



# INSTALLATION INSTRUCTIONS

## FUEL HANGER SURGE TANK

BMW S65/N54/N55 Vehicles

Document: 19-0189

Support: info@radiumauto.com

### 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




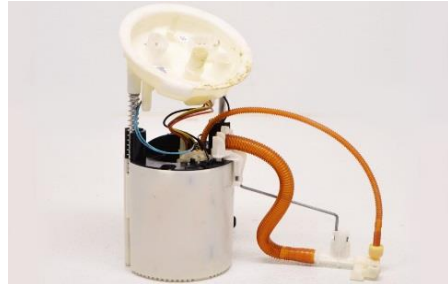


The fuel system is under pressure! Do not loosen any connections until relieving the fuel system pressure.







Consult a service manual for instructions on relieving fuel pressure safely. This product is designed for off-highway and racing use only.

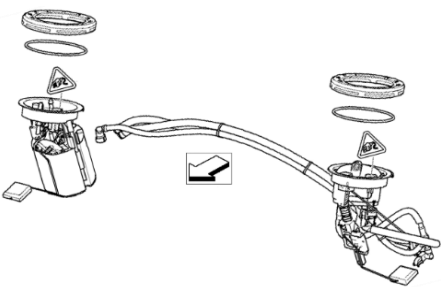


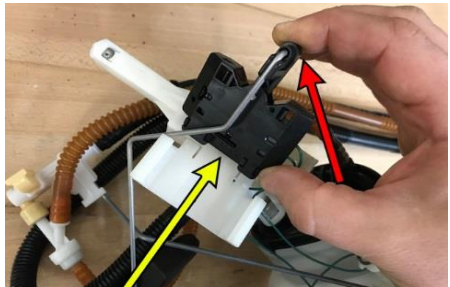


Fuel system components may not be legal for sale or use on emissions controlled motor vehicles. Consult local, state, and federal laws.




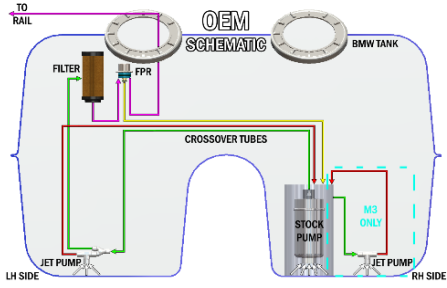
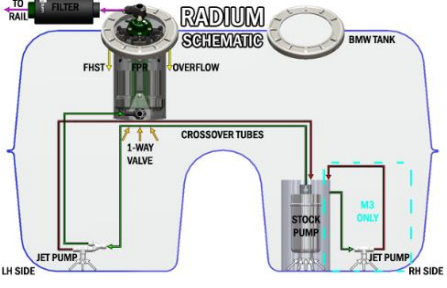

STEP	TOOLS NEEDED	INSTRUCTIONS	PHOTO
1		It is recommended to run the fuel tank dry or drain the tank to reduce fuel spills for an easier and safer installation.	
		Lift the RH rear seat up and forward to dislodge. NOTE: For 4 door sedans, this is a 1 piece bench seat.	
		Remove seat from vehicle.	
2		Fold the carpet insulation to the side to expose the RH fuel tank access cover, as shown.	
3	10mm Socket Wrench	To uninstall the fuel tank access cover, remove the 4 perimeter nuts.	
4	10mm Socket Wrench	Lift the cover up and rotate being careful to not stress the wires. To unplug the 2 connectors, press the thumb tabs and gently pull to release.	
		To depressurize the fuel system, 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. Open the trunk and disconnect the battery's negative terminal.	
		CAUTION: Disconnecting the battery may cancel fault memories of some control units. Consequently, before disconnecting the car's battery, always interrogate any fault memories.	

5		Once the cover is removed, 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.	
		Find the large fuel tank vent SAE quick connect. Push the fitting downwards, squeeze the locking tab, and simultaneously pull upwards to release.	
6		Find the small fuel tank vent SAE quick connect. Push the fitting downwards, squeeze the locking tab, and simultaneously pull upwards to release.	
7		The galvanized hold-down ring will need to be spun counterclockwise.	
		Many technicians will use a hammer and flat chisel. However, it is recommended to purchase a spanner tool to avoid damaging this steel threaded ring. These are relatively inexpensive and can be found online from companies such as Lisle, OEMTools, Ryco, etc.	
		For the BMW, Radium Engineering successfully uses Lisle P/N: 63000 (shown).	
8		When releasing the hold-down ring, be prepared for the fuel pump assembly to spring upwards slightly.	
		Once removed, it is a good idea to clean the hold-down ring.	
9		Pull the fuel pump assembly top upwards.	
		Find the large fuel tank vent SAE quick connect underneath the fuel pump assembly top. Push the fitting further onto the connector, squeeze the locking tab, and simultaneously pull to release.	
10		Lift the cover up and rotate being careful to not stress the wires. To unplug the 2 connectors, press the thumb tabs and gently pull to release.	
		NOTE: these connectors will look slightly different for BMW M3 models (BMW 335i shown).	

