

# Loveco 4 EU Plus II

Electronic Feedback System with incorporated Cut Injectors Emulator



## Fitting Instructions



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## General information

### Where to mount the Feedback System:



- **AWAY** from possible **WATER INFILTRATION**.



- **AWAY** from **EXCESSIVE HEAT SOURCES** (i.e. exhaust manifolds).



- **AWAY** from **IGNITION WIRE**.



Perform good electrical connections and avoid the use of wire splicers.  
**The best electrical connection is properly isolated soldering.**

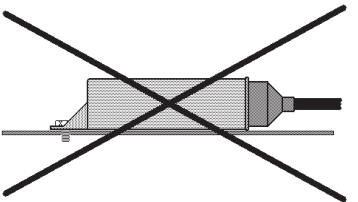
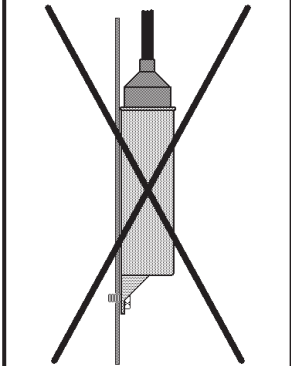
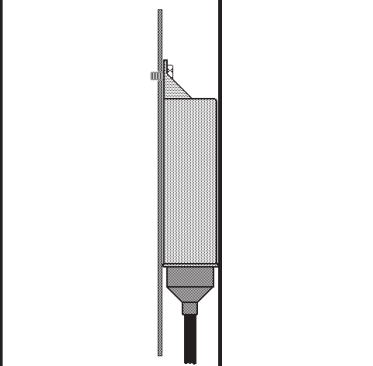


**Inform the customer that if the GAS system fuse blows, the Feedback System restores the System on PETROL mode.**



In order to avoid irreparable damage, do not for any reason open the box of the Feedback System, especially when the engine is rotating or the ignition key is on.  
**LOVATO is not responsible for damages to persons or things resulting from the tampering of its products by unqualified personnel, where such tampering occurs, THE WARRANTY IS VOID.**

### Mounting the Feedback System

INCORRECT INSTALLATION	INCORRECT INSTALLATION	CORRECT INSTALLATION
		

## Principle of operation

The "LOVECO-4EU PLUS II" is a micro-processor controlled system for the management of carburetion on GAS powered vehicles. It is programmable, it's an adaptive learn system managed by micro-controller, and able to maintain stoichiometric ratio between **AIR** and **GAS** (C.N.G. or L.P.G.) under any operational condition by utilizing the following inputs:

- **OXYGEN SENSOR**
- **RPM**
- **THROTTLE POSITION SENSOR (T.P.S.)**

The signal of the above sensors is different according to the vehicle model. Moreover, the operational characteristics are also different according to the vehicle. To correctly manage these signals, the "LOVECO-4EU PLUS II" requires programming that can be achieved by means of one of the following devices.

- PERSONAL COMPUTER on which a specific SOFTWARE program is installed, communicating with the "LOVECO-4EU PLUS II" through SERIAL INTERFACE

The "LOVECO-4EU PLUS II" control unit has an incorporated Cut Injector Emulator inside with **fixed emulation**.

Through the relevant cabling you can stop and simulate the function of the injectors when running the car on GAS.

The "LOVECO-4EU PLUS II" also makes it possible to simulate the correct operation of the Oxygen Sensor during GAS operation without the aid of external emulators.

The GAS modulation is achieved by means of an electro-mechanical actuator installed in the vapour hose connecting the pressure regulator to the mixer.

The electro-mechanical actuator consists of a plastic body provided with a calibrated orifice through which the GAS transits. A stepper motor is mounted on the plastic body. The stepper motor modulates the amount of GAS according to the engine needs. Since the "LOVECO-4EU PLUS II" is an adaptive learn system, it does not require periodic adjustments. The only manual adjustment to be performed is the idle mixture on the pressure regulator. It is important that this adjustment is performed with great precision.

