

# INSTALLATION INSTRUCTIONS

## SUBARU FUEL RAIL PLUMBING KITS

P/Ns: 20-0584, 20-0578, 20-0984, 20-0978

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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.

#### Notes:

- For aftermarket fuel rails only.
- All engine bay fuel plumbing will be replaced.
- OEM pressure regulator will not be used.
- Record static fuel pressure prior to starting.

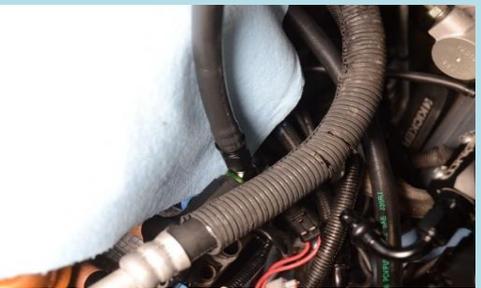
Follow steps 1-28 for the Parallel Kit

Follow steps 29-37 for the Series Kit

STEP	TOOLS NEEDED	INSTRUCTIONS FOR PARALLEL PLUMBING KIT	PHOTO
1		<p>Before installing this Radium fuel rail plumbing kit, OEM fuel hoses, regulator, and piping should be removed from the engine bay. Aftermarket fuel rails with 8AN ORB ports must be used. These instructions will cover installation of the plumbing kit using Radium Engineering fuel rails.</p> <p>NOTE: There are no provisions included for EVAP. A new line will need to be made to replace the hard line under the manifold.</p>	
2	5/16" Allen wrench 4mm Allen wrench	<p>Begin by finding the fuel rail fittings included in the kit. Install the plugs in the bottom and front ports of the two fuel rails. Install the swiveling fittings in the rear ports. Use a small amount of oil on the O-rings. If using fuel pulse dampers, install them in the fuel rail bottom ports at this time.</p> <p>*Note: The swivel fittings in your kit may look slightly different than shown in this document. If they use a green anodized component, tighten them with a 22mm wrench.</p>	
3		<p>Install the fuel injectors into the fuel rails. Make sure the O-rings are lubricated and do not get pinched.</p>	
4	3/4" wrench 7/8" wrench	<p>Prepare the pressure regulator by installing the adapter fittings. On the backside of the regulator (with two ports), install the hose barb fitting adapters as shown.</p> <p><b>Your regulator may look different than the version shown in these instructions, however the installation process is still the same.</b></p> <p>The top port is for the feed line and the bottom port is the return line. If the OEM hard pipes are not going to be used, install the appropriate adapter fittings in these two ports on the regulator.</p> <p>NOTE: Adapter fittings for aftermarket -AN style lines are sold separately.</p>	

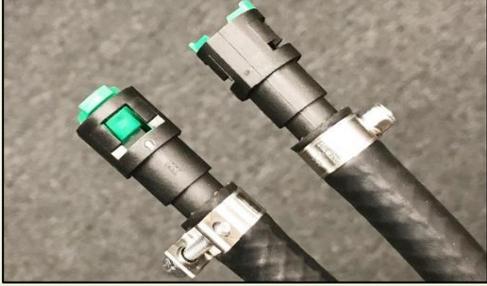
5	3/4" wrench	On the opposite side of the regulator, install the 6AN male adapters in the top two ports and the 6AN plug in the lower port. Use a small amount of oil on the O-rings and tighten all fittings.	
	5/16" Allen wrench		
6	10mm Wrench	Attach the bracket to the regulator using the included long M6 screws and associated nuts. Reference the picture to make sure the bracket is attached to the appropriate side of the regulator.	
	4mm Allen Wrench		
		The regulator comes with several different options for the vacuum reference adapter fitting. Choose the one that best matches the installation. More info on these fittings can be found in the installation instructions for the Radium Multi-Port Regulator (MPR).	
7	10mm Socket	Remove the OEM metal brackets from the LH strut tower. Mount the regulator using the two M6 screws included in the kit. If present, the factory battery cable support bracket installs on top of the Radium regulator bracket.	
8	5mm Allen wrench	Mount the fuel rails to the engine according to the installation instructions for those specific products.	
9	PTFE	Apply PTFE tape or paste to the threads of the pressure gauge. Install the gauge to the in-line adapter included with the kit.	
	7/16" Wrench		
		Tighten the gauge to finger tight, then turn another 1.5 to 3 turns with a wrench.	
10	11/16" wrench	Install the gauge with adapter on to the fuel pressure regulator port as shown. Tighten the nut on the adapter.	
		NOTE: It is recommended to use an aluminum wrench when working with aluminum fittings.	

