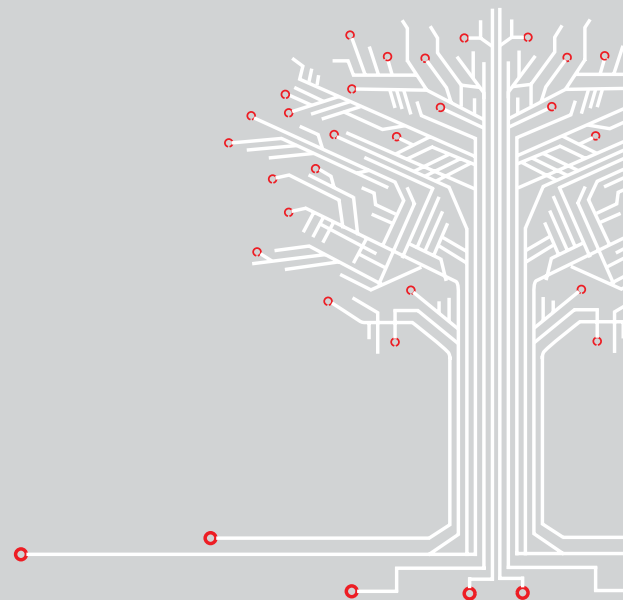


**A.E.B.**<sup>®</sup>

ALTERNATIVE FUEL ELECTRONICS



INJECTION CONTROL UNITS 





# A COMPLETE RANGE OF CONTROL

## INDIRECT INJECTION

AEB ECUs for indirect injection have been designed for a master/slave architecture in Port fuel injection systems with up to 4 cylinders. They are used as injection control modules to drive specific gas injectors, emulate petrol injectors and manage sensors and actuators. These ECUs are able to manage and control the volume of gas in each cylinder.

The vehicle's original ECU manages the petrol and implements engine control strategies; the AEB ECU, by reading the petrol injection time, is able to calculate the correct quantity of gas to inject using the information received from the specific gas sensors (e.g. pressure and temperature). The change-over from petrol to gas occurs automatically once the optimum operating conditions have been reached (engine temperature, gas temperature, etc.).

AEB ECUs perform diagnostics on each ignition, also monitoring every gas component (such as sensors and actuators) to check they are operating correctly. Indeed, in accordance with the R115 regulations, a monitoring function must be implemented on each component which can contribute to emissions in order to detect any malfunctions. In the event of faults, the change-over from gas to petrol is performed automatically in order to guarantee continuity of vehicle operation.

|  | MP32 | MP48 |
|--|------|------|
| NO. CONNECTOR PINS   | 32   | 48   |
| AUTOMATIC CALIBRATION  | ✓    | ✓    |
| READING AND EMULATION OF THE LAMBDA PROBE                    |      | ✓    |
| COIL NEGATIVE REVS READING                                   |      | ✓    |
| REVS READING FROM INJECTION TIMES                            | ✓    | ✓    |
| GAS TEMPERATURE READING AND MANAGEMENT                       |      | ✓    |
| PETROL CONTRIBUTIONS (AT IDLE, AT HIGH REVS)                 |      | ✓    |
| SENSOR AND SWITCH DIAGNOSTICS                                | ✓    | ✓    |
| STATIC DIAGNOSTICS ON SOLENOID VALVES, SWITCH AND INJECTORS  |      | ✓    |
| WIRELESS COMMUNICATION WITH PC                               |      | ✓    |
| NUMBER OF INJECTIONS BETWEEN CYLINDERS IN CHANGE-OVER TO GAS |      | ✓    |

## OBD SEQUENTIAL INJECTION

Like the ECUs for indirect injection, the OBD ECUs for sequential injection are designed for a master/slave architecture in Port fuel injection systems, but have an important additional feature: On-Board Diagnostics.

Thanks to this feature, AEB control units are able to communicate directly with the original vehicle ECU, and are used as an injection control module to drive specific gas injectors, emulate the petrol injectors, and manage sensors and actuators.

Their connection to the original petrol ECU via a CAN or K-line bus allows them to:

- Receive further information on the petrol injector control algorithm
- Implement better gas control strategies
- Obtain better performance in the adaptive gas strategies
- Perform redundant checks on shared sensors (e.g. engine coolant temperature)
- Improve the results of the autocalibration.

