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Installation Instructions for S&S[®] EZFI™

DISCLAIMER:

S&S parts are designed for high performance, off road, racing applications and are intended for the very experienced rider only. The installation of S&S parts may void or adversely affect your factory warranty. In addition such installation and use may violate certain federal, state, and local laws, rules and ordinances as well as other laws when used on motor vehicles used on public highways, especially in states where pollution laws may apply. Always check federal, state, and local laws before modifying your motorcycle. It is the sole and exclusive responsibility of the user to determine the suitability of the product for his or her use, and the user shall assume all legal, personal injury risk and liability and all other obligations, duties, and risks associated therewith.

The words Harley®, Harley-Davidson®, H-D®, Sportster®, Evolution®, and all H-D part numbers and model designations are used in reference only. S&S Cycle is not associated with Harley-Davidson, Inc.

SAFE INSTALLATION AND OPERATION RULES:

Before installing your new S&S part it is your responsibility to read and follow the installation and maintenance procedures in these instructions and follow the basic rules below for your personal safety.

- Gasoline is extremely flammable and explosive under certain conditions and toxic when breathed. Do not smoke. Perform installation in a well ventilated area away from open flames or sparks.
- If motorcycle has been running, wait until engine and exhaust pipes have cooled down to avoid getting burned before performing any installation steps.
- Before performing any installation steps disconnect battery to eliminate potential sparks and inadvertent engagement of starter while working on electrical components.
- Read instructions thoroughly and carefully so all procedures are completely understood before performing any installation steps. Contact S&S with any questions you may have if any steps are unclear or any abnormalities occur during installation or operation of motorcycle with a S&S part on it.
- Consult an appropriate service manual for your motorcycle for correct disassembly and reassembly procedures for any parts that need to be removed to facilitate installation.
- Use good judgement when performing installation and operating motorcycle. Good judgement begins with a clear head. Don't let alcohol, drugs or fatigue impair your judgement. Start installation when you are fresh.
- Be sure all federal, state and local laws are obeyed with the installation.
- For optimum performance and safety and to minimize potential damage to carb or other components, use all mounting hardware that is provided and follow all installation instructions.
- Motorcycle exhaust fumes are toxic and poisonous and must not be breathed. Run motorcycle in a well ventilated area where fumes can dissipate.

IMPORTANT NOTICE:

Statements in this instruction sheet preceded by the following words are of special significance.



WARNING

Means there is the possibility of injury to yourself or others.



CAUTION

Means there is the possibility of damage to the part or motorcycle.

NOTE

Other information of particular importance has been placed in italic type.

S&S recommends you take special notice of these items.

WARRANTY:

All S&S parts are guaranteed to the original purchaser to be free of manufacturing defects in materials and workmanship for a period of twelve (12) months from the date of purchase. Merchandise that fails to conform to these conditions will be repaired or replaced at S&S's option if the parts are returned to us by the purchaser within the 12 month warranty period or within 10 days thereafter.

In the event warranty service is required, the original purchaser must call or write S&S immediately with the problem. Some problems can be rectified by a telephone call and need no further course of action.

A part that is suspect of being defective must not be replaced by a Dealer without prior authorization from S&S. If it is deemed necessary for S&S to make an evaluation to determine whether the part was defective, a return authorization number must be obtained from S&S. The parts must be packaged properly so as to not cause further damage and be returned prepaid to S&S with a copy of the original invoice of purchase and a detailed letter outlining the nature of the problem, how the part was used and the circumstances at the time of failure. If after an evaluation has been made by S&S and the part was found to be defective, repair, replacement or refund will be granted.

ADDITIONAL WARRANTY PROVISIONS:

- (1) S&S shall have no obligation in the event an S&S part is modified by any other person or organization.
- (2) S&S shall have no obligation if an S&S part becomes defective in whole or in part as a result of improper installation, improper maintenance, improper use, abnormal operation, or any other misuse or mistreatment of the S&S part.
- (3) S&S shall not be liable for any consequential or incidental damages resulting from the failure of an S&S part, the breach of any warranties, the failure to deliver, delay in delivery, delivery in non-conforming condition, or for any other breach of contract or duty between S&S and a customer.
- (4) S&S parts are designed exclusively for use in Harley-Davidson® and other American v-twin motorcycles. S&S shall have no warranty or liability obligation if an S&S part is used in any other application.

Thank you for choosing S&S® Cycle's EZFI™ system. EZFI works in conjunction with all stock 2001-2007 H-D® ECMs. EZFI is able to add or remove fuel to match the precise fueling needs of a wide variety of engines with performance modifications.

