INSTALLATION INSTRUCTIONS
FUEL SURGE TANK, FST

DOCUMENT #19-0360
SUPPORT: info@radiumauto.com

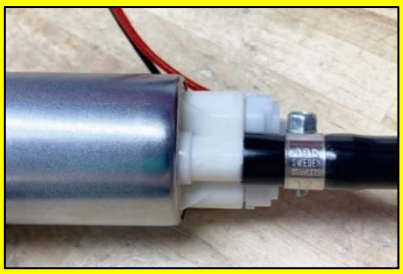
<u>WARNING</u>: DO NOT SMOKE WHILE WORKING ON FUEL SYSTEM. KEEP SPARKS AND OPEN FLAMES AWAY FROM FUEL SYSTEM. DISCONNECT BATTERY BEFORE BEGINNING WORK.

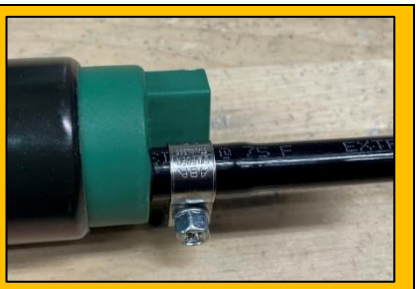
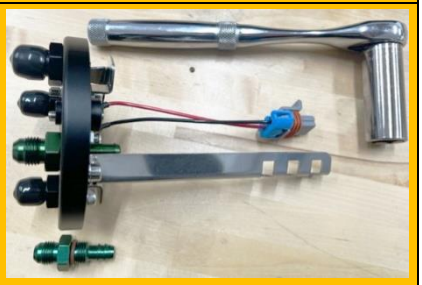
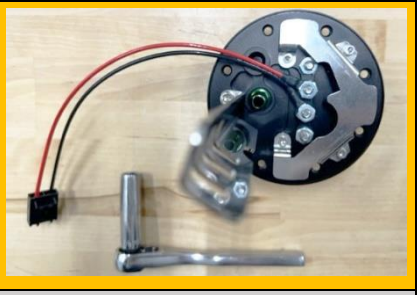
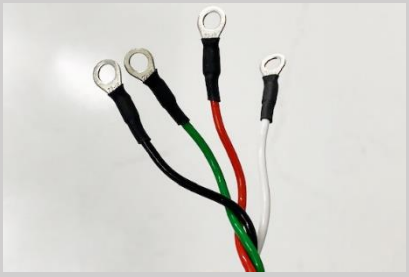
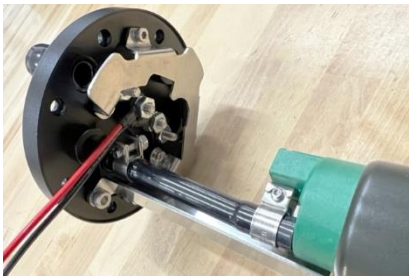
The RADIUM ENGINEERING FST (Fuel Surge Tank) is designed to enhance the vehicle with resistance to fuel starvation and by increasing the fueling capability of the system.

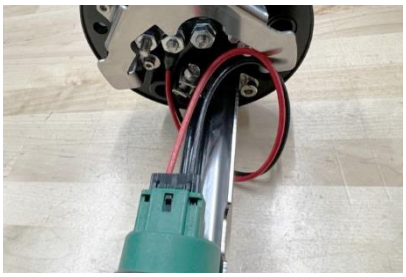
NOTE: When using a surge tank, the primary fuel pump in the vehicle's main fuel tank will no longer directly feed the engine. This fuel pump will now be used to fill and maintain the level of fuel in the surge tank. The FST pump will now be the high pressure source for the engine's fuel demand. Fuel pressure should be checked before and after installation to ensure there is no difference with the FST operating. Any change in fuel pressure can affect engine performance.

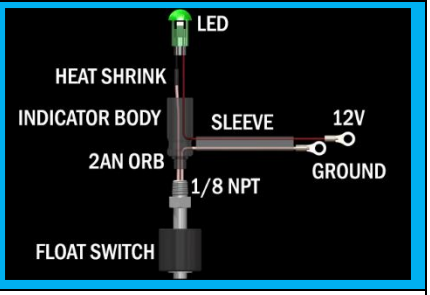
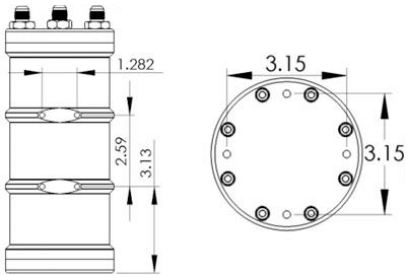
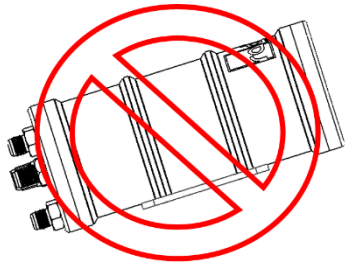
ASSEMBLY AND INSTALLATION