11		Locate the two 120 degree Push-lock hose ends included in the kit. As shown, loosely screw the hose ends to the regulator fittings.	
12		Find the 90 degree and 45 degree hose ends included with the kit. Loosely install one of them on the swiveling fitting on the RH fuel rail. Point the fitting toward the other side of the engine. Choose the hose end that allows the best hose routing and clearance with surrounding components.	
13	Oil	Once the proper hose end is selected, remove it from the fuel rail and push it into one end of the included 3/8 fuel hoses. Apply oil to the hose end barbs to make this process easier.  Note: PushLok hose ends do NOT require hose clamps.	
14	11/16" wrench	Reinstall the hose end on the fuel rail swivel fitting and tighten. In some cases, it may necessary to remove the fuel rail in order to tighten the hose end to the swivel fitting.  Route the hose to the regulator on the LH strut tower. It is advised to cover the hose with a thermal protectant material if it passes near any hot components.	
15	Hose Cutters	Route the hose to the 120 degree hose end that is connected to the pressure gauge adapter. Estimate the proper length and cut the hose cleanly and squarely.  The remaining section of hose will be used, do not discard.	
16	Oil	Press the 120 degree hose end into the hose. Lubrication should be used.	

17	11/16" wrench	Screw the hose from the previous step onto the adapter fitting for the pressure gauge and tighten.	
18	Oil	With the remaining piece of hose, install the straight hose end using the same technique as in previous steps.	
19		Attach the hose from step 18 to the rear swivel fitting on the LH fuel rail. Do not tighten.	
20	Hose Cutters	Route the hose to other 120 degree hose end on the regulator and estimate the length. The hose should have plenty of slack to account for engine movement. Cut the hose to the proper length.	
21	Oil	Insert the 120 degree hose end into the hose from the previous step.	
22	11/16" wrench	Install the hose and tighten the hose end fittings.	

23		<p><i>Follow steps 23-27 if using the stock feed and return pipes. If using an aftermarket feed and/or return line, connect them to the back side of the regulator using appropriate adapter fittings.</i></p>	
		<p>Locate one of the SAE quick connect adapters from the kit and install it on the fuel return pipe near the strut tower. Push until it "clicks" in place. The return pipe has the light colored plastic sleeve.</p>	
		<p>Applying a small amount of oil to the pipe prior to installing the fitting will help with assembly.</p>	
24	Hose cutter	<p>Route a section of the 3/8 hose from the lower rear hose barb to the fitting installed on the return pipe from the previous step.</p>	
		<p>Estimate the length, making sure the hose will be long enough to fully engage the hose barb on the SAE quick connect fitting. Cut the hose to length.</p>	
25	7mm nut driver	<p>Remove the SAE quick connect from the return pipe (by squeezing the gray locks) and install it into the hose from the previous step. Secure with one of the EFI hose clamps included in the kit. Slip a hose clamp over the other end of the hose.</p>	
26	7mm nut driver	<p>Install the hose from the previous step as shown. Snap the SAE quick connect onto the fuel return pipe. Slip the other end of the hose over the regulator return port barb. Tighten the hose clamp on the regulator side until a firm connection is achieved. It is recommended that a nut driver is used (instead of a Phillips screw driver) to achieve greater torque.</p>	
27	7mm nut driver	<p>Repeat the above steps for constructing the hose from the feed pipe to the regulator upper port, as shown.</p> <p>NOTE: The feed pipe has the black color plastic sleeve.</p>	
28		<p>Activate the pump and check all connections for leaks.</p> <p>Reference the MPR instructions at <a href="http://radiumauto.com">radiumauto.com</a> to adjust fuel pressure. Pressure is adjusted using the regulator knob. <b>No locking is required. Do not attempt to tighten the Allen screw.</b></p> <p>Start the vehicle and re-check fuel pressure. Connect a vacuum line to the vacuum reference on the regulator. <i>NOTE: It is not uncommon for pressure to bleed down after the pump is turned off. This behavior does not necessarily imply there is a regulator issue.</i></p> <p><b>INSTALLATION COMPLETE</b></p>	

