



CJM 370z Fuel Pump Tech

Revision 9/13/16

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Section 1: Notice

Gasoline is extremely flammable and dangerous. Professional care needs to be taken while servicing the fuel system.

Proper ventilation needs to be provided around the vehicle while the fuel system is open.

This document demonstrates examples of some typical procedures, and is not intended to be used as strict installation instruction. A professional installer and the vehicle owner must apply individual discretion for each step of installation to ensure the vehicle is safe and reliable to operate. **Special care must be taken to prevent leaks, heat damage to hoses or components, inadequate hose slack between chassis and engine connections, or any other potential hazards.**

Thermal barriers need to be installed between any fuel system component or hose in close proximity to sources of heat, such as, but not limited to: exhaust manifolds, turbo-chargers, downpipes, waste-gates, and exhaust pipes.

Section 2: Vehicle Preparation

The fuel tank level needs to be below 1/8 on the gauge before opening the tank.

Park the vehicle somewhere with good ventilation.

Set the parking brake firmly.

Disconnect negative terminal of battery.

If the engine is warm, allow it to cool down for several hours.

Section 3: Depressurize Fuel System

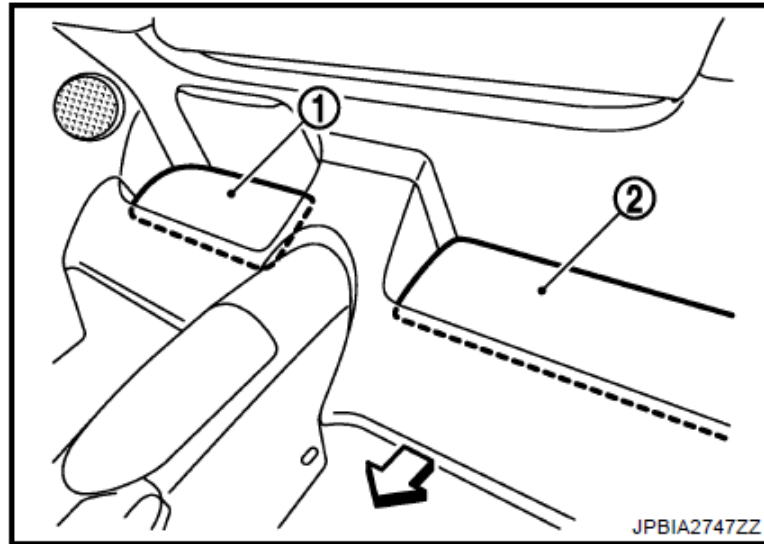
OEM automotive fuel injection systems are intended to maintain fuel pressure after the engine is shut off. This means that, unless the vehicle has been sitting for a very long period of time, the fuel system will still be under pressure.

When opening the fuel system, there will be a brief blast of fuel escaping. You need to take care to prevent this from spraying in an unpleasant or hazardous direction. **Wear your protective eyewear for the duration of this installation.**

It important that the battery remains disconnected while the fuel system is open. Some vehicles will seemingly unpredictably charge the fuel system even with the ignition off. While this is not typical of current Nissans, removing battery power is a good habit to build.

Section 4: Fuel Pump Module Removal

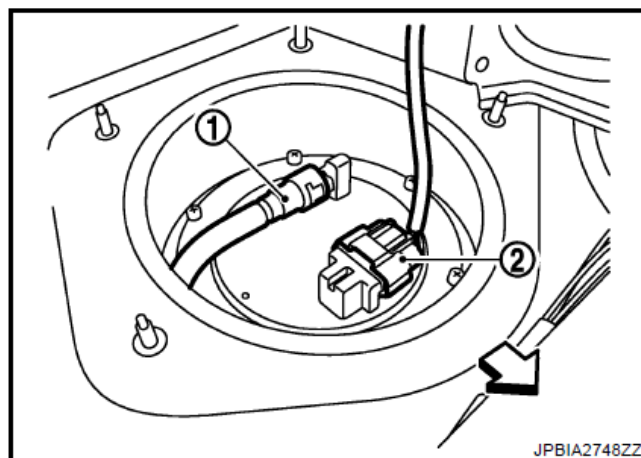
Remove the right hand parcel shelf behind the seat (number 1). It is held in with snap-in clips and is removed by pulling it straight up. You may need to use small pry tools.



Expose the pump access panel by removing the sound deadening sheet found under the shelf. Mark it with a sharpie to indicate forward direction for reinstallation.

With the sound deadening sheet removed, unfasten the 4 (10mm) nuts securing the access panel. Put orientation marks on the panel before removing. Lift the panel and unplug the electrical connector. Pull the grommet and connector through the panel so that you may remove it from the vehicle.

Find the factory fuel line connector (#1 below). Have towels ready to absorb fuel from the connector when it is removed. **THE FUEL WILL BE UNDER PRESSURE AND SPRAY OUT WHEN DISCONNECTED. PROTECT YOURSELF AND YOUR VEHICLE INTERIOR.** Pinch in the lock tabs on the fitting while pushing the connector in to relieve tension so the tabs release, then remove the fitting slowly and **cautiously**. Excess fuel can remove the corrosion protection coating on the top of the fuel tank. Attempt to catch most of it with shop towels. Secure a rag to the fuel line connector to collect residual fuel and push it aside to work in the fuel pump area.



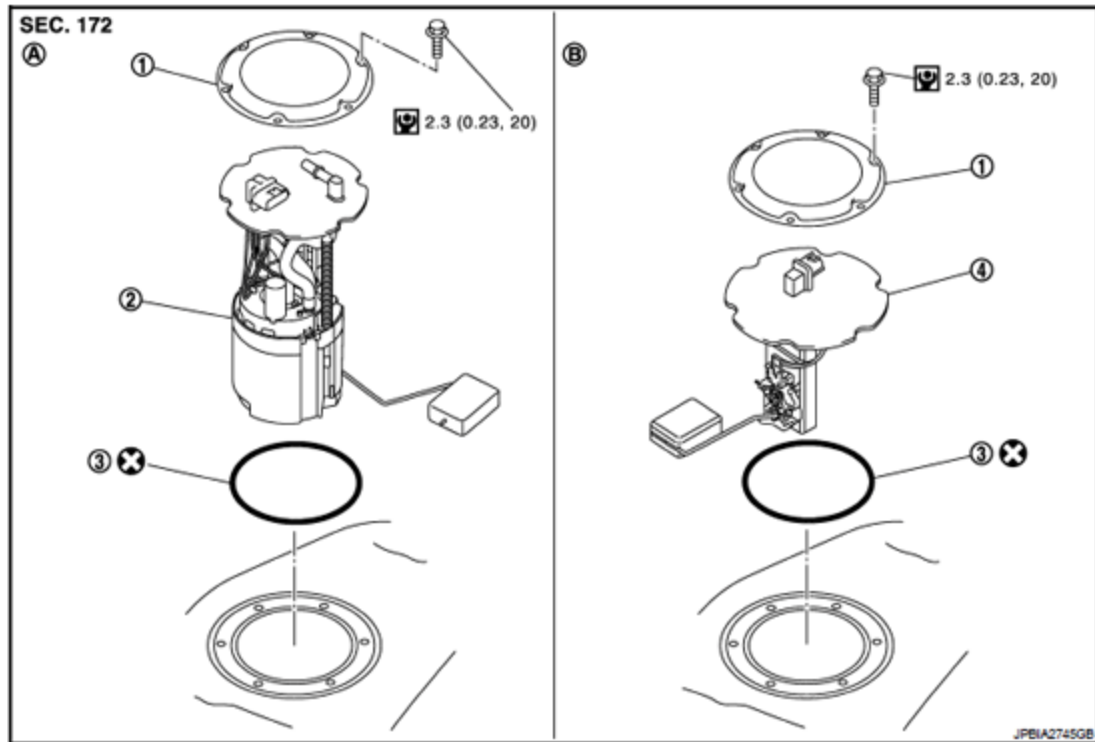


Illustration A (above) is the RH (passenger) side. Note the components:

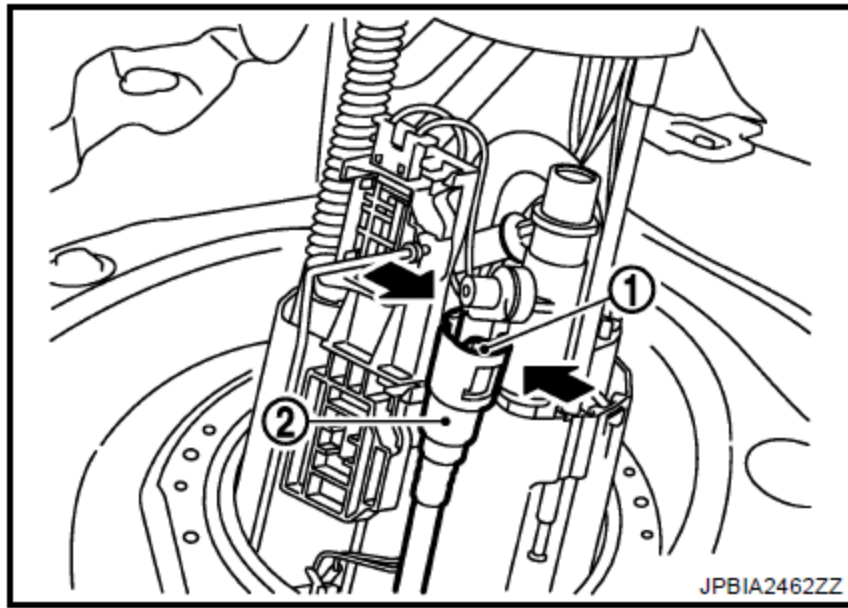
1. Retainer Ring
2. Fuel Pump Module (integrated level sensor, filter, regulator, and pump)
3. O-Ring

Try to keep the o-ring from directly contacting gasoline. It may swell from excessive gasoline exposure and become difficult to reinstall.

