

FIS2-001 Fuel Injection Conversion Kit

Overview

The FIS2-001 Fuel Injection conversion kit is a complete fuel injection solution for Type 1 Volkswagen engines. It replaces the carburetor with a fuel injection system that is modular and easy to install. It provides huge performance gains not only in torque and horsepower, but also in smoothness and throttle response. Every effort has been made to use high quality component parts that are either produced in the USA or for OEM applications.

The Kit can be installed by an experienced mechanic in about four hours. The fuel pump, regulator and filter are all pre-assembled into one unit. The highly integrated throttle body is fitted with the fuel injector, IAT sensor, TPS sensor and idle air valve. It is a direct fit and ready to install. A custom wire harness with clearly labeled connectors makes wiring easy. The MicroSquirt ECU is widely used in the automotive aftermarket and is well supported by documentation, and You Tube videos.

Component parts are specialized to make installation a breeze. A unique fitting for the gas tank allows both feed and return lines to use the same existing fitting on the bottom of the gas tank. An adapter allows the head temperature sensor to be installed from the top of the engine in place of one of the screws that holds the engine tin in place. A pre-formed hard fuel line is used in the back of the car to prevent damage from sharp metal edges.

The ECU operates in speed density mode and uses a GM 1-bar map sensor to measure manifold pressure. A barometric pressure reading is taken on every key cycle to insure consistent fueling over elevation change. The fuel mixture is also fine-tuned according to air and head temperature. The throttle position sensor is used to provide precise acceleration enrichment to optimize throttle response.

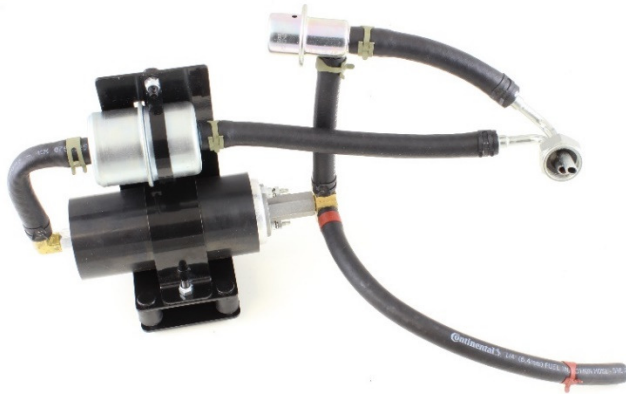
No crank sensor is required, which results in a simpler installation. The RPM pickup is from the distributor. Either points or electronic trigger can be used. The mechanical advance in the distributor is locked to ensure that the points signal pulses at a fixed number of degrees from TDC. The ECU controls the ignition timing advance. An LS1 coil provides the spark.

The ECU uses a 4-wire O2 sensor to operate in closed loop. This is used to maintain the best fuel mixture for cruise conditions and optimum fuel economy.

Every effort was made to select component parts that are common and widely available. Many are GM parts that are widely used in multiple models and years. The installation instructions include the industry part numbers if replacements are needed.

The primary market for the Kit is 1600 single or dual port engines. The MicroSquirt ECU comes pre-loaded with a suitable base map that can easily be modified for smaller or larger engines.

Fuel Pump Assembly



The fuel pump assembly is completely pre-assembled. The fitting to the fuel tank connects to hoses for both feed and return.

The fuel pump assembly is pre-assembled onto a bracket. The assembly keeps the components close together in a compact package that fits under the gas tank. Installation requires drilling four holes and bolting up. A novel adapter allows connection to the fuel tank using the existing fitting on the bottom of the fuel tank. There is no need to drill into the tank for a return line and no need for a separate return line from the rear of the car. Compression fittings are provided that allow use of the existing hard fuel line.

Fuel Pump Relay



The fuel pump relay is prewired for connection to the pump harness, power source and ECU.

The fuel pump is controlled by the MicroSquirt through a pre-wired fuel pump relay. The pump runs for a few seconds when the ignition is first turned on to build fuel pressure. After that, the pump only runs when the engine is running. The relay trigger wire is the only wire that needs to be run from the back to the front of the car.

Throttle Body Assembly



The throttle body comes fully assembled and ready to install.

