S SERIES EURO V

Application to vehicles

F1CE3481

Technical and Repair manual

This publication provides unit and relevant component repair data, specifications, instructions and methodologies.

This publication has been drawn up for qualified and specialised personnel.

Before performing any operation check that the part relevant to the unit on which you must work is available along with all safety devices for accident-prevention, such as, goggles, helmet, gloves, shoes, etc. and hoisting and transporting equipment.

Operations are to be performed by following the indications included here, using the special equipment indicated and assuring proper repair, compliance with schedule and operator's safety requirements.

Each repair must aim to restore operating efficiency and safety in compliance with the FPT provisions.

FPT cannot be held liable for modifications, alterations or other interventions non authorised by FPT on the vehicle and if the unit is warranted the above mentioned interventions will cause its expiration.

FPT is not liable for repairing interventions.

FPT will provide further details required to carry out the interventions and all the instructions that are not included on this publication.

Data included in this publication may not be up-to-date therefore subject to Manufacturer's modifications that can be added at any time for technical or commercial purposes and also to meet new law regulations in other Countries.

If issues on this publication differ from what is actually noticed on the unit, please get in touch with the FPT network before starting any intervention".

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S SERIE EURO V

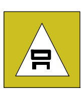
S Serie F1CE **Part 1**

PREFACE TO USER'S GUIDELINE MANUAL

Manuals for repairs are split into Parts and Sections, each one of which is marked by a numeral; the contents of these sections are indicated in the general table of contents.
The sections dealing with things mechanic introduce the specifications, tightening torque values, tool lists, assembly detaching/reattaching operations, bench overhauling operations, diagnosis procedures and maintenance schedules.
The sections (or parts) of the electric/electronic system include the descriptions of the electric network and the assembly's electronic systems, wiring diagrams, electric features of components, component coding and the diagnosis procedures for the control units peculiar to the electric system.
Section 1 describes the engine illustrating its features and working in general.
Section 2 describes the type of fuel feed.
Section 3 relates to the specific duty and is divided in four separate parts:
1. Mechanical part, related to the engine overhaul, limited to those components with different characteristics based on the relating specific duty.
2. Electrical part, concerning wiring harness, electrical and electronic equipment with different characteristics based on the relating specific duty.
3. Maintenance planning and specific overhaul.
4. Troubleshooting part dedicated to the operators who, being entitled to provide technical assistance, shall have simple and direct instructions to identify the cause of the major inconveniences.
Sections 4 and 5 illustrate the overhaul operations of the engine overhaul on stand and the necessary equipment to execute such operations.
The appendix contains a list of the general safety regulations to be respected by all installation and maintenance engineers in order to prevent serious accidents taking place.
The manual uses proper symbols in its descriptions; the purpose of these symbols is to classify contained information. In particular, there have been defined a set of symbols to classify warnings and a set for assistance operations.

SYMBOLS - Warnings

Danger for persons
Missing or incomplete observance of these prescriptions can cause serious danger for persons' safety.



Danger of serious damage for the assembly
Failure to comply, both fully or in part, with such prescriptions will involve serious damage to the assembly and may sometimes cause the warranty to become null and void.

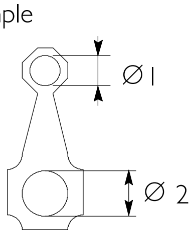
General danger
It includes the dangers of above described signals.

Environment protection
Moreover, it describes the correct actions to be taken to ensure that the assembly is used in such a way so as to protect the environment as much as possible.

NOTE It indicates an additional explanation for a piece of information.

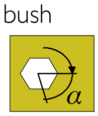
Service operations

Example



Ø 1 = housing for connecting rod small end bush

Ø 2 = housing for connecting rod bearings



Tighten to torque
Tighten to torque + angular value

GENERAL WARNINGS

Warnings shown cannot be representative of all danger situations possibly occurring. Therefore, it is suggested to contact immediate superiors where a danger situation occurs which is not described.

Use both specific and general-purpose toolings according to the prescriptions contained in respective use and maintenance handbooks. Check use state and suitability of tools not subjected to regular check.

The manual handling of loads must be assessed in advance because it also depends, besides weight, on its size and on the path.

Handling by mechanical means must be with hoisters proper as for weight as well as for shape and volume. Hoisters, ropes and hooks used must contain clear indications on maximum carrying capacity acceptable. The use of said means is compulsorily permitted to authorised personnel only. Stay duly clear of the load, and, anyhow, never under it.

In disassembling operations, always observe provided prescriptions; prevent mechanical parts being taken out from accidentally striking workshop personnel.

Workshop jobs performed in pairs must always be performed in maximum safety; avoid operations which could be dangerous for the co-operator because of lack of visibility or of his/her not correct position.

Keep personnel not authorised to operations clear of working area.

You shall get familiar with the operating and safety instructions for the assembly prior to operating on the latter. Strictly follow all the safety indications found on the assembly.

Do not leave the running assembly unattended when making repairs.

When carrying out work on the assembly lifted off the ground, verify that the assembly is firmly placed on its supporting stands, and that the manual/automatic safety devices have been actuated in the event that the assembly is to be lifted by means of a hoist.

When you have to operate on assemblies powered by natural gas, follow the instructions contained in the document, as well as all the specific safety standards provided for.

Only remove radiator cap when the engine is cold by cautiously unscrewing it in order to let system residual pressure out.

Inflammable fuel and all inflammable fluids and liquids must be handled with care, according to what contained on harmful materials 16-point cards. Refuelling must be performed outdoors with the engine off, avoiding lit cigarettes, free flames or sparks in order to prevent sudden fires/bursts. Adequately store inflammable, corrosive and polluting fluids and liquids according to what provided by regulations in force. Compulsorily avoid to use food containers to store harmful liquids. Avoid to drill or bore pressurised containers, and throw cloths impregnated with inflammable substances into suitable containers.

Worn out, damaged or consumable parts must be replaced by original spares.

During workshop activity, always keep the work place clean; timely clear or clean floors from accidental liquid or oil spots. Electric sockets and electric equipment necessary to perform repair interventions must meet safety rules.

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Put on, where required by the intervention, garments and protections provided in accident prevention rules; contact with moving parts can cause serious injuries. Use suitable, preferably tight-fitted garments, and avoid to use jewels, scarves, etc.

Do not leave the engine in motion at workshop locations not provided with a pipe to scavenge exhaust gas outside.

Avoid to breathe fumes coming from heating or from paint welding because they can cause damages to health; operate outdoors or in suitably ventilated areas. Put on proper inspirator if paint powder is present.

Avoid contact with hot water or steam coming from the engine, radiator and pipings because they could cause serious burns. Avoid direct contact with liquids and fluids present in vehicle systems; where an accidental contact has occurred, refer to 16-point cards for provisions to make.

Clean the assemblies and carefully verify that they are intact prior to overhauling. Tidy up detached or disassembled parts with their securing elements (screws, nuts, etc.) into special containers.

Check for the integrity of the parts which prevent screws from being unscrewed: broken washers, dowels, clips, etc. Self-locking nuts with an insert made of nylon must always be replaced.

Avoid contact of rubber parts with diesel oil, petrol or other not compatible substances.

Before washing under pressure mechanical parts, protect electric connectors, and central units, if present.

Tightening screws and nuts must always be according to prescriptions; FPT commercial and assistance network is available to give all clarifications necessary to perform repair interventions not provided in this document.

Before welding:

- ❑ Disconnect all electronic central units, take power cable off battery positive terminal (connect it to chassis bonding) and detach connectors.
- ❑ Remove paint by using proper solvents or paint removers and clean relevant surfices with soap and water.
- ❑ Await about 15 minutes before welding.
- ❑ Equip with suitable fire resistant protections to protect hoses or other components where fluids or other materials flow which may catch fire easily on welding.

Should the vehicle be subjected to temperatures exceeding 80°C (dryer ovens), disassemble drive electronic central units.

The disposal of all liquids and fluids must be performed with full observance of specific rules in force.

GENERAL WARNINGS ON THE ELECTRIC SYSTEM

If an intervention has to be made on the electric/electronic system, disconnect batteries from the system; in this case, always disconnect, as a first one, the chassis bonding cable from batteries negative terminal.

Before connecting the batteries to the system, make sure that the system is well isolated.

Disconnect the external recharging apparatus from the public utility network before taking apparatus pins off battery terminals.

Do not cause sparks to be generated in checking if the circuit is energised.

Do not use a test lamp in checking circuit continuity, but only use proper control apparatuses.

Make sure that the electronic devices wiring harnesses (length, lead type, location, strapping, connection to screening braiding, bonding, etc.) comply with FPT system and are carefully recovered after repair or maintenance interventions.

Measurements in drive electronic central units, plugged connections and electric connections to components can only be made on proper testing lines with special plugs and plug bushes. Never use improper means like wires, screwdrivers, clips and the like in order to avoid the danger of causing a short circuit, as well as of damaging plugged connections, which would later cause contact problems.

To start up the engine, do not use fast chargers. Start up must only be performed with either separate batteries or special truck.

A wrong polarisation of supply voltage in drive electronic central units (for instance, a wrong polarisation of batteries) can cause them to be destroyed.

Disconnect the batteries from the system during their recharging with an external apparatus.

On connecting, only screw up connector (temperature sensors, pressure sensors etc.) nuts at prescribed tightening torque.

Before disconnecting the junction connector from an electronic central unit, isolate the system.

Do not directly supply electronic central units servo components at nominal vehicle voltage.

Cables must be arranged such as to result to be parallel to reference plane, i.e. as close as possible to chassis/body structure.

Once the intervention on the electric system has been completed, recover connectors and wiring harnesses according to original arrangement.

NOTE Connectors present must be seen from cable side. Connectors views contained in the manual are representative of cable side.

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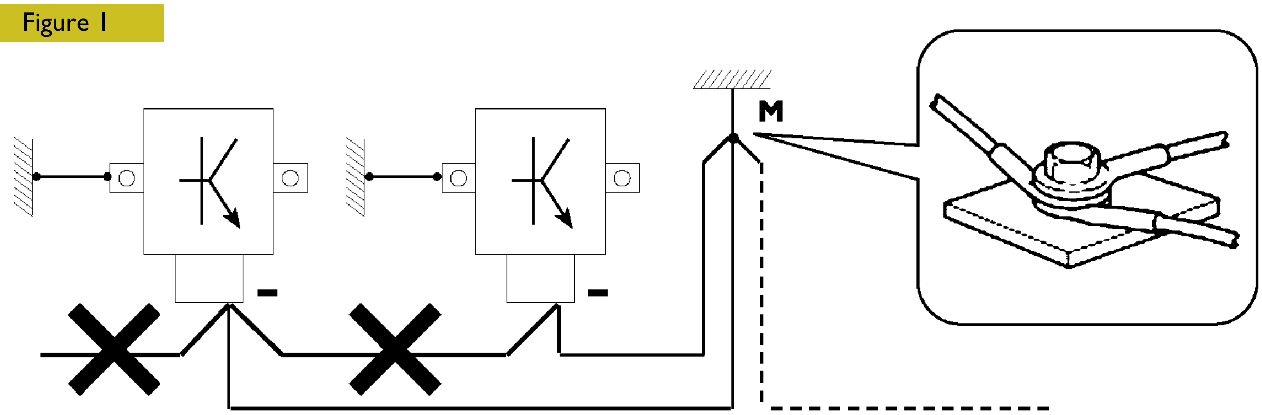
Bonding and screening

Negative leads connected to a system bonded point must be both as short and possible and "star"-connected to each other, trying then to have their centering tidily and properly made (Figure 1, re. M).

Further, following warnings are to be compulsorily observed for electronic components:

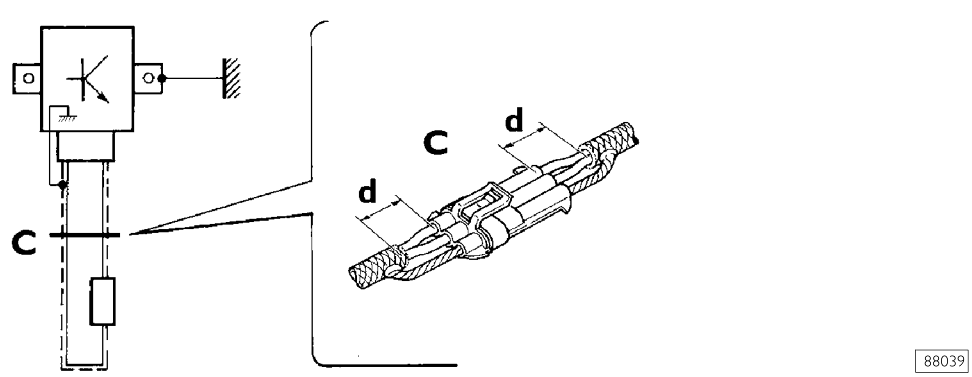
- Electronic central units must be connected to system bonding when they are provided with a metallic shell.
- Electronic central units negative cables must be connected both to a system bonding point such as the dashboard opening bonding (avoiding "serial" or "chain" connections), and to battery negative terminal.
- Analog bonding (sensors), although not connected to battery negative system/terminal bonding, must have optimal isolation. Consequently, particularly considered must be parasitic resistances in lugs: oxidising, clinching defects, etc.
- Screened circuits braiding must only electrically contact the end towards the central unit entered by the signal (Figure 2).
- If junction connectors are present, unscreened section **d**, near them, must be as short as possible (Figure 2).
- Cables must be arranged such as to result to be parallel to reference plane, i.e. as close as possible to chassis/body structure.

Figure 1



1. NEGATIVE CABLES "STAR" CONNECTION TO SYSTEM BONDING M

Figure 2



2. SCREENING THROUGH METALLIC BRAIDING OF A CABLE TO AN ELECTRONIC COMPONENT – **C.** CONNECTOR
d. DISTANCE → 0

CONVERSIONS BETWEEN THE MAIN UNITS OF MEASUREMENT OF THE INTERNATIONAL SYSTEM AND MOST USED DERIVED QUANTITIES

Power

1 kW	=	1.36 metric HP
1 kW	=	1.34 HP
1 metric HP	=	0.736 kW
1 metric HP	=	0.986 HP
1 HP	=	0.746 kW
1 HP	=	1.014 metric HP

Torque

1 Nm	=	0.1019 kgm
1 kgm	=	9.81 Nm

Revolutions per time unit

1 rad/s	=	1 rpm x 0.1046
1 rpm	=	1 rad/s x 9.5602

Pressure

1 bar	=	1.02 kg/cm^2
1 kg/cm^2	=	0.981 bar
1 bar	=	10^5 Pa

Where accuracy is not particularly needed:

- Nm unit is for the sake of simplicity converted into kgm according to ratio 10:1

1 kgm = 10 Nm;

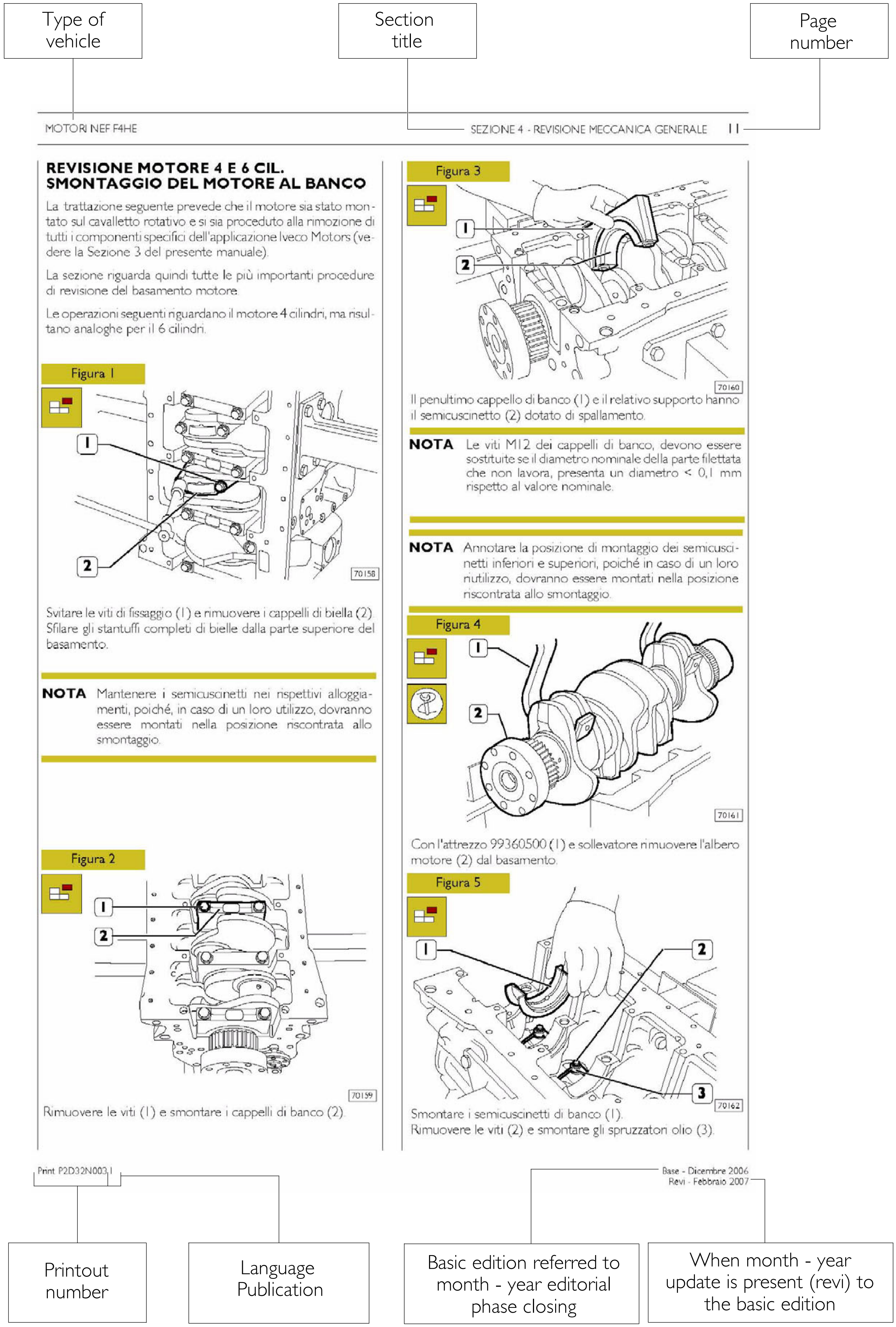
- bar unit is for the sake of simplicity converted into kg/cm^2 according to ratio 1:1

1 kg/cm^2 = 1 bar.

Temperature

0° C = 32° F
1° C = (1 x 1.8 + 32) ° F

KEY OF LECTURE OF THE HEADINGS AND FOOTNOTES



MOTORI NEF F4HE SEZIONE 4 - REVISIONE MECCANICA GENERALE 11

REVISIONE MOTORE 4 E 6 CIL.
SMONTAGGIO DEL MOTORE AL BANCO

La trattazione seguente prevede che il motore sia stato montato sul cavalletto rotativo e si sia proceduto alla rimozione di tutti i componenti specifici dell'applicazione Iveco Motors (vedere la Sezione 3 del presente manuale).

La sezione riguarda quindi tutte le più importanti procedure di revisione del basamento motore.

Le operazioni seguenti riguardano il motore 4 cilindri, ma risultano analoghe per il 6 cilindri.

Figura 1

70158

Svitare le viti di fissaggio (1) e rimuovere i cappelli di biella (2). Sfilare gli stantuffi completi di bielle dalla parte superiore del basamento.

NOTA Mantenere i semicuscinetti nei rispettivi alloggiamenti, poiché, in caso di un loro utilizzo, dovranno essere montati nella posizione riscontrata allo smontaggio.

Figura 2

70159

Rimuovere le viti (1) e smontare i cappelli di banco (2).

Figura 3

70160

Il penultimo cappello di banco (1) e il relativo supporto hanno il semicuscinetto (2) dotato di spallamento.

NOTA Le viti M12 dei cappelli di banco, devono essere sostituite se il diametro nominale della parte filettata che non lavora, presenta un diametro < 0,1 mm rispetto al valore nominale.

NOTA Annotare la posizione di montaggio dei semicuscinetti inferiori e superiori, poiché in caso di un loro riutilizzo, dovranno essere montati nella posizione riscontrata allo smontaggio.

Figura 4

70161

Con l'attrezzo 99360500 (1) e sollevatore rimuovere l'albero motore (2) dal basamento.

Figura 5

70162

Smontare i semicuscinetti di banco (1).
Rimuovere le viti (2) e smontare gli spruzzatori olio (3).

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Base - Dicembre 2006
Revi - Febbraio 2007

Part 1
F1CE3481 ENGINES

	Removal Disconnection
	Reinstallation Connection
	Removal Disassembly
	Positioning Assembly
	Tighten to torque
	Tighten to torque + angle value
	Press or caulk
	Regulation Adjustment
	Visual inspection Installation position check
	Measurement Value to find Check
	Equipment
	Surface for machining Machine finish
	Interference Strained assembly
	Thickness Clearance
	Lubrication Damp Grease
	Sealant Adhesive
	Air bleeding

	Intake
	Exhaust
	Operation
ρ	Compression ratio
	Tolerance Weight difference
	Rolling torque
	Rotation
	Angle Angular value
	Preload
	Number of revolutions
	Temperature
	Pressure
>	Oversized Greater than.... Maximum, peak
<	Undersized Less than.... Minimum
	Selection Classes Oversizing
	Temperature < 0°C (32°F) Cold Winter
	Temperature > 0°C (32°F) Hot Summer

UPDATING

Section	Description	Page	Date of revision

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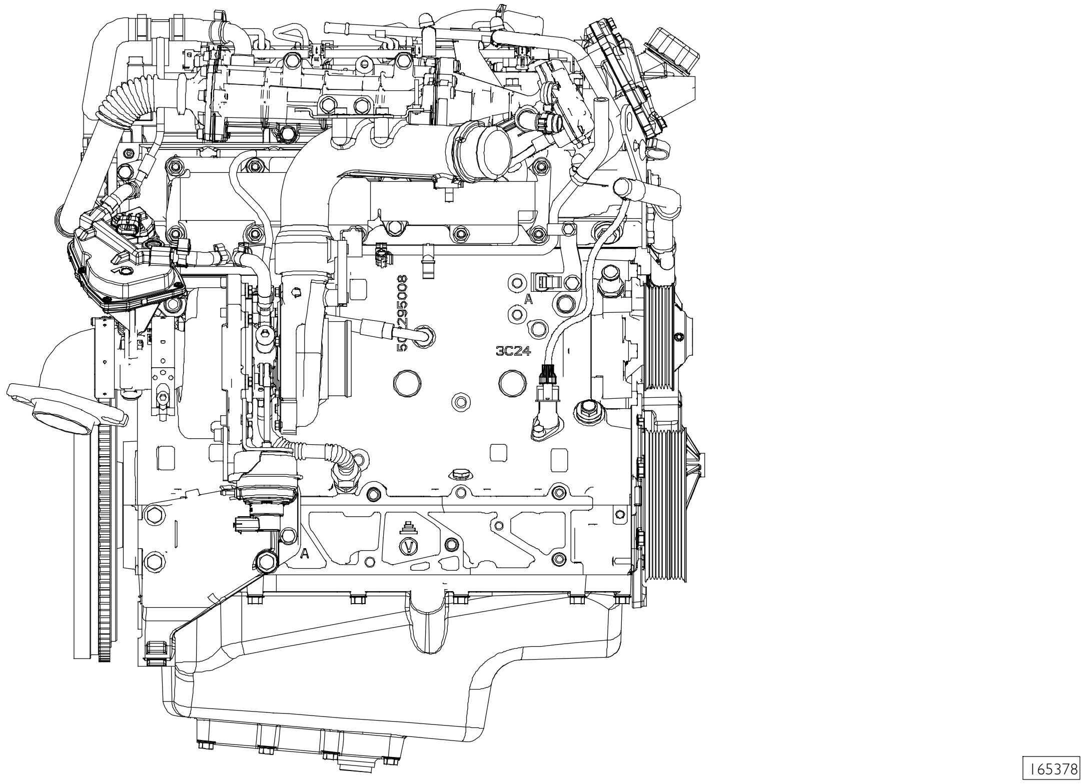
SECTION 1
General specifications

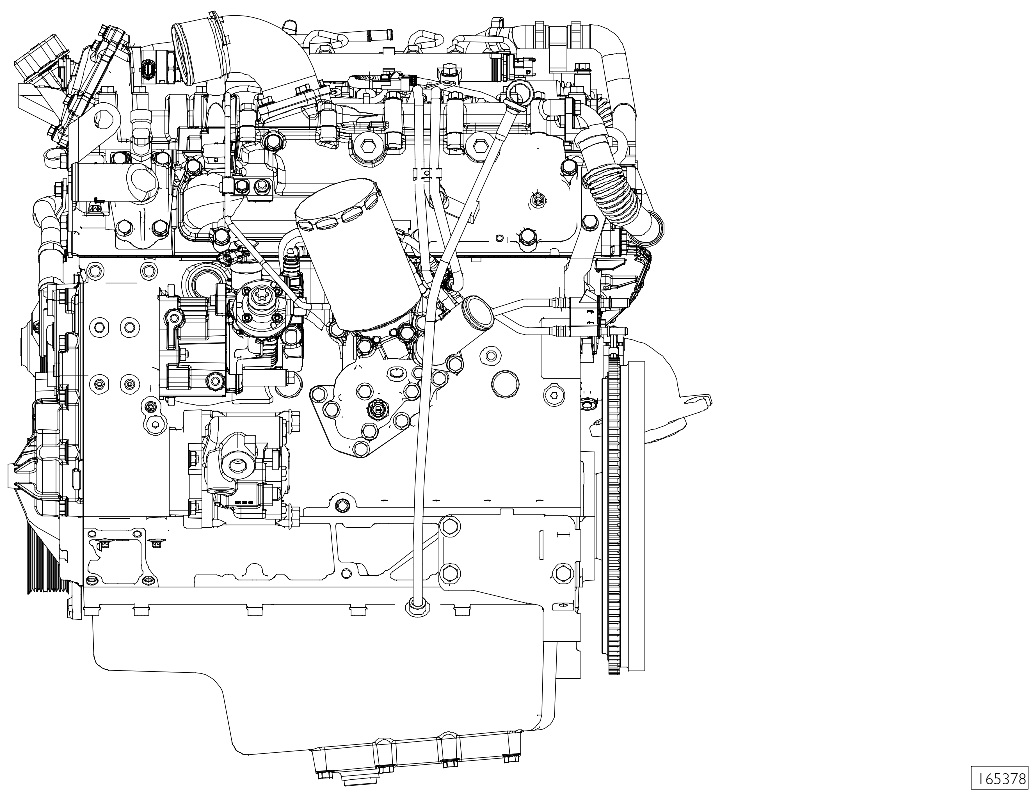
VIEWS OF ENGINE F1CE3481A/R

Figure 1



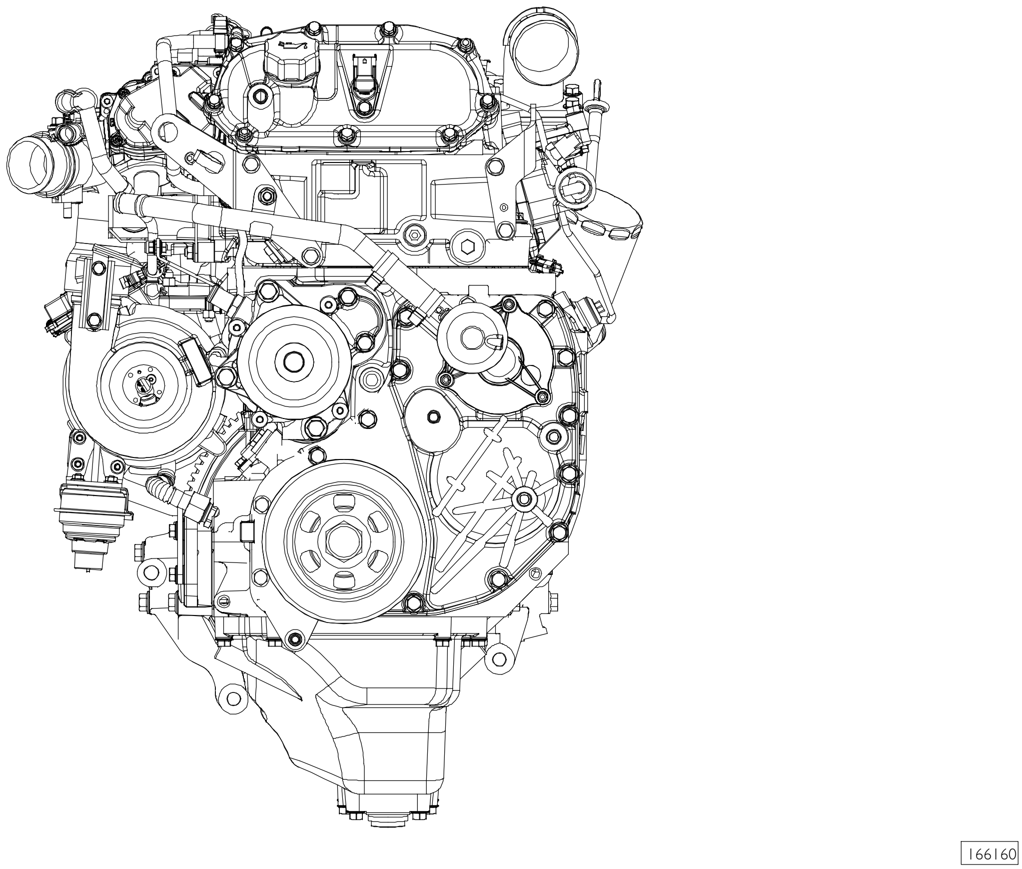
LEFT-HAND SIDE VIEW

Figure 2



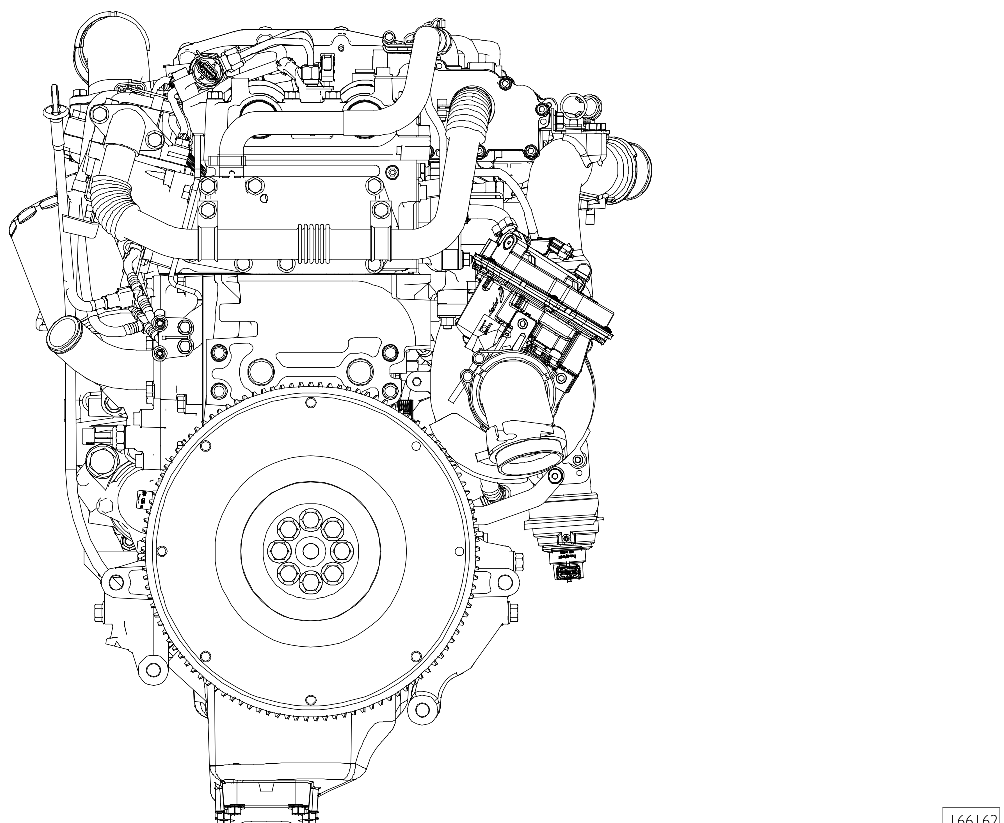
RIGHT-HAND SIDE VIEW

Figure 3



FRONT VIEW

Figure 4



REAR VIEW

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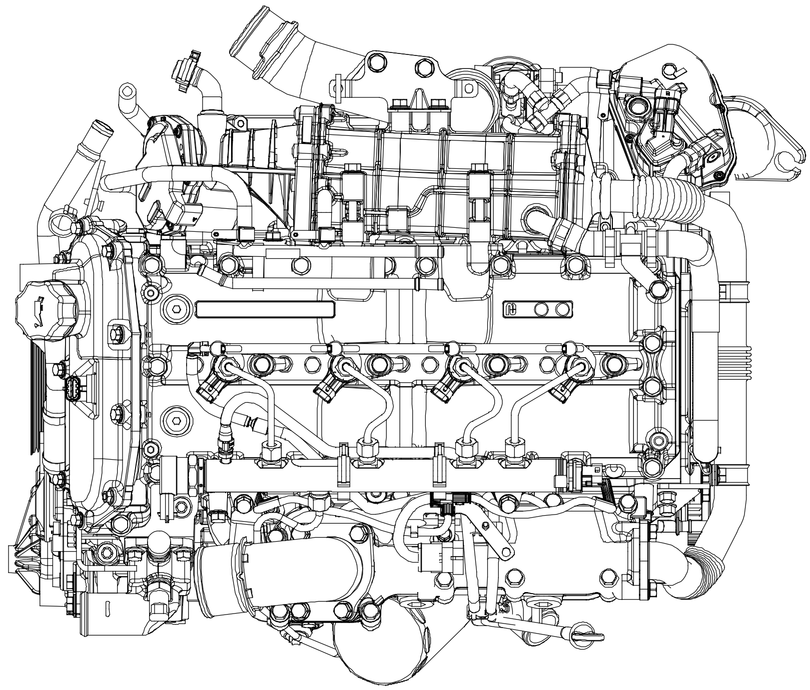
Figure 5



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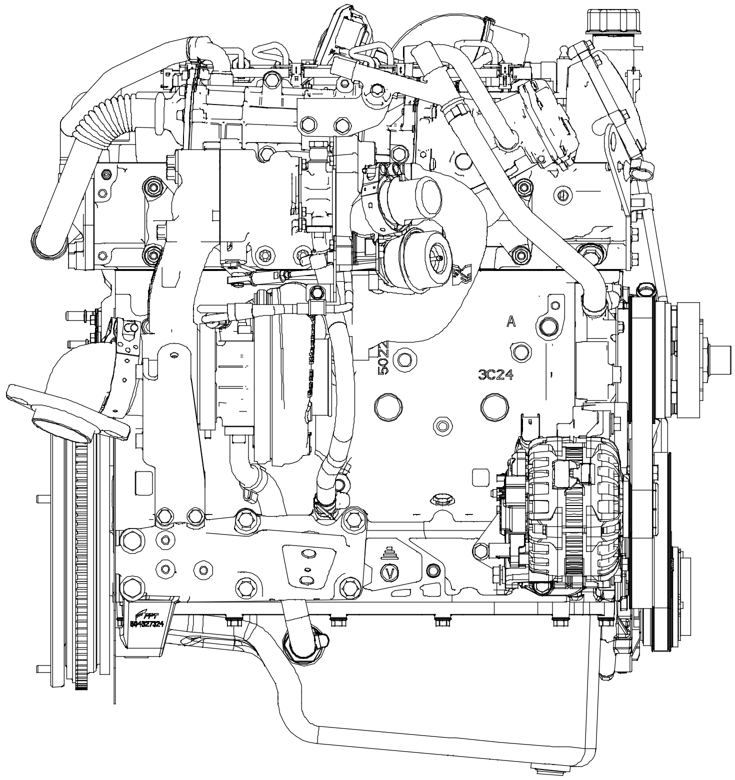
TOP VIEW

F1CE3481C*C124

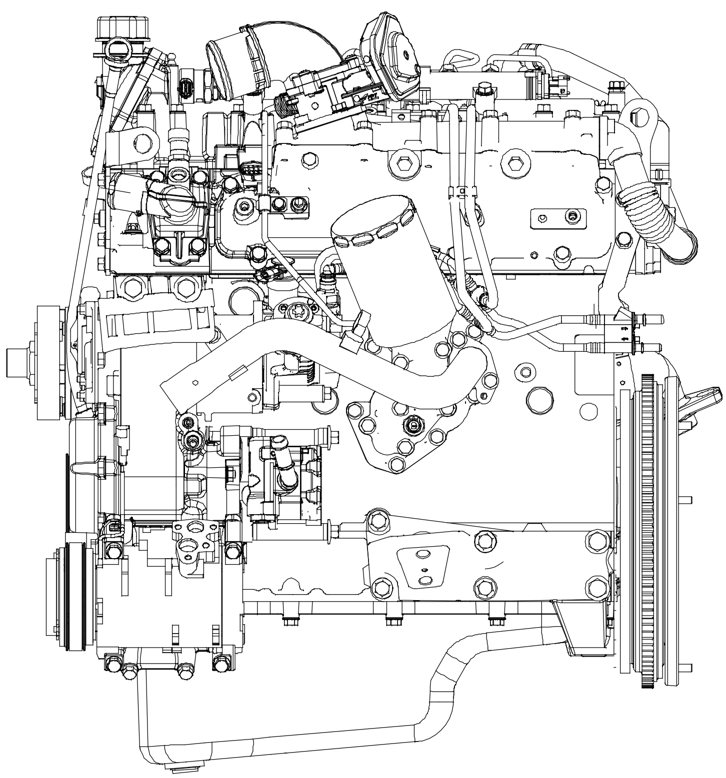
Figure 6



165376

LEFT-HAND SIDE VIEW

Figure 7



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RIGHT-HAND SIDE VIEW

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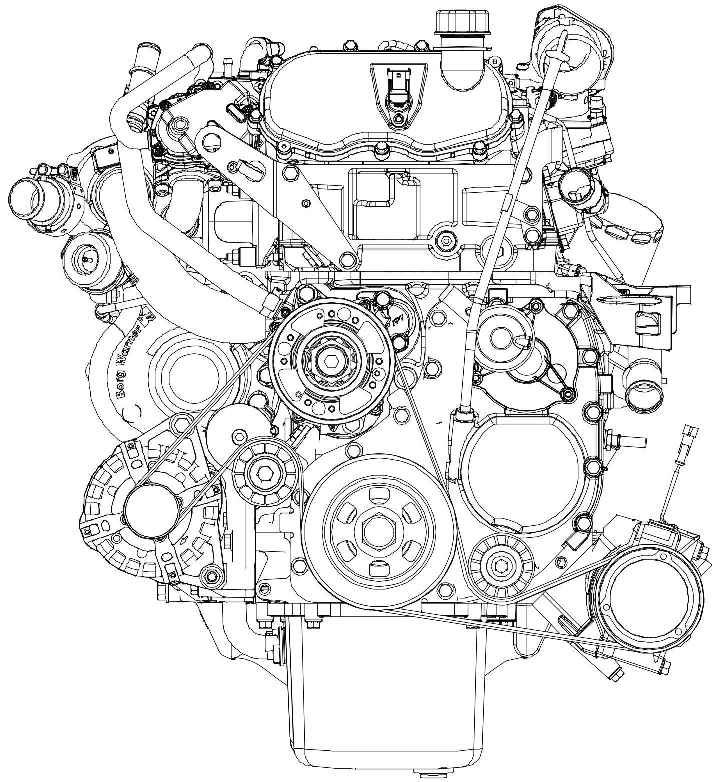
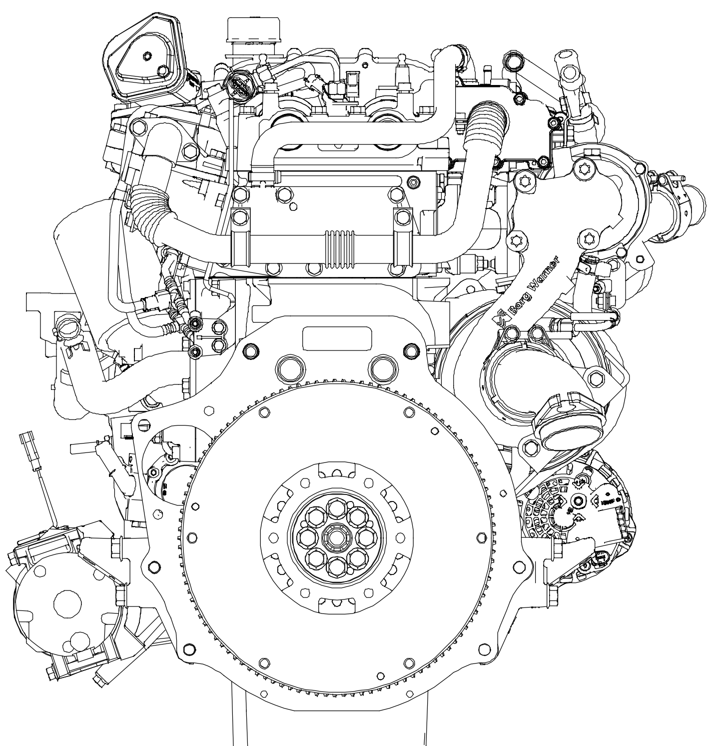
Figure 8



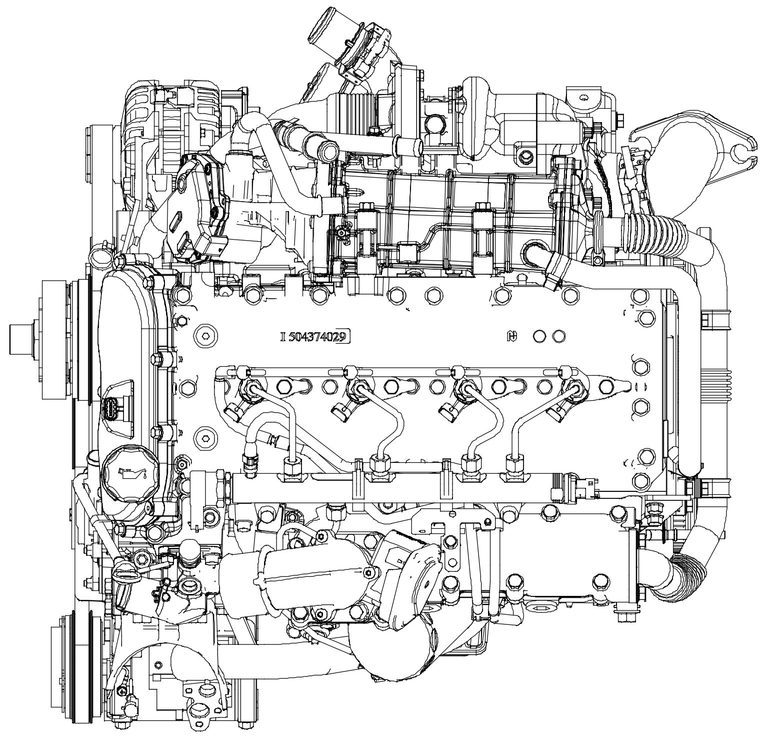
FRONT VIEW

Figure 9



REAR VIEW

Figure 10



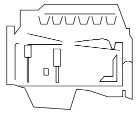
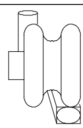
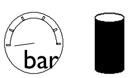
165377

TOP VIEW

GENERAL MOTORS

Type	F1CE3481R *A901	F1CE3481 A*A001	F1CE3481 A*A002	F1CE3481 A*A004	F1CE3481 A*A005	F1CE3481 C*C124
Max. power kW (CV) (rpm)	107 (145) (3500)	80 (108) (-)	107 (145) (3500)	90 (122) (-)	80 (108) (-)	125 (170) (3500)
Max. torque Nm (kgm) (rpm)	370 (37) (1400)	- (-) (-)	370 (37) (1400)	- (-) (-)	- (-) (-)	400 (40) (1250)
Min. enginespeed rpm	-	-	-	-	-	-
Max. enginespeed rpm	-	-	-	-	-	-

GENERAL CHARACTERISTICS

	Type		F1CE3481A/R	F1CE3481 C*C124
	Pressure at T.D.C.	*bar	20 ÷ 26	
	Minimum permissible pressure at T.D.C..	*bar	16	
	Bore x stroke	mm	95,5 x 104	
	Displacement	cm^3	2998	
	**TURBOCHARGING**		With intercooler	
	Turbochargertype:		GARRETT DAVNT COOLED WATER variable geometry	BORG WARNER K 03 B2 with Waste-Gate
	Turbocharger shaft radial play	mm	0,086 ÷ 0,117	0,396 ÷ 0,602
	Turbocharger shaft end float	mm	0,030 ÷ 0,083	0,034 ÷ 0,106
	Minimum stroke of pressure relief valve opening:	mm	-	
	Maximum stroke of pressure relief valve opening:	mm	-	
	Pressure corresponding to minimum stroke:	bar	-	
	Pressure corresponding to maximum stroke:	bar	-	
	**LUBRICATION**		forced by gear pump, pressure relief valve, oil filterwith double filtering	mono-filtrationoilfilter
	Oil pressure with engine hot (100°C ± 5°C):			
	at idling speed	bar	1,0	≥ 0,6
	at top speed	bar	5,0	≥ 4
	COOLING		by centrifugal pump, thermostat for adjustment, coolanttemperature, fan with electromagnetic coupling, radiator, heatexchanger	
	Water pump control		by belt	
	Thermostat:		N. I.	
	start of opening:		79 °C ± 2 °C	
	max opening:		-	94 °C ± 2 °C

(*) The pressure is measured by setting the engine turning with the aid of just the starter motor, with an oil temperature of 40 - 50°C.

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Cooling system (1)	liters	6,9	-
Total capacity			
Lubrication circuit (2)			
Periodic replacement:			
total capacity(3)	litrers (kg)	7,0 (6,3)	7,3 (6,44)
cup at the minimum level	litrers (kg)	4,2 (3,8)	-
cup tothe maximum level	litrers (kg)	6,6 (5,9)	6,6 (5,81)
Power steering oil(4)		(6)	
Fuel tank(5)		(6)	

(1) Quantity relative only to standard configuration engines. Use a mix of water and PARAFLU 11 at 50% even in summer. An alternative option to PARAFLU 11, is to use a product that conforms to the international standard SAE J 1034.

(2) Use lubricants which meet the international standards ACEA C2/C3 SAE 5W30/SAE 5W40. The viscosity degree to be used in relation to standard ambient temperature can be seen in the table found in the appendix. The oil used is considered to be acceptable until reaching a quantity equal to 0.5% of fuel consumption.

(3) The quantities indicated relate to the first refuel only and are relative to the engine, oil sump and filter filling.

(4) The use of Tutela GI/A oil is recommended along with other types in compliance with specification ATF DEXRON IID.

(5) Use STANDARD fuel type that complies with standard EN 590 (2005/55 - 2005/78).

(6) Refer to the instructions provided by the vehicle's manufacturer.

SECTION 2
Operational diagrams

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OPERATION

In this injection system, the pressure regulator, located upstream from the high-pressure pump, governs the flow of fuel needed in the low-pressure system. Afterwards, the high-pressure pump correctly supplies the hydraulic accumulator.

This solution, pressurizing solely the necessary fuel, improves the energy efficiency and limits heating the fuel in the system. The relief valve fitted on the high-pressure pump has the function of keeping the pressure, at the pressure regulator inlet, constant at 5 bars; irrespective of the efficiency of the fuel filter and of the system upstream. The action of the relief valve causes an increase in the flow of fuel in the high-pressure pump cooling circuit.

The high-pressure pump continually keeps the fuel at the working pressure, irrespective of the timing and the cylinder that is to receive the injection and accumulates it in a duct common to all the electro-injectors.

At the electro-injector inlet, there is therefore always fuel at the injection pressure calculated by the electronic control unit.

When the solenoid valve of an electro-injector is energized by the electronic control unit, fuel taken straight from the hydraulic accumulator gets injected into the relevant cylinder.

The hydraulic system is made out of a low-pressure fuel recirculation circuit and a high-pressure circuit.

The high-pressure circuit is composed of the following pipes:

- pipe connecting the high-pressure pump outlet to the Rail;
- hydraulic accumulator;
- pipes supplying the electro-injectors.

The low-pressure circuit is composed of the following pipes:

- fuel intake pipe from the tank to the pre-filter;
- pipes supplying the mechanical supply pump and the pre-filter;
- pipes supplying the high-pressure pump via the fuel filter.

The fuel system is also fitted with the fuel exhaust circuit and the electric injectors.

According to the high performance of this hydraulic system, for reasons of safety it is necessary to:

- avoid connecting high-pressure pipe fittings with approximate tightening;
- avoid disconnecting the high-pressure pipes with the engine running (NEVER try bleeding, which is both pointless and dangerous).

The integrity of the low-pressure circuit is also essential for the system to work properly; it is therefore necessary to avoid all manipulation and modifications and act only in the event of leakage.

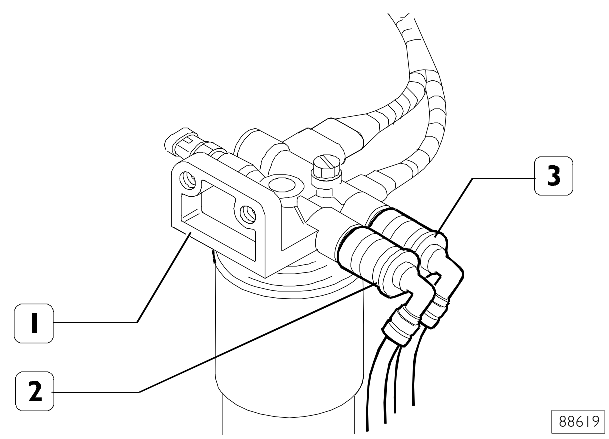
HYDRAULIC SYSTEM

The hydraulic system is composed of:

- tank
- fuel pre-filter
- electric supply pump
- fuel filter
- high pressure supply pump with supply pump built inpressure regulator
- manifold (rail)
- electro-injectors
- supply pipes and fuel recirculation

Fuel pipes

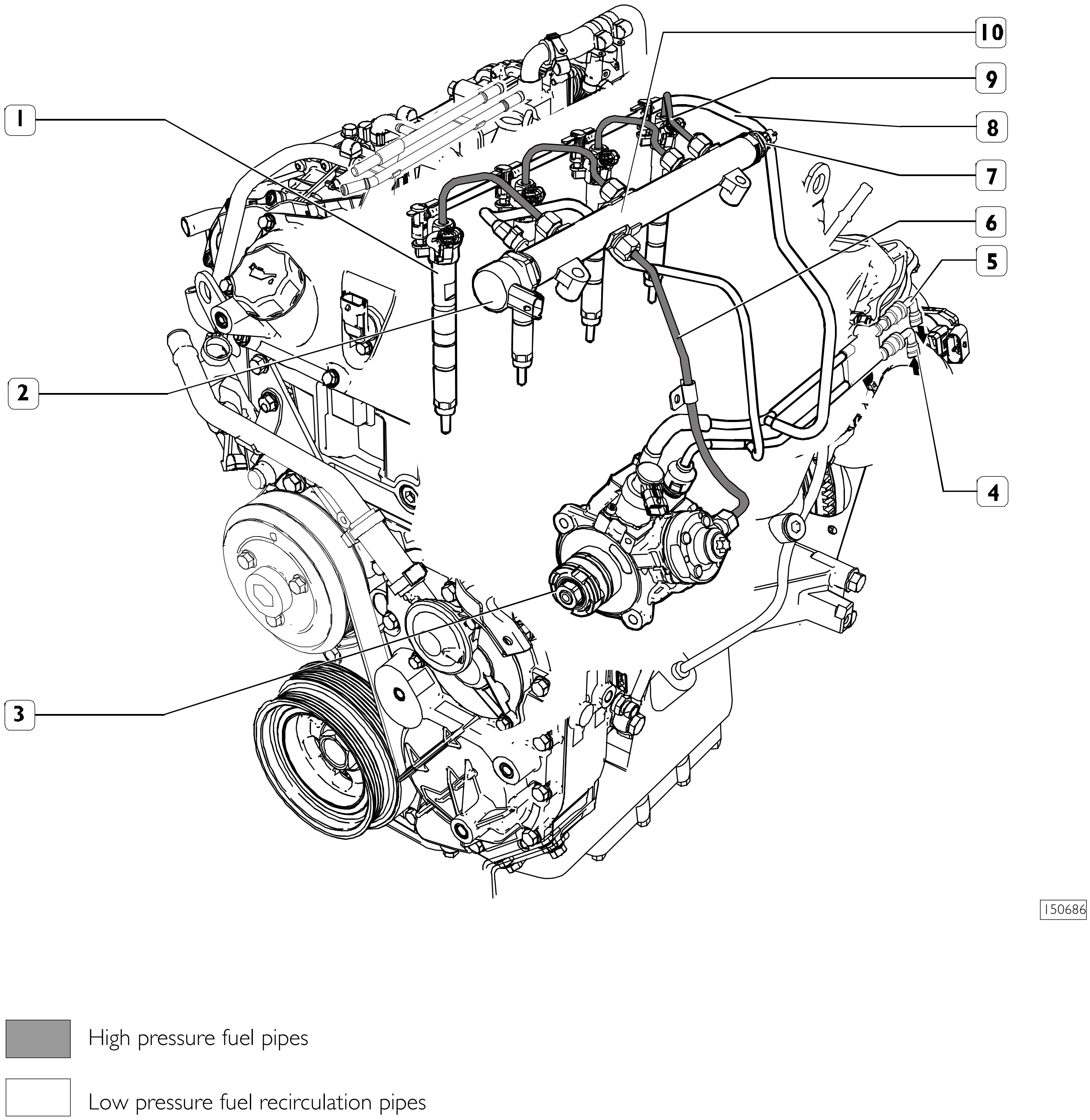
Figure 1



1. Fuel filter mounting - 2. High-pressure pump supply pipe quick-coupling fitting – 3. Supply pipe quick-coupling fitting.

If disconnecting the fuel pipes (2-3) from the mounting (1), it is necessary, when refitting, to make sure their fittings are perfectly clean. This is to avoid an imperfect seal and fuel getting out.

Figure 2



FUEL FEED AND CIRCULATION SYSTEM

1. Electric injector - 2. Pressure regulating valve (DRV) - 3. CP4.1 high-pressure pump - 4. Fuel delivery pipe to the high-pressure pump - 5. Fuel return pipe to the tank - 6. High-pressure fuel delivery pipe to the hydraulic accumulator (rail) - 7 Pressure sensor - 8. Injector fuel exhaust pipe - 9. High-pressure fuel delivery pipe to the electric injectors - 10. Hydraulic accumulator (rail)

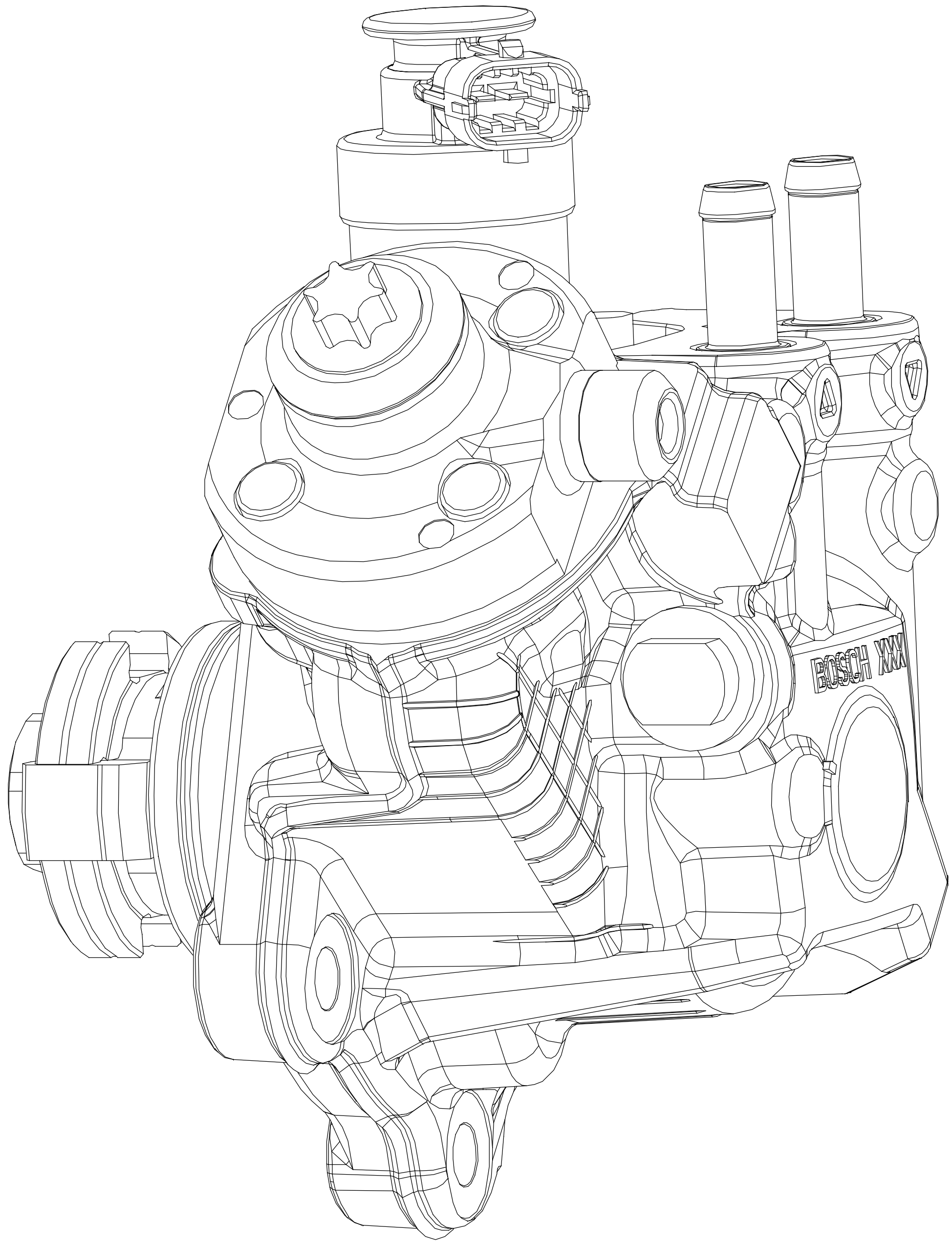
Check valve characteristics

opening pressure $0.5^{+0.05}_{-0.1}$ bar

differential pressure less than 0.2 bar at 120 litres/h of fuel.