Draw a forward facing arrow on both the retainer ring and the plastic pump module top. The module is spring loaded and pushes up lightly. You will want to remove 4 of the (8mm) screws and leave 2 opposing screws installed. Use one hand to hold down on the retainer ring while using your available hand to remove the remaining 2 (8mm) screws and let the assembly decompress. It will rise about a half inch.

Set aside the retainer ring and raise the main assembly a couple inches. Locate the large O-ring and gently maneuver it over the top without stretching and rinse it with water.

Notice the hose connection illustrated below.



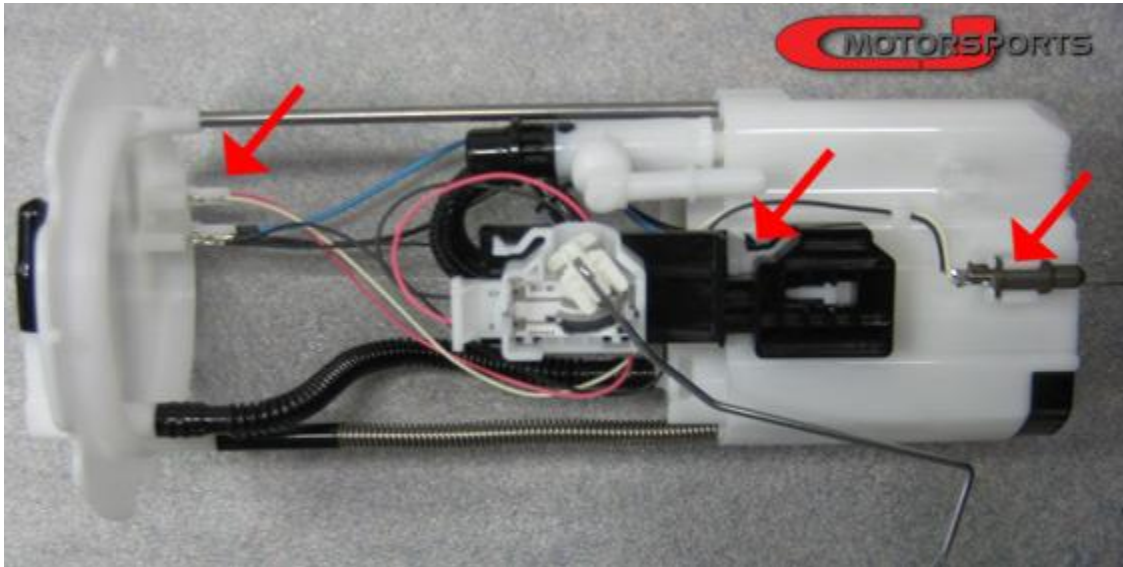
This hose connection is similar to the one atop the unit that you already disconnected. This one will not have any pressure in it, so feel free to just remove it. While lifting this assembly, it is a tight fit and will be snagging on the opening of the gas tank (sharp edges). There is a level sensor float on this assembly, and it may snag on things. **Do not use any force when lifting and removing this unit.** You will risk damaging the fragile level sensor.

Cover the pathway out of the vehicle with towels before removing because this unit will be dripping fuel the entire way out.

Once removed, it would be a good idea to pour out any fuel remaining in the module. If you turn it upside down fuel will come out the outlet. Try and get as much out as you can before moving on.

Section 5: Disassembly

Begin by removing the sensors from the canister. Press in the locking tab on the fuel level riser, and slide it up and off the canister. Carefully extract the fuel temperature sensor from the bottom. Follow the sensor wires from the top flange. Notice that the sensors have a shared wire terminal. Press the small release on the terminals and pull them down to disconnect.



Disconnect the (2) fuel pump wire terminals from the top flange.

Locate the plastic retainer on the side of the canister at the bottom of one stainless rod. Remove this retainer and save it. Slide the canister and pump housing off the stainless rods and set aside the spring and spring spacer.



Remove the canister from the fuel pump housing by spreading the canister over the locking tabs on either side of the assembly while pulling the canister down. It may require rocking the canister while pulling on it. Do not break off the locking tabs.



Remove the venturi pump assembly by pulling the T-Fitting out of the pump housing and releasing the jet-pump from its holder. The plastic is brittle; do not spread the holder open further than necessary.



PERFORM THIS STEP ONLY IF INSTALLING AN EXTERNAL FUEL FILTER:

Remove the filter outlet hose leading to the tank flange by using a blade to split the pressed ends. Do not gratuitously damage the barbs underneath the hose.



PERFORM THIS STEP ONLY IF INSTALLING A NEW FUEL PUMP:

Cut the fuel pump output hose leading from the fuel pump barb to the fuel filter inlet, and remove the hose section from the filter inlet by splitting it.

Release the fuel pump from the housing by pressing the release tabs and rotating it free. The pump can now be pulled out the bottom of the housing.

If the fuel pump to be installed does not have an identical length and locking mechanism at the top, remove the supporting mechanism from inside the fuel pump housing bore to clear the way for alternative style pumps.



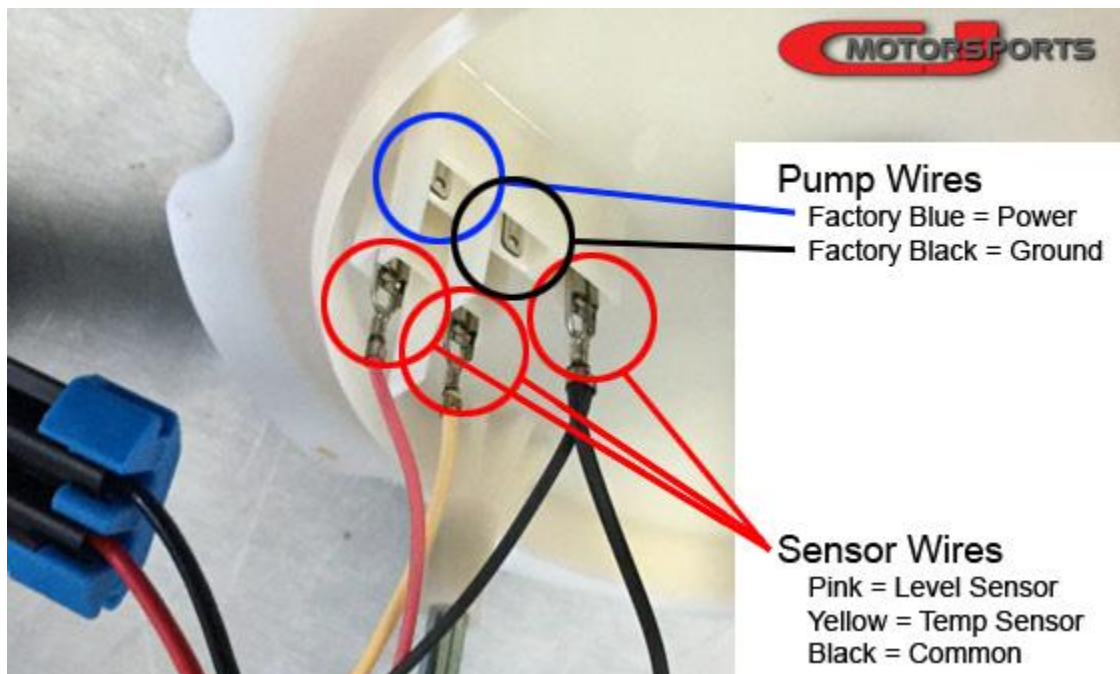
Section 6: Screw Length Warning

During reassembly, only use the original (6) Nissan screws to secure the fuel pump module and retaining ring to the fuel tank. If you lose one, get another from Nissan. If you substitute with a longer screw, it will pierce the fuel tank under the threads. Since the screw locations are outside of the fuel tank o-ring, the fuel tank will leak fuel through the threads if pierced by longer screws.

When using the CJM Billet Hat, only use the provided stainless screws with washers.

