INSTALLATION INSTRUCTIONS

FD3S RX7 FUEL HANGER SURGE TANK

Support: info@radiumauto.com
Document# 19-0291

CAUTION

Only a qualified technician following applicable safety procedures should perform the installation of this product.
One must have knowledge in repair and modification of fuel systems and general vehicle modifications to install this product.
Gasoline and other fuels are flammable and can be explosive.
Only install in a well-ventilated location to minimize buildup of fuel vapors.
No sparks, open flames, smoking or other ignition sources are to be present. Draining and removal of all fuel from the fuel system is recommended.
Proper eye and personal protection is required at all times during installation.

WARNING

The fuel system is under pressure! Do not loosen any connections until relieving the fuel system pressure.
Consult a service manual for instructions on relieving fuel pressure safely. This product is designed for off-highway and racing use only.
Fuel system components may not be legal for sale or use on emissions controlled motor vehicles. Consult local, state, and federal laws.

1. Open the trunk. Unclip and remove the trunk cover and carpet.

To uninstall the fuel tank access cover in the LH side of the trunk, remove the 4 perimeter screws with a Phillips head screwdriver. Push the rubber grommet through the hole to add wiring slack.

2. To depressurize the system, first squeeze the side tab to unplug the white wiring connector on top of the pump housing. Next, unscrew the electrical grounding nut using a 7mm socket wrench. Remove the wire ring terminal and reinstall the nut to the threaded stud, as 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.

Pop the hood and disconnect the battery's negative terminal 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 any fault memories.**

3. Before proceeding, 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.

Using a 10mm socket wrench, remove the two M6 bolts that secure the 2 white check valves to the fuel pump top plate. Do not open these 2 lines as they are used for gas tank venting. The check valves will need to be permanently moved to the side and out of the way.

Using pliers, disconnect the OEM spring clamps for the fuel feed and fuel return hoses. Next, pull the fuel hoses off the barbs and use a rag to clean any spilled fuel.

4. It is necessary to drain the tank to reduce fuel spills for an easier and safer installation.

Using a 17mm socket, remove the hex bolt on the front underside of the fuel tank. Depending on how much fuel is currently in the tank, be prepared to have lots of fuel safe containers ready. The FD3S RX7 has a 20 gallon (76 liter) fuel tank.

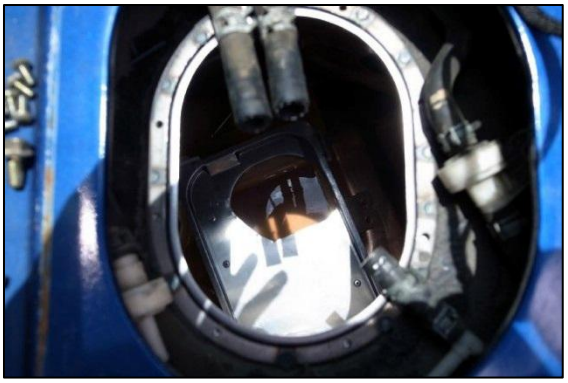
Retighten the hex drain bolt.

5. Using a Phillips head screwdriver, remove the 8 screws around the perimeter.

Before removing the OEM unit, place an empty bucket nearby as there will be residual fuel in the gas tank. Slowly lift the assembly straight up.

Next, carefully tilt the assembly back and forth to clear the level sender and fuel pump sock filter. Pull the unit out and allow it to drain into the bucket. Clean the assembly and set it on a workbench.

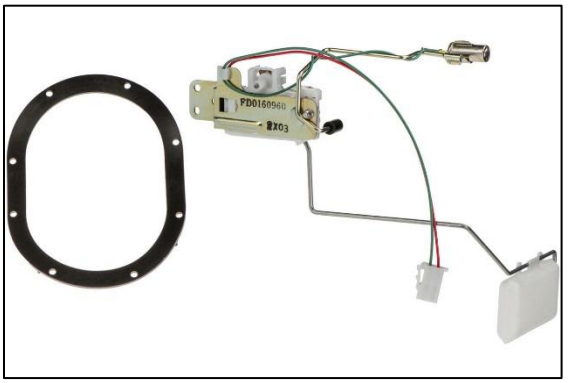
6. NOTE: If installing into a late model Mazda RX7 (FD), there will be a silver baffle on top of the internal sub tank, as shown. This metal plate must be removed. Both early and late model RX7s will benefit from the Radium Engineering baffle replacement in later steps.



7. Only 2 parts will be reused from the OEM Mazda unit (gasket and sensors).

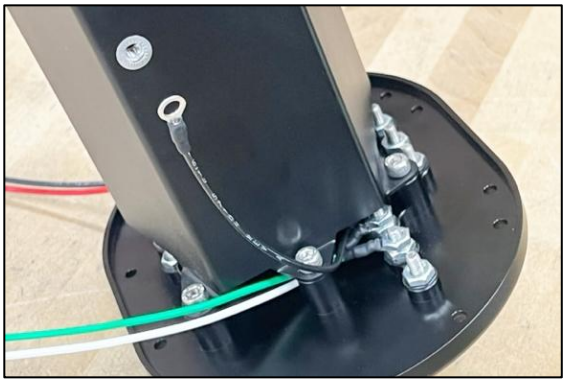
Pry the large black fuel tank gasket off the OEM assembly (shown left). Inspect for wear and deterioration. If necessary, purchase Mazda P/N: HG3060962 for an OEM replacement.

To remove the fuel level/temperature sensor assembly (shown right), first depress the thumb lock to unplug the 2-pin connector. Next, use a Phillips head screwdriver for the small mounting screw. This OEM screw will NOT be reused.

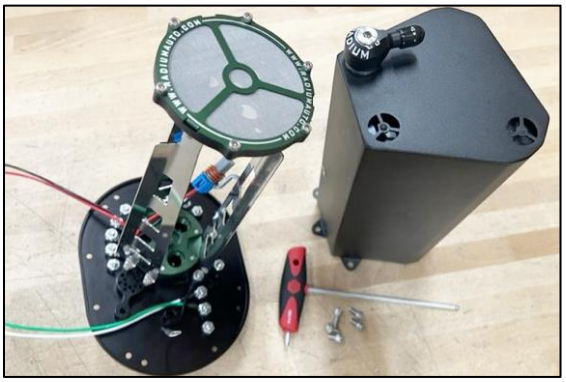


8. Using a 4mm Allen wrench, remove the ground wire on the side of the canister, as shown.

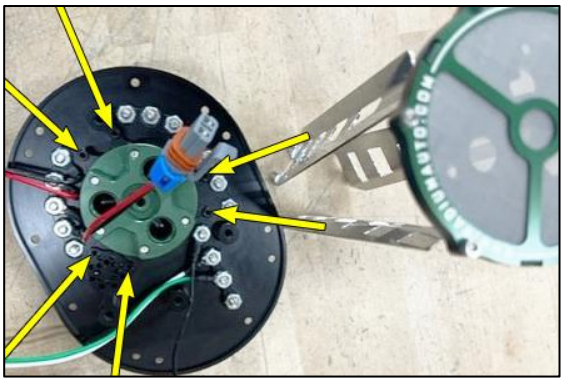
<u>If the fuel pump hanger already has fuel pump(s) installed, skip Steps 9-35.</u>



9. Using a 4mm Allen wrench, remove the 4 bolts that attach the FST canister to the top hat. Separate the two parts, as shown.