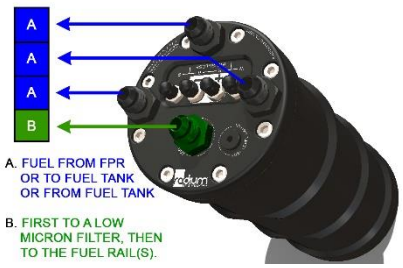
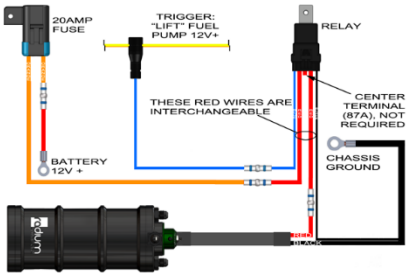
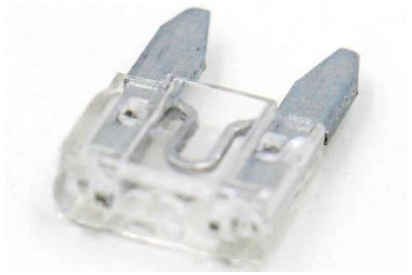
Reference the website product page for a list of compatible fuel pumps.

1	4mm Allen Wrench	Unscrew the 8 socket head bolts around the perimeter of the top hat. Be sure the O-rings under the bolts stay in the counterbores, as shown.	
2		Remove the top hat assembly from the canister. NOTE: Do not lose the large canister O-ring shown.	
3	Hose Cutter	Cut one of tubes to the listed length, based on the fuel pump used. **TUBE SIZE** / **FUEL PUMP** / **CUT LENGTH** -Large ID Tube — Walbro F90000267/274/285/295 — 3.7" (95mm) -Large ID Tube — Ti Automotive E5LM — 2.7" (69mm) -Large ID Tube — Bosch BR540 / Deatschwerks DW400 — 3.3" (84mm) -Large ID Tube — Deatschwerks DW440 — 4.5" (114mm) -Large ID Tube — Protec 11928 / Fuelab 49614 — 4.6" (117mm) -Small ID Tube — Walbro GSS342 — 3.8" (97mm) -Small ID Tube — AEM 50-1000 / AEM 50-1200 — 3.6" (91mm) -Small ID Tube — AEM 50-1220 — 4.1" (91mm)	
4	Oil Lubrication 9/32" Nut Driver	**Follow this step for large barbed fuel pumps ONLY** Lubricate the pump barb and both inner ends of the tubing. Note that fuel pump hose barbs can fracture if not treated with extra care. Secure using one of the large EFI hose clamps provided.	

5	Oil Lubrication 9/32” Nut Driver	**Follow this step for small barbed fuel pumps ONLY** Lubricate the pump barb and both inner ends of the tubing. Note that fuel pump hose barbs can fracture if not treated with extra care. Secure using one of the small EFI hose clamps provided.	
6	¾” or 19mm Socket	**Walbro GSS342 and AEM 50-1000/1200/1220 ONLY** As shown, remove and replace the barbed adapter with the smaller OD fitting provided.	
7	3/8” Socket	**All pumps excluding Walbro F90000267/274/285/295** Remove the fuel pump connector wire harness (shown).	
8	3/8” Socket	**Walbro GSS342 and AEM 50-1000/1200/1220 ONLY** Install the included fuel pump connector wiring harness (shown) to the terminal referencing the labelling on the fuel hat top. The red wire is 12V+. The black wire is ground.	
9	3/8” Socket Wire Crimper	**All pumps excluding Walbro F90000267/274/285/295, Walbro GSS342, and AEM 50-1000/1200/1220** Crimp the provided ring terminals to each wire included with the pump. Slide the heat shrink over the crimped area and apply heat. The example shown is for a 4-wire brushless pump. Using the provided lock nuts, connect each ring terminal to the corresponding fuel hat terminal.	
10	9/32” Nut Driver Oil Lubrication Heat Gun	Find the appropriately sized EFI hose clamp and slide it onto the fuel pump tubing. Carefully push the tube over the barb underneath the top hat. Rotate the fuel pump until it seats against the pump stainless steel mounting post and the tubing is straight. Tighten the upper EFI hose clamp.	

