

# DEFIE

## (Digital Electronic Fuel Injector Enhancer) Installation & Operating Instructions.

Please note. The DEFIE is not intended to be a fuel saver by itself. The DEFIE designed to be used only in conjunction with alternative fuel devices, such as a hydrogen gas electrolyzer, propane, a fuel vapor production unit, or other alternative fuel devices that keep emissions with the EPA standards (EPA Memorandum 1A).

Although new DEFIE can work with voltages up to 28V this is NOT RECOMMENDED. This option only for research purpose and not for installing to car. New DEFIE work great from 8V to 16V maximum. If you need DEFIE for +24V then let me know and I will ship to you 24V DEFIE.

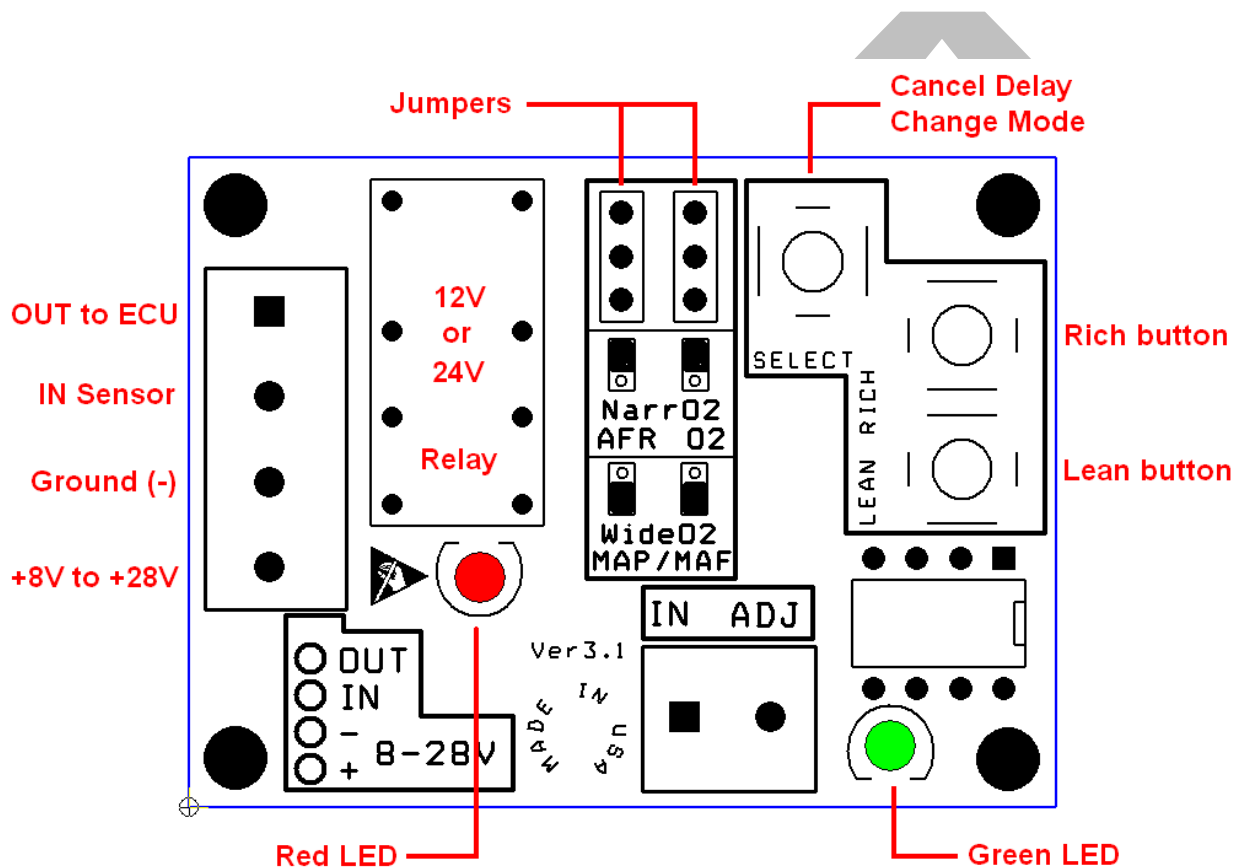
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This DEFIE will work with:

- 1-4 wires narrow band zirconium type oxygen sensors.
- 5 and 6 wire wide band oxygen sensors.
- 4-wire AFR sensor.
- 5 Volt MAP sensors and voltage output MAF sensors.