10. To remove the fuel pump mount, unscrew the 6 bolts shown using a 3/32” Allen wrench. Separate the parts, as shown.

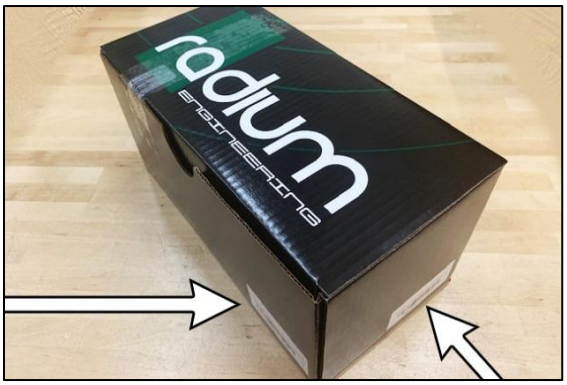


11. Note the part number label on the product box.

Follow Steps 8-14 and 31-35 if installing any of the following into Radium 20-0952
-Walbro F90000267, F90000274, F90000285 Fuel Pump

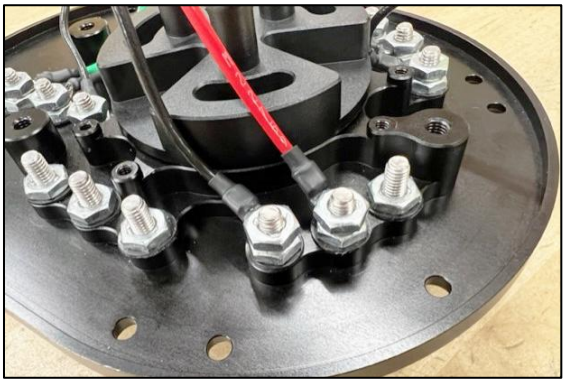
Follow Steps 8-12 and 15-16 and 31-35 if installing any of the following into Radium 20-0950
-Walbro GSS342 255LPH Fuel Pump
-AEM 50-1200 E85 Fuel Pump

Follow Steps 8-12 and 17-35 if installing the following into Radium 20-0951
-Ti Automotive E5LM Fuel Pump



12. Next, determine how many fuel pumps will be installed. Attach the corresponding number of pump connectors to the wiring studs from underneath using a 3/8” socket wrench and included lock nuts. Red wires are positive (+). Black wires are negative (-).

Skip this step for the 20-0951 Ti Automotive E5LM kit.

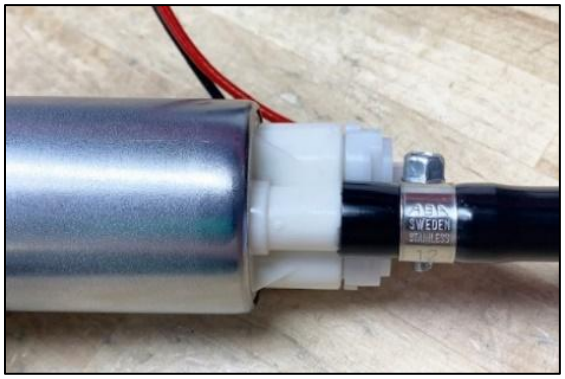


13. **Radium 20-0952 Walbro F90000267/274/285 Fuel Pump Installation**

The provided tubing will be installed between the pump and triple pump collector.

First, apply oil lubrication to the pump outlet barbs and to the inside of the tubing. Care must be taken not to kink the tubing. If too much force is applied, replace the tube. Secure using an EFI hose clamp and a 9/32” nut driver.

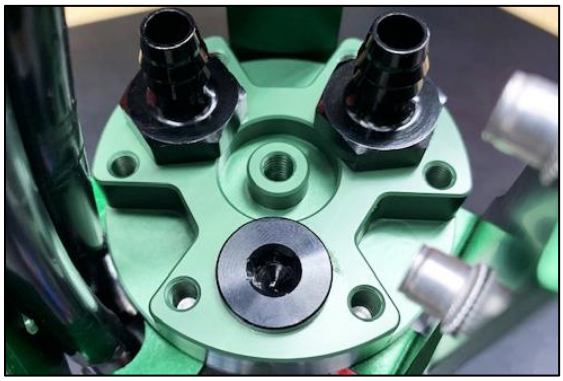
NOTE: Spare tubing is provided in case there is a mistake.



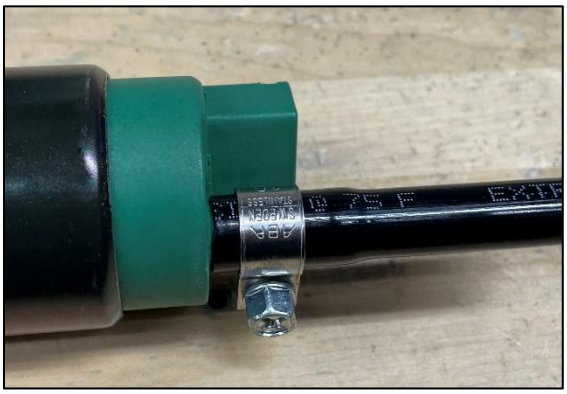
14. Determine how many fuel pumps will be installed. For single or dual fuel pump applications, block-off the unused ports on the underside of the triple pump block using the included 6AN ORB plug fittings and an 1/4" Allen wrench.

-If installing 1 fuel pump, use 2 plugs.
-If installing 2 fuel pumps, use 1 plug (shown).
-If installing 3 fuel pumps, do NOT install any plugs.

Install a barbed fitting for each pump using a ¾" (19mm) wrench. NOTE: Lubricate all O-rings with light oil before installing any ORB fittings.



