Mercury / Venus

ECU Multi point Injection

TECHNICAL SPECIFICATIONS

Date: 12.03.25

Made by: Marco Musso

Revision: 0.1

Cod. PCB:

Cod. Mago: XXXX e XXXX

Approved by: Paolo Mastella

Date: 12.03.25

Revision	Date	Pages Modified	Description	Made by
Rev 0.1	12.03.25	-	Preliminar version	Marco Musso

GENERAL DESCRIPTION

Mercury and Venus (Ecu Gas Injection multi point) are the electronic platform developed by Ecomotive Solutions for the calibration of the petrol engine. It is a specific engine control unit for the electronic management of the Fuel injection of petrol or gas dynamically combined.

This system controls and reduces the quantity of petrol fuel injected or make a full stop of petrol injectors(where it is necessary), and then introduces an amount of gas suitable to leave same horse power of the car engine.

The gas Ecu comunicate run time with the Ecu control engine and send and receive the OBD parameter for adjust the quantity of gas that inject in the manifold.

The ECU communicate also with a PC through serial communication. It is possible to carry out its setup using a dedicated software always developed by Ecomotive Solutions.

PIN CONNECTION

PIN. CONN	32P OBD	4 CIL.	
H4	1	OUT_G1	
G4	2	OUT_G2	
G3	3	OUT_G3	
H3	4	OUT_G4	
A3	5	INJ_ECU1	
B4	6	INJ_ECU2	
D4	7	INJ_ECU3	
F4	8	INJ_ECU4	
A4	9	INJ_B1	
C4	10	INJ_B2	
E4	11	INJ_B3	
F3	12	INJ_B4	
G1	13	GND	
H1	14	+BATT	
G2	15	KEY_IN	
H2	16	KEY_OUT	(Note. 1)
C1	17	+5V_EXT	+VLEVEL(180R)
E2	18	SW_IN	
E3	19	SW_CLK	
D2	20	TEMP	
E1	21	LEVEL	
C2	22	MAP_IN	
D3	23	MAP_IN1	
D1	24	TEMP1	
A1	25	EVGAS1	
A2	26	EVGAS2	
F1	27	RX_PC	

F2	28	TX_PC
B1	29	RPM
B3	30	CAN_H
C3	31	CAN_L
B2	32	ISO_K

PIN. CONN	32P NO_OBD	4 CIL.	
H4	1	OUT_G1	
G4	2	OUT_G2	
G3	3	OUT_G3	
H3	4	OUT_G4	
A3	5	INJ_B1	
B4	6	INJ_B2	
D4	7	INJ_B3	
F4	8	INJ_B4	
A4	9	INJ_ECU1	
C4	10	INJ_ECU2	
E4	11	INJ_ECU3	
F3	12	INJ_ECU4	
G1	13	GND	
H1	14	+BATT	
G2	15	KEY_IN	
H2	16	KEY_OUT	(Note. 1)
C1	17	+5V_EXT	+VLEVEL(180R)
E2	18	SW_IN	
E3	19	SW_CLK	
D2	20	TEMP	
E1	21	LEVEL	
C2	22	MAP_IN	
D3	23	MAP_IN1	
D1	24	TEMP1	
A1	25	EVGAS1	
A2	26	EVGAS2	
F1	27	RX_PC	
F2	28	TX_PC	
B1	29	RPM	
B3	30	LAMB_IN	
C3	31		
B2	32		

Note. The 180R resistor is connected on the green wire of the cable.

FEATURES

- VKEY operational power supply voltage between 10 and 30 V-DC.
- VBAT operating supply voltage between 10 and 16 V-DC.
- Protection against supply voltages polarity inversion.
- Protection of power supplies against transient over-voltages.
- Protection of all inputs from battery or mass short circuit interruptions.
- Monitoring output currents check and circuit overture in case of shorts circuits to ground.
- Circuit over-temperature protection.
- Transient overvoltage resistance (ESD), immunity against electromagnetic interference (EMC), reduced electromagnetic emissions (EMI).
- Integrated Watchdog system which restores device operation within a few milliseconds if the microcontroller fails.
- The microcontroller registers transients and permanent anomalies giving the manufacturer the possibility to detect the stored diagnostic (through a special interface that can be connected to a computer and with dedicated software).
- New generation ST microcontroller with a frequency clock of 180MHz.
- Serial communication with a PC. The data will be stored in the microcontroller's memory.
- 7 analog input 0-5V.
- 4 digital inputs.
- 4 digital outputs.
- 1 input RPM signals.
- 2 12V outputs up to 6A.
- 1 12V output up to 15A (typically used like high-side of gas injectors).
- 1 5V outputs up to 500mA.
- 1 5V output up to 220mA.
- 4 Low-Side outputs up to 12A (4 typically used for peak-hold piloting of gas injectors and 1 typically used to pull to ground for ON/OFF relays).
- 1 CAN Bus up to 1Mbit/sec (it is also possible to work with CAN FD, supported by the microcontroller, by change the transceiver component).
- 1 LIN bus communication.
- Usable in injection systems.
- IP level: IP 65 (mounting with the connector facing down).

FUNCTIONING

Mercury and Venus are a microcontroller device, which allows the management of the SINGLE-FUEL or DUAL-FUEL system by mixing gas (methane or LPG) with petrol.

Fulcrum of the system, is the ECU gas Injection that communicates with the original ECU of the vehicle that block the petro injection time. At the same time, it controls and manages the electromechanical system and the injectors or gas valve for the gas injection.

Gas is managed entirely by the ECU. The device can manage and monitor the entire gas system. It controls different types of mechanical parts and in injection system can operate on 4 gas injectors. It is also able to monitor temperatures (example gas, water), pressures and level of gas fuel.

Mercury and Venus can read the RPM sugnal of the system. In this way, it is possible to read RPM and have a good reference in the map calibration.

To obtain more information, the ECU can read the CAN BUS or ISO-K line (If connected on OBD plug). So, it is possible to communicate with the original system and read more information useful for a better working. The ECU gas is also able to write on CAN line in accord to the original CAN protocol of the original ECU, i.e for erase some data trouble code.

On ECU board, there is a diagnosis that stores all the possible errors. In order to display them, it is possible to connect by using a dedicated software.

Added to this, there is also a serial communication, full-duplex, used to communicate with the PC by a specific adapter and to regulate the parameters and maps time gas corrections. The maps are stored in the flash of the microcontroller.

Mercury and Venus has a double power supply: one fixed at 12V (VBAT) that supplies the high-power section and one sub-key (VKEY) that supplies only circuits part the need to switch off, when the engine if off.

Internal hardware Protections:

1. VBAT power supplies are protected against temporary over-voltage higher than 16V by transil.

2. VKEY power supplies are protected against temporary over-voltage higher than 30V by transil.

3. Low Side drivers have an active clamp circuit that keeps the tension under 45V, in order to avoid over-voltage created by the inductive injector's pilotage. They are also protected against over-voltage by an internal limitation.

4. Every High Side driver has an independent circuit that controls the voltage supplied and blocks temporarily that driver in case of too high voltage or corto circuit versus ground.

5. The analogical inputs operate for voltages from 0 to 5V and can support up to -1V.