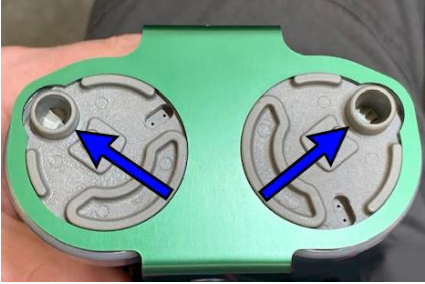
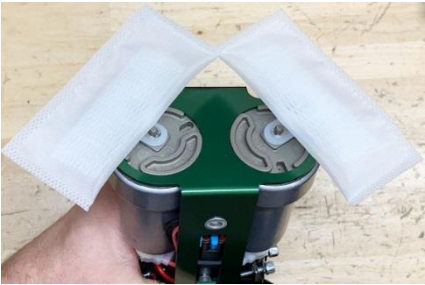
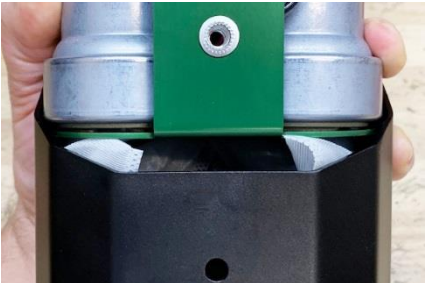
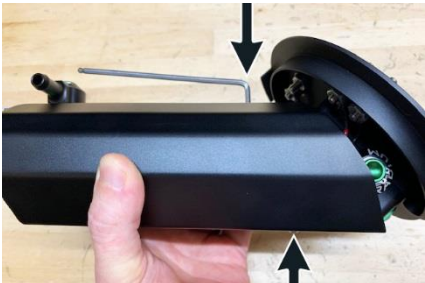


11	Cutters	Cut the black cord that tethers the upper and lower fuel pump assembly together.	
		Inspect the green O-ring gasket and replace if needed. BMW P/N: 16116765055	
12		There are 2 convoluted plastic tubes that come from the LH side of the fuel tank. Depending on the BMW model, these can be transparent, brown, or black (shown).  Simply pull up on the end of the tubes to dislodge them from the fuel pump assembly. NOTE: there are no SAE quick connect locking mechanisms.	
13		Find the fuel pump outlet SAE quick connect secured to the top of the fuel pump. First, rotate the fitting around so the green locking tab can be accessed. Next, push the fitting further down onto the fuel pump, squeeze the locking tab and simultaneously pull up to release.  CAUTION: Do not use excessive force as there are reports of the pump outlet breaking.	
14		<b><i>This step is not necessary unless the main fuel pump will be replaced.</i></b>  NOTES: 1. As shown, the BMW M3 unit uses an additional venturi jet pump on the RH side of the pump bucket that must be manipulated for removing. 2. Have a bucket and rags nearby to catch any fuel spills. 3. There is not much room so place the wiring connectors on top of the unit. 3. For the fuel level sender float to clear the small gas tank opening, the assembly will have to be rocked back and forth. 4. Carefully flip the fuel pump assembly over and dump the residual fuel in the bucket back into the gas tank.	
15		To prevent debris from entering the tank, block off the RH side opening.  Lift the LH rear seat up and forward to dislodge and remove. NOTE: The rear bench may have already been removed if working on a 4 door sedan.	
16		Fold the carpet insulation to the side to expose the LH fuel tank access cover, as shown.	

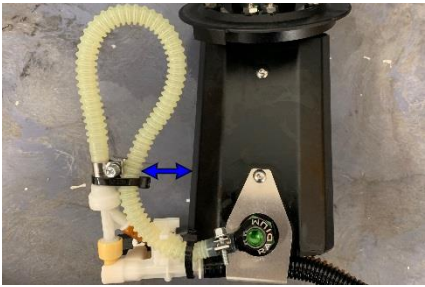
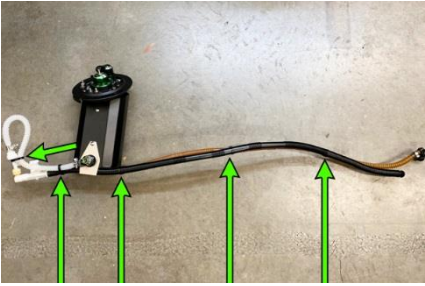
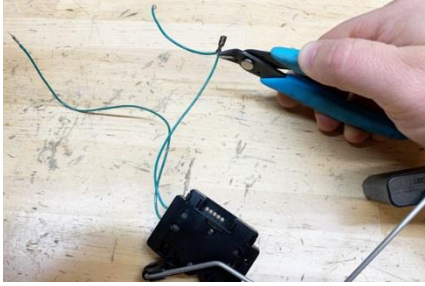