High pressure pump CP4.1 description

Figure 3



Pump with one radial plunger controlled via a gear by the timing belt; it needs no timing.

The pump is lubricated and cooled by the fuel.

The operating pressure is controlled as follows:

- ❑ electronically by a solenoid valve located on the pump casing and controlled by the ECU;
- ❑ by a regulator valve (DRV) mounted on the hydraulic accumulator (Rail).

Fuel supply is provided by a transfer pump. This is built into the fuel level indicator located in the fuel tank incorporated into the fuel intake assembly (GAC) together with the fuel level signalling device located in the fuel tank.

NOTE The high-pressure pump cannot be overhauled; therefore, it must not be removed or tampered with. Only the following repairs are permitted: replacing the drive gear and the pressure regulator.

Pressure control valve

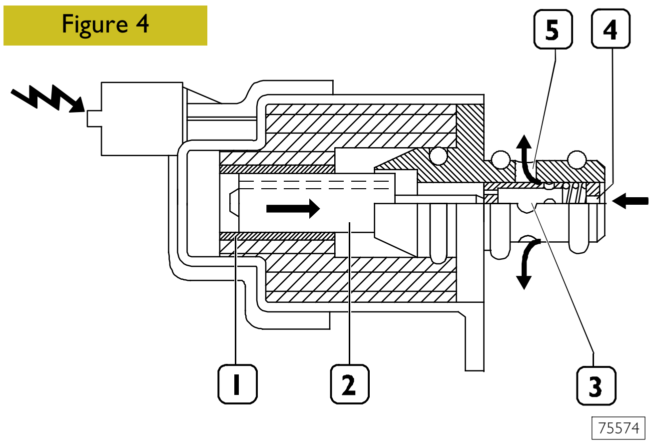
The fuel pressure regulator is mounted on the low-pressure circuit of the CP4 pump. The pressure regulator modulates the amount of fuel sent to the high-pressure circuit according to the commands received directly from the engine control unit. The pressure regulator is mainly composed of the following components:

- connector
- casing
- solenoid
- pre-load spring
- shutter cylinder.

When there is no signal, the pressure regulator is normally open, therefore with the pump providing maximum delivery. The engine control unit, via the PWM (Pulse Width Modulation) signal, modulates the change in fuel flow rate in the high-pressure circuit by partially closing or opening the sections of passage of the fuel in the low-pressure circuit.

Operation

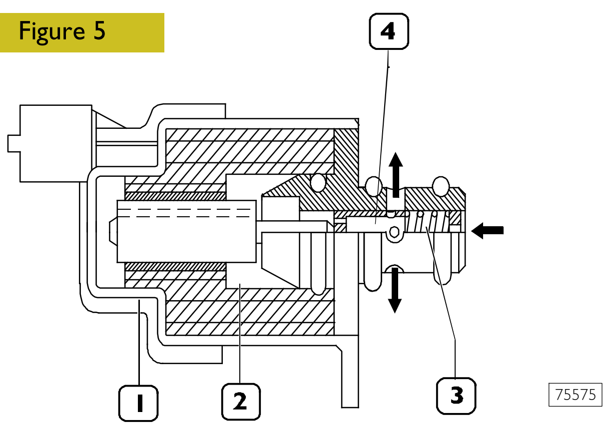
Figure 4



1. Solenoid - 2. Magnetic core - 3. Shutter cylinder - 4. Fuel inlet - 5. Fuel outlet.

When the engine control unit governs the pressure regulator (via PWM signal), the solenoid (1) is energized that, in its turn, generates the movement of the magnetic core (2). The shift of the core causes the shutter cylinder (3) to move axially, choking the flow of fuel.

Figure 5

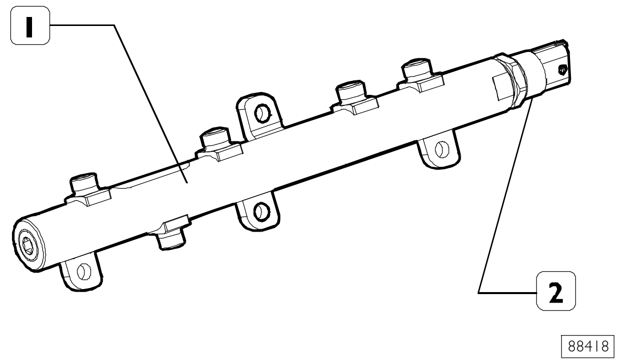


1. Solenoid - 2. Magnetic core - 3. Pre-load spring - 4. Shutter cylinder.

When the solenoid (1) is not energized, the magnetic core is pushed into the rest position by the pre-load spring (3). In this condition, the shutter cylinder (4) is in such a position as to offer the fuel the greatest section of passage.

Hydraulic accumulator (rail)

Figure 6



The hydraulic accumulator is fitted on the cylinder head on the suction side.

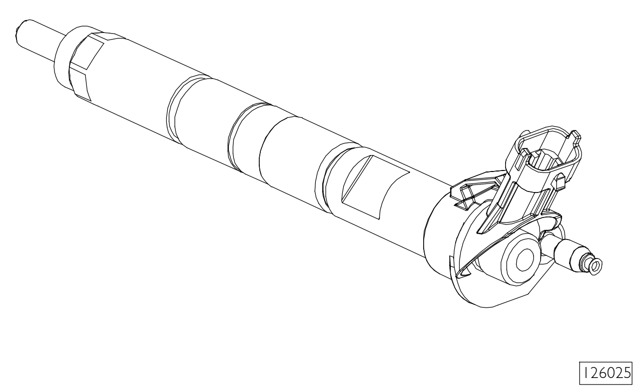
With its volume of approximately 8.8 cm^3 it dampens the pressure ripples of the fuel due to:

- the operation of the high-pressure pump;
- the opening of the electro-injectors.

On the hydraulic accumulator (1) there is the fuel pressure sensor (2).

ELECTRO-INJECTORS

Figure 7



The piezoelectric injectors are located on the engine head and receive the fuel under pressure from the rail. They operate both the high pressure fuel supply and recirculation under atmospheric pressure of the excess fuel that has not been injected.

The following are installed on the injector head :

- ❑ a central access pipe for fuel under high pressure;
- ❑ a lateral pipe for the recirculation of fuel under low pressure with built-in throttle;
- ❑ the site for the electric connector that receives commands from the control unit.

The electronic control unit controls the piezoelectric actuator inside the injector.
The piezoelectric actuator, due to reduced switching times, enables a very fast reaction to the commands sent from the engine control unit, making injection capacity more flexible and increasing the number of injections per cycle.

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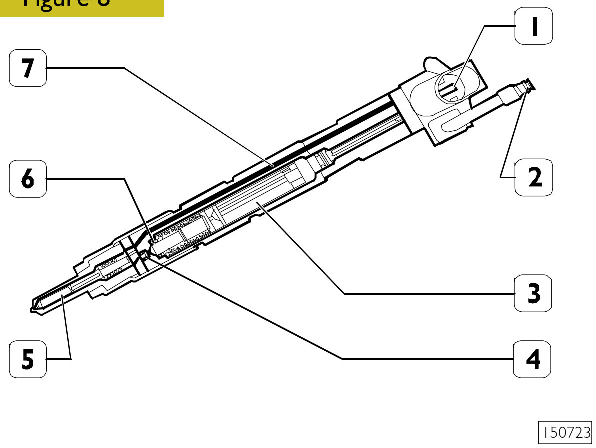
Figure 8



1. Electrical connection - 2. Connection for fuel return flow - 3. Encapsuled piezoelectric actuator - 4. Control valve - 5. Nozzle - 6. Hydraulic amplifier - 7. High pressure line

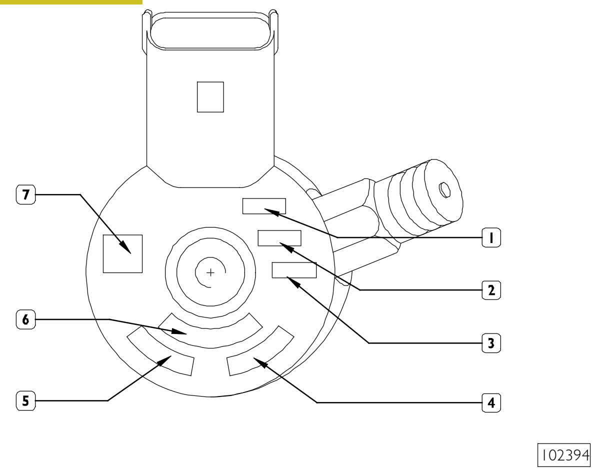
Operation

When the piezoelectric actuator (3) is reached by an electrical load, commanded by the control unit, it increases its length. The movement, amplified by the hydraulic amplifier (6), act mechanically on the control valve (4) and it allows therefore the injection of the fuel present in the high pressure duct (7). While stopping the electrical load, the actuator reacts elastically and again assumes its initial length.The springs add their contribution, winning the pressures that act in balancing on the whole surface of the components.
The fuel in excess is than recirculated in the fuel circuit through the duct (2).

REPLACEMENT OF INJECTORS ON VEHICLE

Electro-injector reprogramming

Figure 9



1. Production plant code - 2. IMA Matrix code - 3. Uncoded IMA code - 4. Bosch spare part No. - 5. Date of production - 6. Serial No. - 7. Production line code - 8. Iveco spare part No.

The electro-injectors are no longer divided into classes: Min (01) - Med (02) - Max (03), so that deviations from the design flow rates are measured, at the final testing phase, by the manufacturer for each injector and stamped with the IMA code (Injector Menge Abgleichung) on the injector magnet. At the engine production facility, the I.M.A. code is read in line by an automated reading station, converted into bar code, printed on the engine identification label and applied to the engine.
In the vehicle factory, the EDC 17 ECU is programmed at the end of the line by automatically reading the engine label.

Figure 10

numero	codice OCR iniettore
0	0
1	1
2	2
3	3
4	4
5	5
6	6
7	7
8	8
9	9

numero	codice OCR iniettore
A	A
B	B
C	C
D	D
E	E
F	F
G	G
H	H
I	I
J	J
K	K
L	L
M	M
N	N
O	O

numero	codice OCR iniettore
P	P
Q	Q
R	R
S	S
T	T
U	U
V	V
W	W
Y	Y
Z	Z

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Conversion table of OCR characters into ARIAL font

At the assistance centre the uncoded IMA code is required (3, Figure 9) for the ECU replacement and reprogramming procedure.

The table shows the conversion of OCR characters into Arial fonts.

When electro-injectors on engine mounted on vehicle require replacing, follow the instructions provided below:

- in cases where electro-injectors are removed and do not need to be replaced, their individual positions need to be noted in order to later re-install them in their original positions; this is done to avoid having to reprogram the ECU;
- after replacing one or more injectors, the ECU requires reprogramming;
- before installing a new electro-injector, note the IMA code stamped on the injector, as it becomes difficult to read the code once the injector is in position;
- in the event the ECU is replaced, program the new ECU with the IMA codes of the electro-injectors installed on the engine and copy the correction coefficients (ZFC) of the replaced ECU; if this is not possible, they must be reset and auto-configuration process must be restarted.

Whilst the engine is running, the EDC 17 ECU performs a number of tests on the electro-injectors' minimum flow rate.

In certain conditions (overrun: vehicle deceleration with pedal released) an increasing (very small) quantity of fuel starting from zero is injected and its effect on engine rotation smoothness is observed. Injection start threshold is detected and stored by the ECU.

This auto-configuration process is carried out on each single cylinder.

Therefore, replacing an electro-injector requires that the ECU be reprogrammed, entering the IMA codes of the new electro-injectors and resetting the correction factors (ZFC) of the cylinder concerned.

Replacing all electro-injectors makes it necessary to reset all the correction coefficients (ZFC) of each single electro-injector.

The correction coefficients (ZCF) can be zeroed using the FPT. diagnostic tool, by reprogramming the ECU and performing the sensor replacement procedure provided by the diagnostic tool.

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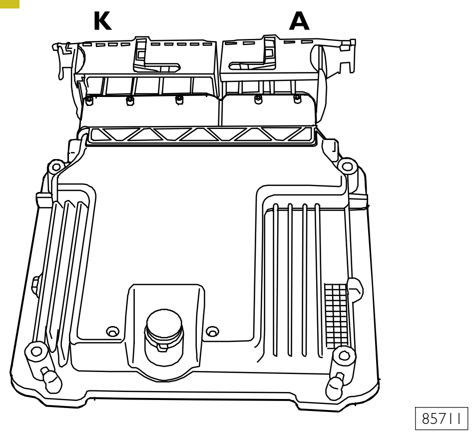
ELECTRIC/ELECTRONIC COMPONENTS

Electronic control unit EDC 17

Figure 11



PERSPECTIVE VIEW
A. Engine side injection cable connector - K. Bonnet/cab cable connector.

The control unit is of the "flash EPROM" type, i.e. it can be reprogrammed from the outside without acting on its hardware.

The control unit processes the signals from the sensors by applying software algorithms, and also controls the actuators (in particular, the electric injectors and the pressure regulator).

The control unit records, in the memory non-labile area, the information on the engine parameters originally set or acquired during engine operation.

The injection control unit incorporates the absolute pressure sensor, in order to further improve the injection system control.

The control unit is fitted to the left side of the engine compartment and is connected to the vehicle wiring by means of two connectors:

- 60-pole connector "**A**" for the components available on the engine;
- 94-pole connector "**K**" for the components on the vehicle.

In addition to controlling the system functions described in the respective charter, the electronic control unit is interfaced with the other electronic systems found on the vehicle, such as ABS - EBD, cruise control, speed limiter, EGR, preheating plugs.

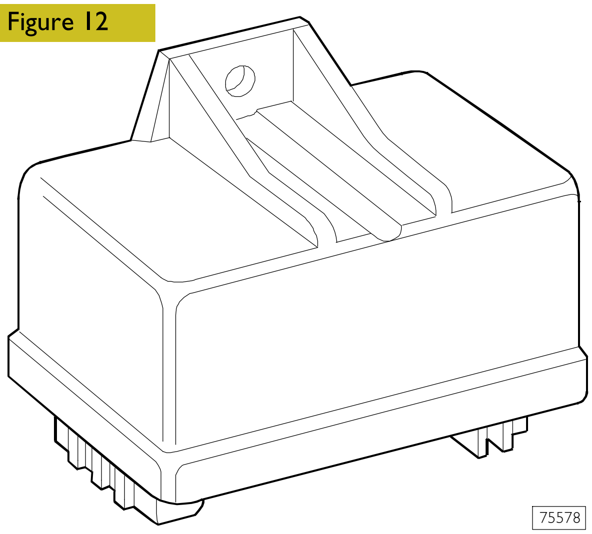
On the vehicles equipped with D.P.F. catalyst, the control unit also controls the catalyst regeneration system. In this case, after any of the operations below is carried out:

- replacing one or several injectors,
- replacing all the injectors,
- replacing the air flow meter,
- replacing the hydraulic accumulator pressure sensor (common rail),
- replacing the EDC 17 control unit;
- changing the engine oil,
- replacing the D.P.F. catalyst,
- replacing the filter differential pressure (Δp) sensor,
- replacing any significant component as regards emission levels,
- performing forced regeneration,

the control unit shall be programmed again by means of the DAIMLER E-Tester tool, and the replacement procedure for the concerned component shall be performed, in accordance with the indications of the diagnosis instruments.

Glow plug electronic control unit

Figure 12



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The engine control unit, in the phase of:

- starting
- after-starting

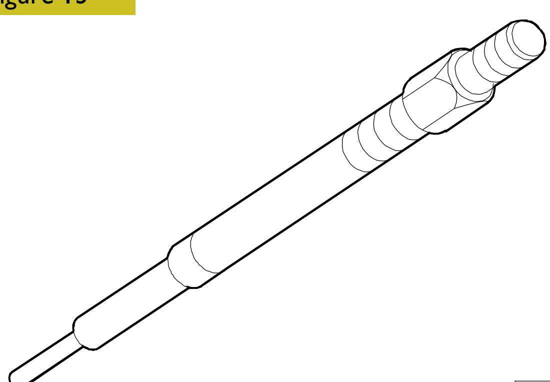
times the operation of the glow plug control unit according to the engine temperature.

The spark plug control takes place through the spark plug pre-warming control unit according to the engine temperature under the direct control of the engine control unit EDC 16.

The pre-heating control unit contains an "intelligent" contactor that sends feedback to the control unit that is thus informed about any fault with the pre-heating control unit or shorting to earth of the glow plugs.

Glow plugs

Figure 13



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CONTROL VALUES

With a constant supply voltage of 11 V:

- max. current drawn	18 A
- in 5 sec.	11 ±1.5 A
- in 30 sec.	6 ±0.9 A
- temperature after 7 sec.	850°C
- tightening torque	8-10 Nm

Engine speed sensor

It is an inductive sensor and is positioned on the phonic wheel fitted on the front end of the drive shaft
It generates the signals resulting from the magnetic flow lines which close through the teeth of the phonic wheel.
Tooth number 58.
The electronic control unit uses this signal to measure the speed of rotation of the engine, its angular position and to operate the electronic rev counter.
If this signal fails the rev counter will not work.

Camshaft timing sensor

It is an inductive sensor and is positioned on the camshaft gear of the suction valves.
It generates the signals resulting from the magnetic flow lines which close through a slot on the gear itself.
The signal generated by this sensor is used by the electronic control unit as a redundant signal to measure the different engine speeds.

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LUBRICATION
General

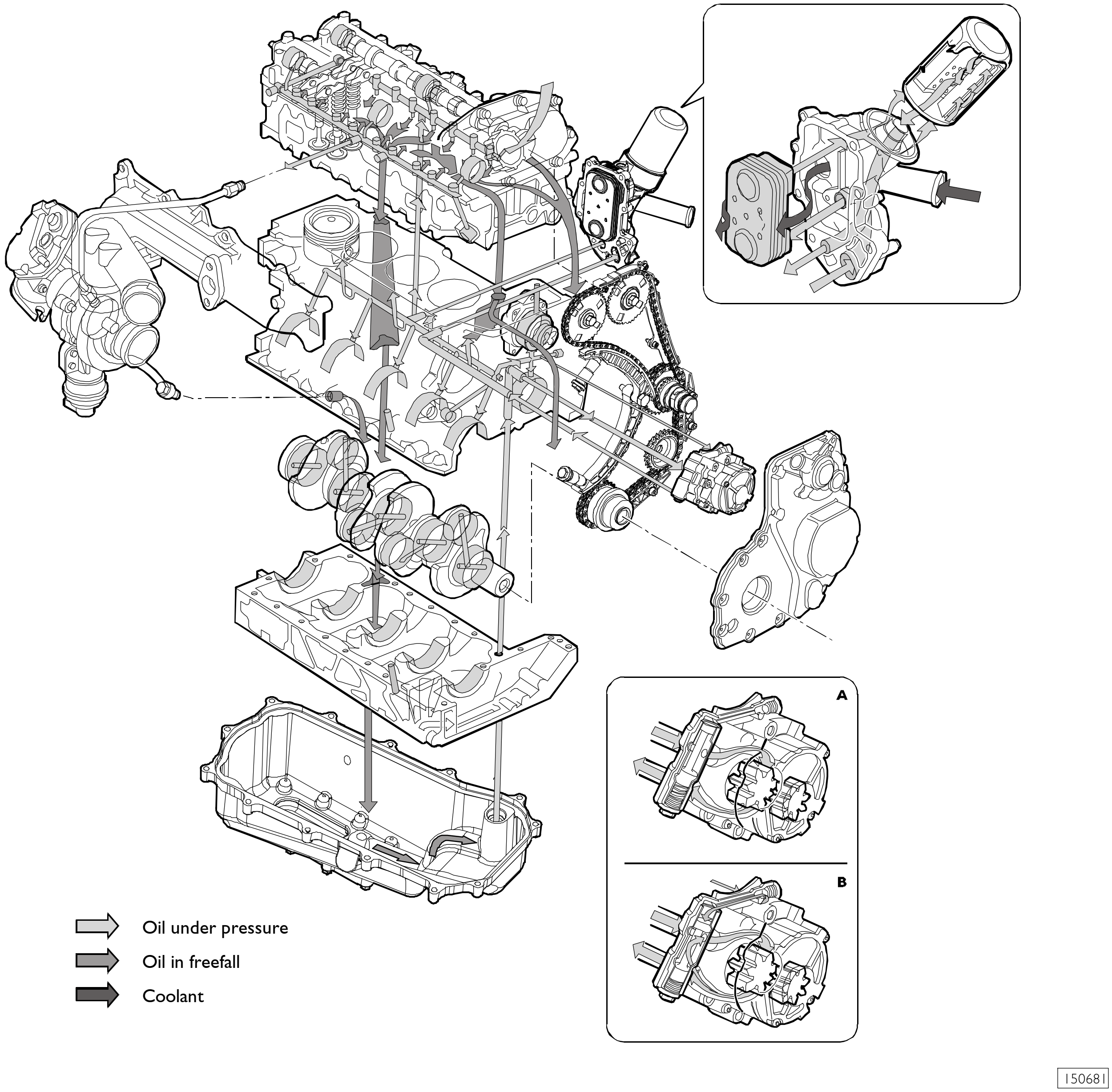
The engine is lubricated by forced circulation performed by the following parts:

- a gear oil pump with built-in depressor (GPOD);
- a pressure relief valve integrated in the oil pump;
- a heat exchanger made up of five elements;
- A double filtration oil filter with built-in safety valve.

Operation (see Figure 14)

Engine oil is drawn up from the sump by the oil pump via the suction strainer and delivered under pressure to the heat exchanger where it is cooled.
The oil continues through the oil filter and goes to lubricate the relevant parts through ducts or pipes.
At the end of the lubrication cycle, the oil returns to the sump by gravity. The oil filter can be excluded by the safety valve built into it if it gets clogged.
In addition, the lubricating oil feeds the chain hydraulic tightening devices for the control of the auxiliary elements and the timing system and the hydraulic tappet.

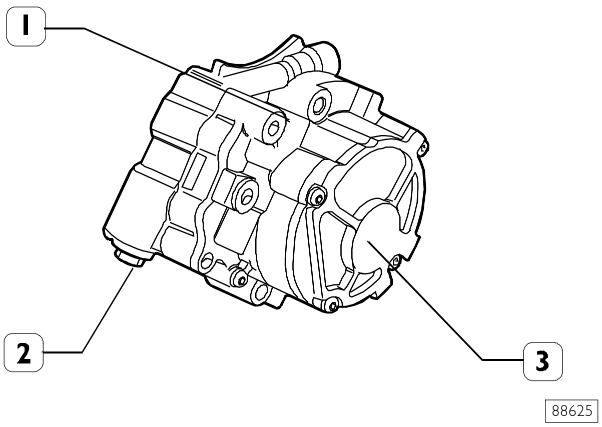
Figure 14



A. Pressure regulating valve closed - B. Pressure regulating valve open.

OIL PUMP/DEPRESSOR UNIT

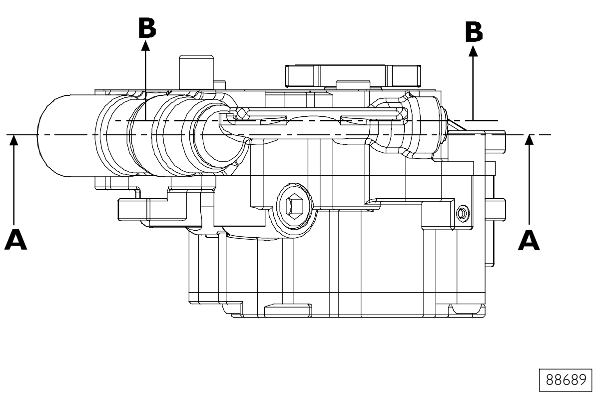
Figure 15



1. Oil pump - 2. Oil pressure adjusting valve - 3. Depressor.

NOTE Should the unit be faulty, not due to the oil pressure adjusting valve, change the whole unit.

Figure 16



SECTIONS OF OIL PUMP/DEPRESSOR UNIT

1. Oil input pipe from cylinder block - 2. Oil suction pipe - 3. Oil pressure adjusting valve - 4. Oil delivery pipe - 5. Depressor air suction pipe - 6. Depressor oil suction pipe.

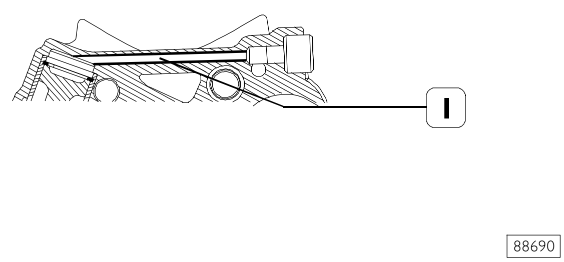
Oil pump

Characteristic data

transmission ratio	1	
displacement	23.52	cm^3
pumping diameter	49.5	mm
number of teeth	7	
height	16	mm
oil pump minimum speed	780	rpm
oil pump max. speed	3500	rpm
oil pump over-revs	4200	rpm
oil pump forced over-revs	4900	rpm
speed	3500	rpm
torque	-	Nm
power draw (calc.)	-	W

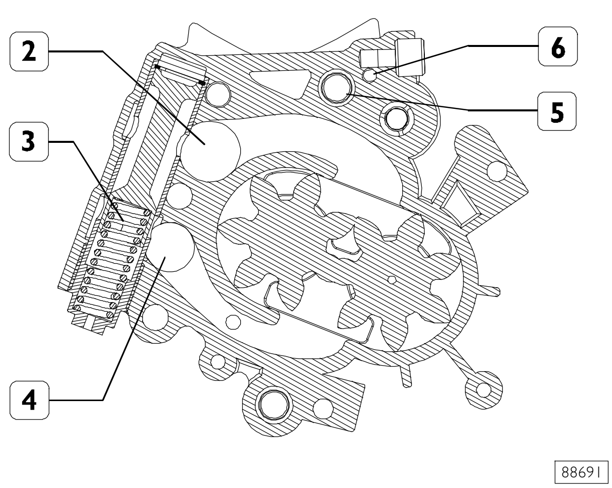
Oil temperature: 100°C – closed recirculation – max. outlet pressure 5 bars	
engine speed rpm (oil pump speed – rpm)	capacity (l/min)
780 (862)	
3500 (4485)	

Figure 17



SECTION B-B

Figure 18



SECTION A-A

Vacuum pump

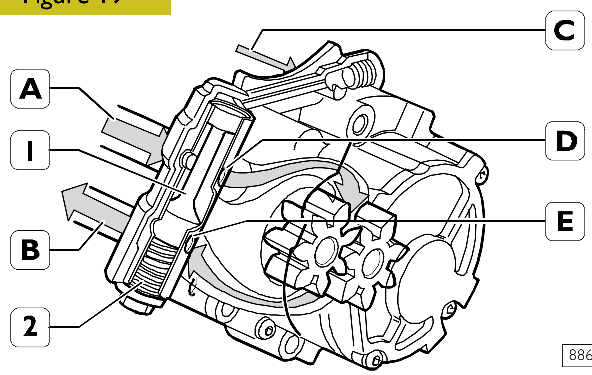
The vacuum pump (2, Figure 15), with radial blades, is also incorporated in the GPOD (1, Figure 16). It is driven directly by the oil pump.

transmission ratio	1	
displacement	150	cm^3
volume to drain	4.5	litres
chamber diameter	65	mm
rotor diameter	45.5	mm
cam	7.5	mm
number of blades	3	
height	34	mm
vacuum pump minimum speed	780	rpm
vacuum pump max. speed	3500	rpm
vacuum pump over-revs	4200	rpm
vacuum pump forced over-revs	4900	rpm
theoretical flow rate at minimum (air)	-	l/min
actual flow rate at minimum (air) – at atmospheric pressure	-	l/min
Theoretical speed at max. speed – (air)	-	l/min
Actual flow rate at max. speed – (air) at atmospheric pressure	-	l/min
measured power draw (maximum)		
speed	3500	rpm
torque	-	Nm
power draw (calc.)	-	W

Oil temperature: 100°C – engine speed 780 rpm (pump speed 994 rpm)			
tank (litres)	vacuum (bar)	0.5	0.8
4.5	time (sec)	4.5	12.5
9		9.5	26.0

Oil pressure adjusting valve

Figure 19



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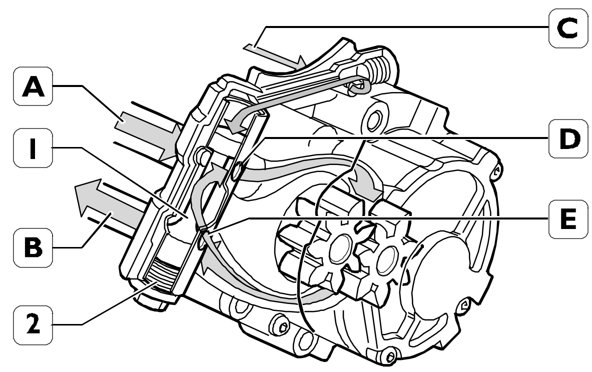
1. Oil input pipe from cylinder block - 2. Oil suction pipe - 3. Oil pressure adjusting valve - 4. Oil delivery pipe - 5. Depressor air suction pipe - 6. Depressor oil suction pipe.

Pressure at opening start: 4.4 bar

Description of oil pressure adjusting valve closed

If in pipe **C** the oil pressure is below 4.4 bar, the valve (1) closes the holes **D** - **E**.

Figure 20



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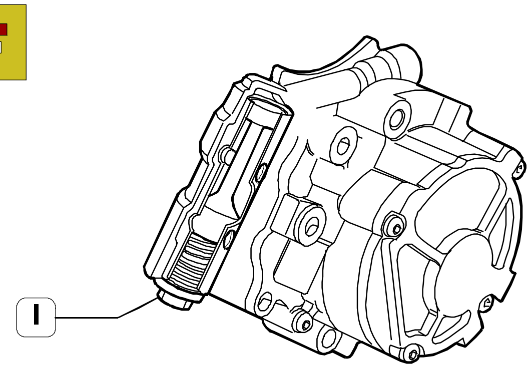
Oil pressure adjusting valve open

If in pipe **C** the oil pressure is equal or above 4.4 bar, the valve (1), as a result of the pressure itself, wins through the spring reaction (2) and goes down, thus opening communication between the delivery pipe **A** and the suction pipe **B**, through draining holes **D**-**E**, and therefore the pressure drops.
When the pressure falls below 4.4 bar, the spring (2) takes the valve (1) to the initial position of closed valve.

Disassembly

Figure 21



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Use the suitable wrench to remove the oil pressure adjusting valve (1) from the oil pump.

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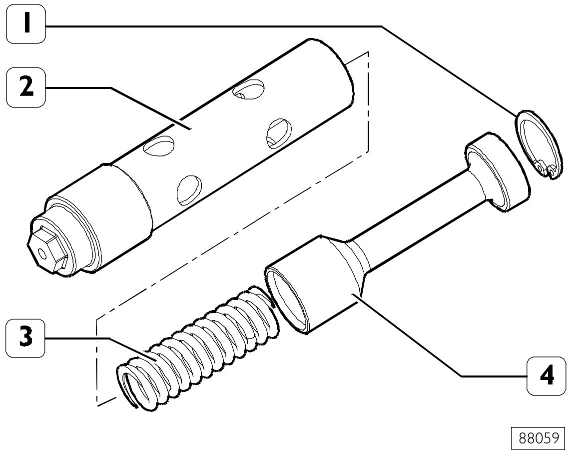
Figure 22

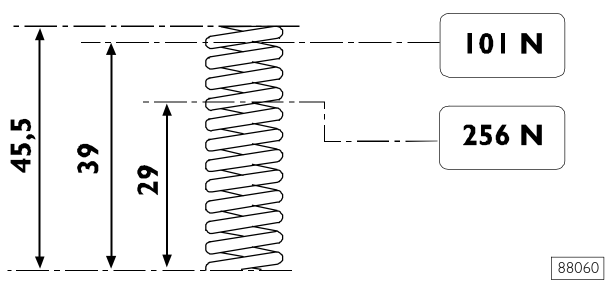


PARTS COMPRISING THE OIL PRESSURE CONTROL VALVE

1. Split ring - 2. Valve - 3. Spring - 4. Valve casing.

Use the suitable pliers to remove the snap ring (1), take off the valve (4) and the spring (3) from the valve body (2).

Figure 23



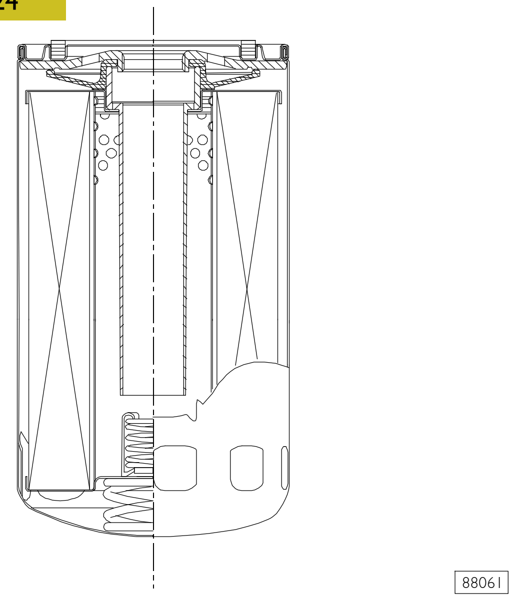
MAIN DATA OF THE OIL PRESSURE CONTROL VALVE SPRING

Assembly

For refitting, reverse the removal operations.

OIL FILTER

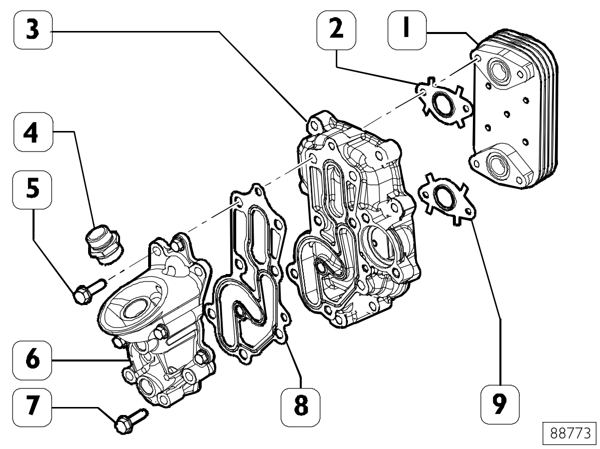
Figure 24



Oil filter with built in by-pass valve - differential opening pressure 2.5 ± 0.2 bar.

HEAT EXCHANGER

Figure 25



HEAT EXCHANGER COMPONENT DETAILS

1. Heat exchanger made up of five elements - 2. Gasket - 3. Box - 4. Pipe union - 5. Screw - 6. Oil filter support - 7. Screw - 8. Heat exchanger box - 9. Gasket.

Disassembly

Remove the screws (5) and take off the heat exchanger (1) from the box (3) with the gasket (8).
Remove the screws (7) and take off the oil filter support (6) from the box (3).

Assembly

For refitting, reverse the removal operations and observe the following warnings.
Clean accurately the heat exchanger (1).
Always change the gaskets (2, 9 and 8). Apply LOCTITE 577 on the threading of the pipe union (4) (if removed), drive it in the support (1) and tighten it to the prescribed torque.
Tighten the screws to the prescribed torque.

Figure 26

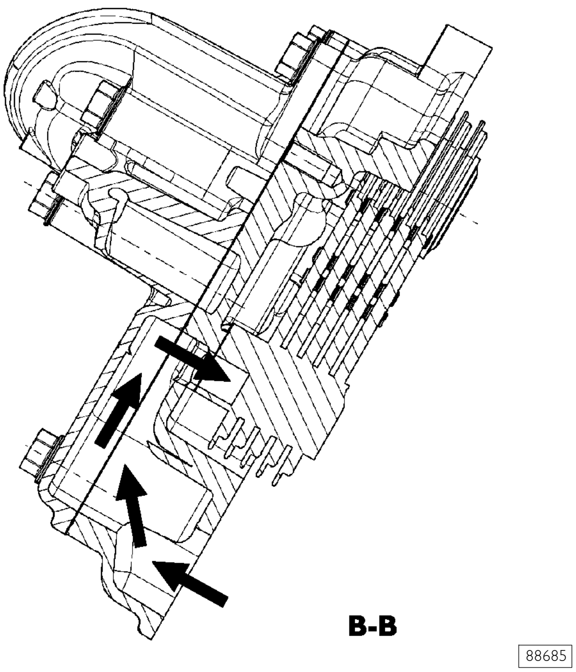


Figure 27

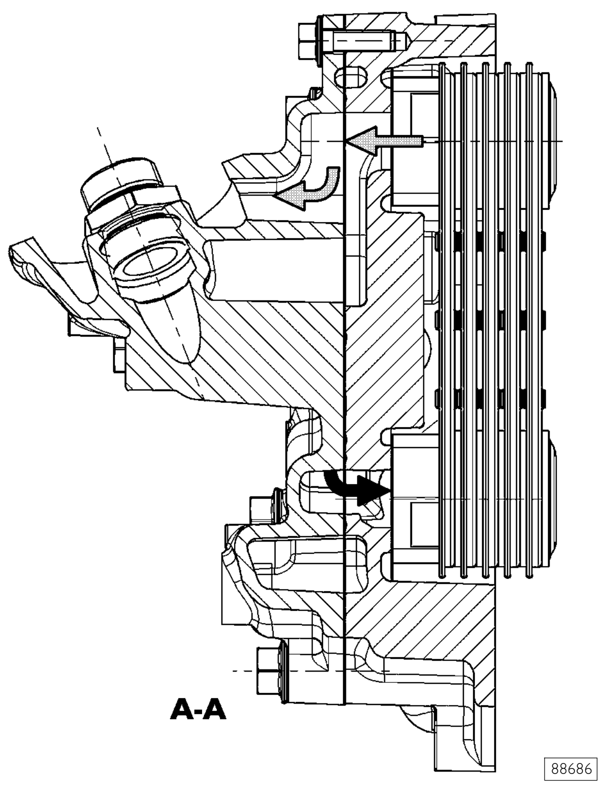


Figure 28

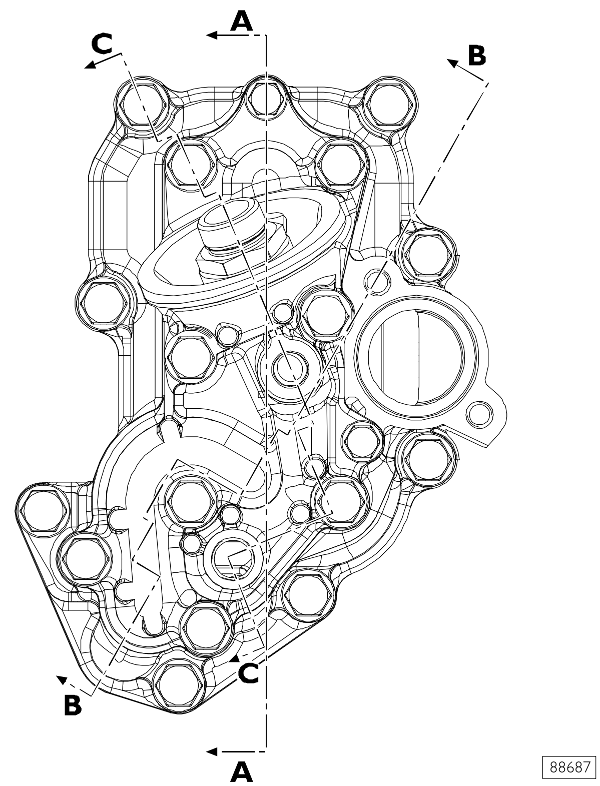
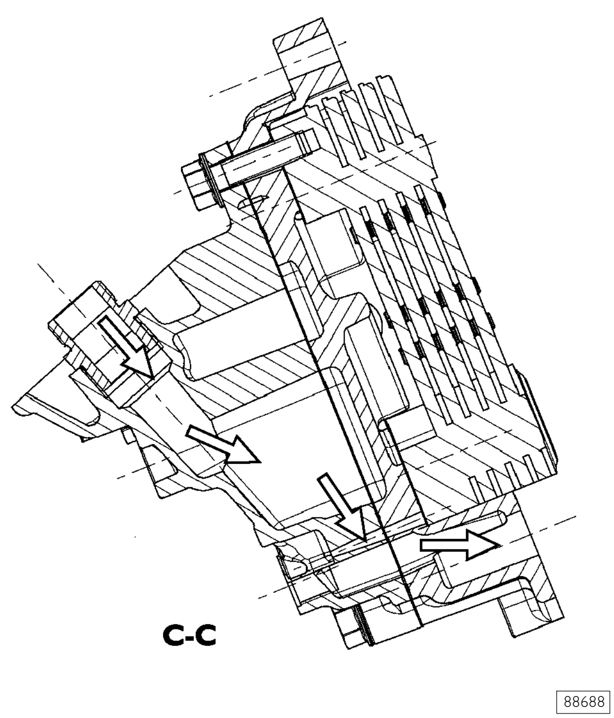


Figure 29



HEAT EXCHANGER SECTIONS

Oil flow from heat exchanger to oil filter

Oil flow from oil filter to cylinder block

Oil flow from cylinder block to heat exchanger

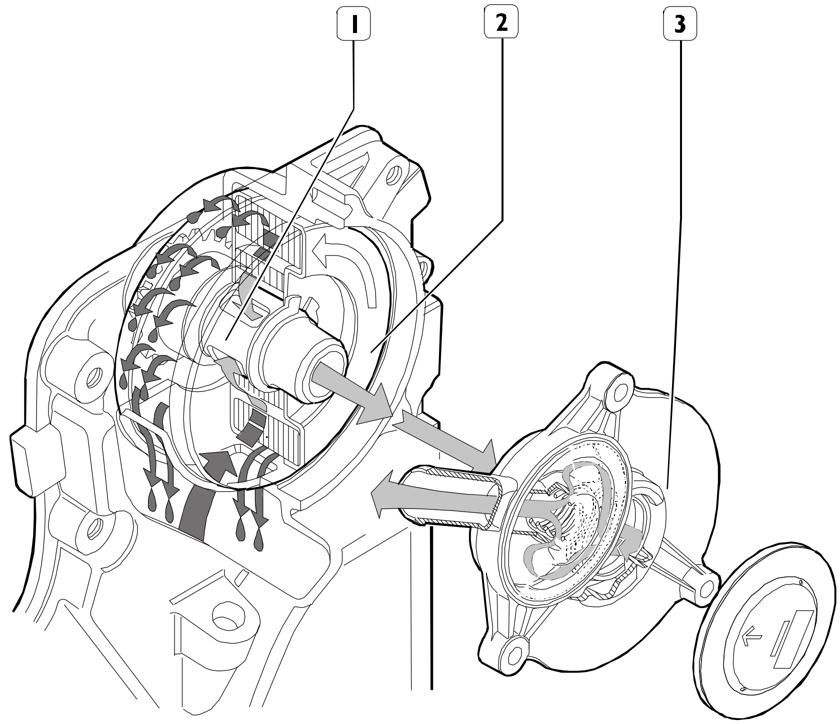
OIL VAPOUR RECIRCULATION (BLOW-BY)

Part of the gas produced by the combustion during the engine operation blows by the piston snap ring ports, in the oil sump, and mixes with the oil vapours present in the oil sump.
This mixture, conveyed from the chain compartment to the top, is partially separated from the oil by means of a device situated on the top side of the distribution cover and is introduced in the air suction system. This device consists mainly of a rotating filter (3), fit flush on the stem (1), a high pressure/shaft control and a cover (2) where the valves (4 and 5), usually closed, are fitted.
The diaphragm valve (4) regulates the partially purified mixture and keeps the pressure inside the chain compartment around a value of ~ 10 ÷15 mbar.
The umbrella valve (5) discharges some of the oil still present in the mixture coming from the filter (3) in the chain compartment and the oil condenses in the chamber (6).

Operation

The mixture which passes through the rotating filter (3) is partially purified from the oil particles, as a result of centrifugation, and so these particles condense on the cover walls to return to the lubrication circuit.
The resulting purified mixture is let in through the stem holes (1) and the diaphragm valve consensus (4) inside the air vent upstream of the turbocharger.
The opening/closing of the valve (4) depends mainly in the ratio between the pressure operating the diaphragm (4) and the depression below it.
The oil still present in the mixture coming from the rotating filter (3) and which condenses in the chamber (6) is drained into the chain compartment through the umbrella valve (5), when the pressure that keeps it closed drops as a result of the engine stop.

Figure 30



Gas with oil level above 10 g/h

Gas with oil level ~ 0,2 g/h

Condensed oil returning to the oil sump

150682

COOLING

Description

The engine cooling system is the type with forced circulation in a closed circuit. It comprises the following parts:

- An expansion tank whose plug has two valves incorporated in it: an outlet and an inlet, which govern the pressure of the system.
- A coolant level sensor at the base of the expansion tank.
- A pressure switch (3) notifies EDC central unit when pressure inside expansion tank exceeds 0.4 bar value; in this case, the central unit reduces engine performance level by modifying injection flow rate (De-rating).
- An engine cooling module to dissipate the heat taken from the engine by the coolant with a heat exchanger for the intercooler.
- A heat exchanger to cool the lubricating oil.
- A centrifugal water pump incorporated in the crankcase.
- An electric fan comprising an electromagnetic coupling on whose shaft a hub turns idle that is fitted with an axially mobile metal plate on which is mounted the impeller.
- A 3-way thermostat governing the circulation of the coolant.

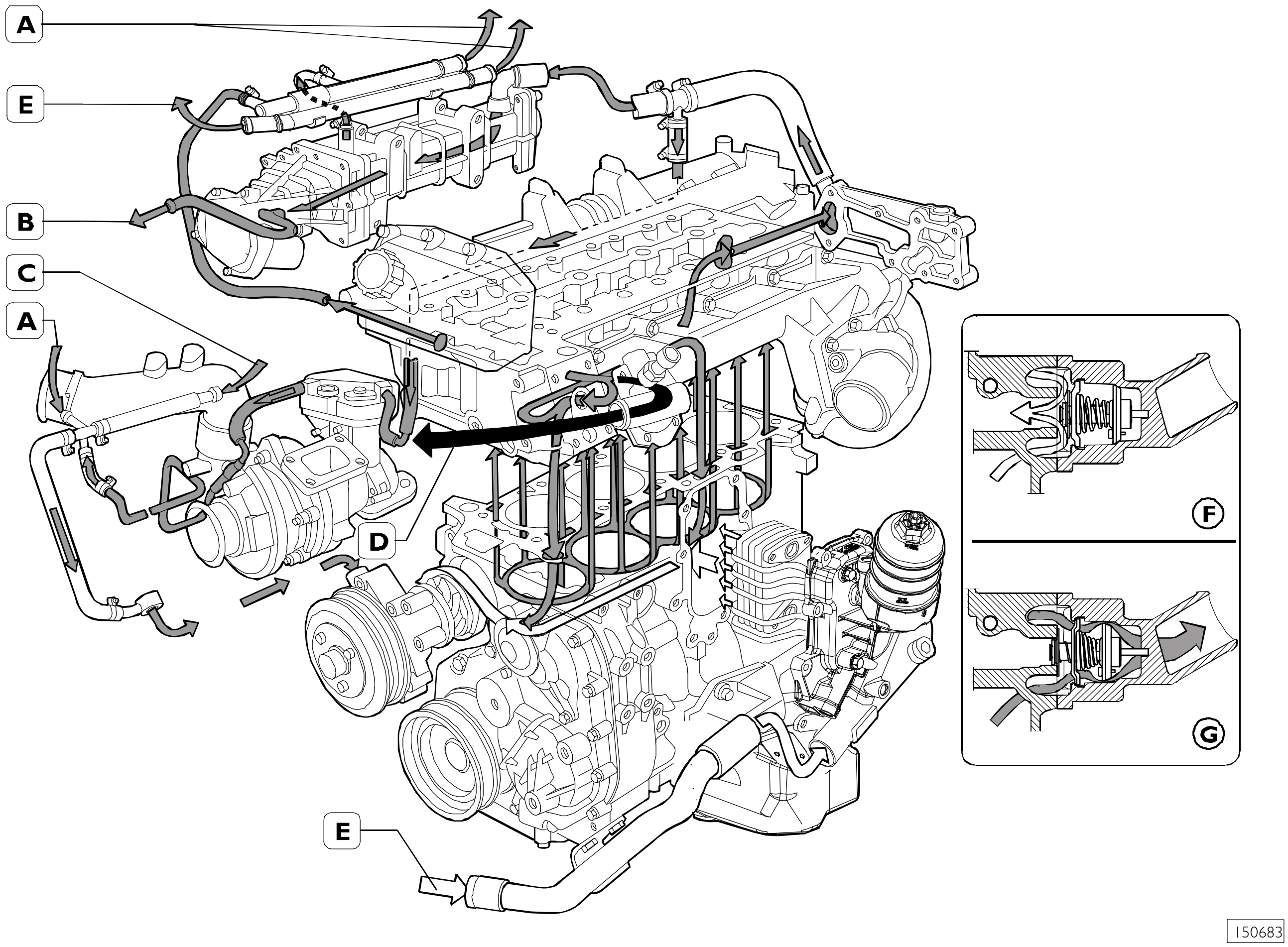
Operation

The water pump driven by a poly-V belt by the crankshaft sends coolant into the crankcase and with a greater head into the cylinder head.
When the coolant temperature reaches and exceeds the working temperature, it causes the thermostat to open and the fluid is channelled from here to the radiator and cooled by the fan.
The pressure in the system due to the change in temperature is governed by the outlet (2) and inlet (1) valves incorporated in the expansion tank filler plug (detail A).
The outlet valve (2) has a twofold function:

- to keep the system slightly pressurized so as to raise the boiling point of the coolant;
- to discharge into the atmosphere the excess pressure produced in case of high coolant temperatures.

The function of the inlet valve (1) is to permit transferring the coolant from the expansion tank to the radiator when a lower pressure is created in the system due to the reduction in volume of the coolant as a result of its temperature lowering.
Outlet valve opening 1 ± 0.1 kg/cm^2.
Inlet valve opening 0.005 – 0.02 kg/cm^2.

Figure 31



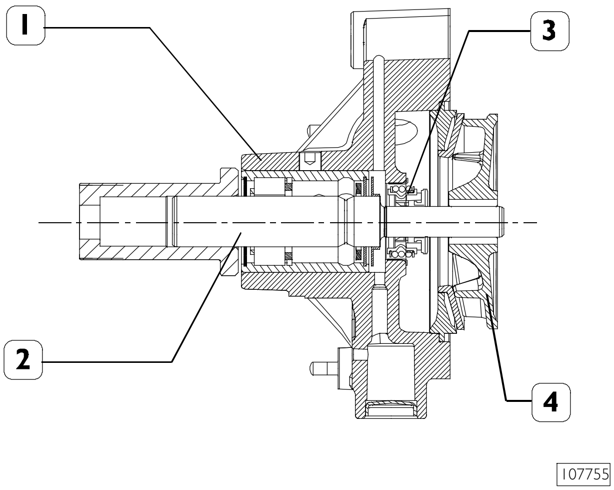
A Vent to expansion tank
B To heating system
C From heating system
D To radiator
E From radiator
F Thermostat closed
G Thermostat open

Hot
Very hot
Cold

Water pump description

The water pump cannot be overhauled. If coolant leakage or damage to the component or seals is identified, it must be replaced.

Figure 32

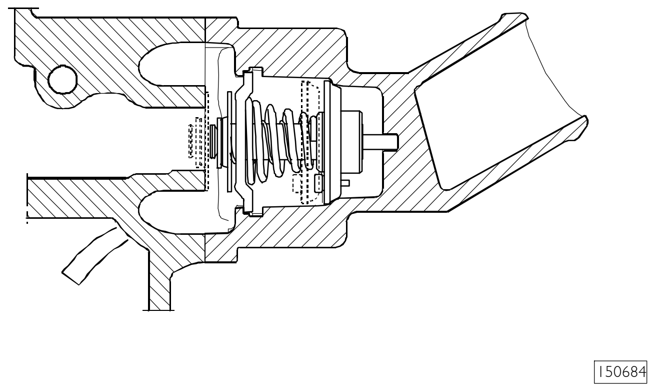


LONGITUDINAL CROSS-SECTION OF WATER PUMP

1. Pump casing - 2. Pump drive shaft with bearing - 3. Seal - 4. Impeller.

Thermostat

Figure 33



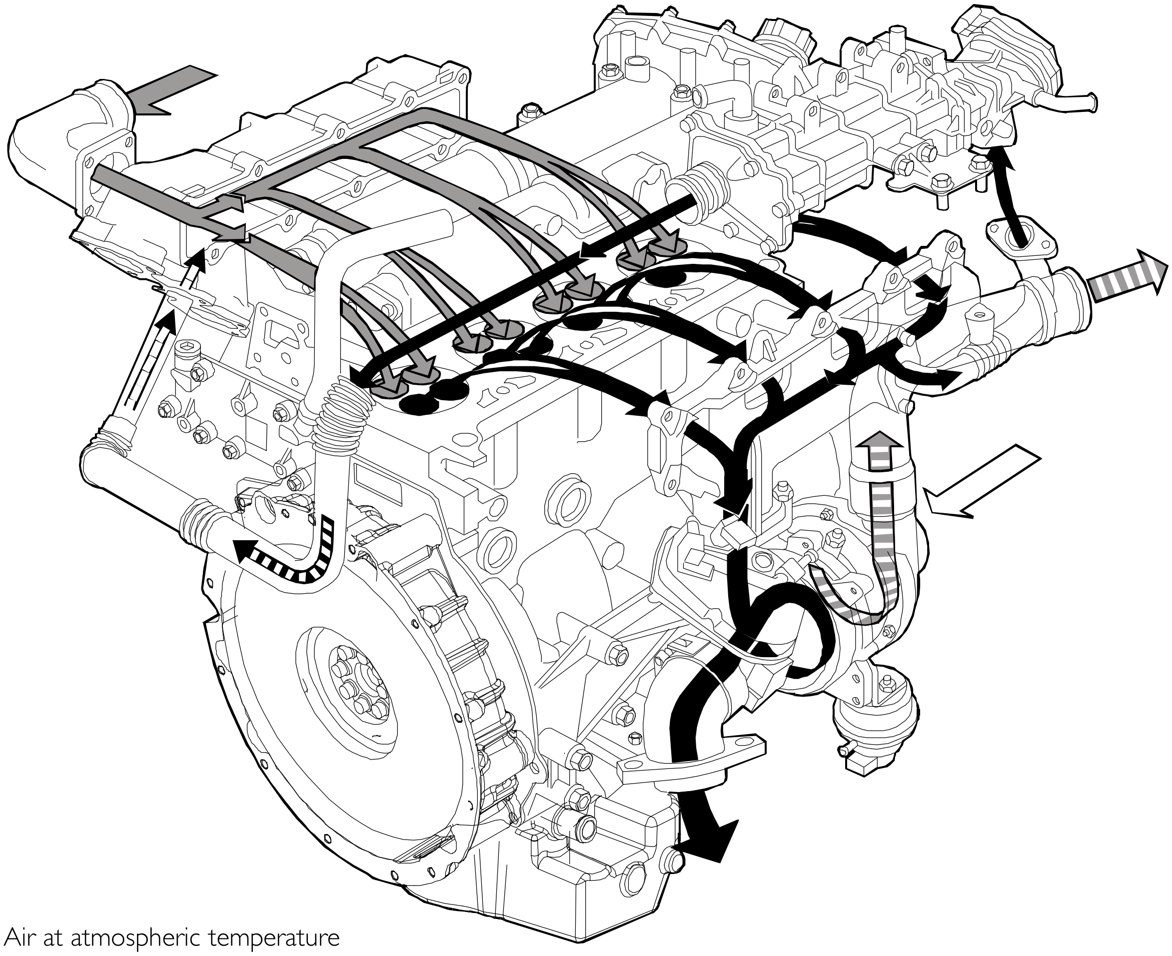
The by-pass thermostat needs no adjustment.
If there is any doubt about its operation, replace it.
The thermostat casing is fitted with the thermometric switch/transmitter and water temperature sensor.

Start of stroke at 79 ± 2 °C.

TURBOCHARGING

For motors F1CE3481A/R

Figure 34



- Air at atmospheric temperature
- Hot compressed air
- Cold compressed air
- Exhaust gas
- Cold exhaust gas

171590

Description

The turbocharging system comprises an air filter, turbocharger and intercooler.
The air filter is the dry type comprising a filtering cartridge to be periodically replaced.

The function of the turbocharger is to use the energy of the engine's exhaust gas to send pressurized air to the cylinders.
The intercooler comprises a radiator included in the engine coolant radiator and its function is to lower the temperature of the air leaving the turbocharger to send it to the cylinders.