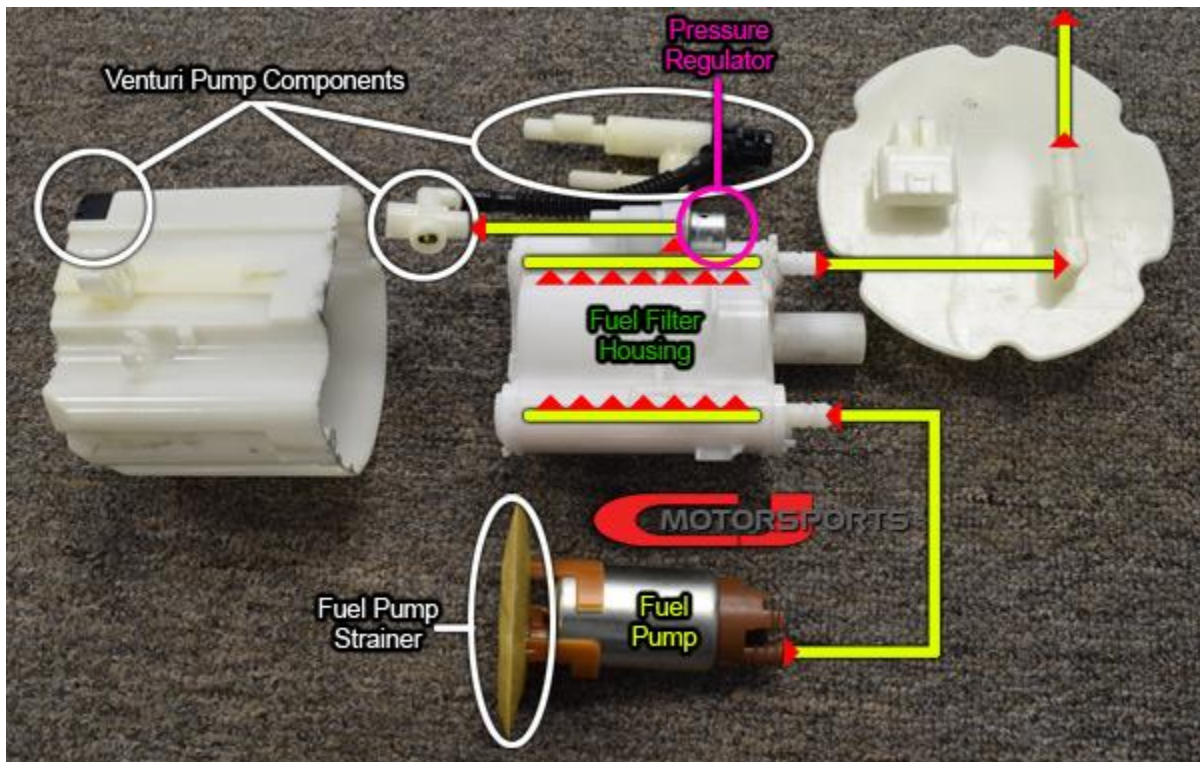
Section 7: Internal Wiring Pinout

Wire locations for the internal wiring of the factory fuel pump module are shown below.



THESE WIRE COLORS DO NOT CORRESPOND WITH THE WIRE COLORS OUTSIDE THE FUEL TANK. THE HARNESS OUTSIDE THE FUEL TANK, WHILE USING THE SAME COLORS FOR THE WIRES, DOES NOT ASSIGN EACH WIRE COLOR THE SAME PURPOSE.

Section 8: Exploded Flow Schematic



The fuel pump pulls fuel through the strainer to prevent large particulates from entering. The strainer is frequently confused as the fuel filter. The strainer does not filter small enough particulates to protect the fuel injectors. The strainer is **not** a fuel filter.

Fuel leaving the top of the pump is sent directly into the fuel filter housing. The factory fuel filter is molded inside the housing and is not serviceable.

After fuel has passed through the filter it can be sent out the top of the filter housing, through the module hat, and to the engine.

The fuel pressure regulator bleeds the necessary amount of fuel from the filtered end of the filter housing to regulate system pressure to about 52psi.

Bypass fuel leaving the regulator is sent into a small series of venturi pump components. The first component is a T-Fitting to split bypass fuel to 2 different venturi pumps.

One venturi pump, located on the bottom of the module canister, is the refill pump. The bypass fuel recycles into the canister here while creating a venturi effect to draw in more fuel from around the canister.

Bypass fuel exiting the side of the T-fitting is sent into a short PTFE hose leading to the in-tank transfer venturi pump. This venturi is used to recover fuel from the driver-side of the fuel tank.

Section 9: Idle Pressure Fix

ONLY PERFORM THIS PROCEDURE WHEN UPGRADING THE FUEL PUMP.

Installing a higher output fuel pump will increase the volume of fuel that the regulator must relieve from the system to regulate pressure. Since the regulator relieves fuel volume/pressure into the venturi pump system, the venturi pumps themselves must flow well enough that excess pressure does not build up behind the regulator.

When you upgrade the fuel pump, you will naturally experience a spike in fuel pressure at low fuel consumption, such as during idle or cruising. The venturi pumps restrict regulator output flow, causing system pressure to rise. As fuel consumption increases (raising RPM or increasing load), regulator bypass volume will decrease, and fuel pressure will come back down to the regulator setting.

This procedure will show you one way to increase flow through the venturi pump system. If you upgrade the fuel pump without performing this procedure, your fuel pressure will spike high at idle. Even with a return fuel system this procedure is required to prevent the pressure spike. This is because a properly designed return fuel system will provide the necessary components to send return fuel to the venturi pumps, once again placing them behind the pressure regulator.

One of the pumps is easily modified to increase overall venturi system flow by enlarging the venturi orifice. The goal is to enlarge this orifice as little as possible while still achieving your target idle pressure setting. Gratuitously oversizing the orifice will hurt the strength of the venturi system, weakening the refill and recovery functions, thus promoting fuel starvation.

Locate the refill venturi on the bottom of the module canister. Carefully extract it by pushing it down and out from inside the canister. This will get it about halfway out, which is all we need.



With the pump orifice exposed, use a small drill to enlarge the outlet.

The pinhole is about 0.050" diameter from the factory. For a 255lph pump, about 0.075" is a good starting point. For larger pumps, 0.10+" is a good starting point. Each installation may differ due to various factors.

If your pressure regulator is unable to control fuel pressure as low as you would like at engine idle when your fuel system work is completed, this step will need to be revisited to further enlarge this outlet. 1-3psi pressure spikes at idle can often be tolerable. This will keep the venturi action strong and is usually not enough to cause a problem that o2 feedback doesn't sort out on its own.

When drilling, take special care not to drill all the way through the component. Sometimes the drill will try to "thread" into the plastic rather than drilling it. If it gains traction while your drill is spinning, it may pull the drill in quickly and push it through the opposite end. This part is not available separately.

Shown enlarged for 340lph (left) and 450lph (right) pumps:



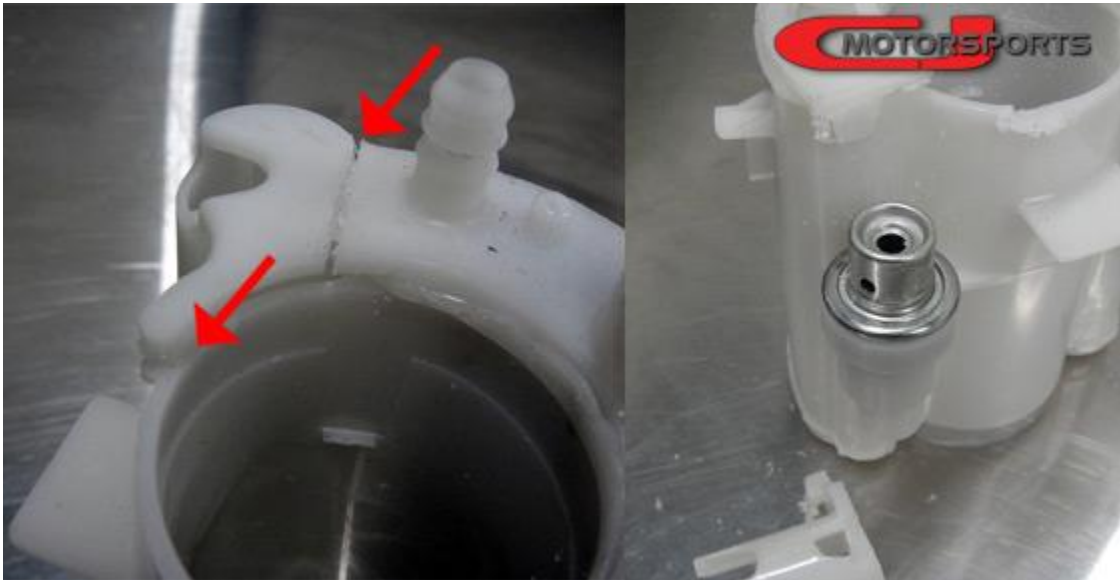
Reinstall the venturi by pushing it up into its home until it snaps into place

Section 10: Regulator Removal

**ONLY PERFORM THIS PROCEDURE WHEN INSTALLING A
RETURN FUEL SYSTEM WITH EXTERNAL FUEL PRESSURE REGULATOR.**

Use care and precision to remove plastic material as shown. Removing material incorrectly can destroy the fuel pump housing.