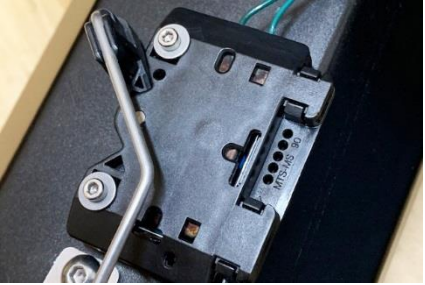
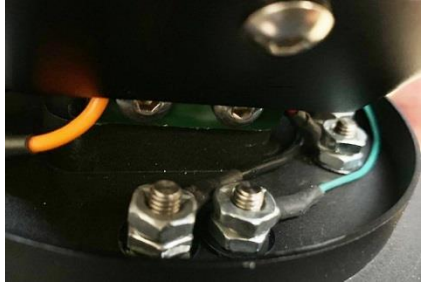
17	10mm Socket Wrench	To uninstall the fuel tank access cover, remove the 4 perimeter nuts.	
18		Lift the cover up and rotate being careful to not stress the wires. To unplug the fuel level sender connector, press the thumb tab and gently pull to release.	
19		Once the cover is removed, it is recommended to clean the top of the fuel tank housing and the surrounding area. This will prevent loose dirt from falling into the gas tank.	
20		Find the SAE quick connect adapter on top. This is the fuel feed outlet that supplies fuel to the engine.  Push the black male fitting inwards while simultaneously pushing the grey locking tab. Pull outwards to release.	
21		The galvanized hold-down ring will need to be spun counterclockwise.  Many technicians will use a hammer and flat chisel. However, it is recommended to purchase a spanner tool to avoid damaging this steel threaded ring. These are relatively inexpensive and can be found online from companies such as Lisle, OEMTools, Ryco, etc.  For the BMW, Radium Engineering successfully uses Lisle P/N: 63000 (shown).	
22		When releasing the hold-down ring, be prepared for the fuel assembly to spring upwards slightly.  Once removed, it is a good idea to clean the hold-down ring.  Inspect the green O-ring gasket and replace if needed. BMW P/N: 16116765055	







23		To understand the following steps, it is best to study this line drawing.	
		The RH fuel assembly consists of a fuel pump, collection bucket, venturi jet pump (M3 only), fuel level float, and vent fittings. The LH fuel assembly consists of a fuel pressure regulator (FPR), fuel filter, venturi jet pump, fuel level float, and fuel feed outlet fitting.	
		Three convoluted crossover tubes:	
		1. RH fuel pump to LH tee fitting	
		2. LH FPR return to RH fuel pump bucket	
		3. LH venturi jet pump return to RH pump bucket	
24		Have a bucket and rags nearby to catch any fuel spills.	
		Pull the fuel assembly up and out. NOTE: for the fuel level sender float to clear the small gas tank opening, the assembly will have to be rocked back and forth.	
25		All 3 convoluted fuel tubes that were disconnected from the RH side will come out of this LH fuel access hole.	
26		To unsnap the black fuel level sender, gently pull from the top of the swing arm pivoting point (shown red arrow). Pull it away from the white plastic holder.	
		Simultaneously push in the direction shown with the yellow arrow to release the black level sender.	
27	Pliers	Pull the female spade ground connection off the FPR male terminal.	
28	Wire Cutter	Cut the 2 fuel level sender wires near the top of the LH unit. Leave as much wire with the fuel level sender as possible. Only leave 1/2" (13mm) of each wire with the OEM unit, as shown.	



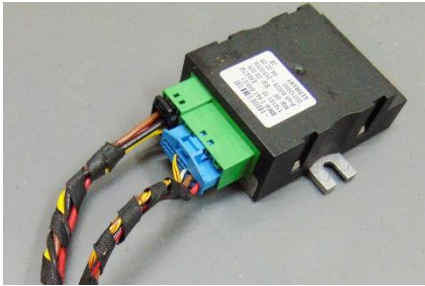
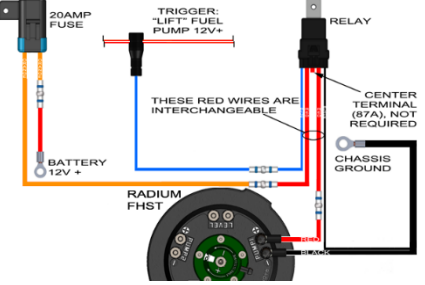