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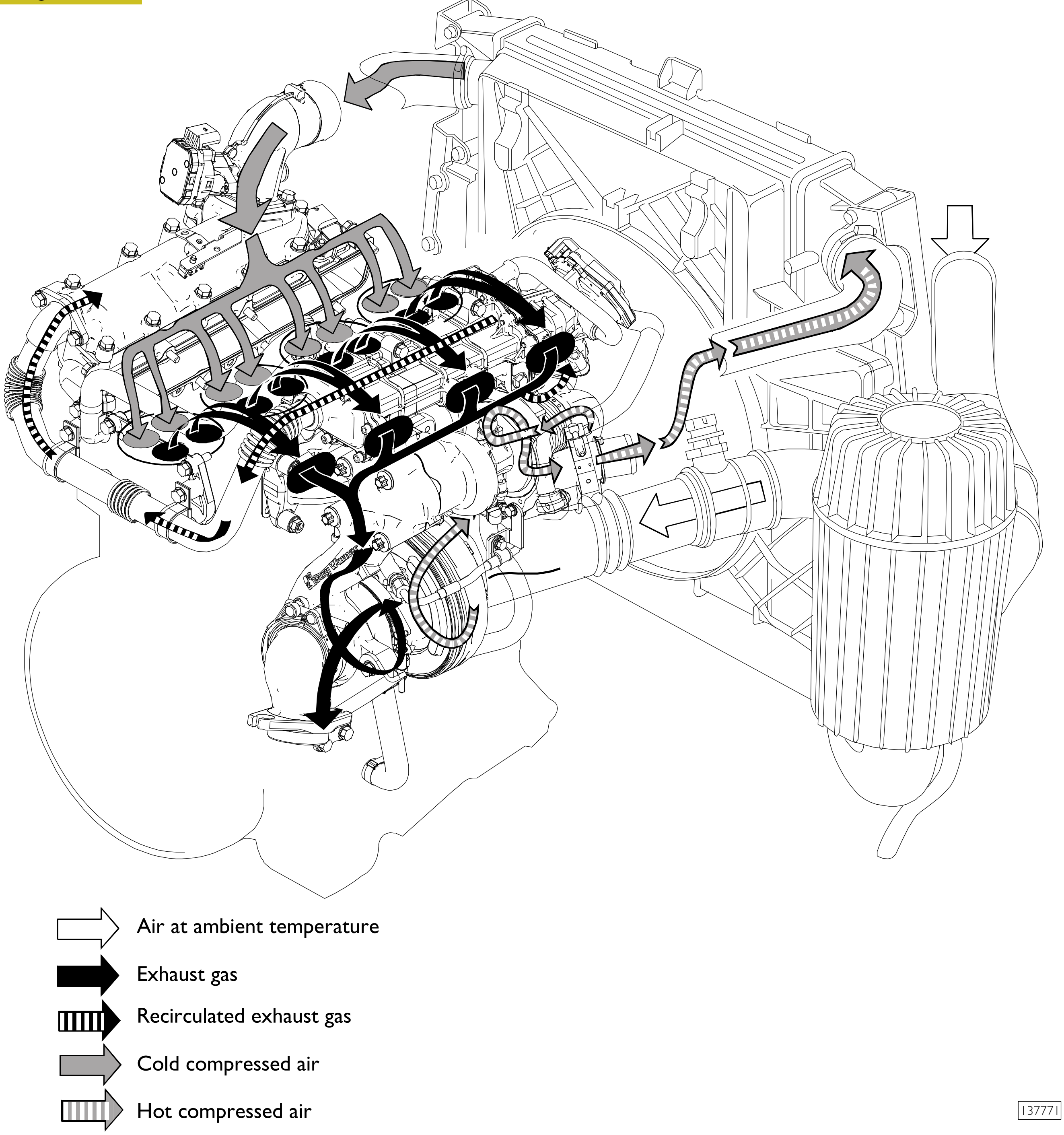
TURBOCHARGER SYSTEM DESCRIPTION

For motor F1CE3481C*C124

Figure 35



TURBOCHARGING DIAGRAM

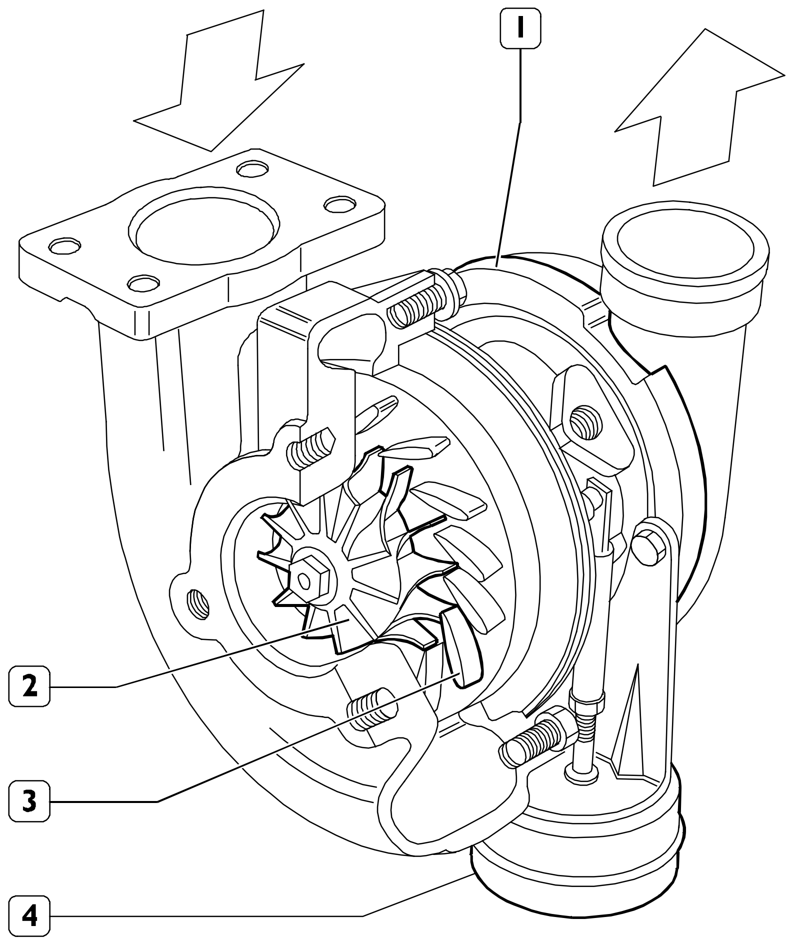
The turbocharging system is composed of: an air filter, two-stage turbocharger and intercooler.
The air filter is a dry type comprising a filtering cartridge that should be periodically replaced.

The function of the two-stage turbocharger is to use the energy of the engine's exhaust gas to deliver pressurized air to the cylinders.
The intercooler consists of a radiator integrated in the engine coolant radiator with the function of lowering the temperature of the air leaving the turbocharger before it is delivered to the cylinders.

GARRET variable geometry turbosupercharger

For motors F1CE3481A/R

Figure 36



The variable geometry turbosupercharger consists of the following:

- centrifugal supercharger (1);
- turbine (2);
- set of mobile blades (3);
- a pneumatic actuator (4) controlling the moving vanes. The actuator is controlled by a vacuum via a proportional solenoid valve controlled by the engine management control unit.

The variable geometry makes it possible to:

- increase the speed of the exhaust gases at the turbine at low engine speeds;
- slow down the speed of the exhaust gases at the turbine at high speeds;

The variable geometry turbocharger makes it possible to produce the maximum volumetric efficiency for the engine at low rotation speeds (with the engine in load conditions).

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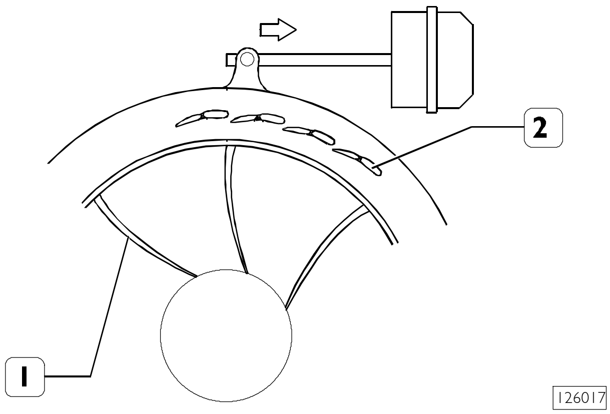
Operation at low engine rpm

Figure 37

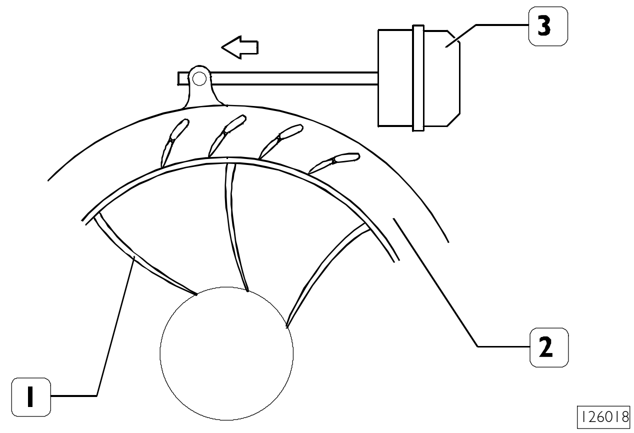


1. TURBINE - 2. MOBILE BLADES

When engine is running at low speed, the exhaust gases show weak kinetic energy; under these conditions a traditional turbine shall rotate slowly, thus providing a limited booster pressure.
In the variable geometry turbine (1), the mobile blades (2) are set to max. closed position and the small through-sections between the blades increase the inlet gas speed. Higher inlet speeds involve higher tip speeds of the turbine and therefore of the turbosupercharger.
Engine speed increase results in a gradual increase of exhaust gas kinetic energy, and also in turbine (1) speed and booster pressure increase.

Operation at high engine rpm

Figure 38



1. TURBINE - 2. MOBILE BLADES -
3. PNEUMATIC ACTUATOR

The ECU, through the actuator control solenoid valve, modulates the vacuum acting on the diaphragm, so actuator (3) controls through the tie rod, the gradual opening of the mobile blades (2) until reaching the max. open position.
Blade through-sections results larger thus producing a speed decrease in exhaust gas flow through the turbine (1) with speeds equal to or lower than those of the low rpm condition.
Turbine (1) speed is therefore adjusted to a proper value enabling suitable engine operation at high speed

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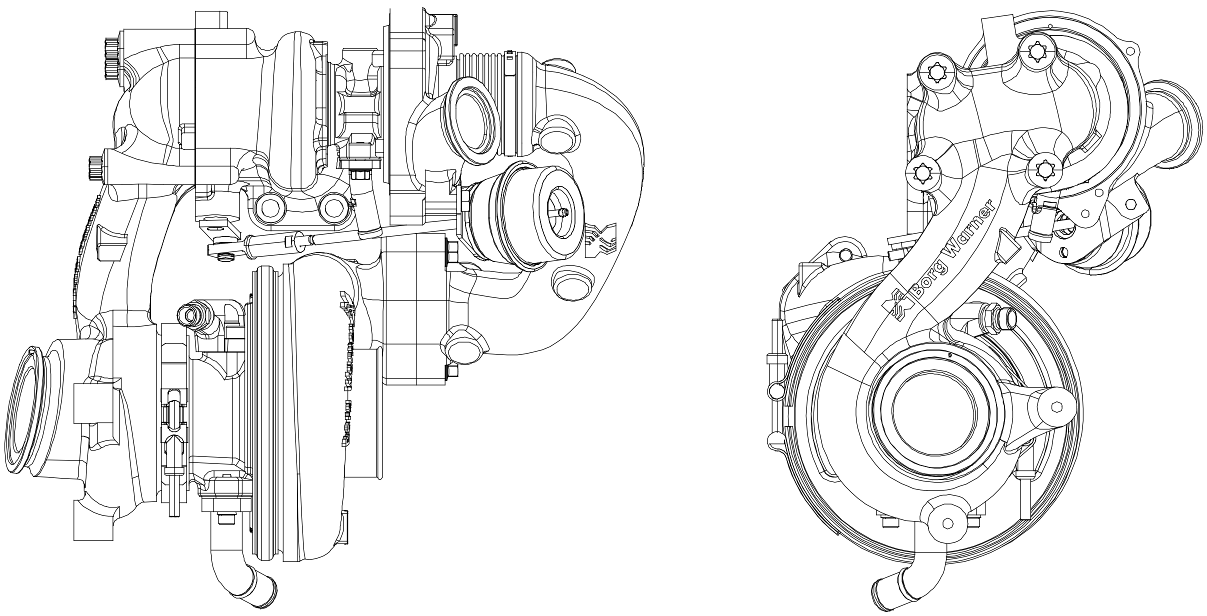
Borg Warner turbocharger description

For motor F1CE3481C*C124

Figure 39



137772

The Borg Warner turbocharger is a two-stage type with pressure relief valve. Essentially this consists of:

- a first high-pressure turbocharger consisting of:
  - a) a central casing housing a shaft supported by bushings at whose opposite ends are fitted the turbine and the compressor wheels;
  - b) a small fixed geometry turbine casing and a compressor casing mounted at the end of the central casing;
- a second low-pressure turbocharger consisting of:
  - c) a central casing housing a shaft supported by bushings at whose opposite ends are fitted the turbine and the compressor wheels;
  - d) a larger fixed geometry turbine casing and a compressor casing mounted at the end of the central casing;
- a gas pipe connecting the two turbines;
- a pipe connecting the compressed air between the two compressors;
- a pressure relief valve fitted on the high pressure turbine casing. This separates a portion of the exhaust gas outlet and sends part directly to the low pressure turbine via the pipe connecting the two turbines when the supercharging pressure exceeds the set value. The Waste-Gate valve is controlled by a modulator valve which modulates the vacuum drawn from the air circuit of the servo brake, according to the information exchanged between the electronic control unit and the sensors: engine rpm, throttle pedal position and pressure/temperature fitted on the intake manifold.

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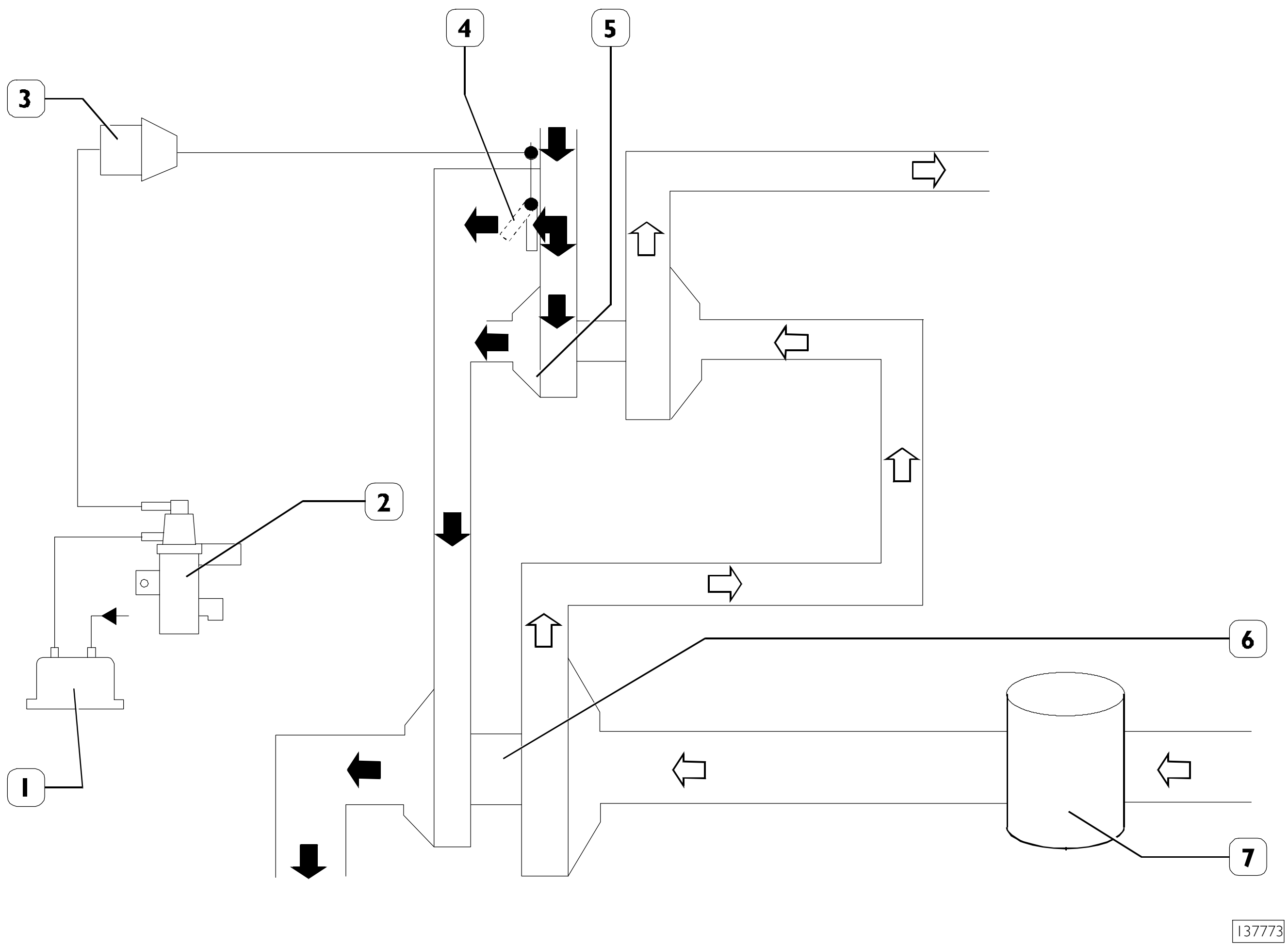
Figure 40



OPERATION DIAGRAM

1. Vacuum tank - 2. Modulator solenoid valve - 3. Actuator (Waste Gate) - 4. Throttle valve - 5. High pressure turbocharger - 6. Low pressure turbocharger - 7. Air filter

Operation at low speed

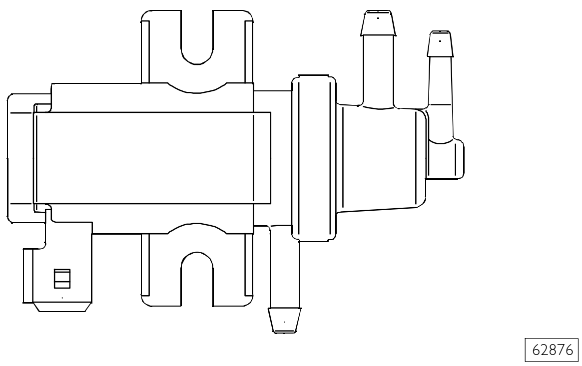
At low engine speeds, the WG valve is closed and the exhaust gases from the exhaust manifold provide little kinetic energy to rotate the high-pressure turbine slowly. The residual kinetic energy of the exhaust gases flowing out of the high-pressure turbine also rotates the low-pressure turbine slowly, activating both compressors and thus allowing the outside air to be compressed and sent through the connection piping to the intercooler with a limited turbocharged pressure.

Operation at high engine rpm

When the engine speed increases, the kinetic energy of the exhaust gases also increases, therefore the high-pressure turbine speed increases, which in turn causes the WG valve to intervene and cause a rise in turbo charging pressure. Waste Gate valve intervention allows the part of the exhaust gases with greater kinetic energy to bypass the high-pressure turbine and go directly to the low-pressure turbine, which is rotating more quickly; also, by activating both compressors and thus allowing the outside air to be compressed, it is sent through the connection piping to the intercooler with a limited turbocharged pressure.

Proportional solenoid valve controlling turbocharger actuator

Figure 41

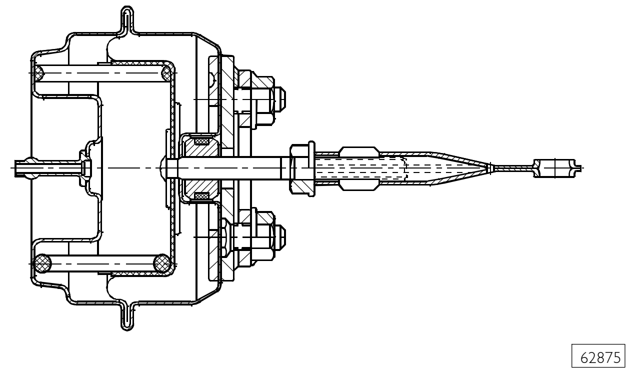


The solenoid valve modulates the low pressure controlling the turbocharger actuator, taken from the air circuit of the servo brake, according to the information exchanged between the electronic control unit and the sensors: engine speed, throttle pedal position and pressure/temperature fitted on the intake manifold.

As a result, the actuator varies the opening of the blades of the turbocharger that adjust the flow of exhaust gases.

Actuator

Figure 43



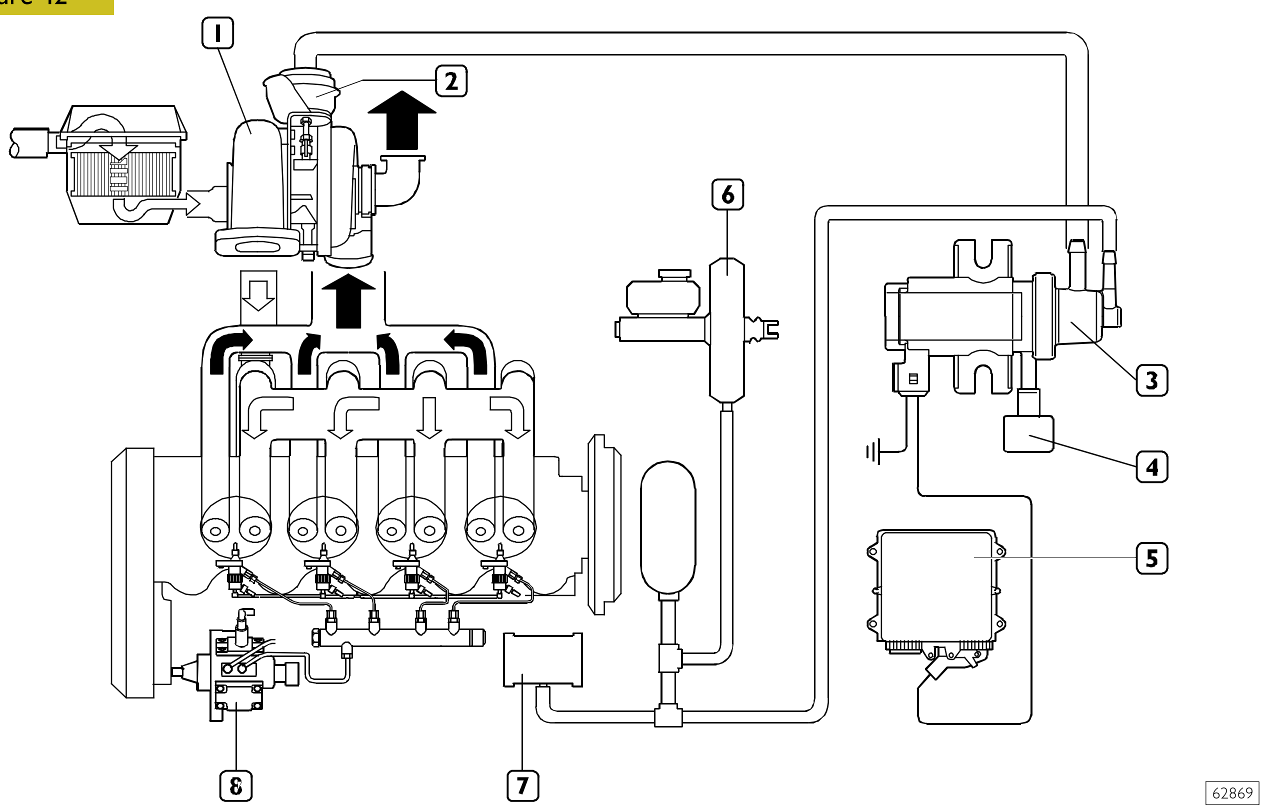
SECTION ON THE ACTUATOR

The actuator diaphragm, connected to the control rod, is governed by the low pressure on the top of the actuator.

The low pressure modulated by the proportional solenoid valve varies the movement of the diaphragm and, as a result, of the rod governing the turbine's mobile blades.

For motors F1CE3481A/R

Figure 42



TURBOCHARGING FUNCTIONAL DIAGRAM

1. Variable geometry turbocharger - 2. Pneumatic actuator - 3. Proportional solenoid valve - 4. Air filter - 5. EDC 16 control unit - 6. Servo brake - 7. Vacuum device - 8. High-pressure pump.

For motor F1CE3481C*C124

Figure 44

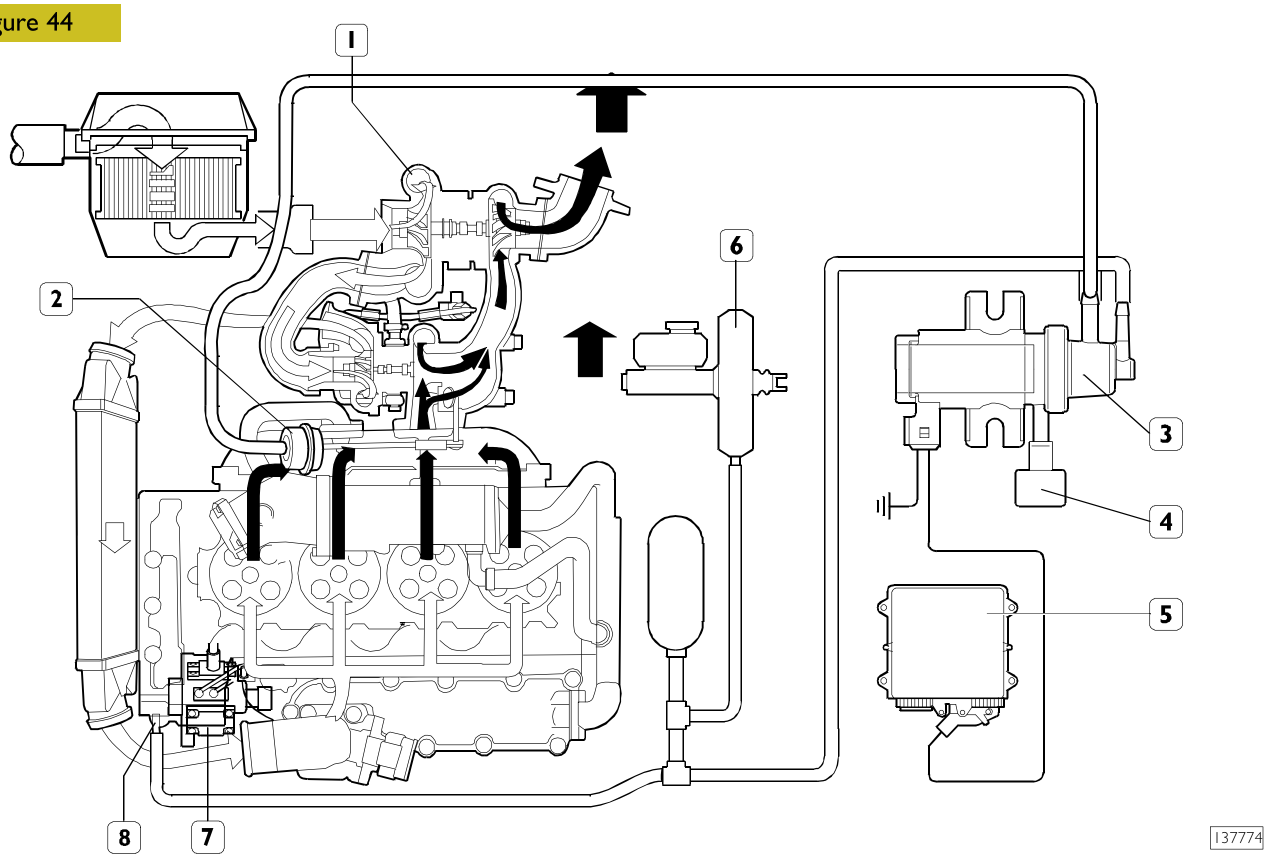
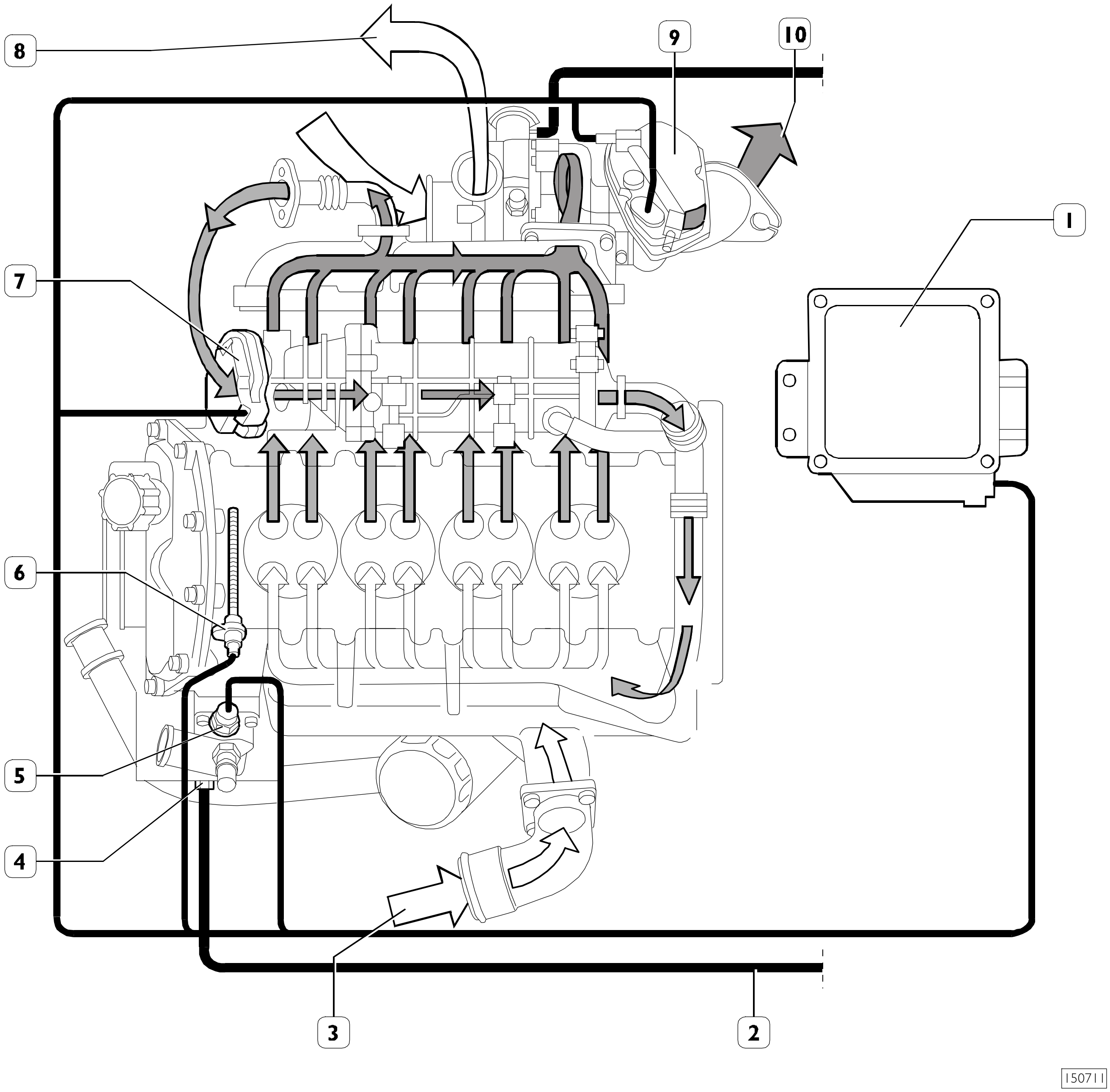


DIAGRAM OF TURBOCHARGING FUNCTION

1. Two-stage turbocharger - 2. WG turbocharger actuator - 3. Proportional solenoid valve - 4. Air filter - 5. EDC 17 ECU - 6. Servo brake - 7. High pressure pump - 8. Vacuum pump

EXHAUST GAS RECIRCULATION (EGR) SYSTEM

Figure 45



1. Electronic control unit - 2. Pressure drop pipe - 3. Air from intercooler -
4. Vacuum connector - 5. Water temperature sensor - 6. Engine revs sensor - 7. Flow regulation valve -
8. Air to intercooler. - 9. EBS Valve - 10. Exhaust gas

Operation

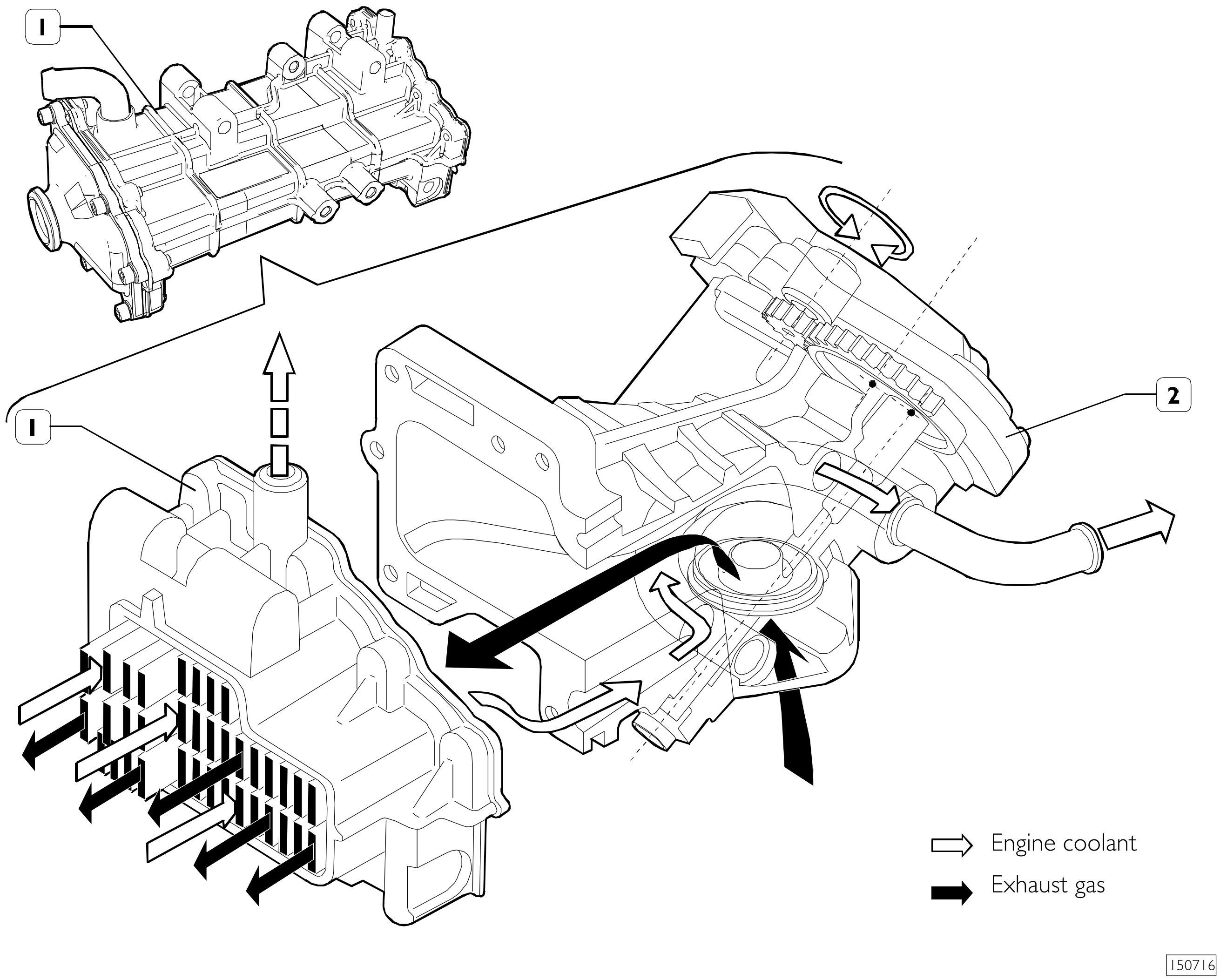
The E.D.C. 17 electronic control unit processes the information coming from the: atmospheric pressure sensor, water temperature sensor, engine rpm sensor, accelerator pedal potentiometer and, in accordance with suitably programmed modes in its memory, operate the opening of the plate in the E.G.R. valve by means of a PWM signal.

In this way, some of the exhaust gases are sent towards the heat exchanger where they are cooled and directed to the chamber for the throttle valve assembly to be mixed with the air coming from the intercooler and flow to the intake manifold. If the vehicle is fitted with a D.P.F. catalytic converter, at the same time, the E.D.C. 17 control unit, adapts the flow rate of the fuel to be injected into the cylinders depending on the quantity of "recirculated" exhaust gases.

When the engine is running and the recirculation of the gases is not required (regeneration of the particulate filter, starting, engine cold, idle speed, load request, high altitude), the control unit control signal is cancelled.

E.G.R. Assembly (Exhaust gas recirculation)

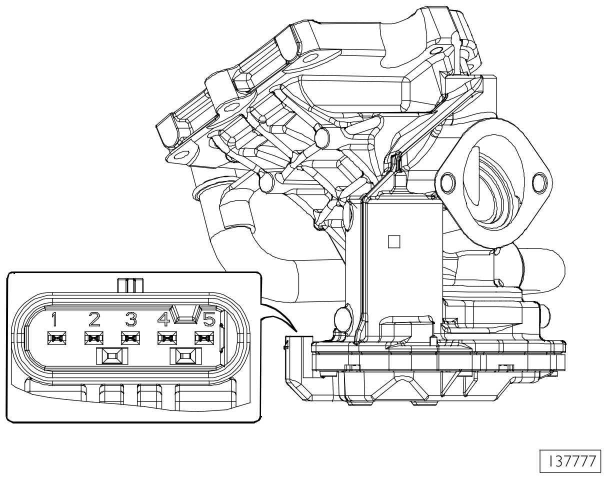
Figure 46



The E.G.R. assembly (Exhaust gas recirculation) comprises a heat exchanger (1) and a flow regulation valve (2).
The heat exchanger (1) has the task of lowering the temperature of the exhaust gases which are partly sent to the intake manifold. This operation has only one aim: to lower the combustion temperature of the mixture. This takes place because the exhaust gases, totally inert, mix with the mixture and slow down combustion. Lowering this temperature produces a considerable decrease in NOx (nitrogen oxide) emissions which are harmful to the environment.
The body of the heat exchanger is composed of a tube bundle cooled on the outside by the coolant fluid circulating in the enigne. Some of the exhaust gases destined for "recirculation" pass inside the tube bundle and are cooled.
The flow regulation valve (2) is fitted on the end of the heat exchanger. The adjustment of the amount of recirculation exhaust gases takes place by means of an electrically operated plate valve.
The valve is cooled by the engine coolant coming out of the heat exchanger thereby ensuring it is more efficient and lasts longer.

EGR flow regulator valve

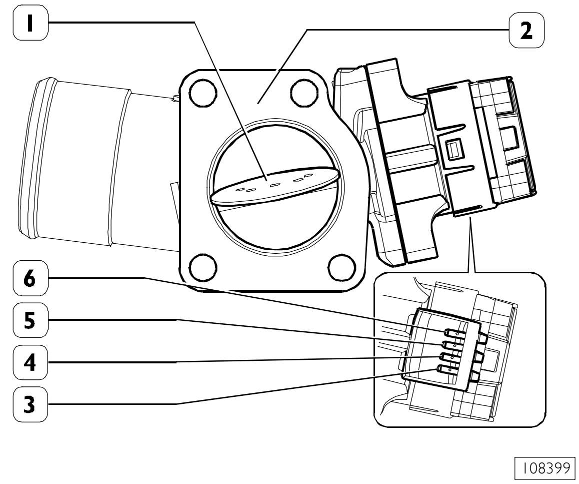
Figure 47



Pin - out	Designation
1	Engine -
2	Engine +
3	Sensor -
4	Sensor signal
5	Sensor +

Throttle valve assembly description

Figure 48



1. Throttle valve - 2. Electrical actuator - 3. Throttle position signal - 4. Earth - 5. Voltage - 6. PWM signal

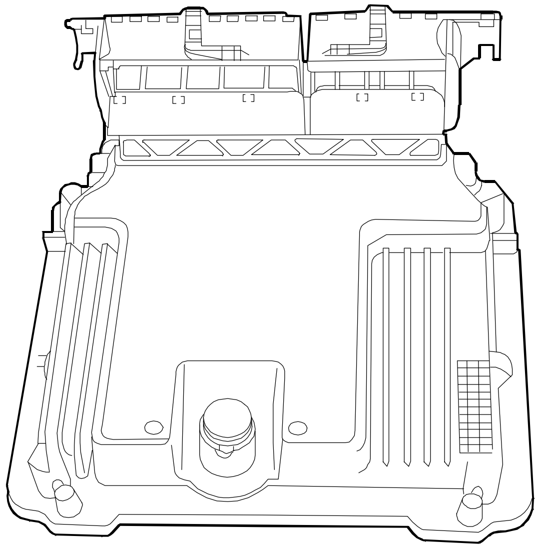
Throttle valve assembly (normally open) , located on the inlet manifold, has the task of regulating the air flow rate arriving from the intercooler to be mixed with the exhaust gasses recirculated by the E.G.R. valve according to a programmed percentage. The recirculated exhaust gas is mixed with air from the intercooler in a duct machined into the cylinder head. The throttle valve is operated by an electric actuator controlled by a PWM signal from the EDC 17 ECU.

SECTION 3
Electrical equipment

Page

ENGINE CONTROL EDC17 ELECTRONIC CONTROL UNIT

Figure 1



The control unit is a flash type EEPROM, in other words it can be reprogrammed from the outside without intervening on the hardware; it processes the signals coming from the sensors by applying the software algorithms and controls the actuators, in particular the injectors and the pressure regulator. It has a built-in absolute pressure sensor to further improve the management of the injection system.
It is mounted on the left side of the engine compartment and is linked to the vehicle's wiring by means of two connectors:

- CONNECTOR A, 60-pin for the components in the engine;
- CONNECTOR K, 94-pin for the components on the vehicle.

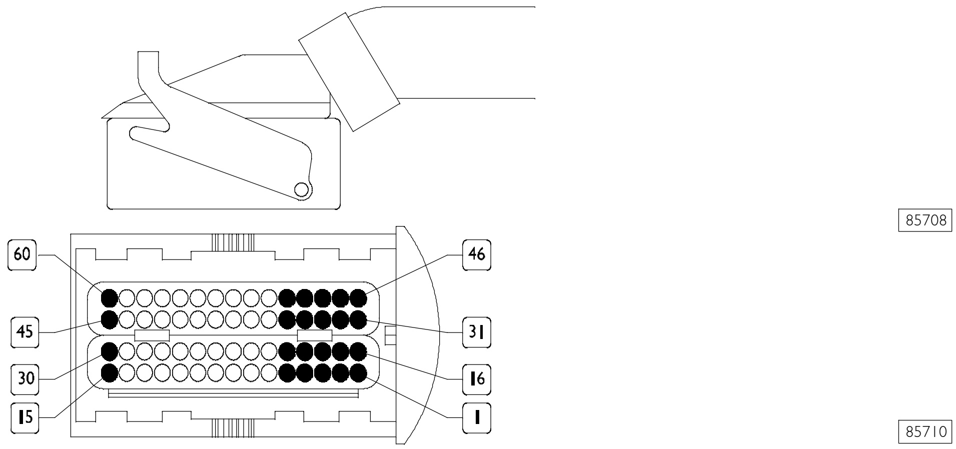
The engine ECU calculates the injection modes by processing the following parameters:

- engine speed;
- accelerator pedal position;
- air flow rate introduced;
- coolant temperature;
- battery voltage;
- fuel pressure.

Up to 2800 rpm pre-injection is also carried out in order to reduce the typical noise of direct diesel injection. Pre-injection and main injection advance angles vary according to the engine operating conditions and temperature at that moment.

ECU connection to the injection cable on engine side (housing A)

Figure 2



Pin	Function
1	Connection of solenoid valve 21 (injector on cylinder 3)
2	Connection of solenoid valve 22 (injector on cylinder 2)
3	---
4	---
5	---
6	Turbocharger pressure and temperature sensor
7	Speed sensor on timing system
8	Connection to rail pressure sensor
9	---
10	---
11	VGT Position sensor
12	Turbocharger pressure and temperature sensor
13	Turbocharger pressure and temperature sensor
14	Engine speed sensor connection
15	Rail pressure control solenoid valve
16	Connection of solenoid valve 21 (injector on cylinder 3)
17	Connection of solenoid valve 22 (injector on cylinder 2)
18	VGT Position sensor
19	VGT Throttle valve actuator
20	---
21	---
22	Speed sensor on timing system
23	Engine coolant temperature sensor
24	---
25	Turbocharger pressure and temperature sensor
26	---
27	EGR valve position sensor
28	---
29	EGR valve position sensor
30	Fuel dosing valve on high pressure pump
31	Connection of solenoid valve 11 (injector on cylinder 1)
32	Connection of solenoid valve 12 (injector on cylinder 4)
33	EGR valve position sensor
34	Actuator brake engine
35	EGR throttle valve actuator
36	Engine speed sensor connection

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Pin	Function
37	---
38	Debimeter
39	Rail pressure sensor
40	---
41	---
42	Debimeter
43	Rail pressure sensor
44	Debimeter
45	Rail pressure control solenoid valve
46	Connection of solenoid valve 11 (injector on cylinder 1)
47	Connection of solenoid valve 12 (injector on cylinder 4)
48	VGT Position sensor
49	---
50	EGR throttle valve actuator
51	---
52	---
53	Engine speed sensor connection
54	Engine cable disconnection
55	Engine coolant temperature sensor
56	---
57	Engine cable disconnection
58	---
59	---
60	Fuel dosing valve on high pressure pump
●	Power housings
○	Signal housings
-	The Pins not shown are not used

F1C ENGINE HARNESS
Injection cable F1C

Figure 3

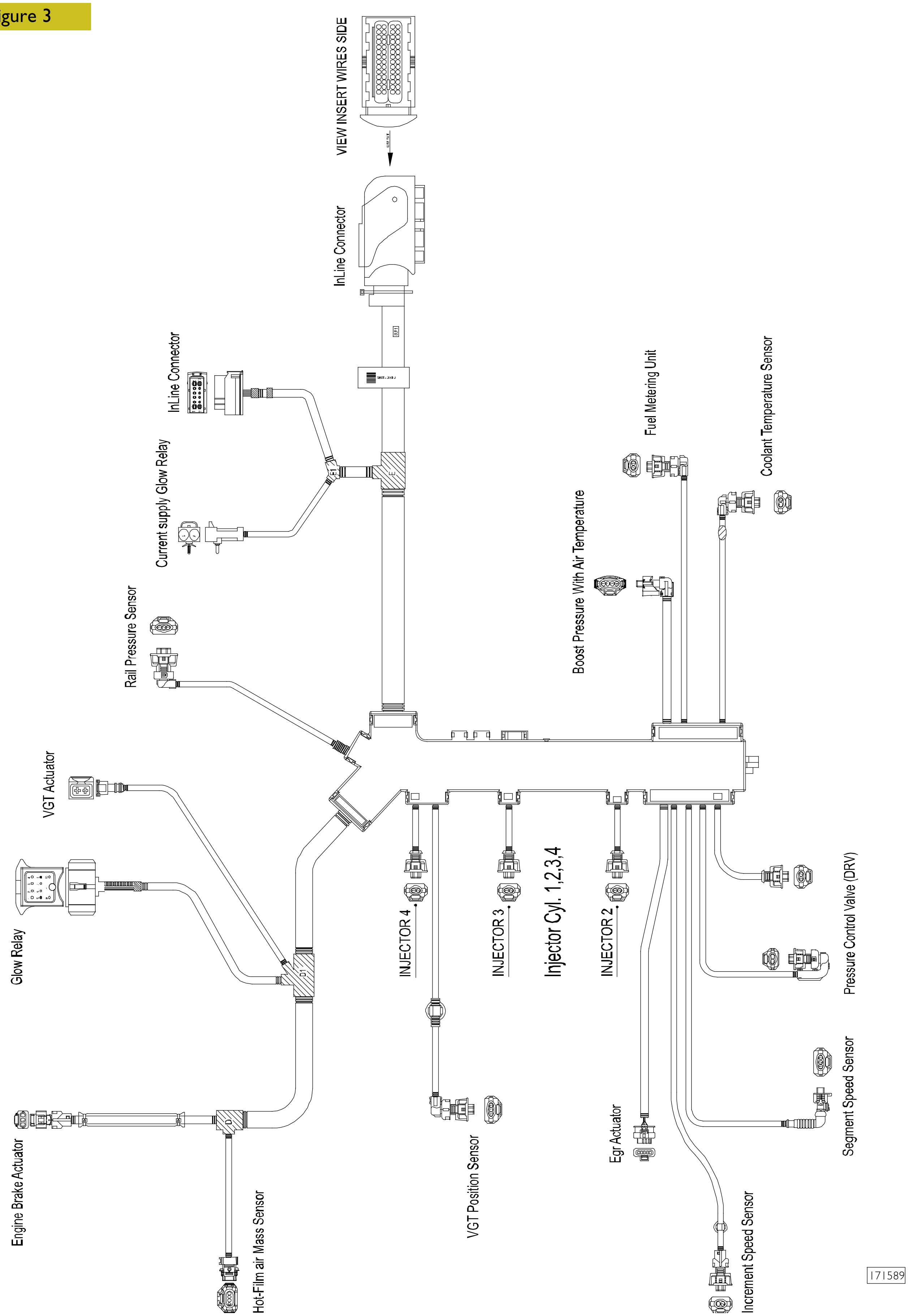
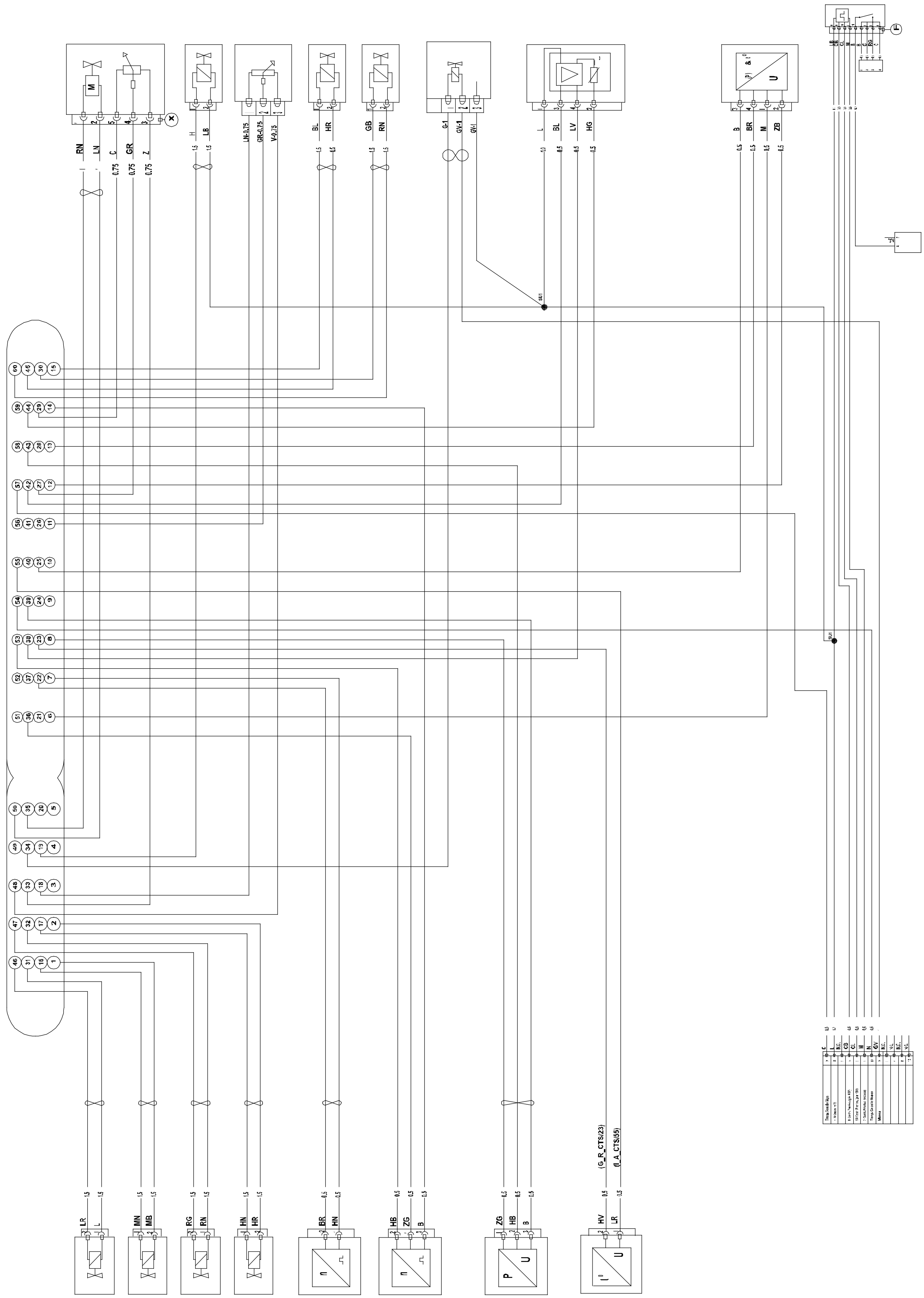


Figure 4



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SYSTEM OPERATION
Self-diagnosis – BLINK CODE

The control unit self-diagnosis system checks the signals from the sensors, comparing them with the admitted limits (see relative heading):

Immobilizer recognition (if present)

When the control unit receives the signal of the key on "MAR" it communicates with the immobilizer control unit to enable starting.

Checking fuel temperature

With the fuel temperature greater than 75°C, detected by the sensor on the fuel filter, the control unit operates the pressure regulator to decrease the line pressure (injection times are not changed). If the temperature exceeds 90°C, the power is reduced to 60%.

Checking engine coolant temperature

The control unit, depending on the temperature:

- of the engine coolant, turbocharging air and fuel, operates the electromagnetic fan (Baruffaldi) and switches on the coolant temperature warning light.

Checking quantity of fuel injected

According to the signals from the sensors and the mapped values, the control unit:

- operates the pressure regulator;
- varies the "pilot" injection time to 2200 rpm;
- varies the "main" injection time.

Checking idling adjustment

The control unit processes the signals from the various sensors and regulates the amount of fuel injected:

- it operates the pressure regulator;
- it varies the injection times of the electro-injectors.

Within certain thresholds the speed takes account of the battery voltage.

Fuel cut-off in release phase

In the phase of releasing the throttle pedal the control unit actuates the following logic elements:

- it cuts off supply to the electro-injectors;
- it partially reactivates supply to the electro-injectors before reaching idling speed;
- it operates the fuel pressure regulator.

Checking cylinder balancing on idling

According to the signals received from the sensors, the control unit controls the regularity of the torque at idling speed:

- it varies the amount of fuel injected into the single electro-injectors (injection time).

Checking regular engine rotation (anti-sawing)

It ensures regular engine rotation at a constant rate while increasing revs.
The control unit processes the signals received from the sensors and determines the amount of fuel to be injected via:

- the pressure regulator;
- the electro-injector opening time.

Checking smokiness at exhaust on acceleration

With heavy acceleration, on the basis of the signals received from the air introduction meter and engine speed sensor, the control unit determines the optimum amount of fuel to inject:

- it operates the pressure regulator;
- it varies the electro-injector injection time.

Checking exhaust gas recirculation

Depending on the engine load and the signal from the accelerator pedal sensor, the control unit limits the amount of air taken in, actuating partial suction of the exhaust gases.

Checking top speed limit

Depending on the number of revs, the control unit actuates two action strategies:

- at 4250 rpm it cuts off the fuel, decreasing the electro-injector opening time;
- over 5000 rpm it deactivates the electro-injectors.

Checking regular rotation on acceleration

Regular progression is assured in all conditions by the control of the pressure regulator and the electro-injector opening time.

Checking glow plug control unit

The injection control unit, in the phase of:

- starting
- after-starting

times operation of the glow plugs according to the engine temperature.

Checking activation of air-conditioning system

The control unit operates the air-conditioning compressor:

- switching it on/off when the relative switch is pressed;
- momentarily turning it off (approximately 6 sec.) if the engine coolant reaches the set temperature.

Checking fuel pump

Irrespective of the speed, the control unit:

- supplies the auxiliary fuel pump with the key on MAR;
- cuts off auxiliary pump supply if the engine is not started up within a few seconds.

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Checking diesel warming

It times operation of diesel warming in relation to ambient temperature.

Checking cylinder position

During each turn of the engine, the control unit recognizes which cylinder is in the power stroke and operates the injection sequence for the appropriate cylinder.

Checking pilot and main injection timing

According to the signals from the various sensors, including the absolute pressure sensor built into the control unit, the control unit determines the optimum point of injection according to internal mapping.

Checking injection pressure closed cycle

Depending on the engine load, determined by processing the signals from the various sensors, the control unit operates the regulator to obtain optimum line pressure.

Fuel supply

The fuel supply is calculated in relation to:

- accelerator pedal position
- engine speed
- quantity of air introduced.

The outcome may be corrected in relation to:

- the water temperature.

Or to avoid:

- noise
- smoke
- overloading
- overheating
- turbine over-revving.

The delivery can be modified in the case of:

- action of external devices (ABS), ABD, EDB
- serious trouble decreasing the load or stopping the engine.

After determining the mass of air introduced by measuring its volume and temperature, the control unit calculates the corresponding mass of fuel to inject into the relevant cylinder (mg per delivery) also taking into account the temperature of the diesel.
The mass of fuel calculated in this way is first converted into volume (mm^3 per delivery) and then into degrees of throw, or duration of injection.

Correcting flow rate according to water temperature

A cold engine meets with greater resistance during operation: friction is high, the oil is still very viscous, and the various clearances are not yet optimized.
In addition, the injected fuel tends to condense on the metal surfaces that are still cold.
The fuel supply for a cold engine is therefore greater than for a warm one.

Correcting flow rate to avoid noise, smoke or overloading

The behaviour that could lead to this kind of trouble is well known.

The designer has therefore included special instructions in the control unit to avoid it.

De-rating

In the event of the engine overheating, injection is modified, decreasing the delivery to a varying degree, in proportion to the temperature reached by the coolant.

Injection timing electronic test

The advance (start of delivery, expressed in degrees) may be different from one injection to the next, also differentiated from one cylinder to another. It is calculated, similarly to the delivery, in relation to the engine load (accelerator position, engine speed and air introduced).
The advance is appropriately corrected:

- in phases of acceleration;
- according to the water temperature.

And also to obtain:

- lower emissions, noise and overloading;
- better vehicle acceleration.

An extremely high advance is set on starting, depending on the water temperature.
Feedback from the start of delivery is supplied by the change in impedance of the injector solenoid valve.

Speed governor

The electronic speed governor has both features of governors:

- idling and top speed
- all speeds

It is stable in ranges where conventional, mechanical governors are imprecise.

Engine starting

During the first few turns of the engine, the timing and cylinder no. 1 recognition signals (flywheel sensor and camshaft sensor) are synchronized.
The accelerator pedal signal is ignored on starting. Starting delivery is set only according to water temperature, by a special map.
When the control unit detects such speed and acceleration of the flywheel as to be able to consider the engine started up and no longer driven by the starter motor, it re-enables the accelerator pedal.

Cold starting

If even just one of the three temperature sensors (water, air or diesel) records a temperature lower than 10°C, pre-post heating is activated.
When the key makes contact the pre-heating indicator light comes on and stays on for a length of time that varies in relation to the temperature (while the glow plugs in the cylinder head heat the air), then flashes. It is now possible to start up the engine.
When the motor is running this indicator light goes out, while the glow plugs continue to be powered for a certain length of time (variable) for post-heating.
If, with the indicator light flashing, the engine is not started up within 20-25 seconds (inattention time), the operation is cancelled so as not to run down the batteries pointlessly.
The pre-heating curve is also variable in relation to the battery voltage.

Warm starting

If the reference temperatures all exceed 10°C, when the key makes contact the indicator light comes on for approximately 2 sec., for a short test, and then goes out. It is now possible to start up the engine.

Run up

When the key makes contact, the control unit transfers the information stored in memory when the engine was last stopped into the main memory (see After Run) and makes a diagnosis of the system.

After run

Whenever the engine is switched off with the key, the control unit stays powered for a few seconds by the main relay.
This makes it possible for the microprocessor to transfer some data from the main memory (volatile) to a non-volatile memory, which can be erased and written over (EEPROM), so as to make it available at the next start up (see Run Up).

These data basically consist of:

- various settings (engine idling adjustment, etc.);
- settings of some components;
- fault memory.