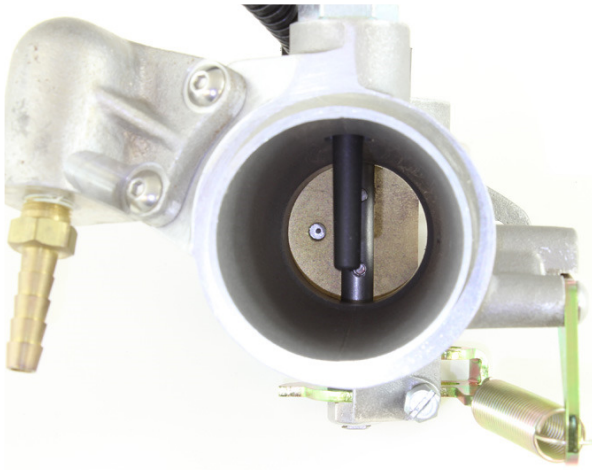
The throttle body is 100% designed and built by Split Second. The casting and machining are all produced to spec in the USA. The throttle body is fully assembled and ready to bolt up. It is designed and built for the Type 1 engine. It mates directly to the 34 mm manifold opening and has two sets of mounting holes for both 30 PICT and 34 PICT carburetors. The throttle linkage is designed to operate identically to the stock carb linkage. That prevents problems with throttle cable alignment. The housing is fully integrated with fuel injector and fuel rail, intake air temperature sensor, throttle position sensor and idle air valve.



The throttle body has mounting holes for 30 PICT and 34 PICT carburetors.

The integrated fuel rail allows direct connection of the flexible fuel line to the assembly. Fuel is pulsed once per ignition event through a Siemens FI114191 60 lb/hr injector. This is the same injector used by OEMs in high horsepower applications such as the Chevy Corvette and Dodge Hemi.

High idle is commanded through a solenoid valve when the engine is cold and for initial start. The solenoid valve actuates a piston that mates with a flat on the throttle butterfly. This simple and reliable scheme takes up minimum space and requires no vacuum lines.



The IAT sensor is directly above the throttle shaft for unimpeded air flow. The flat on the butterfly is sealed off by the idle air valve which is opened for high idle when cold and on initial start.

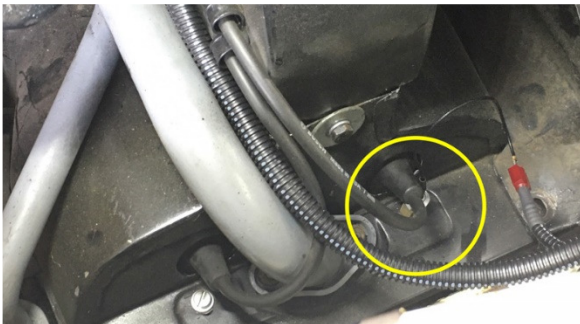
The throttle body uses a Bosch intake air temperature sensor which is strategically placed above the throttle shaft to minimize unnecessary obstruction of air flow. The IAT sensor is used for density compensation due to changes in air temperature.

A Ford throttle position sensor provides a precise measurement of throttle opening. The TPS sensor is crucial for transient enrichment. The amount of acceleration enrichment is carefully mapped to optimize responsiveness.

ECU

The system is controlled by the MicroSquirt module which is well known in the automotive aftermarket. It picks up RPM from the distributor which is locked so it has no mechanical advance. It works with mechanical points or an electronic coil trigger. The points generate four pulses per cam revolution at 60 degrees before top dead center. Timing is precisely controlled by adjusting the delay time from the pulse to the ignition event. This avoids the need for a separate crank sensor and tone wheel.

Engine temperature is measured by a head temp sensor that has a unique adapter that assures easy installation. The screw holding down the engine cover just below the #1 cylinder is removed and replaced by the adapter. The head temp sensor is threaded into the adapter.

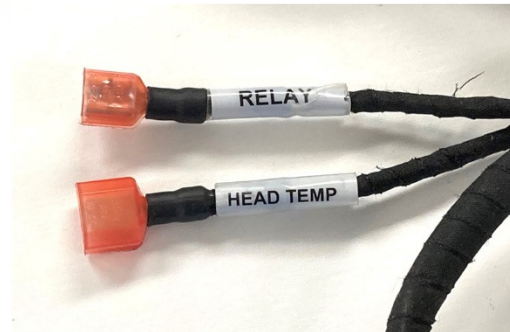
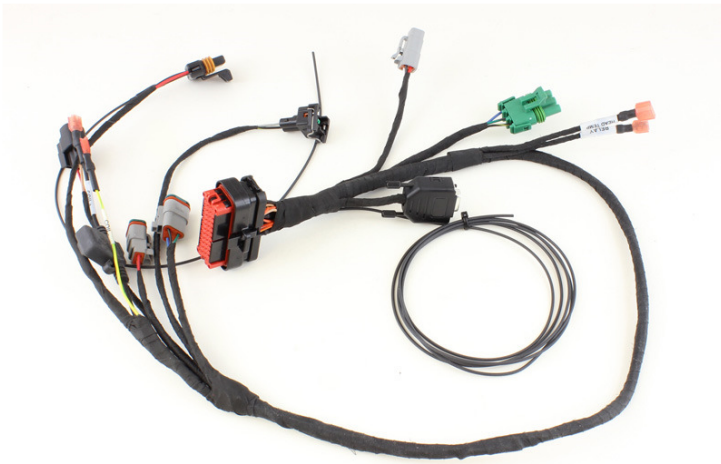


The head temp sensor is installed into an adapter that replaces the screw under the #1 spark plug.