All oxygen sensors that were developed **before** catalytic converter **need own dedicated EFIE** device.

Oxygen sensors that were developed after catalytic converter do not need EFIE devices, because they are only used by ECU to monitor converter fuel efficiency. PS. Some new cars need own dedicated EFIE also after catalytic converter also.



## 1. Features.

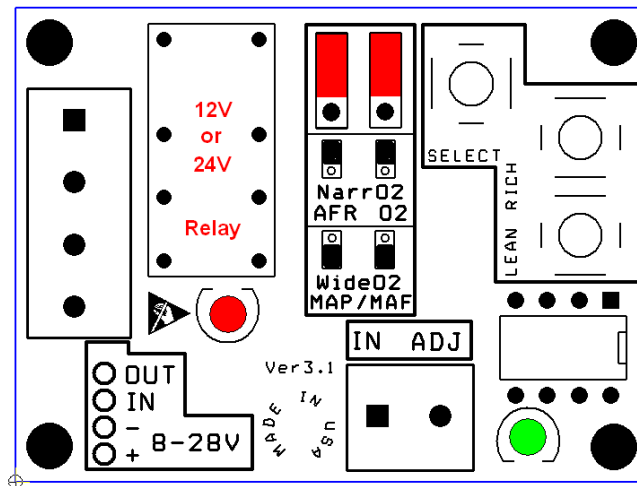
1. Soft Start Feature slowly increases the adjustment voltages when powered ON (For example: O2 sensor warm up delay).
2. Option to disable and change time from 1 to 5 minutes on Soft Start Feature.
3. Option to reset ECU every 20 minutes.
4. LED's light indicates when the power is ON and show delay time and current mode.
5. Additional Terminal Block makes testing the voltages (offset, input) simple.
6. Special circuit design eliminates variance of actual voltage output, input and adjustment voltage when using multi-meter.
7. Fine adjustable tune with a 4096 steps on full scale (0-5Volts). Each step is 1.22mV
8. Normal connection from O2/MAP/MAF sensors to the ECU (vehicle computer) when power OFF.

- 9. Low current consumption: 23mA (0.023A).
- 10. Low temperature sensitivity +/- 2mV (0.002V).
- 11. Operating temperature: -31F to 185F (-35C to 85C).
- 12. Small size: 2" x 1.5" x 0.6 (51mm x 38mm x 15mm).

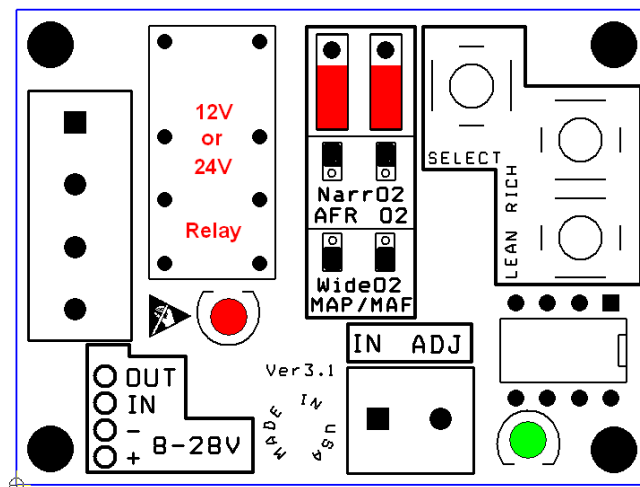
## 2. Placing DEFIE.

**Before placing DEFIE in the car please place jumpers as shown on the pictures.** Installation of jumpers should be carried out only when the power is OFF.

1-4 wires narrow band zirconium type oxygen sensors or 4 wires AFR sensor.