The process lasts a few seconds, typically from 2 to 7 (depending on the amount of data to save), after which the ECU sends a command to the main relay and makes it disconnect from the battery.

NOTE It is extremely important for this procedure not to be broken off, for example by switching off the engine with the battery cut-out, or by disconnecting the battery cut-out before 10 seconds have passed since switching off the engine. If this happens, the functioning of the system is ensured, but repeated interruptions may damage the control unit.

Cut-off

This function cuts off fuel delivery when the vehicle is decelerating (accelerator pedal released).

Cylinder balancing

Individual cylinder balancing contributes to increasing comfort and handling.
This function permits individual, customized control over the delivery of fuel and the start of delivery for each cylinder, even differently from one cylinder to another, to compensate for the hydraulic tolerances of the injector.

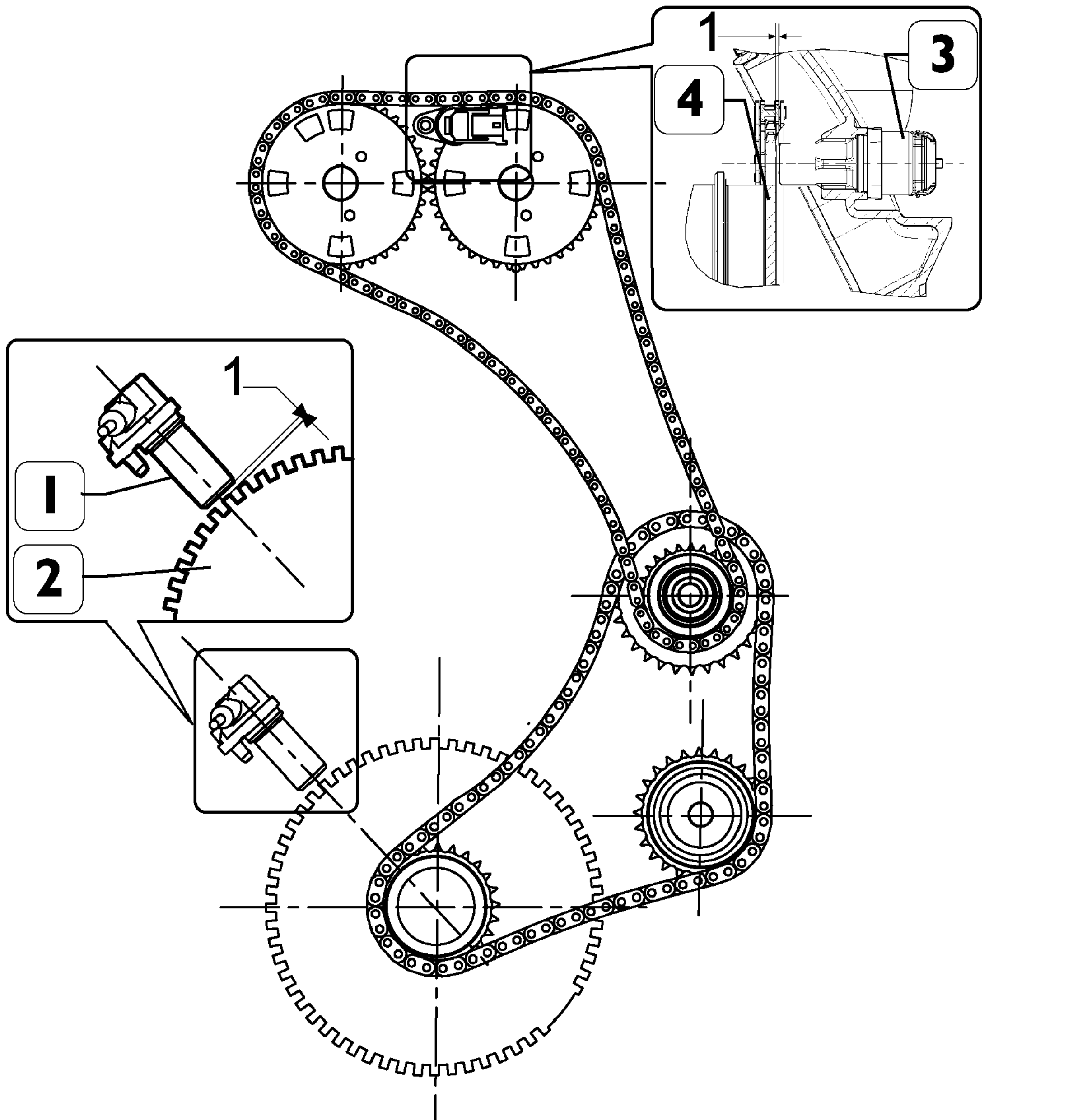
The differences in flow (delivery specifications) between the various injectors cannot be evaluated directly by the control unit. This information is supplied by Modus reading the bar code of each injector at the time of assembly.

Synchronization search

If there is no signal from the camshaft sensor, the control unit is anyhow able to recognize the cylinders into which the fuel is to be injected.
If this occurs when the engine is already running, the combustion sequence has already been acquired, so the control unit continues with the sequence on which it has already been synchronized.
If this occurs when the machine is at a standstill, the control unit energizes a single solenoid valve. Within at most 2 turns of the crankshaft, injection will take place in that cylinder, so the control unit just needs to get synchronized on the firing sequence and to start up the engine.

Driving shaft and camshaft unit

Figure 5



1. R.p.m. sensor - 2. Phonic wheel on drive shaft - 3. Timing sensor - 4. Phonic wheel on camshaft.

Camshaft revolution sensor

A semiconductor layer, immersed in a magnetic field and through which current flows, generates a potential difference (called Hall voltage) at its ends.

If current intensity remains constant, the generated voltage depends only on the magnetic field strength: periodical variation of field strength is enough to obtain a modulated electric signal.

The smooth portion of the phonic wheel (distributing shaft pulley) covers, while moving, the sensor, thus blocking the magnetic field with resulting low output signal.

On the contrary, the sensor generates a high signal next to the openings and when a magnetic field is available.

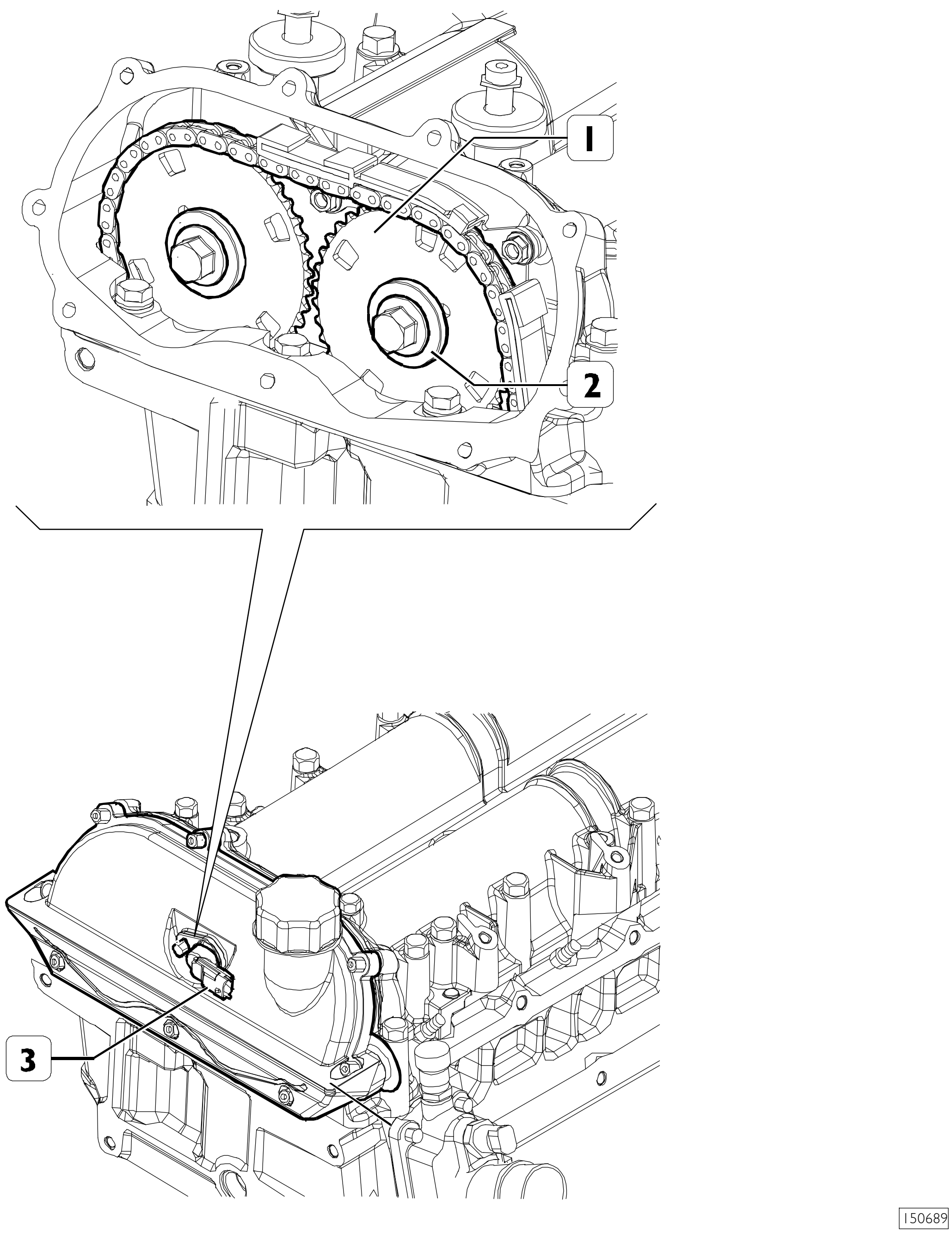
Phase sensor signals are acquired, and the engine position is recognized according to the sequence of the phonic wheel notches.

The mounting function makes it possible to identify signal errors and interferences (if any).

The resulting signal is supplied to the processor that controls the injection system.

The sensor is connected to the central unit at pins A 7/22.

Figure 6



1. Phonic wheel on camshaft - 2. Identification slots - 3. Sensor.

Driving shaft revolution sensor

A phonic wheel is fitted on the drive shaft. As the sensor detects existing teeth passing, it provides the central unit with the signal that is necessary to determine engine r.p.m.'s.

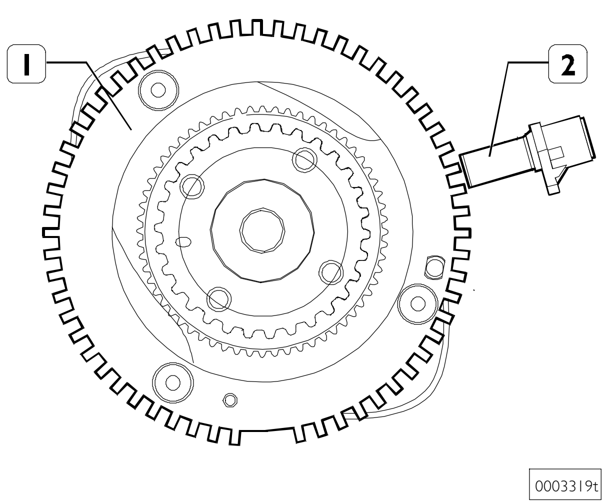
The variation of the signal generated by the lack of some teeth (synchronisation gap) occurring at each drive shaft turn is the reference signal which enables the central unit to detect the lead of the pair of pistons 1-4 with respect to PMS.

This signal is also used by the control unit to detect the engine rotation speed, the duration of injection and to control the rev counter.

This is an inductive sensor.

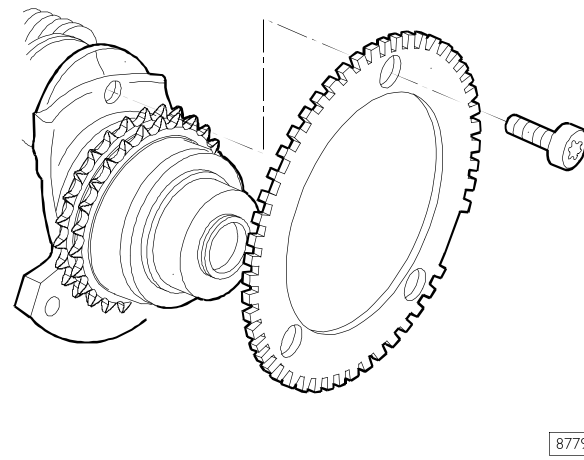
The sensor is connected to the pins No 36, 53 and 14 of the connector A in the electronic control unit.

Figure 7



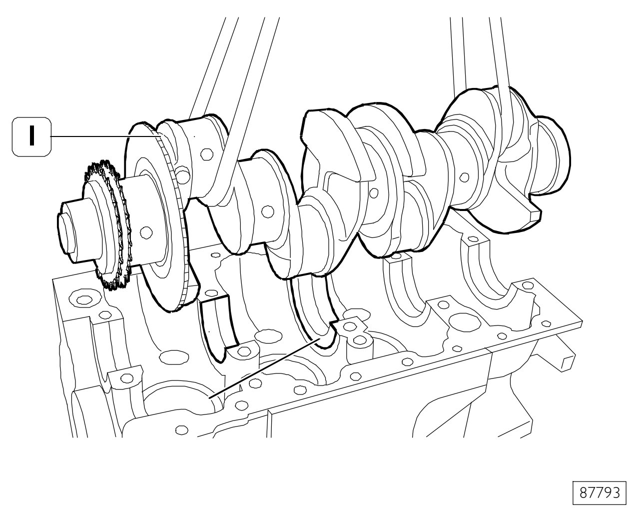
TECHNICAL VIEW OF THE SOUND WHEEL AND SENSOR
1. Sound wheel - 2. Sensor.

Figure 8



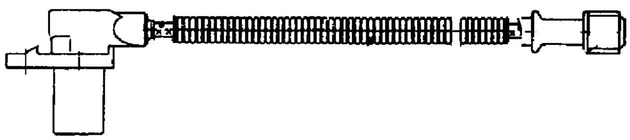
PHONIC WHEEL MOUNTING

Figure 9



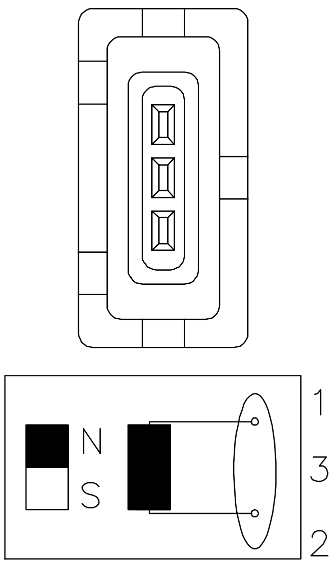
1. Phonic wheel.

Figure 10



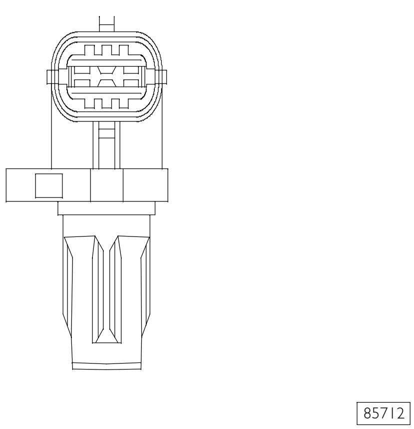
RPM SENSOR AND CONNECTION CABLE

Figure 11



SENSOR CONNECTOR AND WIRING DIRAGRAM

Figure 12



TIMING SENSOR
1. Earth - 2. Signal output - 3. Power supply positive.

Pressure regulator

It is mounted on the low pressure circuit of pump CP4.1.

When the engine control centre pilots the pressure regulator via the PWM signal, solenoid (1) is activated, which in its turn generates movement of magnetic core (2).

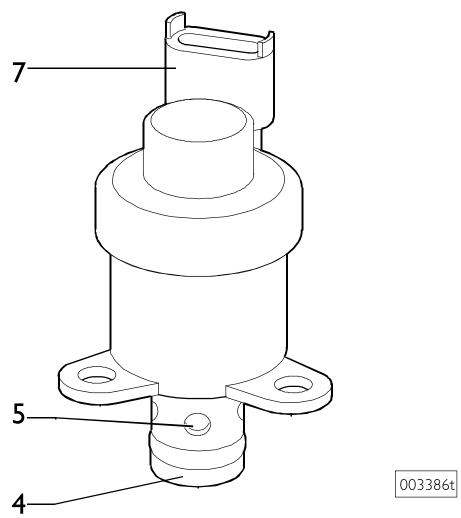
Core movement causes cylinder (3) axial displacement by fuel delivery partialization.

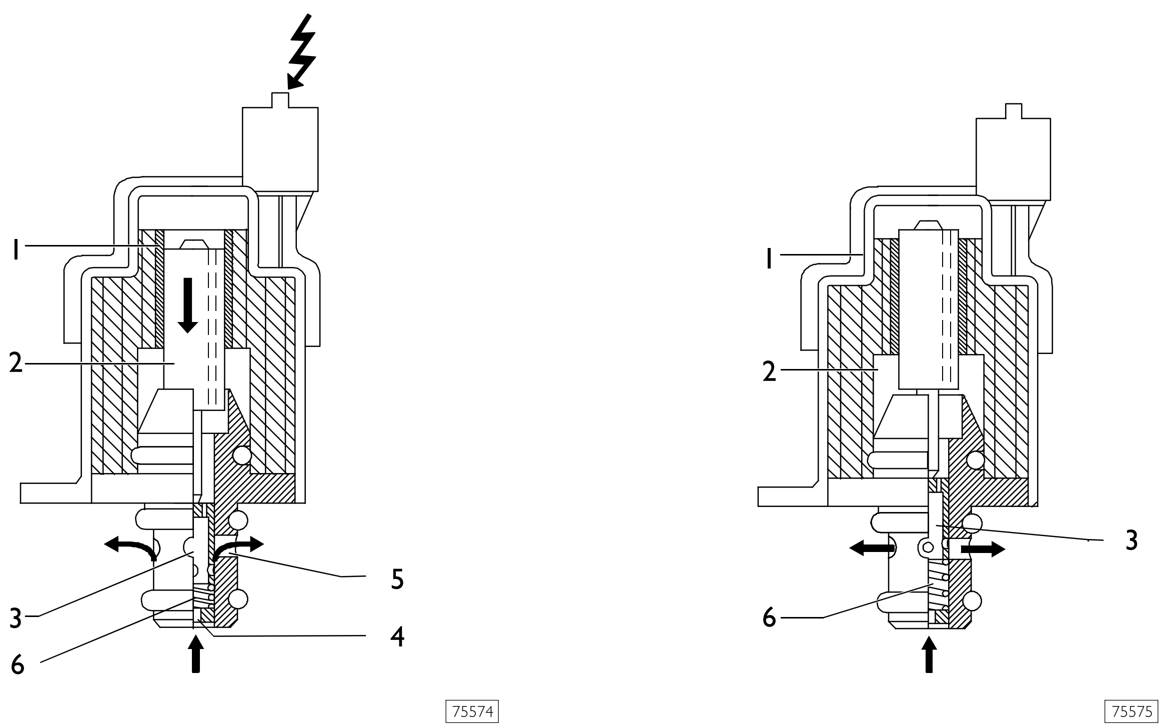
When solenoid (1) is not activated, the magnetic core is moved to its rest position by preload spring (6).

In these conditions, cylinder (3) is in a position to offer maximum fuel passage cross-section.

Drive solenoid valve is connected to pins 19 and 49 of connector A of central unit EDC 17.

Figure 13





1. Solenoid - 2. Magnetic core - 3. Cylinder - 4. Fuel input - 5. Fuel output - 6. Preloiad spring - 7. Connector.

Fuel pressure sensor (Rail)

Fitted to a rail end, it measures fuel pressure present to the purpose of determining existing fuel pressure. Pressure value is used to control pressure and determine injection electric control duration.
It is connected to the central unit at pins A 8, 43, 39. It is fed at 5 V.

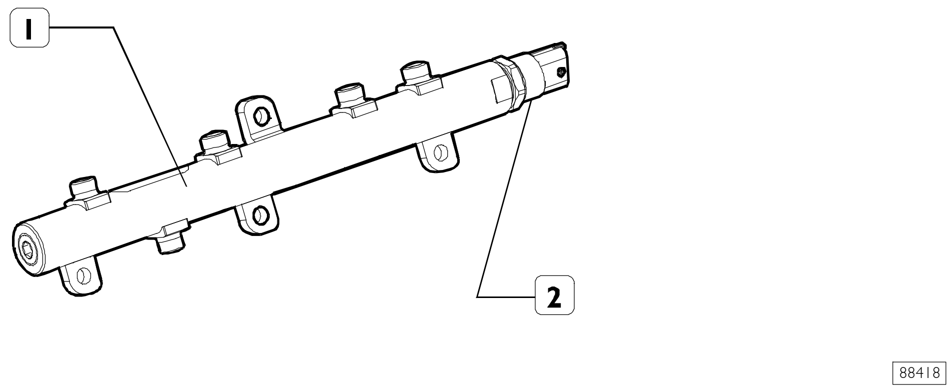
The hydraulic accumulator is mounted in the cylinder head on the side opposite aspiration.

By its volume, it damps fuel pressure oscillations owing to:

- ❑ high-pressure pump operation
- ❑ electro injector opening.

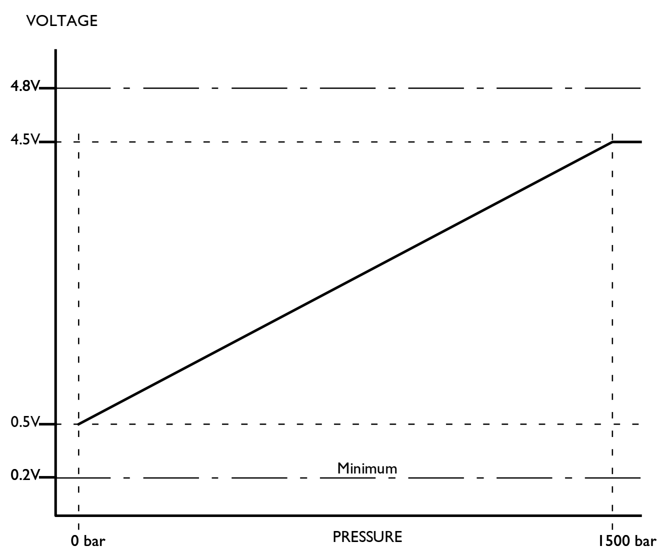
On hydraulic accumulator there is located the fuel pressure sensor.

Figure 14



1. Rail - 2. Pressure sensor.

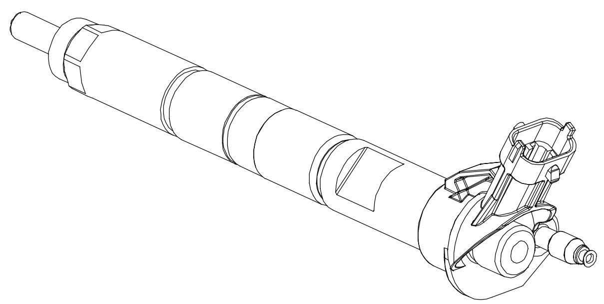
Figure 15



PRESSURE LIMITER OPERATING GRAPH

Electro-Injectors

Figure 16



The piezoelectric injectors are located on the engine head and receive the fuel under pressure from the rail. They operate both the high pressure fuel supply and recirculation under atmospheric pressure of the excess fuel that has not been injected.

The following are installed on the injector head :

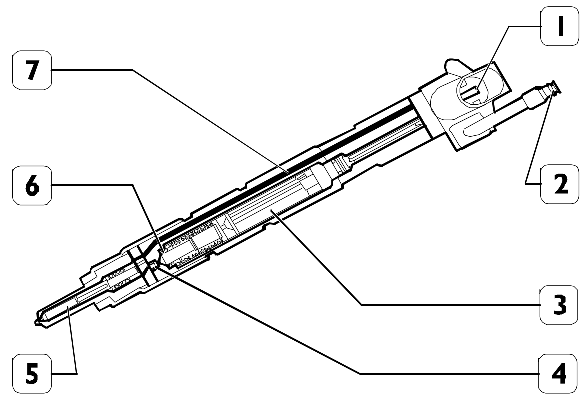
- a central access pipe for fuel under high pressure;
- a lateral pipe for the recirculation of fuel under low pressure with built-in throttle;
- the site for the electric connector that receives commands from the control unit.

The electronic control unit controls the piezoelectric actuator inside the injector.
The piezoelectric actuator, due to reduced switching times, enables a very fast reaction to the commands sent from the engine control unit, making injection capacity more flexible and increasing the number of injections per cycle.

The injectors are connected individually to the control unit at the following pins:

- A31 / A46 cylinder 1 injector
- A2 / A17 cylinder 2 injector
- A1 / A16 cylinder 3 injector
- A47 / A32 cylinder 4 injector

Figure 17



1. Electrical connection - 2. Connection for fuel return flow - 3. Encapsuled piezoelectric actuator - 4. Control valve - 5. Nozzle - 6. Hydraulic amplifier - 7. High pressure line

Operation

When the piezoelectric actuator (3) is reached by an electrical load, commanded by the control unit, it increases its length. The movement, amplified by the hydraulic amplifier (6), act mechanically on the control valve (4) and it allows therefore the injection of the fuel present in the high pressure duct (7). While stopping the electrical load, the actuator reacts elastically and again assumes its initial length.The springs add their contribution, winning the pressures that act in balancing on the whole surface of the components.
The fuel in excess is than recirculated in the fuel circuit through the duct (2).

Airflow gauge

This component incorporates a temperature sensor and a pressure sensor.

It is fitted on the engine intake manifold and measures the maximum flow rate of the intake air which is used to accurately calculate the amount of fuel to be injected at each cycle.

It is connected to the central unit on connector "A".

Pin Sensor	Pin ECU	Function
1	A6	ground
2	A12	temperature signal
3	A25	5 V power supply
4	A13	0 ÷ 5V pressure signal

Course of sensor in relation to the temperature

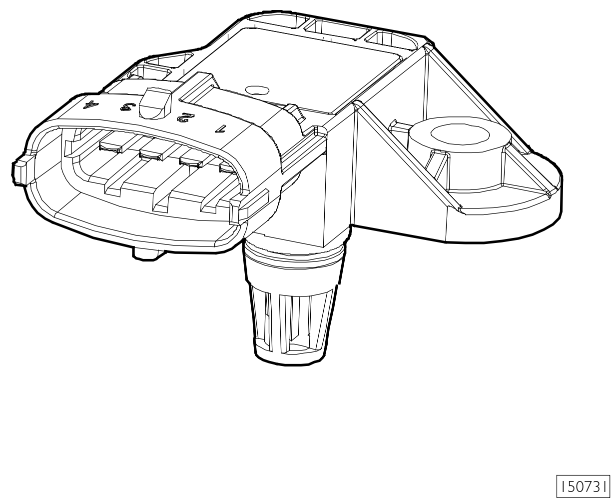
Temperature	Resistance
- 40 °C	45.30 kOhm
- 20 °C	15.45 kOhm
0 °C	5.89 kOhm
20 °C	2.50 kOhm
40 °C	1.17 kOhm
60 °C	0.59 kOhm
80 °C	0.32 kOhm
100 °C	0.18 kOhm
120 °C	0.11 kOhm

Course of sensor in relation to the pressure:

See graph opposite.

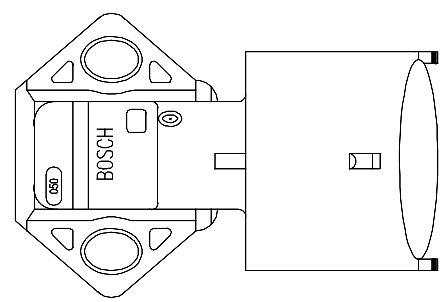
Figure 18

Course of sensor in relation to the pressure:



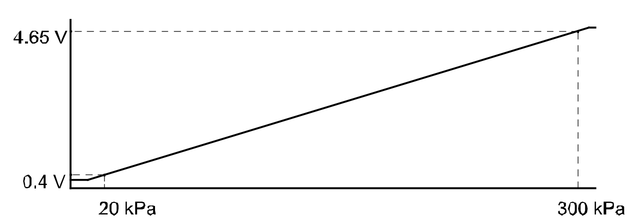
AIR FLOW METER

Figure 19



AIR FLOW METER CONNECTION

Figure 20



AIR FLOW METER OPERATING GRAPH

Atmospheric pressure sensor

This is integrated inside the control unit.

It measures the atmospheric pressure to correct the flow rate in relation to the altitude.

Engine coolant temperature sensor

This is an NTC sensor located on the thermostat box.

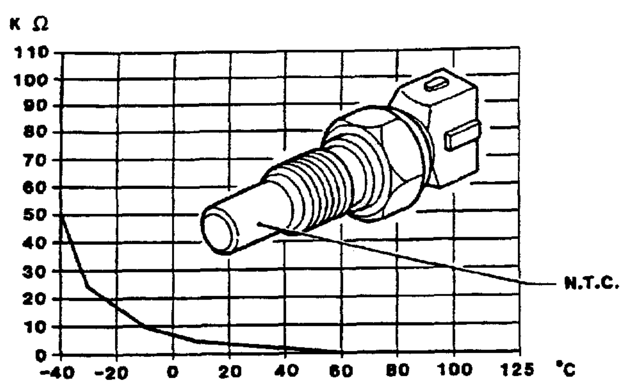
It detects the temperature of the coolant fluid to give the control unit information about the engine temperature conditions.

It is connected to pins 23 and 55 of connector A of central unit EDC 17.

Course of the sensor in relation to the temperature:

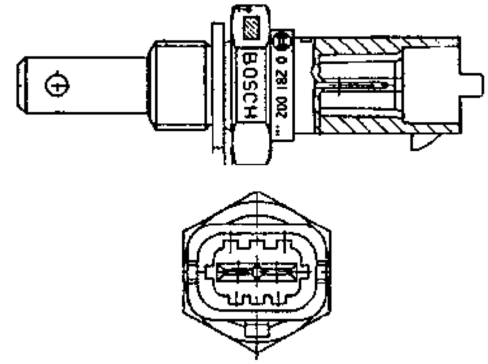
Temperature	Resistance
- 40°C	48.30 kOhm
- 20°C	15.46 kOhm
0°C	5.89 kOhm
20°C	2.50 kOhm
40°C	1.17 kOhm
60°C	0.59 kOhm
80°C	0.32 kOhm
100°C	0.19 kOhm
120°C	0.11 kOhm

Figure 21



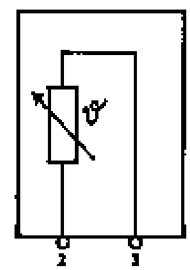
COURSE OF SENSOR RESISTANCE IN RELATION TO TEMPERATURE

Figure 22



TECHNICAL VIEW OF ENGINE COOLANT TEMPERATURE SENSOR

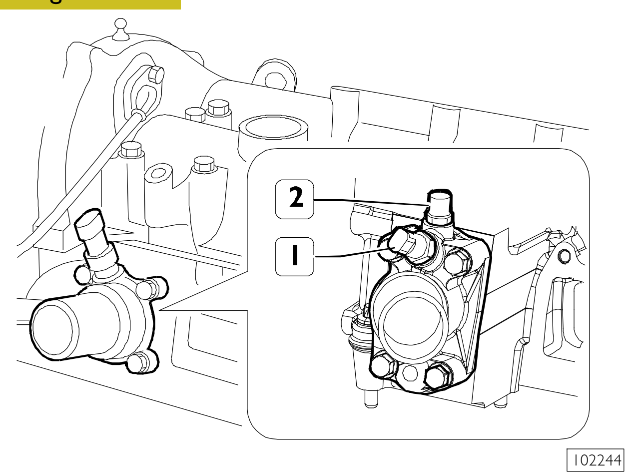
Figure 23



NTC

WIRING DIAGRAM

Figure 24



LOCATION OF F1C ENGINE COOLANT TEMPERATURE SENSOR
1. EDC - 2. Signal instrument panel signal

Preheat plug electronic centre

EDC central unit effects the timing of the functioning of glow plugs pre-heating central unit depending on engine temperature, which, in turn, activates the glow plugs.

The preheat centre contains an "intelligent" remote control switch that sends a feed-back to the control centre for information on any preheat centre defect or plug earth shirt circuit.

Preheat centre pin-out

31 - Mass

86 - Start switch (+15)

ST - EDC electronic centre

DI - EDC electronic centre

30 - Battery positive (+30)

G1 - Preheat plugs

G2 - Preheat plugs

G3 - Preheat plugs

G4 - Preheat plugs

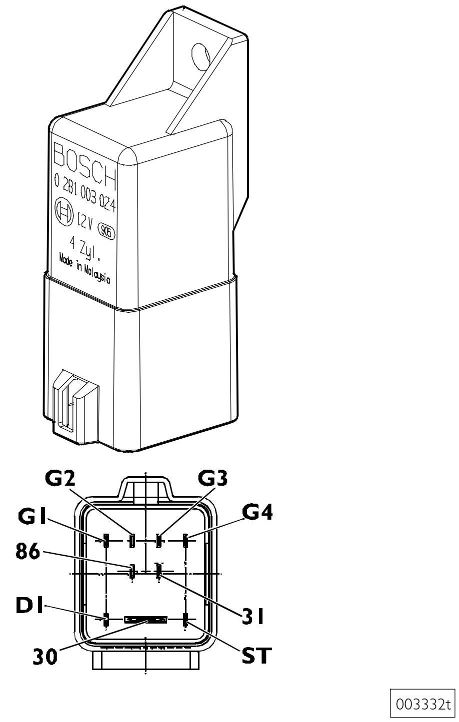
Preheat plugs

CONTROL VALUES

With constant di 11V power supply:

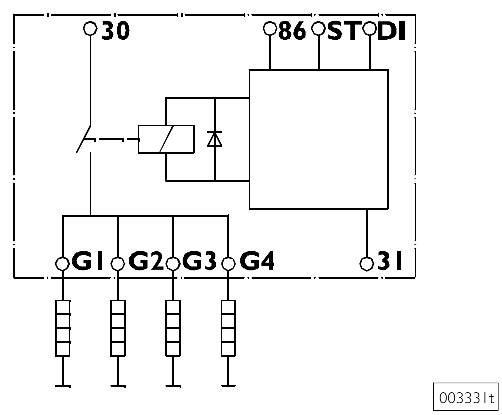
❑ maximum current absorbed	18 A
❑ in 5"	11 ± 1,5 A
❑ in 30"	6 ± 0.9 A
❑ temperature after 7"	850°C
❑ torque	8-10 Nm

Figure 25



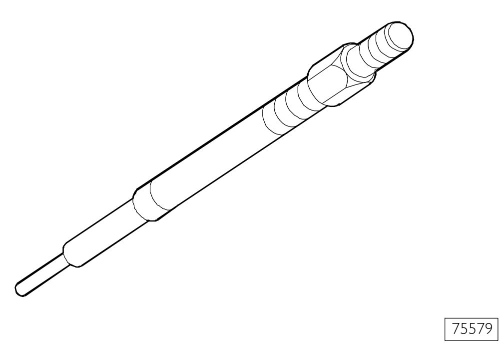
PREHEAT CENTRE

Figure 26



ELECTRICAL DIAGRAM

Figure 27

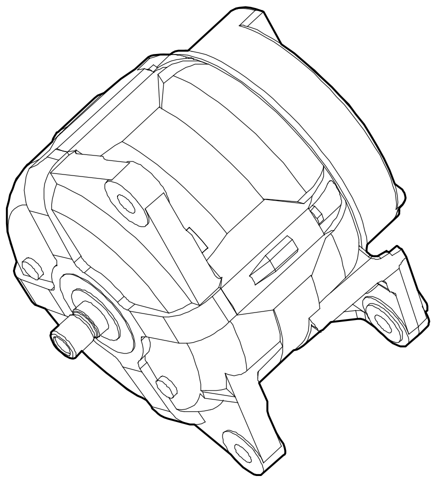


PREHEAT PLUS

BOSCH Alternator 12V

For motors F1CE3481A/R

Figure 28



166163

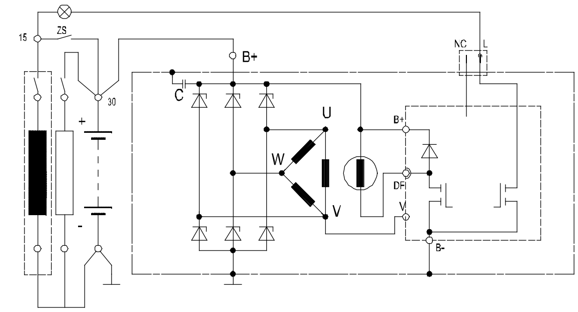
Instructions for use

Can be used with batteries of all capacities
The alternatorcanbe usedwithoutconnecting to a battery
Never connect with inverted polarities
Never use on vehicles transporting hazardous goods

Functional characteristics

Nominal voltage	12V
Nominal current output @ 25 °C	
	117 A at 6,000 rpm
	55 A at 1,800 rpm
Control side rotation direction	clockwise
Max. speed	13,000 rpm
Current consumption in stand-by mode	
	≤0.3 mA

Figure 29

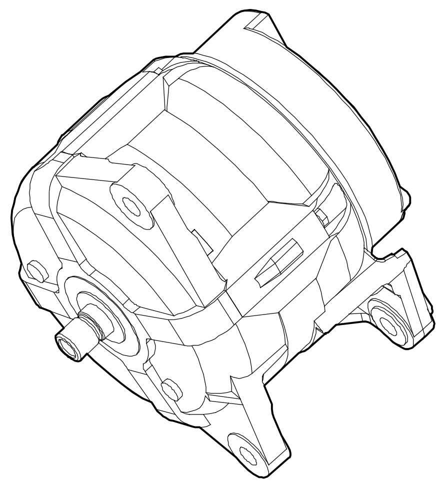


166164

BOSCH Alternator 12V

For motor F1CE3481C*C124

Figure 30



166163

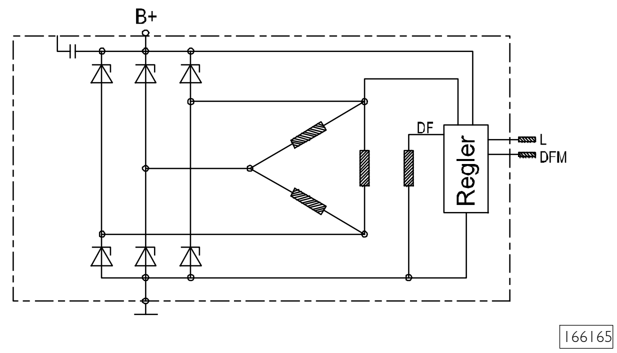
Instructions for use

Can be used with batteries of all capacities
The alternatorcanbe usedwithoutconnecting to a battery
Never connect with inverted polarities
Never use on vehicles transporting hazardous goods

Functional characteristics

Nominal voltage	12V
Nominal current output @ 25 °C	
	150 A at 6,000 rpm
	70 A at 1,800 rpm
Control side rotation direction	clockwise
Max. speed	13,000 rpm
Current consumption in stand-by mode	
	≤0.3 mA

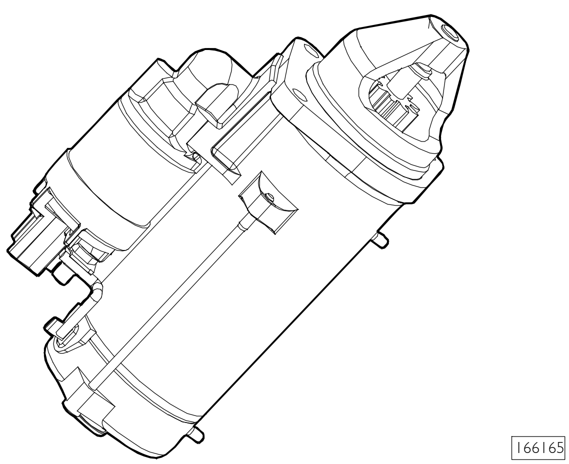
Figure 31



Starter motor

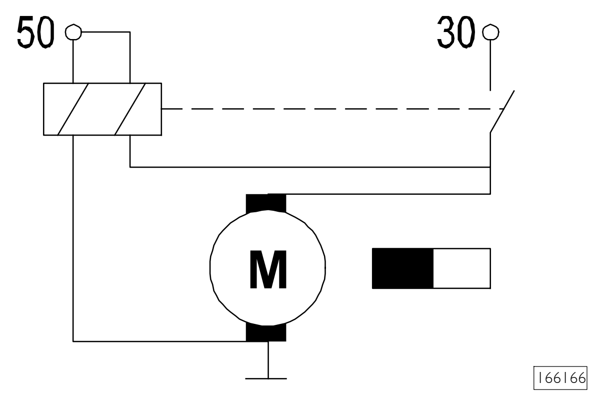
Motor type	Manufa cturer	Electric installation	Nominal output
F1CE3481A*A001	BOSCH	12 V	2,5 kW
F1CE3481A*A002			
F1CE3481A*A002			
F1CE3481A*A004			3 kW
F1CE3481A*A005			

Figure 32



The operating wiring diagram of the starter motor is as follows:

Figure 33



SECTION 4
Maintenance schedule

MAINTENANCE

At each oil replacement it is necessary to reset the counter of the particulate filter regeneration (DPF).

Such operation shall be carried out by means of diagnosis equipment, selecting "OIL REPLACEMENT" in the "COMPONENTSREPLACEMENT" menu of the "SPECIFIC FUNCTIONS" area of the motor control unit EDC 17

- Average speed calculated at 50 km/h.
- If the number of kilometers travelled over the year is very low, or in any case under 40,000 km/year, the engineoil and filter must be changed every 12 months.
- The engine oil and filter may require replacement prior to the scheduled date if the vehicle is used predominantlyin cities where frequent particulate filter regeneration (on the vehicles equipped with such component) may berequired. In this instance, the vehicle's computer will advise of the need to carry out this unscheduled operation.
- If less than 40,000 km are covered per year, the rear axle oil should be changed at least every 2 years.
- If less than 40,000 km are covered per year, the gearbox oil should be changed at least every 3 years.

Inspection and/or maintenance interventions

Type of intervention	Regular intervals
LUBRICATION, CHANGING OIL, FILTERS AND CHECKING FLUIDS	
Change the engine oil	Every 40,000 km/800 hours
Replace the engine oil filter	Every 40,000 km/800 hours
Replace the fuel filter *	Every 40,000 km/800 hours
ENGINE COMPARTMENT CHECKS	
Check the auxiliary drive belts condition	Every40,000 km/800 hours
Replace the water pump and alternator (1) belts	Every120,000 km/2,400 hours
Replace air conditioner compressor belts (1)	Every 120,000 km/2,400 hours
UNDER VEHICLE CHECKS	
Clean the rear axle oil breather	Every 120,000 km/2,400 hours
DIAGNOSTICS	
Reset the particulate filter (DPF) regeneration with diagnostic tools	Every 40,000 km/800 hours
Check the engine EDC system with PT-BOX	Every 120,000 km/2,400 hours

* If the warning light indicating that the filter is clogged lights up on the instrument panel, the filter should be replaced beforereplacement is due.
(1) Replace every 60,000 km under heavy duty use (dust and/or heat).
(2) Vehicle and equipment handling activities in workshop.

Timed extra plan operations (to be carried out possibly in combination with maintenance service)

Type of intervention	Regular intervals
REPLACEMENT	
Change the rear axle differential oil (1)	Every 80,000 km/1,600 hours
Replace the alternator movable belt tensioner	Every 240,000 km or, in any case, every 5 years (or 4,800 hours)
Replace the pre-heating glow plugs	Every 240,000 km or, in any case, every 5 years (or 4,800 hours)
Replace the timing system gears with the chains removed	Every 400,000 km/8,000 hours)
Replace the exhaust gas catalytic converter	Every 400,000 km/8,000 hours)
Replace the engine breather filter	Every 400,000 km/8,000 hours)
Replace the primary and secondary timing system drive chains, in addition to timing system drive chain tensioners	Every 400,000 km/8,000 hours)
ORDINARY MAINTENANCE	
Check the coolant density	Each year prior to the winter season
Replace the supplementary heater fuel filter	Each year prior to the winter season
EXTRAORDINARY MAINTENANCE	
Replace the cartridge and clean the air filter housing (2)	Every three years - even if there is no indication of the air filter clogging
Change engine coolant (3)	Every three years - even if there is no indication of the air filter clogging

(1) If less than 40,000 km are covered per year, the rear axle oil should be changed at least every 2 years.
(2) Early clogging of the air filter is generally due to adverse environmental conditions. For this reason the filter must be replaced when the sensor indicates such, regardless of when replacement is due. When specific indications are not given, the part should be replaced according to schedule.
(3) Paraflu11 must be diluted 50% with water, whereas Paraflu FE is already diluted 50% with water.

MAINTENANCE INTERVENTIONS

NOTE After checking or changing parts, perform functional testing of the vehicle.

Change the engine oil

Warning: We recommend to wear proper protections because of high motor service temperature.

The motor oil reaches very high temperature: you must always wear protection gloves.

We recommend to carry out the oil drainage when the motor is hot.

- ❑ Place a proper container for the oil collecting under the pan connected with the drain plug.
- ❑ Unscrew the plug and then take out the control dipsick and the inserting plug to ease the downflow of the lubrication oil.

The oil motor is very pollutant and harmful.

In case of contact with the skin, wash with much water and detergent.

Protect properly skin and eyes: operate according to safety rules.

Dispose of the residual properly following the rules.

- ❑ After the complete drainage, screw the plug and carry out the clean oil filling.

Use only the recommended oil or oil having the requested features for the corrrect motor functioning.

In case of topping up, don't mix oils having different features.

If you don't comply with theses rules, the service warranty is no more valid.

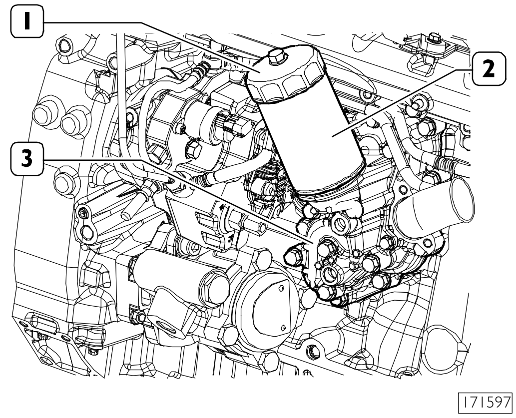
- ❑ Check the level through the dipsick until when the filling is next to the maximum level notch indicated on the dipsick.

Whereas you replace the lubrication oil, it is necessary to replace the filter.

Replace the engine oil filter

Removal

Figure 1

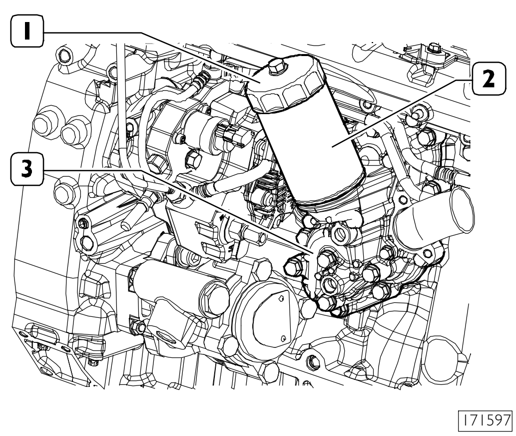


Use tool 99360076 (1) to remove the oil filter (2) from the heat exchanger (3).

Refitting

NOTE Before reinstalling the new cartridges, moisten the gasket with engine oil.

Figure 2

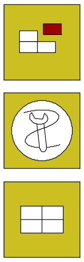


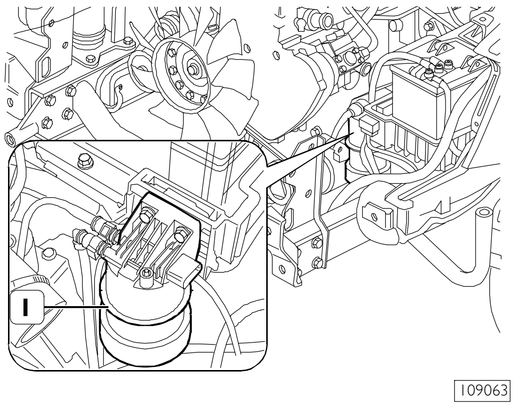
Lubricate the seal ring of the oil filter (2) with engine oil and fasten it on the heat exchanger (3). Use tool 99360076 (1) to tighten the oil filter to the prescribed torque.

Replace the fuel filter

Type Filtrauto

Figure 3

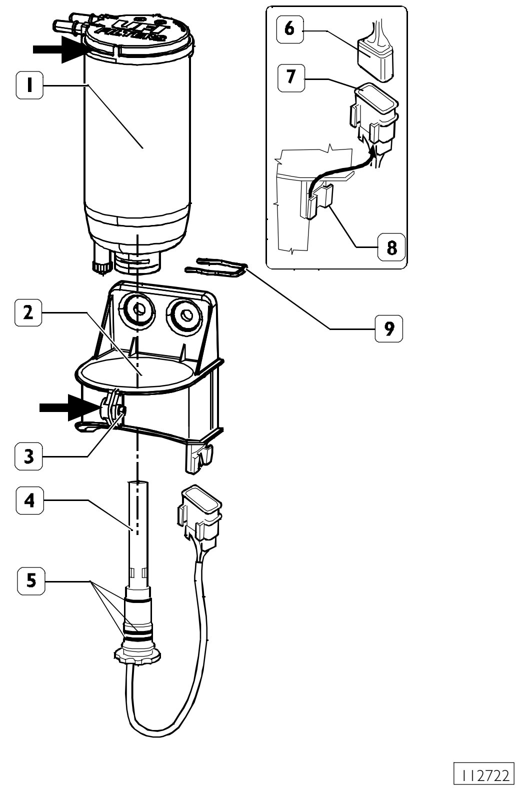




Unscrew fuel filter housing (1) and replace the cartridge, then screw the housing (1) and tighten it to 35±5 Nm.

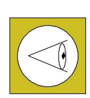
Type UFI Filters

Figure 4



Disconnect the chassis cable connection (6) from the electronic unit connection (7). Free the connection (7) from the support bracket (8). Remove the clip (9), remove the electronic unit (4) and place it carefully so that it does not get damaged or dirty. Loosen the screw (3) and pull out the fuel filter (1) upwards from the support (2). Install the new filter (1) so that the notch (") is aligned with the joining point of the support ends (2) and tighten the screw (3) to the specified torque. Check the seal rings (5) and replace them if damaged. Install the electronic unit (4) in the fuel filter (1) until it stops, so that the clip (9) inserts properly in the annular grooves of the electronic unit (4). Connect the connection (7) to the bracket (8) and the connector (6) to the connection.

Check the auxiliary drive belts



Visually check that the belts are not worn or deteriorated, otherwise replace them as described in the relative section.

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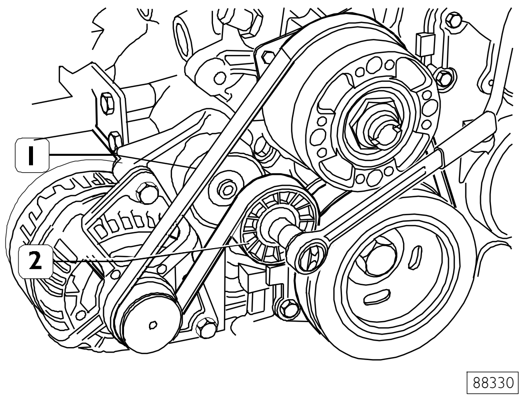
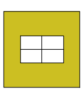
Replace the water pump and alternator belts

Removal

Figure 5



Disassemble the compressor drive belt, as described in the relevant chapter.
Using the specific wrench on the automatic belt tensioner (2), reduce the tension of the belt (1) and remove it.



Refitting

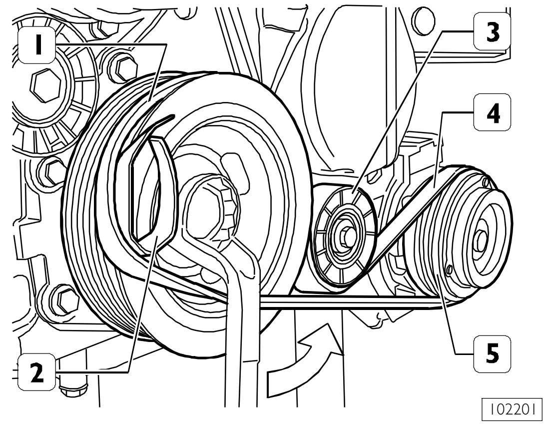
Mount the drive belt (1) taking care to position its ribs correctly in the respective races of the pulleys. Release the automatic tightener (2). Rotate crankshaft by one revolution to settle the belt.

Mount the compressor drive belt, and adjust the tension as described in the relevant chapter.

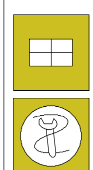
Replace air conditioner compressor belts

Removal

Figure 6



Position the vehicle over the service pit or on the lift. Remove the middle soundproofing guard from under the vehicle.
Remove the flexible belt (4) from the pulleys (1 and 5).



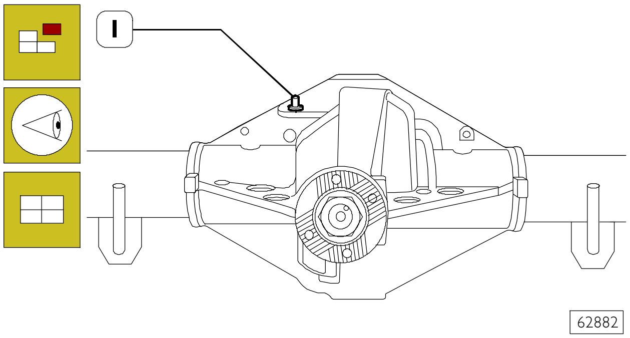
Refitting

Fit the 99360186 drift (2) to pulley (1) with the elastic belt (4), and position the belt on roller (3) and pulley (5), making sure to fit the ribs of the belt in the grooves in the pulleys (1 and 5).

Turn the crankshaft anticlockwise (") until the belt (4) is completely fitted onto the pulley (1).

Clean the rear axle oil breather

Figure 7



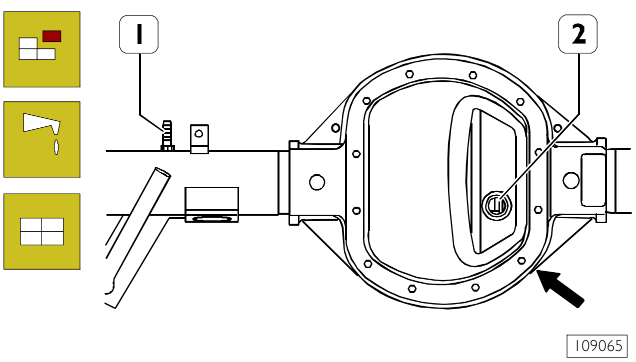
Check that the air breather (1) is not clogged; remove and clean it thoroughly if clogged.

NOTE For oil breather cleaning operations, refer to rear axle 450517/2, and for 450511 NDA R.S. - NDA R.G. axles, refer to Figure 9.

Change the rear axle differential oil

NOTE If less than 40,000 km are covered per year, the rear axle oil should be changed at least every 2 years.

Figure 8

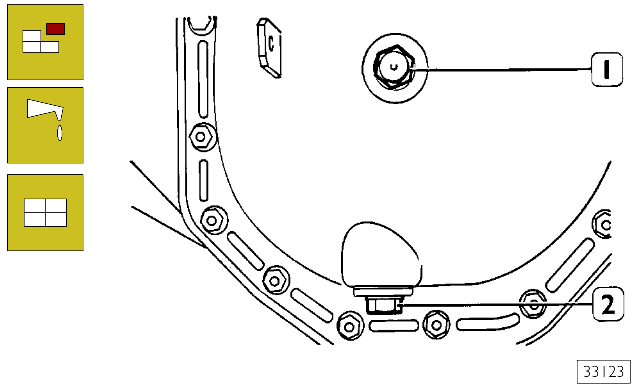


NOTE The oil change shown refers to the NDA R.S. - NDA R.G. - 450511 rear axles.

Lubrication oil should be drained when it is warm. Place a container under the cap near the arrow; remove the cap and drain the oil.

Screw the cap. Unscrew the cap (2) and pour in the required grade and quantity of lubricating oil (see fluids table in the GENERAL chapter). Remove the oil vapour breather (1) and clean it thoroughly.

Figure 9



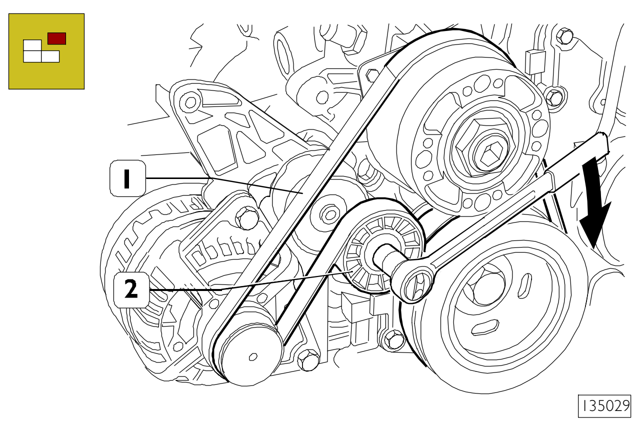
NOTE The oil change described refers to the 450517/2 rear axle.

Lubrication oil should be drained when it is warm.
Place a special container under the plug (2). Take out the plug and drain off the oil.
Screw the plug (2) back on. Unscrew the cap (1) and pour in the required grade and quantity of lubricating oil (see fluids table in the GENERAL chapter).
Remove the oil vapour vent and clean it thoroughly. (Shown in Figure 8).

Replace the alternator movable belt tensioner

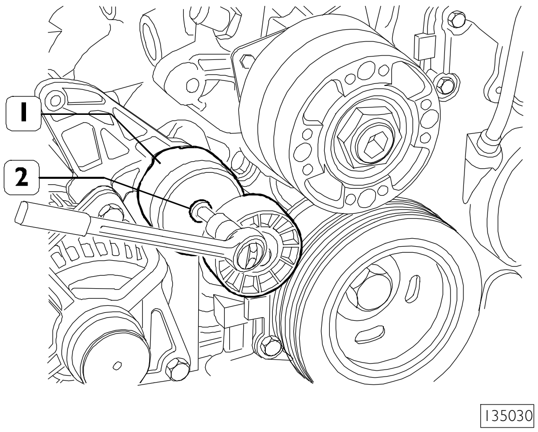
Removal

Figure 10



Using (") the specific wrench on the automatic belt tensioner (2), slacken the tension of the belt (1) and remove it.