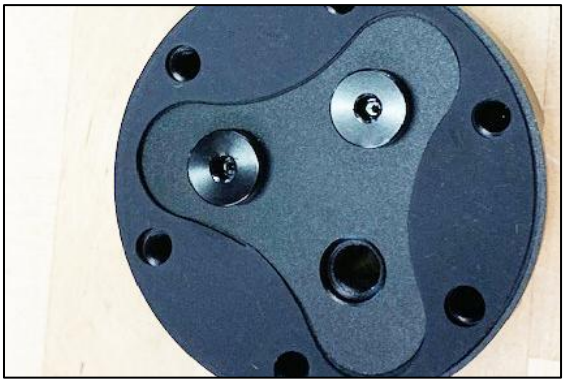
15. **<u>Radium 20-0950</u> Walbro GSS342 or AEM 50-1200 E85 Fuel Pump Installation**
The provided tubing will be installed between the pump and triple pump collector. First, apply oil lubrication to the pump outlet barbs and to the inside of the tubing. Care must be taken not to kink the tubing. If too much force is applied, replace the tube. Secure using an EFI hose clamp and a 9/32" nut driver. Spare tubing is provided in case there is a mistake.
NOTES:
1. For Walbro GSS342 fuel pumps, the included long tubing is required.
2. For AEM fuel pumps, the provided short tubing is required.
3. For many 300/320/340LPH pumps (shown), low heat may be required to soften the tubing. In this case, be careful not to over-heat and melt the tubing. If the tubing becomes too soft and deformed, replace it with a new piece.



16. If installing less than 3 pumps, the triple pump block will have to be disassembled. First, remove the triple pump block's 6 perimeter screws. ***NOTE: if manufactured after Feb 2024, these screws will be accessed underneath the fuel hat (rather than on top).*** Using lubrication and a 1/8" Allen wrench, install the included plug(s) to any of the 3 threaded holes.

-If installing 1 fuel pump, use 2 plugs (shown).
-If installing 2 fuel pumps, use 1 plug.
-If installing 3 fuel pumps, do NOT install any plugs.

Make sure the gasket is properly seated and reinstall all pieces. NOTE: The 6-bolt flange cannot be improperly orientated as the bolt spacing is not symmetrical.

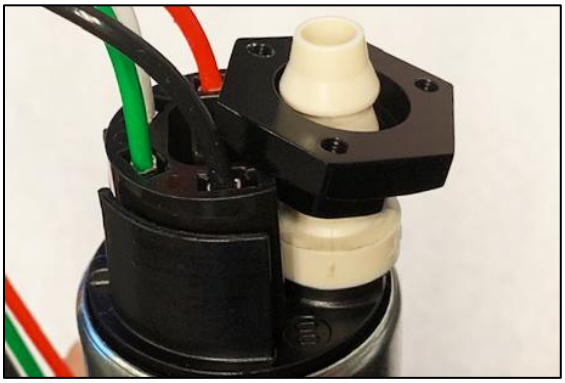


17. **<u>Radium 20-0951</u> Ti Automotive E5LM Fuel Pump Installation**

Inspect the fuel pump outlet hose barb. If deformed or damaged, the Radium check valve pump adapter will NOT attach properly.

The Ti Automotive E5LM 4-pin wiring connector MUST first be installed to the electrical terminals.

To install the check valve, first slide the black collar over the pump outlet with the flat surface upward, as shown.

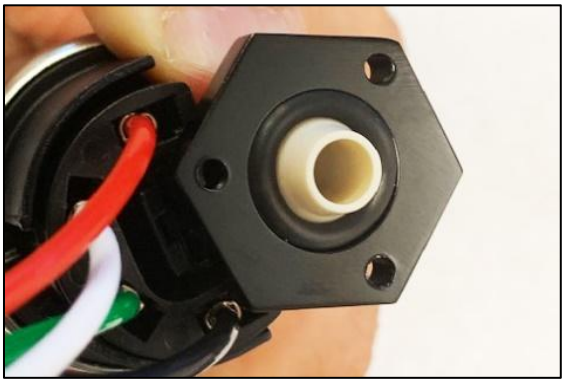


18. Next, slip the stainless steel retainers under the hose barb ridge closest to the end of the pump outlet opening. Be patient as this will take a little bit of work.

Pull the collar up to confirm the retainers lock into place as depicted.

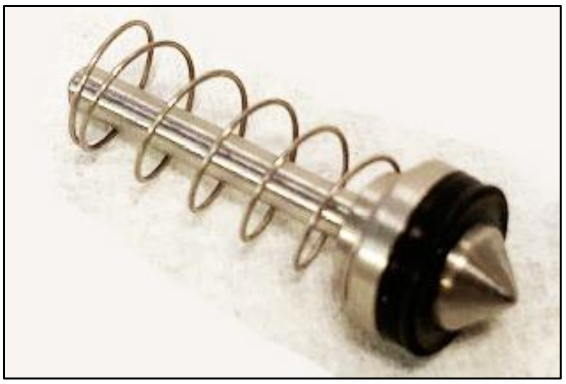
19. Place the included O-ring on the fuel pump outlet. Apply a petroleum-based lubricant to the O-ring.

Slide the black collar upward and tuck the O-ring into the groove, as shown.

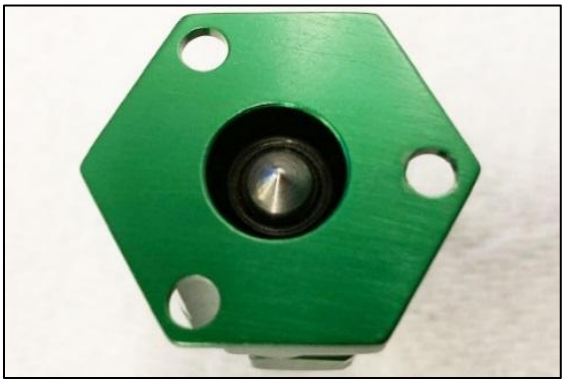


20. Place the O-ring onto the check valve plunger groove, as shown.

21. Place the provided spring around the plunger rod, as shown.

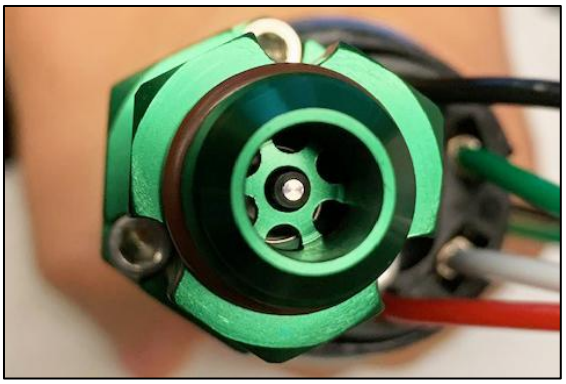


22. Insert the plunger rod through the internal center hole of the green adapter fitting, as shown.

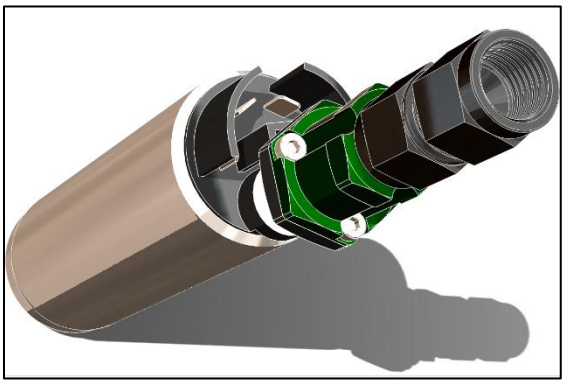


23. Apply a high-strength thread locking compound to the threads on the 3 included bolts. Line up the green fitting holes to the black fitting threads. Use a 2.5mm Allen wrench.