Although the "LOVECO-4EU PLUS II" is capable of modulating carburetion at idle, this modulation is not optimized if the manual adjustment is poorly performed, as the modulating ability of the "LOVECO-4EU PLUS II" is limited at idle, and only indicated for fine adjustments.

The "LOVECO-4EU PLUS II" E.C.U. manages the operation of the GAS electrovalves directly. The switch provided is used only to select the fuel used.

## Original configuration

### WARNING!

The "LOVECO-4EU PLUS II" is supplied configured according to the parameters given in the chart below. Considering that not all vehicles have the same characteristics, it is necessary to make sure each time that the parameters are correct.

If, after the modification of the various parameters, the **[ERASE MEMORY]** function is used by means of the laptop COMPUTER, the parameters are automatically returned to the original configuration.

VEHICLE CONFIGURATION MENU	
Ignition type or number of cylinders	<b>DUAL COIL</b>
Type of RPM signal	<b>STANDARD</b>
Type of Petrol to Alt. fuel switch-over	<b>DECCELERATION</b>
Fuel switch-over temperature	<b>25 °C</b>
<b>PLEASE NOTE: if the temperature sensor is not connected to the "LOVECO-4EU PLUS II", this function has no effect on the fuel switchover.</b>	
Petrol-Alt. fuel switch-over RPM	<b>2000 RPM</b>
Duration of fuel overlap	<b>0,4 seconds</b>
Type of Alt. fuel level indicator	<b>AEB</b>
TPS type	<b>LINEAR 0-5 V</b>
O2 sensor type	<b>0-1 V</b>
O2 sensor reading delay	<b>5 seconds</b>
Type of O2 simulation	<b>SQUARE WAVE</b>
Full throttle option	<b>DISENGAGED</b>
Cut-Off option	<b>DISENGAGED</b>
Option default lock	<b>DISENGAGED</b>
Maximum actuator position	<b>240 steps</b>
Manimum actuator position	<b>20 steps</b>
Overrev Option	<b>DISENGAGED</b>
Option Economical Driving	<b>DISENGAGED</b>
Idle TPS hysteresis	<b>0,14 V</b>
Erase memory	