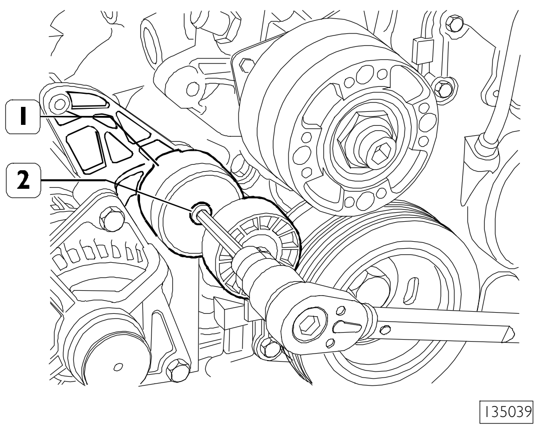
Figure 11



Remove the screw (2) and remove the automatic belt tensioner (1).

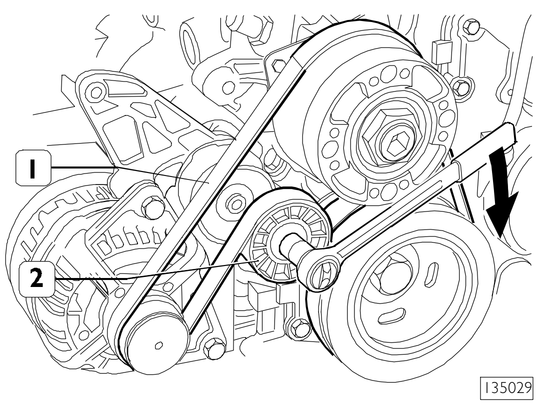
Refitting

Figure 12



Fit the automatic chain tensioner (1) insert in the screw (2) and tighten to the specified torque.

Figure 13

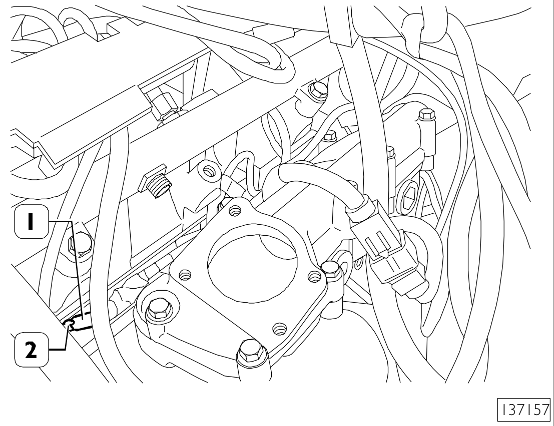


Using (→) a wrench on the automatic belt tensioner (2), fit the belt (1), making sure that the ribs on the belt fit properly into the grooves on the pulley.

Replace the pre-heating glow plugs

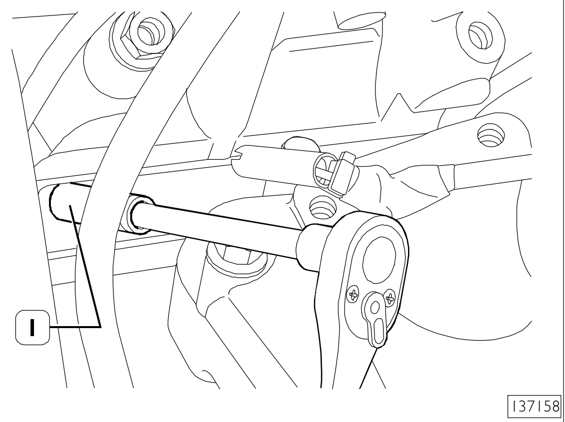
Removal

Figure 14



Remove the throttle valve assembly, as described in the relevant chapter. Disconnect electrical connections (1) from the preheating glow plugs (2).

Figure 15



Use socket SP 2275 (1) to remove the preheating glow plugs.

Refitting

To refit, carry out the removal operations in reverse order, observing the following instructions:

- replace gaskets with new parts;
- tighten the nuts and screws to the specified torque.

SECTION 5
Diagnostics

PREFACE

A successful troubleshooting is carried out with the competence acquired by years of experience and attending training courses.

When the user complains for bad efficiency or working anomaly, his indications must be kept into proper consideration using them to acquire any useful information to focus the intervention.

Using FPT processing instruments, it is also possible to establish a bi-directional connection with the central unit, by which not only to decoding the failure codes but also input an enquiry relying on memory files, in order to achieve any further necessary information to identify the origin of the anomaly.

Every time there is a breakdown claim and this breakdown is actually detected, it is necessary to proceed inquiring the electronic unit in one of the ways indicated and then proceed with the diagnostic research making trials and tests in order to have a picture of the working conditions and identify the root causes of the anomaly.

In case the electronic device is not providing any indication, it will be necessary to proceed relying on the experience, adopting traditional diagnosis procedures.

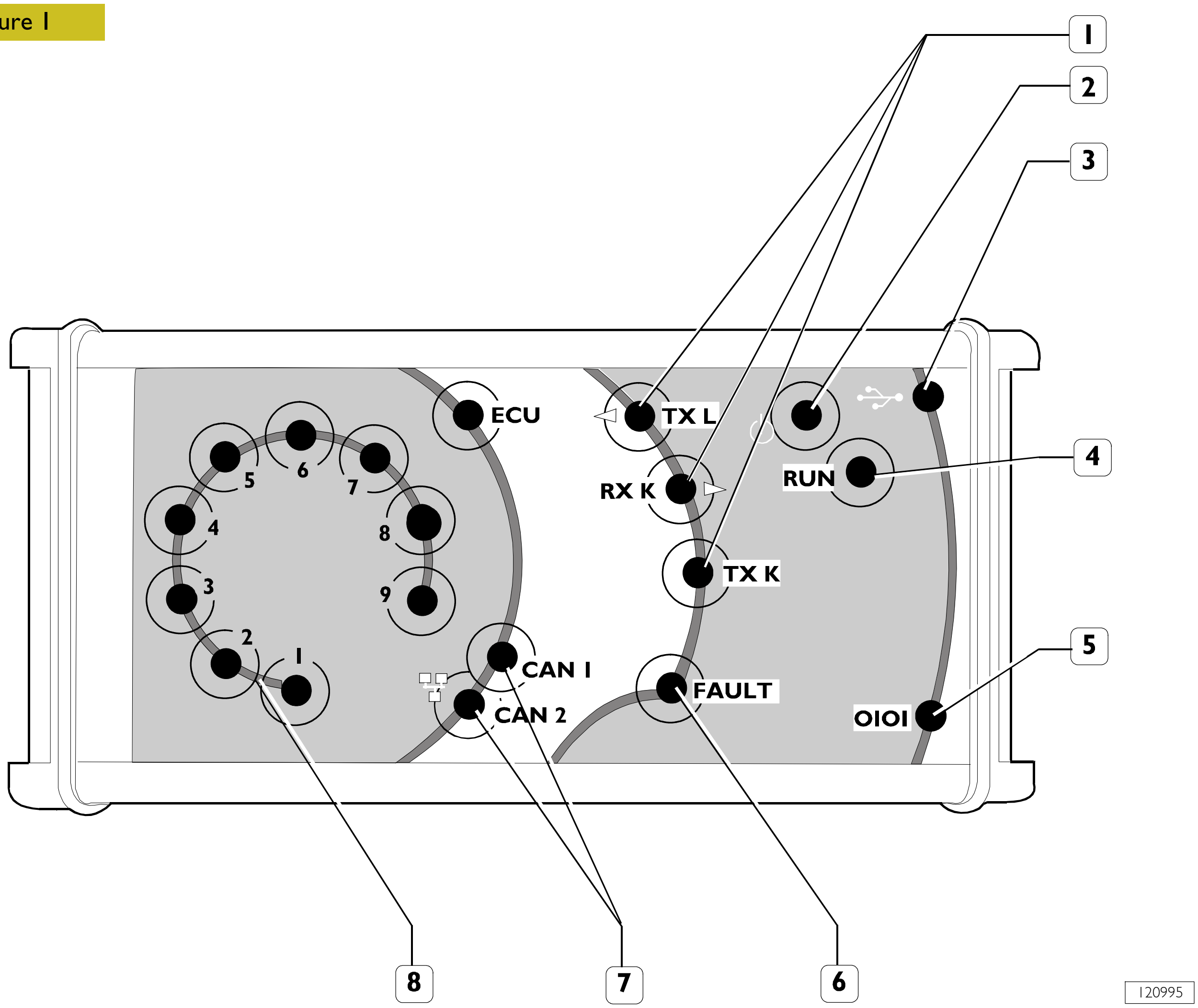
NOTE Any kind of operation on the electronic center unit must be executed by qualified personnel, duly authorized by FPT.

Any unauthorized tamper will involve decay of after-sales service in warranty.

PT - BOX

PT - BOX is a test tool to be connected to a Laptop.

Figure 1



1. Data flow lamps (blinking) - 2. Ignition indicator - 3. USB indicator - 4. Operation indicator - 5. Serial port indicator - 6. "Error" indicator - 7. CAN line indicator - 8. Line K indicator for automatic management

PT-BOX functions:

- ECU ID reading;
- Failure memory reading;
- Flight recorder reading;
- Parameters reading;
- Failure memory cleaning;
- Active diagnosis: actuators activation/testing;
- Programming of repalced components and parameters/second level;
- Acquisition/Saving of parameters

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PT-BOX INSTRUCTIONS

Hardware installation

This Sw may cause engine start-up. Be extremely careful.

The user is responsible for the correct use of the PT-DIAGNOSIS software so as not to any cause injury to people or damage to items.

The user is also responsible for complying with all the rules relating to security for activities on the industrial applications (engine, pump, generating set…) carried out in the workshop.

Carefully read the user manual before using the diagnostic tool and follow the instructions displayed on the screen.

General rules for use

The following instructions should always be strictly followed:

- all instruments ensuring the security must be applied as indicated in the application;
- ensure that the PT-BOX module is connected to the diagnostic socket of the engine on which work is to be carried out;
- in case of emergency, disconnect the PT-BOX module from the engine or disconnect the USB cable;
- ensure that while using the software, there is nobody near the engine/vehicle you are working on;
- if it is necessary for more than one person to be working on or near the engine/vehicle, they are all responsible for complying with security regulations of the workshop;
- we strongly suggest that the PT-BOX modules be visibly and uniquely identified (for example by using coloured adhesive tape, labels with names, etc…).

By only accepting the use disposal it is possible to access PT-DIAGNOSIS (the green tick icon becomes active).

The diagnosis system consists of:

- a PC (Panasonic / your PC + Microsoft Windows 2000 or Windows XP Professional);
- an instrument used as interface between engines/vehicles and PC (PT-BOX tester);
- a SW program (PT-DIAGNOSIS) to process data.

By combinating the above indicated components 2 different configuration are possible.

Select your user configuration type and then follow the relevant information.

1. PT-PLUS configuration
- PC Panasonic user
- PT-BOX module
- PT-DIAGNOSIS sw

2. PT-DIAGNOSIS configuration
- user with own PC
- PT-BOX module
- PT-DIAGNOSIS sw

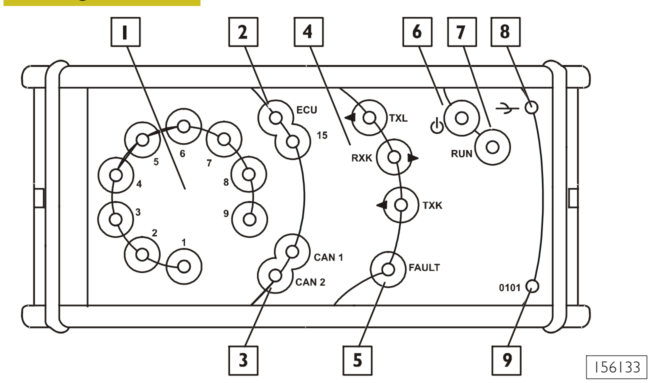
The PT-BOX module (Electronic Communication Interface)

PT-BOX is an interface module allowing the communication between the engine ecu's and the PC.

- ❑ Weight: 500 g;
- ❑ Dimension: 175x75x30mm;
- ❑ Flash memory: 4Mb - RAM 1Mb;
- ❑ Thermal tolerance: 0-50°C;
- ❑ Power supply: 6-32V;
- ❑ Connection interfaces: USB and RS232 standard Bluetooth optional;
- ❑ Interface for engine electronic systems: 9 KL ISO 9141 lines - 2 channels CAN Bus 2.0B - 3 digital outputs - 3I/O PWM.

The led indicators on the front view allow to check the communication lines activity with the engine and with the PC to which the instrument is connected.

Figure 2



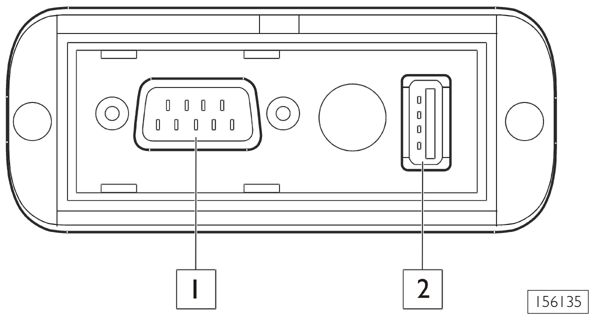
1. Led indicators to display the activity of the communication lines K/L. - 2. The upper led display the ECU's communication activity. - 3. The lower led indicators display the CAN lines activity. - 4. The three upper led indicators show the activity of the K/L communication lines. - 5. The lower led indicator (fault) shows the presence of errors on the K/L lines. - 6. The upper led indicator shows that the PT-BOX is power-supplied. - 7. When blinking the lower led indicator (run) shows that the PT-BOX module is correctly working. - 8. Led indicators to display the USB ports (upper led). - 9. Led indicators to display the serial ports (lower led).

Connect the pt-box module

On the PT-BOX module there are the communication ports for the connection to the PC and to the engine / vehicle.

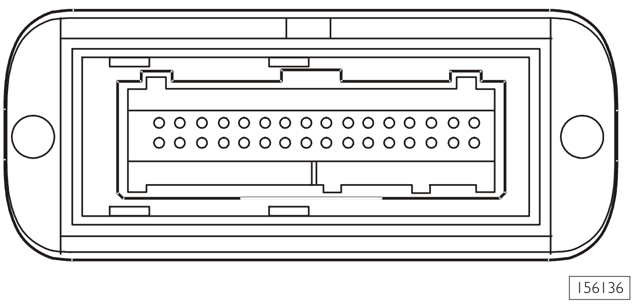
Communication ports for the connection to the PC

Figure 3



1. serial port - 2. USB port

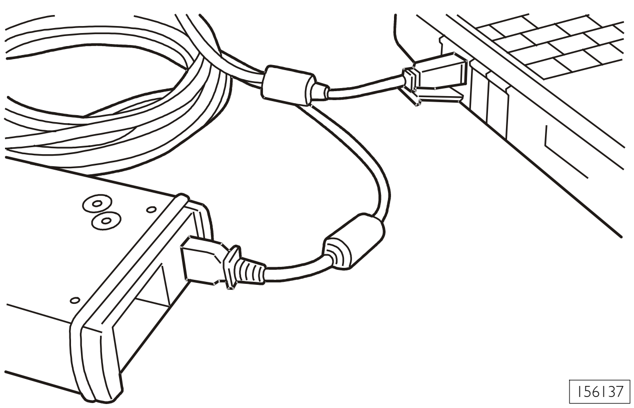
Figure 4



Connector for the connection of the engine communication cable.

Pt-box - pc connection

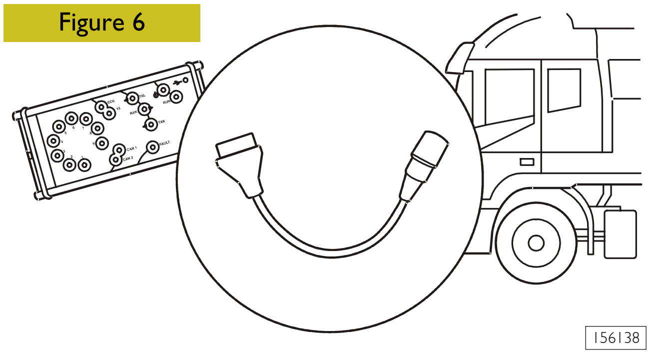
Figure 5



- connect the USB cable (PT-BOX side marked) to the PT-BOX module (remove the holding screws from the PT-BOX module, where present);
- connect the USB cable to the PC;
- turn the PC on.

Pt-box - engine/vehicle connection

Figure 6



- connect the module to the engine/vehicle by using the specific connection cable.

NOTE The module is power-supplied by the diagnostic cable; for this reason to work correctly it must be connected to the engine.

System requirements

Minimum

- Processor: 300 MHz Pentium-II CPU;
- Hard disk space: 3 GB available;
- Ram: 256 MB;
- Display: 800 x 600 video adapter and monitor;
- Internet connection only needed for rss and pt-diagnosis software update (eaus): modem;
- External ports: USB connector;
- External reader: DVD-ROM reader;
- Os: Microsoft Windows™ XP Professional Service Pack 2 - Microsoft Windows 2000 Service Pack 4 plus - Windows 2000-KB835732-x86-ENU.EXE (login with administrator privileges);
- Browser: Internet Explorer 5.5.

Recommended

- Processor: 1 GHz Pentium IV - Centrino CPU;
- Hard disk space: 5 GB available;
- Ram: 512 MB;
- Display: 1024 x 768 high colour video adapter and monitor;
- Internet connection only needed for rss and pt-diagnosis software update (eaus): high-speed e.g. ADSL;
- External ports: 2 USB 2.0 connectors, Bluetooth;
- External reader: DVD-ROM reader;
- Os: Microsoft Windows™ XP Professional - Service Pack 3 (login with administrator privileges);
- Browser: Internet Explorer 6.0.

Software installation

Registration

Before using the PT-Diagnosis system you have to carry out the registration of the system being used. This procedure allows you to obtain the activation code.

The registration procedure is carried out on-line and it is different according to the user type:

- ❑ OEM users
- ❑ Dealer users

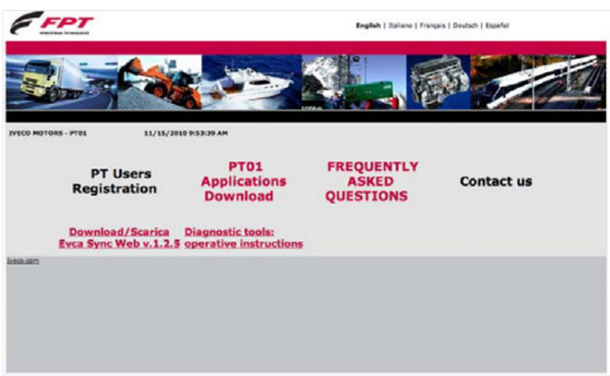
NOTE For both configurations (PT-PLUS and PT-DIAGNOSIS) the SW installation is the same.

Registration>OEM users

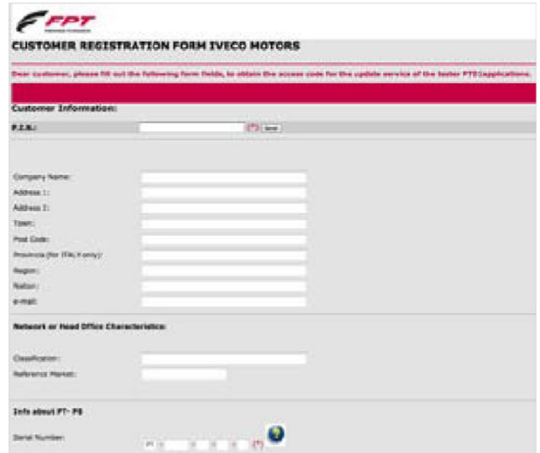
Before using the PT-Diagnosis system you have to carry out the registration of the system being used. This procedure allows you to obtain the activation code.

For this reason:

- Check that the registration card has been delivered together with the kit.



- Select www.eltrac.it/ivecomotors/default.asp.
- From the starting page, select the language.
- Select *pt users registration*.

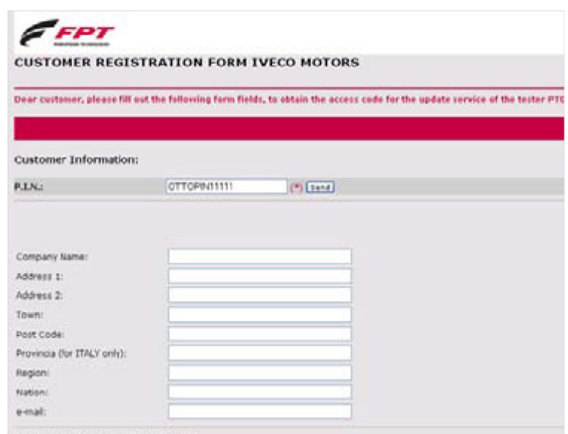


- A fill-in form is displayed.

The activation code received will be requested the first time you run the PT-DIAGNOSIS software.

Registration form (OEM user)

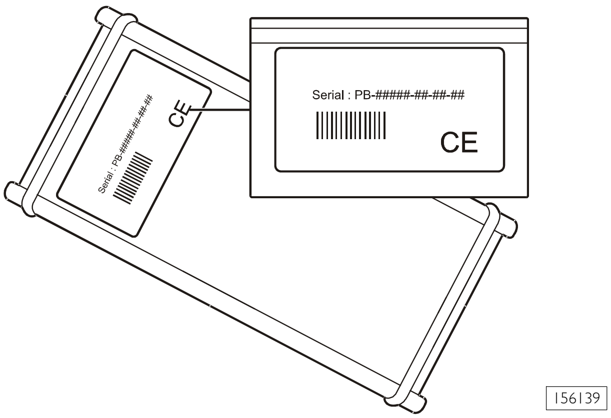
The Registration allows you to download the EVCA SYNC WEB application which allows you to obtain the activation code:



In the registration form:

1. Enter the *Customer PIN*:
   it is the customer authentication code; it is an alphanumeric code sent by e-mail to the user after having bought the PT-DIAGNOSIS system.
2. Select the *send* key:
   the identification data and the *Network characteristics* areautomatically entered.
3. Enter the serial number of the PT-BOX instrument.

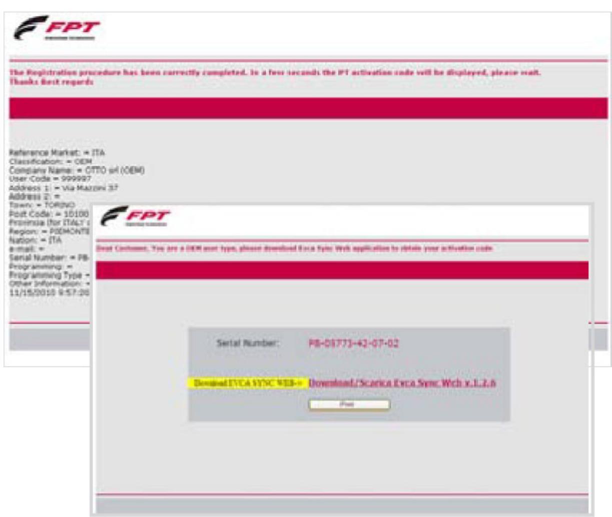
Figure 7



The serial number is type PB-#####-##-##-##; to be found on the back of the PT-BOX module

4. Read the note in compliance with art. 13 of Italian Legislative Degree 196 dated 30 June 2003 about the processing of personal data Informative
5. Select the *send* key (only once!) wait…

After sending a summary window is displayed waiting for the end of the registration procedure.



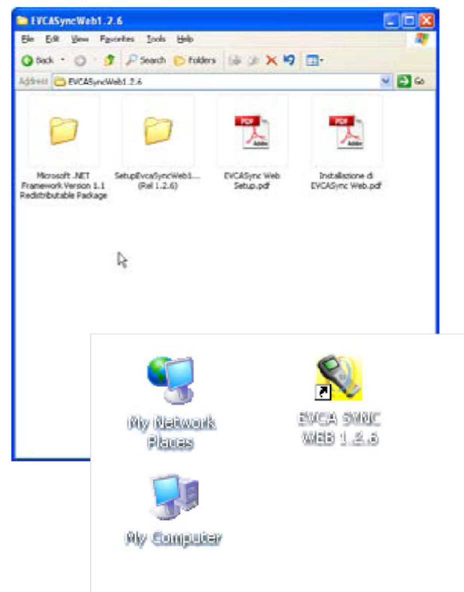
Then a link is available to download the EVCA SYNC WEB application. It will be used to obtain the activation code:

6. Select the *print* key for printing a summary report (registration data and number of registered instrument).
7. Select the link to download and then select the save key, to *save* the application on the PC.

NOTE Before carrying out the registration we suggest to install the PT-Diagnosis SW.

Installing the EVCA SYNC WEB (OEM users) application

To obtain the activation code it is necessary to install the EVCA SYNC WEW application, after saving it on the desired directory:

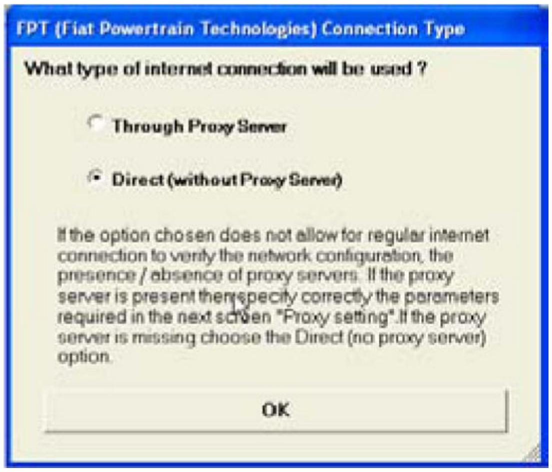


1. Unzip the evcasyncweb1.2.6.zip (for example using WinZip: www.winzip.com/downwz.htm).
2. Open the EVCASyncWeb1.2.6 and then EVCASyncWeb15-09-10 (Rel1.2.6).
3. Run setup.exe and continue with the installation of the guided application.

NOTE For further information about the installation of EVCASyncWeb it is possible to read the detailed guide EVCASyncWeb Setup.pdf in the directory EVCASyncWeb1.2.6.

4. At the end of the installation, the icon of the EVCASyncWeb application is displayed on the desktop of the PC.

Running the EVCA SYNC WEB (OEM user) application



1. Double click on the icon EVCASyncWeb application.

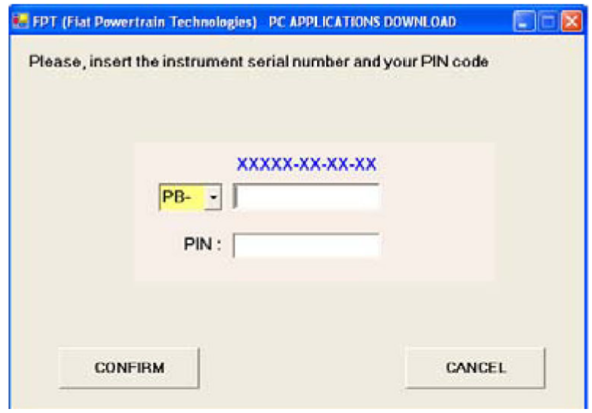
At the start up of the application choose the Internet connection mode:

❑ by means of the Proxy Server;
it is necessary to enter the connection parameters; at the end select the *okey*. It is possible to pre-set the connection parameters: read the EVCASyncWeb manual;

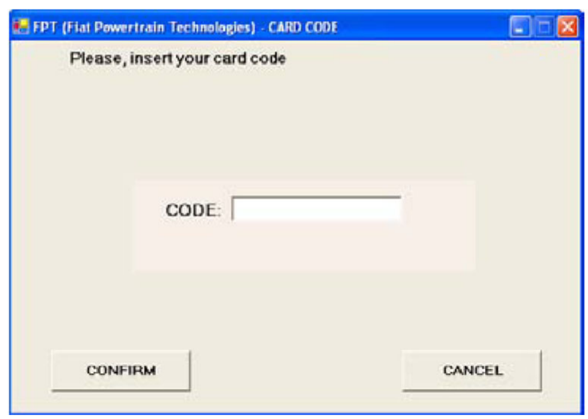
❑ without Proxy Server;
select the *okey*.

The starting page EVCASyncWeb is displayed; some functions are available (for more information read the manual EVCASyncWeb).

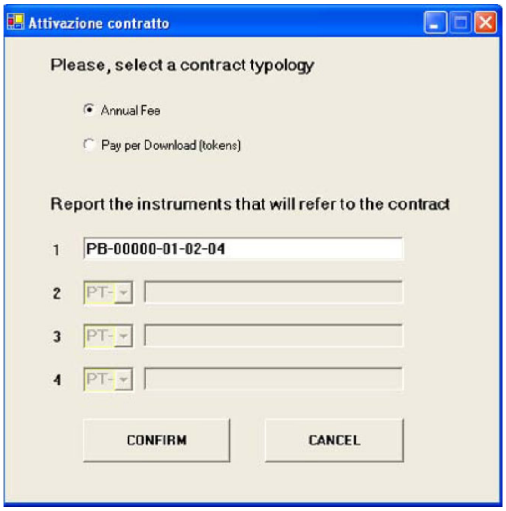
2. Select the *applications* key *for pc.*



3. Enter the PT-BOX serial number of and the Customer PIN.
4. To continue, select the *confirm* key.



5. Enter the alpha code supplied with the Registration Card (scrap the card).
6. To continue, select the *confirm* key.



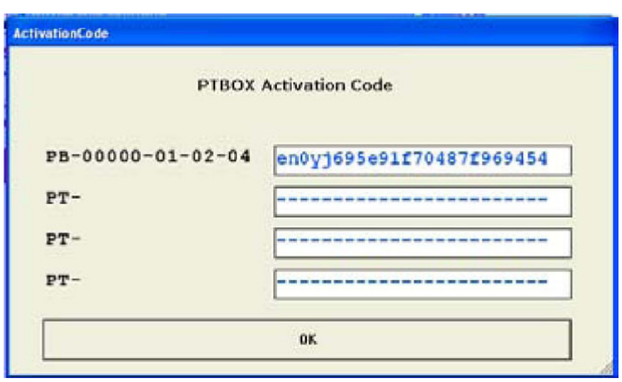
Contract Activation (OEM User)

7. Select a contract type.

The contract types available for the OEM users are indicated below:

- ❑ Fee (annually):
  the duration of the contract is for one year, starting from the activation date of the contract. During this phase it is only possible to associate one instrument to the contract.
- ❑ Token (to be deducted):
  it is the payment for a single download of an application; it is possible to associate to the contract to 4 instruments.

8. To continue, select the *confirm* key.



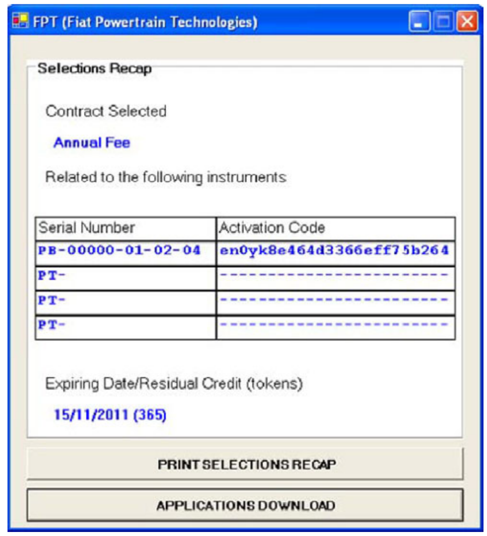
The window containing the activation codes is displayed.

9. Print/copy the activation codes and keep them together with the instruments they are associated to.

10. Select the *okey* to end.

Summary of the selected choices (OEM user)

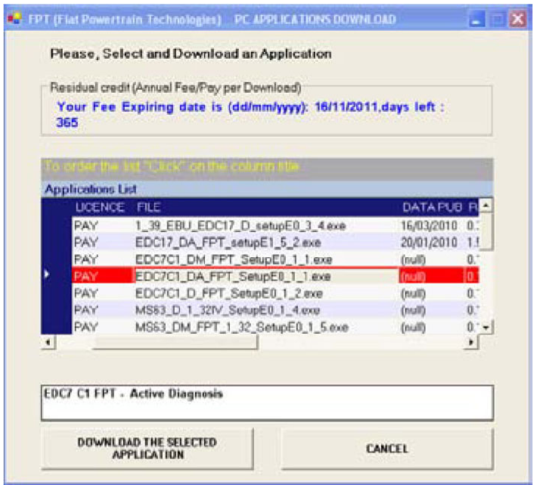
At the end of the activation procedure, the summary of the selected choices is available. The following data are displayed:



- ❑ The type of selected contract.
- ❑ The list of instruments (PT/PB) associated to the contract with the generated activation codes
- ❑ The expire date of the contract (in case of yearly fee) or residual credit (coins):

  1. We suggest you to print and keep the summary data: select the key *print selections recap*.
  2. Show and download the list of the available applications belonging to your profile (FPT activation): select the *applications download* key.

Download the applications



The following information for each one of the available applications for downloading is displayed: ECU, license, file name, Release Date, Release Type and short description.

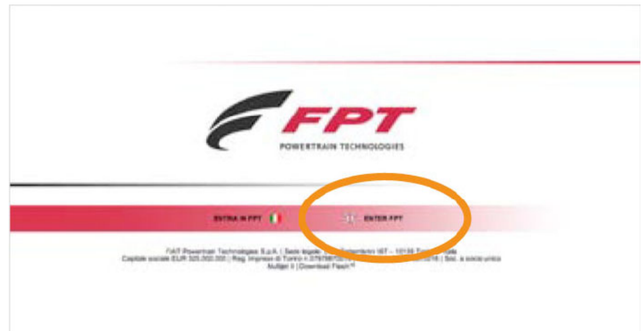
Each option can be used to sort the list: to sort the list in ascending/descending order according to a given key, select the title of the corresponding column.

1. Select the application to be downloaded; the selected line is highlighted in red.
2. Select the *download the selected application* key and follow the system instructions.
3. Identify the path where the packets have been downloaded.
4. At the end of the download install the packets (double click) one by one.

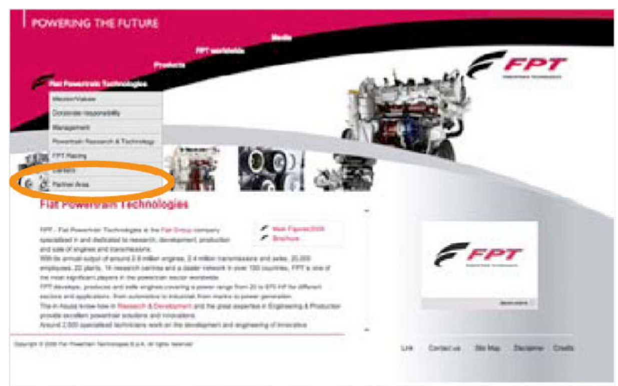
NOTE The packets must be downloaded/installed one by one.

Registration>Dealer users

Before using the PT-DIAGNOSIS diagnosis system you must register on the FPT web site.

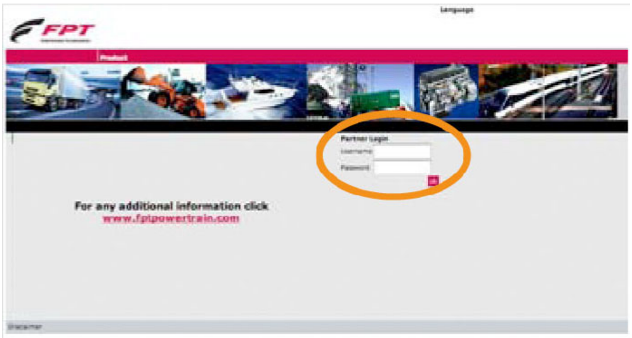


1. Connect to http://www.fptpowertrain.com/index_main.htm.
2. Select the language.



3. Select *Fiat Powertrain Technologies* and then *Partner Area*.

4. Connect to the web site by selecting *Click here*.



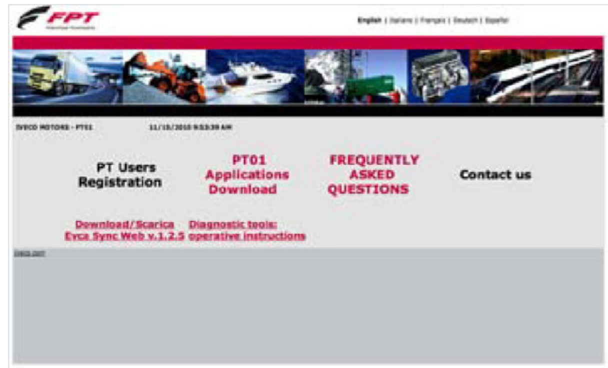
5. Fill in the fields for the login procedure.

NOTE For the new customers:
request username and password to areapartner@fptpowertrain.com.

For the customers already registered:
use username and password received by e-mail.

6. Please follow the indicated instructions

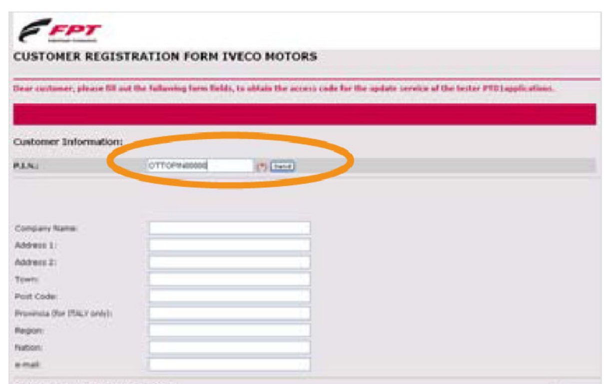
After Sales>Various>Diagnostic Instruments>Diagnostic Tools



7. Go to the registration web page; select *pt users registration* a fill-in form is displayed (*on-line registration form*).

Registration form (Dealer user)

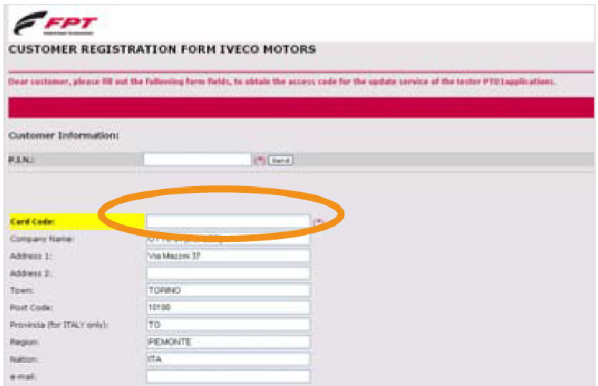
The Registration allows you to download the EVCA SYNC WEB application which allows you to obtain the *activation code*.



In the registration form:

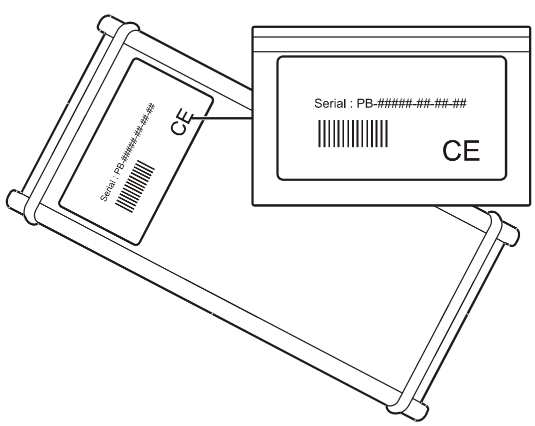
1. Enter the *Customer PIN*:
   it is the customer authentication code; it is an alphanumeric code sent by e-mail to the user after having bought the PT-DIAGNOSIS system.

2. Select the *send key*:
   the identification data and the *Network* characteristics are automatically entered.



3. Fill in the yellow field by entering the alpha code supplied with the Registration Card (scrap the area on the card).
4. Enter the *serial number of the pt-box instrument.*

Figure 8



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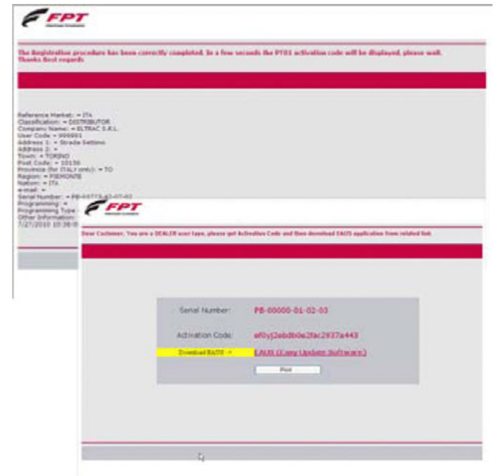
The serial number is type PB-#####-##-##-##; to be found on the back of the PT-BOX module.

5. Read the note in compliance with art. 13 of Italian Legislative Degree 196 dated 30 June 2003 about the processing of personal data Informative.



6. Select the *send* key (only once!) wait…

After sending a summary window is displayed waiting for the end of the registration procedure.

Wait for the following window:

❑ the activation code;

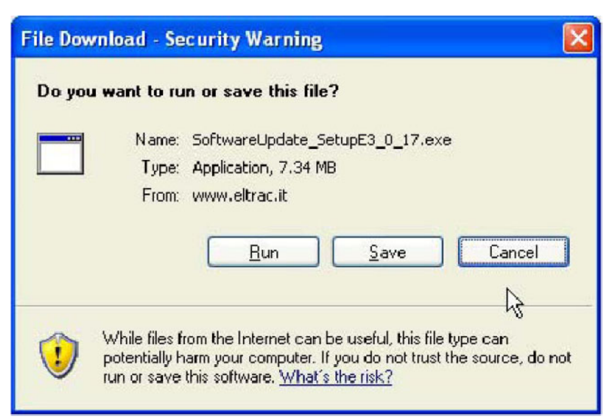
❑ the link to download the EAUS application (E.A.SY. Update Software).

7. Print the activation codes (*print* key) and keep them together.
8. Select the link to download the EAUS application.

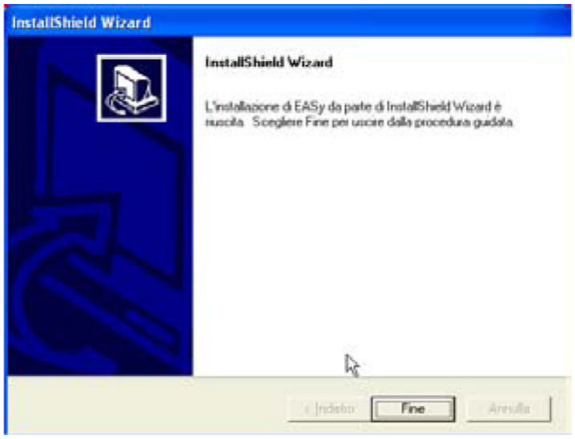
Installation of EAUS application (Dealer user)

The EAUS application is an update utility to automatically download all SW Updates for all ECU's activated for FPT.

After having selected the link for downloading the EAUS application, the system asks you to select the file or to directly run it.



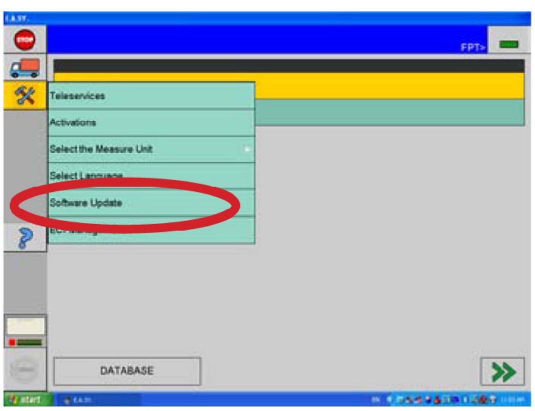
1. Select the *run* key:
the system automatically downloads first and then installs the EAUS application; run the operation required by the system and wait for the end of operation.



2. Select the *end* key to exit the installation.

NOTE Before carrying out the registration we suggest to install the PT-Diagnosis SW.

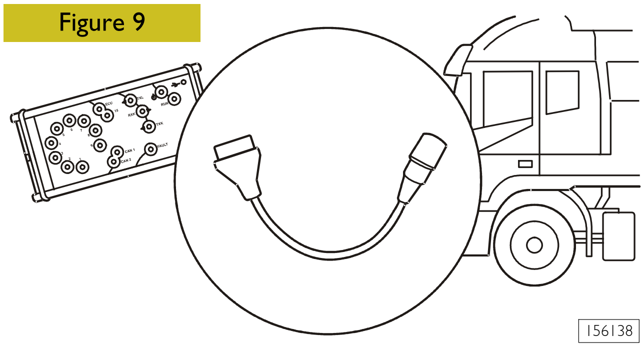
Run the EAUS (Dealer user) application



1. It is now possible to download the update by using the Automatic Update Function (*tools>software update* key).

Connection

Figure 9

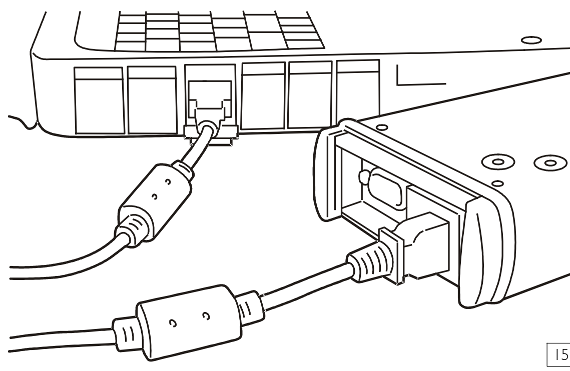


156138

1. Connect the PT-BOX module to the engine/vehicle using the diagnosis cable.
2. Connect the PT-BOX module to the PC, using one of the two USB cables provided with the module.

! The PT-BOX module is supplied by the diagnosis cable; therefore it must be connected to the engine/vehicle to be able to work.

Figure 10

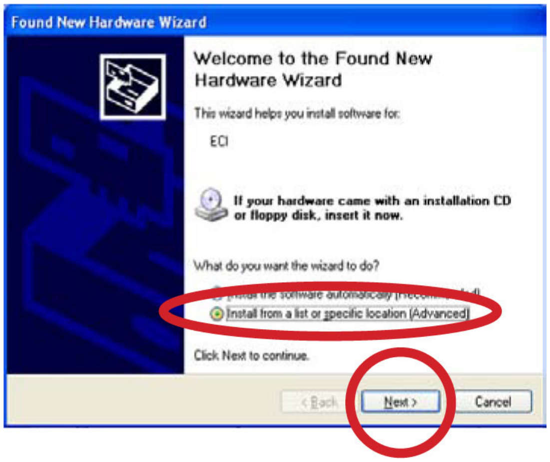


156140

3. Switch the PC on.

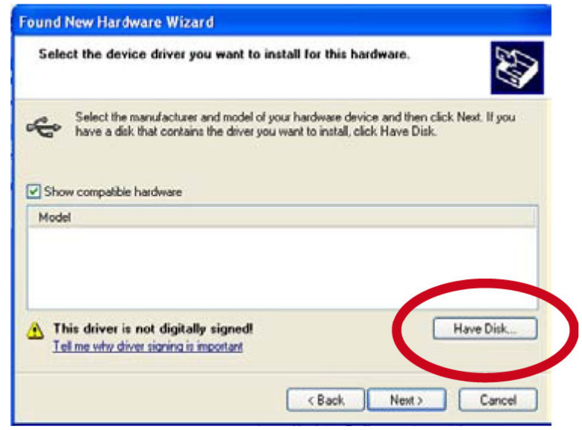
PT-BOX module USB driver set-up
(only for the PT-DIAGNOSIS configuration)
This operation is required only if the PC in use has never been connected to an PT-BOX module:

1. Check that the PT-BOX module is correctly connected to the PC via the USB cable.
2. The PC acknowledges the presence of a new hardware component; press the cross button to continue.

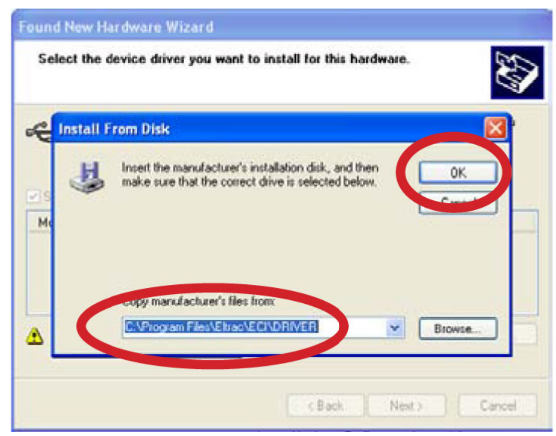


3. Automatically (Windows XP) the procedure starts to set-up the driver; select the *Install from a list or specific location* option; select the *next>* button to continue.

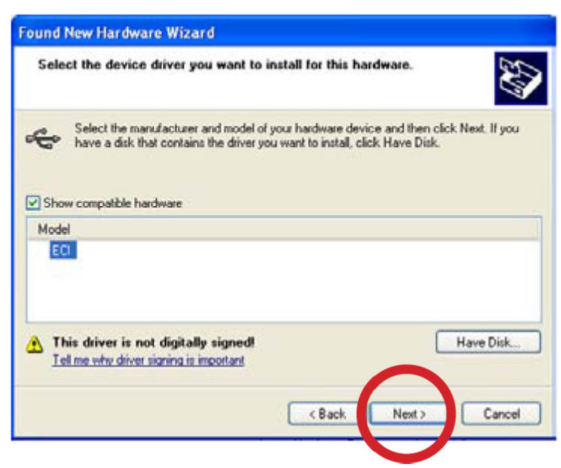
4. Select the Don't search. *I will choose the driver to install*; select the *next>* button to continue.



5. Select the *have disk...>* button to continue.

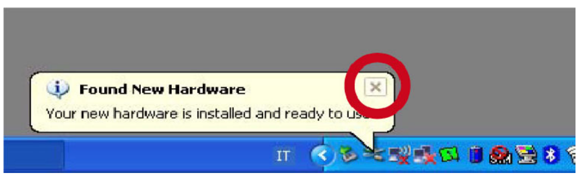


6. Enter the path:
ProgramFiles\EltracECI\Driver\PT-BOX.sys;
select the *ok* button.



7. Select the *next>* button to continue.

8. Driver set-up begins… wait.
9. The procedure is completed; press the *finish* button.

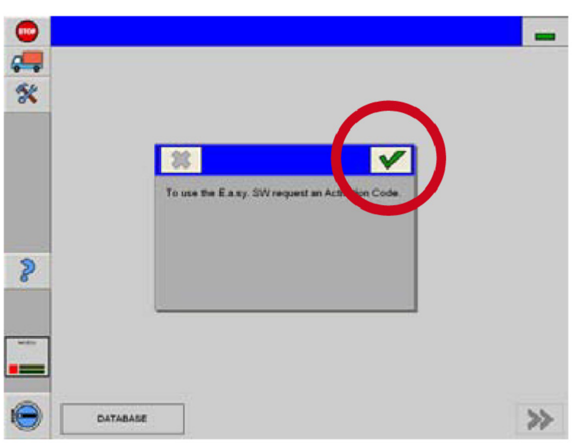


10. The system informs that the new hardware has been correctly installed; select the *cross* button to continue.
11. Re-start the PC.

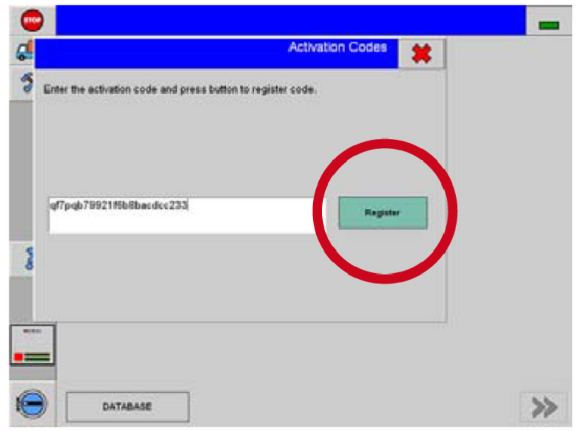
Activation - first time of use of PT-DIAGNOSIS sw + PT-BOX module

The first time the PT-DIAGNOSIS Diagnosis System is used, it is necessary to follow the procedure described below:

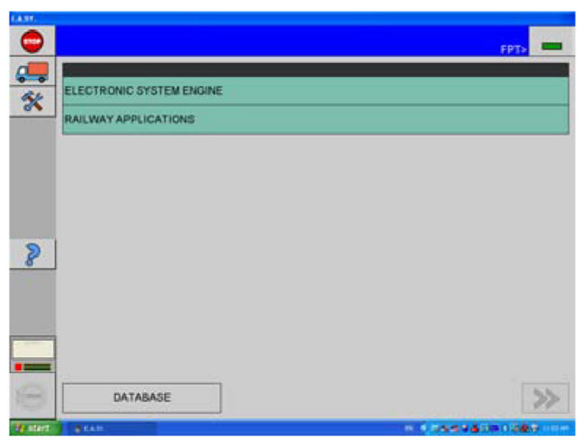
1. Make sure you possess the activation codes (Web access).
2. Connect the PT-BOX module to the Panasonic PC and to the engine/vehicle using the USB/BT module.
3. Start the Panasonic PC.



4. The system asks you to enter the activation code received from Field Service; select the *tick* button.



5. Enter the activation code sent via Web.
6. Select the *register* button; a message confirms that registration has taken place.
7. Select the *cross* button to close the *Activation Code* window and go back to the PT-DIAGNOSIS screen.

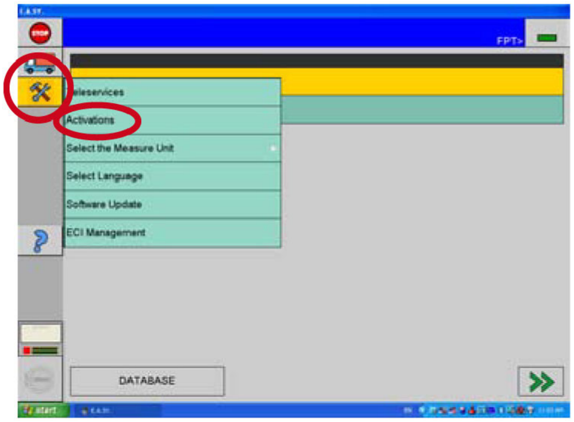


8. Select the *stop* button and restart PT-DIAGNOSIS.

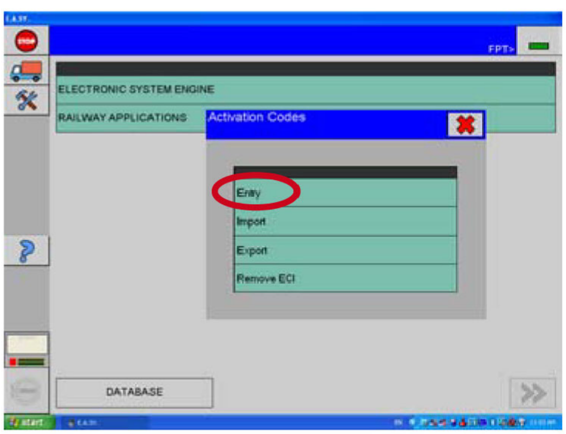
Now all the software functions are available.

Activating - new PT-BOX module

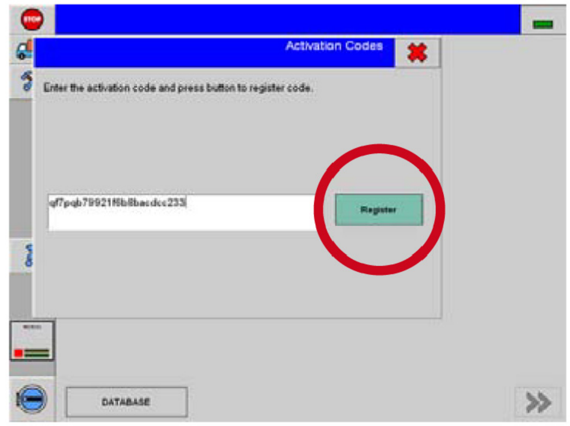
The activation procedure is necessary every time you want to use an PT-BOX module that has not yet been paired to the PT-DIAGNOSIS diagnosis system in use; follow the operations described below:



1. Make sure you have requested and obtained the activating code for the PT-BOX module.
2. Connect the PT-BOX module to the Panasonic PC and to the engine/vehicle using the USB cable.
3. Start the PT-DIAGNOSIS software: double click on the EASY icon (PT-DIAGNOSIS) placed on the desktop of PC.
4. Select the *tools>activations* button.



5. Select the *entry* button.



6. Enter the activation code received from Field Service.
7. Select the register button; …a message confirms that registration has taken place.
8. Select the cross button to end activation.
9. Re-start the PT-DIAGNOSIS (E.A.SY. icon).

Software Interface

The PT-DIAGNOSIS software interface is designed to facilitate access to tools, view functions and make diagnostic procedures clear and adaptable to various needs.

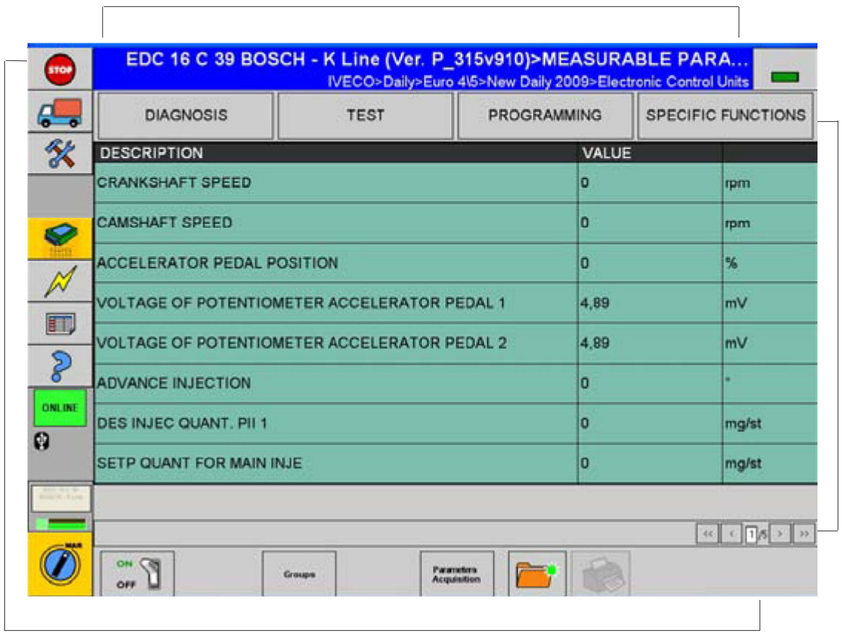
All windows follow the same design with additional features which depend on the specific working environments.