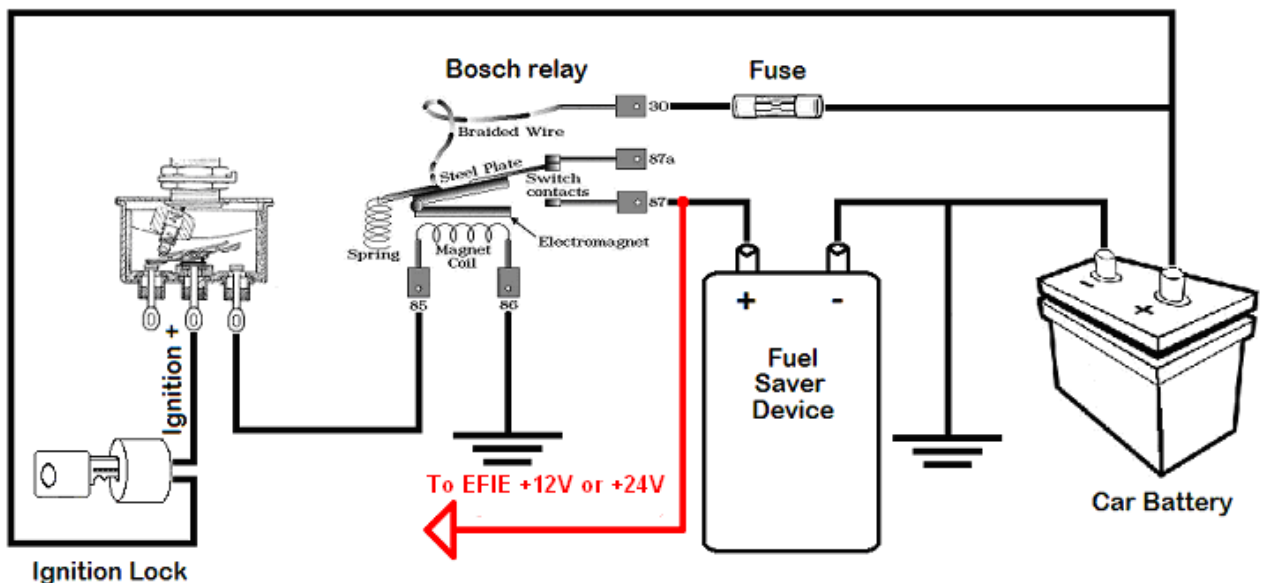
5 and 6 wire wide band oxygen sensors.  
5 Volt MAP sensors and voltage output MAF sensors.



The best place for the installation of the DEFIE is a place where the DEFIE will be warm, dry and accessible to adjustment. As a last resort, the DEFIE can be placed under the hood, but you should take care of water resistance and humidity resistance. I recommend that is better to be installed under a dash. The DEFIE can be attached in the chosen place with Velcro. Due to this, it is necessary for you to pick up a suitable plastic box and attach the DEFIE inside with the Velcro.

### 3. Locate 12 or 24 Volts Power and Ground.

If you now install this DEFIE, then you should already have installed a fuel saver device. Therefore, I think that you have already found the +12 or +24 volt and the ground (minus). The +12 or +24 volt is the best way for transferring from the fuel saver device.



The reason which is necessary to connect +12 or +24 Volt of DEFIE to the +12 or +24 Volt of the fuel saver device is very simple: when you turn ON fuel saver device then simultaneously you turn ON DEFIE and when you turn OFF the fuel saver device then simultaneously you turn OFF the DEFIE. The DEFIE works only when the fuel saver device works. In any case you can use an ignition switched power source +12 or +24 Volt to the DEFIE. The DEFIE will shut OFF when you shut OFF ignition key.

If you previously have not established the fuel saver device, these resources can help:

<http://www.bulldogsecurity.com/wiring%20diagrams2.htm>

<http://www.the12volt.com/>

Note: O2 sensor heater wire cannot be used because in some cases ECU (vehicle computer) will cut the power to the O2 sensor during the trip.

The ground can be the vehicle body (chassis ground), engine block or ground from another device. Do not use oxygen sensor as a ground.

