



IMPIANTO FILTRO ANTIPARTICOLATO

290/295 - Ducato FL 2014

PARTICULATE FILTER SYSTEM - DESCRIPTION

An electronic control system supervises and governs all engine parameters to optimise performance and fuel consumption by means of a real-time response to different operation conditions.

E5050 DIESEL ENGINES ELECTRONIC MANAGEMENT

To comply with the current (EURO 6) pollution control regulations, the most recent version of electronic management which includes new components, a periodic trap oxidizer (D.P.F. - Diesel Particulate Filter) together with a new catalytic converter has been adopted.

The oxidation-reduction catalytic converter is a post-treatment device used for oxidising the carbon oxide (CO), the hydrocarbons (HC), the nitrogen oxides (NOx) and the particulate (PM), transforming them into carbon dioxide (CO₂) and aqueous vapour (H₂O).

The exhaust gases passing through the cells heat the catalytic converter, triggering the conversion of pollutants into inert compounds.

The periodic trap oxidizer (D.P.F.) is a mechanical filter, inserted in the exhaust pipes downstream of the catalyst, which traps the carbon particles (PM) still present in the exhaust gases on Diesel engines. This filter makes it possible to almost totally eliminate the emission of carbon particles in line with current legislation.

For this version (EURO 6 FULL), five specific sensors (one for pressure and four for exhaust gas temperature) inform the Engine Control Module on operation of catalytic converter and the particulate trap; in details:

- the differential pressure sensor constantly measures the difference in pressure between the inlet and outlet of the particulate filter: this measurement makes it possible to determine the filter blockage level;
- a temperature sensor located on the pipe in low pressure from EGR solenoid valve to air intake manifold, allows to measure the temperature of exhaust gas re-issued in intake;
- a temperature sensor located upstream of the catalytic converter, allows to measure the temperature of exhaust gas entering the post-treatment system;
- a temperature sensor located upstream of the periodic trap oxidizer (D.P.F.) but downstream of catalytic converter, allows to measure the temperature of exhaust gas exiting from the catalytic converter but before being introduced in the periodic trap oxidizer (D.P.F.);
- a temperature sensor located downstream of the DPF, allows to measure the temperature of exhaust gas exiting the post-treatment system.

This regeneration is carried out automatically by the Powertrain Control Module on the basis of information provided by the sensors and if particular usage conditions are satisfied.

During the normal usage of the vehicle, the engine control module records a series of data related to usage (period of usage, type of journey, temperatures reached, etc.) and empirically calculates the quantity of particulates accumulated in the filter.

The trap is an accumulation system and should be periodically regenerated (cleaned) by burning the carbon particles in excess.

During the regeneration, the following phenomena might occur: limited increase in the engine idle speed, fan activation, a limited increase in fumes and high temperatures at the exhaust. These are not faults; they do not impair vehicle performance.

The instrument panel provides the information necessary for the management of the filter regeneration process by means of warning lights and messages.

The switching on of the "DPF (particulate trap) cleaning in progress" warning light in fixed mode and the displaying of a message for versions where feasible, involve the need to eliminate the pollutants trapped in the filter through a regeneration process. Regeneration requires to perform a driving cycle so that the vehicle runs until the end of the same process.

The switching on of the warning light does not occur when the DPF is being regenerated, rather when the system recognises that this is necessary depending on the detected conditions.

It is possible, during the filter regeneration stage, that the particulate being "washed" may pollute the engine oil.

For this reason, the warning light "engine oil degraded" is activated in flashing mode, along with a dedicated message (where provided) displayed on the instrument panel to indicate the need to replace the engine oil.

When further thresholds of engine oil degradation are reached without any change, the "EOBD/injection system failure" warning light switches on, thus limiting the engine revolutions.



The engine oil change should be carried out by the Service Network.



Changing the oil should be followed by resetting the parameter that involves the quantity and by the switching off of the warning light in the Instrument Panel.

The system is controlled by a dedicated relay switch in the engine compartment junction control unit. Lines supplying the engine control unit and various system components (sensors and actuators) are protected by dedicated fuses that are also located inside the engine compartment junction unit.

"ON DEMAND" FORCED REGENERATION

For company fleets, there is a self-adaptive system with "on demand" forced regeneration procedure.

The vehicle is provided with an innovative DPF electronic management system, specifically developed for those who cover very short distances, characterised by regular engine starting and stopping.

