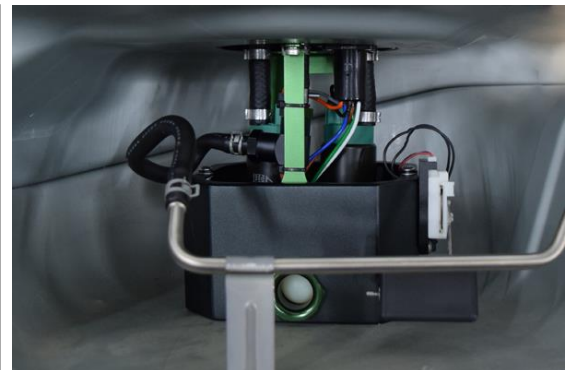
Make note of the orientation graphic on the top plate of the pump hanger assembly and make sure it is aligned correctly with the vehicle, as shown.

Reinstall the OEM M5 flange nuts using an 8mm wrench. Tighten to factory specs in steps using an alternating crisscross pattern.



18. The top plate and gasket should be flush with the mounting ring.

When the fuel pump hanger is fully seated into the collector box, it would look like the example in this picture.



19. Lubricate the O-ring found on the OEM pressure sensor and insert it into the top of the hanger.

Install the included black hold down bracket and lineup the 2 holes. Using the included button head bolts, secure the pressure sensor down as shown with a 2.5mm Allen hex wrench.



20. **External Wiring:** Cut off the OEM 5-pin fuel pump control module connector, as shown. Remove some of the tape, and wire loom than strip all 5 wires.

Cut the following 4 Radium external harness wires around 6" long. Twist the Brown and White (Radium) wires together as they will be spliced with the OEM thin gauge Black "ground" wire.

OEM Fuel Level and Temperature Sensor (Black Wire) ----> **Radium Connector (Brown Wire)**
-----> **Radium Connector (White Wire)**

The other sensor wires will be paired-up, as follows.

OEM Fuel Level Sensor (Yellow/Red Wire) -----> **Radium Connector (Blue Wire)**

OEM Fuel Temperature Sensor (White/Black Wire) -----> **Radium Connector (Green Wire)**



21. To properly use crimpless solder heat shrink butt connectors, insert a wire through one side and then twist the 2 wires together.

Next, center the connector on the bare wires and use a heat gun to melt the solder. Be careful with the surrounding area as the internal solder can take awhile to melt.

Finally, verify the connection is solid by gently tugging.

Match the keyways and insert the plug into the bulkhead connector. Lock the connector down with a clockwise ¼ turn.

Position wires into Solder Splice, as shown.



22. **Dual Fuel Pump Applications ONLY:**

Each fuel pump must use an independent fuse and relay to handle the extra current draw. Consider purchasing Radium 17-0031 (shown) for each pump.

Below are the wire colors for "PUMP 1".

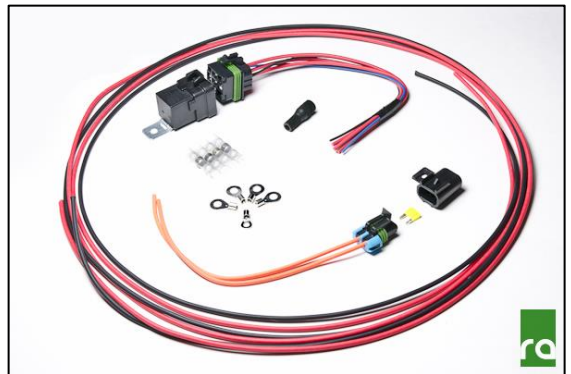
Radium Connector, Pump1 + (Red Wire)

Radium Connector, Pump1 - (Black Wire)

Below are the wire colors for "PUMP 2".