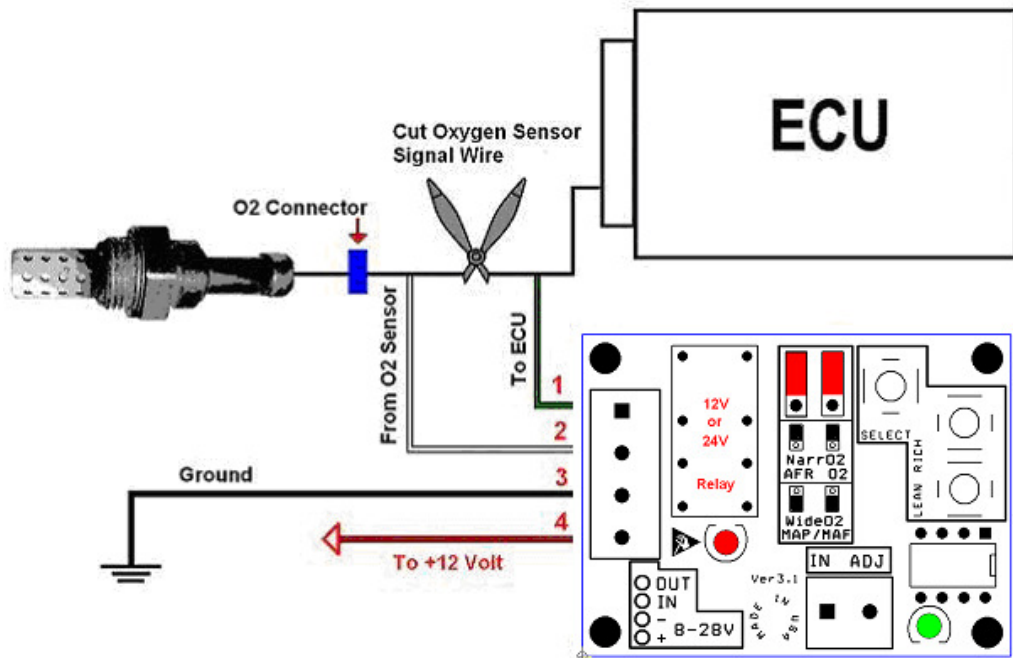
Turn multi-meter to Resistance mode



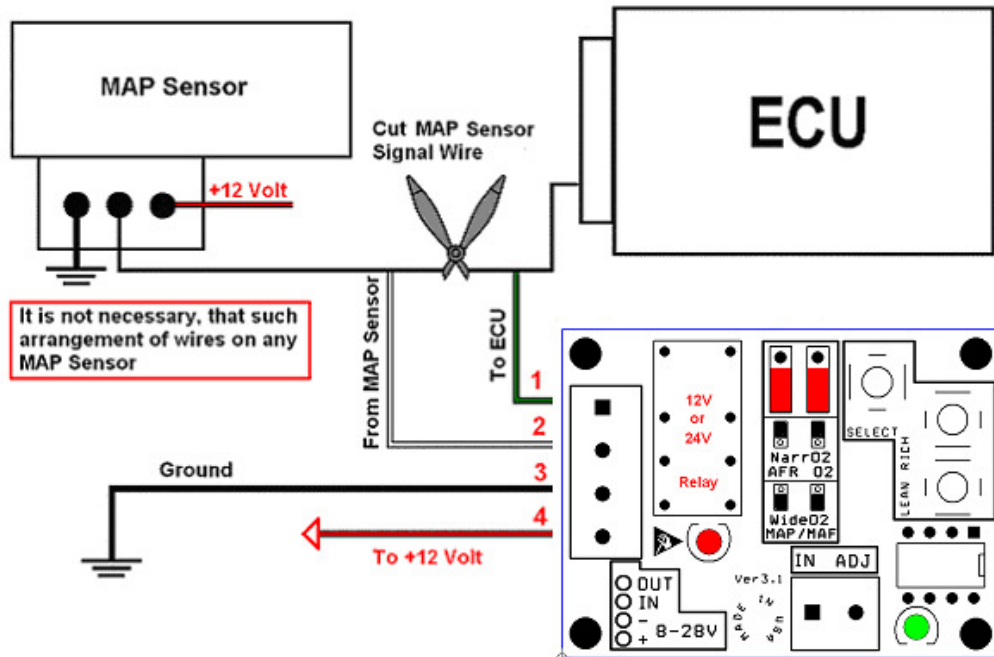
Test the resistance between ground wire, which you have found and battery negative terminal. If it is < 10 ohm you can use it.