WHAT YOU'LL NEED

10 mm wrench
Phillips screwdriver
3/16 hex key and T30 Torx
(Dyna installation only)
Side cutter
Small flat screwdriver

INSTALLATION

⚠ CAUTION

To protect against shock and accidental start-up of the engine, disconnect the negative battery cable. Inadequate observation of safety precautions could result in serious injury or death.

- 1- Disconnect the negative battery terminal.
- 2- Remove the right side cover (Touring models) or seat (Harley-Davidson® Dyna™ and Softail® models) to gain access to the ECM.
- 2a- If installing on a Dyna, also remove the left side cover and electrical caddy. Refer to the service manual for further directions on accessing the ECM.
- 3- Open the gray ECM connector and remove the clear retainer.
- 4- Remove the following wires from the ECM connector by using a small screwdriver to gently lift the retaining tabs while pulling on the wire. Wire colors may vary, so check that you are removing wire from the proper position.
 - Position 3 - Pink – Tachometer (may not be present on some models)
 - Position 13 - White/Black - Switched Ignition Power
 - Position 19 – Green/Gray – Rear Injector
 - Position 21 - White/Yellow – Front Injector
 - Position 24 - Gray/Violet – Throttle Position Input
- 5- Insert the wires removed in step 4 into the supplied six position Deutsch® connector per Table 1.

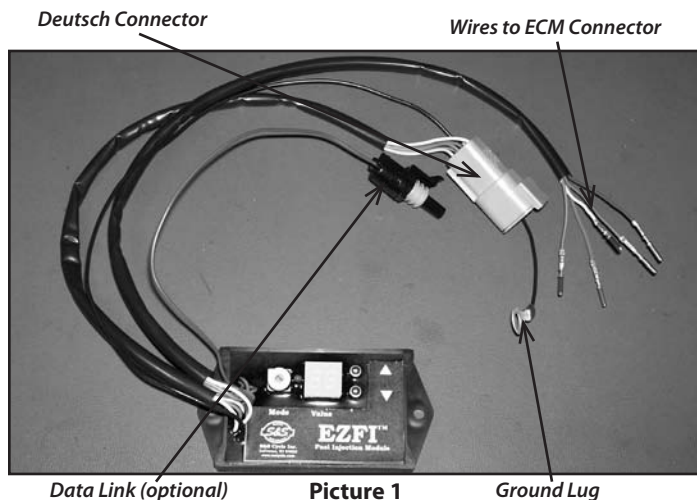
Table 1 - Wire Insertion Guide

ECM Pin #	Stock Wire Color	Deutsch Pin #
3	Pink	2
13	White/Black	1
19	Green/Gray	5
21	White/Yellow	4
24	Gray/Violet	3

- 6- Insert the supplied orange wedge lock into the Deutsch connector.
- 7- Find a suitable location for the EZFI module. On Touring models, the EZFI can be piggybacked on top of the stock ECM. On Dyna models, the EZFI can be located in the space to the right of the electrical caddy with the wires routed through the caddy. Use a zip tie or Velcro® to secure the EZFI.
- 8- Plug the Deutsch connector assembled in step 6 into the EZFI's mating Deutsch connector. Verify the wire colors across the six pin Deutsch connector. They should line up per Table 2.

Table 2 - Deutsch Connector Wire Colors

Stock Wire Color	Deutsch Pin #	EZFI Wire Color
White/Black	1	White
Pink (optional)	2	Blue
Gray/Violet	3	Violet
White/Yellow	4	Yellow
Green/Gray	5	Green
Not Used	6	Not Used



Picture 1

9- Insert the five EZFI™ wires into the ECM connector per Table 3 and confirm that all the wiring matches the wiring diagram in Figure 1.

Table 3 - EZFI Wire Colors in ECM Connector	
EZFI Wire Color	ECM Pin #
Blue	3
White	13
Red	19
Orange	21
Violet	24

- 10- Install the clear retainer onto the ECM connector and close the connector. Use a zip tie for strain relief of the ECM connector wires. Reconnect the harness to the ECM.
- 11- Reconnect the negative terminal of the battery, and with the black wire with the ground lug from the EZFI. If the EZFI's ground lug will not reach the battery, find a suitable grounding point on the frame to bolt it to.
- 12- Reinstall the electrical caddy (Harley Davidson® Dyna™ installation only), side covers and seat.