24. After tightening all bolts evenly, inspect the internal side of the green fitting. When installed properly, the plunger should be slightly sticking out of the center hole at rest, as shown.



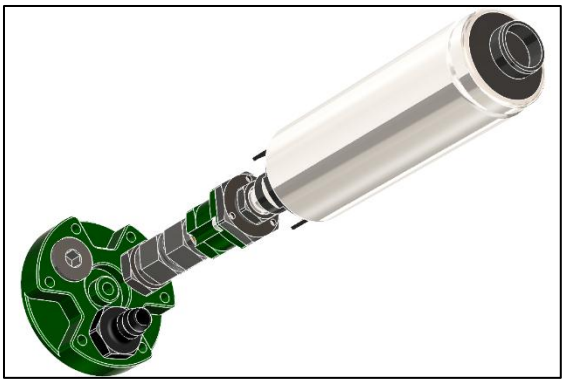
25. Using a 11/16” wrench and a 13/16” wrench secure the provided 6AN female to female coupler to the pump outlet adapter.



26. If not using a fuel pump slot, install the included plug(s) into the triple pump block.

For each slow that a Ti Automotive E5LM brushless pump will be installed, install a 6AN ORB to 6AN male adapter fitting into the triple pump block. Next, install the check valve adapter(s).

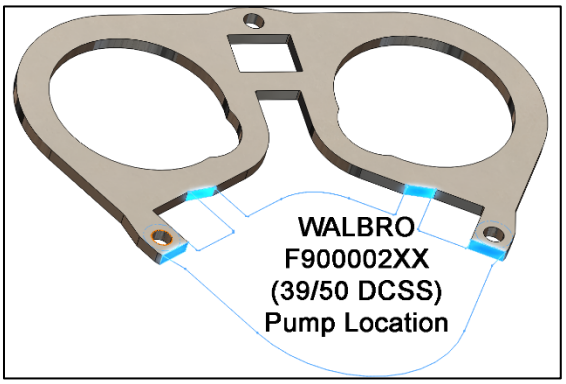
For those wanting a hybrid setup with standard brushed pump(s), install a barbed adapter (shown). These fittings are not included. Reference the website product page for more information.



27. For those wanting a hybrid setup with standard brushed pump(s), barbed fittings (14-0291 or 14-0691) will be needed for the triple pump block as well as tubing and clamps.

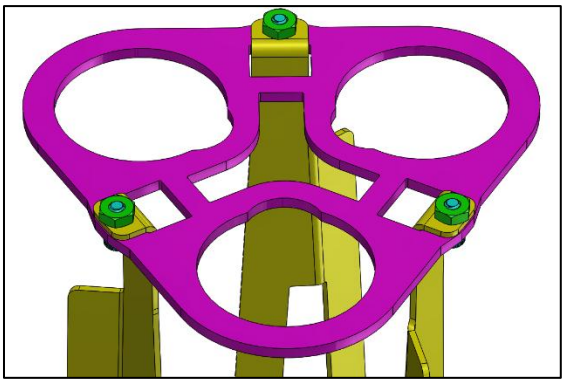
If installing a Walbro F900002XX fuel pump (or any 39/50 DCSS pump), the brushless pump adapter bracket will need to be modified, as shown. But because the pump retention is removed, the fuel pump will be free and not secured. The installer must figure out a way to attach this fuel pump to the assembly as there are no provisions for these larger pumps.

For Walbro GSS342 and AEM 50-1200 style fuel pumps, no modification is required to the brushless pump adapter bracket.



28. Install the brushless pump adapter bracket (pink) to the main pump bracket (yellow).

Secure using the 5-40 threaded bolts (blue) and 5-40 threaded nuts (green) using a ¼” socket wrench and a 5/64” Allen wrench. Hint: the button heads can typically be held in place with your finger while tightening the nut with a wrench.

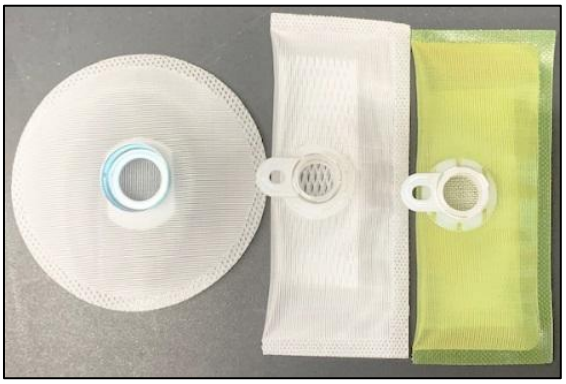


29. Install the recommended filter socks below for the respective pumps.

BRUSHED PUMPS
-Radium P/N: 14-0143 (shown center)
-Filter sock included with AEM 50-1200 (shown right)

BRUSHLESS E5LM PUMPS
-Radium P/N: 14-0543 (shown left)

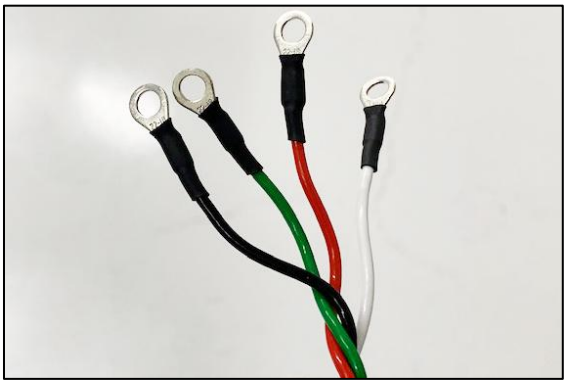
NOTE: The lower filter screen (included with the other kits) is NOT compatible with Ti Automotive E5LM brushless pumps.



30. Crimp the provided ring terminals to the end of each wire. Slide the heat shrink over the crimped area. Apply heat to the shrink the insulation.

Connect each ring terminal to the corresponding wire color terminal depicted on the top of the fuel hat. R = Red, G = Green, W = White, B = Black. Attach the corresponding number of pump connectors to the wiring studs underneath the top hat using 3/8" wrenches and the included lock nuts.

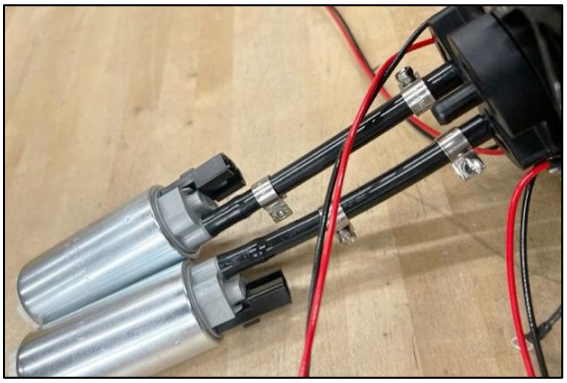
NOTE: The kit includes extra hardware which can be used as spares.