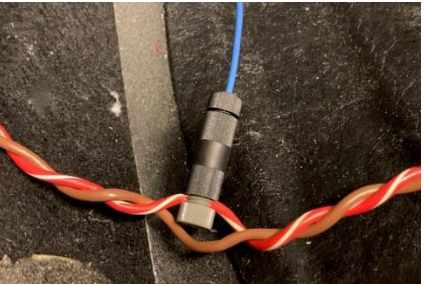
29	Knife	Carefully cut the convoluted tubing at the barbed fitting shown. Pull the tubing off the barbed fitting.	
		NOTE: This tube will be replaced with the supplied convoluted tubing.	
30	Needle Nose Pliers	Squeeze the steel wire support as shown. Simultaneously pull away from the plastic venturi jet pump to release.	
31	Diagonal Cutter	Cut the cable zip-ties that secure the crossover tubes. Pull the OEM FPR return tubing out of the 3 convoluted tube bundle. This will not be reused.	
		Shown is all that will be reused from the LH side stock unit.	
		1. OEM Fuel Level Sender	
		2. OEM Venturi Jet Pump with Y-Adapter	
		3. OEM Pump Outlet Crossover Tubing	
		4. OEM Venturi Return Crossover Tubing	
32		Reference the picture to understand how the OEM BMW fuel system worked.	
33		Reference the picture to understand how the Radium Engineering fuel hanger surge tank system will work.	
		If the fuel pump hanger kit was purchased with fuel pump(s) included, skip Steps 34-44.	
34	2mm Allen Wrench	Remove the 2 small fuel level sender bolts/washers from the canister.	
	3mm Allen Wrench	Next, remove the four M5 bolts that attach the canister to the FHST assembly. There are 2 on the front, 2 on the back.	
		Separate the two parts, as shown.	





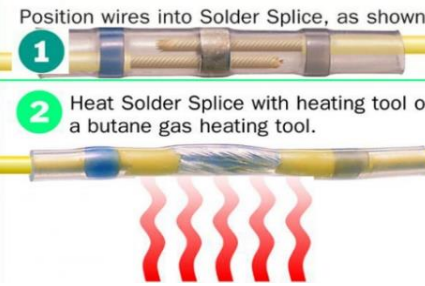


35	3mm Allen Wrench	To remove the dual pump mounting bracket, unscrew the four M5 bolts.	
		NOTE: these bolts are slightly shorter than the similar bolts removed from the canister.	
36	3/8" Socket Wrench	If installing 1 fuel pump, this step can be ignored.	
	1/4" Allen Wrench	If installing 2 fuel pumps:	
	22mm Wrench	1. Replace the preinstalled 6AN ORB plug with the provided 90 degree barb fitting. Use the swiveling feature of the fitting to spin the nut a quarter turn at a time then use an open-ended wrench to tighten.	
		2. Attach the included fuel pump connector to the corresponding "PUMP2" wiring studs. Red wires are positive (+). Black wires are negative (-).	
37	Hose Cutter	Cut the provided submersible fuel hose to the following sizes for each fuel pump.	
		<b>Fuel Pump Hose Lengths</b>	
		Walbro GSS342 255LPH 1.83" (46.5mm) long sections	
		Walbro F90000267 E85 1.73" (44mm) long sections	
		Walbro F90000274 E85 1.73" (44mm) long sections	
		Walbro F90000285 E85 1.73" (44mm) long sections	
38	Oil Lubrication	Apply lubrication and install the submersible hose to the fuel pump barb(s).	
	9/32" Socket	Install and tighten the included EFI clamp(s). NOTE: For Walbro F90000267, F90000274, and F90000285 fuel pumps, use the large EFI clamps provided.	
		Insert the other med-sized EFI clamp(s) over the hose(s). Slide the hose onto the 90 degree barb fittings. Do not tighten the EFI clamps yet.	
39		Plug in the fuel pump connector(s).	
		NOTE: If installing dual Walbro F90000267 or F90000274 or F90000285 fuel pumps, the large electrical connectors must be orientated properly for fitment purposes. As shown, place one fuel pump connector at the front of the assembly and the other connector at the rear of the assembly.	
40	3mm Allen Wrench	Reinstall the dual pump mounting bracket using the 4 short bolts.	





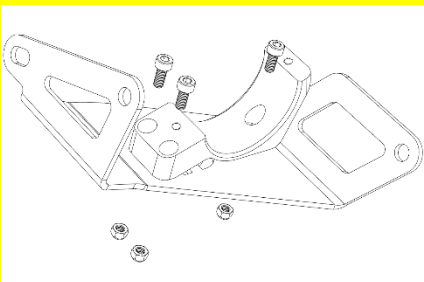

41	9/32" Socket	Rotate the fuel pump(s) until the round inlet(s) are concentric with the half circle cut-out(s) in the bracket, as shown.	
		Once the orientation is correct, tighten the upper fuel pump EFI hose clamp(s).	
42		Install the fuel pump filter(s).	
		NOTE: the BMW FHST requires a pliable filter sock such as Radium Engineering P/N: 14-0143 (shown).	
43		Fold the filter sock(s) downward and insert the fuel pump assembly into the canister.	
		NOTE: Do not allow the filter sock(s) to rise upwards along inner walls of the canister as the clearancing is too tight.	
44	3mm Allen Wrench	Reinstall the 2 bolts on opposing sides of the canister in the upper locations, as shown. Do not install the lower 2 bolts yet.	
45	3mm Allen Wrench	If not already, remove the 2 lower bolts allowing the lower bracket to be loose.	
		Insert the OEM crossover tubes between the canister and the lower bracket. Make sure the position of the crossover hoses are as shown.	
		Tighten the two lower bracket bolts.	
46	Heat Gun	Insert the provided 2 small EFI clamps onto the included convoluted tubing.	
		Carefully heat both ends of the tubing just enough to soften the plastic.	