Make 2 precision cuts and remove the fuel pressure regulator retainer.



Smooth out the cut areas and extract the regulator. Save the white spacer and large o-ring from the regulator. These will be used for the return conversion.



Section 11: Filter Delete

THIS PROCEDURE IS OPTIONAL WHEN INSTALLING AN EXTERNAL FILTER KIT.

DO NOT PERFORM THIS PROCEDURE IF NOT INSTALLING AN EXTERNAL FILTER KIT.

THIS PROCEDURE IS REQUIRED, WITH AN EXTERNAL FILTER KIT, WHEN INSTALLING A WALBRO 450.

In order to fit the Walbro 400 or 450 pumps, with their larger lower diameter, it is required to physically remove the lower section of the fuel filter housing and extract the filter element material. While this is not required for pumps of a uniform diameter, such as the popular 255s or 340s, the increased surge displacement and reduced pump strainer shrouding should contribute to a reduction in fuel starvation tendencies.

Begin the filter removal by cutting off the entire bottom of the housing underneath the regulator outlet. Perform this cut with a saw blade, preferably a band saw (well secured to protect your hands). Do not damage the connection point for the jet-pump T-Fitting, stay below it.



Using pliers, tear out the paper filter element. Do your best to remove as much as you can. Scrape away as much that remains as you are able. Use a file to smooth out the cut edges and clean it up. This is about as good as it gets:



Continuing along, you need to use care to not remove part of the filter housing that you will later wish was still there. The following photos show a further modified housing. Notice the top filter barbs have been cut off and chamfered to aid in fuel entry and promote air or vacuum evacuation.



At this point, the filter has been removed and the clearance has been made for most fuel pumps. You can smooth and refine all the cuts and edges and clean up the (empty) filter housing nicely.

Section 12: Fuel Pump Installation

SKIP THIS SECTION WHEN REUSING THE ORIGINAL PUMP.

This section details the installation of an upgraded fuel pump, integrating different pump support hardware, setting fuel pump height, and setting fuel pump orientation.

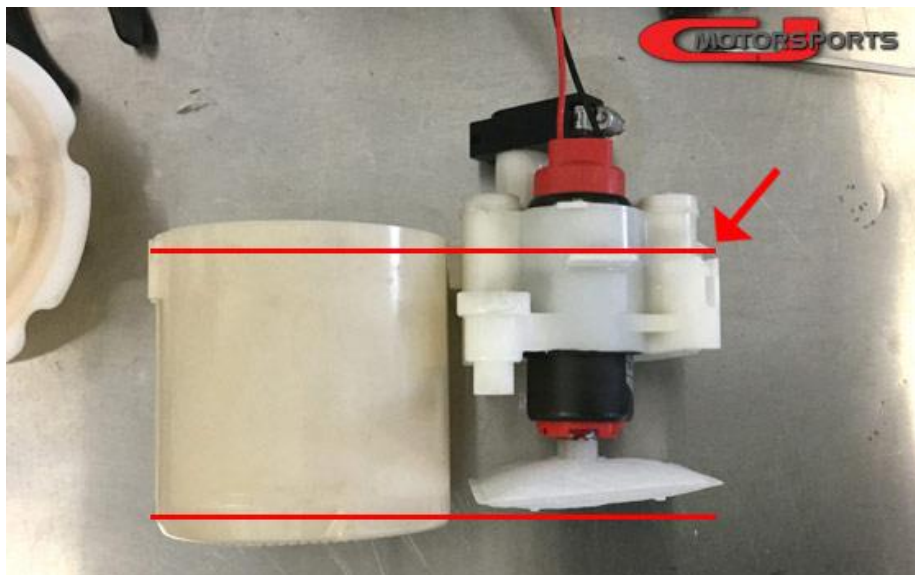
If you have not already, you will need to break away the factory fuel pump support from inside the pump housing bore to make room. The fuel pump bore in the filter housing should be relatively smooth and free of obstructions. Ignore the molten plastic (weld) holding the filter caps to the top or bottom of the housing, this is not in the way.

Attach your fuel pump strainer (and retainer ring if required) to the fuel pump, and insert the pump into the fuel pump bore.



Place the canister next to the pump module, and align the locking tabs on the module with the receiving locations on the canister.

Set the fuel pump height by selecting a vertical position that places the fuel pump strainer at the bottom of the canister. The lower the pump rests, the better, but it has to fit when assembled. Most pickups are OK to rest on the bottom of the canister and will not close up.



Take note of your fuel pump height and where you will position the fuel pump support foam. Remove the pump from the bore, install the support foam at the proper height on the pump, and then reinsert the pump with foam sleeve back into the bore at the determined height.

Clock the rotation of the pump to a degree that causes the least interference with the strainer and venturi T-Fitting during reassembly.

FOLLOW THIS STEP ONLY WHEN INSTALLING A BILLET FUEL PUMP SUPPORT CLAMP

When also using the fuel pump support clamp, clock the fuel pump in a position that places the output barb directly in the center of the support clamp opening. There will be 2 positions for each pump that this alignment can be achieved. Select the position that causes the least interference with the strainer and venturi T-fitting during reassembly.

Adjust the support clamp height as necessary and tighten the clamp screw to secure its position to the post.

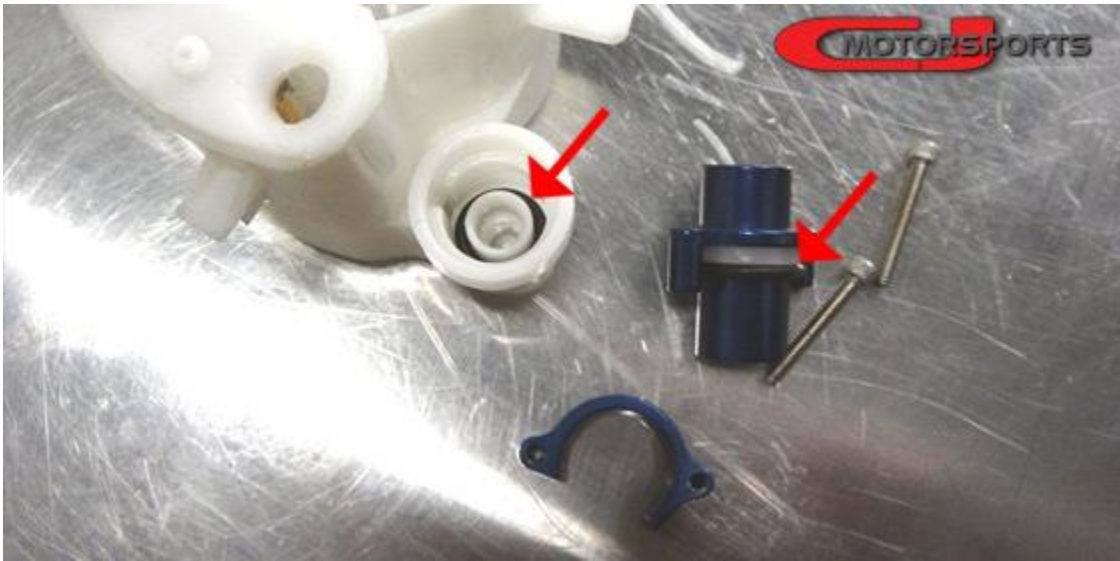


This type of mount was originally intended for soft in-tank lines. It would laterally brace the output barb while holding the vertical position once the internal clamp was tight.

When used with a PTFE in-tank hose, it is redundant and not necessary. However, it can still offer vertical support on the hose clamp if you are trying to hold the pump strainer up higher.

Section 13: Return Conversion

Install the white spacer ring and o-ring from the factory regulator onto the CJM regulator delete fitting. Install the CJM o-ring down to the floor of the regulator receptacle as shown.