## Component description

<p><b>+12 VOLT IGNITION</b></p> <p><b>RED WIRE</b></p>	<p>It is important that the +12 V ignition is connected where the power is not timed, or is disabled during start-ups. Verification procedure:</p> <ul style="list-style-type: none"> <li>• connect a digital multimeter and select the voltage range 20 V;</li> <li>• turn the ignition key on. The display on the multimeter must show 12 V;</li> <li>• wait a few seconds:             <ul style="list-style-type: none"> <li>- if the voltage goes to 0 V it is timed, try another power supply point;</li> <li>- if the voltage remains steady at +12 V, continue testing this power supply point;</li> </ul> </li> <li>• start the engine while observing the multimeter. While the starter is cranking the engine, make sure that the +12 V power supply is steady, and that it does not go to 0 V while cranking and back to +12 V as soon as the engine is started:             <ul style="list-style-type: none"> <li>- if the voltage goes to 0 V, try another power supply point;</li> <li>- if the voltage remains steady at +12 V, this is the appropriate power supply to which the RED wire of the "LOVECO-4EU PLUS II" is to be connected.</li> </ul> </li> </ul> <p>We recommend using <b>7,5 A MAX.</b> fuses.</p>												
<p><b>+12 VOLT BATTERY</b></p> <p><b>RED-BLACK WIRE</b></p>	<p>The RED-BLACK wire is connected to battery positive through a protector fuse (<b>MAX. 7,5 A</b>). It allows the "LOVECO-4EU PLUS II" to maintain memory of all data pertinent to carburetion (<b>DEFAULT value</b>). If the RED-BLACK wire is disconnected from battery, the memorised data pertinent to carburetion are erased from memory.</p> <p>All other parameters related to the "LOVECO-4EU PLUS II" configuration are memorised in a special memory and can be modified or erased only through laptop COMPUTER.</p>												
<p><b>INJECTOR EMULATION</b></p>	<p>A 4-cylinder injector emulator has been integrated into the "LOVECO-4EU PLUS II". See page 7 to choose the injector disconnect cable to be used and to find the connection diagram.</p>												
<p><b>GAS ACCESSORIES OUTPUT</b></p> <p><b>BLUE WIRE</b></p>	<p>The GAS accessories output (BLUE wire from the "LOVECO-4EU PLUS II" E.C.U.) supplies a +12 V power output for the GAS electrovalves (pressure regulator and lock-off valves) and for all devices (timing advance processors and emulators) that require voltage during GAS mode to operate. The GAS accessories output is controlled by a SAFETY-CAR safety device, which is integrated in the "LOVECO-4EU PLUS II" E.C.U.. The SAFETY-CAR function enables the GAS electrovalve only when the engine is running.</p> <p>In this way, if (for example) the engine stalls, the GAS supply is automatically turned off.</p>												
<p><b>DIAGNOSTIC PLUG</b></p>	<p>By using the diagnostic plug, it is possible to connect the "LOVECO-4EU PLUS II" to a PC through serial interface on which a special programming software is installed. Several menus are available. From these menus it is possible to configure the "LOVECO-4EU PLUS II" to the characteristics of different vehicle types, as well as to check for correct operation of the chosen configurations.</p>												
<p><b>COIL NEGATIVE OR RPM SIGNAL</b></p> <p><b>BROWN WIRE</b></p>	<p>The engine RPM signal can be read directly from the coil negative or from the tachometer. <b>It is essential that this input is connected for the "LOVECO-4EU PLUS II" to work correctly.</b></p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th colspan="2" style="text-align: center;">VEHICLE CONFIGURATION MENU</th> </tr> <tr> <th style="text-align: left;">SETTING TYPE</th> <th style="text-align: left;">ACTIVE SETTING</th> </tr> </thead> <tbody> <tr> <td>Ignition type or number of cylinders</td> <td> <b>4 cylinders</b>  <b>5 cylinders</b>  <b>6 cylinders</b>  <b>8 cylinders</b>  <b>Dual coil</b>  <b>Single coil for cylinder</b> </td> </tr> <tr> <td>Type of RPM signal</td> <td> <b>Standard</b>  <b>Weak</b> </td> </tr> </tbody> </table>	VEHICLE CONFIGURATION MENU		SETTING TYPE	ACTIVE SETTING	Ignition type or number of cylinders	<b>4 cylinders</b> <b>5 cylinders</b> <b>6 cylinders</b> <b>8 cylinders</b> <b>Dual coil</b> <b>Single coil for cylinder</b>	Type of RPM signal	<b>Standard</b> <b>Weak</b>				
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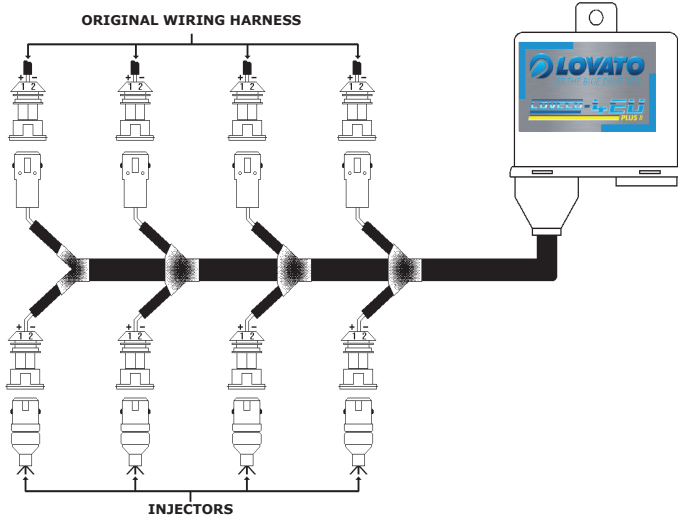
# Component description

