

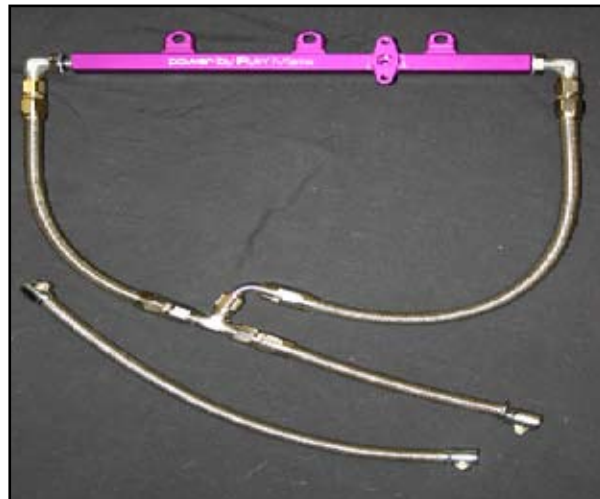
Flyin' Miata

We make Miatas fly!

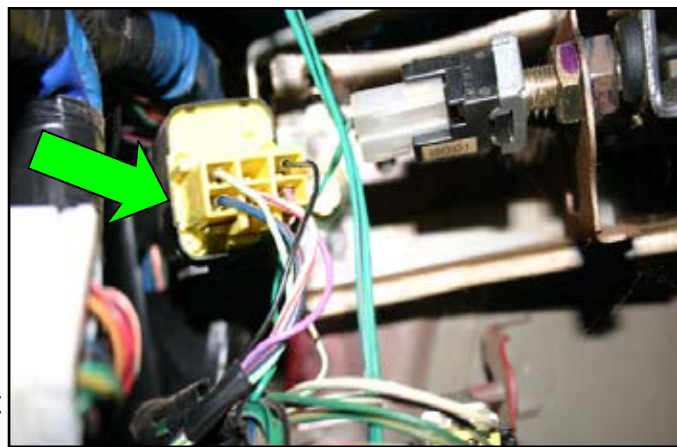


Flyin' Miata Fuel Rail Installation Instructions V1.5 12-14-10

Congratulations on purchasing the FM Fuel Rail! We're confident that this high quality piece will help ensure the safety and performance of the engine in your Miata. Following are instructions that will help you safely install this piece.



1. The fuel system first needs to have its pressure relieved. First, find the relay that's pictured to the side. It will be underneath the dash, near the steering column. It should look similar to the relay in the picture, but different years had different relays, so it might not be exactly the same. Look for a blue wire with a red stripe on a '90 - '97 car, or a red wire with a blue stripe on a '99 - '05; that's the wire that goes to the fuel pump. Start the car and let it idle. While the car is idling, unplug the relay. This will kill the engine, as it's no longer being fed the fuel it needs. Turn the car off once the engine has stopped. The gas cap also needs to be removed, to ensure that pressure doesn't build up in the tank. Don't reinstall it until the fuel rail is fully installed.



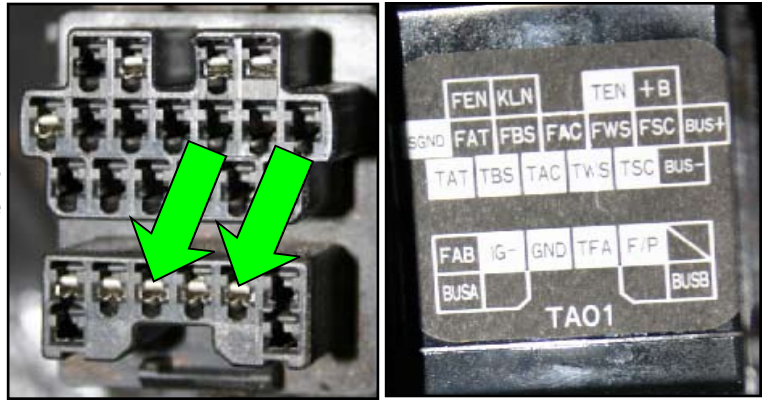
2. Disconnect the negative terminal for the battery. You'll be working near the starter, and you don't want to accidentally touch one of the stainless steel lines to the lead on the starter.

3. **'90 - '97 cars only:** Remove both of the rubber fuel lines from the metal hard lines. Fuel will spill out from these lines, so try to have something to catch the spillage. These can be a pain to remove, try twisting the rubber line to break the adhesion between the rubber and metal lines. It's also a good idea to try to drain as much as possible from the lines, this will make the rest of the mess smaller.

4. **'99 - '05 cars only:** Slip the included fuel line tool (cylindrical grey plastic piece) over the metal line, then push it into the fuel fitting. The fuel line should then pull off with a small tug.