Radium Connector, Pump2 + (Orange Wire)

Radium Connector, Pump2 - (Grey Wire)



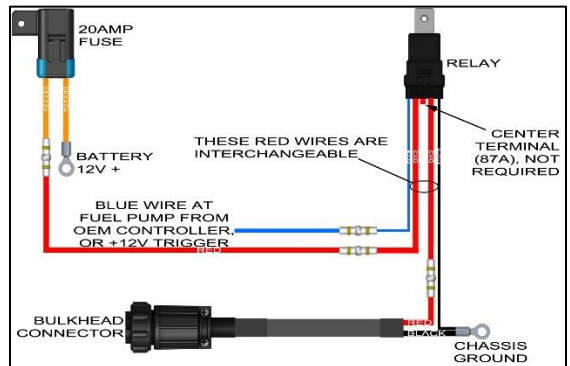
23. **Single Fuel Pump Applications ONLY:**

In some cases, the Mitsubishi fuel pump controller (designed for less than 15A) will be sufficient unless fuel pressure is excessive. To reuse the OEM fuel pump controller and keep the fuel pump duty-cycled, cut the Red and Black (Radium) wires 6" long and connect "PUMP 1" as follows:

OEM Fuel Pump + (Blue Wire) -----> **Radium Connector, Pump1 + (Red Wire)**

OEM Fuel Pump - (Black Wire) -----> **Radium Connector, Pump1 - (Black Wire)**

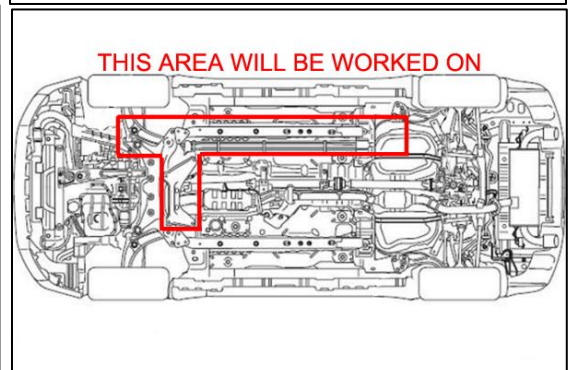
NOTE: The stock fuel pump negative terminal uses a thick gauge black OEM wire and is not to be confused with the thinner gauge black wire used for the sensors. Alternatively, the OEM fuel pump controller can be bypassed using Radium 17-0031 Wiring Kit, as shown. This schematic will run the pump at 100% duty cycle.



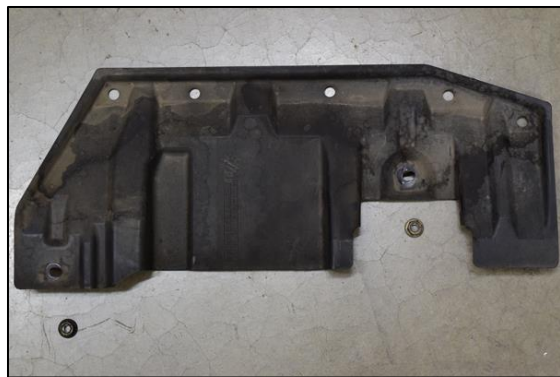
24. **SKIP TO STEP 36 IF THE OPTIONAL PLUMBING KITS WERE NOT PURCHASED.**

Optional 20-0246-XX Fuel Hanger Feed Kit. Steps 24-33

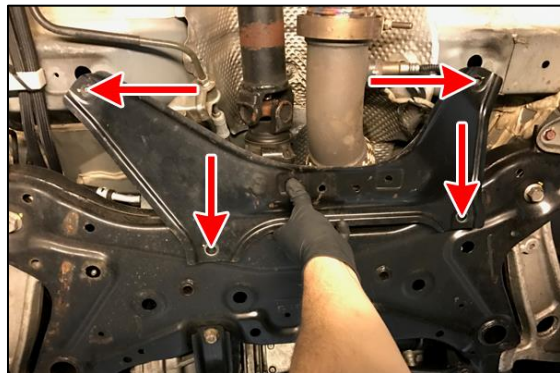
Safely raise the vehicle.



25. The plastic shield (pictured) near the left rear tire and the metal shield near the front left tire that covers the hard lines need to be removed temporarily. Using a 10mm socket wrench, remove the M6 screws and drop the shield down.



26. The center metal under tray brace (pictured) under the exhaust downpipe elbow and driveshaft needs to be removed temporarily. Remove the 4 bolts and drop the brace down.

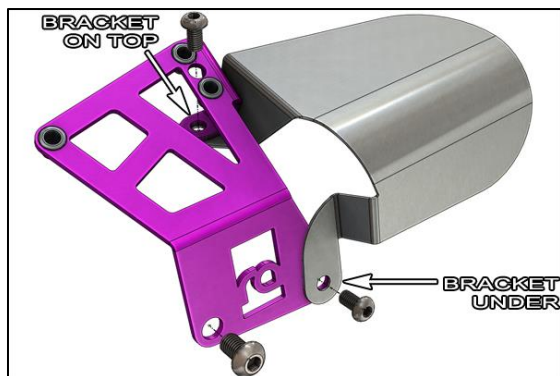


27. When installing the included fuel filter bracket (shown in purple), note that the front OEM hard line shield will be reinstalled at the same time. The OEM shield will sit on top of the bracket on one side and underneath the bracket on the other side, as shown.