## 4. Connect DEFIE wires.

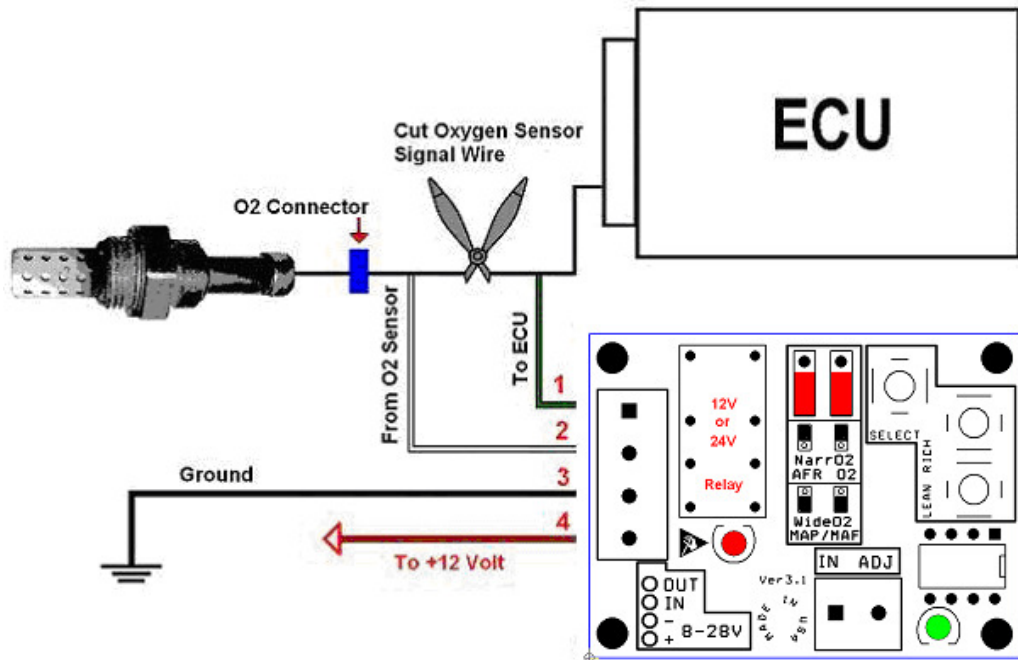
1-4 wires narrow band zirconium type oxygen sensors.



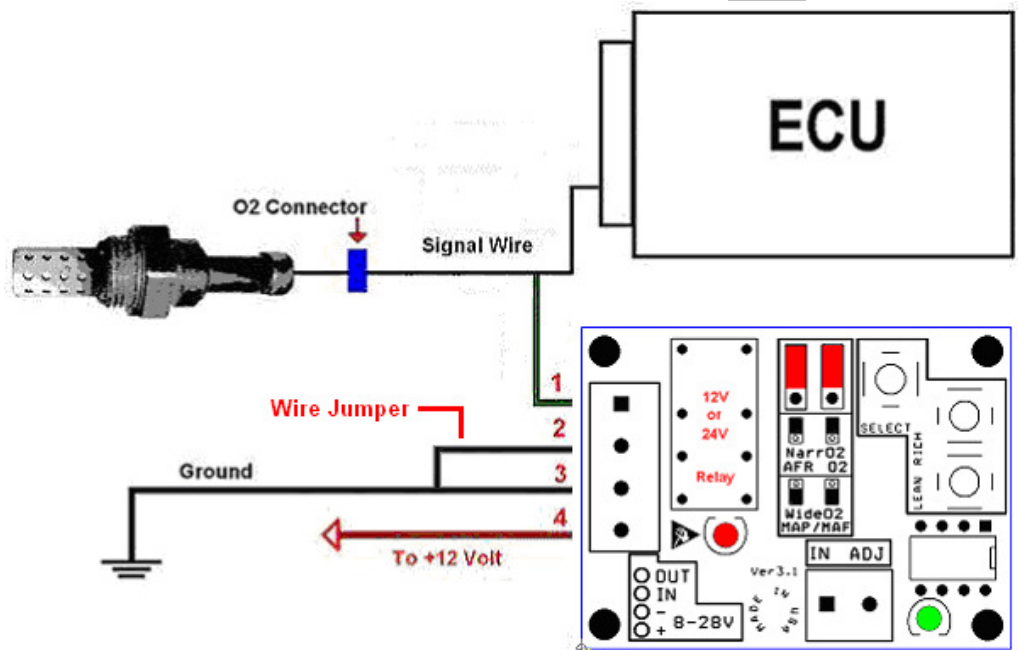
5 Volt MAP sensors and voltage output MAF sensors.



5 and 6 wire wide band oxygen sensors.



4 wires AFR sensor.



**Note:** During connection and the lining of wires execute some simple rules: while lining the wires try not to lay wires near to details of the car which will be

hot during the working of the car. At connection of wires don't use crimp connectors.

Solder wires, and then seal them with silicone, shrink-wrap or with liquid tape.