<b>SWITCH</b>	<p>The "LOVECO-4EU PLUS II" is supplied complete with fuel switch. The fuel switch is provided with the following functions:</p> <ul style="list-style-type: none"> <li>• level indicator;</li> <li>• button to select <b>GASOLINE</b> or <b>GAS</b>;</li> <li>• each pressing of the button produces the passage from GASOLINE to GAS and vice versa.</li> </ul> <div style="text-align: center;"> <p>The diagram shows a central fuel switch unit with a 'G' logo and a fuel pump icon. It has four LEDs on top: one red and three green. Four boxes with arrows point to these LEDs: 'RED LED RESERVE' (red), '4 GREEN LED's LEVEL INDICATOR' (green), 'GREEN LED GAS OPERATION' (green), and 'YELLOW LED GASOLINE OPERATION' (yellow).</p> </div> <p><b>GREEN LED</b>  <b>Quick flashing</b> - The unit is set for PETROL and automatic GAS switchover.  <b>Steady on</b> - GAS operation.</p> <p><b>RED LED + 4 GREEN LED's</b>  <b>Fuel level indicator</b> - The RED led indicates low fuel, while the 4 GREEN led's indicate the fuel level (1/4, 2/4, 3/4, 4/4).</p> <p><b>YELLOW LED</b>  <b>Steady on</b> - PETROL operation.</p> <p><b>EMERGENCY</b>          If you have set start-up with PETROL and the vehicle does not manage to start with PETROL, it is possible to start it up directly with GAS. To do so, carry out the following instructions:</p> <ul style="list-style-type: none"> <li>• turn the ignition key on (the lights on the switch is on);</li> <li>• pressed the button for 5 seconds;</li> <li>• the GREEN led stays steady on;</li> <li>• start the engine without turning the ignition key off. This causes the engine to start directly on GAS;</li> <li>• each time the engine is turned on it is necessary to repeat the above procedure to start the engine in EMERGENCY mode.</li> </ul> <p style="text-align: center;"><b>WARNING!</b>  <b>The EMERGENCY function can be activated only if the RED wire of the "LOVECO-4EU PLUS II" is connected to +12 V ignition, not timed.</b></p>								
<b>FUEL LEVEL SENSOR INPUT</b>  <b>GREEN AND WHITE WIRE</b>	<p>To have the GAS level indication (C.N.G. or L.P.G.) it is necessary that the GREEN and WHITE wires of the "LOVECO-4EU PLUS II" are connected to a special sensor.          To adapt the "LOVECO-4EU PLUS II" to the different types of sensors, it is necessary to select the correct option by means of the laptop COMPUTER.</p> <table style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th colspan="2" style="text-align: center; border-bottom: 1px solid black;">VEHICLE CONFIGURATION MENU</th> </tr> <tr> <th style="text-align: left; border-bottom: 1px solid black;">SETTING TYPE</th> <th style="text-align: left; border-bottom: 1px solid black;">ACTIVE SETTING</th> </tr> </thead> <tbody> <tr> <td>Type of Alt. fuel level indicator</td> <td><b>LANDI RENZO</b> <b>A.E.B.</b> <b>0-90 Ohm</b> <b>Reserve Indication Only</b></td> </tr> </tbody> </table>	VEHICLE CONFIGURATION MENU		SETTING TYPE	ACTIVE SETTING	Type of Alt. fuel level indicator	<b>LANDI RENZO</b> <b>A.E.B.</b> <b>0-90 Ohm</b> <b>Reserve Indication Only</b>		