5. **'99 - '05 cars only:** The upper intake manifold needs to be removed. There are eight ('99 - '00) or seven ('01 - '05) bolts that need to be removed to allow the two pieces to separate. Two of these bolts are below the throttle body. Be sure to remove any of the hoses and such that will prevent the top half from being lifted off. Make a note of where all of the lines go, so you're sure to put them back in the right places. Once these have been removed, tilt the top half forward and out of the way. Be careful of the various lines going to the throttle body. While they can remain attached, you need to make sure that they don't get kinked. Also put rags in the open holes, to ensure that nothing accidentally falls down there.
6. **'90 - '97 cars only:** Remove the hoses from the fuel pressure regulator (FPR). There will be a fuel line and a vacuum line.
7. Remove the FPR ('90 - '97 cars) / damper ('99 - '05 cars) from the fuel rail. Set this aside with its bolts, they'll all be reused.
8. Remove the bolts that hold the fuel rail in. There are small black plastic spacers that these bolts go through, they're below the fuel rail. These are very easy to lose and very hard to find once lost, so be careful with them. Gently pull the rail off of the fuel injectors. There are also four small black rubber rings that the bottom of the injectors sit in, be careful not to lose these either. Remove the rail and hoses from the car.
9. Now it's time to move onto the new parts! First, be sure that there is nothing inside of the fuel rail or lines. You should spray them out with brake cleaner or carb cleaner, just to be sure they're completely clean.
10. Install the old FPR / damper onto the new rail. Be sure to lightly oil the O-ring with some motor oil. Once the FPR is secured, install the new fuel line onto it. '99 - '05 cars use a damper, which has no lines. Also install the 90° fittings onto each end of the fuel rail. The end with the O-ring, washer, and lock nut goes into the fuel rail. The lock nut can be left loose for now, as the orientation of the fitting will be decided once the lines have been run.
11. Install the new fuel rail onto the engine. Try to weave the fuel return line into an appropriate place between the runners of the intake manifold. Make it so that the fuel line ends up near the hard lines by the frame. Be sure to lightly oil the O-rings on the fuel injectors, as was done for the FPR/damper. Carefully line the injectors up with the rail, being sure not to pinch any of the O-rings. Re-use the black plastic spacers at the bolts, again being sure to not lose them. Once everything is properly lined up, tighten down the bolts holding the fuel rail down. You should be able to turn the injectors, although there will be a little resistance. If they spin freely or won't spin at all, something's wrong. Take the assembly apart and see what has happened. If one or more of the injectors won't spin, chances are one of the O-rings was unseated and is binding. Fix this (replace the O-rings if they're damaged) and reinstall everything.
12. Weave the fuel feed lines up to either end of the rail. Experiment with different routes and which line goes to each end of the rail to get the smoothest, cleanest routing. Be careful with what the SS lines rub against. While the lines won't wear, what they're rubbing against will. Protect or move things as needed. Once you're satisfied, smear some oil on the threads and taper of the male fittings and tighten the lines onto them. Be sure not to over-tighten the tapered fittings, as that's fairly common. They should technically be tightened to 29 ft-lbs, but hand-tight plus a quarter turn is a good approximation. Also be sure to tighten the locknut on the 90° fittings once the orientation is correct.

13. **'90 - '97 Cars Only:** Slip the return line - from the FPR/damper - onto the forward line. Slide the hose down until it hits the stop - the second bump - on the hard line. Then tighten the hose clamp. You're going to want to get this tight, but don't strip the hose clamp. Repeat the process for the feed line, which connects to the rear line. Also slip the vacuum hose onto the FPR.



14. Take one final look at everything, making sure that everything has been installed correctly. Double check the tightness of all of the fittings.

15. **'99 - '05 cars only:** Reinstall the top half of the intake manifold.

16. Tighten down the gas cap, reconnect the relay, and turn the car on - but DO NOT start it. Jump - a paperclip works well - "GND" and "F/P" in the Diagnosis box in order to keep the fuel pump on. This ensures that the system is fully primed. If you don't have a metal terminal in the "GND" location, use a wire to jump "F/P" to a chassis ground (e.g., a random bolt with no wires going to it). Some of the later cars did away with the "GND" in the diagnosis box. Leave the jumper connected for 5 - 10 seconds, then remove it. Once the fuel system is primed, check all of your connections and be sure that there are absolutely no leaks. Check all of the junctions, including all of the fittings, where the new lines connect to the hard lines, and where the fuel injectors seat into the fuel rail.



17. **'90 - '97 Cars Only:** Once certain that there are no leaks, start the car. Pinch off the return line and make sure there are no fuel leaks. This increases the fuel pressure to the maximum, so you'll be able to check for leaks in the situation most likely to create leaks. '99 - '05 cars run at a constant fuel pressure.

18. It's also a good idea to check for vacuum leaks where the injector seats into the manifold/head. To do this, spray carb cleaner at the seat of the injector - while the car is idling - and listen very closely to the idle of the car. If it stumbles, even a little bit, it means that the engine has sucked in carb cleaner, which therefore means that there's a vacuum leak. Be sure that you can repeat this behavior before deciding that you have a vacuum leak. Chances are that the cause of this is that your injector seats are dried out and hard. You can get new ones from Mazda, or you can get two Ford fuel injector O-rings per one Mazda injector - the Ford O-rings should be stacked to equal the Mazda injector seat. These can be picked up at an auto parts store. Bring the original injector seat with you, so that you can compare sizes.

19. Since the fuel rail is no longer a limitation on how much fuel your engine gets, you'll need to re-tune whatever engine management you have. As always, a wideband O2 sensor is the best way to do this.