Tighten the provided hose barb fitting into the CJM regulator delete. Install the CJM regulator delete by inserting it into the regulator receptacle and attaching the regulator delete clamp. The CJM o-ring will be compressed by tightening the 2 bolts evenly. The clamp is upside-down on the left photo, install it as shown in the right photo:

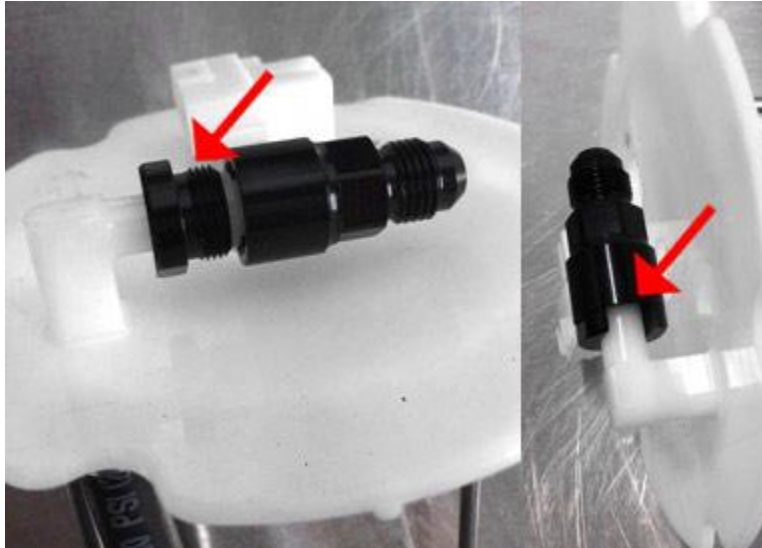


NOTE: The regulator delete hose barb fitting changes sizes depending on the product kit it was supplied in. Early CJM return fuel systems that retained the stock filter would use a 1/4" hose barb adapter. Later CJM systems with external filters use a 5/16" hose barb adapter. Some CJM Billet Top Hat Installation kits use 3/8" hose barb adapters.

Section 14: Quick Disconnect to AN Adapter

THIS SECTION PERTAINS TO FUEL SYSTEM PROJECTS THAT USE A -6AN RETURN FUEL LINE. IGNORE THIS SECTION FOR PROJECTS USING THE STOCK FEED LINE AS THE RETURN.

Remove the OEM plastic QD retainer from the barb. Install the fuel pump output fitting which will now be used as the return fuel inlet. Place the threaded retainer lock behind the plastic lip and insert the fitting. Tighten the fitting and lock appropriately.



Section 15: Bulkhead Addition

**FOLLOW THIS SECTION ONLY FOR RETURN FUEL SYSTEM INSTALLATION.
IGNORE THIS SECTION IF USING A CJM BILLET TOP HAT**

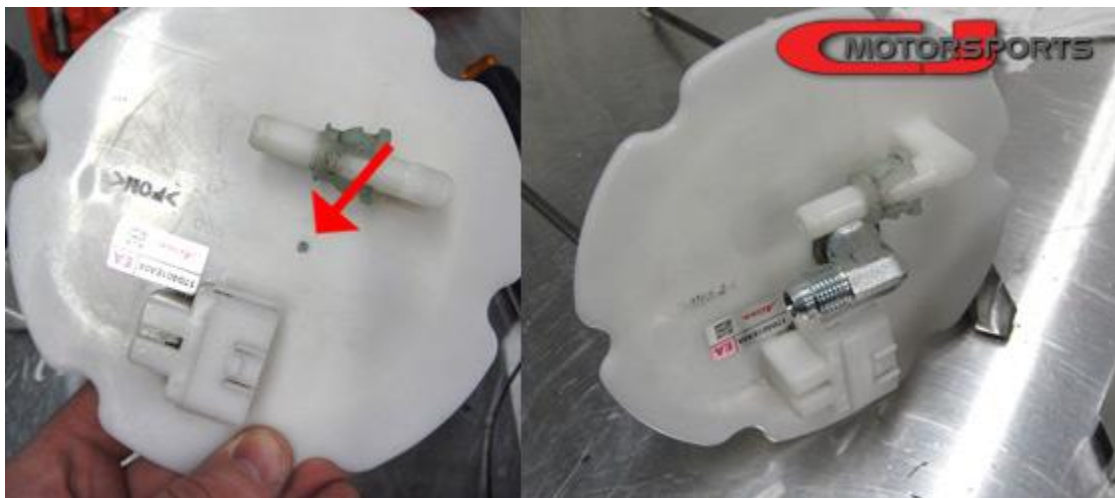
The factory fuel pump hat only has a single fuel line. A return system requires 2; one for fuel output, and one for fuel return.

CJM return kits that use the stock fuel filter (Level 1) also use the stock fuel pump output, and then add a -4 return bulkhead to the top hat for return fuel. CJM return kits with external filter (Level 2) add a -6 bulkhead for the fuel pump output, and then use the original fuel output connection as the return.

Using a step drill, create a hole where shown. Typical drills have a helical flute (twist) that will attempt to thread into the plastic rather than cutting it after initially piercing the surface. This makes it easy to break or chip the plastic rather than drilling. A step drill uses vertical flutes, so it does not attempt to thread. If you do not have access to a step drill and will be using standard drills, you will want to start very small and incrementally enlarge the hole with several steps.

For a -4 bulkhead, make a 7/16" hole. For a -6 bulkhead, make a 9/16" hole.

Once the hole is created, install one of the seal washers to the bulkhead fitting, and insert the bulkhead fitting into the fuel tank flange facing the same direction as the original outlet. Install the second washer to the bottom side of the bulkhead fitting, install the bulkhead nut, and tighten the nut while holding the bulkhead fitting in the proper direction.



Section 16: Reassembly & Hose Connections

Reinstall the venturi assembly by reconnecting the T-Fitting and snapping the pump into its holder. Tuck the fuel pump strainer upward if it is blocking the bottom of the T-Fitting.

Reinstall the canister to the completed filter housing with pump. Ensure that the fuel pump strainer does not interfere where the venturi T-fitting attaches to the bottom inside of the. Check for clearance around the bolt ears of the regulator delete fitting. Adjust clocking position if required.

Reinstall the plastic spacer and spring to the stainless rod, slide the housing and canister onto the stainless rods, and reinstall the retention clip.

When required, perform the necessary hose connections to complete the fuel pump module internal plumbing. The following hose connection guide will ignore the venturi pump hose and fitting connections which remain consistent and original (unmodified) between each configuration.

Stock Hose Connections

1. Fuel Pump Output to Fuel Filter Inlet (Original)
2. Fuel Filter Outlet to Stock Top Hat Output (Original)

Fuel Pump Install Kit Only Connections

1. Fuel Pump Output to Fuel Filter Inlet **(REPLACE WITH PROVIDED HOSE)**
2. Fuel Filter Outlet to Stock Top Hat Output (Original)

CJM Level 1 Return Conversion (S1, S1.S)

1. Fuel Pump Output to Fuel Filter Inlet
(ORIGINAL FOR STOCK PUMP, OR REPLACE WITH FUEL PUMP INSTALL KIT HOSE)
2. Fuel Filter Outlet to Stock Top Hat Output (Original)
3. Fuel Return Bulkhead (-4) to CJM Regulator Delete Fitting Barb (1/4") **(USE PROVIDED HOSE)**

CJM Level 2 Return Conversion (S1.E, S1.SE, S2.SE)

1. Fuel Pump Output to CJM Output Bulkhead (-6) **(USE PROVIDED HOSE)**
2. Stock Top Hat Output Barb (5/16") to CJM Regulator Delete Fitting Barb (5/16")
(USE PROVIDED HOSE, ORIGINAL OUTPUT IS NOW THE RETURN)

While making the hose connections, keep in mind that the fuel pump module assembly will be compressed to an installed height of 10.55" from the floor of the module to the bottom flange surface of the top hat where it contacts the top of the fuel tank. Test that the assembly can compress to this height freely with each connection made. Make adjustments if anything prevents this compression.

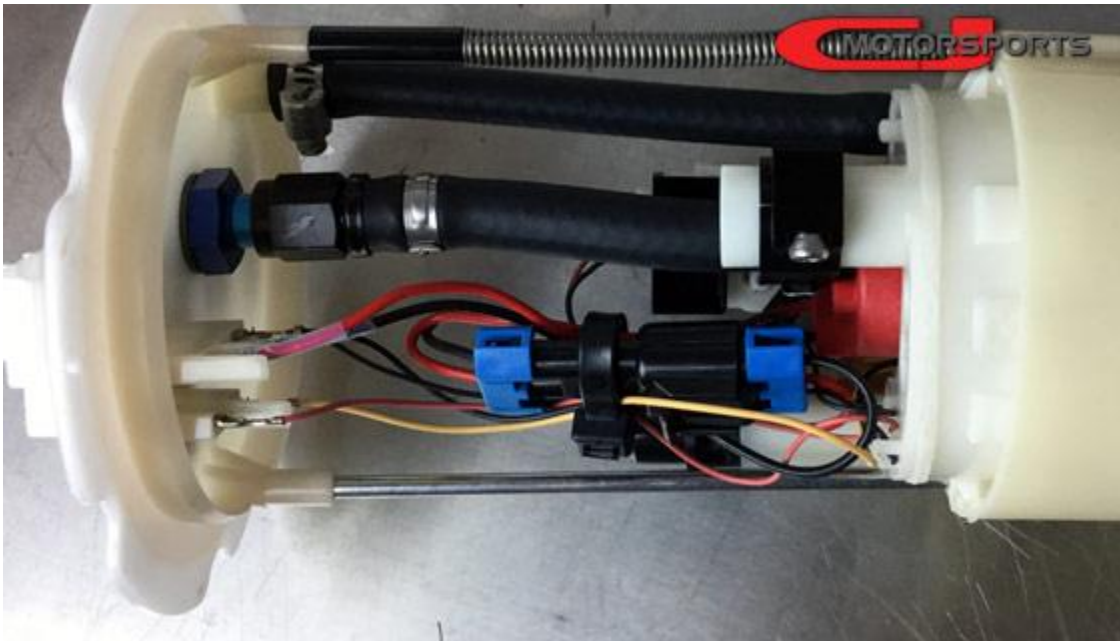
PTFE HOSE CONNECTIONS: PTFE Hoses will require a heat gun or hair dryer to install. Warm the collar on the end of the hose until it softens enough to slide over the barb. Start warm, and go warmer as required. If you overheat the PTFE, it will collapse when pushing over the barb and you will need a new piece. Only use smooth, non-worm-drive hose clamps on PTFE hoses.