Each window presents three main areas to which specific functions are univocally associated:

- ❑ Keys Area
- ❑ Title Area
- ❑ Operative Area

The *Title* area shows the selected function under test and previous choices by which you arrived.

The *Keys* area contains Keys for accessing the operative environments and the functions to which they are associated.



The *Operative* area contains available system and function list referred to the intervention area.

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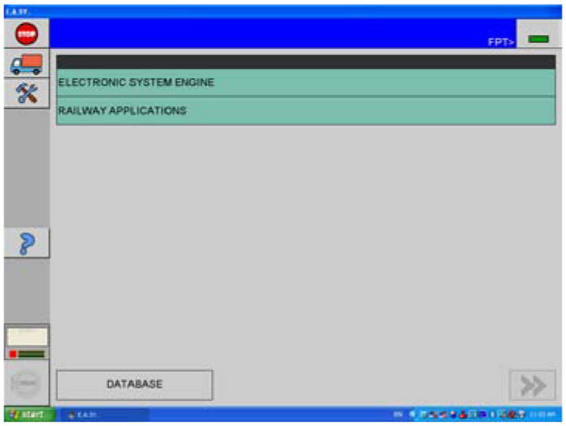
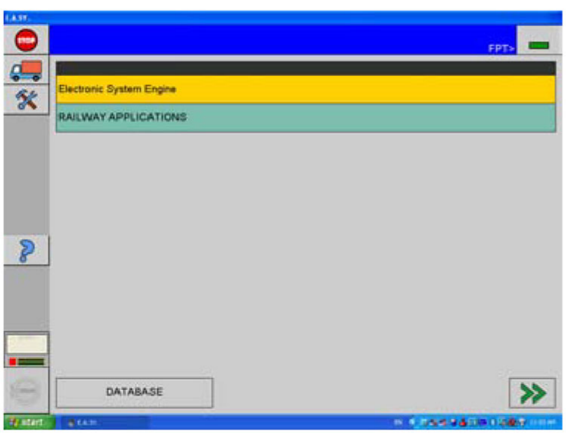
To go from one environment to another



1. The Start Window shows the family.

Start Window

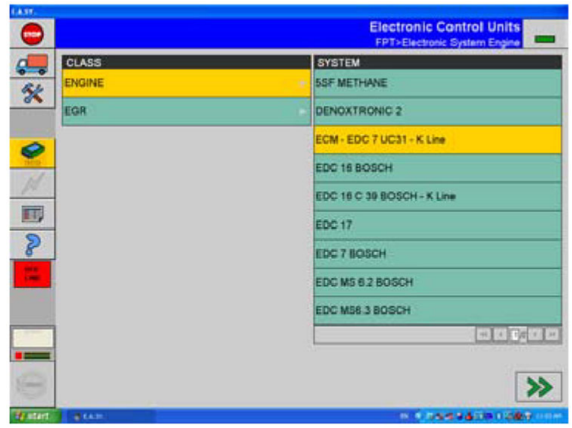
- ❑ It is possible to select a new family or to choose a family from the database;
- ❑ green identifies a pull-down menu.



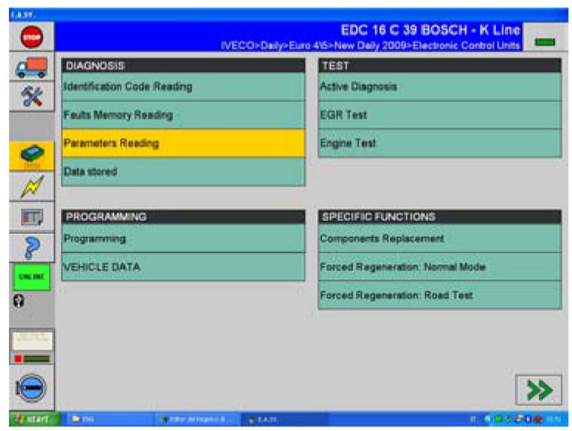
2. Select the fami ly of the engine/vehicle under diagnosis; then press the navigation key (is active - green) to continue.

Family Choice Window

- ❑ Yellow identifies a selected item in a pull-down menu;
- ❑ a paged list is used to display a large amount of information one page at a time; navigation tools are available to navigate from page to page.



3. Select the Class and the System under test to which the engine/ vehicle belongs; then press the navigation key (is active - green) to continue.



4. The window Choose Activity appears; it is here possible to choose from four lists.

Window Choose Activity

It is now possible to choose:

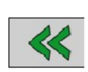
- ❑ diagnosis;
- ❑ test;
- ❑ programming;
- ❑ specific functions.

Navigation keys

They allow you to go from one environment to another. Enabled keys are displayed in green and disabled keys are displayed in grey.

 *navigation* key *forward* disabled

 *navigation* key *forward* enabled

 *navigation* key *back* enabled

Database key

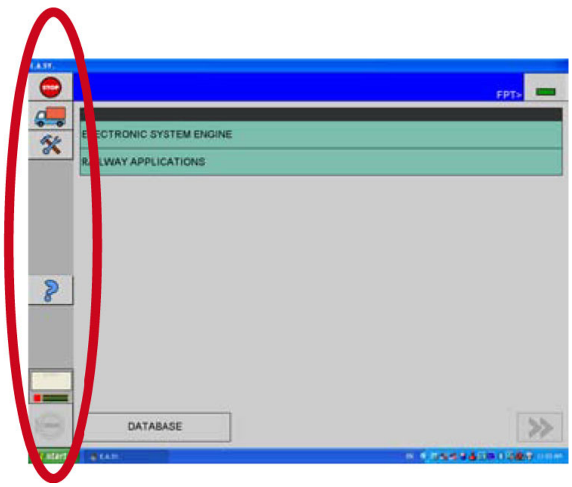
It allows you to access the Database environment.

Browse key

To scroll long lists which cannot be contained in a single window.

Detail of Keys area

In the Start Window the Keys area contains the Keys for accessing the functions which are always available:



stop key

To quit PT-DIAGNOSIS application at any time.

engine/vehicle key

It allows you to return to the Family Choice Window.

utilities key

When selected the Key background will be yellow and allows you to access a menu.

guide to diagnosis key

It allows you to access the environment Guide to Diagnosis (only available for some ranges). It is available in the Electrical Control Units environment.

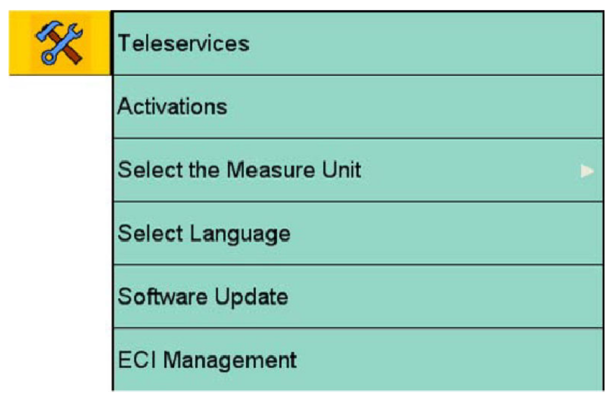
ignition key

For the equipped engines, it allows you to operate engine ignition directly via the diagnostic tool. Two positions (stop and mar) and three states (enabled stop, disabled stop, enabled mar) are possible.

communication panel

It indicates that the communication with the ECU is active or that the ECU is not present (no ecu).
The lower leds indicate the communication state of the electronic system as shown below:
Square LEDs: two states (green/red); green indicates that communication with the electronic system has been initialised; if red indicates the communication has been interrupted.
Rectangular LEDs: blinking indicate that data exchange between electronic system and diagnostic system is in progress.

Utilities key



Teleservices key

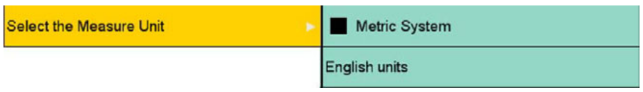
It allows you to access the remote connections services.

Activations key

It allows you to access the management function of the activation codes.

Select the measure unit key

It allows you to choose the measure unit system.



The Metric System (SI), the international standard one, is based on the meter, kilogram and second. The British System (fps) is based on the foot, pound and second.

Select language key

To change the language; restart the application to make the setting operational.

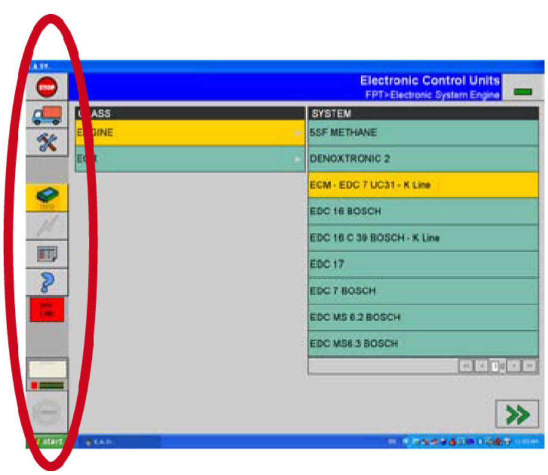
Software update key

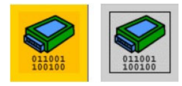
It allows you to carry out the automatic update of the PT-DIAGNOSIS software.

Eci management key

It allows you to manage the connection (usb or Bluetooth) PT-DIAGNOSIS - PT-BOX module.

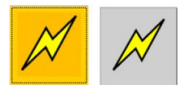
In the Start Window select the fami ly; by pressing the navigation key forward it is possible to access the next window. New icons appear in the Keys area for accessing specific functions:





Electronic control units key

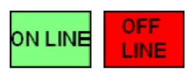
It allows you to access the Electronic Ecu's environment. The key appears on a yellow background (default status, environment Electronic Control Units enabled) or on a grey background (environment Electronic Control Units disabled). If you want to work at the same time with more Ecu's, select the key environment electronic ecu's>add ecu.


Electrical diagrams key

It refers to a CLASSES list for which an electrical diagram is available. The key appears on a yellow background (environment Electrical Diagrams enabled) or on a grey background (environment Electrical Diagrams disabled). To enter the Electrical Diagrams environment select the key electrical diagrams area.


Report key

It allows you to access the Report environment. The key appears on a yellow background (environment Report enabled) or on a grey background (environment Report disabled). To access the Report environment select the report key.



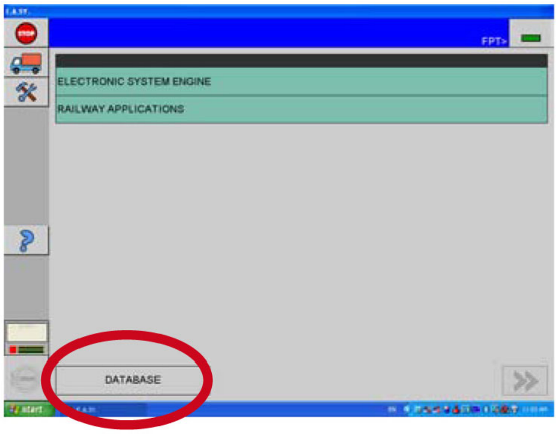
On/Off-line key

It can be on-line or off-line. The *on-line* key indicates that the PT-Diagnosis SW uses the PT-BOX/PC module connection. The *off-line* key indicates the PT-Diagnosis SW is working in simulated mode. To change the status select the key.

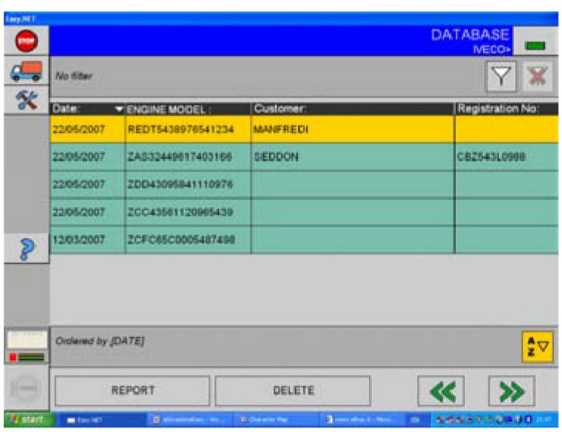
Acceptance

Environment DataBase

From the PT-DIAGNOSIS start window it is possible to select a new engine or to select one from the database.



1. Select the database button: you access the DataBase environment (it contains the list of accepted engines).



2. The list of accepted engines is available.
   They can be search by means of the following keys:
   - ❑ DATE
   - ❑ ENGINE MODEL
   - ❑ CUSTOMER
   - ❑ NUMBER PLATE

key *search*

It allows you to search an engine by applying a filter (DATE, engine mode l, CUSTOMER or NUMBER PLATE).

key *delete search*

It cancel the filter; it is active only after a search.

key *order*

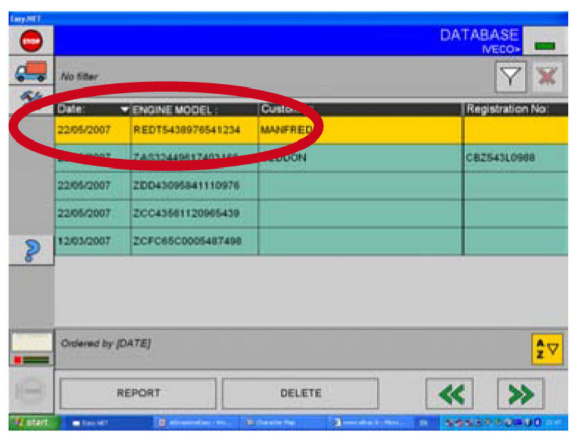
It orders the list according to the selected ordering criterion.

REPORT key *report*

It gives access to the summary environment; enabled after selecting an engine.

DELETE key *delete*

It deletes the selected engine from the database; it is active only after selecting an engine.



3. Select an engine from the list (the background is yellow); it is possible:
   - to analyse engine data (*report* button);
   - to start again the diagnosis procedure on the engine (*navigation* button *forward*);
   - to return to the start window (*navigation* button *back*).

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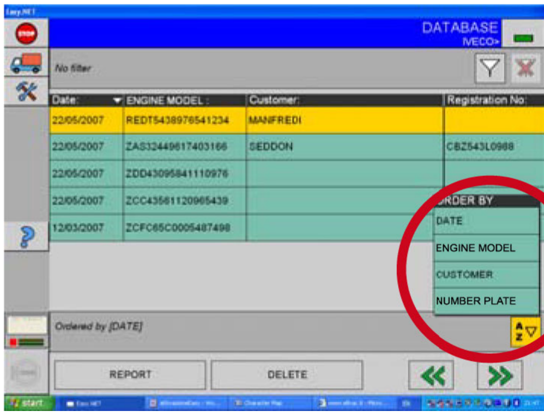
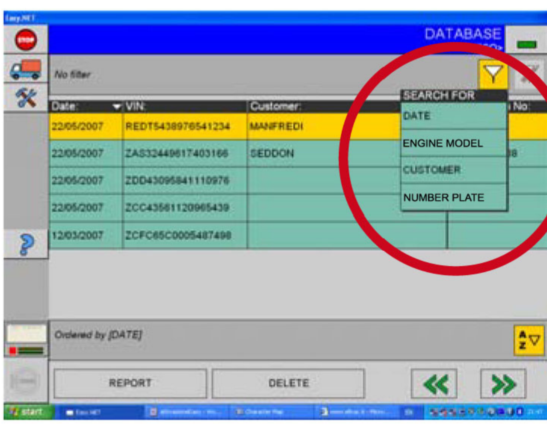
How to order the engines list



1. Select the *order* key.
2. Select the order method.
   - ❑ DATE
   - ❑ ENGINE MODEL
   - ❑ CUSTOMER
   - ❑ NUMBER PLATE

How to search for an engine from the database



1. Select the search key.
2. Select the search method.
   - ❑ DATE
   - ❑ ENGINE MODEL
   - ❑ CUSTOMER
   - ❑ NUMBER PLATE

3. If required, enter the word or the code to be searched and confirm by selecting the *tick* icon.

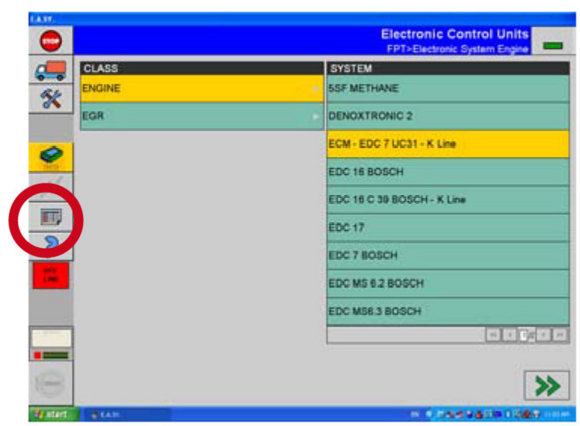
To cancel the search and display all elements from the archive select the *cancel search* key.

For the selection of a new engine see *ECU Diagnosis*.

Environment Report

When the engine sheet of the engine under test has been saved in the Report Environment, the engine has been accepted.

You access the Report environment in the following ways:

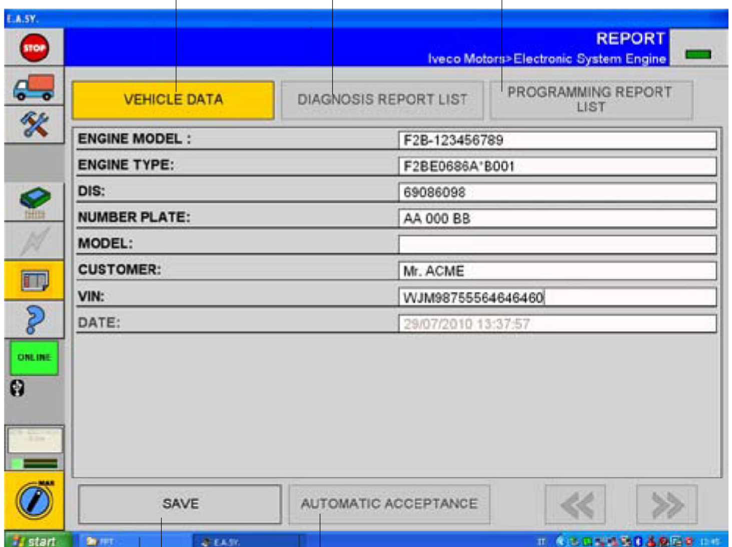


- ❑ from the Buttons area at any time by selecting the corresponding button;
- ❑ from the DataBase environment by selecting the required engine and the report button.

Environment Report

DIAGNOSIS REPORT LIST KEY:
summary of all performed diagnosis operations

ENGINE DATA KEY:
engine identification data; the fields can be always changed (with the exception of the engine model and the date) can be always changed



PROGRAMMING REPORT LIST KEY:
summary of all performed programming operations

SAVE KEY:
it allows you to save the engine sheet (to accept it)

AUTOMATIC ACCEPTANCE KEY:
(enabled only if the communication is active)

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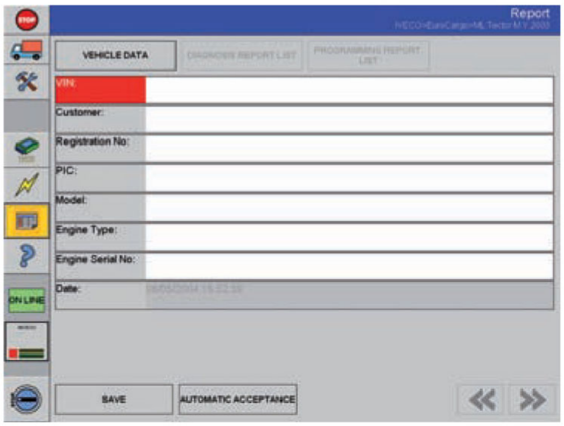
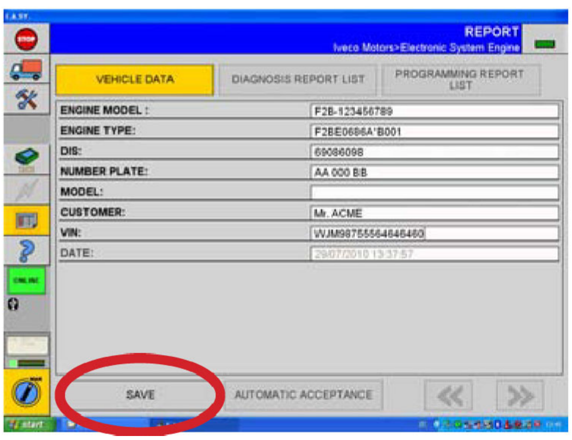
Acceptance

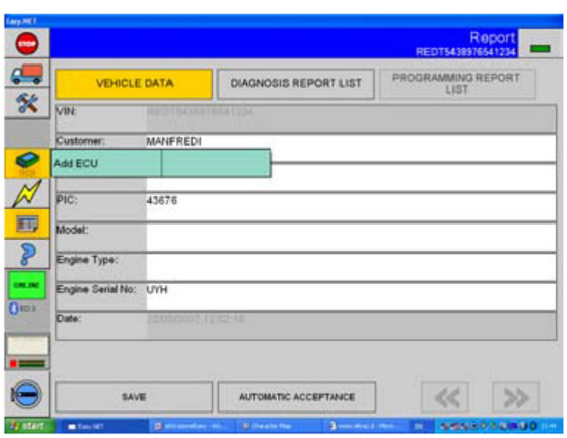
The acceptance (sheet saving) is mandatory when important operations are performed on the engine (read or cancel faults memory, programming).



1. Read or cancel the faults memory or carry out a programming and then select from the corresponding environment the *report* button; you enter the Report environment.
2. Enter data.

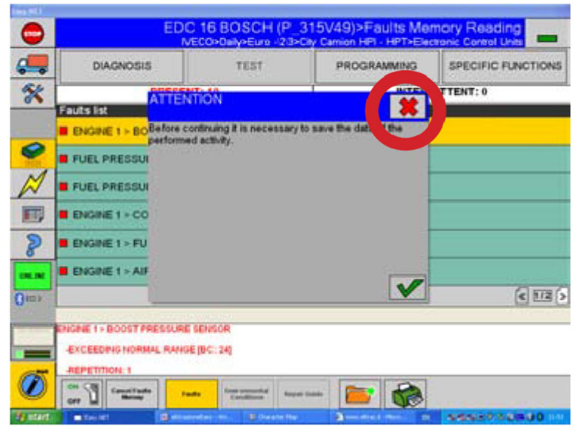


3. Save the sheet by selecting the *save* button.

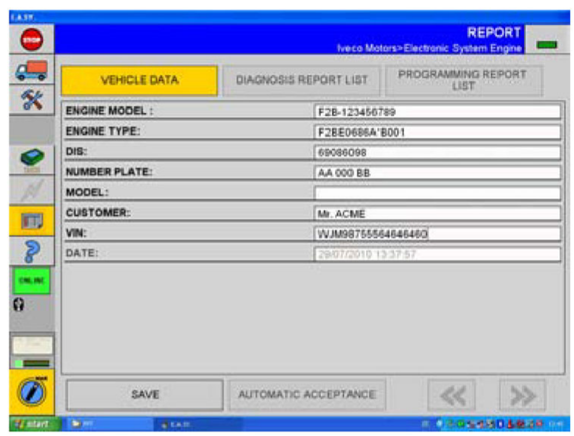


4. From the Buttons area select the button of the operation you want to perform.

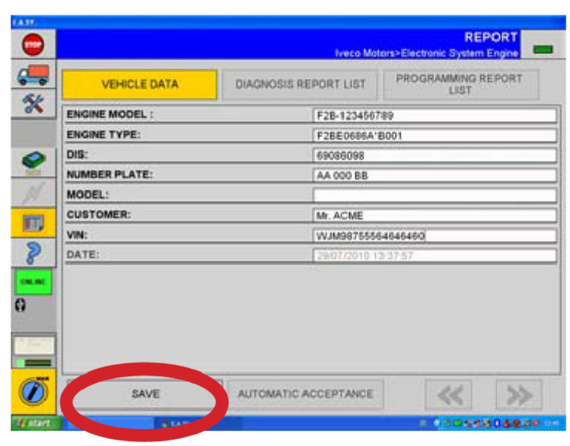
When you read or cancel the faults memory or carry out a programming it is not possible to return directly to the window Family Choice; by selecting the *engine* button the following windows are displayed:



1. Before continuing it is necessary to save the data of the performed activity; select the tick icon; the Report environment appears.



2. Enter data.



3. Save the sheet by selecting the save button.

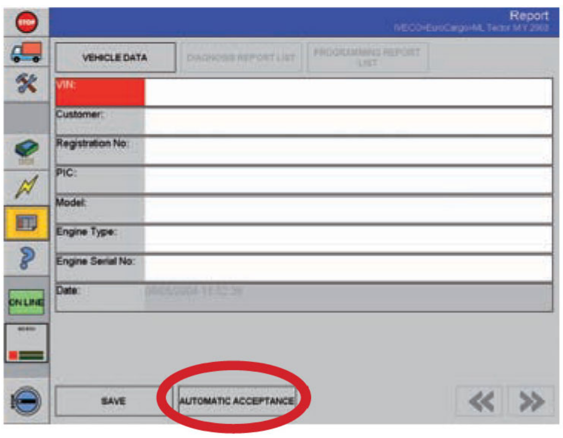
It is now possible to return to the Family Choice window.

Automatic acceptance

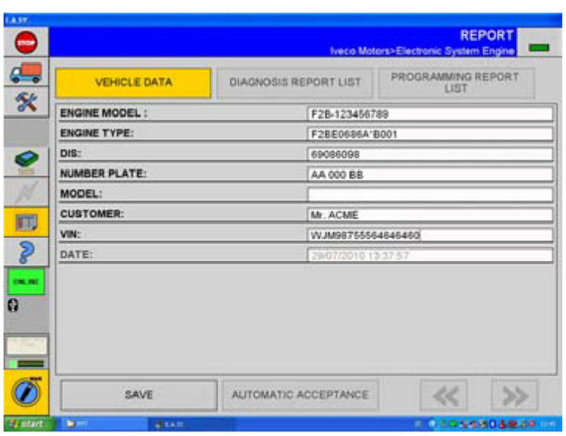
From the Report environment it is also possible to accept the engine automatically.

> ⚠ This operation is only possible if the communication with the system has been activated.

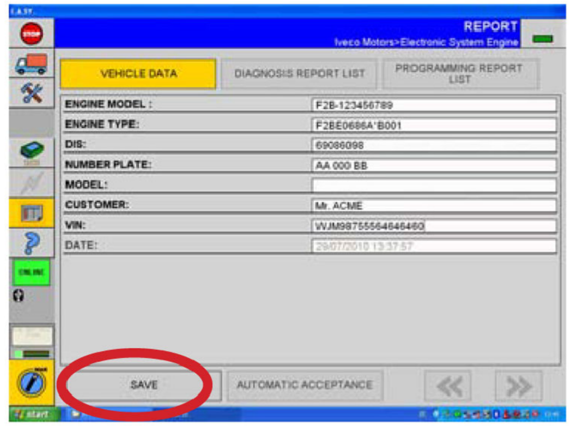
1. Read or cancel the faults memory or carry out a programming and then select from the corresponding environment the *report* button.



2. You enter the Report environment.
3. Select the button *automatic acceptance*.



4. By means of the automatic acceptance the system tries to communicate with the engine ECU: confirm the displayed message by pressing the tick icon; wait until the ECU is ready.



5. The automatic acceptance reads the following information:
   - ❑ Engine Model (engine type + engine serial number)
   - ❑ PIC
   - ❑ Engine type
   - ❑ Engine Serial Number
6. At the select the *save* key.

ECU diagnosis

1. Sselect the Family, the Class and then the System of engine under diagnosis.
2. Press the *navigation* button *forward* (enabled - green) to continue.

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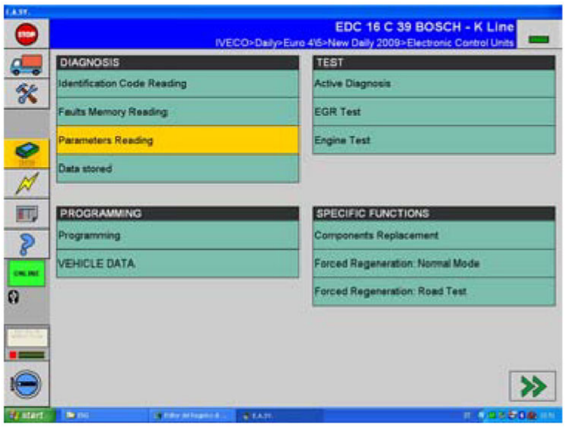
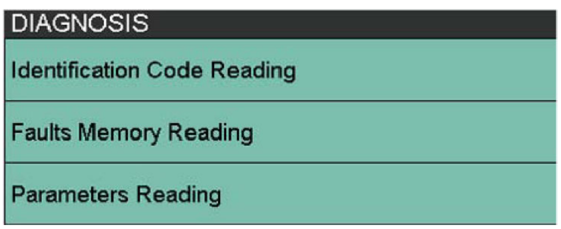


3. The window Choose Activity appears; it is here possible to choose from four lists:

Window Choose Activity

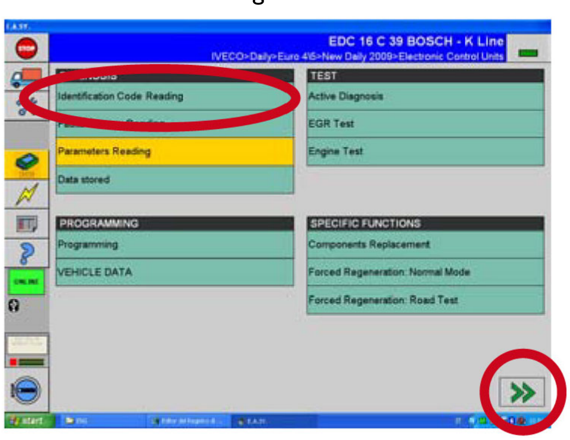
- ❑ diagnosis
- ❑ test
- ❑ programming
- ❑ specific functions



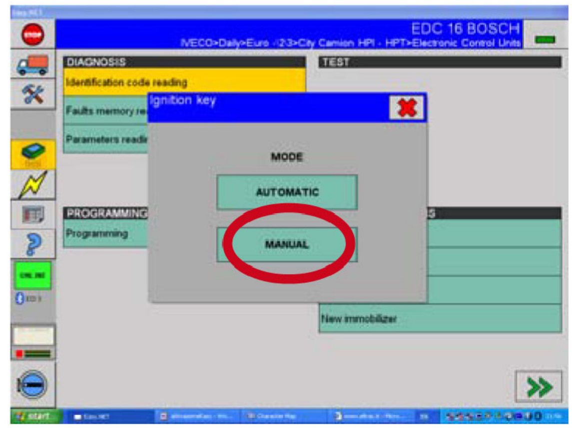
4. The present Repair Guide describes the diagnosis environment and the specific functions to which it is associated:

- ❑ Identification Code Reading
- ❑ Faults Memory Reading
- ❑ Parameters Reading

Identification code reading



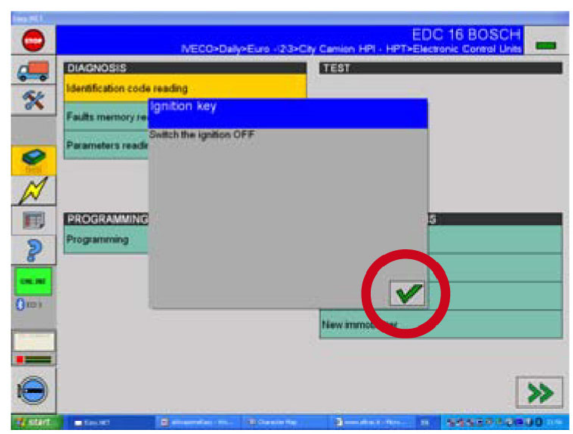
1. To access the Read Identification environment select the item Identification Code Reading from the Diagnosis list and then press the *navigation* button *forward*.



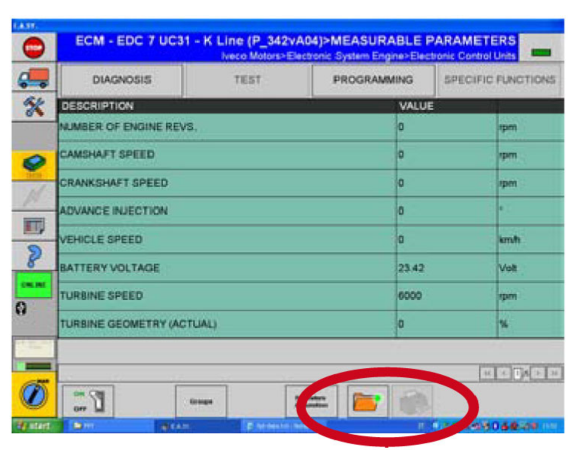
2. PT-DIAGNOSIS system presents a pop-up window where to select the automatic or the manual activation of the ignition key; select the required mode; the *key* button is disabled.

Under the automatic mode all activation of the ignition key are controlled by the diagnosis instrument (key button working).

Under the manual mode all activation of the ignition key are controlled by the operator on the engine.



3. Confirm the new message by pressing the *tick* icon.



report key

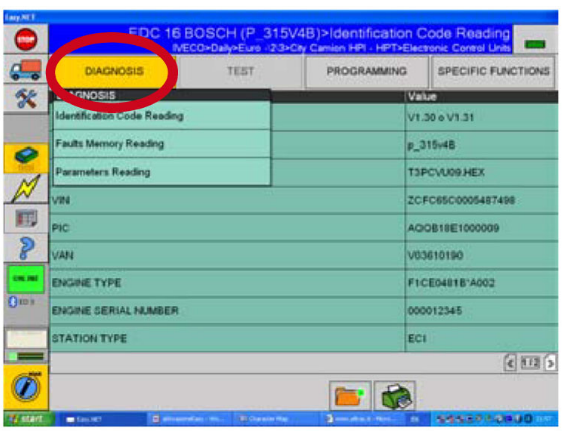
Shows the Diagnosis Report List (and allows you to print each report).

print key

Prints the summary page of Identification Parameters.

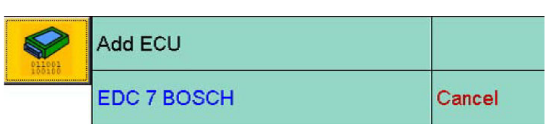
4. Wait until the ECU is ready; the general information about the electronic system under test is read:
   - ❑ identification code
   - ❑ HW version
   - ❑ SW version
   - ❑ production date
   - ❑ …

After identification code reading it is possible to carry out other activities (step 5) or to return to the window Choose engine (step 6).



5. To access the other activities from the environment Identification Code Reading, select the choose activities buttons: *choose an activity*; the system automatically access the selected activity.

The choose activities buttons are shown in yellow when selected.



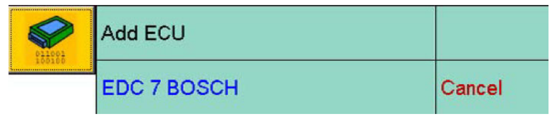
6. To exit the diagnosis of the engine under test select the button *ecu's area>ecu under test>cancel.*

Multitasking option

PT-DIAGNOSIS introduces a very important news: it is possible to associate more ECU's to the family of engine under test.

Add an ecu

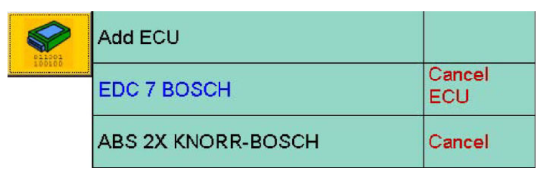
It is possible to interrupt the diagnosis with an ECU and to start the procedure with another one.



1. Select the button *ecu's area>add ecu*; the Choose Vehicle window will appear, where you can select the desired ECU.

Managing more ecu's

It is possible to operate with two or more connected ECU's at the same time.

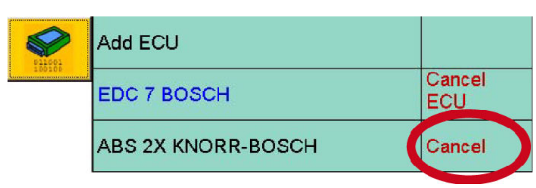


1. Select the button *ecu's area>desired ecu.*

The activity remains interrupted for the not selected ECU's and can be started again at any time.

Cancel an ecu

It is possible to stop the activity on one of the connected ECU's.



1. Slect the button *ecu's area>required ecu>cancel.*
2. Select the required ECU.

Ignition Key Button Modes - on line/off line

At the system start up the *on/off* button is *on-line* if the PT-BOX module is activated and connected to the PC, otherwise is disabled (*off-line*).

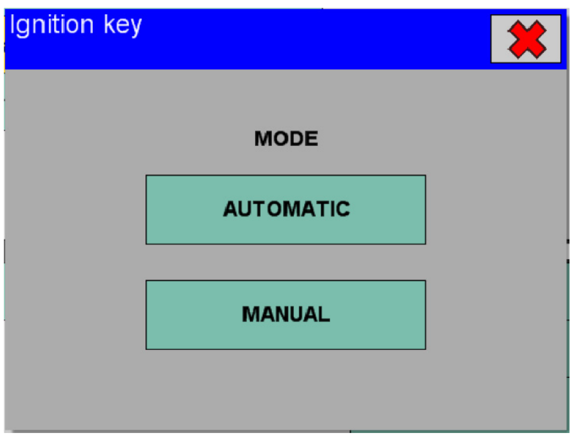
On line mode

The function "Ignition Key" is active; it can be managed in automatic or manual mode; the "ignition key" screen appears only after the selection of a function that requires it (e.g. diagnosis functions).

In automatic mode all ignition key activations are managed by the diagnosis instrument.

In manual mode all ignition key activations are managed by the operator on the engine.

The automatic activation depends on the type of engine; make sure the engine supports the function before selecting automatic mode.



1. After selecting the automatic mode a test procedure is carried out.
2. Switch the *ignition off.*
3. The engine chassis may move.

The PT-DIAGNOSIS SW activates the ignition key and displays a screen page in which it asks to check the dashboard; if it is turned "on" the diagnosis procedure can be continued; otherwise the system asks for position of the key to ON in manual mode.

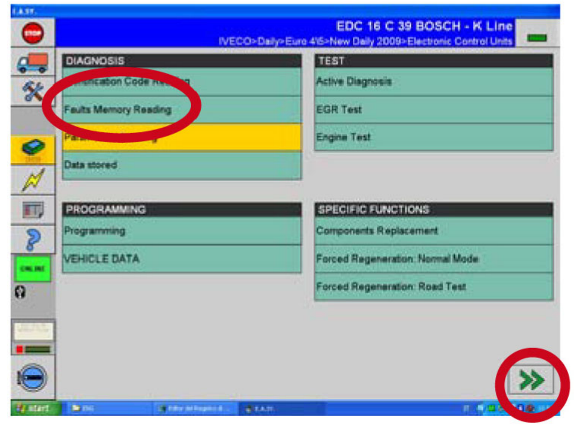
Both in manual and in automatic mode:

1. Before ignition key activation a message is always displayed: request (manual mode) or warning (automatic).
2. When the ECU is cancelled a message indicates that it is necessary to interrupt the communication and then to confirm the operation.
3. The chosen mode remains until the engine under test is changed.

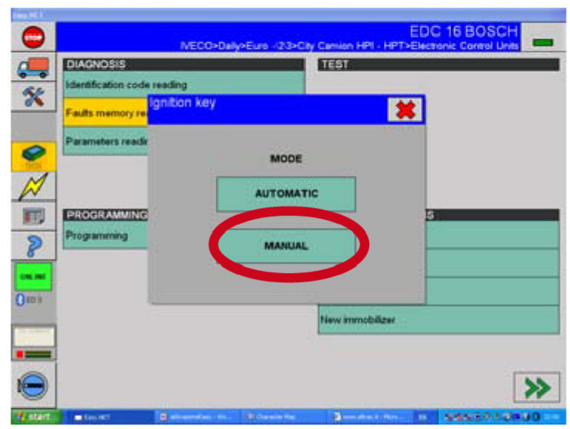
Off line mode

The basis diagnosis is simulated and it is possible to read some information about the electronic system under test.

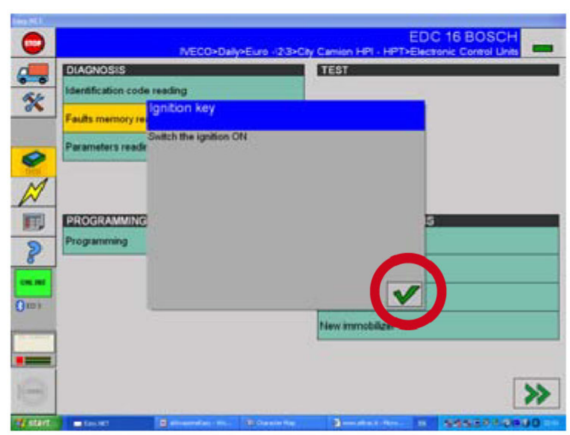
Read faults memory



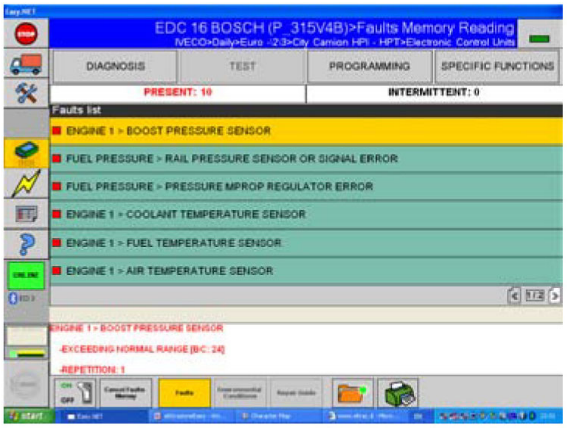
1. To access the Read Faults Memory environment select the item Faults Memory Reading from the list Diagnosis and then press the *navigation* button *forward.*



2. PT-DIAGNOSIS system presents a pop-up window where to select the automatic or the manual activation of the ignition key; select the required mode; the key *button* is disabled.



3. Confirm the new message by pressing the *tick* icon.



4. Wait until the ECU is ready; the list and faults type occurred during the working are displayed.

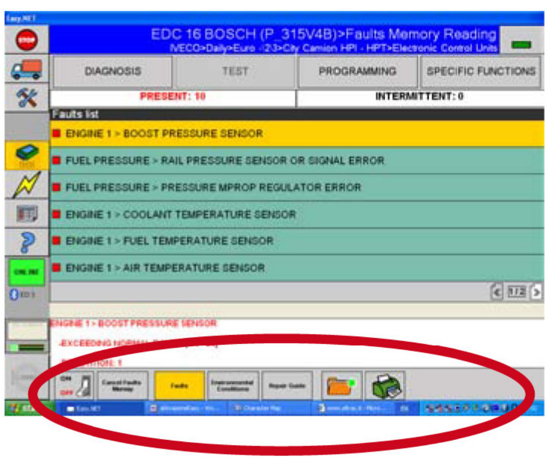
   There are two types of failures:

   ❑ failures present during the reading procedure (red);

   ❑ intermittent failures not present during the reading operation but which occurred at least once before (black).

Detail of Buttons area of the *Faults Memory* area

New icons appear in the window Read Faults Memory for accessing specific functions:



On line Mode

Faults Memory Reading Icons

on key

The communication between the system and the ECU is active: it performs again the Faults Reading; it updates the ECU communication.

Select the button to interrupt the reading.

off key

The communication with the ECU has been interrupted.

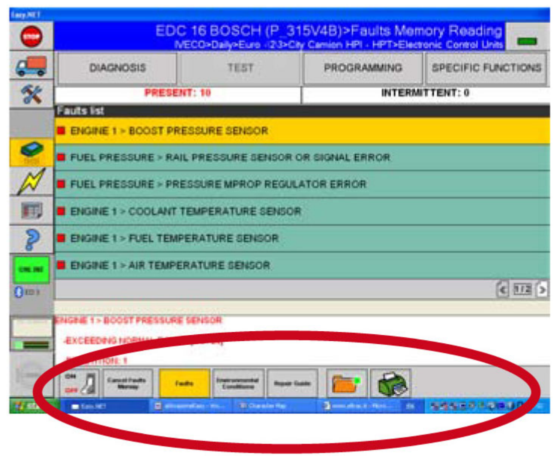
Select the button to start again the electronic system reading.

cancel faults memory key

It cancels the faults selected in the list; it is possible to cancel a fault at a time; the cancel operation will be effective when you confirm it by pressing the *tick* icon displayed in the next pop-up-window.

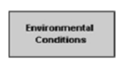
faults key

It allows you to access the Faults environment; it can be yellow (the faults list is displayed) or gray (environment Faults disabled).



On line Mode

Faults Memory Reading Icons



environmental condi tions key

Active when the communication with the ECU has been interrupted this is used to examine environmental conditions when the failure occurred. It can be gray (default status) or yellow (when selected).

repair guide key

Active when the communication with the ECU has been interrupted it gives an analysis of the fault selected from the list; in particular other information (blink code, failure code and fault mode) is available it can be gray (default status) or yellow (when selected).


report key

It allows you to save the report of carried out operations see Report environment > button *diagnosis report.*


print key

It allows you to print the displayed window.

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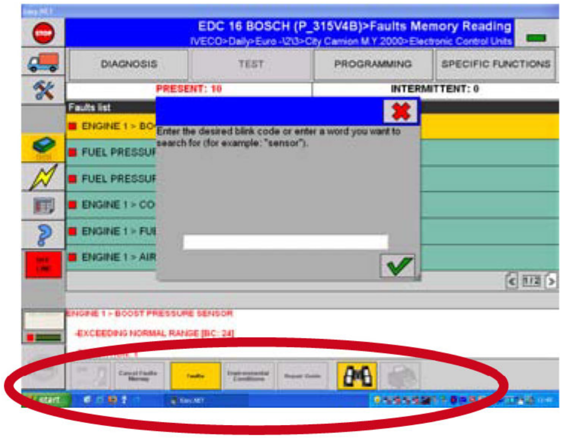


Off line Mode

Faults Memory Reading Icons

 *blink code search* key

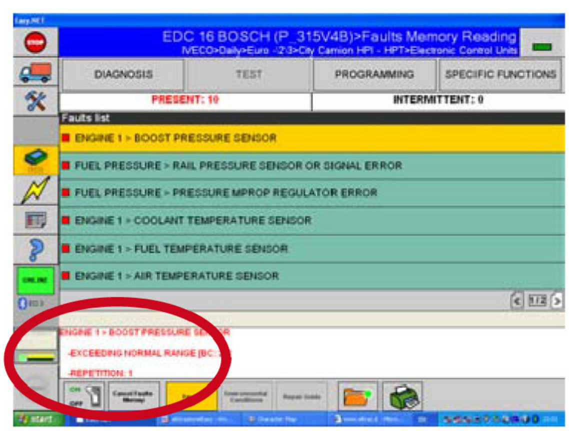
Appears only if the communication with the ECU interrupted is (under OFF LINE Mode) recognize the fault where blink code or required word appear.

To go from one function to another (faults, environmental conditions, troubleshooting) select the corresponding button.

Operations like Read and Cancel Faults Memory are very important: they are automatically stored and need the engine acceptance.

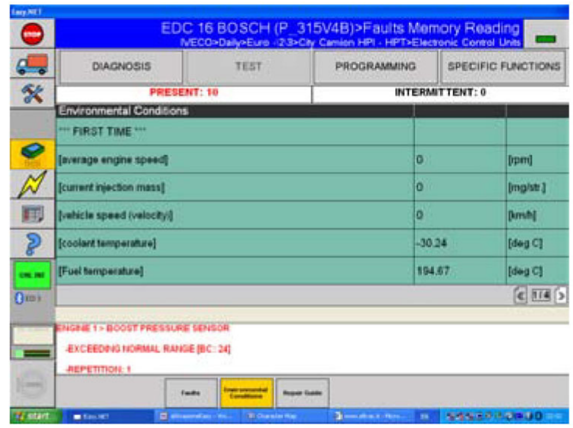
How to get information about a fault

1. Interrupt the communication with the ECU (button *on/off*) and select an item from the faults list: the fault is described in the below blank area; in particular the following information is available:



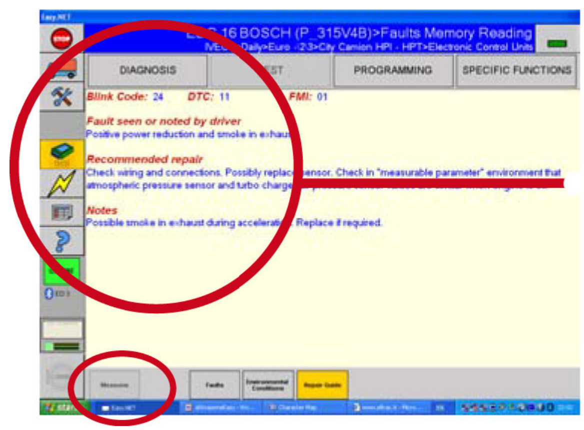
- ❑ the fault
- ❑ the signal type
- ❑ the repetition type

The button *faults* appears on yellow background because it is selected.



2. Select the button *environmental conditions.*

It examines the present environmental conditions at time of the fault.



3. Select the repair guide button; the following information is available:

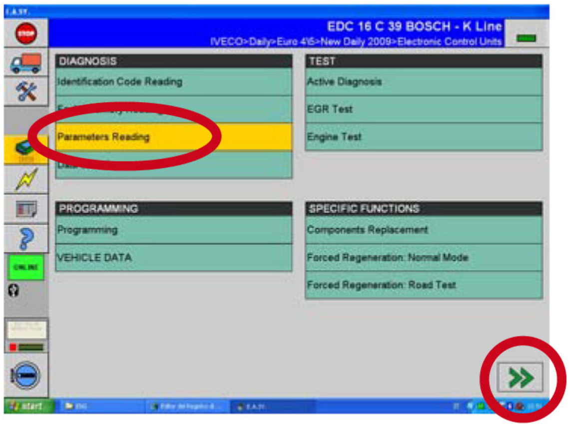
- ❑ the blink code
- ❑ the failure code (DTC)
- ❑ the failure mode (FMI)

Appears a new icon, the *measures* key

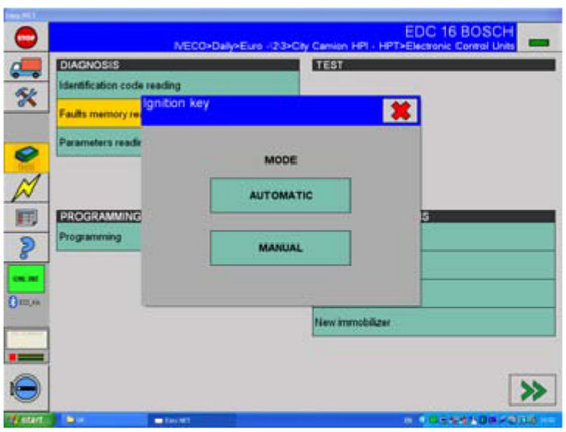
 *measures* key

The Measurements pop-up window opens with a list of possible measurements and the relevant operating suggestions.

Parameters reading

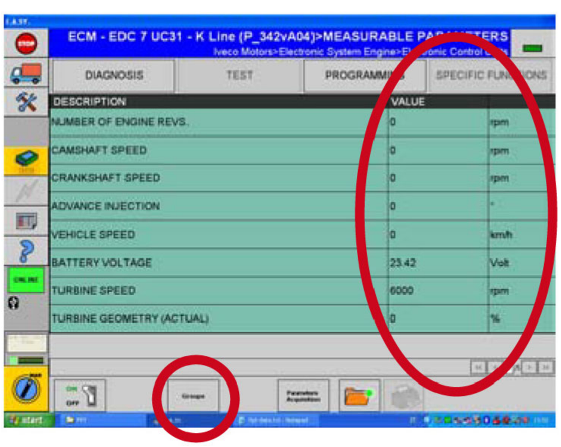


1. To access the Parameters Reading environment select the item Parameters Reading from the Diagnosis List and then press the *navigation* button *forward.*



2. PT-DIAGNOSIS system presents a pop-up window where to select the automatic or the manual activation of the ignition key; select the required mode; the *key* button is disabled.

Pay close attention to the displayed messages and wait until the ECU is ready.

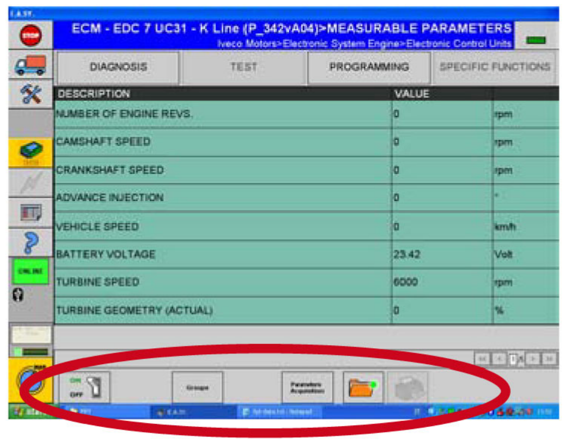


3. The read parameters are shown and the values assumed
4. Select the *groups* key.

The groups key allows you to access the groups management functions (see *group* Management).

Detail of parameters buttons area

New icons appears on the window Parameters Reading for accessing specific functions:



on key

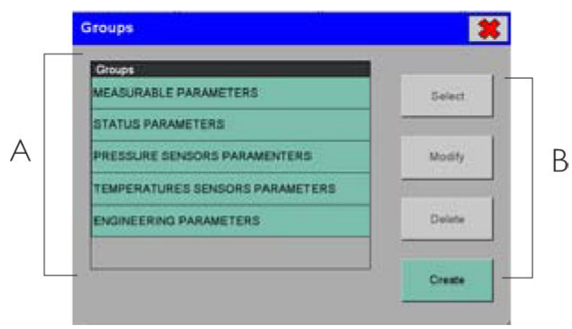
The communication between the system and the ECU is active: select the button to interrupt the reading.

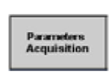
off key

The communication with the ECU has been interrupted; select the button to start again the electronic system reading.

groups key

It opens the GROUPS window showing the list of created group (A) and the keys to create/modify the groups (B).





parameters acquisition key

It allows to record the trend in time of the measurable parameters.


report key

It allows you to save the report of carried out operations.

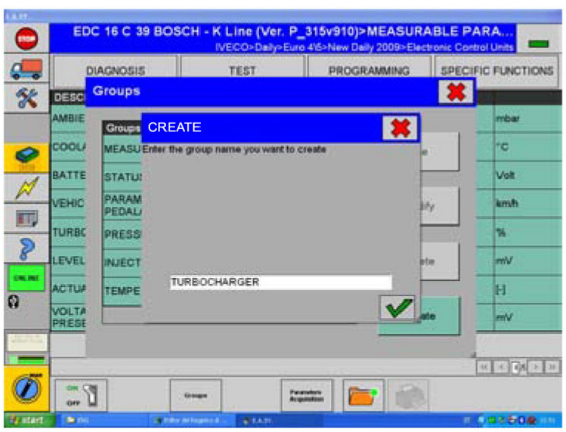

print key

It allows you to print the displayed window.

Groups Management

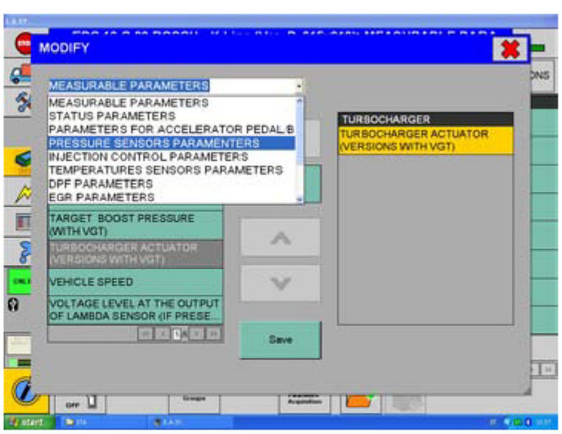
5. The Groups window opens.

The pre-defined parameter groups are first displayed then the customized ones; the pre-defined parameters (measurable and status) can not be modified.



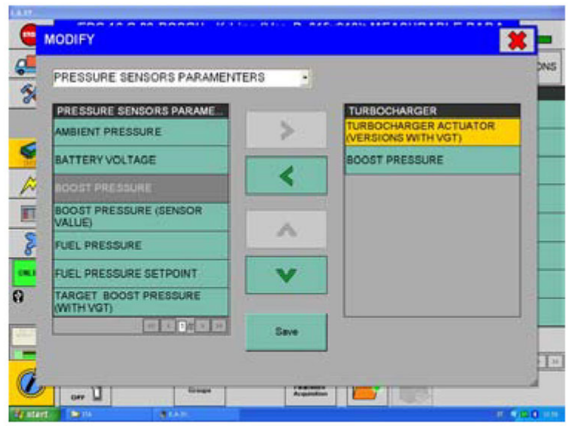
Create a new parameters group

6. Select *create*.
7. Enter the name of the group you want to create.
8. Confirm by selecting the green *tick* icon.



9. From the drop down menu (above on the left), select one of the available parameter groups, excluding the parameter you are changing.
10. On the left-hand list the parameters of the selected group are shown; on the right-hand list the parameter of the group you are changing are shown.

The parameters with a gray background on the left-hand list are parameters that have already been added and can not be selected.



11. To a parameter to the right-hand group, select it and confirm by pressing the right arrow key ( ).
12. To remove a parameter (from the right-hand list select it and confirm by pressing the left hand arrow key ( ).

Select the save key to *save* and exit the groups management environment.

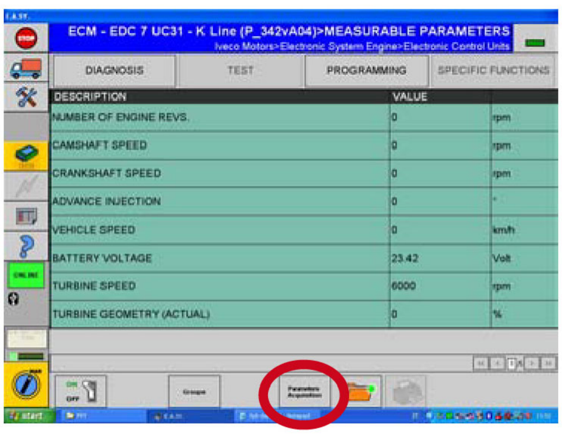
Modify a parameters group

1. Select a customized parameters group.
2. Select *modify*; the window for parameters groups management opens.
3. Select the group you want to change and continue with step 9 (link).