The OBD range of sequential ECUs includes models for vehicles from 2 to 10 cylinders.

|  | AEB2001NC     | MP48 OBD      | MP6C          | AEB2568D       | AEB2010 |
|--|---------------|---------------|---------------|----------------|---------|
| NO. CYLINDERS  | 2-3-4         | 2-3-4         | 5-6           | 5-6-8          | 10      |
| OBD COMMUNICATION  | CAN and KLine | CAN and Kline | CAN and Kline | CAN and K-Line | CAN     |
| IGNITION DIAGNOSTICS   | ✓             | ✓             |               |                |         |
| COIL NEGATIVE REVS READING                                   | ✓             | ✓             | ✓             | ✓              | ✓       |
| REVS READING FROM INJECTION TIMES                            | ✓             | ✓             | ✓             | ✓              |         |
| SPLIT FUEL AND START&STOP                                    | ✓             | ✓             |               |                |         |
| NUMBER OF INJECTIONS BETWEEN CYLINDERS IN CHANGE-OVER TO GAS |               | ✓             |               |                |         |
| AUTOMATIC CALIBRATION  |               | ✓             |               |                |         |
| DIAGNOSTICS ON GAS COMPONENTS                                | ✓             | ✓             | ✓             | ✓              | ✓       |
| STATIC DIAGNOSTICS ON SOLENOID VALVES, SWITCH AND INJECTORS  | ✓             | ✓             | ✓             | ✓              | ✓       |
| NO. INDEPENDENT SOLENOID VALVE OUTPUTS                       | 2             | 2             | 2             | 2              | 2       |

# UNITS FOR LPG/CNG CONVERSIONS



## DIRECT INJECTION SYSTEMS

AEB ECUs for vehicles with direct injection conform to a master/slave architecture in direct petrol injection systems (Gasoline Direct Injection, GDI/Fuel Stratified Injection, FSI), that is engines where the petrol injectors are located in the combustion chamber.

These control units have specific internal hardware for reading the petrol commands and emulating the petrol injectors: this is the main characteristic which differentiates them from the OBD family of ECUs.

By interfacing appropriately with the vehicle injection system, these ECUs are able to read and manage the pressure in the petrol fuel rail in order to implement specific control algorithms when running on gas.

In particular, these ECUs implement a fuel dosing strategy to inject petrol into some cylinders while running on gas in order to preserve the petrol injector lubrication and maintain the pressure in the petrol rail within an optimum range.

Like the OBD ECUs, the ECUs for direct injection can be connected to a bus with OBD communication (CAN or K-Line) in order to:

- Receive further information on the petrol control algorithm
- Implement better gas control strategies
- Obtain better performance in the adaptive gas strategies
- Perform redundant checks on shared sensors (e.g. engine coolant temperature)

|   | AEB3000 | DI60 | DI108       |
|---|---------|------|-------------|
| CYLINDERS   | 3-4     | 3-4  | FROM 3 TO 8 |
| ADVANCED PETROL INJECTOR EMULATION                                |         | ✓    | ✓           |
| COMPATIBILITY WITH NEW PETROL ECU DIAGNOSTICS (NISSAN, OPEL, ...) |         | ✓    | ✓           |
| MORE POWERFUL INJECTOR DRIVER                                     |         | ✓    | ✓           |
| AUTOMATIC ACQUISITION AND PETROL INJECTION CURRENT DISPLAY        |         | ✓    | ✓           |
| DEDICATED OUTPUT FOR TIMING ADVANCE PROCESSOR OR EMULATOR         |         | ✓    | ✓           |
| PROPRIETARY CAN COMMUNICATION BUS                                 |         | ✓    | ✓           |
| SENSOR AND SWITCH DIAGNOSTICS                                     | ✓       | ✓    | ✓           |
| STATIC DIAGNOSTICS ON SOLENOID VALVES, SWITCH AND INJECTORS       | ✓       | ✓    | ✓           |
| WIRELESS COMMUNICATION WITH PC                                    | ✓       | ✓    | ✓           |
| LOW STANDBY POWER CONSUMPTION                                     |         | ✓    | ✓           |

## DUAL FUEL INJECTION

The AEB ECU range also includes a DUAL FUEL model: the MP48 DF.

This ECU has been designed to allow the use of a more ecologically friendly fuel (LPG or CNG) on 12V common rail Diesel engines with electronic pump.

Dual Fuel systems allow the simultaneous use of two fuels, in this case Diesel + CNG or Diesel + LPG: the reduction in diesel consumption is obtained by decreasing the injection pressure of the fuel and simultaneously injecting the Gas into the intake manifolds in order to return the engine power to its nominal value.

This device is particularly suitable for Light Duty commercial vehicles with 4-cylinder engines (2000cc - 2500cc) which cover medium-high mileages, as in addition to the cost savings, it also significantly increases the vehicle's range while reducing harmful emissions and particulate matter.

The MP48 DF ECU calculates the quantity of gas to inject in the intake manifold during the gas phase, based on the engine load conditions (pedal, intake air pressure, engine rpm etc.) and the pressure of the diesel in the Common Rail, obtaining a significant reduction in diesel fuel consumption for the same level of performance. This offers a dual benefit: cost savings for the end user, and ecological benefits for the environment due to the significant reduction in pollutant emissions.