Reinstall the fuel level sensor and fuel temperature sensor. Reconnect the 3 sensor wire terminals as they were.



Connect the fuel pump power wires. Consider soldering the pump wire terminals to the flange, or using new 1/8" spade terminals to improve conductivity and reduce hot spotting. This is an area where we see signs of overheating, so you want to make sure and have quality connections.

Shown below, improved using new spade terminals soldered on (to the wires and to the flange pins), with quality wire, and covered with PTFE heat shrink.

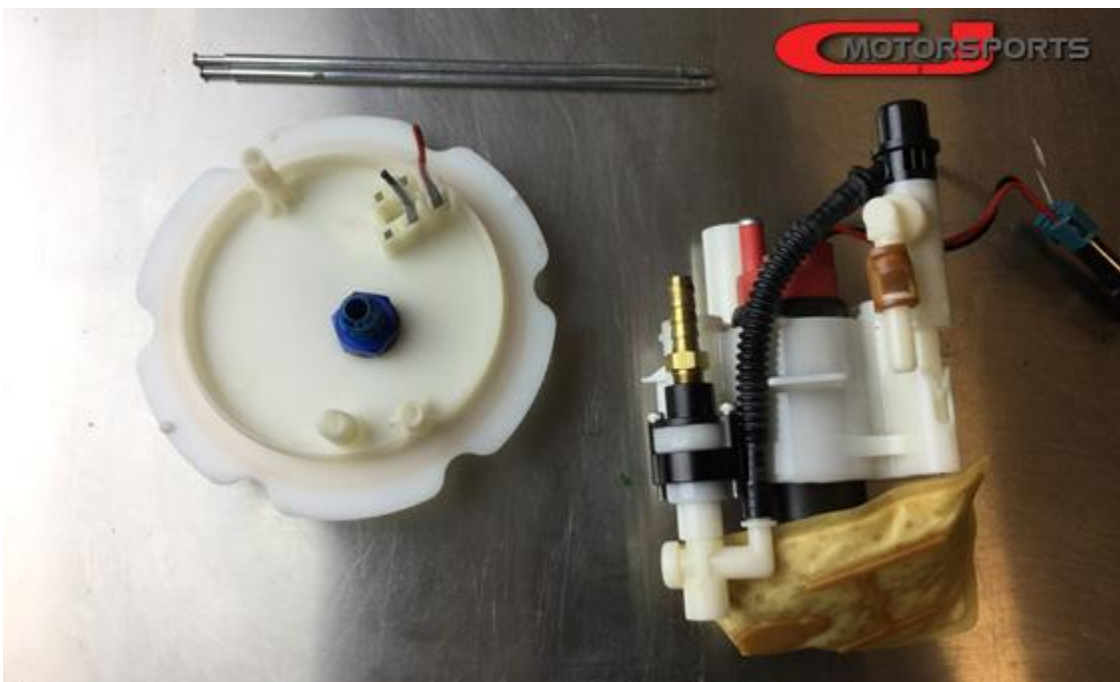


Section 17: Billet Top Hat

To prepare the billet top hat for installation, the stainless rods from the plastic top hat need to be extracted. Use a heat gun to soften the plastic until you can pull the rods out.



Work both rods out from the factory plastic hat.



Use a wrench and hex key to tighten the ground lug. Nice and snug so it seals fuel in.

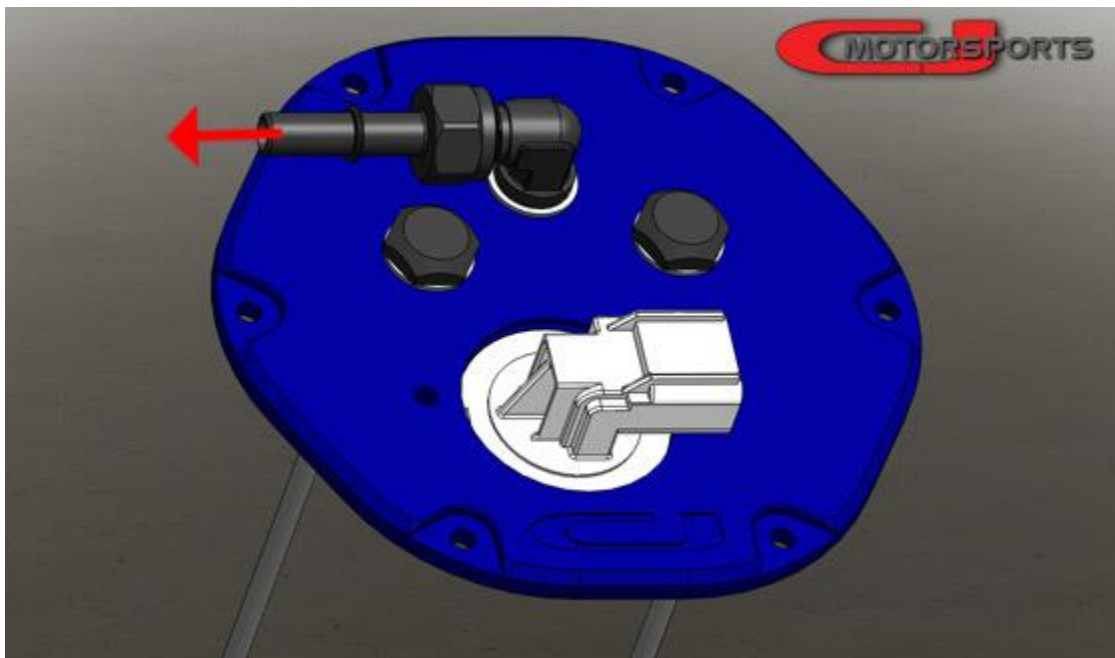


Mark the rods at 0.70" from the top.

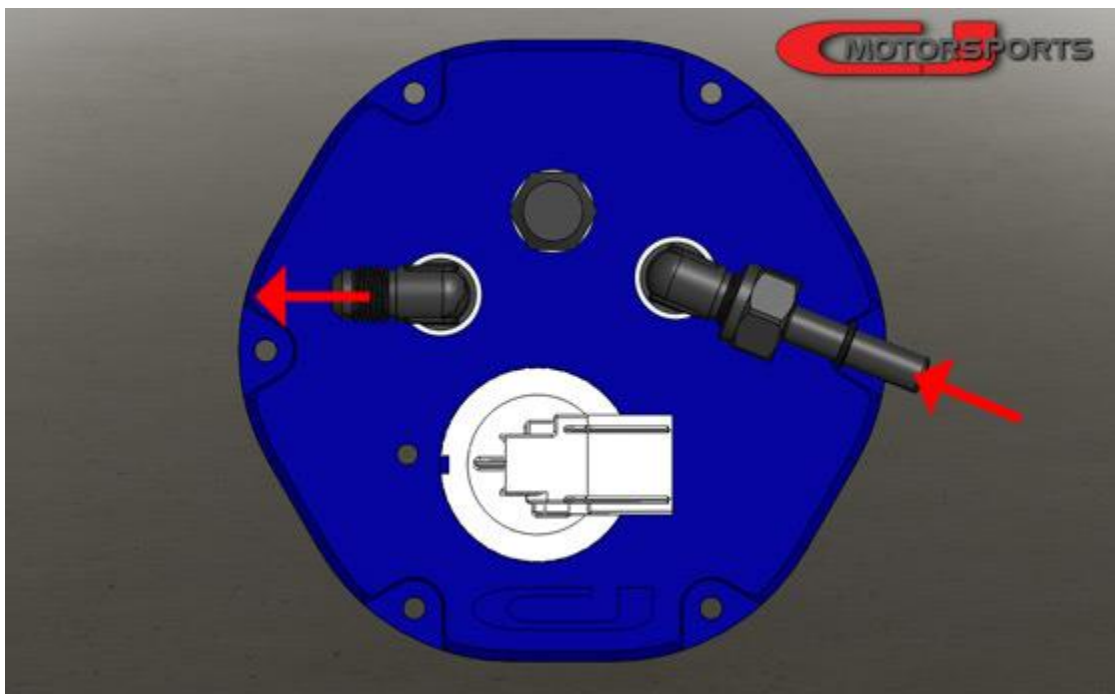


For each fitting of the installation kit, use a provided aluminum crush washer on both the inside and outside of the tap hat. The following images show the installation kit layouts.