- Turn ignition OFF.
- Connect wire from the car ground (read section 2) to the DEFIE connector **#3**.
- Connect +12 or +24 Volt wire (read section 2) to the DEFIE connector **#4**.

**Please attention!** The DEFIE is adjusted for the Narrow band O2 sensor with 5 minutes of the Soft Start Feature and 200mV of the adjustment voltage. If you have other type of the sensor then before connection the signal wire to DEFIE please read next chapter.

- Cut the Sensor "signal" wire on the car side of the connector.
- Connect wire from Sensor side to DEFIE connector **#2** and wire from ECU side to DEFIE connector **#1**.

**Remember, solder wires and seal them for prevention of corrosion.**

## 5. Operation

This DEFIE will work with:

- 1-4 wires narrow band zirconium type oxygen sensors.
- 5 and 6 wire wide band oxygen sensors.
- 4-wires AFR sensor.
- 5 Volt MAP sensors and voltage output MAF sensors.

This DEFIE have 8 different modes:

0. Soft Start Feature is OFF
1. Soft Start Feature is 1 minute
2. Soft Start Feature is 2 minutes
3. Soft Start Feature is 3 minutes
4. Soft Start Feature is 4 minutes
5. Soft Start Feature is 5 minutes
6. AFR Mode (Soft Start Feature is 50 seconds)
7. MAP/MAF Mode (Soft Start Feature is OFF)



Soft Start Feature slowly increases the adjustment voltage when powered ON to allow to the ECU (car computer) time to adjust for the changes.)

Note: This DEFIE have Red LED and Green LED. They can't be ON or OFF same time. When the Red LED ON then the Green LED OFF and when the Green LED ON then the Red LED OFF.

When you turn ON the DEFIE:

1. Green LED ON for about 2 seconds.
2. Red LED ON for about 4 seconds. Close the Red LED with your finger (for example) to see only the Green light.
3. Green LED will blink a few times to show number of Mode and again will wait about 4 seconds. For example: If the mode is #5 then the Green Led will blink 5 times.

Please note: If the Mode is #0 or #7 then Red LED will not blink and the adjustment voltage will rich 100% instantly. In this case don't read the next point of the menu.

4. You can wait specific delay time or can cancel this time by pressing SELECT button. After pressing the SELECT button the adjustment voltage will rich 100% instantly.
5. Red LED ON.
6. Now you can change the Mode or the adjustment voltage.
  - 6.1 To change the adjustment voltage - just push the Rich or Lean buttons. After changing the adjustment voltage the DEFIE will wait about 5 seconds and will write the setting in to internal memory.
  - 6.2 To change the mode just push short time the SELECT button. The Green LED will ON. Push again the SELECT button, but long time until the Red LED will ON. Release the SELECT button. The Green LED will ON. Close the Green LED with your finger (for example) to see only the Red light. To change the modes push the Rich or Lean buttons. The Red LED will blink a few times to show number of Mode and again will wait about 4 seconds. To exit just push short time the SELECT button.

Now more detailed about the modes:

0. Soft Start Feature is OFF  
This mode suitable for the 1-4 wire narrow band zirconium type oxygen sensors, 5 and 6 wire wide band oxygen sensors, 5 Volt MAP sensors and voltage output MAF sensors.

1. Soft Start Feature is 1 minute  
This mode suitable for the 1-4 wire narrow band zirconium type oxygen sensors, 5 and 6 wire wide band oxygen sensors.
2. Soft Start Feature is 2 minutes  
This mode suitable for the 1-4 wire narrow band zirconium type oxygen sensors, 5 and 6 wire wide band oxygen sensors.
3. Soft Start Feature is 3 minutes  
This mode suitable for the 1-4 wire narrow band zirconium type oxygen sensors, 5 and 6 wire wide band oxygen sensors.
4. Soft Start Feature is 4 minutes  
This mode suitable for the 1-4 wire narrow band zirconium type oxygen sensors, 5 and 6 wire wide band oxygen sensors.
5. Soft Start Feature is 5 minutes  
This mode suitable for the 1-4 wire narrow band zirconium type oxygen sensors, 5 and 6 wire wide band oxygen sensors.
6. AFR Mode (Soft Start Feature is 50 seconds)  
This mode suitable for the AFR sensor (Soft Start Feature is 50 seconds).
7. MAP/MAF Mode (Soft Start Feature is OFF)  
This mode suitable for the 5 Volt MAP sensors and voltage output MAF sensors.