31. Excluding Ti Automotive E5LM brushless pump(s), slide a second hose clamp onto the tubing attached to the fuel pump. Use lubrication as previously mentioned and push the tube over the barb until it is fully seated. NOTE: Do NOT apply heat on this side of the tubing connection. It is NOT required.

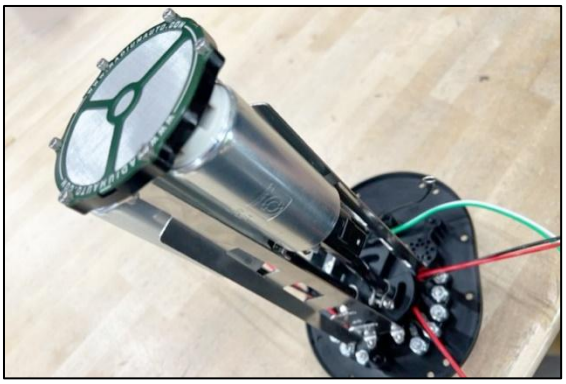
Rotate each pump so the wire connectors are facing outwards. Secure the clamp(s) using a 9/32" nut driver.

NOTE: If using less than 3 fuel pumps, ensure a fuel pump is not accidentally installed into a blocked off port.



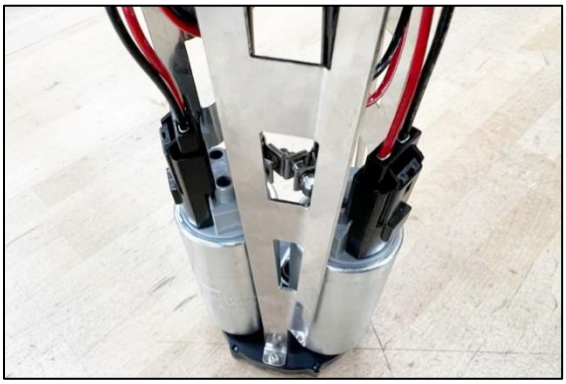
32. Using a 3/32" Allen wrench, resecure the brackets to the fuel hat, as shown.

NOTE: Excluding 20-0951 Ti Automotive E5LM kit each fuel pump has its own dedicated filter chamber. There are 3 individual compartments. Contaminants can NOT get into the pump inlets from the unused spot (shown).

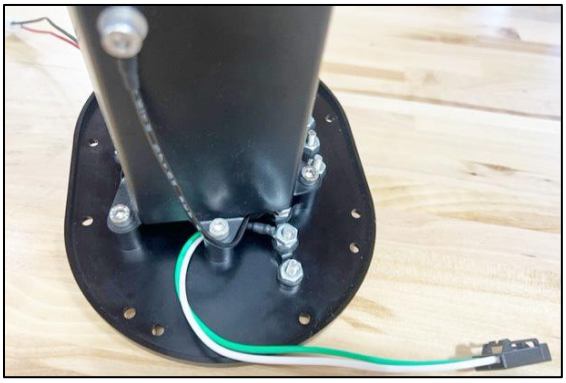


33. If using brushed pumps, plug in the fuel pump connectors.

Skip this step for the 20-0951 Ti Automotive E5LM kit.

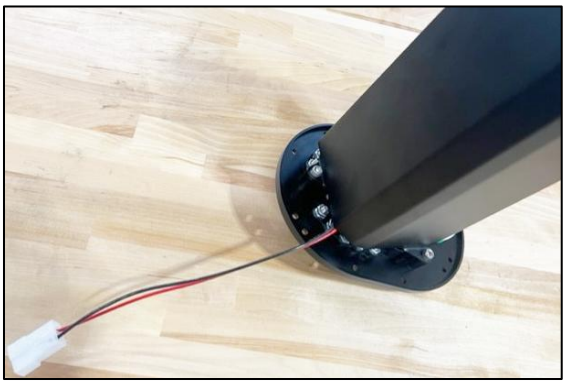


34. Before fully seating the FST canister to the top plate, correctly position the electrical wires. The black sensor ground wire should NOT enter the FST canister. The black connector with the green and white wires will be used for the fuel level/low fuel sensor.



35. The white connector with the red and black wires will be used for the lift pump. This should exit the opposite side of the FST canister, as shown.

Tighten all 4 FST canister mounting bolts using a 4mm Allen Wrench.



36. **Follow all the following steps if fuel pumps are installed in the FST canister**

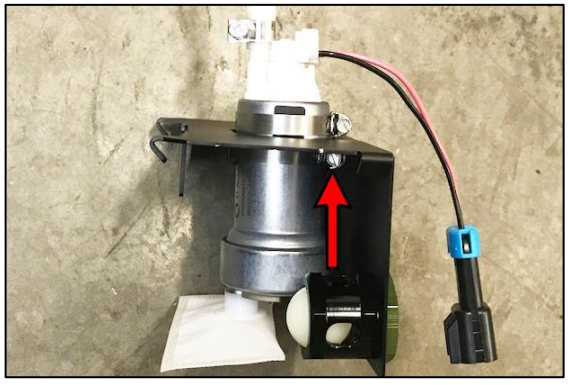
To install the provided convoluted tubing to the fuel pump outlet barb, first run the end of the tube in hot water or use a heat gun. Secure with the included EFI hose clamp using a 9/32" socket wrench.

Install the fuel sock filter to the lift pump.

37. Insert the pump through the bottom side of the included lift pump baffle. NOTE: depending on the pump, it may save time to place one of the included worm drive clamps on the bottom side prior to inserting the pump.

Secure the fuel pump using the worm drive clamps on both sides of the baffle. To tighten the clamps, a flat head screwdriver or a thin-walled ¼" socket wrench can be used.

NOTE: To prevent interference with the OEM sub tank, the lower clamp's locking mechanism must be positioned, as shown with red arrow. Do not place it 180 degrees from this location.

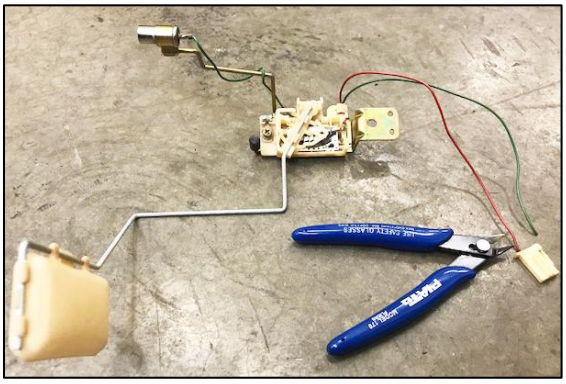


38. Find the OEM fuel level sender float/temperature sensor probe assembly.

Using diagonal cutters, cut the 2 wires at the OEM electrical connector leaving as much slack as possible. See picture.