Cancel a parameters group

1. Select a group of customized parameters
2. Select *delete*; confirm or cancel the request.

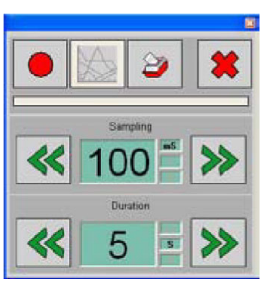
Appendix parameter acquisition key



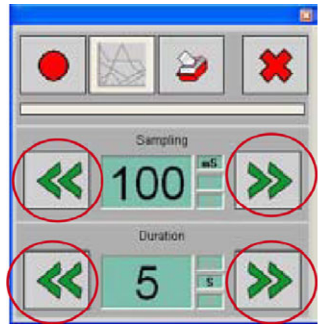
1. Select the *parameters acquisition* key; the window Store Parameter opens.

   The key is only active under on line mode.

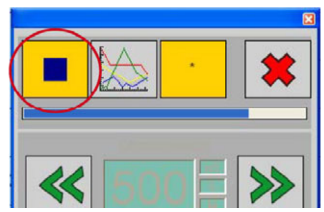
Parameters reading



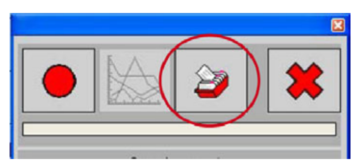
Window Store Parameter



2. Select the sample time by using the arrows on the Sampling active area.
3. Select the duration of registration by using the arrows key on the active area Duration.

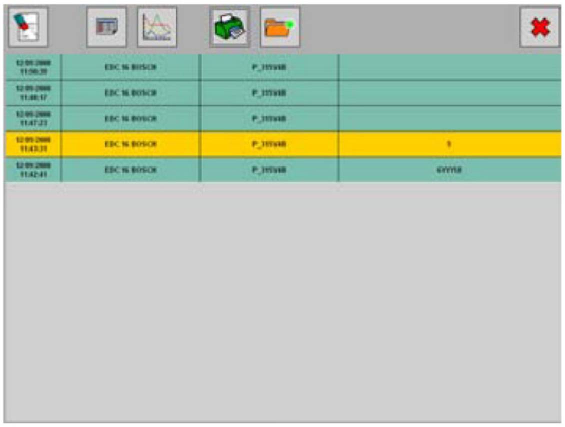


4. Select the key *start/stop* to start the registration (a new window open *Notes* where you can add a comment).
5. Close the *Notes* window, the registration starts.
6. Wait for the end of registration procedure (it is also possible to interrupt the registration, by using the *stop* key).



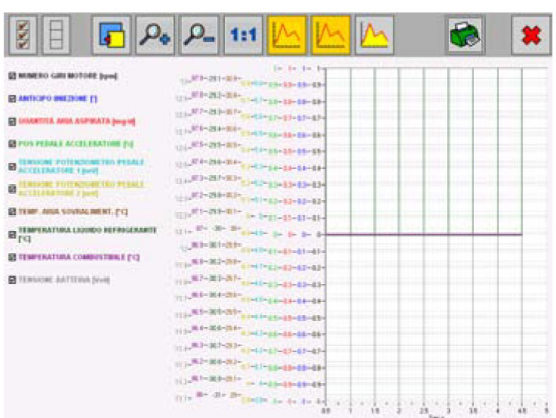
7. Select the *archive* key: the Archive window open showing the list of available registration in the archive.

Archive window



1. From the Archive windows, select a registration; it is possible:
   - ❑ to cancel it (*cancel* key)
   - ❑ to read data (*report* key)
   - ❑ to show data (*show* key, opens the *Data Reading window*)
   - ❑ to print data (*print* key)
   - ❑ to save data in text format (*save as* key)
   - ❑ to go back (*cross* key)

Data Reading window

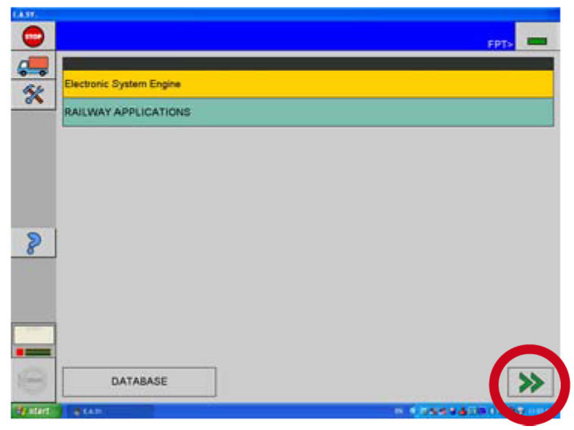


2. From the Archive window, select a registration and the show key; the Data Reading window opens; it is possible:
   - ❑ To select all parameters (fast selection key).
   - ❑ Deselect all parameters (fast deselection key).
   - ❑ To show the diagram with full-screen.
   - ❑ Increase, reduce or to bring back to the original display the time range (x-axle, seconds).
   - ❑ To display tables (horizontal or vertical).
   - ❑ To colour display the area indicated by the diagram.
   - ❑ Print.
   - ❑ To go back

Programming

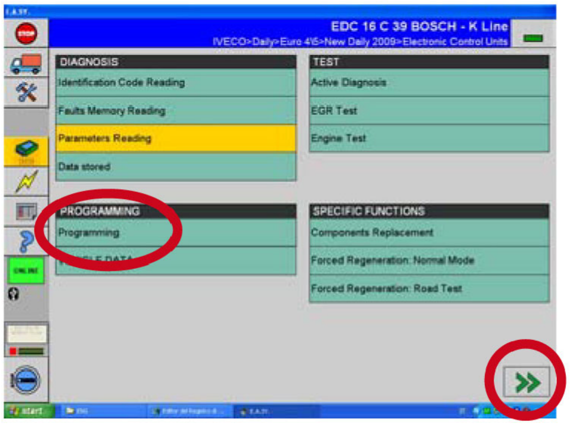
The consultation can be started

To access the programming area of the ECU under test proceed as follows:



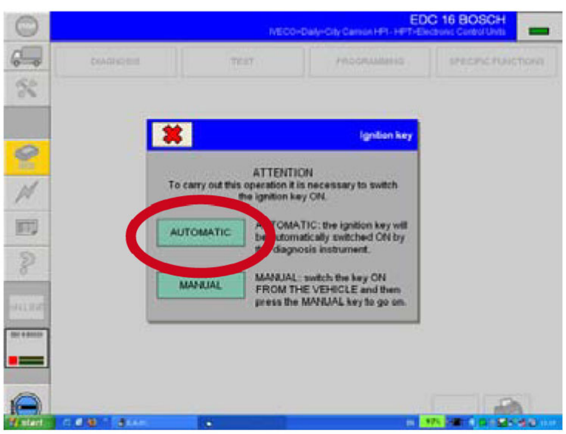
1. Select the Engine Family under diagnosis.
2. Press the *navigation* button *forward* (enabled - green) to continue.

3. Select the Class and the System under test to which the engine belongs; select the *forward navigation* key (enabled - green) to continue.

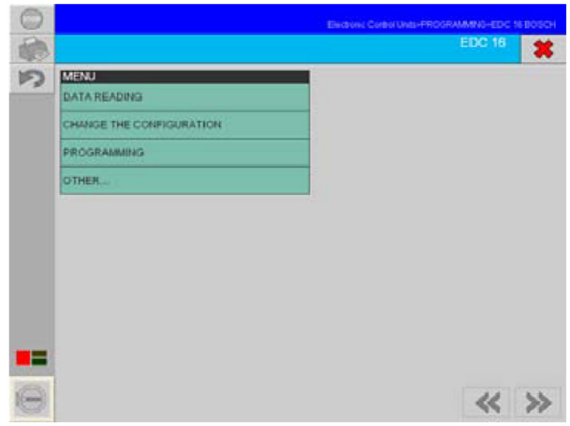


4. Select the programming option from the Programming list; select the forward navigation key (enabled - green).
5. If required, enter the required data, by following the indicated procedure.

> ⚠ It is possible to carry out a programming only in online mode. In case of error check the connections ECU/PT-BOX/PT-DIAGNOSIS.



6. Select the ignition key management (automatic/manual): if the electronic system engine under test is fitted with this function, select the *automatic* key.
   - ❑ PT-DIAGNOSIS shows the running activities.
   - ❑ The ignition key ON is automatically activated.
   - ❑ The connection to the ECU starts.

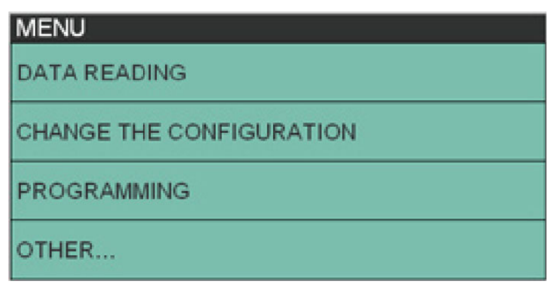


7. Read the displayed messages and select the green *tick* icon to continue.
8. At the end the system permits access to the Programming environment; the components list is displayed, on which tests can be carried out.

> ⚠ During the programming do not disconnect the USB cable. Before carrying out the ECU programming verify the charge left in the computer's battery.
> It is recommended to plug the PC in (connect it to the engine/vehicle or to the mains supply).

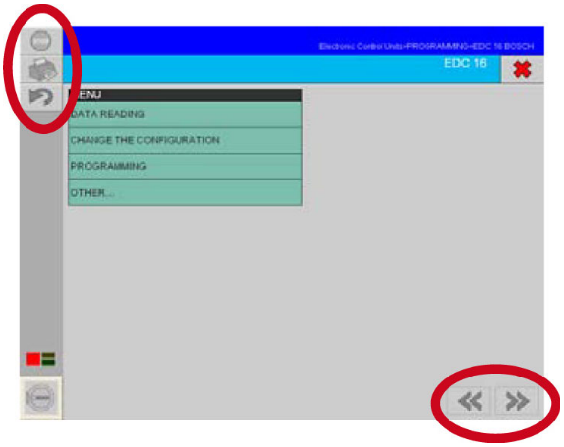
Programming environment

It is possible to use specific functions, by selecting the corresponding key:



- ❑ Data Reading
- ❑ Change the configuration
- ❑ Programming
- ❑ PTO (only for the PT-DIAGNOSIS full version SW)

The available function types are determined according to the type of ECU under test. The Keys area contains the buttons for accessing the functions specific for the Programming environment.

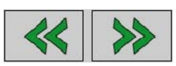


 *print* key

If enabled, select to print a report.

 *cancel* key

If enabled, select to re-establish a configuration.

 *navigation* keys

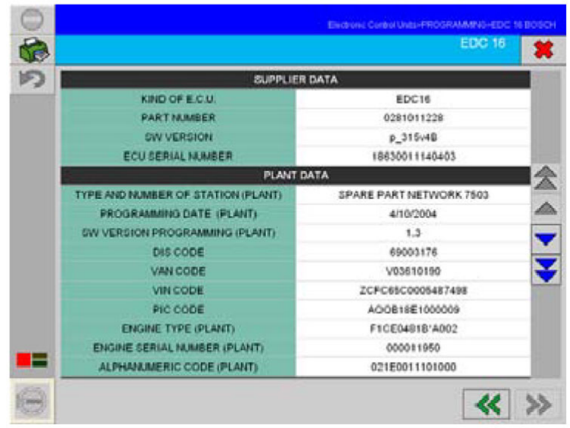
If enabled, select to move between different environments.

 *cross* key

If enabled, select to cancel an operation.

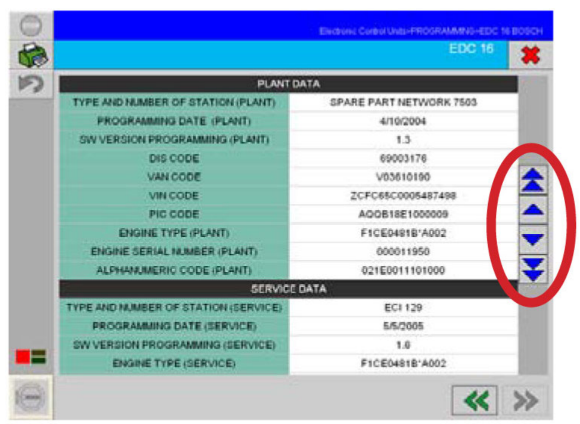
Data Reading

This is used to view the data concerning the ECU and the respective programming state; tampering attempts are shown.



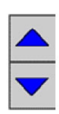
The following are indicated:

- ❑ station type and number;
- ❑ programming date;
- ❑ ECU software release.

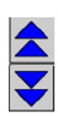


The system views the following data classes:

- ❑ supplying data;
- ❑ factory data (never updated);
- ❑ service data (updated after each programming event).

 *scroll* keys

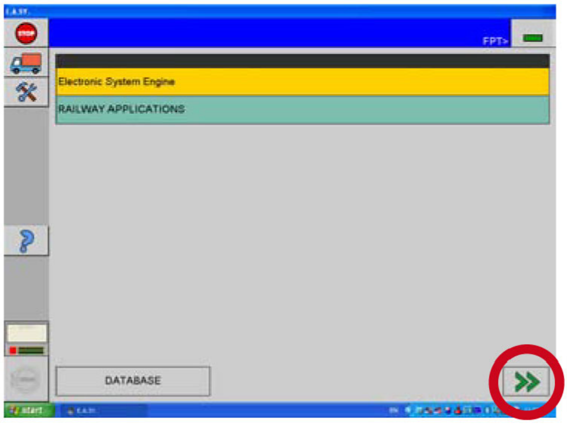
If enabled, select to scroll the list step by step.

 *fast scroll* keys

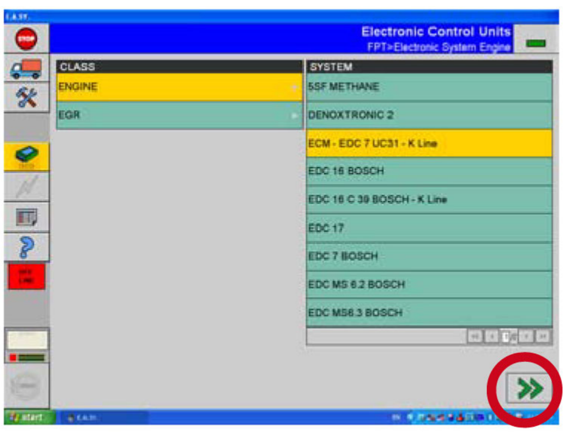
If enabled, select to scroll the list step by step.

Active diagnosis

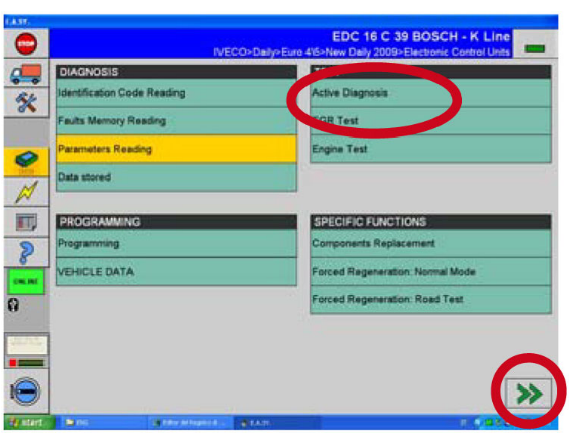
To start the Active Diagnosis



1. Select the Engine Family under diagnosis.
2. Press the *navigation* button *forward* (enabled - green) to continue.

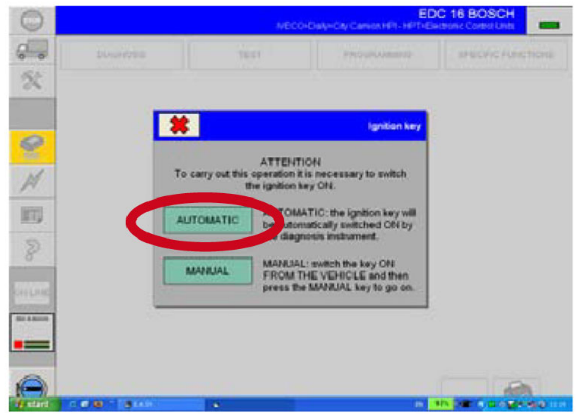


3. Select the Class and the System under test to which the engine belongs; select the *forward navigation* key (enabled - green) to continue.

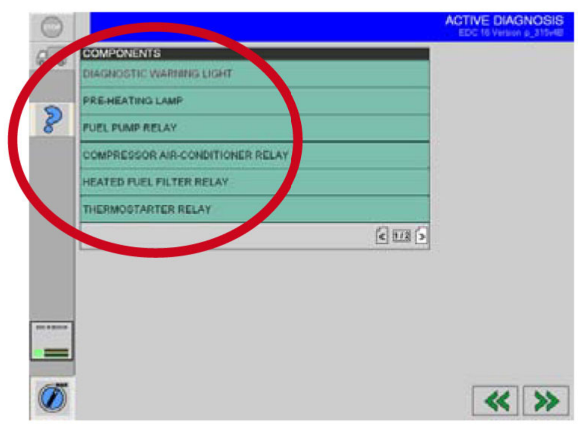


4. From the Test list select the option acti ve diagnosis; select the *forward navigation* key (it is active, in green displayed).

It is possible to carry out an active diagnosis only in online mode. In case of error check the following connections ECU/PT-BOX/PT-DIAGNOSIS.



5. Select the ignition key management (automatic/manual): if the electronic system engine under test is fitted with this function, select the *automatic* key.
   - ❑ PT-DIAGNOSIS displays some information about the activity in progress.
   - ❑ The ignition key ON is automatically activated.
   - ❑ The ECU connection starts.
6. Read the displayed messages and select the green tick icon to continue.



7. At the end the system permits access to the Active Diagnosis environment; the components list is displayed, on which tests can be carried out.

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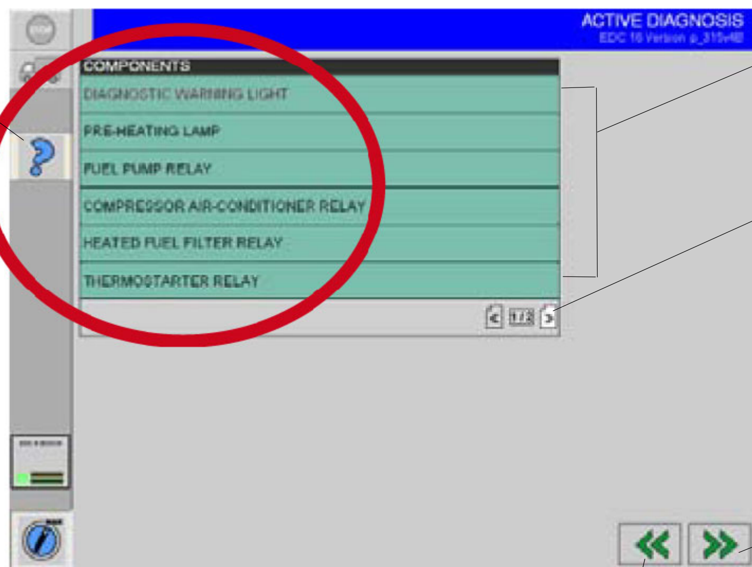
Active Diagnosis environment

The components of the selected electronic system are indicated in a list; use the browse keys to display all the elements of the list.

1. Select the component on which the test will be carried out.
2. Select the forward navigation key to continue and carry out the test.

Help key
if selected it shows information about the electronic system under test; information about the guide to the diagnosis are not provided.



Components: selectable list

Browse key

Forward navigation key

Back navigation key
It allows you to move one step back; if selected at this level it allows you to exit the Active Diagnosis environment.

DTC	Description	Dfp Name	MIL	OBD System	Power red	Long Term Failure	Reason of failure	Possible failure correction
1357	Air flow meter: DFC for plausibility check	AFSDrftAdjPlausMax	OFF		none	YES potential	Fouling or blockage of the air mass sensor, inaccurate sensor due to ageing, leakage or obstruction in the intake duct, jammed EGR actuator, defective VTG/WG	Clean sensor and check intake system, replace air mass sensor if necessary, check EGR actuators and boost pressure actuator. Reinitialize drift compensation values using UDS service Routine Control (Id $0242)
3357	Air flow meter: DFC for plausibility check	AFSDrftAdjPlausNPL	OFF		none	YES potential	Fouling or blockage of the air mass sensor, inaccurate sensor due to ageing, leakage or obstruction in the intake duct, jammed EGR actuator, defective VTG/WG	Clean sensor and check intake system, replace air mass sensor if necessary, check EGR actuators and boost pressure actuator. Reinitialize drift compensation values using UDS service Routine Control (Id $0242).
1657	Air flow meter: AFS correction at low idle exceeding the maximum drift limit	AFSDrftIdlAdjValMax	OFF		none	YES potential	Fouling or blockage of the air mass sensor, inaccurate sensor due to ageing, leakage or obstruction in the intake duct, jammed EGR actuator, defective VTG/WG	Clean sensor and check intake system, replace air mass sensor if necessary, check EGR actuators and boost pressure actuator. Reinitialize drift compensation values using UDS service Routine Control (Id $0242)
2657	Air flow meter: AFS correction at low idle lower than minimum drift limit	AFSDrftIdlAdjValMin	OFF		none	YES potential	Fouling or blockage of the air mass sensor, inaccurate sensor due to ageing, leakage or obstruction in the intake duct, jammed EGR actuator, defective VTG/WG	Clean sensor and check intake system, replace air mass sensor if necessary, check EGR actuators and boost pressure actuator Reinitialize drift compensation values using UDS service Routine Control (Id $0242)
1757	Air flow meter: AFS correction at load point exceeding the maximum drift limit	AFSDrftLdAdjValMax	OFF		none	YES potential	Fouling or blockage of the air mass sensor, inaccurate sensor due to ageing, leakage or obstruction in the intake duct, jammed EGR actuator, defective VTG/WG	Clean sensor and check intake system, replace air mass sensor if necessary, check EGR actuators and boost pressure actuator. Reinitialize drift compensation values using UDS service Routine Control (Id $0242)
2757	Air flow meter: AFS correction at load point lower than the minimum drift limit	AFSDrftLdAdjValMin	OFF		none	YES potential	Fouling or blockage of the air mass sensor, inaccurate sensor due to ageing, leakage or obstruction in the intake duct, jammed EGR actuator, defective VTG/WG	Clean sensor and check intake system, replace air mass sensor if necessary, check EGR actuators and boost pressure actuator. Reinitialize drift compensation values using UDS service Routine Control (Id $0242)

DTC	Description	Dfp Name	MIL	OBD System	Power red	Long Term Failure	Reason of failure	Possible failure correction
1857	Air flow meter: AFS correction at overrun higher than the maximum drift limit	AFSDrftOvrRunAdjValMax	OFF		none	YES potential	Fouling or blockage of the air mass sensor, inaccurate sensor due to ageing, leakage or obstruction in the intake duct, jammed EGR actuator, defective VTG/WG	Clean sensor and check intake system, replace air mass sensor if necessary, check EGR actuators and boost pressure actuator. Reinitialize drift compensation values using UDS service Routine Control (Id $0242)
2857	Air flow meter: AFS correction at overrun lower than the minimum drift limit	AFSDrftOvrRunAdjValMin	OFF		none	YES potential	Fouling or blockage of the air mass sensor, inaccurate sensor due to ageing, leakage or obstruction in the intake duct, jammed EGR actuator, defective VTG/WG	Clean sensor and check intake system, replace air mass sensor if necessary, check EGR actuators and boost pressure actuator. Reinitialize drift compensation values using UDS service Routine Control (Id $0242)
1257	Air flow meter: Offset drift high error for HFM sensor at engine stand still	AFSOffsDrftMax	ON	EGR	none	YES potential	Inaccurate or defective air mass sensor, or defect in the wiring of the HFM sensor.	Check wiring and the accuracy of the air mass sensor and replace it if necessary
2257	Air flow meter: Offset drift low error for HFM sensor at engine stand still	AFSOffsDrftMin	ON	EGR	none	YES potential	Inaccurate or defective air mass sensor, or defect in the wiring of the HFM sensor.	Check wiring and the accuracy of the air mass sensor and replace it if necessary
1347	Air fllow meter: Physical Range Check high for air mass flow sensor	AFSPhysRngHi	ON	EGR	none	YES direct	Inaccurate or defective air mass sensor, or defect in the wiring of the HFM sensor	Check wiring and the accuracy of the air mass sensor and replace it if necessary
2347	Air fllow meter: Physical Range Check low for air mass flow sensor	AFSPhysRngLo	ON	EGR	none	YES direct	Inaccurate or defective air mass sensor, or defect in the wiring of the HFM sensor	Check wiring and the accuracy of the air mass sensor and replace it if necessary

DTC	Description	Dfp Name	MIL	OBD System	Power red	Long Term Failure	Reason of failure	Possible failure correction
1157	Air flow meter: Sensitivity drift high error for HFM sensor	AFSSetyDrft Max	ON	EGR	none	YES direct	Defect in wiring, inaccurate or defective air mass sensor, leakage or obstruction in the intake duct, defective VTG/WG	Check wiring of the intake air mass sensor and its accuracy and replace it if necessary, check intake duct and boost pressure actuator. Reset HFM learning drift correction factors using UDS service Routine Control (Id $0242)
2157	Air flow meter: Sensitivity drift error low for HFM sensor	AFSSetyDrft Min	ON	EGR	none	YES direct	Defect in wiring, inaccurate or defective air mass sensor, leakage or obstruction in the intake duct, jammed EGR actuator, defective VTG/WG	Check wiring of the intake air mass sensor and its accuracy and replace it if necessary, check intake duct, EGR actuators and boost pressure actuator. Reset HFM learning drift correction factors using UDS service Routine Control (Id $0242)
4147	Air flow meter: Hardware error detection for HFM sensor	AFSSigErr	ON	EGR	none	YES direct	Defect in wiring or defective air mass sensor	Check wiring of the intake air mass sensor, replace air mass sensor
1147	Air flow meter: SRC high error for corrected value in HFM6 sensor	AFSSRCCor Max	ON	EGR	none	YES direct	Defect in wiring, defective air mass sensor and/or the temperature sensor unit	Check wiring of the air mass sensor, replace air mass sensor
2147	Air flow meter: SRC low error for corrected value in HFM6 sensor	AFSSRCCor Min	ON	EGR	none	YES direct	Defect in wiring, defective air mass sensor and/or the temperature sensor unit	Check wiring of the air mass sensor, replace air mass sensor
1247	Air flow meter: SRC high error for raw value in HFM6 sensor	AFSSRCRaw Max	ON	EGR	none	YES direct	Defect in wiring, defective air mass sensor	Check wiring of the air mass sensor, replace air mass sensor

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DTC	Description	Dfp Name	MIL	OBD System	Power red	Long Term Failure	Reason of failure	Possible failure correction
2247	Air flow meter: SRC low error for raw value in HFM6 sensor	AFSSRCRawMin	ON	EGR	none	YES direct	Defect in wiring, defective air mass sensor	Check wiring of the air mass sensor, replace air mass sensor
1161	Air conditionar: SRC high for AC coolant pressure	AirCCIntPAnaSRCMax	OFF		none	NO	Sensor defective or wiring short circuit to external source	Check wiring or replace sensor
2161	Air conditionar: SRC low for AC coolant pressure	AirCCIntPAnaSRCMin	OFF		none	NO	Sensor defective or wiring short circuit to ground	Check wiring or replace sensor
1361	Air conditionar: SRC high for AC coolant pressure	AirCCIntPdcycSRCMax	OFF		none	NO	Defective sensor or wiring prblem	Check sensor and wiring
2361	Air conditionar: SRC low for AC coolant pressure	AirCCIntPdcycSRCMin	OFF		none	NO	Defective sensor or wiring prblem	Check sensor and wiring
1261	Air conditionar: SRC high for AC coolant pressure	AirCCIntPPerSRCMax	OFF		none	NO	Defective sensor or wiring prblem	Check sensor and wiring
2261	Air conditionar: SRC low for AC coolant pressure	AirCCIntPPerSRCMin	OFF		none	NO	Defective sensor or wiring prblem	Check sensor and wiring
5182	Air conditionar compressor: No load error on power stage for the compressor	AirCCmprOL	OFF		none	NO	Broken or disconnected wiring or defective relay	Check of wiring or replacement of relay

DTC	Description	Dfp Name	MIL	OBD System	Power red	Long Term Failure	Reason of failure	Possible failure correction
8561	Air conditioner compressor: Over Temperature of the power stage for AC compressor.	AirCCmprOvrTemp	OFF		none	NO	High battery voltage, high temperature inside ECU, high load or wiring problem	No reaction needed if failure isn't present after short time, check load and output, check wiring, replace ECU
5282	Air conditionar compressor: No load error on power stage for the reduce torque instruction	AirCCmprRedTrqOL	OFF		none	NO	Broken or disconnected wiring or defective relay	Check of wiring or replacement of relay
8661	Air conditioner compressor: Over Temperature on the power stage for reduce torque instruction output.	AirCCmprRedTrqOvrTemp	OFF		none	NO	High battery voltage, high temperature inside ECU, high load or wiring problem	No reaction needed if failure isn't present after short time, check load and output, check wiring, replace ECU
6282	Air conditionar compressor: Short circuit to battery error on power stage for the reduce torque instruction	AirCCmprRedTrqSCB	OFF		none	NO	Short circuit of wiring to external source or inside relay	Check of wiring or replacement of relay
7282	Air conditionar compressor: Short circuit to ground error on power stage for the reduce torque instruction	AirCCmprRedTrqSCG	OFF		none	NO	Short circuit of wiring to ground or inside relay	Check of wiring or replacement of relay

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DTC	Description	Dfp Name	MIL	OBD System	Power red	Long Term Failure	Reason of failure	Possible failure correction
6182	Air conditionar compressor: Short circuit to battery error on power stage for the compressor	AirCCmprSCB	OFF		none	NO	Short circuit of wiring to external source or inside relay	Check of wiring or replacement of relay
7182	Air conditionar compressor: Short circuit to ground error on power stage for the compressor	AirCCmprSCG	OFF		none	NO	Short circuit of wiring to ground or inside relay	Check of wiring or replacement of relay
1182	Air conditionar: Coolant pressure too high	AirCPresMax	OFF		none	NO	AC fluid expansion valve blocked? Pressure measurement not OK	Check AC coolant circuit, check pressure sensor
2182	Air conditionar: Coolant pressure too low	AirCPresMin	OFF		none	NO	AC fluid expansion valve blocked open? AC compressor defective? Pressure measurement not OK	Check AC coolant circuit, check pressure sensor
3182	Air conditionar: Coolant pressure value not plausible	AirCPresNpl	OFF		none	NO	AC Compressor not correctly shut off, pressure measurement incorrect	Check AC compressor, check pressure sensor
3461	Air conditionar: Plausibility error for CAN input	AirCSwtNpl	OFF		none	NO	CAN Timeout in message Com_stAC, A/C supply defective, CAN connection problem	Check presence and correct connection of the A/C, check A/C voltage supply, check wiring
4461	Air conditionar: Signal error for CAN input	AirCSwtSig	OFF		none	NO	A/C defective, A/C supply defective	Check A/C supply, check A/C module
1217	EGR Control: Positive governor deviation above limit for regeneration (EGR too high)	AirCtlGovDvtEOMMax	OFF		none	NO	Defective air mass flow sensor, leakage in the air duct, electrical or mechanical defect in EGR actuators or defect in wiring of EGR actuators	Check air mass flow sensor, air duct, EGR actuators and their wiring
2217	EGR Control: negative governor deviation below limit for regeneration (EGR too low)	AirCtlGovDvtEOMMin	OFF		none	NO	Defective air mass flow sensor, obstruction or leackage in air duct, electrical or mechanical defect in EGR actuators or defect in wiring of EGR actuators	Check air mass flow sensor, air duct, EGR actuators and their wiring

DTC	Description	Dfp Name	MIL	OBD System	Power red	Long Term Failure	Reason of failure	Possible failure correction
1117	EGR Control: Positive governor deviation above limit (EGR too high)	AirCtlGovDvtMax	ON	EGR	none	YES direct	Defective air mass flow sensor, leakage in the air duct, electrical or mechanical defect in EGR actuators or defect in wiring of EGR actuators	Check air mass flow sensor, air duct, EGR actuators and their wiring
2117	EGR Control: negative governor deviation below limit (EGR too low)	AirCtlGovDvtMin	ON	EGR	none	YES direct	Defective air mass flow sensor, obstruction or leackage in air duct, electrical or mechanical defect in EGR actuators or defect in wiring of EGR actuators	Check air mass flow sensor, air duct, EGR actuators and their wiring
1317	EGR Control: Positive governor deviation at closed loop above limit (EGR too high)	AirCtlPlausMax	ON	EGR	none	YES direct	Defect in the EGR actuators (EGR valveor Throttle Valve at intake), obstruction or leakage in the intake duct or deviation in the measured air mass (HFM sensor)	Check for errors of the EGR actuators (correct installation, wiring, electrical connectors, jammed actuator), check for obstruction or leakage in the intake duct, check presence of failure related to HFM
2317	EGR Control: negative governor deviation at closed loop below limit (EGR too low)	AirCtlPlausMin	ON	EGR	none	YES direct	Defect in the EGR actuators (EGR valve or Throttle Valve at intake), leakage in the intake duct or deviation in the measured air mass (HFM sensor)	Check for errors of the EGR actuators (correct installation, wiring, electrical connectors, jammed actuator), check for leakage in the intake duct, check presence of failure related to HFM
A627	EGR Valve: Error path for too long time spent in transtion mode Rgn to Nrm	AirCtlRmpTOut	OFF		none	NO	Defect in the EGR actuators (EGR and throttle valve) Calibration error (wrong layout of the open loop EGR control during transition from Regeneration to normal mode)	Check for errors of the EGR actuators (correct installation, wiring, electrical connectors, jammed actuator) Contact Help desk.
1174	Air heater: DFC to SRC High error when heater is Off	AirHt_TstOffHi	OFF		none	NO	Short circuit of wiring to external source or defective air heater	Check wiring, check air heater

DTC	Description	Dfp Name	MIL	OBD System	Power red	Long Term Failure	Reason of failure	Possible failure correction
2174	Air heater: DFC to SRC Low error when heater is Off	AirHt_TstOffLo	OFF		none	NO	Short circuit of wiring to ground or defective air heater	Check wiring, check air heater
1274	Air heater: DFC to SRC High error when heater is On	AirHt_TstOnHi	OFF		none	NO	Short circuit of wiring to external source or defective air heater	Check wiring, check air heater
2274	Air heater: DFC to SRC Low error when heater is On	AirHt_TstOnLo	OFF		none	NO	Short circuit of wiring to ground or defective air heater	Check wiring, check air heater
A174	Air heater: Grid Heater always switched on	AirHtStickOn	OFF		none	NO	Short Circuit to Ground in wiring or Grid Heater	Check wiring and Grid Heater
11C7	Selected Temperature sensor 1 delivering implausible value (check description for detail)	AirTMonPlaus_0	OFF		none	NO	The temperature sensor is drifted	Check temperature sensor
21C7	Selected Temperature sensor 2 delivering implausible value (check description for detail)	AirTMonPlaus_1	OFF		none	NO	The temperature sensor is drifted	Check temperature sensor
31C7	Selected Temperature sensor 3 delivering implausible value (check description for detail)	AirTMonPlaus_2	OFF		none	NO	The temperature sensor is drifted	Check temperature sensor

DTC	Description	Dfp Name	MIL	OBD System	Power red	Long Term Failure	Reason of failure	Possible failure correction
41C7	Selected Temperature sensor 4 delivering implausible value (check description for detail)	AirTMonPlaus_3	OFF		none	NO	The temperature sensor is drifted	Check temperature sensor
51C7	Selected Temperature sensor 5 delivering implausible value (check description for detail)	AirTMonPlaus_4	OFF		none	NO	The temperature sensor is drifted	Check temperature sensor
12C7	Two or more Selected Temperature sensors deliver implausible value s	AirTMonPlausTot	OFF		none	NO	More than one temperature sensor considered for enhanced plausibility check is drifted	Check all involved temperature sensor
119C	ECM problem: EEPROM values for baud rate cannot be read	Appdesc_EEP_ERR_CB	OFF		none	NO	Wrong programming? EEPROM defective?	Reprogram ECM, replace ECM
A187	EGR: Too High NOx emission: Hard limits of the NOx monitoring	ASModHardNOxMon	ON	EGR	none	YES direct	Inaccurate lambda sensor, problem with EGR control or another emission reduction device, problem with injectors (wrong quantity)	Check lambda sensor for accuracy, check injectors, check EGR control and other emission reduction devices
A287	EGR: Too High NOx emission: Soft limits of the NOx monitoring	ASModSoftNOxMon	ON	EGR	none	YES direct	Inaccurate lambda sensor, problem with EGR control or another emission reduction device, problem with injectors (wrong quantity)	Check lambda sensor for accuracy, check injectors, check EGR control and other emission reduction devices
31B1	Exhaust Flap actuator: Engine break active at vehicle stand still	AuxBrkCut	OFF		none	NO	Short circuit in the Exhaust brake request switch (permanent Exhaust brake request) Short circuit in the wiring harness of exhaust brake switch (permanent Exhaust brake request)	Check Exhaust brake switch Check Wiring harness of exhaust brake switch
5242	Auxiliariy Break lamp: No load error for Auxiliary Brake Lamp	AuxBrkLmpOL	OFF		none	NO	Broken or disconnected wiring or defective auxiliary brake lamp	Check of wiring or replacement of auxiliary brake lamp

DTC	Description	Dfp Name	MIL	OBD System	Power red	Long Term Failure	Reason of failure	Possible failure correction
8242	Break lamp: Over temperature error	AuxBrkLmpOvrTemp	OFF		none	NO	High battery voltage, high temperature inside ECU, high load or wiring problem	No reaction needed if failure isn't present after short time, check load and output, check wiring, replace ECU
6242	Auxiliariy Break lamp: Short circuit to battery error for Auxiliary Brake Lamp	AuxBrkLmpSCB	OFF		none	NO	Short circuit of wiring to external source or inside auxiliary break lamp	Check of wiring or replacement of auxiliary break lamp
7242	Auxiliariy Break lamp: Short circuit to ground error for Auxiliary Brake Lamp	AuxBrkLmpSCG	OFF		none	NO	Short circuit of wiring to ground or inside auxiliary break lamp	Check of wiring or replacement of auxiliary break lamp
111D	Battery voltage: SRC high for battery voltage sensor	BattUSRCMax	OFF		none	NO	Alternator voltage governor defect	Replace alternator governor device or alternator
211D	Battery voltage: SRC low for battery voltage sensor	BattUSRCMin	OFF		none	NO	Battery defect, alternator defect, wiring problems (too high resistance) or ECU defect. Occurence possible during cold start.	Replace battery or alternator. Check ECU and wiring.
3131	Brake Actuation: Main and redundant brake switch state different	BrkNpl	OFF		none	NO	- The adjustment of the brake switches is not good enough. - One of the brake switches has a short circuit. - The circuit has an open lead.	- Check the adjustment of the brake switches - Check the brake switches for short circuit - Check the wiring and the brake switches for open lead
4131	Break Actuation: Sig Error for Brake (signal via CAN)	BrkSig	OFF		none	NO	- One of the brake switches has a short circuit. - The circuit has an open lead.	- Check the brake switches for short circuit - Check the wiring and the brake switches for open lead
B51B	CAN Bus: Error passive CAN Bus Node A	BusDiagBusOffErrPasNodeA	OFF		none	NO	Wrong configuration of CAN timing (Prescaler, synchronization jump width, sampling, propagation and phase segments), bad termination resistors, defective network connection and contacts or defective CAN controller with erroneous messages.	Check timing configuration with hardware compatibility, check termination resistors and network connection and contacts. Short circuits to external source, ground or CAN High to Low.Monitor CAN communication for erroneous behaviour of a participant.

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DTC	Description	Dfp Name	MIL	OBD System	Power red	Long Term Failure	Reason of failure	Possible failure correction
B61B	CAN Bus: Error passive CAN Bus Node B	BusDiagBus OffErrPasNodeB	OFF		none	NO	Wrong configuration of CAN timing (Prescaler, synchronization jump width, sampling, propagation and phase segments), bad termination resistors, defective network connection and contacts or defective CAN controller with erroneous messages.	Check timing configuration with hardware compatibility, check termination resistors and network connection and contacts. Short circuits to external source, ground or CAN High to Low.Monitor CAN communication for erroneous behaviour of a participant.
B71B	CAN Bus: Error passive CAN Bus Node C	BusDiagBus OffErrPasNodeC	OFF		none	NO	Wrong configuration of CAN timing (Prescaler, synchronization jump width, sampling, propagation and phase segments), bad termination resistors, defective network connection and contacts or defective CAN controller with erroneous messages.	Check timing configuration with hardware compatibility, check termination resistors and network connection and contacts. Short circuits to external source, ground or CAN High to Low.Monitor CAN communication for erroneous behaviour of a participant.
B81B	CAN Bus: Error passive CAN Bus Node D	BusDiagBus OffErrPasNodeD	OFF		none	NO	Wrong configuration of CAN timing (Prescaler, synchronization jump width, sampling, propagation and phase segments), bad termination resistors, defective network connection and contacts or defective CAN controller with erroneous messages.	Check timing configuration with hardware compatibility, check termination resistors and network connection and contacts. Short circuits to external source, ground or CAN High to Low.Monitor CAN communication for erroneous behaviour of a participant.
B11B	CAN Bus: Error CAN Bus Node A	BusDiagBus OffNodeA	OFF		none	NO	Wrong configuration of CAN timing (Prescaler, synchronization jump width, sampling, propagation and phase segments), bad termination resistors, defective network connection and contacts or defective CAN controller with erroneous messages.	Check timing configuration with hardware compatibility, check termination resistors and network connection and contacts. Short circuits to external source, ground or CAN High to Low.Monitor CAN communication for erroneous behaviour of a participant.
B21B	CAN Bus: Error CAN Bus Node B	BusDiagBus OffNodeB	OFF		none	NO	Wrong configuration of CAN timing (Prescaler, synchronization jump width, sampling, propagation and phase segments), bad termination resistors, defective network connection and contacts or defective CAN controller with erroneous messages.	Check timing configuration with hardware compatibility, check termination resistors and network connection and contacts. Short circuits to external source, ground or CAN High to Low.Monitor CAN communication for erroneous behaviour of a participant.

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DTC	Description	Dfp Name	MIL	OBD System	Power red	Long Term Failure	Reason of failure	Possible failure correction
B31B	CAN Bus: Error CAN Bus Node C	BusDiagBus OffNodeC	OFF		none	NO	Wrong configuration of CAN timing (Prescaler, synchronization jump width, sampling, propagation and phase segments), bad termination resistors, defective network connection and contacts or defective CAN controller with erroneous messages.	Check timing configuration with hardware compatibility, check termination resistors and network connection and contacts. Short circuits to external source, ground or CAN High to Low.Monitor CAN communication for erroneous behaviour of a participant.
B41B	CAN Bus: Error CAN Bus Node D	BusDiagBus OffNodeD	OFF		none	NO	Wrong configuration of CAN timing (Prescaler, synchronization jump width, sampling, propagation and phase segments), bad termination resistors, defective network connection and contacts or defective CAN controller with erroneous messages.	Check timing configuration with hardware compatibility, check termination resistors and network connection and contacts. Short circuits to external source, ground or CAN High to Low.Monitor CAN communication for erroneous behaviour of a participant.
A543	Charge-air cooler: efficiency too low	CACIgEta	ON	Compre hensive	none	NO	Charge air-cooler defective	Check charge-air cooler
B543	Charged air pressure cooler efficiency low	CACPlaus	OFF		none	NO	Charged air cooler efficiency low	Check charged air cooler
3313	Coolant temp sensor: defect fault check for Absolute plausibility test	CEngDsTAb sTst	OFF		none	NO	Very cold ambient conditions and cabine heater(s) on full power (specially if additional heaters using coolant temeprature installed in the vehicle) Additional electrical resistance in the wiring (corroded connector) Inaccurate sensor (although sensor d	Ensure that engine was not running in extreme ambient conditions. Check wiring and connectors (corrosion) Check accuracy of sensor, replacement of sensor Check Thermostate functionality

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DTC	Description	Dfp Name	MIL	OBD System	Power red	Long Term Failure	Reason of failure	Possible failure correction
3413	Coolant temp sensor: defect fault check for dynamic plausibility test	CEngDsTDynTst	OFF		none	NO	Very cold ambient conditions and cabine heater(s) on full power (specially if additional heaters using coolant temperature installed in the vehicle) Additional electrical resistance in the wiring (corroded connector) Inaccurate sensor (although sensor d	Ensure that engine was not running in extreme ambient conditions. Check wiring and connectors (corrosion) Check accuracy of sensor, replacement of sensor Check Thermostate functionality
D113	Diagnostic Fault Check for Physical Signal above maximum limit	CEngDsTPhysRngHi	OFF		none	NO	Sensor defective or wrongly connected	Check sensor and mounting
E113	Diagnostic Fault Check for Physical Signal below minimum limit	CEngDsTPhysRngLo	OFF		none	NO	Sensor defective or wrongly connected	Check sensor and mounting
4213	Coolant temp sensor: Error over CAN for Engine coolant temperature(down stream)	CEngDsTSig	OFF		none	NO	Sensor defect, Problems with CAN	Check Sensor Check CAN Wiring
1113	Coolant temp sensor: SRC High for Engine coolant temperature(down stream)	CEngDsTSRCMax	OFF		none	NO	Sensor defective or short circuit to external source	Check wiring or replace sensor
2113	Coolant temp sensor: SRC low for Engine coolant temperature(down stream)	CEngDsTSRCMin	OFF		none	NO	Sensor defective or short circuit to ground	Check wiring or replace sensor

DTC	Description	Dfp Name	MIL	OBD System	Power red	Long Term Failure	Reason of failure	Possible failure correction
3113	Engine Coolant Temperature: failed plausibility check at ECU start	CEngDsTVDPlaus	OFF		none	NO	Coolant temperature sensor drifted	Check sensor
2523	Coolant pressure: Min error detection for coolant pressure state sensor	CEngPMin	OFF		YES (technical)	NO	Defective pressure switch, defect in wiring (open circuit), leakage in cooling system, defective cooling pump	Check pressure switch and wiring, check entire cooling system for leakages, check cooling pump
3523	Coolant pressure: NPL error detection for coolant pressure state sensor	CEngPPlaus	OFF		none	NO	Defect in wiring (short circuit), defective pressure switch (stuck in closed position)	Check wiring and pressure switch for proper functioning, replace pressure switch sensor
F46C	ECU Internal: Reported SPI and COM-Errors of a Cj945	Cj945SpiCom1	OFF		none	NO	Electric disturbances, internal defect of the ECU leading to a SPI bus communication error	Replace ECU if failure remains present
51C2	Coolant Ctrl Lamp: Indicates No Load Error	ClntTLmpOL	OFF		none	NO	Broken or disconnected wiring or defective Coolant Temperature Warning Lamp	Check of wiring or replacement of Coolant Temperature Warning Lamp
81C2	Coolant Ctrl Lamp Ctrl Lamp: Indicates Over Temperature Error	ClntTLmpOvrTemp	OFF		none	NO	High battery voltage, high temperature inside ECU, high load or wiring problem	No reaction needed if failure isn't present after short time, check load and output, check wiring, replace ECU

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DTC	Description	Dfp Name	MIL	OBD System	Power red	Long Term Failure	Reason of failure	Possible failure correction
61C2	Coolant Ctrl Lamp Ctrl Lamp: Indicates Short Circuit to Battery	ClntTLmpSCB	OFF		none	NO	Short circuit of wiring to external source or inside Coolant Temperature Warning Lamp	Check of wiring or replacement of Coolant Temperature Warning Lamp
71C2	Coolant Ctrl Lamp Ctrl Lamp: Indicates Short Circuit to Ground	ClntTLmpSCG	OFF		none	NO	Short circuit of wiring to ground or inside Coolant Temperature Warning Lamp	Check of wiring or replacement of Coolant Temperature Warning Lamp
3241	Clutch pedal: Plausibility check for Clutch	ClthNpl	OFF		none	NO	Clutch switch defective, wiring broken or short circuit to ground, misuse of vehicle (starting engine with engaged gear or change gear without actuating clutch etc)	Check clutch switch, check wiring
4241	Clutch pedal: Sig Error for Clutch	ClthSig	OFF		none	NO	Clutch switch defective or problem on CAN comunication with cutch switch	Check clutch switch. Check CAN connection
A1A6	Combustion: Combustion of more than 1 cylinder not equlibrated	CmbMonGen	OFF		none	YES potential	non balanced cylinders possibly due to problem of one or more injectors.	try to identify the irregular cylinders by the deviations at failure recognition (snap shot): the 2 extreme cylinders have probably a problem. check regulirity of combustion (idle test or run up test)
11A6	Combustion: Combustion of cylinder no 1 low	CmbMonMax_0	OFF		none	YES potential	injector of cylinder 1 has too low fuel quantity or the cylinder itself is defect (no compression/misfiring)	check regulirity of combustion (idle test or run up test) and replace injector if necessary

DTC	Description	Dfp Name	MIL	OBD System	Power red	Long Term Failure	Reason of failure	Possible failure correction
12A6	Combustion: Combustion of cylinder no 3 low	CmbMonMax_1	OFF		none	YES potential	injector of cylinder 3 has too low fuel quantity or the cylinder itself is defect (no compression)	check regulirity of combustion (idle test or run up test) and replace injector if necessary
13A6	Combustion: Combustion of cylinder no 4 low	CmbMonMax_2	OFF		none	YES potential	injector of cylinder 4 has too low fuel quantity or the cylinder itself is defect (no compression)	check regulirity of combustion (idle test or run up test) and replace injector if necessary
14A6	Combustion: Combustion of cylinder no 2 low	CmbMonMax_3	OFF		none	YES potential	injector of cylinder 2 has too low fuel quantity or the cylinder itself is defect (no compression)	check regulirity of combustion (idle test or run up test) and replace injector if necessary
21A6	Combustion: Combustion of cylinder no 1 too high	CmbMonMin_0	OFF		none	YES potential	injector of cylinder 1 has too high fuel quantity (open locked inejctor)	check regulirity of combustion (idle test or run up test) and replace injector if necessary
22A6	Combustion: Combustion of cylinder no 3 too high	CmbMonMin_1	OFF		none	YES potential	injector of cylinder 3 has too high fuel quantity (open locked inejctor)	check regulirity of combustion (idle test or run up test) and replace injector if necessary
23A6	Combustion: Combustion of cylinder no 4 too high	CmbMonMin_2	OFF		none	YES potential	injector of cylinder 4 has too high fuel quantity (open locked inejctor)	check regulirity of combustion (idle test or run up test) and replace injector if necessary

DTC	Description	Dfp Name	MIL	OBD System	Power red	Long Term Failure	Reason of failure	Possible failure correction
24A6	Combustion: Combustion of cylinder no 2 too high	CmbMonMin_3	OFF		none	YES potential	injector of cylinder 2 has too high fuel quantity (open locked inejctor)	check regulirity of combustion (idle test or run up test) and replace injector if necessary
F11F	Info: Torque Limitation active: Torque limitation caused by turbo charger protection	CoETSBstPrtTrqLim	OFF		none	NO	Active power redcution > 2.00s due to turbo charger protection	No actions necessary due to this failure alone. If powerreduction occurred due to actual defect, the failure triggering the torque limitation should also be in the failure memory. Follow troubleshooting of this root error.
F21F	Info: Torque Limitation active: Torque limitation caused by engine protection	CoETSEngPrtTrqLim	OFF		none	NO	Active power redcution > 2.00s due to engine mechanics protection	No actions necessary due to this failure alone. If powerreduction occurred due to actual defect, the failure triggering the torque limitation should also be in the failure memory. Follow troubleshooting of this root error.
F31F	Info: Torque Limitation active: Torque limitation caused by injection system	CoETSInjSysTrqLim	OFF		none	NO	Active power redcution > 2.00s due to high pressure fuel pump protection	No actions necessary due to this failure alone. If powerreduction occurred due to actual defect, the failure triggering the torque limitation should also be in the failure memory. Follow troubleshooting of this root error.
F41F	Info: Torque Limitation active: Torque limitation caused by engine brake	CoETSNTCTrqLim	OFF		none	NO	Active power redcution > 2.00s due to torque rise limitation after engine brake release.	No actions necessary due to this failure alone. If powerreduction occurred due to actual defect, the failure triggering the torque limitation should also be in the failure memory. Follow troubleshooting of this root error.

DTC	Description	Dfp Name	MIL	OBD System	Power red	Long Term Failure	Reason of failure	Possible failure correction
F51F	Info: Torque Limitation active: Torque limitation caused by particulate filter	CoETSPDiffTrqLim	OFF		none	NO	Active power reduction > 5.00s due to torque limitation for pressure drop limitation over particulate filter.	No actions necessary due to this failure alone. If powerreduction occurred due to actual defect, the failure triggering the torque limitation should also be in the failure memory. Follow troubleshooting of this root error.
F61F	Info: Torque Limitation active: Torque limitation caused by OBD performance limiter	CoETSPrflmTrqLim	OFF		none	NO	Active power reduction due to the OBD performance limiter because of too high NOx emissions	No actions necessary due to this failure alone. If powerreduction occurred due to actual defect, the failure triggering the torque limitation should also be in the failure memory. Follow troubleshooting of this root error.
F71F	Info: Torque Limitation active: Torque limitation caused by SCRCAT protection	CoETSSCRPrtTrqLim	OFF		none	NO	Active power redcution due to excessive temperatures in the SCR catalyst	No actions necessary due to this failure alone. If powerreduction occurred due to actual defect, the failure triggering the torque limitation should also be in the failure memory. Follow troubleshooting of this root error.
F81F	Info: Torque Limitation active: Torque limitation caused by smoke limitation	CoETSSmkTrqLim	OFF		none	NO	Active power redcution due to smoke limitation with unexpected long duration > 5.00s If no other failure stored concerning EGR or Boost pressure control: operation in extreme high altitude (>1800 m, i.e ambient pressure < 780mbar) sticking of VGT or EGR	No actions necessary due to this failure alone. If powerreduction occurred due to actual defect, the failure triggering the torque limitation should also be in the failure memory. Follow troubleshooting of this root error. If no failruie stroed in memory

DTC	Description	Dfp Name	MIL	OBD System	Power red	Long Term Failure	Reason of failure	Possible failure correction
A18B	CAN Bus: Timeout Error of CAN-Transmit-Frame Ambient conditions (AmbCon, barometric pressure, ambient temperature)	ComAmbConTO	OFF		none	NO	Defective CAN Controller within Chassis CAN, CAN Cables disconnected or broken. Short circuit in wiring.	Check the installation and the proper connection of the Engine Control Unit to the CAN vehicle network. Check correct operating conditions of the CAN controller. Check the vehicle wirings.
B48B	CAN Bus: Timeout Error of CAN-Transmit-Frame AT1IMG	ComAT1IMGTO	OFF		none	NO	CAN bus overload, frame could not be send.	Check CAN bus wiring. A defect could cause error frames which lead to high bus load or send the CAN controller to "bus off" state.
A12B	CAN Bus MIL: DFC for MIL LAMP Error	ComBC1MIL	ON	Comprehensive	none	NO	Defective MIL/Body Controller or disturbed CAN communication	Check presence and correct connection of the Body Computer to the network, Check correct functioning of the CAN controller and its voltage supply. Check wiring.
B33A	CAN Bus: Timeout Error of CAN-Receive-Frame CRI1 (Catalyst reagent information)	ComCRI1TO	OFF		none	NO	CAN bus overload or disturbed, frame could not be received.	Check CAN bus wiring. A defect could cause error frames which lead to high bus load or send the CAN controller to "bus off" state.

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DTC	Description	Dfp Name	MIL	OBD System	Power red	Long Term Failure	Reason of failure	Possible failure correction
A1AB	CAN Bus Dash Port: Timeout Error of CAN-Receive-Frame Dashboard (DashDspl: fuel level)	ComDashDsplTO	ON	Comprehensive	none	NO	Defective CAN controller of Vehicle Control Module or Body controller, undervoltage of VCM or Body controller, missing VCM or Body controller, CAN cable connecting the VCM or the Body controller is disconnected or broken. Short circuit in wiring.	Check presence and correct connection of the VCM or Body Controller to the network, Check correct functioning of the VCM or Body Controller CAN controller and its voltage supply. Check wiring.
AA3B	CAN Bus: Timeout Error of CAN-Receive-Frame Electronic Brake Controller (EBC1: ASR,EBS,ABS, Traction control, retarder)1	ComEBC1TO	OFF		none	NO	Defective CAN controller of ABS / ASR / ESP, CAN cable disconnected or broken. Short circuit in wiring.	Check presence and correct connection of the ABS / ASR / ESP to the network, Check correct functioning of the CAN controller. Check wiring.
AC3B	CAN Bus: Timeout Error of CAN-Receive-Frame Wheel Speed Information	ComEBC2TO	OFF		none	NO	Wheel speed frame could not be received. Defect of EBC module. CAN bus overload or disturbed, .	Please check EBC and CAN bus wiring. If CAN bus is disturbed, frames from other modules could possibly also not received.
AE8B	CAN Bus: Active DFC Timeout of EDC to NOx Sensor Dew Point Message (EDC2NOx)	ComEDC2NOxDewPnt	none		none	NO	No failure, Dew pont reached!!	No intervention
AD8B	CAN Bus: Timeout Error of CAN-Transmit-Frame EDC to NOx Sensor (EDC2NOx: Engine operation status, engine speed,Dew point, exhaust temperatures)	ComEDC2NOXTO	ON	Comprehensive	none	YES direct		

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DTC	Description	Dfp Name	MIL	OBD System	Power red	Long Term Failure	Reason of failure	Possible failure correction
B58B	CAN Bus: Timeout Error of CAN-Transmit-Frame EDC to NOx Upstream Sensor (EDC2NOxUS: Engine operation status, engine speed,Dew point, exhaust temperatures)	ComEDC2NOXUSTO	ON	Comprehensive	none	YES direct		
B18B	CAN Bus: Timeout Error of CAN-Transmit-Frame Electronic Engine Control 1 (EEC1: torque informations)	ComEEC1TO	OFF		none	NO	Defective CAN controller, CAN cable disconnected or broken. Short circuit in wiring.	Check the presence and correct connection of the EDC to the network, Check correct functioning of the CAN controller. Check wiring.
B28B	CAN Bus: Timeout Error of CAN-Transmit-Frame Electronic Engine Control 2 (EEC2: accelerator pedal informations)	ComEEC2TO	OFF		none	NO	Defective CAN controller, CAN cable disconnected or broken. Short circuit in wiring.	Check the presence and correct connection of the EDC to the network, Check correct functioning of the CAN controller. Check wiring.
A87B	CAN VTO: Timeout Error of CAN-Receive-Frame Electronic Engine COntrol 2 from vehicle controller (EEC2V: CAN IDs and charactheristics)	ComEEC2VTO	OFF		none	NO	Defective CAN controller of Vehicle controller , undervoltage of VC, missing VC, CAN cable connecting the VC is disconnected or broken. Short circuit in wiring.	Check presence and correct connection of the Vehicle Controller to the network, check correct functioning of the VC CAN controller and its voltage supply. Check wiring.