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<b>T.P.S. THROTTLE POSITION SENSOR</b>  <b>BLUE-YELLOW WIRE</b>	<p>The Throttle Position Sensor is mechanically connected to the butterfly of the gas pedal. It sends a variable voltage signal to the E.C.U. that is proportional to the opening angle of the butterfly. In the latest generation of vehicles where the opening of the butterfly is achieved through an electromechanical device as opposed to linkage, the T.P.S. signal can be taken at the sensor, which reads the position of the gas pedal.</p> <table style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th colspan="2" style="text-align: center; border-bottom: 1px solid black;">VEHICLE CONFIGURATION MENU</th> </tr> <tr> <th style="text-align: left; border-bottom: 1px solid black;">SETTING TYPE</th> <th style="text-align: left; border-bottom: 1px solid black;">ACTIVE SETTING</th> </tr> </thead> <tbody> <tr> <td>TPS type</td> <td><b>Linear 0-5 V</b> <b>Linear 5-0 V</b> <b>Direct switch</b> <b>Inverted switch</b> <b>Monobosch</b> <b>No TPS</b></td> </tr> <tr> <td>Idle TPS hysteresis</td> <td><b>0-0,5 V</b></td> </tr> </tbody> </table>	VEHICLE CONFIGURATION MENU		SETTING TYPE	ACTIVE SETTING	TPS type	<b>Linear 0-5 V</b> <b>Linear 5-0 V</b> <b>Direct switch</b> <b>Inverted switch</b> <b>Monobosch</b> <b>No TPS</b>	Idle TPS hysteresis	<b>0-0,5 V</b>
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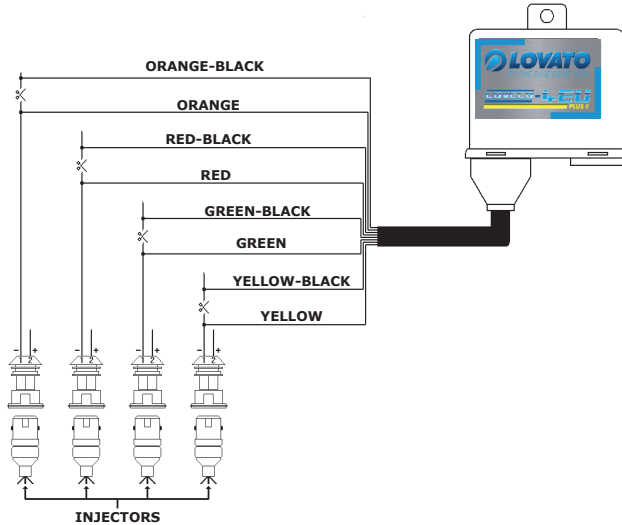
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<b>OXYGEN SENSOR  GREY AND PURPLE WIRE</b>	<p>For the purpose of carburetion adjustments, the Oxygen Sensor provides information to the COMPUTER about the quantity of oxygen existing in the exhaust gases. If a high level of oxygen is present in the exhaust, the carburetion is LEAN (small amount of fuel). If a low level of oxygen is present in the exhaust, the carburetion is RICH (large amount of fuel). To sort out the signal carrier wire of an Oxygen Sensor, we recommend using a digital multimeter. Set the instrument to measure DC; put a probe to battery GROUND; with the other probe check which wire carries a variable voltage. It is important that the Oxygen Sensor is hot before performing this test.</p> <p style="text-align: center;"><b>VEHICLE CONFIGURATION MENU</b></p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 50%; text-align: left;">SETTING TYPE</th> <th style="width: 50%; text-align: left;">ACTIVE SETTING</th> </tr> </thead> <tbody> <tr> <td>O2 Sensor type</td> <td><b>0-1 V</b> <b>0-5 V type A</b> <b>0-5 V type B</b> <b>5-0 V type A</b> <b>5-0 V type B</b> <b>0,8-1,6 V</b></td> </tr> <tr> <td>Type of O2 sensor simulation</td> <td><b>Open circuit</b> <b>Ground simulation</b> <b>Square wave</b></td> </tr> <tr> <td>O2 sensor reading delay</td> <td><b>5-1275 seconds</b></td> </tr> </tbody> </table>	SETTING TYPE	ACTIVE SETTING	O2 Sensor type	<b>0-1 V</b> <b>0-5 V type A</b> <b>0-5 V type B</b> <b>5-0 V type A</b> <b>5-0 V type B</b> <b>0,8-1,6 V</b>	Type of O2 sensor simulation	<b>Open circuit</b> <b>Ground simulation</b> <b>Square wave</b>	O2 sensor reading delay	<b>5-1275 seconds</b>														