47	9/32" Socket Wrench	While still soft and warm, quickly install the convoluted tubing between the OEM Y-adapter and the canister inlet barb as shown. Tighten the EFI clamps.	
		Slide the crossover tubes so there is a tight gap between the canister and the venturi jet pump. If the gap is any larger than shown, the crossover tubes will not reach the OEM fuel pump bucket on the RH side when reinstalled. NOTE: BMW does not provide ANY extra slack on the OEM crossover tubes.	
48	Diagonal Cutter	Install the provided large cable zip ties in the areas shown. Be sure the crossover tubing is not twisted before tightening. Cut off the zip-tie tails.	
		NOTE: when installed back into the OEM fuel tank, the white convoluted tubing loop should stay vertical, as shown.	
49	Wire Cutter	Cut the fuel level sender wire right at the female spade terminal (as shown). This will provide the maximum amount of the slack needed in the following steps.	
		NOTE: the terminal and short wire that was cut can be discarded.	
50	Wire Stripper	Strip 1/4" of insulation off the end of the 2 OEM fuel level sender wires.	
	Scissors	Cut two 1/2" sections of the included small heat shrink and insert over each wire.	
	Wire Crimper	Crimp the included small gauge ring terminals to each wire.	
	Heat Gun	Slide the heat shrink over the crimped area and apply heat to shrink into place.	
51	2mm Allen Wrench	Install the fuel level sender onto the canister using the provided bolts and washers, as shown. NOTE: for orientation purposes, the fuel level sender wires will point upwards.	
52	3/8" Wrench	Insert the longer of the two OEM fuel level sender wire ring terminals to the available fuel level stud shown. Polarity is not important.	
		Tighten the locking nut.	







53	3mm Allen Wrench	Unscrew the bolt shown (red arrow).	
	Diagonal Cutter	Insert the preinstalled black extension ground wire and short OEM fuel level sender wire ring terminals in this location. Retighten the bolt.	
		As shown, secure the 2 OEM fuel level sender wires together using the included small cable zip tie. Cut off the zip-tie tail.	
		Work bench assembly complete.	
54		Insert the crossover tubes through the LH side fuel tank opening.	
		Before sliding the crossover tubes towards the RH side of the fuel tank, bend them and tip the FHST assembly the opposite direction. Next, insert the fuel level float and jet pump into the LH side opening.	
		Rotate the assembly back to normal and slowly lower into the gas tank.	
55		To fully seat the FHST, rotate and adjust the positioning of the FHST alignment tab so it mates properly to the gas tank slot.	
		Reinstall all internal OEM parts on the RH side of the gas tank in reverse order.	
		Reinstall both OEM lock rings.	
56	Flat Blade	An independent fuse and relay must be used to drive each high current FHST pump. If the kit was purchased with "2 PUMPS INCLUDED" then 2 relays, 2 fuses, and all wiring accessories are already provided. For all other kits, Radium Engineering P/N: 17-0031 can be purchased for an additional pump.	
		First, open the trunk. Remove the flooring and the RH side carpet from the wall.	
57	10mm Socket Wrench	Remove the M6 nut from the grounding stud shown.	
58		Pull the nearby OEM wiring harness bundle up to release the black plastic push-style fastener from the threaded stud.	