OEM Internal Sensor Wire Colors

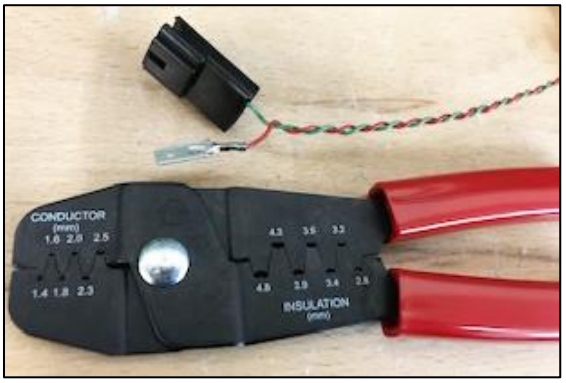
GREEN	Low Fuel Signal
RED	Fuel Level Signal



39. For flexibility, it is recommended to twist the 2 wires together.

Strip 3/16” of insulation off each wire. Install the 2 provided terminals and secure using a crimp tool, such as Molex 63811-1000. As shown, insert the green wire terminal into connector pin A until a click is “felt”. Insert the red wire terminal into connector pin B until a click is “felt”.

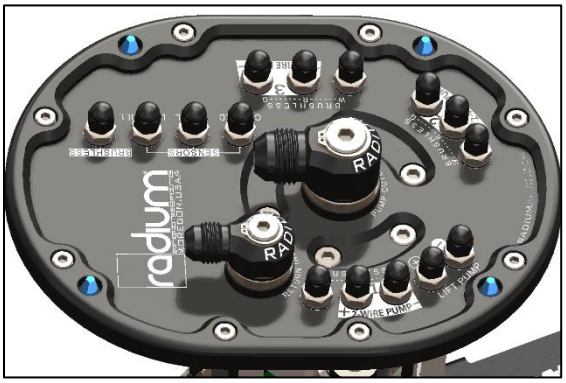
NOTES:
1. These terminals can accidentally be inserted upside down.
2. An extra black plastic connector is provided as a spare.



40. Find the OEM rubber gasket that was previously removed. Inspect to be sure there are no rips, tears, cuts, imperfections, etc. Mazda P/N: HG30-60-962

Fully seat the gasket on the underside of the top plate, as shown. NOTE: The gasket can only go on one way.

41. From the top side of the top hat, pull up the 4 rubber indexing nubs (shown in blue). They will lock into place.



42. Using pliers, loosen the 2 OEM spring clamps for the front RH rubber vent hose, as shown.

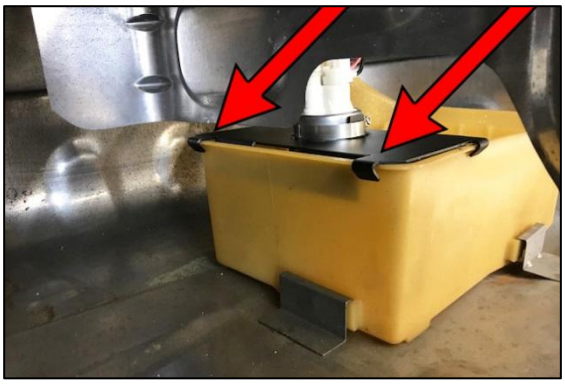
43. Rotate the rubber vent hose 180 degrees and secure with the spring clamps, as pictured.

This will effectively move the front RH check valve out of the way, as depicted.

Next, tuck the LH rear check valve (not shown) away from the gas tank opening.

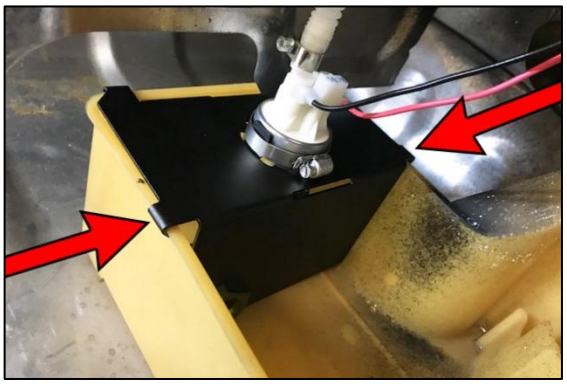
44. Plug in the 2-wire extension harness with the white connector to the lift pump. Lower the baffled lift pump assembly into the gas tank as shown.

45. To secure the baffle into the OEM sub tank, it is important that all 4 tabs are installed properly. First, tilt the baffle up and push the baffle to the rear of the tank. With a flashlight confirm the 2 rear tabs are locked into place.

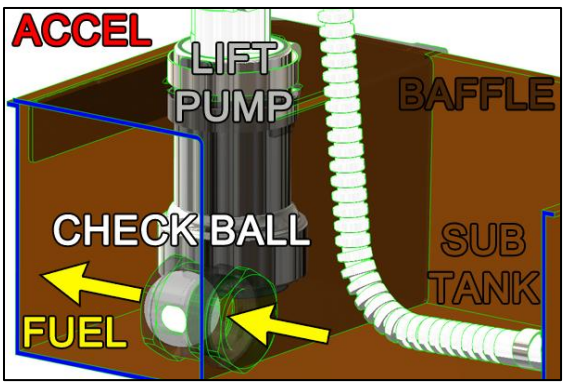


46. Next, gently squeeze the side walls of the OEM sub tank to allow the 2 baffle tabs to lock in place.

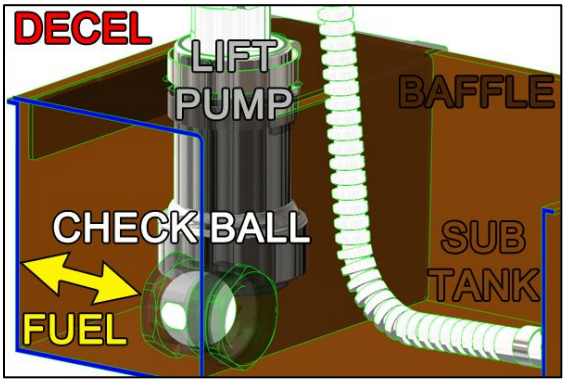
NOTE: Pictured is the baffle correctly installed inside the gas tank.



47. During acceleration, the check ball will open supplying the lift pump with ample fuel located inside the OEM sub tank as shown.