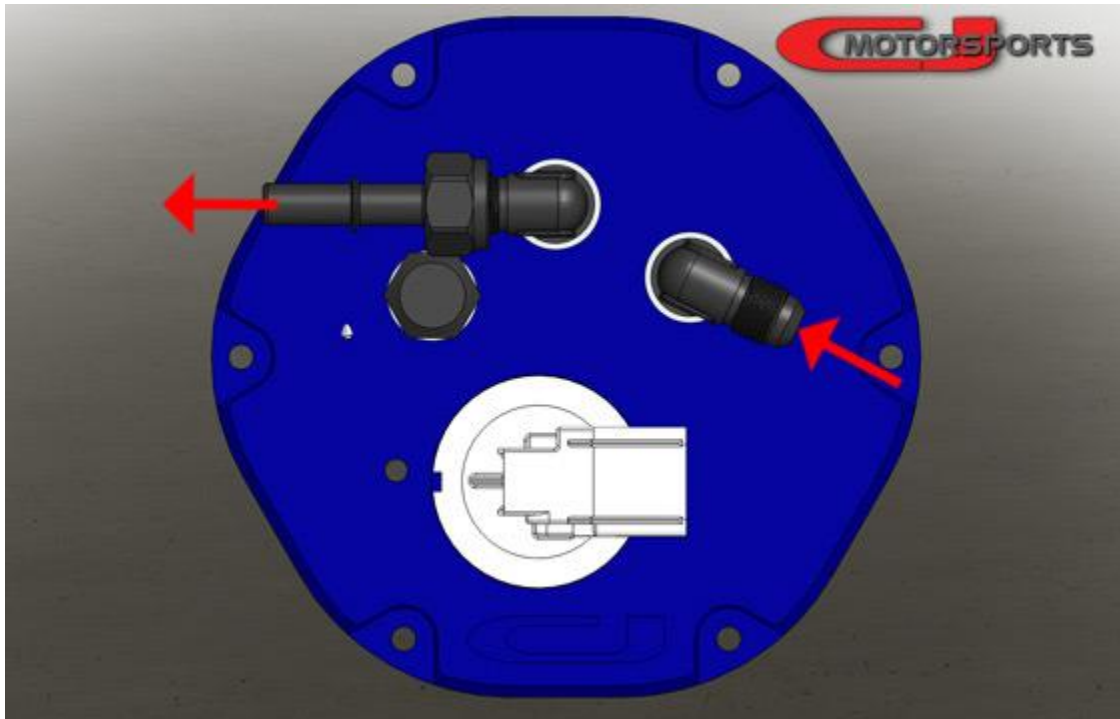
STOCK TYPE INSTALLATION KIT (FOR STOCK FUEL SYSTEMS OR BASIC CJM RRP INSTALL)



CJM LEVEL 2 RETURN INSTALLATION KIT (S1.E, S1.SE, S2.SE)



CJM LEVEL 1 RETURN INSTALLATION KIT (S1, S1.S)



Tighten the bulkhead nuts for the installation kit bulkheads and/or plugs. Make any intended PTFE hose connections and install the appropriate clamp.

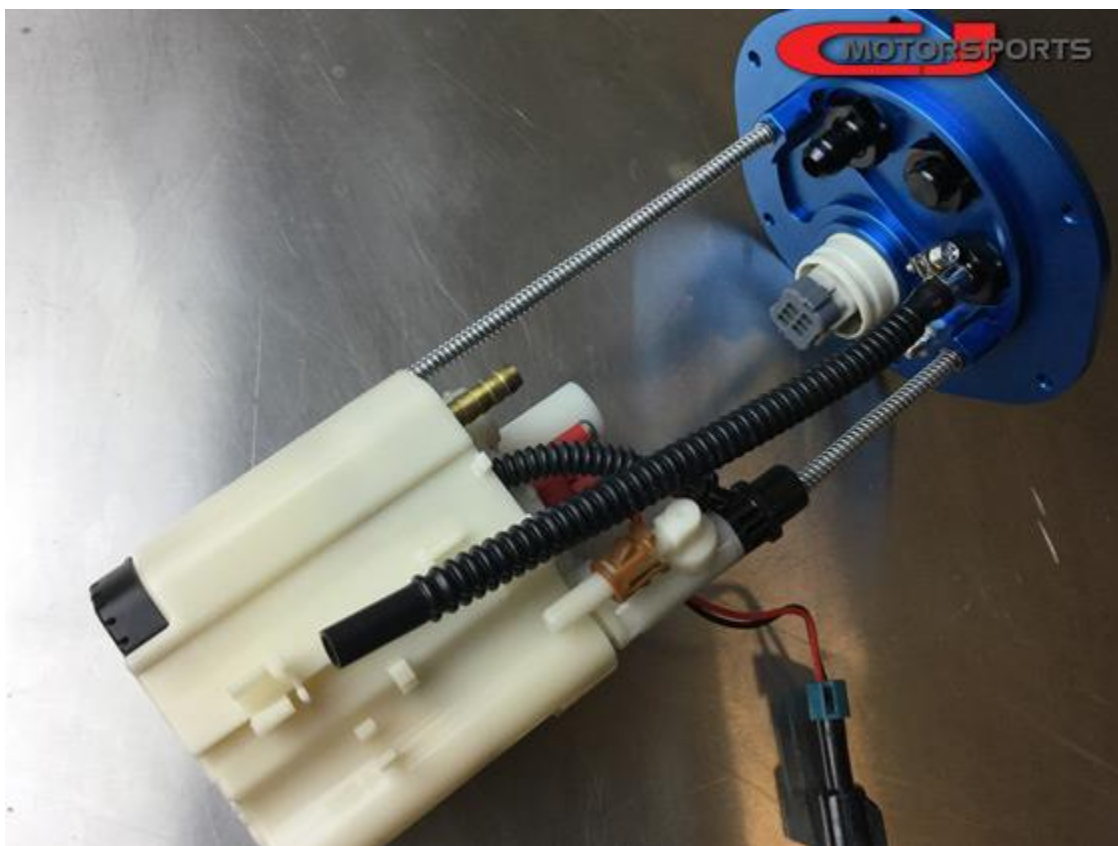
Install the stainless rods into the hat, and check the 0.70" depth mark reaches the surface of the billet top hat. Install the wedge screws and tighten to hold the rods firmly in place.



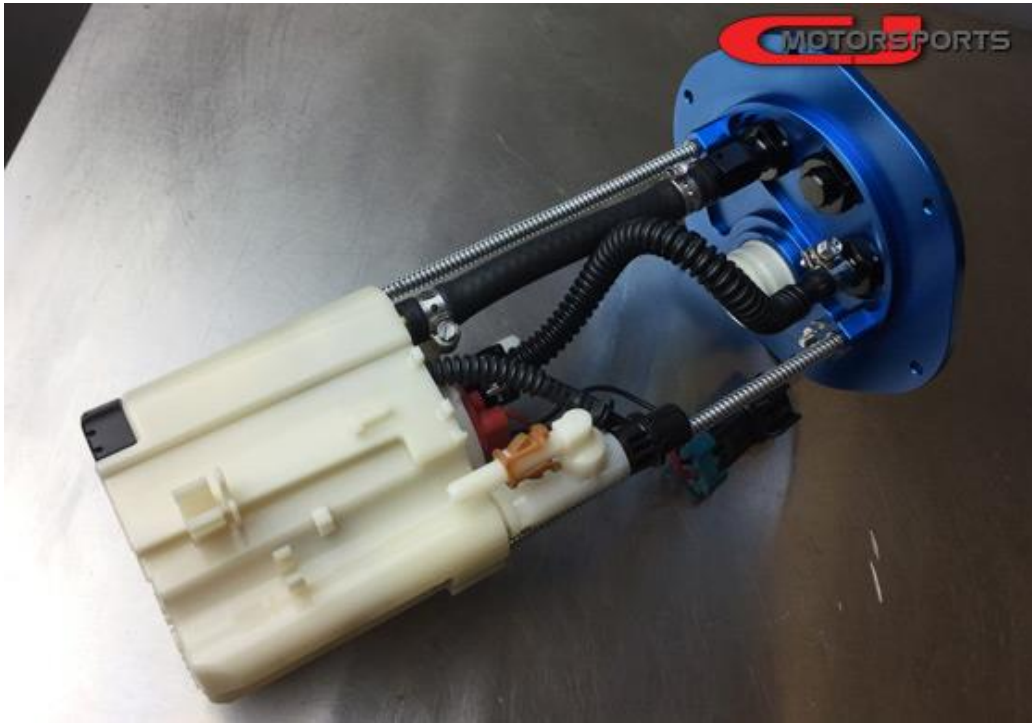
If using the optional dual spring kit, slide the spring seat washers on the rods and then install the springs, otherwise install the factory spring and spacer parts.