Modes from #0 to #5 suitable for the 1-4 wire narrow band zirconium type oxygen sensors, 5 and 6 wire wide band oxygen sensors.

- What difference? The difference - Soft Start Feature time (delay time). Normal and standard time for the narrow band and wide band oxygen sensor is 5 minutes.
- When and why change this delay time? You can change the delay time for different seasons. In a summer you can make 4 minutes of the delay and in a winter you can make 5 minutes of the delay. Also very important distance of your driving. If you drive each day from the home to work and from the work to home and time of the driving is about 10 minutes, then make time of the delay about 1-4 minutes. Also you can turn OFF the delay (turn OFF the Soft Start Feature), but with this you need reduce your adjustment voltage. For example: You found that 4-5

minutes of the delay and 250mV of the adjustment voltage work great for the 1 hour of the driving. You changed your home address or the work and now your driving to work is 10 minutes. In this situation you can make the delay 1-4 minutes or turn OFF, but you need reduce the adjustment voltage to 150-200mV. Why? Very simple. Because in most cases the ECU (vehicle computer) will show to you ERROR. To avoid this with lowering time of the delay please lower the adjustment voltage.

What difference between the modes #0 and #7? They both suitable for the MAP/MAF sensor. The answer is simple.

- Mode #0 will work with MAP or MAF, but have 1 adjustment setting.
  - Mode #7 will work with MAP or MAF, but have 2 adjustment settings.
- To change between two the adjustment settings – push short time the SELECT button. The Red LED – 1<sup>st</sup> MAP/MAF mode (for example for the city road). The Green LED – 2<sup>nd</sup> MAP/MAF mode (for example for the highway road). The initial adjustment voltages for the 1<sup>st</sup> mode is 200mV and for the 2<sup>nd</sup> mode is 400mV.

## 7. ECU reset.

Today most vehicles have very smart ECU (adaptive ECU). After installation of the HHO generator and the EFIE most people see great results, but after 1-2 days no results. It happens because the ECU learns the signal and makes changes. To reset this ECU need back to the original signal from O2 sensor each 20 minutes (this time depend on model of car, but 20 minutes will work with almost every car).

You will receive devices with disabled feature.

How to turn ON this feature?

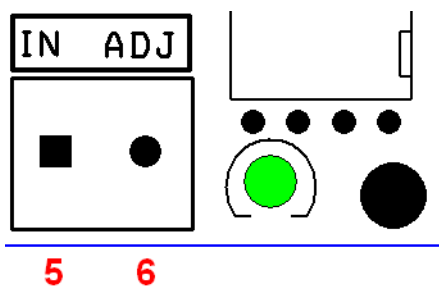
When you turn ON the DEFIE then Green LED will be ON for about 2 seconds. This is normal working status of the DEFIE. If you want to turn ON function to reset ECU every 20 minutes then you need:

1. Turn OFF the DEFIE.
2. Push "SELECT" button and don't release.
3. Turn ON the DEFIE with pushed "SELECT" button.
4. Release the "SELECT" button after about 1 second.
5. Turn OFF the DEFIE
6. Turn ON the DEFIE (don't push any button)

You will see that when you turn ON the DEFIE then Red LED will be ON without Green LED. It says that function to reset ECU activated. To turn OFF this function make same step from 1 to 6. After that you will see that Green LED will be ON for about 2 seconds. Also when you turn this function ON make 2-3 minutes delay (soft start).

## 7. Adjustment.

Adjustments should only be made when the DEFIE is powered ON and the engine is warm and running. Do not make any adjustments without the use of a multi-meter. Touch your Red multi-meter wire to the “IN” test pin #5, “Out” test pin #1, “Adjustment Voltage” test pin #6 to read the voltage while adjusting.



**Note:** For the “Ground” you can use a screw #3 in the pictures in chapter #4.

To change the adjustments you need push “Rich” and “Lean” buttons. Step of adjustment is 1.22 millivolt.

**Please attention!** After adjustment the DEFIE will wait about 5 seconds and will write the setting in to internal memory. After the saving the LED’s will blinks 1 time. You don’t need wait this time. You can push again the buttons to change the adjustment - just don’t turn OFF the DEFIE during this time.

**If you DON’T WANT to wait time of the Soft Start Feature then just push the “Select” button and adjustment voltage will rich 100% instantly**