




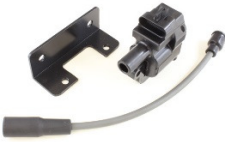




## FIS2-001 Installation Manual

### Included in the kit:

Major Components		Miscellaneous Parts	
Split Second throttle body assembly, gasket and bolts INJ: FI114191 IAT: 0280130060 TPS: CX1228		Hard fuel line, fuel hose, fuel hose clamps, compression fittings	
Microsquirt 3.0 controller		Head temp Sensor EMPI 47-9009-0 and adapter EMPI 47-9001-0	
Split Second wire harness		Fuel pump block-off, screws and gasket	
Fuel pump assembly		Distributor lock	
LS1 Ignition coil GM 19421259, bracket and coil wire		Fuel pump relay and harness	
1-bar MAP sensor GM 12569240 and mounting screws		Vacuum line	
4-wire O2 sensor GM 213810 and weld bung		Zip ties, mounting screws, ring terminal and male push terminal	

## Tools Required

- Tape measure
- Phillips screwdriver
- Drill motor
- 5 mm (7/32") drill
- Digital timing light
- Crimp tool
- 10 mm socket
- 13 mm socket
- Ratchet
- Ratchet extension
- Diagonal cutters
- 22 mm wrench

## Before You Start

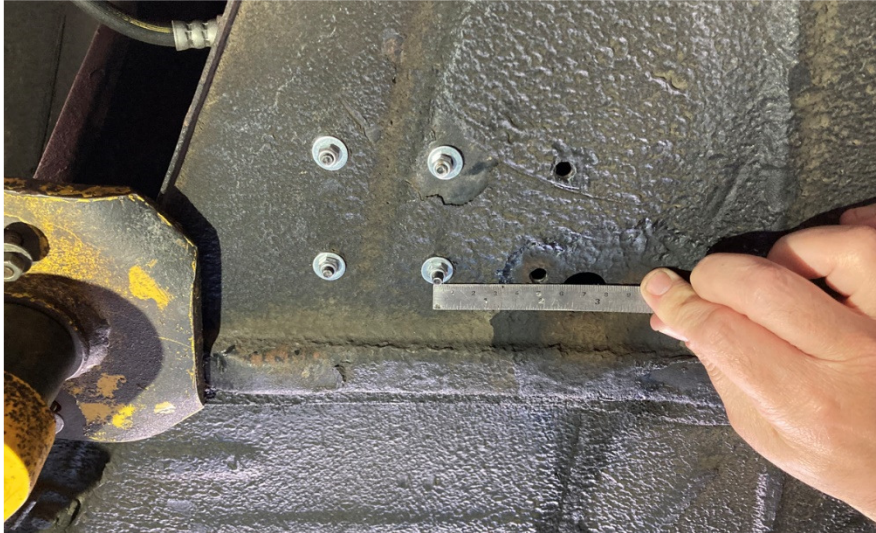
- 1) Read through this manual entirely before you start the installation.
- 2) Verify that your electrical system is charging correctly and has a battery voltage above 13 V when the engine is running.
- 3) Use resistance type plug wires.
- 4) Verify that your fuel tank is clean and free of sediment.
- 5) Verify that your throttle cable moves freely and smoothly.
- 6) Verify that your engine pulls a healthy idle vacuum.

## Oxygen Sensor Installation

- 1) In most cases a trip to a muffler or fab shop is required to weld on the O2 sensor bung. It is best to take care of that before starting the rest of the installation.
- 2) Find a suitable place to weld the O2 sensor bung to the exhaust. Take care to allow clearance for the sensor body. Position the sensor at least 30 degrees up from horizontal so gravity will drain away any condensation.
- 3) Bear in mind that the sensor cable must be routed to the lower right area of the firewall.
- 4) If not pre-lubed, apply the anti-seize lubricant to the threads of the sensor. Avoid getting the anti-seize on the sensor element.
- 5) Start the threads by hand and tighten to 35 ft-lbs. If you don't have a torque wrench, tighten finger tight then tighten another  $\frac{1}{2}$  to  $\frac{3}{4}$  turn.
- 6) Route the cable to the lower right area of the firewall and secure with zip ties.

## Fuel system Installation - Front

- 1) Park the vehicle on level ground, set the parking brake and block a tire. Jack up the vehicle and remove the right tire. Use jack stands to support the vehicle safely.
- 2) Disconnect the battery ground cable. Inspect and clean your battery terminals and check for a good electrical connection where battery ground bolts to the chassis.
- 3) Completely drain the fuel tank. Clean out any sediment or debris in the tank.
- 4) Test fit the fuel pump assembly between the tank and the pan near the drain hole. The bracket should be positioned approximately 2.25" to the passenger side of the drain hole. Verify that the fitting to the fuel tank is well positioned to mate with the tank.
- 5) One edge of the bracket backing plate should fall on the centerline of the drain hole. Position the backing plate to avoid humps on the pan. Use the backing plate as a template to mark the hole locations on the bottom of the pan. Drill four 5 mm (7/32") holes.