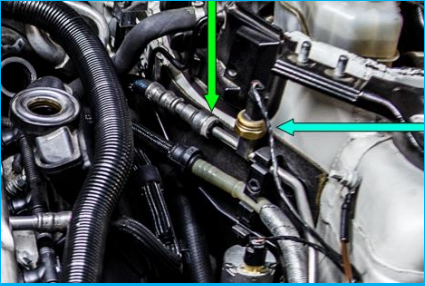



59	Electrical Pick	Find the included relay flying lead connector in the kit. The large red wire located in the center (terminal 87A) will not be used.	
		To remove, first pry off the large red rubber seal and slide it along the 5 wires to dislodge it from the connector. Insert a pick into the center socket and pry the terminal loose from its internal lock. Simultaneously push the wire through the front of the connector, as shown.	
		Discard the wire/terminal and reattach the large red rubber seal.	
		Reinstall the flying lead connector to the relay.	
60	10mm Socket Wrench	Mount the relay and fuse holder to the threaded stud using supplied nut.	
		NOTE: 1. Single pump BMW FHST with 1 relay and 1 fuse is shown. 2. If using a dual pump BMW FHST, the installer should mount the additional relay and fuse near this area.	
61		For safety purposes, the FHST pump relay(s) must be triggered from a source that turns OFF when the engine stalls. The source should also have a priming feature used for quicker engine starts. Aftermarket ECUs utilize these outputs.	
		For non BMW M3s which use a standard 2-wire fuel pump, the FHST pump relay(s) can be triggered from the OEM fuel pump's red/white stripe power wire. In the next few steps, the fuel pump(s) will be wired for non BMW M3s.	
		<b>For BMW M3s which use a 4 wire (3 phase) fuel pump, an alternative trigger will need to be sourced by the installer not discussed in this manual. Pictured is the BMW M3 fuel pump control module.</b>	
62	Wire Cutters	Assemble the components as shown in the wiring schematic (not to scale).	
	Wire Strippers	Cut all wires to length.	
	Wire Crimpers		
63		Unscrew both ends off the included black Posi-Tap connector.	
		Insert the OEM red/white stripe power wire (non M3) from the fuel pump connector into the slotted end of the Posi-Tap connector.	
		Screw the center section back on making sure the wire gets pierced.	
64	Wire Stripper	Slide the Posi-Tap collar end piece over the blue wire provided in the kit.	
		Strip the blue insulation back to expose 3/8" of copper and insert into the end of the Posi-Tap connector.	
		Finally, smash the blue wire by tightening the collar end into the Posi-Tap connector, as shown.	
		See the online Posi-Tap tutorial videos for more information.	



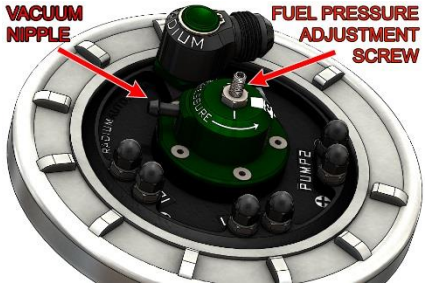

65	Duct Tape	To prevent wire damage, the provided FHST fuel pump power wires will be routed under the rear seat sheet metal but on top of the fuel tank.	
	TIG Welding Rod	A trick is to tape the wires together with a thin stiff metal object such as a coat hanger or preferably a welding rod, as shown.	
66		Push the FHST fuel pump wires through the LH side opening and find them in the RH side opening, as shown.	
67	Electrical Pick	Using a pick or screwdriver, poke 2 holes through the underside of the RH rubber grommet. Individually push each wire through the holes, as shown.	
68	Diagonal Cutter	Route the blue trigger wire and fuel pump power wires from the RH side of the tank into the trunk. Use cable zip-ties to keep the bundle away from areas which could chafe.	
69	Heat Gun	In the Radium wiring diagram from a few steps back, note the different locations of the included Raychem solder butt connectors.  To properly use the Raychem solder butt connectors, strip each wire insulation back and insert both wires into the butt connector ends. Use a heat gun. Be careful with the surrounding area as the internal solder will take a few minutes to melt. Verify the connection is solid by giving it a tug.  For strain relief, always allow some slack in the wire so it does not pull.	<p>Position wires into Solder Splice, as shown.</p>  <p>1 Position wires into Solder Splice, as shown.</p> <p>2 Heat Solder Splice with heating tool or a butane gas heating tool.</p> 
70	10mm Socket Wrench	Install the black wire ring terminal to the grounding stud as shown.	

71	10mm Socket Wrench	Run the fused power wire directly to the battery.	
		NOTE: As the wiring diagram above illustrates, the orange wire from the fuse will likely need to be slightly extended to reach the battery. In the picture, the orange wire just reached without needing an extension.	
72	Wire Cutters	Cut the fuel level sender wires 1/2" (13mm) from the connector.	
	Wire Strippers	Strip 1/4" of insulation off the end of each wire.	
	Scissors	Cut two 1/2" sections of the included small heat shrink and insert over each wire.	
	Wire Crimpers	Crimp the included small gauge ring terminals to each wire.	
	Heat Gun	Slide the heat shrink over the crimped area and apply heat to shrink into place.	
		Install the ring terminals to the "FUEL LEVEL" studs. Polarity is NOT important.	
73	Wire Cutters	Strip 1/4" of insulation off the end of each fuel pump power wire.	
	Wire Strippers	Cut two 1/2" sections of the included large heat shrink and insert over each wire.	
	Scissors	Crimp the included large gauge ring terminals to each wire.	
	Wire Crimpers	Slide the heat shrink over the crimped area and apply heat to shrink into place.	
	Heat Gun	Install the ring terminals to the fuel pump studs. Red wire(s) are positive (+). Black wire(s) are negative (-).	
		Hand tighten all acorn nuts. DO NOT OVERTIGHTEN!	
		If 20-0475 FUEL HANGER FEED, BMW was NOT purchased, skip Steps 74-89 and go directly to Step 90. NOTE: the OEM fuel feed line will need to be adapted to the FHST. Also, a low micron fuel filter must be installed somewhere in the fuel feed line prior to the direct injection fuel pump.	
74	Oil Lubrication	<b>INSTALLATION INSTRUCTIONS: 20-0475 FUEL HANGER FEED, BMW</b>  The long 1-piece hard line underneath the vehicle will be replaced. NOTE: the BMW M3 (only) uses a fuel pressure sensor on this aforementioned hard line. To reuse this sensor, 20-0471 FUEL HANGER FEED, BMW M3 ADD-ON is also required.  The fuel filter has markings identifying the "INLET" and the "OUTLET". Install the 10AN ORB to 8AN male fitting to the inlet port and the 10AN ORB to SAE quick connect male fitting to the outlet port. NOTES: 1. Oil lubrication must first be applied to the O-rings to prevent damage. 2. Aluminum wrenches can help prevent marring of the anodized hex finish.	
	1" Wrench		
75	4mm Allen Wrench	Install the lower half of the Radium fuel filter mount to the fuel filter bracket using the provided M5 socket head bolts and lock nuts.	
	8mm Wrench		
76	4mm Allen Wrench	Place the fuel filter on the lower half mount in the direction depicted.  Install the upper half of the fuel filter mount using the provided M5 socket head bolts, as shown. Center the filter within the clamp and tighten the bolts.	