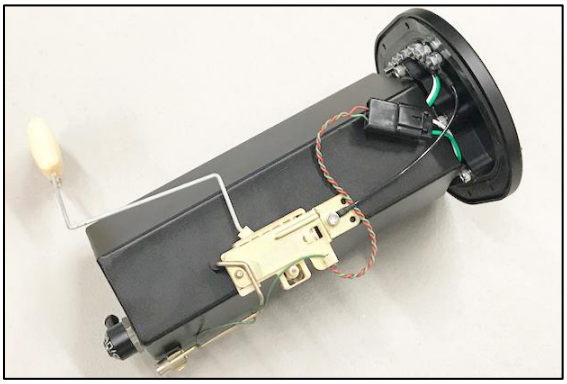
48. During deceleration, the check ball will close preventing fuel inside the OEM sub tank from escaping baffled area.



49. Pull the lift pump wiring connector and fuel tubing out of the gas tank opening, as shown.

50. Insert the M5 socket head bolt through the black ground wire ring terminal and fuel level/temperature sensor assembly. Secure to the FST canister rivet nut using a 4mm Allen hex wrench.

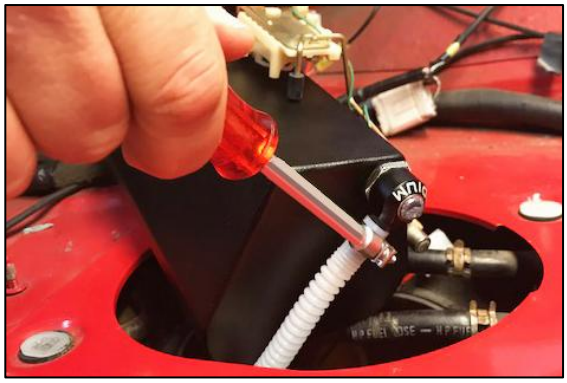
Plug in the fuel level/temperature sensor connectors, as shown.



51. Move the FST assembly very close to the gas tank opening.

Insert the EFI clamp onto the convoluted tubing and loosen the clamp bolt. Using a heat gun (or hot water), carefully allow the convoluted tubing end to soften and expand. Quickly insert the convoluted tubing onto the bottom barb of the FST canister.

Fit the clamp over the barbed area and tighten using a 9/32” nut driver, as shown.



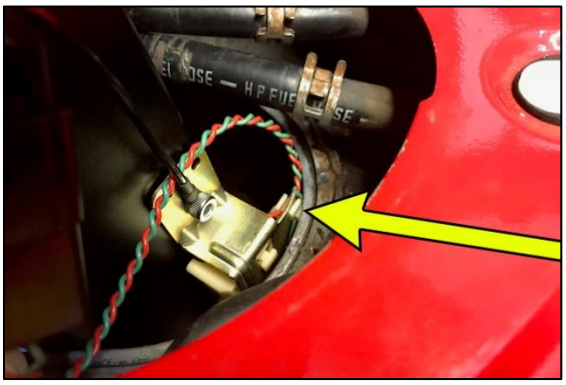
52. Plug in the lift pump connectors, as shown.

53. To install into the gas tank, the fuel level float must enter the gas tank first. Carefully tip the fuel hanger assembly to angle in the fuel level float, as shown.

Readjust vertically and slowly lower the FST assembly downwards.

54. Find another person to help with this step as it is difficult. The fuel level sender will need to be pressed inward with an object to get it past the gas tank opening.

NOTES:
1. If experiencing difficulty with this step, remove the FST assembly from the tank. Next, unplug and remove the fuel level/temperature sensor assembly and briefly insert it into the gas tank. Reinstall the FST assembly halfway into the tank and bring the fuel level/temperature sensor assembly up just under the gas tank opening. Secure the black ground wire and fuel level/temperature sensor assembly to the FST canister and plug in the electrical connector.
2. When servicing, the fuel level/temperature sensor assembly will need to be unbolted just before the FST canister is removed from the gas tank opening.



55. Check to be sure none of the electrical wires are getting pinched. Also check that the 8 OEM gasket holes line up with the corresponding threads.

Using a 3mm Allen Hex wrench and the 8 provided socket head screws (shown in blue), secure the FST assembly to the gas tank. Tighten in a crisscross pattern.

56. Cut the white OEM external connector off using diagonal cutters, as shown.

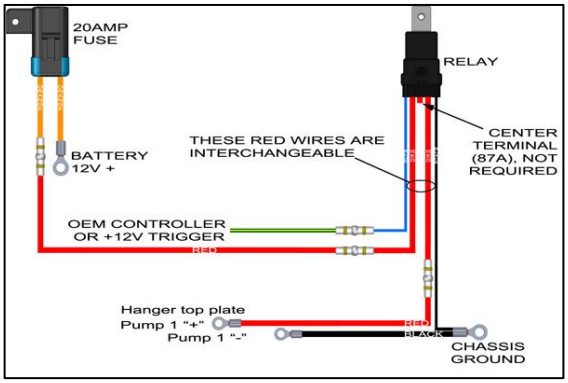
57. Cut the OEM external ground terminal off using diagonal cutters, as shown.

58. Unravel the electrical tape and remove the access cover rubber grommet from the wiring harness, as shown.

59. The OEM fuel pump power wiring will be reused for the lift pump. The OEM wiring does NOT need to be upgraded since the lift pump operates at very low pressure thus low current.

WARNING: The OEM fuel pump wiring cannot supply power directly to other fuel pumps!

For the FST pumps, independent fuses, relays, and thick gauge wire will need to be wired in to the system, as illustrated. Consider Radium P/N: 17-0031 DIY Fuel Pump Wiring Kit for each pump. If purchased, reference those specific instructions on www.radiumauto.com



60. Once the new unterminated FST fuel pump wires are assembled, run them through the OEM rubber grommet along with the unterminated OEM wires.

NOTE: If 4 pumps are used and/or the insulation of the wires is excessively large, a slit may need to be cut into the OEM rubber grommet to pass all of the wires through.

61. Reattach the rubber grommet to the OEM fuel tank access cover. Allow ample slack for terminating the wires in the following steps.

62. Use the large diameter shrink tube and large gauge (AWG) ring terminals to connect all fuel pump wires.

Use the small diameter shrink tube and small gauge (AWG) ring terminals to connect the 3 sensor wires.

A wire stripper, crimper, and heat gun are necessary to make these connections

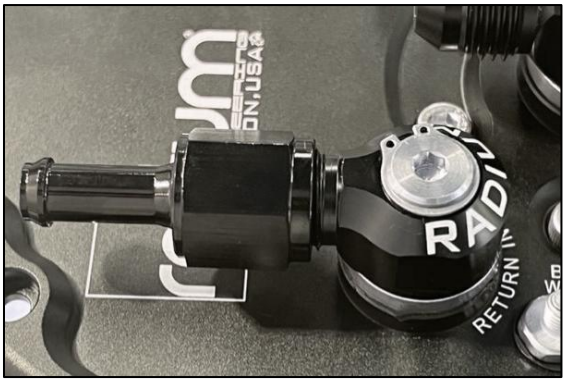
The kit may contain extra electrical connection parts which can be used as spares.