View from under the car.

The fuel pump bracket screw should be about 2.5" to the left of the drain hole.

- 6) Connect the red and black wires on the fuel pump relay harness to the (+) and (-) terminals on the fuel pump, respectively.
- 7) Position the fuel pump assembly and mount the backing plate. Secure with four M4 lock nuts.
- 8) Disconnect the existing fuel fitting and fuel line from the bottom of the tank and discard. Install the new fitting into the bottom of the tank. Make sure the gasket is in place and tighten.
- 9) Install the right-angle brass compression fitting onto the existing hard fuel line that runs to the back of the car.
- 10) Connect the pressure line from the pump assembly to the brass fitting to the hard line. Secure with a red hose clamp.
- 11) Secure the fuel lines in place as needed with zip ties.
- 12) Inspect the installation to make sure no hoses will be pinched or kinked. Also make sure that the fuel lines are kept away from the steering linkage.
- 13) Route the fuel pump harness through a grommet up to the area behind the dash. The other end of the harness will be connected later.



The fuel pump assembly tucks in below the fuel tank. After installation make sure that the fuel lines are secured away from the steering linkage.

## **Relay Installation:**

Position the relay where you plan to mount it. Make sure that the red wire with 3-way tab adapter can reach the terminal where you plan to get power for the relay. Power should come from a circuit that is fused and switched by the ignition. Mount the relay.

## **Wiring:**

- 1) Plug the red wire with 3-way tab adapter into a fused circuit switched by the ignition.
- 2) Locate the red wire from the relay that has a barrel connector crimped at the end.
- 3) Slip a piece of heat shrink over that wire.
- 4) Crimp the relay red wire with barrel to the fuel pump harness red wire and cover with heat shrink.
- 5) Crimp a ring terminal onto the black fuel pump harness wire and connect to chassis ground.
- 6) Run the orange wire to the relay control circuit.
- 7) Slip a piece of heat shrink over the end of the orange wire.
- 8) Crimp a male push terminal onto the orange wire and secure with heat shrink.
- 9) Plug the orange wire into the corresponding connector for relay control.
- 10) The relay is turned on when the orange wire is grounded.
- 11) Reconnect the battery.

## **Fuel System Installation – Rear**

- 1) Remove the existing mechanical fuel pump and line to the carb. Install the fuel pump block-off plate with the gasket and bolts provided.
- 2) Install the straight brass compression fitting to the hard line from the front of the car. Connect the pre-formed hard line to the brass fitting with a short piece of fuel line and secure with red hose clamps.
- 3) Connect the long piece of flexible fuel line to the other end of the pre-formed hard line and clamp. The flex line should be routed to the back of the carburetor.

## **Throttle body Installation**

- 1) Remove the air filter.
- 2) Disconnect the throttle cable.
- 3) Remove the carburetor.
- 4) Install the throttle body assembly using the provided gasket and bolts.
- 5) Connect the fuel hose to the brass fitting on the fuel rail and secure with a red hose clamp.
- 6) Connect the throttle cable.
- 7) Verify that the cable moves freely and allows the throttle plate to go from completely closed to completely open.
- 8) Install the air filter.

## **Distributor Lockout**

- 1) Remove the cap from the distributor.
- 2) Disassemble to access the centrifugal advance mechanism.
- 3) Remove one of the internal springs.
- 4) Replace the spring with the solid lockout and secure with the nylon washer.
- 5) If your distributor has vacuum advance, disconnect and cap the vacuum line.



One of the springs in the distributor is replaced by a solid link. This locks the distributor so that timing can be controlled by the Microsquirt.

## ECU Installation

- 1) Position the MAP sensor next to the Microsquirt on the upper right corner of the firewall. The location is usually approximately 3 inches from the side wall and 12 inches up from the floor of the engine bay.
- 2) Mark the holes for mounting.
- 3) Secure the MAP sensor and Microsquirt with mounting screws.
- 4) Remove the existing ignition coil.
- 5) Install the new ignition coil using the bracket provided.