11	Screwdriver	There are 2 pairs of fuel pump clamps provided. Use the smaller pair for all pumps excluding the Bosch BR540 (and Deatschwerks DW400). The large diameter body of these pumps require the larger pair of clamps. Wrap the 2 clamps around the fuel pump and the stainless steel mounting post. Orient the clamps for best fitment and tighten.	
12		Secure the filter sock onto the fuel pump inlet. NOTE: Depending on the fuel pump large rigid filter socks may not fit properly in the canister.	
13		Plug in the electrical connector to the fuel pump.	
14		**Optional 20-0461 Fuel Level Switch** The float on the switch can be flipped for a Normally Open (NO) or Normally Closed (NO) configuration by removing the E-clip. For the switch to be closed during low fuel, the arrow on the float should be pointing downward.	
15	1/8" Allen Wrench	**Optional 20-0461 Fuel Level Switch** As shown, remove the small 2AN ORB plug from the top plate.	
16	PTFE Paste ¼" Wrench	**Optional 20-0461 Fuel Level Switch** Apply PTFE paste to the level switch threads. Route the wires through the hole. Hand tight the switch into the underside of the top plate. Next, add another 1.5 to 3 turns with a wrench until tight and sealed. The 2 switch wires can be routed for the installer's specific purposes. The switch will activate when fuel level drops by 20% or more. NOTE: If necessary, zip-tie the fuel pump wires so they will not interfere with the movement of the fuel level float.	

17		The FST top hat can now be installed back on the canister. First, place the large O-ring on the outside groove of the canister.	
18	4mm Allen Wrench Torque Wrench	Next, carefully place the top hat pump assembly onto the canister. Tighten the 6 bolts in an alternating cross-pattern making sure not to pinch the large O-ring. Torque the bolts to 30in-lbs (3.4Nm).	
19	Solder Iron Heat Gun Wire Cutter ½" Wrench	**Optional 20-0508 Fuel Level Diagnostic Indicator Kit** Route the 2 pink wires (from 20-0461 level switch) through the included black aluminum tube. Next, thread the tube into the FST top hat and tighten. Route one of the switch wires back down into the tube and out one of the side holes of the tube. Pull slack out. Cut the other switch wire short and solder it to the red LED wire, which should also be cut short. Make sure to cover this connection with the included shrink tube. Route the LED black wire down into the tube and out the same hole as the other level switch wire.	
20	Wire Crimper Heat Gun	**Optional 20-0508 Fuel Level Diagnostic Indicator Kit** Push the LED down into the tube until fully seated. Cover both loose wires with the protective sleeving and route to the power source. Crimp the ring terminals to the power and ground wires. Connect the red to the positive terminal and black to the negative terminal. Use heat shrink on the ring terminal crimps. NOTE: The wiring described above puts the switch on the positive side of the LED. The switch can also be put on the negative side of the LED.	
21		The FST should be firmly mounted to a stable, structural component of the vehicle away from moving parts and excessive heat. The M6x1mm threaded boss dimensional units shown are "inches". Universal mounting brackets for the FST are available at www.radiumauto.com	
22		It is possible to mount the FST anywhere between a vertical and horizontal position. However, an upright "vertical" position is preferred for optimal protection. NOTE: Do NOT orient the FST with the top pointing downward. This will trap air and lead to premature fuel starvation.	

23		Four 6AN (3/8”) hoses will need to be constructed. The 3 black 6AN (shown blue) are interchangeable. FPR fuel will return back into one port. Another port will receive fuel from the main tank’s “lift” pump. The last port will return overflow fuel back to the main tank. NOTE: If the FST is mounted any orientation other than vertical, THE OVERFLOW PORT MUST BE AT THE HIGHEST POINT ON THE FST. The green 6AN port is the pump outlet and is routed to the fuel rail(s). A low-micron fuel filter should be used on this feed line.	
24	8mm Socket	The FST pump must be wired to a 12V source capable of providing more current than the maximum current draw of the pump. It is highly recommended to activate the FST pump with a relay that is triggered by the same signal as the primary fuel pump. Depicted is a Radium Engineering fuel pump wiring kit (17-0031). Install the ring terminals to the appropriate electrical wiring studs using the provided insulating acorn nuts.	
25		The FST must be fully primed with fuel before for the engine with start. Simply remove the FST pump fuse and cycle the vehicle’s ignition power several times. This will activate the primary fuel pump for a few seconds each time. Check for leaks. After 3-4 cycles, the surge tank should be ready.	
26		Reinstall the FST fuel pump fuse. Turn the vehicle’s ignition power ON. The lift pump and FST pump should prime at the same time. Check for leaks. Several priming cycles may be necessary to allow the desired pressure. **INSTALLATION COMPLETE**