63. Referencing the chart, secure all ring terminal connections to the electrical studs using the provided acorn nuts and an 8mm socket wrench. Do NOT overtighten.

OEM External Wire Colors

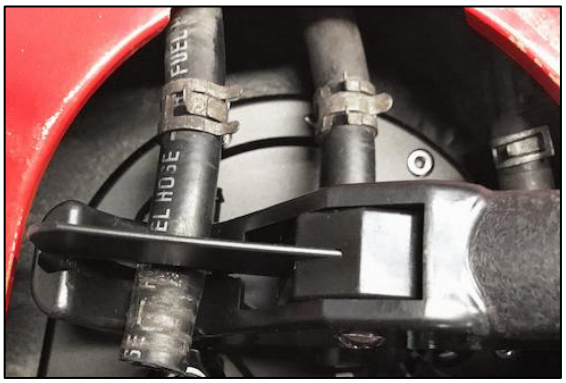
BLACK/BLUE	(small AWG)	Sensor GND
BLUE	(small AWG)	Low Fuel
WHITE/GREEN	(small AWG)	Fuel Level
WHITE/RED	(large AWG)	Lift Pump (+)
BLACK	(large AWG)	Lift Pump (-)

64. If the OEM feed and return hoses will be reused, install and tighten the 2-piece barbed hose ends.



65. Lineup the OEM hoses to the barbs and cut to length.

Lubricate the inner portion of the OEM hoses and the barb fitting with light oil.



66. Push the OEM hoses onto the barb and secure with the OEM spring clamps, as shown.

NOTE: the provided top hat fittings can be changed, if necessary. See port threads below.

-RADIUM Feed Port Female Threads **10AN ORB (7/8”-14)**
-RADIUM Return Port Female Threads **8AN ORB (3/4”-16)**

Reattach all fuel tank mounting related components in reverse order. Reconnect the battery using a 10mm wrench.

64. Turn the ignition key to the ON position to pressurize the fuel system. Confirm the new fuel pump(s) are properly operating. Check for leaks. If no leaks are found, start the vehicle.

NOTE: The engine may run rough for a few seconds until all air is bled from the fuel system.

Recheck for leaks.

FUEL HANGER INSTALLATION COMPLETE

Follow the steps below for installation of the optional fuel feed kits, P/Ns: 20-0455-03 and 20-0455-05

1. **20-0455-0X Fuel Hanger Feed, FD RX7**

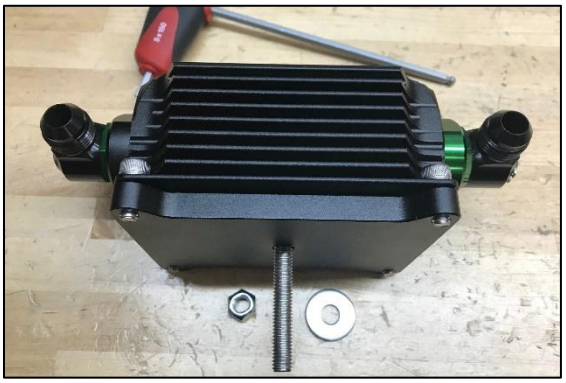
Begin by inserting the fuel filter into the heat exchanger housing. Make sure the ends are flush, then tighten the two small screws on the housing with a 3mm Allen hex wrench. The direction inside the housing does not matter.

Next, lubricate the O-rings on the swivel fittings and install one into each filter port.

2. Locate the filter mounting plate (shown) and the associated long M8 bolt. Drop the bolt (with no washer) into the hole in the center of the mounting plate, as shown.

3. Fit the mounting plate to the bottom of the fuel filter housing. Using a 5mm Allen hex wrench, secure with the four short M6 bolts.

The M8 bolt from the previous step should still be in place, as shown.



4. Find the length of ½" vapor shield hose in the kit. Measure and cut to 13.5". Lubricate the barbs on the two push-lok hose ends (straight and 45 degree) and push them into the hose.

NOTE: Hose clamps are not required for push-lok hose ends.

5. Attach the 45 degree hose end to the fuel filter inlet (black end). Tighten using a 7/8" wrench. It is a good idea to hold the swiveling fitting with an adjustable wrench while tightening the hose end.

Make sure the orientation of the hose end is similar to the picture.

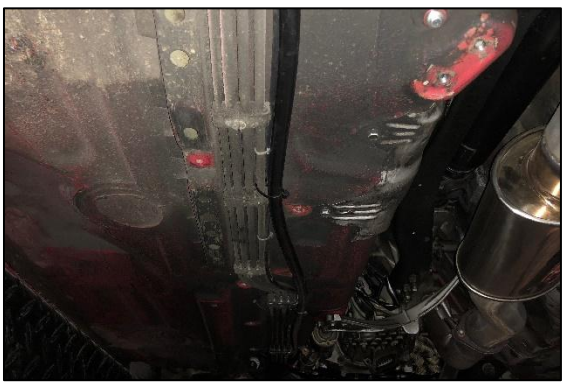
6. Locate the unused hole in the rear subframe as shown (viewed from rear of car).

7. Install the fuel filter assembly with the black end of the filter upwards. Make sure the hose from Step 5 is routed up toward the fuel pump hanger and passes in front of the rear sway bar. Slide the long M8 bolt on the filter mount through the hole in rear subframe. Install the M8 washer and locking nut. Use a 13mm socket wrench, but do not torque the nut yet.

8. Find the long 8AN PTFE hose in the kit and attach the end with the 45 degree non-swiveling hose end to the fuel filter outlet (green side) as shown in the picture. Route the hose along the subframe to the area by the OEM fuel lines. Once the hose is situated, tighten the hose end to the fuel filter outlet using a 7/8” wrench.

9. Use a 10mm socket and remove the factory fuel line covers and set aside.

10. Continue to route the feed line along the same path as the OEM hard lines, using a zip tie about every 12 inches or so to secure in place.



11. The feed line will route up into the engine bay where it will need to be connected to the fuel rail system of the engine. The exact details of this will depend on the engine and fuel delivery setup.

12. Replace the plastic fuel line cover. Some modification and tweaking of the cover will be required to fit the 8AN feed line.

13. At the fuel pump hanger, connect the feed line onto the feed port swivel fitting on the feed port. When tightening the hose end, hold the swivel fitting with an adjustable wrench. Double check that all connections are tight.

Turn the ignition key to the ON position to pressurize the fuel system. Confirm the new fuel pump(s) are properly operating. Check for leaks. If no leaks are found, start the vehicle. NOTE: The engine may run rough for a few seconds until all air is bled from the fuel system.

Recheck for leaks.

FUEL HANGER FEED KIT INSTALLATION COMPLETE