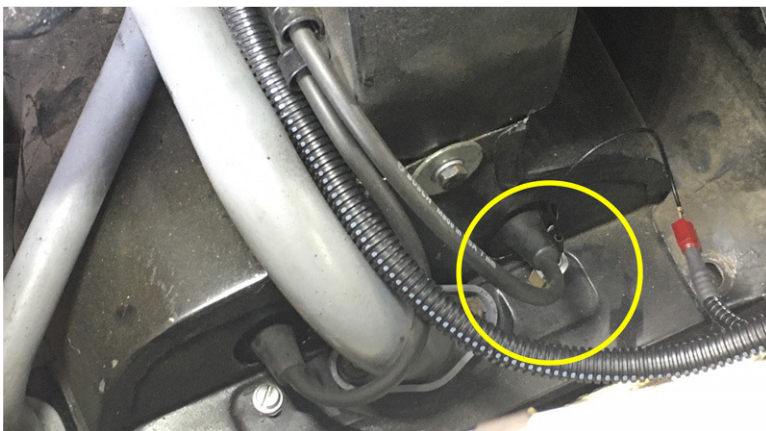
## Wiring Installation

- 1) Plug the 35-pin ECU connector on the wire harness into the Microsquirt.
- 2) Route the harness along the alternator backing plate over to the area behind the throttle body. Keep the wire harness away from plug wires as best as you can.
- 3) Mate all throttle body connectors to corresponding connectors on the harness.
  - a. Injector
  - b. IAT
  - c. TPS
  - d. Air valve
- 4) Plug the push terminal marked coil (+) to the ignition wire that used to go to coil positive.
- 5) Plug the push terminal marked coil (-) to the trigger wire coming from the distributor.
- 6) Plug the 4-pin coil connector into the ignition coil.
- 7) Install the ring terminal on the black wire from the coil connector to the bolt holding the intake manifold to the half case.



Secure the ring terminal from the coil connector to the stud below the throttle body.

- 8) Remove the screw that holds down the engine tin next to spark plug #1.
- 9) Replace the screw with the head temp adapter.
- 10) Thread the head temp sensor into the adapter and tighten.



Replace the screw below the #1 spark plug with the head temp adapter and sensor.

- 11) Plug the push terminal on the head temp sensor into the corresponding terminal on the wire harness.
- 12) Plug the green 3-pin connector on the wire harness into the map sensor.
- 13) Route the long black wire from the Microsquirt connector to the battery. Crimp a ring terminal onto the end of the wire and secure it to battery negative.
- 14) Plug the O2 sensor connector into the corresponding connector on the harness.
- 15) Find a convenient location for the fuel pump relay behind the dashboard and mount it.
- 16) Connect the red wire from the fuel pump harness to the red wire from the relay.
- 17) Crimp a ring terminal onto the black wire on the fuel pump harness and connect to chassis ground.
- 18) Route the long orange wire to the Microsquirt area at the back of the car.
- 19) Crimp a male push terminal onto the orange wire and connect it to the relay terminal on the wire harness.

## Before Engine Start

- 1) Put some fuel in the tank.
- 2) Turn on the ignition, but do not start the engine.
- 3) Verify that the pump runs for a few seconds and shuts off.
- 4) Turn off the ignition then back on. Do not start the engine. This will build higher pressure.
- 5) Check for fuel leaks on all fuel line connections. Look carefully with a flashlight and in particular check the compression fittings on the hard fuel line on the car.
- 6) Verify that you can back off the idle stop on the throttle to close it all the way. Turn the throttle stop so it just contacts the throttle linkage. Turn the throttle stop clockwise two turns for the initial idle setting.
- 7) Give the installation a good visual inspection. Make sure all wires and hoses are secure and held away from any moving parts.
- 8) Connect a digital timing light that reads RPM.

## Initial Start

- 1) Loosen the distributor so it can rotate.
- 2) Have one person crank the engine. Rotate the distributor to get the engine to start.
- 3) Adjust the idle to 800 to 900 RPM.
- 4) Set the timing to 12 degrees and tighten the distributor.
- 5) Set the throttle stop for your target idle RPM.

## Troubleshooting Guide

No start	Make sure the Microsquirt ECU is getting power at the coil (+) connection.
	Check the in-line fuse on the coil (+) wire.
	Make sure the fuel pump turns on for two seconds when the ignition is turned on. If you don't hear it, check for voltage going to the pump.
	Make sure all connectors are plugged in all the way. All connectors with a latch should click when fully engaged.
	Make sure there is fuel pressure to the injector. Fit a fuel pressure gauge to the line feeding the fuel rail. Fuel pressure should be 40 psi.
Hard to cold start	Check the connection to the air temp sensor. If bad the ECU will not go into cold start.
	Check the resistance of the air temp sensor. It should be approximately 2k ohm at room temperature. The resistance goes down as temperature increases.
	Check the connector to the air valve. Make sure it is plugged in all the way.
Dies at idle	Check the voltage feeding the coil (+) terminal. With the engine held to 1500 RPM, the voltage should be above 13 V.
	Verify the timing advance is set to 12 degrees at idle.
Has high idle	Check for air leaks.
	Check the throttle stop adjustment.
Engine runs lean	Change the fuel filter.
	Verify there is 38 to 42 psi fuel pressure.
Engine runs rich	Check the connection to the O2 sensor.
	If the O2 sensor is bad, the engine should run better with it disconnected.

## Daily Driving Tips

- 1) There is no need to pump the throttle when cranking the engine.
- 2) Do not run the engine out of gas. The fuel pump will overheat without fuel running through it.