77	8mm Socket Wrench	Safely lift the vehicle and support with jack stands. Remove the plastic under panels from the front and along the LH side.	
	10mm Socket Wrench	In the LH side area of the transmission tunnel there is a steel bracket covering the fuel feed line connection. Unscrew the 3 nuts to remove. The OEM steel bracket (shown) will NOT be reused.	
78	13mm Wrench	As shown, unbolt the M8 nut to remove the large ground strap lug terminal.	
79		<u>All non BMW M3 vehicles</u>  Pry the plastic safety clip off the OEM female SAE quick connect fuel feed line shown.	
80	Rag	<u>All non BMW M3 vehicles</u>  Push the female SAE quick connect fitting further onto the male SAE quick connect fitting. Simultaneously squeeze the blue lock into the female SAE quick connect fitting and pull the connections apart.  Have a rag handy as fuel will likely spill out.	
81	Flat Blade	Starting from the front area, pop the plastic OEM fuel line out of the black plastic retainers one by one working your way to the rear.	
82	Rag	The last retainer will be on a vertical wall leading to the LH gas tank opening. Dislodge this black plastic retainer completely from the body. This will permit the additional space required for the new 8AN PTFE fuel line.  <u>All non BMW M3 vehicles</u> Remove the OEM fuel feed line. Have a rag handy as fuel will likely spill out.	

83	6mm Allen Wrench	Unscrew the black plastic nut that holds the last horizontally positioned retainer to the floor. The black plastic nut will be reused. The plastic retainer will NOT be reused.	
84	Oil Lubrication	<u>All non BMW M3 vehicles</u>  Lubricate the Radium Engineering fuel filter male SAE quick connect fitting. Next, insert this fitting into the OEM female SAE quick connect hose until a "click" is felt.  Lastly, reinstall the plastic OEM safety clip as shown.	
85	13mm Wrench	Lineup the 3 fuel filter bracket holes to the OEM studs. Tighten the 3 OEM nuts.  Slide the large ground strap through the bracket behind the filter. Reinstall the ground lug to the stud using the OEM nut.	
86		From inside, shine a flashlight down in front of the FHST. Note that there is a notch in the plastic OEM gas tank to make space for the fuel feed line.  Find the 8AN PTFE hose in the kit. From inside the cabin, insert the 45 degree hose end into the area around the lock ring. NOTE: The 90 degree hose end will stay in the cabin and attach to the FHST outlet.  Align the 45 degree hose end to the notched area of the gas tank and push downwards. Ideally a helper under the vehicle can direct the hose to the underside of the vehicle.	
87	10mm Wrench	From underneath, pull the PTFE hose towards the front of the vehicle. Temporarily screw the 45 degree hose end to the fuel filter inlet fitting.	
	Diagonal Cutter	Note the ground clearance. If an adjustment is required, uninstall the filter bracket and slide the filter within the 2-piece clamping mount accordingly.	
	7/8" Wrench	Tighten the 45 degree hose end to the fuel filter inlet.	
		Use the provided large cable zip-ties to attach the PTFE hose to the vehicle. Start from the fuel filter and move backwards to the FHST.	
88	6mm Allen Wrench	At the rear, loop the provided cushioned P-clamp around the PTFE hose. Using the OEM plastic nut, secure the PTFE hose where the last horizontal OEM retainer was previously located.	