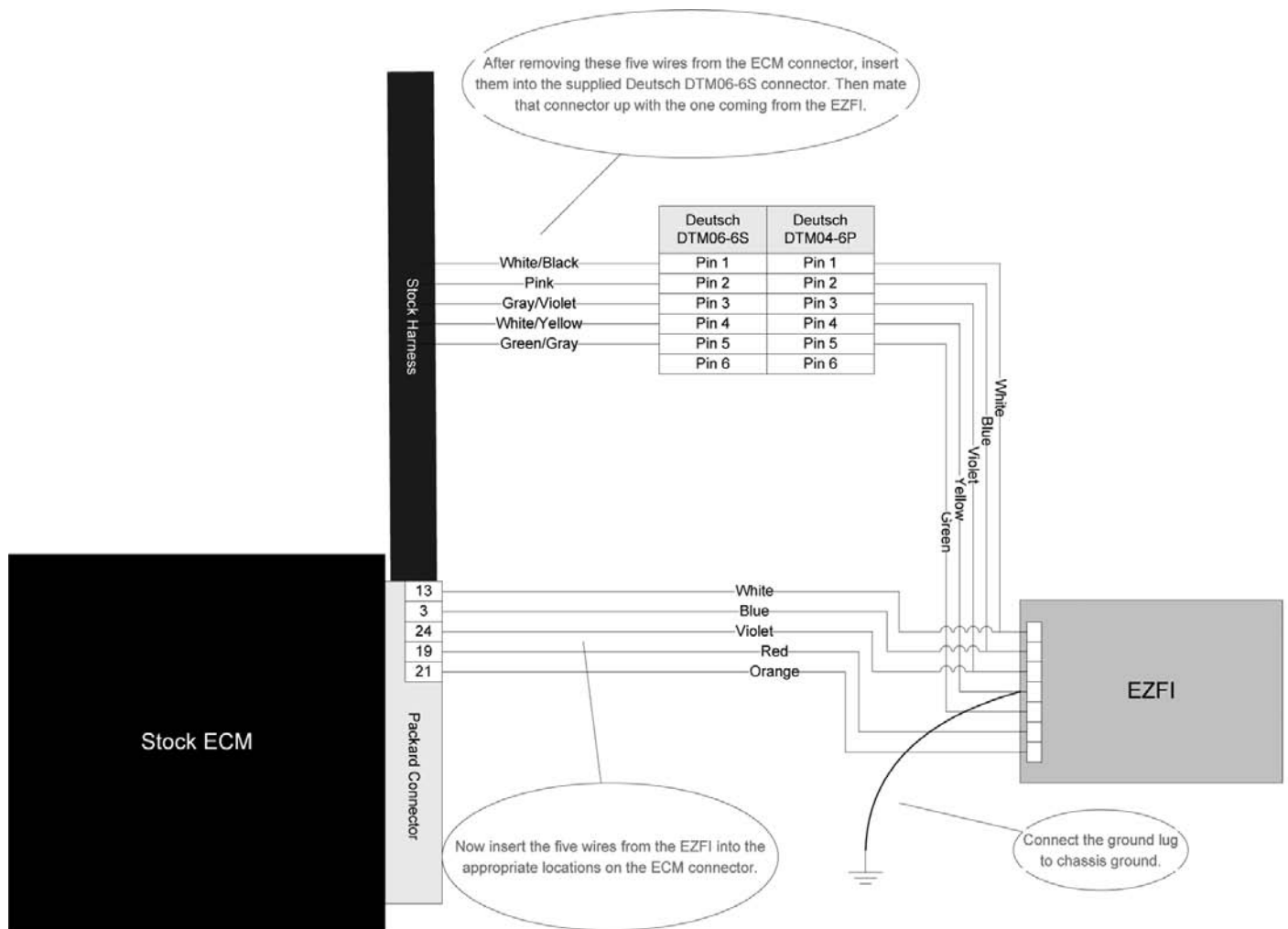


Figure 1

EZFI OPERATION

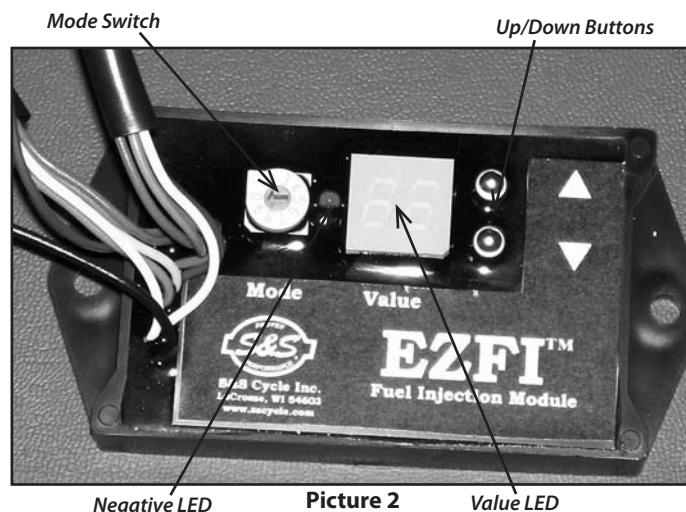
The EZFI system is simple to operate. A 10 position mode switch allows you to select which RPM and throttle range to tune. The 10 operating modes are listed in Table 4. The display is turned off in Mode 0.