Use the included stainless steel hardware to secure the shield and bracket. The two M6 bolts require a 4mm Allen wrench.

NOTE:

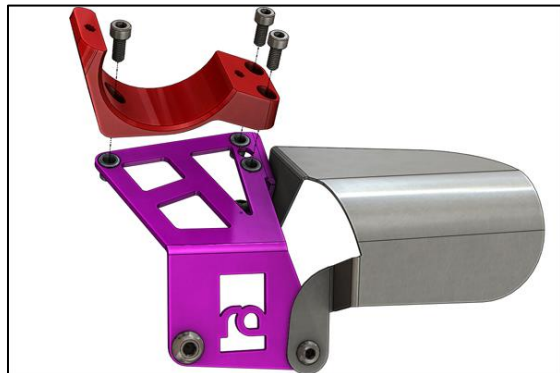
Only install the M8 bolt now if the under tray brace will not be reused.



28. Find the fuel filter clamp in the kit.

Using the included stainless steel hardware, install the lower portion of the clamp (shown in red) to the bracket's rivet nuts.

The three M5 bolts require a 4mm Allen wrench.

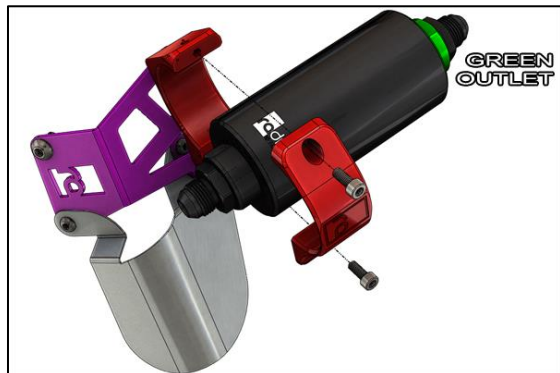


29. Lubricate the O-rings and install the two 8AN adapter fittings into the fuel filter ends.

Temporarily install the filter and upper clamp to the bracket using the three stainless steel hardware.

Make sure the filter is orientated so the outlet (denoted in green) is pointing towards the engine.

The two M5 bolts require a 4mm Allen wrench. Do not torque these bolts yet.



30. Find the shorter PTFE hose included in the kit. Route the hose in the engine bay between the fuel filter and the fuel rail keeping the 45 degree hose end at the fuel rail side.

From underneath the vehicle, pull and slide the fuel filter downwards out of the clamp. Torque the straight hose end to the green fuel filter outlet. Slide the fuel filter all the way back into place. Lineup the clamp the filter, as shown. Have another person simultaneously torque the 45 degree hose end to the aftermarket fuel rail's 8AN male inlet fitting. For hose end clocking purposes, allow the filter to rotate inside the clamp until the 45 degree hose end is tight.

Next, torque the two fuel filter clamp bolts.



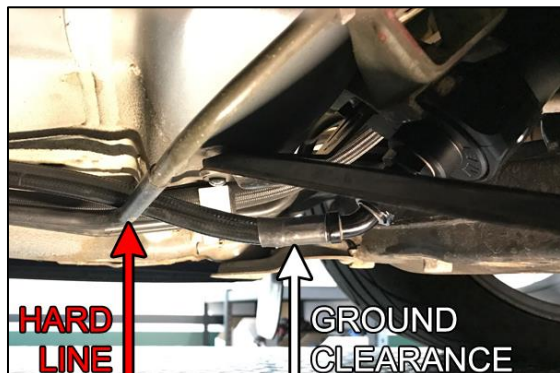
31. Loosely install the longer PTFE fuel hose included in this kit from the fuel pump hanger to the fuel filter.

The straight hose end connects to the "PUMP OUT" port.

The 45 degree hose end connects to the fuel filter inlet port. Be sure to route the PTFE hose above the hard brake line, as shown.

Make sure the fuel filter inlet hose end port has sufficient ground clearance, as shown.

Use the included zip ties to secure the PTFE hose to the hard lines underneath the vehicle.