The electronic control unit constantly monitors the driving style and the type of routes travelled to manage the DPF regeneration with self-adaptive logic, thus allowing optimisation of the engine oil replacement intervals and an improved use of the vehicle.

Only in the case that the electronic control unit detects a use of the vehicle which does not allow the completion of the automatic DPF regeneration cycle, it will be necessary to intervene to activate the procedure.


Any constant switching on of the "DPF warning light" during travel signals particularly demanding use of the vehicle in terms of complete regeneration of the DPF and that it could not be completed automatically.

In this case, the DPF warning light appears on the instrument panels on and the following message is shown on the display: "DPF cleaning: regenerate see handbook". It is then necessary, within 100 km from the appearance of the indication, to carry out "on demand" forced regeneration, as in the procedure indicated below:

1. check that the engine is warm (engine coolant temperature gauge at halfway point);
2. position the vehicle on level ground;
3. engage the handbrake;
4. stop the engine (key in STOP position) and open the bonnet;
5. put the gear lever in neutral (N for versions with automatic transmission);
6. turn the ignition key to the MAR position;
7. fully depress the accelerator pedal and the brake pedal SIMULTANEOUSLY for 10 seconds;
8. if the manoeuvre was carried out correctly, the DPF warning light will start to flash on the instrument panel and the message will be displayed simultaneously: "DPF cleaning: start engine and keep the vehicle still";
9. release both pedals;
10. start the engine, without pressing the accelerator pedal or the clutch pedal, turning the key to AVV (if the engine fails to start, repeat the procedure from point 4);
11. the engine speed will gradually be brought to 2000 rpm automatically;
12. during the regeneration process, DO NOT press any pedal (accelerator, brake, clutch); otherwise, it is interrupted, and it will be necessary to repeat the process from point 4.

Throughout the procedure, the "spy DPF" continues to flash.

The "DPF warning light" switches off when the regeneration procedure has finished, and the engine speed returns to the normal level. When the warning light switches off, after closing the bonnet, the vehicle can be moved.

 should the regeneration procedure be carried out following the switching on of the "INJECTION SYSTEM FAILURE" warning light, and in any case within the five hours, to switch it off start the engine three times in a row. If the "INJECTION SYSTEM FAILURE" and/or "DPF" warning lights stay on, contact a Fiat Dealership.

PARTICULATE FILTER SYSTEM - FUNCTIONAL DESCRIPTION

Engine management control unit M010 controls and governs the entire electronic ignition and injection system and the particulate filter with its catalytic converter.

The direct battery power supply arrives, via a line protected by fuse F18 of the engine compartment relay module box B001 (pin 23 of connector C) at pin 91 of connector B of M010. An ignition-operated supply (15/54) is received at pin 75 of connector B of M010 from a line protected by fuse F16 of B001 (pin 9 of connector C).