Engine load is measured by a GM 1-bar map sensor. The MicroSquirt calculates the load on the engine according to manifold pressure and RPM. Fuel and timing are mapped according to load and RPM. Other functions include idle air control, cold start enrichment and acceleration enrichment.

Wire Harness

Installation is a breeze with the pre-made wire harness for the system. Automotive grade connectors are used throughout. The harness is finished with adhesive wiring loom cloth tape which provides resistance to chemicals and abrasion. Separate grounds are used for the ECU and the coil to minimize electrical noise.



Distributor Lockout

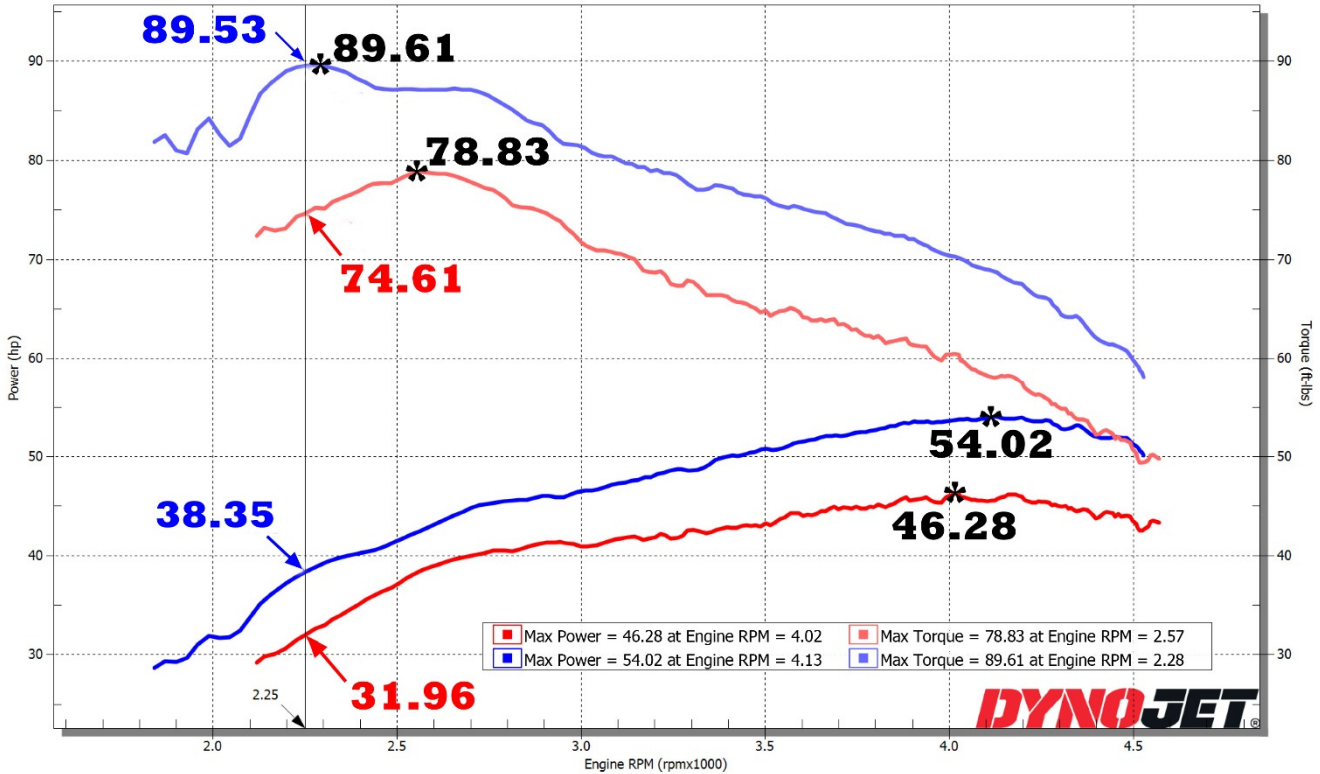
The distributor is locked to defeat the stock mechanical advance. The points (or electronic trigger) provide a timing reference to the ECU at a fixed number of degrees before TDC. The ignition timing is precisely controlled by the ECU for optimum performance throughout load and RPM. One of the springs is replaced by a solid link to lock it in place.



The distributor lock replaces one of the springs in the mechanical advance mechanism.

Performance

The throttle body flows 42% higher cfm than the stock carburetor. Horsepower has increased from 46 to 54 hp. Torque goes from 79 to 90 ft-lbs.



The dyno results above are on a stock 1600 engine.

More impressive than the raw performance numbers are the transformation in throttle response, smoothness, and drivability. Other benefits include less cranking upon initial start-up. The closed-loop operation of the ECU fine tunes injection as you drive for optimum fuel economy. Smiles are virtually assured after the conversion.