STEP	TOOLS NEEDED	INSTRUCTIONS FOR SERIES PLUMBING KIT	PHOTO
29		This procedure will vary depending on the model year as there is a diversity of Subaru fuel feed line configurations. Some have fuel pulse dampers (shown at right) and/or a fuel filter (shown in following picture) in the center of the fuel feed line. Some use SAE quick connectors while some use barb connections. If installing in a vehicle with a fuel filter in the engine bay, the feed hose from this kit can connect to the fuel filter outlet.	
		NOTE: There are no provisions included for EVAP. A new line will need to be made to replace the hard line under the manifold.	
30		Before installing this Radium fuel rail plumbing kit, OEM fuel hoses, regulator, and piping should be removed from the engine bay. Aftermarket fuel rails with 8AN ORB ports must be used.	
		These instructions will cover installation of the plumbing kit using Radium Engineering fuel rails.	
31	4mm Allen wrench	Locate the 3 matching swiveling adapter fittings. Install one in each end of the passenger side (RH) fuel rail, and one in the front port on the driver side (LH) fuel rail. Install the 8AN ORB plugs in the bottom ports of the fuel rails. If using fuel pulse dampers, install them in the fuel rail center ports at this time.  NOTE: Depending on production date, some versions of this kit will have swivel adapter fittings that have a green anodized component. These function the same way. Tighten with a 22mm wrench.	
	5/16" Allen wrench		
32	8mm Allen wrench	Install the 1/8 NPT plugs into the regulator side ports. These already have PTFE on the threads. No additional PTFE is needed. Alternatively, a fuel pressure gauge/sensor can be installed in one of these ports. Install the 6AN 90 degree swiveling fitting into the bottom port of the regulator. <b>You regulator may look different from the one shown in these instructions, however the installation process is the same.</b> Install the straight swiveling fitting into the front port on the fuel pressure regulator using an Allen wrench. Then install it into the last remaining port on the driver side (LH) fuel rail.	
	22mm wrench		
33	11/16" wrench	Apply a small amount of PTFE paste or tape to the fuel pressure gauge threads. Install the gauge into the inline adapter fitting. Next, install the inline adapter fitting to one of the front port swivel adapters, as shown.  NOTES: 1. The fuel pressure gauge can be installed on either fuel rail. 2. If the pressure gauge is installed on the regulator, the inline adapter will not be used.	
	7/16" wrench		
	PTFE Paste or tape		
34	Hose Cutter	Using the provided -6AN PushLock hose-ends, cut and assemble the hoses to length. Exact hose-end configurations will vary by application (straight vs 45deg vs 90deg). Extra hose-ends are included for this purpose. Determine optimal routing before cutting hose. The system is designed to be run in series with the feed line from the firewall ran to the turbo side fuel rail port first, as shown.  NOTES: 1. Hose clamps are NOT necessary for the Push Lok hose ends. 2. Apply oil to the hose-end barbs before pushing into the hose.	
	Oil Lubrication		
	11/16" wrench		

35	11/16" wrench	Using the remaining hose and hose ends, construct a return line from the return port on the regulator back to the return hard line near the LH strut tower. This hard line is most often identified by a white or light gray plastic sleeve on the piping.	
36	Phillips Screwdriver	<p>Connect the vapor shield fuel hose to the OEM hard lines.</p> <p>For late model Subarus that use SAE quick connects, insert the provided SAE quick connect fittings to the hose and secure using the included EFI hose clamps, as shown (fittings may look slightly different).</p> <p>For early model Subarus that use barb connection, the included SAE quick connect fittings will NOT be used. Instead, insert the hose directly to the OEM hard line barbs and secure using the included EFI hose clamps.</p>	
37		<p>Activate the pump and check all connections for leaks. Reference the DMR instructions at <a href="http://radiumauto.com">radiumauto.com</a> to adjust fuel pressure. Pressure is adjusted using the regulator knob. No locking is required. Do not attempt to tighten the Allen screw.</p> <p>Start the vehicle and re-check fuel pressure. Connect a vacuum line to the vacuum reference on the regulator. <i>NOTE: It is not uncommon for pressure to bleed down after the pump is turned off. This behavior does not necessarily imply there is a regulator issue.</i></p> <p><b>INSTALLATION COMPLETE</b></p>	