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<b>STEPPER MOTOR</b>	<p>The stepper motor has the function of modulating the flow of the GAS taken in by the engine. It maintains optimal values of carburetion in any operational condition. To that end, the <b>"LOVECO-4EU PLUS II"</b> processes the THROTTLE POSITION SENSOR, OXYGEN SENSOR and RPM SIGNALS.</p> <p style="text-align: center;"><b>VEHICLE CONFIGURATION MENU</b></p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 50%; text-align: left;">SETTING TYPE</th> <th style="width: 50%; text-align: left;">ACTIVE SETTING</th> </tr> </thead> <tbody> <tr> <td>Maximum actuator position</td> <td><b>20-240 steps</b></td> </tr> <tr> <td>Minimum actuator position</td> <td><b>20-240 steps</b></td> </tr> <tr> <td>Full throttle option</td> <td><b>DISENGAGED</b> <b>ENGAGED</b></td> </tr> <tr> <td>Actuator position during full throttle</td> <td><b>20-240 steps</b> (to enable this option it is necessary to enter a Full throttle option "ENGAGED" at which this option is engaged)</td> </tr> <tr> <td>Full throttle TPS</td> <td><b>0-5 V</b></td> </tr> <tr> <td>Cut-Off option</td> <td><b>DISENGAGED</b> <b>ENGAGED</b></td> </tr> <tr> <td>Lower RPM Cut-Off threshold</td> <td><b>0-8000 RPM</b> (to enable this option it is necessary to enter a Cut-Off option "ENGAGED" at which this option is engaged)</td> </tr> <tr> <td>Actuator position during Cut-Off</td> <td><b>20-240 steps</b></td> </tr> <tr> <td>Optional default lock</td> <td><b>DISENGAGED</b> <b>ENGAGED</b></td> </tr> <tr> <td>Default locked value</td> <td><b>20-240 steps</b> (to enable this option it is necessary to enter a Optional default lock "ENGAGED" at which this option is engaged)</td> </tr> </tbody> </table>	SETTING TYPE	ACTIVE SETTING	Maximum actuator position	<b>20-240 steps</b>	Minimum actuator position	<b>20-240 steps</b>	Full throttle option	<b>DISENGAGED</b> <b>ENGAGED</b>	Actuator position during full throttle	<b>20-240 steps</b> (to enable this option it is necessary to enter a Full throttle option "ENGAGED" at which this option is engaged)	Full throttle TPS	<b>0-5 V</b>	Cut-Off option	<b>DISENGAGED</b> <b>ENGAGED</b>	Lower RPM Cut-Off threshold	<b>0-8000 RPM</b> (to enable this option it is necessary to enter a Cut-Off option "ENGAGED" at which this option is engaged)	Actuator position during Cut-Off	<b>20-240 steps</b>	Optional default lock	<b>DISENGAGED</b> <b>ENGAGED</b>	Default locked value	<b>20-240 steps</b> (to enable this option it is necessary to enter a Optional default lock "ENGAGED" at which this option is engaged)
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## Wiring diagram for cable BOSCH Type



## Wiring diagram for cable UNIVERSAL Type



# Installation diagram