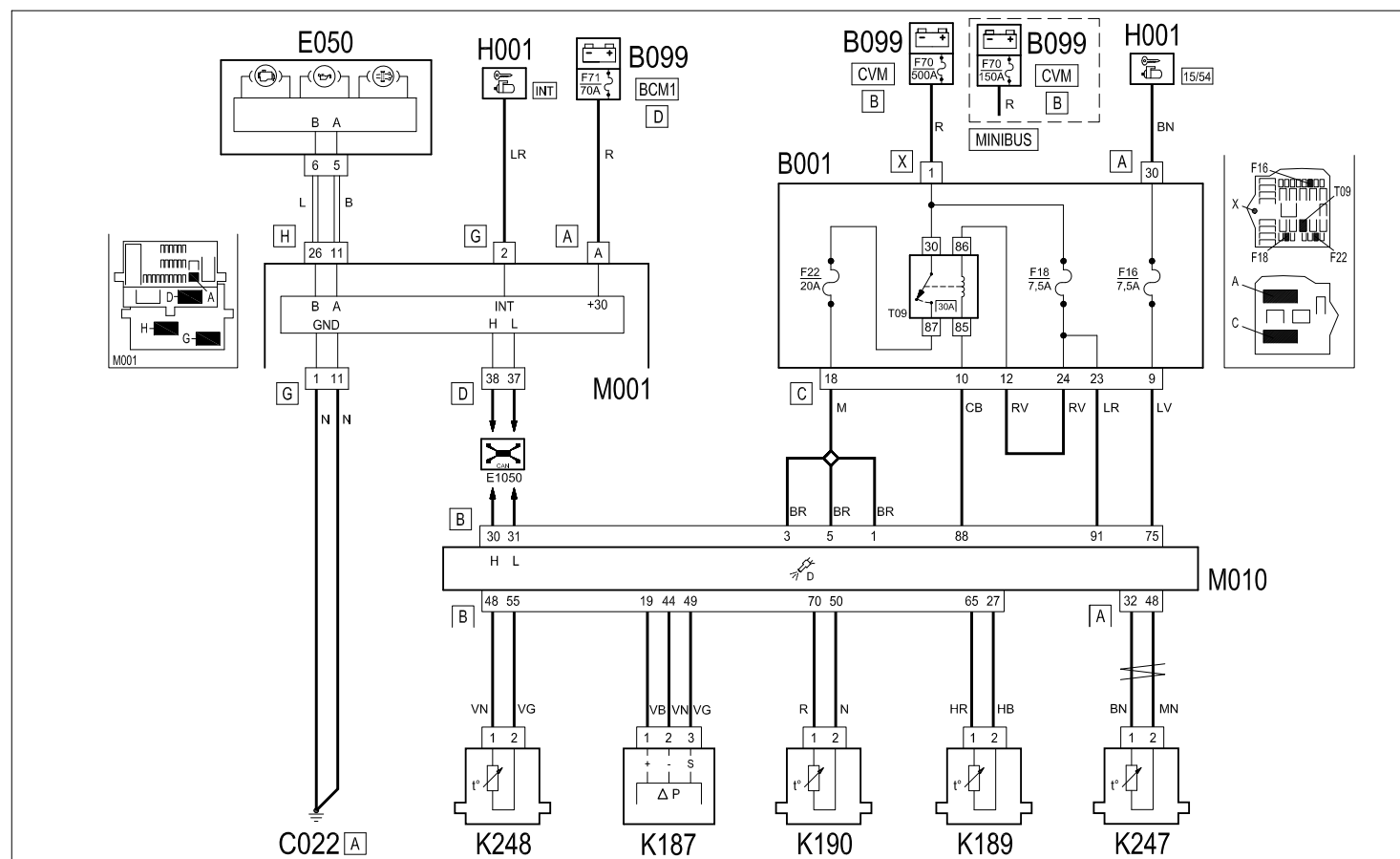
The main injection relay switch T09 of control module B001 controls the entire system: the coil is supplied by the line which is protected by fuse F18 of B001. The coil is then energised by an earth signal from pin 88 of connector B of control module M010 and sends a power supply to pin 1, 3 and 5 of connector B of the control module, through the line protected by fuse F22 of B001 (pin 18 of connector C).

The Engine Control Module M010 receives signals from the different sensors thereby controlling all the engine operating parameters; in particular there are five specific sensors for managing the operation of the periodic trap oxidizer (D.P.F.) and of the catalytic converter:

- the differential pressure sensor K187 receives a power supply from the control module M010 from pin 19 of connector B and a reference earth from pin 44 of connector B and sends a signal proportional to the pressure to pin 49 of connector B of M010;
- the temperature sensor on the pipe in low pressure from EGR solenoid valve to intake manifold K247 receives a reference earth from pin 48 of connector A of Engine Control Module M010 and provides a signal proportional to the temperature measured at pin 32 of connector A of M010 itself;
- the temperature sensor upstream of catalytic converter K248 receives a reference earth from pin 55 of connector B of engine control module M010 and supplies a signal proportional to the temperature measured at pin 48 of connector B of M010 itself;
- the temperature sensor upstream of the periodic trap oxidizer (D.P.F.) K189 receives a reference earth from pin 27 of connector B of engine control module M010 and supplies a signal proportional to the temperature measured at pin 65 of connector B of M010 itself;
- the temperature sensor downstream of the periodic trap oxidizer (D.P.F.) K190 receives a reference earth from pin 50 of connector B of engine control module M010 and supplies a signal proportional to the temperature measured at pin 70 of connector B of M010 itself.

The control unit M010 (pins 30 and 31 of connector B) is then connected, via the C-CAN, to the Body Computer M001 (pins 38 and 37 of connector D); the Body Computer M001, via a dedicated gateway, sends this information, via the B-CAN, to the instrument panel E050, thereby controlling the switching on of the "engine oil degraded", "EOBD / injection system failure" and "DPF (particulate trap) cleaning in progress" warning lights, with the display of the dedicated messages.

PARTICULATE FILTER SYSTEM - WIRING DIAGRAM



PARTICULATE FILTER SYSTEM - COMPONENT LOCATION