Typically, just two gas injectors are required to offset the reduction in diesel flow rate with CNG or LPG.

MP48 DF is equipped with an OBD connection which allows many parameters to be read directly from the engine control unit, allowing tuning of the system to be simplified.

MP48 DF is equipped with gas system diagnostics: any malfunctions in mechanical components create a diagnostic condition and an error warning by the gas ECU. The presence of any errors can be checked directly in the calibration software, both during installation of the system and over the vehicle lifetime: this allows any malfunction problems to be avoided and facilitates repair.



# AND A UNIQUE SOFTWARE PACKAGE

AEB offers a tool equipped with dedicated software for calibration of all its injection ECUs, significantly facilitating tuning. The calibration tool, combined with an external interface, can be connected to AEB injection ECUs to read and modify their operational parameters via a Windows PC. The connection interface can be USB (AEB001N USB) or wireless (AEBZIGBEE). Calibration can be performed either manually or automatically thanks to a dedicated autocalibration algorithm, making installation significantly simpler and faster. Software updates for the calibration tool and Firmware updates for the injection ECUs with new releases and functions are available free of charge for AEB Customers.



### SIMPLICITY ABOVE ALL

THE KEYWORD FOR THIS SOFTWARE IS EASE OF USE. AN INTUITIVE MENU GUIDES THE INSTALLER THROUGH THE STAGES OF CONFIGURING THE VEHICLE AND VIEWING ITS PARAMETERS, DIAGNOSTICS, CALIBRATION AND REPROGRAMMING OF THE ECU.



### FOR FAST, AUTOMATIC CALIBRATION

THANKS TO THE AUTOCALIBRATION FUNCTION, OR MANUAL CALIBRATION USING THE ENGINE OPERATING PARAMETERS DISPLAY, EVEN ON THE OSCILLOSCOPE, CALIBRATION IS ALWAYS OPTIMAL.



### ALSO FOR DIRECT INJECTION

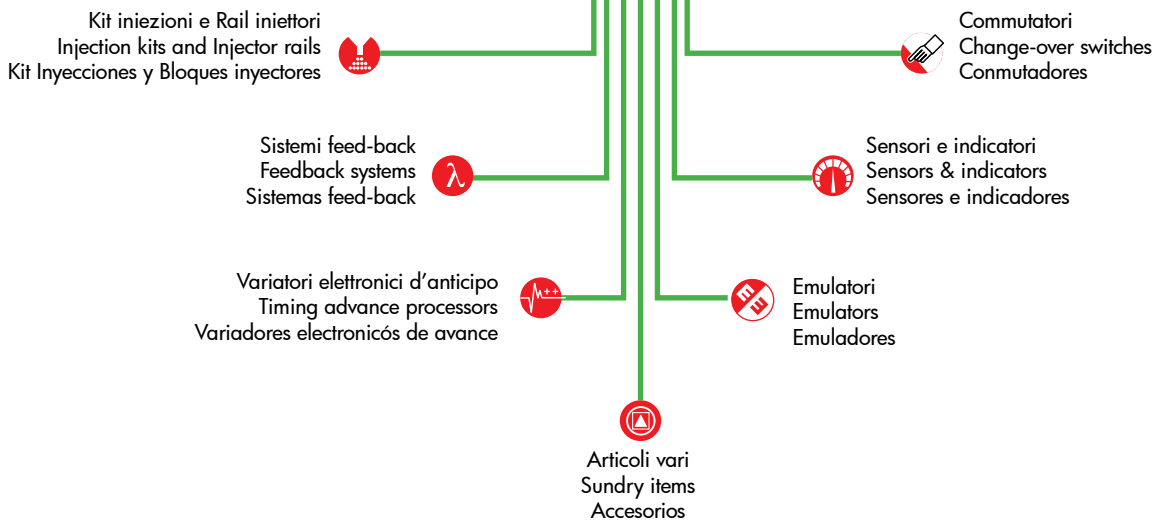
AEB OFFERS DEDICATED CALIBRATION SOFTWARE FOR DIRECT INJECTION ECUS, IN WHICH SPECIAL ATTENTION IS PAID TO DIAGNOSTIC ASPECTS.



### AND DUAL FUEL INJECTION, TOO

AEB OFFERS DEDICATED SOFTWARE FOR DUAL FUEL SYSTEMS: THE PARAMETERS ARE DISPLAYED IN A PARTICULARLY SIMPLE AND CLEAR MANNER.

SCOPRI LA GAMMA COMPLETA DEI NOSTRI PRODOTTI  
DISCOVER THE COMPLETE RANGE OF OUR PRODUCTS  
DESCUBRA LA GAMA COMPLETA DE NUESTROS PRODUCTOS



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