32. Using a 7/8" wrench, torque the 45 degree hose end on the fuel filter inlet first, then torque the straight hose end on the pump hanger. To avoid breaking anything, brace the part. To prevent hose end marring, an aluminum wrench is recommended.

Reinstall the rear plastic hard line shield.



33. When reinstalling the center under tray brace, first check for clearance near the 45 degree hose end. Grind if necessary.

The OEM under tray brace will sandwich the Radium fuel filter bracket. Three of the OEM under tray brace bolts will be reused. For the fuel filter area, use the longer stainless steel button head bolt (shown) included in the kit. Torque with a 5mm Allen hex wrench.



34. Optional 20-0249 Fuel Hanger Return Kit. Steps 34-35

This kit will use the OEM feed line as the new return line.

Remove the 6AN ORB fitting from the "RETURN" port on the Radium pump hanger. Transfer the O-ring from this fitting to the included 3/8" SAE Male Fitting. Lubricate the O-ring and install it into the "RETURN" port.

Fully insert the plastic OEM feed line on the green 3/8" SAE male fitting. NOTE: It is always a good idea to use light oil to lubricate the internal O-ring. Push the OEM green lock down to secure the connection. Gently tug the hose connection to verify a positive lock has been made.

Flush out the fuel remaining in the OEM return as this line will no longer be used.



35. Torque the 5/16" SAE Male Fitting into either end of the PTFE hose included in the kit. If installing to a Radium fuel rail with a DMR installed onto the top port, make sure the 6AN male return fitting is pointing towards the left side of the vehicle. Loosely install the opposing hose end to the DMR's 6AN female fitting. NOTE: Hose routing will differ if installing onto a different brand pressure regulator.

Install the 5/16" SAE Male Fitting into the OEM "feed" hose (now converted to a return hose). NOTE: It is always a good idea to use light oil to lubricate the internal O-ring. Push the OEM red lock down to secure the connection. Gently tug the hose connection to verify a positive lock has been made. Wrap the included cushion clamp around the PTFE hose. Using one of the M6 bolts included in the fuel rail, secure the hose to the fuel rail, as shown. Torque the hose end with a 9/16" wrench.



36. NOTE: This kit eliminates the OEM hanger's "post" fuel pump filter so a low micron aftermarket filter should be installed downstream to protect the injectors from debris.

Reconnect the battery and turn the key to the ON position. Confirm the new fuel pump(s) prime for a few seconds and check for leaks. If no leaks are found, start the vehicle. The engine may run rough for a few seconds until all the air is bled from the fuel system. Recheck for leaks.

Reinstall the OEM metal cover plate and rear seat.

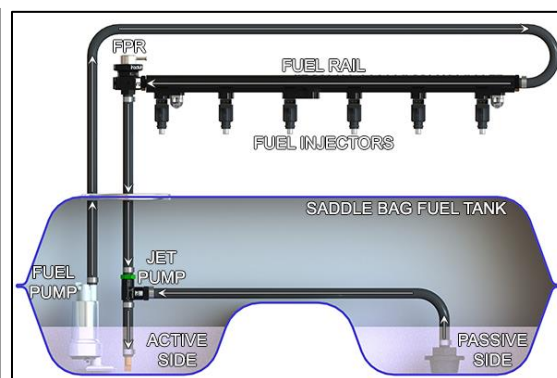
Installation Complete



Venturi Jet Pump Troubleshooting:

- A. If the vehicle is prematurely running out of fuel, the venturi jet pump is not siphoning fuel quick enough. In this case, the smaller black orifice should be installed into the venturi jet pump body.
- B. If the minimum static fuel pressure is higher than usual, there is likely too much backpressure in the FPR return line. In this case, the larger green orifice should be installed into the venturi jet pump body.

To better grasp this idea, see the general illustration of how a venturi jet pump works pictured at the right.



FOR AEM 50-1200 E85 PUMPS ONLY

In June 2016, AEM Inc. made an electrical connector change to their 50-1200 fuel pumps. All 50-1200 fuel pumps purchased directly from AEM after May 2016 now use the same 2-pin connector found on their 50-1000 fuel pumps (also common to the infamous Walbro 255LPH fuel pumps). All Radium components purchased after June 2016 are preconfigured to adapt to the new AEM 50-1200 electrical connector. If an older AEM 50-1200 fuel pump was purchased separately, internal wire splicing modifications will be required to connect to the FST.