The Value LED displays the adjustment percentage for the selected range. The indicated number is the percent fuel being added (positive) or taken away (negative) from the base pulse width. The small LED is lit when the adjustment is negative, which means the EZFI is leaning the mixture out in that range.

The Up and Down buttons raise or lower the fuel adjustment for the selected operating range.

Advanced tuning of both front and rear fuel maps is possible when our EZTune software is used in conjunction with our S&S® Super Stock® diagnostic cable. These are available separately.

Table 4 - Operating Ranges for Mode Switch Settings	
Mode Switch Position	Adjustment Range
0	None – display off
1	Idle, 750 to 1250 RPM, closed throttle
2	Low cruise, 1250 to 2000 RPM, 2.5% to 50% throttle
3	High cruise, 2000 to 3750 RPM, 2.5% to 50% throttle
4	Wide Open 1250 to 2000 RPM, 50% to 100% throttle
5	Wide Open 2000 to 2750 RPM, 50% to 100% throttle
6	Wide Open 2750 to 3750 RPM, 50% to 100% throttle
7	Wide Open 3750 to 4750 RPM, 50% to 100% throttle
8	Wide Open 4750 to 6500 RPM, 50% to 100% throttle
9	Acceleration enrichment



BASIC TUNING TIPS

Now that you have EZFI™ installed and understand how to operate it, you are ready to tune. Here are some basic tips to make tuning with EZFI faster and more productive.

Take notes.

Tuning while riding is not a safe practice. If the engine hesitates, surges, or doesn't run right, make a mental note of which operating range it is occurring in. Just keep tabs on the *RPM*, *throttle position* (cruising at part throttle or accelerating hard at wide open throttle?) and the *behavior* (surging, sluggish response, missing, etc.) Then at a safe spot, pull over and write down your notes.

Warm up the engine before tuning.

Starting your tuning session with a warm engine minimizes the amount of temperature compensation that the stock ECM might be adding in. It also ensures repetitive results. If you tune the motorcycle with the engine cold, you will probably end up re-tuning it later when it's warm.

If possible, measure what the engine is doing.

The fastest method of tuning requires wide band air fuel ratio (AFR) measurements. There are numerous stand-alone wideband systems available, which can be operated while riding the motorcycle. Most tuning centers are equipped with wideband systems, which usually analyze the AFR using a sensor inserted into the exhaust pipe. Either method will provide better data than "seat of the pants" interpretations of engine operation. Knowledge of the AFR at various operating points allows you to dial in the precise fuel adjustments necessary to hit your target AFR.

Know your symptoms.

Adding fuel does not solve all running problems. Many engine modifications will require a reduction in the amount of fuel at *certain operating points* for optimal tuning. Don't be afraid to take fuel away.

Coughing or surging usually indicate a lean condition. These conditions will require adding fuel to correct. Measuring your AFR with a wideband system will give much better results than trying to diagnose the symptoms.

Tuning on Closed Loop Vehicles.

Tuning for performance modifications on a 2006 Harley-Davidson® Dyna™ and any 2007 model is more difficult because the ECMs on these motorcycles run closed loop fuel control. This means that the ECM uses feedback from oxygen sensors to continuously re-calculate the amount of fuel needed at each operating point. In general, most stock ECMs target a near-stoichiometric (14.6) air fuel ratio (AFR) for the operating range of 0 to 4500 RPM and 0 to 80% throttle. *If you use EZFI to alter the fuel amount in this range, the stock ECM will undo your change to force the AFR to its 14.6 target.*

For example, if you are in the low cruise range of 1500 RPM and 15% throttle, the ECM will target a 14.6 AFR. If you tune +10% fuel to target a richer AFR, the ECM will detect this extra fuel and reduce it's base fuel amount to return the AFR back to 14.6.

There are two options for tuning closed loop motorcycles. Both achieve the same result. The first is to do nothing and let the stock ECM add or remove up to 30% fuel to meet its target AFR. Don't tune within the stock closed-loop range defined above. This roughly corresponds to EZFI modes 1, 2, and 3. Leave the adjustment in these three modes at 0. Let the ECM run closed-loop to target its programmed AFR. Tune the remaining modes, 4 – 9, for wide open throttle conditions.

Your second tuning option is to use EZFI to zero out the ECM's adjustments. Highly modified engines may require more fuel than the stock closed loop system can compensate for. The main reason to do this is if the stock ECM is running out of fuel adjustment and setting the Check Engine light. This would only be necessary on the most extreme engine modifications, where fuel delivery requirements are drastically different from the stock engine.