Install the lower spring seat washers (CJM dual spring upgrade) while inserting the rods through the canister and install the factory plastic retainer clip to hold the unit together.



Level 2 Return Type: Connect the hose from the output bulkhead to the fuel pump output, and connect the hose from the regulator delete to the return bulkhead. L2 Return Example Below.

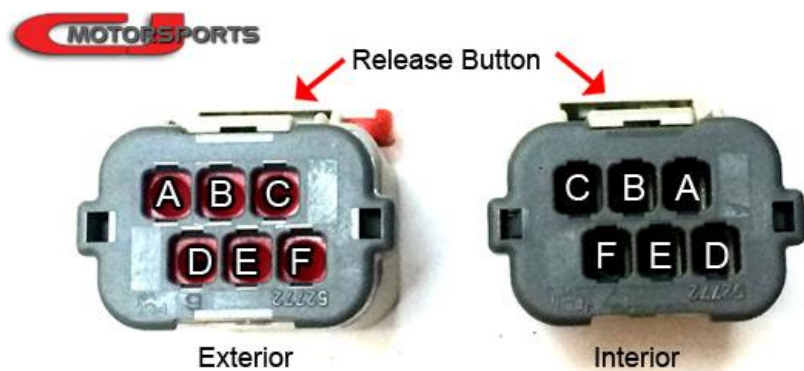


This product uses an OEM engineered 6-position bulkhead connector that is secured to the billet tank flange with a snap ring and sealed with a Viton o-ring. A pair of internal and external connectors eliminates any need to remove the snap-ring and bulkhead. It is suggested to leave it in.

Note that the internal and external connectors are identical, but the in-tank connector has the (non-fuel compatible) rubber seals removed and the orange connector lock is removed.

The crimp terminals support up to 10 or 12 AWG wiring. While 10 AWG can be done, your crimping tools and skills must be on point to get the 10 AWG crimped terminals into the connector. If your crimping capabilities leave a lot to desired, consider reinforcing your crimp with a small solder point.

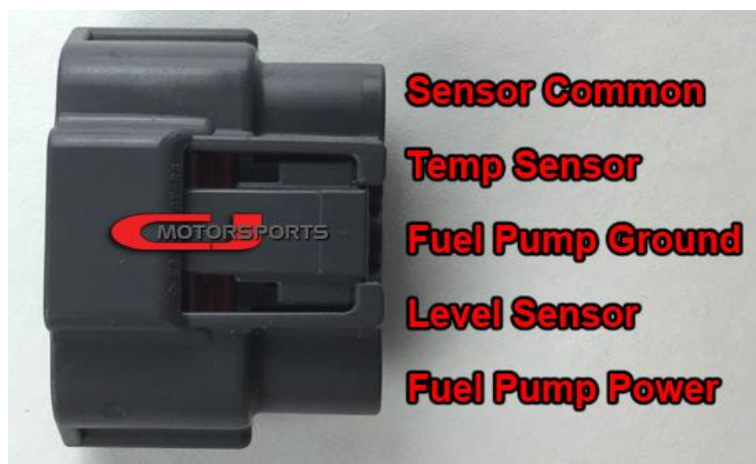
Note that the wiring positions are different for the internal and external connectors as they shift when passing through the bulkhead connector. The following diagram illustrates the position relationships. When performing your in-tank wiring connections, be sure to build a pin-out to use for your external connections.



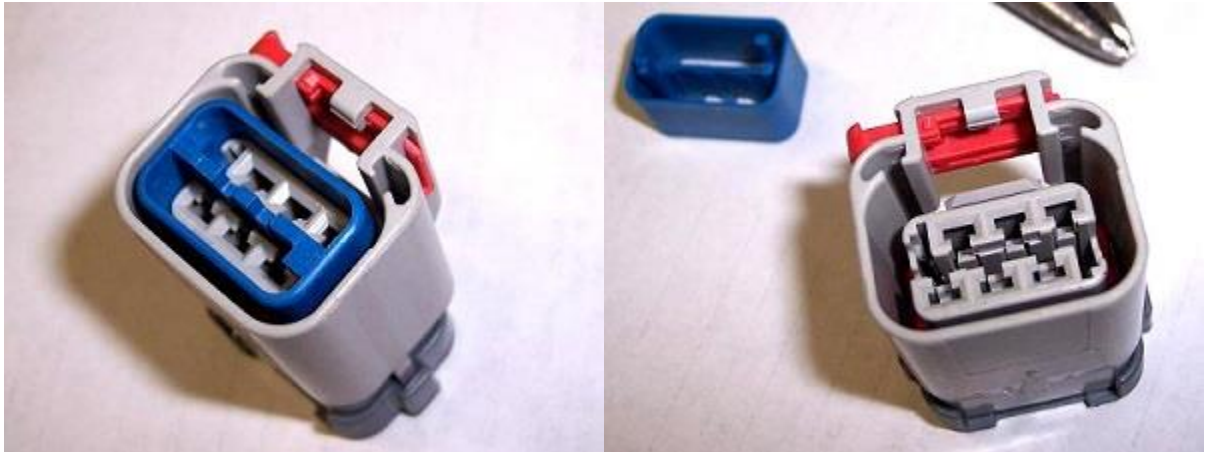
CJM Fuel Pump Connector: Terminal Position Relationships

WIRE COLORS INSIDE THE TANK DO NOT CORRESPOND WITH THE WIRE COLORS OUTSIDE THE FUEL TANK. THE HARNESS OUTSIDE THE FUEL TANK, WHILE USING THE SAME COLORS FOR THE WIRES, DOES NOT ASSIGN EACH WIRE COLOR THE SAME PURPOSE.

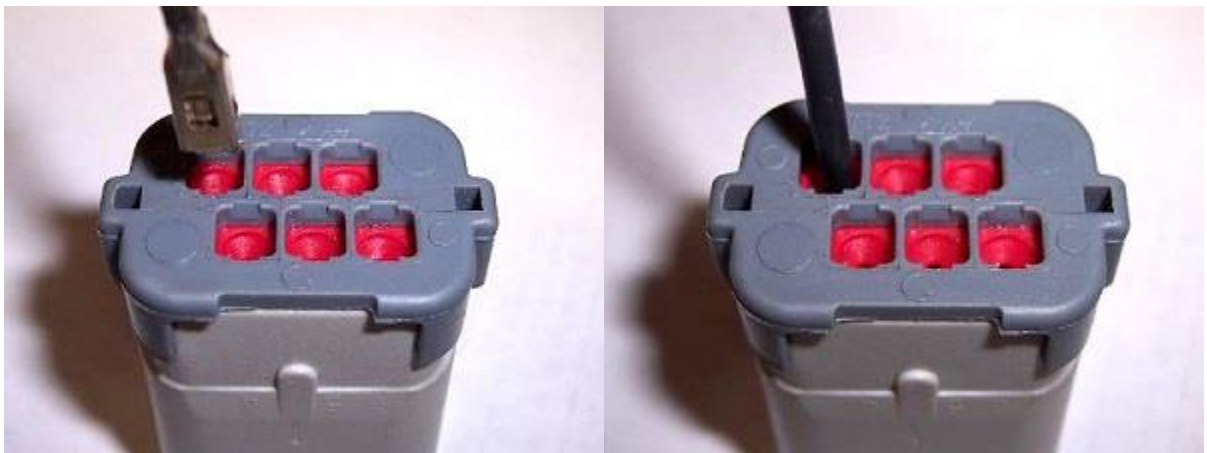
THE FOLLOWING CHART SHOWS WIRE POSITIONS AT THE EXTERNAL HARNESS CONNECTOR.



To insert crimped terminals into the connector, first remove the blue terminal lock collar. Small needle-nose pliers will be able to grab it directly in the center.



The terminals will now slide in until they click and lock in place. Reinstall the blue terminal lock collar when finished.



Section 18: Final Notes

Reinstall the pump module to the fuel tank. Remember to reconnect the in-tank hose to the pump module when installing.

The fuel level sensor is on the back side of the module with the float arm facing the inside of the vehicle.

Do not forget to put the fuel tank o-ring gasket back in the o-ring groove. Compress the pump module to reinstall the retaining ring (unless using CJM Billet Hat).

Use only the (6) original Nissan retaining ring screws or the CJM provided screws and washers for the Billet Hat.

After making your intended hose connections and testing the system for leaks, reinstall the fuel pump access plate cover, electrical grommet, and electrical connector.

If using the billet hat with L2 installation kit, notice that the factory feed line will be reworked to approach from the other side. Take a moment and use care to perform this change without kinking the hose. You can mildly tweak the chassis hard-pipe it is connected to and route it over clean without kinks.