89	7/8" Wrench	From the inside the cabin, loop the PTFE hose counterclockwise around the perimeter of the OEM lock ring.	
		As shown, install the 90 degree hose end to the 8AN FHST outlet fitting.	
		<b>20-0475 FUEL HANGER FEED, BMW INSTALLATION COMPLETE</b>	
90		<b>20-0471 FUEL HANGER FEED, BMW M3 ADD-ON</b>	
		This "add-on" is for BMW M3 vehicles only. Because the M3 uses a longer OEM fuel feed hard line (shown), this kit includes enough hose and fittings to plumb the fuel filter outlet fitting (from 20-0475) to the SAE quick connect fitting from the OEM S65 fuel rail. The add-on also permits an adapter to reuse of the OEM S65 fuel pressure sensor.	
91	Adjustable Wrench	The fuel pressure sensor is mounted near the strut tower brace on the LH side of the vehicle, as shown in blue. Unplug the sensor. Unscrew the fuel pressure sensor from the OEM fuel hard line. Have a rag handy as fuel will likely spill out.	
	Rag	Next, pry the plastic safety clip off the OEM female SAE quick connect fuel feed line shown in green. Push the female SAE quick connect fitting further onto the male SAE quick connect fitting. Simultaneously squeeze the black lock into the female SAE quick connect fitting and pull the connections apart. Have a rag handy as fuel will likely spill out.	
		Remove the OEM BMW M3 fuel hard line. Have a rag handy as fuel will likely spill out.	
92	Teflon Paste	Apply PTFE (Teflon) sealant paste to the provided fuel pressure sensor adapter threads.	
	3/4" Wrench	Next, screw this adapter into the 1/8" NPT port found on the included inline 6AN adapter. First hand tighten, then add an additional 1.5 to 3 turns. NOTE: it is normal to still see some tapered threads on NPT fittings.	
	Adjustable Wrench	Next, install the OEM fuel pressure sensor to the adapter.	
	5/8" Wrench	Next, install the provided SAE quick connect male fitting to the female portion of the 6AN inline adapter.	
	11/16" Wrench	Lastly, loosely install the included 6AN PushLok hose end to the 6AN inline adapter fitting.	
93	Phillip Head Screwdriver	Insert the supplied SAE quick connect female fitting into the included EFI hose. Secure this connection with the provided EFI clamp, as shown.	
	Lubrication	From underneath the vehicle, lubricate the Radium Engineering fuel filter SAE quick connect male fitting (from 20-0475). Next, connect the included SAE quick connect hose to the fuel filter outlet fitting until a "click" is felt.	
		Run the EFI hose towards the strut tower brace where the fuel pressure sensor was located.	
94	Hose Cutter	Place the OEM fuel pressure sensor assembly (with all the attached adapters) in the vicinity of the stock location. Cut the EFI hose to length.	
	Lubrication	Unscrew the 6AN PushLok hose end from the adapters. Lubricate the barbs. As shown, fully insert the hose end into the EFI hose. NOTE: PushLok hose ends do NOT require hose clamps. Reattach the hose end to the adapters and tighten.	
	11/16" Wrench	Lubricate the male portion of the included SAE quick connect adapter. Now install the OEM S65 fuel rail hose until a "click" is felt. Reattach the OEM SAE lock.	
	Diagonal Cutter	Use the included cable zip ties to secure everything in place.	
		<b>20-0471 FUEL HANGER FEED, BMW M# ADD-ON INSTALLATION COMPLETE</b>	

95	10mm Socket Wrench	<b>FUEL HANGER SURGE TANK INSTALLATION CONT...</b>	
		Temporarily remove the new fuel pump fuse. Reconnect the battery. Switch the ignition ON a few times without starting the engine. This will prime the OEM fuel pump and fill the FST. Check for leaks and fix any that may have occurred. Reinstall the fuse. It may take longer than usual to start the engine as air pockets are being bled from the system. Start and idle the engine. Recheck for leaks.	
		The FHST is NOT preassembled to a specific fuel pressure. Fuel pressure must be adjusted. Fortunately, BMW supplies these vehicles with an OEM fuel pressure sensor in the fuel feed line. For the BMW N54/N55 engine, the low fuel pressure sensor is located underneath the intake manifold just upstream of the direct injection pump. For the BMW S65 engine, the fuel pressure sensor (pictured) is located just under the LH side strut brace.	
96		The real-time "Fuel Low Pressor Sensor (psi)" live parameter pictured is from a MHD Flasher. These are available from <a href="http://www.mhdtuning.com">www.mhdtuning.com</a> for the N54/N55 engine. However, there are many other companies that offer this monitoring ability.	
		More readily, the N54, N55, and S65 fuel pressure sensors can be viewed with a BMW GT1 OBDII diagnostics tool. NOTE: BMW does not send this fuel pressure signal out for standard OBDII scan tools to read.	
		Alternatively, an auxiliary gauge could be installed for fuel pressure monitoring.	
97	3/8" Open End Wrench	<p>To increase fuel pressure, tighten the set screw. To reduce fuel pressure, loosen the set screw. Once adjusted, lock the set screw in place with the jam nut. The following are fuel pressures from the stock engines:</p> <p><b>BMW N54/N55 Engine</b> 5 bar (72.5psi)</p> <p><b>BMW S65 Engine</b> 6 bar (87.0psi)</p> <p>NOTE: Do NOT connect a vacuum hose to the FHST nipple unless a 1:1 fuel pressure rising rate is required. OEM fuel pressure does not use a rising rate.</p>	
	3/32" Allen Wrench		
98		Reinstall all components in reverse order.	
		<b>FUEL HANGER SURGE TANK INSTALLATION COMPLETE</b>	