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DTC	Description	Dfp Name	MIL	OBD System	Power red	Long Term Failure	Reason of failure	Possible failure correction
B38B	CAN Bus: Timeout Error of CAN-Transmit-Frame Electronic Engine Control 3 (EEC3: friction,desired speed, estimated engine parasitic losses)	ComEEC3TO	OFF		none	NO	Defective CAN controller, CAN cable disconnected or broken. Short circuit in wiring.	Check the presence and correct connection of the EDC to the network, Check correct functioning of the CAN controller. Check wiring.
AF8B	CAN Bus: Timeout Error of CAN-Transmit-Frame Electronic Engine Control 5 (EEC5: EGR valve position)	ComEEC5TO	OFF		none	NO	Defective CAN controller, CAN cable disconnected or broken. Short circuit in wiring.	Check the presence and correct connection of the EDC to the network, Check correct functioning of the CAN controller. Check wiring.
B68B	CAN Bus: Timeout Error of CAN-Transmit-Frame EFL_P1 frame (Engine Fluid Level/Pressure)	ComEFL_P1TO	OFF		none	NO	Defective CAN controller, CAN cable disconnected or broken. Short circuit in wiring.	Check the presence and correct connection of the EDC to the network, Check correct functioning of the CAN controller. Check wiring.
A1F7	CAN Bus EGR Rate: Timeout Error of CAN-Receive Frame Engine gas flowrate (EngGsFlowRt: EGR mass rate)	ComEngGsFlowRtTO	OFF		none	NO	EGR mass flow measure sensor connected via CAN is not sending a value because defective or CAN connection defective (wiring)	Check EGR sensor, check CAN wiring

DTC	Description	Dfp Name	MIL	OBD System	Power red	Long Term Failure	Reason of failure	Possible failure correction
11F7	CAN Bus EGR Rate: Open Circuit Error for Exhaust Gas Mass Flow Rate Signal	ComEngGsFlRtHtrMax	OFF		none	NO	EGR air mass flow sensor or wiring defective	Check EGR air mass flow sensor and wiring
21F7	CAN Bus EGR Rate: Short Circuit Error for Exhaust Gas Mass Flow Rate Signal	ComEngGsFlRtHtrMin	OFF		none	NO	EGR air mass flow sensor or wiring defective	Check EGR air mass flow sensor and wiring
31F7	CAN Bus EGR Rate: Not Plausible Error Circuit Error for Exhaust Gas Mass Flow Rate Signal	ComEngGsFlRtHtrNpl	OFF		none	NO	Defective EGR sensor.	Check wiring of EGR sensor and its proper functioning. If necessary replace EGR sensor.
41F7	CAN Bus EGR Rate: Signal Error for Exhaust Gas Mass Flow Rate Signal	ComEngGsFlRtHtrSig	OFF		none	NO	EGR air mass flow sensor or wiring defective	Check EGR air mass flow sensor and wiring

DTC	Description	Dfp Name	MIL	OBD System	Power red	Long Term Failure	Reason of failure	Possible failure correction
A28B	CAN Bus: Timeout Error of CAN-Transmit-Frame Engine Retarder Configuration Broadcast Announce Message (EngRefCfgBAM)	ComEngRetCfgBAMTO	OFF		none	NO		
A38B	CAN Bus: Timeout Error of CAN-Transmit-Frame Engine Retarder Configuration Package (EngRefCfgPAC: retarder parameters)	ComEngRetCfgPACTO	OFF		none	NO		
A2AB	CAN Bus VCM: DFC of Auxiliary Engine Shutdown Switch Message	ComEngShOffBC2EDC2	OFF		engine stop (indirect)	NO		
A53B	CAN Bus: Engine shut off request through CAN	ComEngShOffEBC1	OFF		none	NO	An Engine Shut off request was activated by another another failure	Check failure source for engine shut off (Fid_EngShOff)
A48B	CAN Bus: Timeout Error of CAN-Transmit-Frame ENGTEMP: Engine temperatures (Coolant, Oil,Fuel)	ComEngTempTO	OFF		none	NO	Defective CAN controller, CAN cable disconnected or broken. Short circuit in wiring.	Check the presence and correct connection of the EDC to the network, Check correct functioning of the CAN controller. Check wiring.

DTC	Description	Dfp Name	MIL	OBD System	Power red	Long Term Failure	Reason of failure	Possible failure correction
A76B	CAN Bus: Timeout Error of CAN-Receive-Frame Electronic Transmission Control 1 (ETC1: shift and clutching informations)	ComETC1TO	OFF		none	NO	Defective CAN controller of Gearbox Control Unit , undervoltage of ETC, missing ETC, CAN cable connecting the ETC is disconnected or broken. Short circuit in wiring.	Check presence and correct connection of the ETC to the network, check correct functioning of the ETC CAN controller and its voltage supply. Check wiring.
A86B	CAN Bus: Timeout Error of CAN-Receive-Frame Electronic Transmission Control 2 (ETC2: selected gear, gear ratio)	ComETC2TO	OFF		none	NO	Defective CAN controller of Gearbox Control Unit , undervoltage of ETC, missing ETC, CAN cable connecting the ETC is disconnected or broken. Short circuit in wiring.	Check presence and correct connection of the ETC to the network, check correct functioning of the ETC CAN controller and its voltage supply. Check wiring.
B78B	CAN Bus: Timeout Error of CAN-Transmit-Frame Fuel Consumption message (FIC: total, current cycle)	ComFICTO	OFF		none	NO	Defective CAN controller, CAN cable disconnected or broken. Short circuit in wiring.	Check the presence and correct connection of the EDC to the network, Check correct functioning of the CAN controller. Check wiring.
A58B	CAN Bus: Timeout Error of CAN-Transmit-Frame Fuel economy message (FIEco: fuel rate, instant fuel)	ComFIEcoTO	OFF		none	NO	Defective CAN controller, CAN cable disconnected or broken. Short circuit in wiring.	Check the presence and correct connection of the EDC to the network, Check correct functioning of the CAN controller. Check wiring.

DTC	Description	Dfp Name	MIL	OBD System	Power red	Long Term Failure	Reason of failure	Possible failure correction
A29B	CAN Bus: Timeout Error of CAN-Receive-Frame High Resolution Vehicle Distance (HRVD)	ComHRVDTO	OFF		none	NO	Defective CAN controller of Body Computer , undervoltage of BC missing BC, CAN cable connecting the Body Computerr is disconnected or broken. Short circuit in wiring.	Check presence and correct connection of the Body Computer to the network, Check correct functioning of the BC CAN controller and its voltage supply. Check wiring.
A93B	CAN Bus: Timeout Error of CAN-Receive-Frame High Resolution Wheel Speed Information (HRWS: Fron Axle Left/Right wheel speed)	ComHRWSTO	OFF		YES (technical)	NO	Defective CAN controller of Body Controller or VCM, undervoltage, CAN cable connecting Body Controller or VCM is disconnected or broken. Short circuit in wiring.	Check presence and correct connection of Body Controller or VCM to the network, check CAN controller and its voltage supply. Check wiring.
B88B	CAN Bus: Timeout Error of CAN-Transmit-Frame IC1 (SAE J1939)	ComIC1TO	OFF		none	NO	CAN bus overload, frame could not be send.	Check CAN bus wiring. A defect could cause error frames which lead to high bus load or send the CAN controller to "bus off" state.
146A	CAN NOx Sensor: Open Circuit Error for Nox Sensor	ComNOxSensHtrMax	ON	Comprehensive	none	YES direct	Wiring defect NOx Sensor defect	Check wiring (specially heating wires) Check NOx Sensor
246A	CAN NOx Sensor: Short Circuit Error for Nox Sensor	ComNOxSensHtrMin	ON	Comprehensive	none	YES direct	Wiring harness has short circuit NOx Sensor defect	Check wiring harness Check Sensor
346A	CAN NOx Sensor: NOx Signal out of range	ComNOxSensNpl	ON	Comprehensive	none	YES direct	NOx Sensor defective	Replace NOx sensor

DTC	Description	Dfp Name	MIL	OBD System	Power red	Long Term Failure	Reason of failure	Possible failure correction
156A	CAN NOx Sensor Upstream: Open Circuit Error for Nox Sensor upstream	ComNOxSensUsHtrMax	ON	Comprehensive	none	YES direct	Wiring defect NOx Sensor upstream defect	Check wiring (specially heating wires) Check NOx Sensor Upstream
256A	CAN NOx Sensor Upstream: Short Circuit Error for Nox Sensor upstream	ComNOxSensUsHtrMin	ON	Comprehensive	none	YES direct	Wiring defect NOx Sensor upstream defect	Check wiring (specially heating wires) Check NOx Sensor Upstream
356A	CAN NOx Sensor Upstream: NOx Signal out of range	ComNOxSensUsNpl	ON	Comprehensive	none	YES direct		
A1BB	CAN Bus: Timeout Error of CAN-Receive-Frame Adaptive Cruise Control Vehicle Speed from Radar Interface	ComRxACC1TO	OFF		none	NO	Defective CAN controller of Radar Interface, CAN cable connecting the interface is disconnected or broken. Short circuit in wiring.	Check presence and correct connection of the Radar Interface to the network. Check wiring.
A2BB	CAN Bus: Timeout Error of CAN-Receive-Frame Cruise Control Vehicle Speed from Radar Interface	ComRxCCVSRDUTO	OFF		none	NO	Defective CAN controller of RDU, CAN cable disconnected or broken. Short circuit in wiring.	Check presence and correct connection of the RDU to the network, Check correct functioning of the CAN controller. Check wiring.

DTC	Description	Dfp Name	MIL	OBD System	Power red	Long Term Failure	Reason of failure	Possible failure correction
A5AB	CAN Bus: Timeout Error of CAN-Receive-Frame Cruise Control Vehicle Speed (CCVS: parking brake switch,wheel based vehicle speed, CC status, brake switch, clutch switch, PTO state)	ComRxCCVSTO	OFF		none	NO	Defective CAN controller of Body Computer or Vehicle Control Module , undervoltage of BC or VCM, missing BC or VCM, CAN cable connecting the BC or VCM is disconnected or broken. Short circuit in wiring.	Check presence and correct connection of the BC or VCM to the network, check correct functioning of the BC or VCM CAN controller and its voltage supply. Check wiring.
12E7	CAN Bus: Open Circuit Error for Exhaust Gas temperature Signal	ComRxEngTemp2SensMax	OFF		none	NO	Defective or incorrect functioning of EGR temperature measuring device	Check EGR temperature measuring device for proper functioning
22E7	CAN Bus: Short Circuit Error for Exhaust Gas temperature signal	ComRxEngTemp2SensMin	OFF		none	NO	Defective or incorrect functioning of EGR temperature measuring device	Check EGR temperature measuring device for proper functioning
32E7	CAN Bus: NPL Error Circuit Error for Exhaust Gas Mass Temperature Signal	ComRxEngTemp2SensNpl	OFF		none	NO	Defective or incorrect functioning of EGR temperature measuring device	Check EGR temperature measuring device for proper functioning

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DTC	Description	Dfp Name	MIL	OBD System	Power red	Long Term Failure	Reason of failure	Possible failure correction
42E7	CAN Bus: Sig Error for Exhaust Gas temperature Signal	ComRxEngTemp2SensSig	OFF		none	NO	Defective or incorrect functioning of EGR temperature measuring device	Check EGR temperature measuring device for proper functioning
A2E7	CAN Bus: Timeout Error of CAN-Receive-Frame RxEngTemp2	ComRxEngTemp2TO	OFF		none	NO	Defective CAN controller of EGR Temperature Sensor , undervoltage of EGR Sensor, missing EGR Sensor, CAN cable connecting the EGR Sensor is disconnected or broken. Short circuit in wiring.	Check presence and correct connection of the EGR Sensor to the network, check correct functioning of the EGR Sensor CAN controller and its voltage supply. Check wiring.
A59B	CAN Bus: Timeout error of CAN-Receive-Frame of Vehicle Distance (RxVD)	ComRxVDTO	OFF		none	NO	Defective CAN controller of Body Controller, CAN cable disconnected or broken. Short circuit in wiring.	Check presence and correct connection of Body Controller to the network, Check correct functioning of the CAN controller. Check wiring.
A68B	CAN Bus: Timeout error of CAN-Transmit-Frame Shut Down (ShutDwn)	ComShutDwnTO	OFF		none	NO	Defective CAN Controller within Chassis CAN, CAN Cables disconnected or broken. Short circuit in wiring.	Check the installation and the proper connection of the Engine Control Unit to the CAN vehicle network. Check correct operating conditions of the CAN controller. Check the vehicle wirings.
A49B	CAN Bus: Timeout Error of CAN-Receive-Frame Tachograf (TCO1)	ComTCO1TO	OFF		YES (technical)	NO	Defective CAN controller of Tachograph or Instrument Cluster, CAN cable disconnected or broken. Short circuit in wiring.	Check presence and correct connection of the Tachograph or of the Instrument Cluster to the network, Check correct functioning of the CAN controller. Check wiring.

DTC	Description	Dfp Name	MIL	OBD System	Power red	Long Term Failure	Reason of failure	Possible failure correction
A78B	CAN Bus: Timeout Error of CAN-Transmit-Frame Urea Tank Information (TI1: fostered catalyst tank level; catalyst temperature)	ComTI1TO	OFF		none	NO	Defective CAN Controller within Chassis CAN, CAN Cables disconnected or broken. Short circuit in wiring.	Check the installation and the proper connection of the Engine Control Unit to the CAN vehicle network. Check correct operating conditions of the CAN controller. Check the vehicle wirings.
A3AB	CAN Bus: Timeout Error of CAN-Receive-Frame IVECO proprietary Body Computer to EDC (BC2EDC1)	ComTOBC2EDC1	OFF		none	NO	Defective CAN controller of Body Computer , undervoltage of BC, missing BC, CAN cable connecting the BC is disconnected or broken. Short circuit in wiring.	Check presence and correct connection of the BC to the network, Check correct functioning of the BC CAN controller and its voltage supply. Check wiring.
A6AB	CAN Bus: Timeout Error of CAN-Receive-Frame IVECO proprietary Body Computer to EDC (BC2EDC2)	ComTOBC2EDC2	OFF		none	NO	Defective CAN controller of Body Computer , undervoltage of BC, missing BC, CAN cable connecting the BC is disconnected or broken. Short circuit in wiring.	Check presence and correct connection of the BC to the network, Check correct functioning of the BC CAN controller and its voltage supply. Check wiring.
A88B	CAN Bus: Timeout Error of CAN-Transmit-Frame IVECO proprietary EDC to Body Computer (EDC2BC)	ComTOEDC2BC	OFF		none	NO	Defective CAN controller, CAN cable disconnected or broken. Short circuit in wiring.	Check the presence and correct connection of the EDC to the network, Check correct functioning of the CAN controller. Check wiring.

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DTC	Description	Dfp Name	MIL	OBD System	Power red	Long Term Failure	Reason of failure	Possible failure correction
A98B	CAN Bus: Timeout Error of CAN-Transmit-Frame Electronic Retarder Controller 1 (ERC1)	ComTOERC1	OFF		none	NO	Defective CAN controller, CAN cable disconnected or broken. Short circuit in wiring.	Check the presence and correct connection of the EDC to the network, Check correct functioning of the CAN controller. Check wiring.
ACAB	CAN Bus: Timeout Error of CAN-Receive-Frame MuxInfo from Body Computer for reverse gear lights	ComTOMuxInfo	OFF		none	NO	Defective CAN controller of Body Computer or VCM, CAN cable disconnected or broken. Short circuit in wiring.	Check presence and correct connection of the Body Computer to the network, Check correct functioning of the CAN controller. Check wiring.
A46A	CAN NOx Sensor: Timeout Error of CAN-Receive-Frame NOX sensor (NOxSens: NOX concentration,Lambda function,Oxygen function, sensor status, sensor error)	ComTONOxSens	ON	Comprehensive	none	YES direct	Defective CAN controller of NOx Sensor , undervoltage of NOx Sensor, missing NOx Sensor, CAN cable connecting the NOx Sensor is disconnected or broken. Short circuit in wiring.	Check presence and correct connection of the NOx Sensor to the network, Check correct functioning of the NOx Sensor CAN controller and its voltage supply. Check wiring.
A56A	CAN NOx Sensor Upstream: Timeout Error of CAN-Receive-Frame NOX sensor upstream (NOxSens: NOX concentration,Lambda function,Oxygen function, sensor status, sensor error)	ComTONOxSensUs	ON	Comprehensive	none	YES direct	Defective CAN controller of NOx Sensor Upstream , undervoltage of NOx Sensor, missing NOx Sensor Upstream, CAN cable connecting the NOx Sensor Upstream is disconnected or broken. Short circuit in wiring.	Check presence and correct connection of the NOx Sensor Upstream to the network, Check correct functioning of the NOx Sensor Upstream CAN controller and its voltage supply. Check wiring.

DTC	Description	Dfp Name	MIL	OBD System	Power red	Long Term Failure	Reason of failure	Possible failure correction
A19B	CAN Time Date: Timeout Error of CAN-Receive-Frame Time Date message (TimeDate)	ComTOTimeDate	ON	Comprehensive	none	NO	Defective CAN controller of Tachograph or Instrument Cluster, CAN cable disconnected or broken. Short circuit in wiring.	Check presence and correct connection of the Tachograph or of the Instrument Cluster to the network, Check correct functioning of the CAN controller. Check wiring.
A13B	CAN Bus: Active DFC TimeOut of Torque Speed Control TSC1AE Message	ComTOTSC1AEAct	OFF		none	NO	Defective CAN controller of ABS / ASR / ESP, CAN cable disconnected or broken. Short circuit in wiring.	Check presence and correct connection of the ABS / ASR / ESP to the network, Check correct functioning of the CAN controller. Check wiring.
A23B	CAN Bus: Passive DFC TimeOut of Torque Speed Control TSC1AE Message	ComTOTSC1AEPas	OFF		none	NO	Defective CAN controller of ABS / ASR / ESP, CAN cable disconnected or broken. Short circuit in wiring.	Check presence and correct connection of the ABS / ASR / ESP to the network, Check correct functioning of the CAN controller. Check wiring.
A33B	CAN Bus: Active DFC TimeOut of Torque Speed Control TSC1AR Message	ComTOTSC1ARAct	OFF		none	NO	Defective CAN controller of ABS / ASR / ESP, CAN cable disconnected or broken. Short circuit in wiring.	Check presence and correct connection of the ABS / ASR / ESP to the network, Check correct functioning of the CAN controller. Check wiring.
A43B	CAN Bus: Passive DFC TimeOut of Torque Speed Control TSC1AR Message	ComTOTSC1ARPas	OFF		none	NO	Defective CAN controller of ABS / ASR / ESP, CAN cable disconnected or broken. Short circuit in wiring.	Check presence and correct connection of the ABS / ASR / ESP to the network, Check correct functioning of the CAN controller. Check wiring.

DTC	Description	Dfp Name	MIL	OBD System	Power red	Long Term Failure	Reason of failure	Possible failure correction
A14B	CAN Bus: Passive DFC TimeOut of Torque Speed Control TSC1DE Message	ComTOTSC1DEAct	OFF		none	NO	Defective CAN controller of Driveline Retarder or RDU, CAN cable disconnected or broken. Short circuit in wiring.	Check presence and correct connection of the Driveline Retarder or RDU to the network, Check correct functioning of the CAN controller. Check wiring.
A24B	CAN Bus: Passive DFC TimeOut of Torque Speed Control TSC1DE Message	ComTOTSC1DEPas	OFF		none	NO	Defective CAN controller of Driveline Retarder or RDU, CAN cable disconnected or broken. Short circuit in wiring.	Check presence and correct connection of the Driveline Retarder or RDU to the network, Check correct functioning of the CAN controller. Check wiring.
A34B	CAN Bus: Passive DFC TimeOut of Torque Speed Control TSC1DR Message	ComTOTSC1DRAct	OFF		none	NO	Defective CAN controller of Driveline Retarder or RDU, CAN cable disconnected or broken. Short circuit in wiring.	Check presence and correct connection of the Driveline Retarder or RDU to the network, Check correct functioning of the CAN controller. Check wiring.
A44B	CAN Bus: Passive DFC TimeOut of Torque Speed Control TSC1DR Message	ComTOTSC1DRPas	OFF		none	NO	Defective CAN controller of Driveline Retarder or RDU, CAN cable disconnected or broken. Short circuit in wiring.	Check presence and correct connection of the Driveline Retarder or RDU to the network, Check correct functioning of the CAN controller. Check wiring.
A15B	CAN Bus: Active DFC TimeOut of Torque Speed Control TSC1PE Message	ComTOTSC1PEAct	OFF		none	NO	Defective CAN controller of PTO Controller, CAN cable disconnected or broken. Short circuit in wiring.	Check presence and correct connection of the PTO Controller to the network, Check correct functioning of the CAN controller. Check wiring.
A25B	CAN Bus: Passive DFC TimeOut of Torque Speed Control TSC1PE Message	ComTOTSC1PEPas	OFF		none	NO	Defective CAN controller of PTO Controller, CAN cable disconnected or broken. Short circuit in wiring.	Check presence and correct connection of the PTO Controller to the network, Check correct functioning of the CAN controller. Check wiring.
A16B	CAN Bus: Active Time out for Torque Speed Control TSC1TE message	ComTOTSC1TEAct	OFF		none	NO	Defective CAN controller of Transmission Controller, CAN cable disconnected or broken. Short circuit in wiring.	Check presence and correct connection of the Transmission Controller to the network, Check correct functioning of the CAN controller. Check wiring.

DTC	Description	Dfp Name	MIL	OBD System	Power red	Long Term Failure	Reason of failure	Possible failure correction
A26B	CAN Bus: Passive Time out for Torque Speed Control TSC1TE message	ComTOTSC1TEPas	OFF		none	NO	Defective CAN controller of Transmission Controller, CAN cable disconnected or broken. Short circuit in wiring.	Check presence and correct connection of the Transmission Controller to the network, Check correct functioning of the CAN controller. Check wiring.
A36B	CAN Bus: Active Time out for Torque Speed Control TSC1TR message	ComTOTSC1TRAct	OFF		none	NO	Defective CAN controller of Transmission Controller, CAN cable disconnected or broken. Short circuit in wiring.	Check presence and correct connection of the Transmission Controller to the network, Check correct functioning of the CAN controller. Check wiring.
A46B	CAN Bus: Passive Time out for Torque Speed Control TSC1TR message	ComTOTSC1TRPas	OFF		none	NO	Defective CAN controller of Transmission Controller, CAN cable disconnected or broken. Short circuit in wiring.	Check presence and correct connection of the Transmission Controller to the network, Check correct functioning of the CAN controller. Check wiring.
A17B	CAN Bus: Active Time out for Torque Speed Control TSC1VE message	ComTOTSC1VEAct	OFF		none	NO	Defective CAN controller of Vehicle Controller, CAN cable disconnected or broken. Short circuit in wiring.	Check presence and correct connection of the Vehicle Controller to the network, Check correct functioning of the CAN controller. Check wiring.
A27B	CAN Bus: Passive Time out for Torque Speed Control TSC1VE message	ComTOTSC1VEPas	OFF		none	NO	Defective CAN controller of Vehicle Controller, CAN cable disconnected or broken. Short circuit in wiring.	Check presence and correct connection of the Body Computer to the network, Check correct functioning of the CAN controller. Check wiring.
A37B	CAN Bus: Active Time out for Torque Speed Control TSC1VR message	ComTOTSC1VRAct	OFF		none	NO	Defective CAN controller of Body Computer, CAN cable disconnected or broken. Short circuit in wiring.	Check presence and correct connection of the Body Computer to the network, Check correct functioning of the CAN controller. Check wiring.

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DTC	Description	Dfp Name	MIL	OBD System	Power red	Long Term Failure	Reason of failure	Possible failure correction
A47B	CAN Bus: Passive Time out for Torque Speed Control TSC1VR message	ComTOTSC1VRPas	OFF		none	NO	Defective CAN controller of Body Computer, CAN cable disconnected or broken. Short circuit in wiring.	Check presence and correct connection of the Body Computer to the network, Check correct functioning of the CAN controller. Check wiring.
B98B	CAN Bus: Timeout Error of CAN-Transmit-Frame Cruise Control Vehicle Speed Setup Information (TxCCVS)	ComTOTxCCVS	OFF		none	NO	Defective CAN controller, CAN cable disconnected or broken. Short circuit in wiring.	Check the presence and correct connection of the EDC to the network, Check correct functioning of the CAN controller. Check wiring.
A57B	CAN Bus: Timeout Error of CAN-Receive-Frame Torque Speed Control TSC1VE message	ComTSC1VETO	OFF		none	NO	Defective CAN controller of Tachograph Output , undervoltage of TCO, missing TCO, CAN cable connecting the TCO is disconnected or broken. Short circuit in wiring.	Check presence and correct connection of the TCO to the network, Check correct functioning of the TCO CAN controller and its voltage supply. Check wiring.
A67B	CAN Bus: Timeout Error of CAN-Receive-Frame Torque Speed Control TSC1VR message	ComTSC1VRTO	OFF		none	NO	Defective CAN controller of Tachograph Output , undervoltage of TCO, missing TCO, CAN cable connecting the TCO is disconnected or broken. Short circuit in wiring.	Check presence and correct connection of the TCO to the network, Check correct functioning of the TCO CAN controller and its voltage supply. Check wiring.
A33A	CAN Urea Level: Timeout Error of CAN-Receive-Frame Urea Tank Level (UreaLvl)	ComUreaLvlTO	OFF		none	NO	Defective CAN controller of Urea tank level sensor , CAN cable connecting the sensor is disconnected or broken. Short circuit in wiring.	Check presence and correct connection of the Urea tank level sensor to the network, Check correct functioning of the sensor CAN controller and its voltage supply. Check wiring.

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DTC	Description	Dfp Name	MIL	OBD System	Power red	Long Term Failure	Reason of failure	Possible failure correction
A63B	CAN Bus: Timeout Error of CAN-Receive-Frame Vehicle Dynamic Stability Control 1 (VDC1: VDC Info, Brake light request, Roll Over Prevention active,Yaw Control active)	ComVDC1TO	OFF		none	NO	Defective CAN controller of Vehicle Dynamics Control Unit , undervoltage of VDCU, missing VDCU, CAN cable connecting the VDCU is disconnected or broken. Short circuit in wiring.	Check presence and correct connection of the VDCU to the network, check correct functioning of the VDCU CAN controller and its voltage supply. Check wiring.
A39B	tbd	ComVDTO	OFF		none	NO		
BA8B	CAN Bus: Timeout Error of CAN-Transmit-Frame Vehicle Power (VEP1: battery voltage information)	ComVEP1TO	OFF		none	NO	Defective CAN controller, CAN cable disconnected or broken. Short circuit in wiring.	Check the presence and correct connection of the EDC to the network, Check correct functioning of the CAN controller. Check wiring.
A77B	CAN Bus: Timeout Error of CAN-Receive-Frame Vehicle Control Module to EDC (VM2EDC: low/high Idle, Intermeduiate speed Gov.parameters)	ComVM2EDCTO	OFF		none	NO	Defective CAN controller of Vehicle Control Module , undervoltage of VCM, missing VCM, CAN cable connecting the VCM is disconnected or broken. Short circuit in wiring.	Check presence and correct connection of the VCM to the network, Check correct functioning of the VCM CAN controller and its voltage supply. Check wiring.
F91F	Info: Torque Limitation active: OBD performance limiter is active.	CoVehPrfmLimAct	OFF		none	NO	Active power reduction due to the OBD performance limiter because of too high NOx emissions	Check which failure activated the performance limitation (FID_CoVehPrfmLim%%OBD with %%=11,12,21 or 22) and perform troubleshooting on the basis of this defect. Note: The OBD performance limiter can be disabled with service tester at maximum 3.00- times

DTC	Description	Dfp Name	MIL	OBD System	Power red	Long Term Failure	Reason of failure	Possible failure correction
51D2	Cruise Control Lamp: No load error for powerstage.	CrCLmpOL	OFF		none	NO	Broken or disconnected wiring or defective Cruise Ctrl Lamp	Check of wiring or replacement of Cruise Ctrl Lamp
81D2	Cruise Control Lamp: Over temperature error.	CrCLmpOT	OFF		none	NO	High battery voltage, high temperature inside ECU, high load or wiring problem	No reaction needed if failure isn't present after short time, check load and output, check wiring, replace ECU
61D2	Cruise Control Lamp: Short circuit to battery error for powerstage.	CrCLmpSCB	OFF		none	NO	Short circuit of wiring to external source or inside cruise control lamp	Check of wiring or replacement cruise control lamp
71D2	Cruise Control Lamp: Short circuit to ground error for powerstage.	CrCLmpSC G	OFF		none	NO	Short circuit of wiring to ground or inside cruise control lamp	Check of wiring or replacement cruise control lamp
D1F3	Crankcase differential pressure : Physical signal above upper limit (physical SRC)	CrCsPPhysR ngHi	OFF		none	NO	Inaccurate or defective crankcase differential pressure sensor, defect in the wiring	Check wiring and the accuracy of the crankcase differential pressure sensor and replace it if necessary

DTC	Description	Dfp Name	MIL	OBD System	Power red	Long Term Failure	Reason of failure	Possible failure correction
E1F3	Crankcase differential pressure : Physical signal below lower limit (physical SRC)	CrCsPPhysRngLo	OFF		none	NO	Inaccurate or defective crankcase differential pressure sensor, defect in the wiring	Check wiring and the accuracy of the crankcase differential pressure sensor and replace it if necessary
11F3	Crankcase differential pressure : Signal Range Check high	CrCsPSRCMax	OFF		none	NO	Short circuit of sensor to external source or defective sensor	Check wiring and sensor
21F3	Crankcase differential pressure : Signal Range Check low	CrCsPSRCMin	OFF		none	NO	Short circuit of sensor to ground or defective sensor	Check wiring or replace sensor
A1F3	Crankcase differential pressure value above limit; hose drop of crankcase ventilation	CrCsVDiscIntMnf	OFF		none	NO	Disconnection between blow-by hose and air duct	Check blow-by duct
3291	Cruise control: Irreversible fault path which indicates the invalid combination of cruise control keys pressed	CrCUIIrvrsNpl	OFF		none	NO	Failure in Cruise control module (switches) Failure in wiring harness	Check Cruise control unit Check wiring harness
3391	Cruise control: Reversible fault path which indicates the invalid combination of cruise control keys pressed	CrCUIRvrsNpl	OFF		none	NO	Failure in Cruise control module (switches) Failure in wiring harness	Check Cruise control unit Check wiring harness

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DTC	Description	Dfp Name	MIL	OBD System	Power red	Long Term Failure	Reason of failure	Possible failure correction
A313	Coolant temp sensor: DFC-ID of CtT to be used with DSM	CtT	OFF		none	NO	Coolant temperature sensors does not measure correct values or Thermostat does not close correctly (engine remains too cold for a too long time)	Check fucntionality of Thermostat Check functionality of Coolant temperature sensor
F36C	ECU Internal: SPI/COM-Errors of the Cy320	Cy320SpiCom	OFF		none	NO	ECM internal failure	Replace ECM
114F	Battery voltage: Powerstage diagnosis could be disabled due to high Battery voltage	DevLibBattUHi	OFF		none	NO	Power supply is to high --> possibly external power supply connected (battery charger??) or internal failure of ECU (wrong measurement of supply voltage)	Check battery status and voltage level,Disconnect external device if connected or replace ECU if no supply problem is found.
214F	Battery voltage: Powerstage diagnosis could be disabled due to low Battery voltage	DevLibBattULo	OFF		none	NO	Too low battery voltage, possible also during engine cranking (possibly in cold conditrion), too low measurement of battery voltage possibly due to corroded contacts or wiring harness	Chech battery state (charge state). Check connectors and wiring harness to corrosion and/or too high electrical resistance

DTC	Description	Dfp Name	MIL	OBD System	Power red	Long Term Failure	Reason of failure	Possible failure correction
FFFF	No description available	DSMDummy	none		none	NO		
A15A	SCR Control: Catalyst ageing limit exceeded	DStgyAge	OFF		none	YES potential	Catalyst aged due to the use at higher temperature than expected (>> 700°C).	Check, if the SCR efficiency has really droped downs (drive at ~constant vehicle speed with CAt Temperature ~300 to 400°C and check, if demanded NOx can be reached (with NOx sensor reading) and the Closed loop controller factor within0.7 to 1.3). If OK, r
A1EA	SCR Control: Closed loop contribution outside tolerance range	DStgyCLCtrl NH3Corr	ON	Compre hensive	none	YES potential	Reagent with deviating UREA concentration Reagent injection deviating Wrong NOx measurement Engine NOx raw emissions deviating from expected (humidity sensor measures wrong, injection timing deviating, fuel pressure sensor deviating...)	Check Reagent, if correct concentration Check Dosing quantity of SCR system Check if engine raw emissions are OK (e.g. drive vehicle at constant speed without Reagent injection and compare measured with estimated NOx with tester), if not check: Check NO
A25A	SCR Control: Too high efficiency of the catalyst system	DStgyHiEff	OFF		none	NO	Reagent with too high UREA concentration (>>32%) Too high Reagent injection Wrong NOx measurement (NOx Sensor measures too low values) Engine NOx raw emissions lower than epxected (humidity sensor measures too dry air, injection timing retarded, fuel p	Check Reagent, if correct concentration Check Dosing quantity of SCR system Check if engine raw emissions are OK (e.g. drive vehicle at constant speed without Reagent injection and compare measured with estimated NOx with tester), if not check: Check NO
A2EA	NOx sensing: NOx sensor lambda measure deviating from LSU sensor measure	DStgyLambd aRecMon	ON	Compre hensive	none	YES direct	Lambda sensor or NOx sensor measurement deviating	If no LSU failures present NOx sensor probably defective. If also NOx plausibility failure is present NOx sensor defective, replace NOx sensor

DTC	Description	Dfp Name	MIL	OBD System	Power red	Long Term Failure	Reason of failure	Possible failure correction
A35A	SCR Control: NH3 slip DFC	DStgyNH3Sl ip	OFF		none	NO	Reagent with too high UREA concentration (>>32%) Too high Reagent injection Wrong NOx measurement (NOx Sensor measures too high values) Engine NOx raw emissions lower than epxected (humidity sensor measures too dry air, injection timing retarded, fuel	Check Reagent, if correct concentration Check Dosing quantity of SCR system Check if engine raw emissions are OK (e.g. drive vehicle at constant speed without Reagent injection and compare measured with estimated NOx with tester), if not check: Check NO
A16A	NOx Sensing: Drift error of NOx sensor value	DStgyNOxD rft	ON	Exhaust Gas Sensor	none	YES direct	NOx Sensor dos not measure correctly Continuous NH3 slip (in this case possibly also failure NOxLvl1 or NOxLv2 active!)	Check NOx sensor: drive and measure NOx Sensor signal - must indicate < 30.00ppm each time engine is in overrun. If not, disable Reagent dosing and repeat test: - If NOx concentration still > 30.00ppm in overrun phase -> NOx sensor defect --> replace it.
A17A	Too High NOx Emissions: Catalyst efficiency lower than first NOx production threshold level	DStgyNOxL vl1	ON	Exhaust Gas Sensor	none	YES direct	Reagent with too low UREA concentration (<<32%) Too low or no Reagent injection Wrong NOx measurement (NOx Sensor measures too high values) Engine NOx raw emissions higher than epxected (humidity sensor measures too humid air, injection timing anticip	Check Reagent, if correct concentration Check Dosing quantity of SCR system Check if engine raw emissions are OK (e.g. drive vehicle at constant speed without Reagent injection and compare measured with estimated NOx with tester), if not check: NOx Sens
A27A	Too High NOx Emissions: Catalyst efficiency lower than second NOx production threshold level	DStgyNOxL vl2	ON	Exhaust Gas Sensor	none	YES direct	Reagent with too low UREA concentration (<<32%) Too low or no Reagent injection Wrong NOx measurement (NOx Sensor measures too high values) Engine NOx raw emissions higher than epxected (humidity sensor measures too humid air, injection timing anticip	Check Reagent, if correct concentration Check Dosing quantity of SCR system Check if engine raw emissions are OK (e.g. drive vehicle at constant speed without Reagent injection and compare measured with estimated NOx with tester), if not check: NOx Sens

DTC	Description	Dfp Name	MIL	OBD System	Power red	Long Term Failure	Reason of failure	Possible failure correction
316A	NOx Sensing: Plausibility error of NOx sensor value	DStgyNOxPlaus	OFF	Exhaust Gas Sensor	none	YES direct	NOx Sensor dos not measure correctly Engine NOx raw emissions different from expected (humidity sensor measures wrong humidty, injection timing not correct, fuel pressure sensor measures wrong fuel pressure...)	Check if engine raw emissions are OK (e.g. drive vehicle at constant speed without Reagent injection and compare measured with estimated NOx with tester), if not check: NOx Sensor Humidity Sensor Fuel pressure sensor Injection timing Note for EURO OBD ap
322A	SCR Temp monitoring: Dynamic plausibility error	DStgyPlausDyn	OFF	NOx Aftertreatment	none	YES direct	One of the SCR Temperature sensors defective One of the SCR Temperature sensors with corroded connector or defect wiring harness One of both SCR Temperature sensors not mounted correctly (e.g. not in exhaust flow due to mounting problems) Temperature i	Check the SCR temperature sensors for correct mounting (sensor in exhaust flow, not covered by insulation of SCR housing etc...), correct connectors (no corrosion) and wiring (correct insulation, not broken). Check temperature sensors and replace them if
332A	SCR Temp monitoring: Plausibility temperature monitoring when with ambient or catalyst temperatures	DStgyPlausTempBoth	OFF	NOx Aftertreatment	none	YES direct	AmbientTemperature sensor (in humidity sensor) defective. Both, before and after SCR temperature sensors defective. Vehicle "shifted" into "heated" room after long stand still in cold ambient.	Check temperature sensor in humidity sensor. Check temperature sensors before and after SCR. Check, if "special ambient conditions" (vehicle shifted from cold ambeint to heated room without engine start) could have caused the problem.

DTC	Description	Dfp Name	MIL	OBD System	Power red	Long Term Failure	Reason of failure	Possible failure correction
342A	SCR Temp monitoring: Plausibility temperature monitoring with down stream temperature	DStgyPlausTempDs	OFF	NOx Aftertreatment	none	YES direct	Temperature sensor after SCR defective. Exhaust system at "sunshine", rest of the system in "cold shadow" for a longer time. Temperature sensor before SCR defective. Ambient temperature sensor defective.	Check Temperature sensor after SCR. Check temperature sensor before SCR. Check temperature sensor in humidity sensor. Check, if "special ambient conditions" (as sunshine at temperature after SCR) could have caused the problem.
352A	SCR Temp monitoring: Plausibility temperature monitoring when with up stream temperature	DStgyPlausTempUs	OFF	NOx Aftertreatment	none	YES direct	Temperature sensor before SCR defective. Exhaust system at "sunshine", rest of the system in "cold shadow" for a longer time. Temperature sensor after SCR defective. Ambient temperature sensor defective.	Check Temperature sensor after SCR. Check temperature sensor before SCR. Check temperature sensor in humidity sensor. Check, if "special ambient conditions" (as sunshine at temperature after SCR) could have caused the problem.
A12A	SCR Temp Sensing: Catalyst present monitoring	DStgyPrs	OFF		none	YES potential	SCR Catalyst dismounted. Temperature sensors before-after SCR interchanged.	Check if SCR not dismounted (i.e. not empty housing) Check if SCR temperature sensors are connected correctly (not interchanged)
A22A	SCR Control: State monitoring of the SCR system	DStgySCRState	OFF	NOx Aftertreatment	none	YES direct	Heating system not working. Wrong temperature measurement of Reagent tank or Reagent pump temperature (too low temp measurement) No pressure built up possible in Reagent dosing pump (e.g. leakage in suction line, no Reagent in tank, Pump defect)	Check if reagent available. Check reagent heating system (not necessary, if failure occured at ambient temperature > 0°C and reagent tank temperature > 0°C when failrue occurred) Check Temperature sensors in Reagent tank and/or reagent pump for correct

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DTC	Description	Dfp Name	MIL	OBD System	Power red	Long Term Failure	Reason of failure	Possible failure correction
B13A	SCR Reagent Qualtity: Urea conductivity error	DStgyUrCnd	OFF	NOx Aftertreatment	none	YES potential	Sensor defect. Wiring harness defect. Wrong reagent liquid.	Check UREA qualtity sensor Checke wiring harness. Check Reagent liquid.
C13A	SCR Reagent Qualtity: Urea quality error	DStgyUrQl	OFF	NOx Aftertreatment	none	YES potential	If also failure "DStgyUrCnd" stored: sensor or wiring harness defect. reagent liquid out of specification.	If also failure "DStgyUrCnd" stored: check sensor. Check Reagent quality, should be ~32% (between 10.00% and 100.00%)
A13A	SCR Reagent Level Sensing: Urea level tank error	DStgyUTnkLvl	OFF	NOx Aftertreatment	none	NO	Level sensor defect Wiring harness defect	Check Sensor. Check wiring harness.
3231	Break Actuation: Engine break preselection not plausible	EBrkPreSelPlaus	OFF		none	NO	- One of the preselection switches or the wiring has a short circuit.	- Check the switches for short circuit.
4194	Engine compartment button: stop button pressed too long	ECBtnStopSig	OFF		none	NO	Engine compartment button stuck in pressed position	Check stop button.
4294	Engine compartment button: start button pressed too long	ECBtnStrtSig	OFF		none	NO	Engine compartment button stuck in pressed position	Check start button.

DTC	Description	Dfp Name	MIL	OBD System	Power red	Long Term Failure	Reason of failure	Possible failure correction
5177	EGR Valve: No load error on power stage for EGR Cooling Valve Bypass Actuator	ECBVlvOL	ON	EGR	none	YES direct	Broken or disconnected wiring or defective EGR Cooling Bypass Valve Actuator	Check of wiring replace EGR Cooling Bypass Valve Actuator
8177	EGR Valve: Over temperature error on powerstage for EGR cooler bypass valve	ECBVlvOvrTemp	OFF		none	YES potential	High battery voltage, high temperature inside ECU, high load or wiring problem or actuator defective	Check battery voltage, wiring, power stage and actuator
1197	EGR Valve: Physical Signal for EGR Cooling Valve Bypass Actuator above maximum limit	ECBVlvPhysRngHi	OFF		none	NO	Inaccurate or defective position sensor, or defect in the wiring of the sensor	Check wiring and the accuracy of the position sensor and replace it if necessary
2197	EGR Valve: Physical Signal for EGR Cooling Valve Bypass Actuator below minimum limit	ECBVlvPhysRngLo	OFF		none	NO	Inaccurate or defective position sensor, or defect in the wiring of the sensor	Check wiring and the accuracy of the position sensor and replace it if necessary
6177	EGR Valve: Short circuit to battery error on power stage for EGR Cooling Valve Bypass Actuator	ECBVlvSCB	ON	EGR	none	YES direct	Short circuit of wiring to external source or defective EGR Cooling Bypass Valve Actuator	Check of wiring or replace EGR Cooling Bypass Valve Actuator
7177	EGR Valve: Short circuit to ground error on power stage for EGR Cooling Valve Bypass Actuator	ECBVlvSCG	ON	EGR	none	YES direct	Short circuit of wiring to ground or defective EGR Cooling Bypass Valve Actuator	Check of wiring or replace EGR Cooling Bypass Valve Actuator

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DTC	Description	Dfp Name	MIL	OBD System	Power red	Long Term Failure	Reason of failure	Possible failure correction
1177	EGR Valve: Fault check SRC Max error of ECBVlv position sensor	ECBVlvSRC Max	OFF		none	YES potential	Short circuit of wiring to external source or defective position sensor	Check wiring harness or replace sensor
2177	EGR Valve: Fault check SRC Min error of ECBVlv position sensor	ECBVlvSRC Min	OFF		none	YES potential	Short circuite at wiring harness or inside the EGR Cooling Bypass Valve position sensor to ground or open circuit	Check of wiring or replace EGR Cooling Bypass Valve position sensor
A14D	ECU EEPROM: EEP Read Error based on the error for more blocks	EEPEraseErr	OFF		none	NO	Wrong programming/flashing of the ECM, internal defect of the ECM.	Try to flash the ECM correctly with a proper dataset, if defect persists: replace ECM.
A24D	ECU EEPROM: EEP Read Error based on the error for more blocks	EEPRdErr	OFF		none	NO	Wrong programming/flashing of the ECM, internal defect of the ECM.	Try to flash the ECM correctly with a proper dataset, if defect persists: replace ECM.
A34D	ECU EEPROM: EEP Write Error based on the error for one block	EEPWrErr	OFF		none	NO	Wrong programming/flashing of the ECM, internal defect of the ECM.	Try to flash the ECM correctly with a proper dataset, if defect persists: replace ECM.
3417	EGR cooler or Charged air pressure cooler efficiency low	EGRCACPlaus	ON	EGR	none	YES potential	EGR cooler or charged air cooler efficiency low (error can not be localised clearly)	Check EGR cooler and charged air cooler
31A7	EGR cooler: Cooler efficiency low	EGRClgMon	ON	EGR	none	YES potential	EGR cooler efficiency low	Check EGR cooler

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DTC	Description	Dfp Name	MIL	OBD System	Power red	Long Term Failure	Reason of failure	Possible failure correction
32A7	EGR Valve: EGR cooler bypass clogged	EGRClgMonVlv	OFF		none	NO	EGR cooler clogged, bypass valve stuck	Check EGR cooler bypass valve
33A7	EGR cooler: Cooler efficiency low	EGRClrPlaus	ON	EGR	none	YES potential	EGR cooler efficiency low	Check EGR cooler
2517	Info: EGR shut off for intercooler or EGR cooler efficency test	EGROff	OFF		none	NO	Only information path, no intervention required	No intervention required
B527	EGR Valve: Current limited	EGRVlvCurrLim	OFF		none	NO	EGR Valve actuation current is higher than allowed to reach the desired position: possibly electrical problem inside EGR Valve actuator or wiring harness ("short" circuit) or mechanical sticking of valve	Check EGR valve electric circuit Check mechanical EGR valve functionality
B427	EGR Valve: DFC for valve drift at closed position	EGRVlvDrftClsd	ON	EGR	none	YES direct	EGR valve does not fully close: EGR valve blocked mechanically Dirt on the valve seat EGR valve position sensor mismatched	Check Thightness of EGR valve and the corresponding position
C427	EGR Valve: DFC for valve drift at open position	EGRVlvDrftOpn	ON	EGR	none	YES direct	EGR valve does not fully open: EGR valve blocked mechanically EGR valve sticks EGR valve position sensor mismatched	Check Functionality of EGR valve and the corresponding position

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DTC	Description	Dfp Name	MIL	OBD System	Power red	Long Term Failure	Reason of failure	Possible failure correction
3197	EGR Valve: Drifting detected	EGRVlvDrftRng	OFF		none	NO	EGR valve does not fully open: EGR valve blocked mechanically EGR valve sticks EGR valve position sensor mismatched	Check Functionality of EGR valve and the corresponding position
4127	EGR Valve: Cold Start	EGRVlvGovDvtCld	ON		none	YES potential	Desired EGR valve position can not be reached at cold status EGR valve forzen EGR valve sticks EGR valve position sensor mismatched	No action needed, as long as failure "jammed valve is not detected"
1127	EGR Valve: Position deviation above maximum positive limit detected (too high EGR)	EGRVlvGovDvtMax	OFF		none	YES potential	Desired EGR valve position can not be reached EGR valve sticks EGR valve position sensor mismatched	No action needed, as long as failure "jammed valve is not detected"
2127	EGR Valve: Position deviation below maximum negative limit detected (too low EGR)	EGRVlvGovDvtMin	OFF		none	YES potential	Desired EGR valve position can not be reached EGR valve sticks EGR valve position sensor mismatched	No action needed, as long as failure "jammed valve is not detected"
5127	EGR Valve: Open load of H-Bridge	EGRVlvHBrgOpnLd	ON	EGR	none	YES direct	Electrical problem of the EGR valve actuator: broken wiring harness, no contact of conector, internal broken line in actuator	Check wiring harnes on open circuit Check EGR valve actuator on open circuit

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DTC	Description	Dfp Name	MIL	OBD System	Power red	Long Term Failure	Reason of failure	Possible failure correction
1227	EGR Valve: Over current of H-Bridge	EGRVlvHBrg OvrCurr	ON	EGR	none	YES direct	Electrical problem of the EGR valve actuator: "short circuit" in wiring harness or internal "short circuit" in actuator	Check wiring harnes on partial short circuit Check EGR valve actuator on partial short circuit
8127	EGR Valve: Over temperature of H-bridge	EGRVlvHBrg OvrTemp	ON	EGR	none	YES direct	High battery voltage, high temperature inside ECU, high load or wiring problem	No reaction needed if failure isn't present after short time, check load and output, check wiring, replace ECU
6127	EGR Valve: Short circuit to battery on Out1 of H-bridge	EGRVlvHBrg ShCirBatt1	ON	EGR	none	YES direct	Short circuit of wiring to external source	Check of wiring
6227	EGR Valve: Short circuit to battery on Out2 of H-bridge	EGRVlvHBrg ShCirBatt2	ON	EGR	none	YES direct	Short circuit of wiring to external source	Check of wiring
7127	EGR Valve: Short circuit to ground on Out1 of H-bridge	EGRVlvHBrg ShCirGnd1	ON	EGR	none	YES direct	Short circuit of wiring to ground	Check of wiring

DTC	Description	Dfp Name	MIL	OBD System	Power red	Long Term Failure	Reason of failure	Possible failure correction
7227	EGR Valve: Short circuit to ground on Out2 of H-bridge	EGRVlvHBrgShCirGnd2	ON	EGR	none	YES direct	Short circuit of wiring to ground	Check of wiring
7327	EGR Valve: Short circuit over load of H-bridge	EGRVlvHBrgShCirOvrLd	ON	EGR	none	YES direct	Short circuit of wiring	Check of wiring
8227	EGR Valve: Temperature dependent over current of H-bridge	EGRVlvHBrgTempOvrCurr	ON	EGR	none	YES direct	Electrical problem of the EGR Valve actuator: "short circuit" in wiring harness, internal "short circuit" in actuator	Check wiring harnes on partial short circuit Check EGR Valve actuator on partial short circuit
7427	EGR Valve: Under voltage of H-bridge	EGRVlvHBrgUndrVltg	ON	EGR	none	YES direct	Too high Voltage fluctuations in system internal failure of ECU	Check electrical system of vehicle Replace ECU
A227	EGR Valve: Jammed valve in closed state	EGRVlvJamVlvClsd	ON	EGR	none	YES direct	EGR valve can not be opened as desired within expected time EGR valve blocked mechanically EGR valve sticks EGR valve position sensor mismatched	Check Functionality of EGR valve and the corresponding position

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DTC	Description	Dfp Name	MIL	OBD System	Power red	Long Term Failure	Reason of failure	Possible failure correction
B227	EGR Valve: Jammed valve in open state	EGRVlvJamVlvOpn	ON	EGR	none	YES direct	EGR valve can not be closed as desired within expected time EGR valve blocked mechanically EGR valve sticks EGR valve position sensor mismatched	Check Functionality of EGR valve and the corresponding position
1427	EGR Valve: valve position sensor physical SRC high	EGRVlvPhysSRCMax	ON	EGR	none	YES direct	EGR valve position sensor gives higher values than maximum due:to electrical problems ("short circuit") or position sensor mismatch	Check wiring harness Check EGR valve position sensor electrically Check correct position in closed (0%) and fully opened (100%) position
2427	EGR Valve: valve position sensor physical SRC low	EGRVlvPhysSRCMin	ON	EGR	none	YES direct	EGR valve position sensor gives lower values than minimum due to electrical problems ("short circuit") or position sensor mismatch	Check wiring harness Check EGR valve position sensor electrically Check correct position in closed (0%) and fully opened (100%) position
1327	EGR Valve: SRC high for valve position sensor voltage	EGRVlvSRCMax	ON	EGR	none	YES direct	Short circuit of wiring to external source or defective EGR valve position sensor	Check of wiring or replace EGR valve postion sensor
2327	EGR Valve: SRC low for valve position sensor voltage	EGRVlvSRCMin	ON	EGR	none	YES direct	Short circuit of wiring to ground or defective EGR valve position sensor	Check of wiring or replace EGR valve postion sensor
B127	EGR Valve: loose connection or sticking valve	EGRVlvTmpErr	OFF		none	NO	Electrical problem in EGR valve (loose connection) or sticking flap	Check EGR valve, check electrical connection

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DTC	Description	Dfp Name	MIL	OBD System	Power red	Long Term Failure	Reason of failure	Possible failure correction
A45A	SCR NOx calculation: multi signal defects in NOx estimation	EGTCondNOxEst	OFF		none	YES potential	see leading failure (failure also stored in memory, which activates Fld_EGTCondGsCnstn)	see failure stored in memory, which activated Fld_EGTCondGsCnstn
A15D	ECU internal Check: Injection cut off demand (ICO) for shut off coordinator	EngICO	OFF		engine stop (indirect)	NO	Another failure requested engine speed limitation. This failure path should always appear in failure memory with with another lead failure from ECM monitoring level (level 2)	No action, this is only an information path
A164	Engine Overspeed: Overspeed detection in component engine protection	EngPrtOvrSpd	OFF		none	NO	Engine overspeed has occurred	No reactions necessary only if this fault/information status reoccurs frequently. In this case check driving conditions of vehicle, engine speed acquisition and injection system for quantity setpoint and actual value during fault recognition, check also f
A454	Engine speed sensing: Indicates if a Two Mass Flywheel resonance shutoff condition is active	EngPrtTMFWShOff	OFF		none	NO	Engine stalled by driver mishap.	No intervention necessary

DTC	Description	Dfp Name	MIL	OBD System	Power red	Long Term Failure	Reason of failure	Possible failure correction
51A2	Engine speed signal output: No load error on the engine speed output power stage	EngSpdOL	OFF		none	NO	Broken or disconnected wiring or defective tachometer	Check of wiring or replace tachometer
81A2	DFC for OvrTemp error on the PWM output powerstage for engine speed output.	EngSpdOvrTemp	OFF		none	NO	High battery voltage, high load and high ECU temperature, defective wiring, Tachometer or ECU	Check load and output, check wiring, replace Tachometer or ECU
61A2	Engine speed signal output: Short circuit to battery error on the engine speed output power stage	EngSpdSCB	OFF		none	NO	Short circuit of wiring to external source or defective engine speed limiter	Check of wiring or replace tachometer
71A2	Engine speed signal output: Short circuit to ground error on the engine speed output power stage	EngSpdSCG	OFF		none	NO	Short circuit of wiring to ground or defective tachometer	Check of wiring or replace tachometer

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DTC	Description	Dfp Name	MIL	OBD System	Power red	Long Term Failure	Reason of failure	Possible failure correction
1139	Oxicat Temp Monitoring: Diagnostic Fault Check for enhanced SRC-Max of First exhaust gas temperature	EnhSRCMax T1ExhTMon	OFF		none	NO	Exhaust Temperature Sensor at exhaust collector inlet measures wrong values	Check wiring and connectors for correct contact (corrosion). Check sensor and replace it if necessary
1239	DPF Temp montioring: Diagnostic Fault Check for enhanced SRC-Max of Second exhaust gas temperature	EnhSRCMax T2ExhTMon	OFF		none	NO	Exhaust Temperature Sensor before EGR exit measures wrong values	Check wiring and connectors for correct contact (corrosion). Check sensor and replace it if necessary
172A	SCR Temp monitoring: Diagnostic Fault Check for enhanced SRC-Max of third exhaust gas temperature	EnhSRCMax T3ExhTMon	ON	NOx Aftertrea tment	none	YES direct	Exhaust Temperature Sensor before DPF measures wrong values	Check wiring and connectors for correct contact (corrosion). Check sensor and replace it if necessary
192A	Exhaust Temp monitoring: Diagnostic Fault Check for enhanced SRC-Max of Fourth exhaust gas temperature	EnhSRCMax T4ExhTMon	ON	NOx Aftertrea tment	none	YES direct	Exhaust Temperature Sensor after DPF measures wrong values	Check wiring and connectors for correct contact (corrosion). Check sensor and replace it if necessary

DTC	Description	Dfp Name	MIL	OBD System	Power red	Long Term Failure	Reason of failure	Possible failure correction
1339	Exhaust Temp monitoring: Diagnostic Fault Check for enhanced SRC-Max of fifth exhaust gas temperature	EnhSRCMax T5ExhTMon	OFF		none	NO	Exhaust Temperature Sensor after turbine measures wrong values	Check wiring and connectors for correct contact (corrosion). Check sensor and replace it if necessary
1A2A	Exhaust Temp monitoring: Diagnostic Fault Check for enhanced SRC-Max of sixth exhaust gas temperature	EnhSRCMax T6ExhTMon	ON	NOx Aftertrea tment	none	YES direct	Exhaust Temperature Sensor after turbine measures wrong values	Check wiring and connectors for correct contact (corrosion). Check sensor and replace it if necessary
2139	Oxicat Temp Monitoring: Diagnostic Fault Check for enhanced SRC-Min of First exhaust gas temperature	EnhSRCMin T1ExhTMon	OFF		none	NO	Exhaust Temperature Sensor at exhaust collector inlet measures wrong values	Check wiring and connectors for correct contact (corrosion). Check sensor and replace it if necessary
2239	DPF Temp montioring: Diagnostic Fault Check for enhanced SRC-Min of Second exhaust gas temperature	EnhSRCMin T2ExhTMon	OFF		none	NO	Exhaust Temperature Sensor before EGR exit measures wrong values	Check wiring and connectors for correct contact (corrosion). Check sensor and replace it if necessary

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DTC	Description	Dfp Name	MIL	OBD System	Power red	Long Term Failure	Reason of failure	Possible failure correction
272A	SCR Temp monitoring: Diagnostic Fault Check for enhanced SRC-Min of third exhaust gas temperature	EnhSRCMin T3ExhTMon	ON	NOx Aftertrea tment	none	YES direct	Exhaust Temperature Sensor before DPF measures wrong values	Check wiring and connectors for correct contact (corrosion). Check sensor and replace it if necessary
292A	Exhaust Temp monitoring: Diagnostic Fault Check for enhanced SRC-Min of Fourth exhaust gas temperature	EnhSRCMin T4ExhTMon	ON	NOx Aftertrea tment	none	YES direct	Exhaust Temperature Sensor after DPF measures wrong values	Check wiring and connectors for correct contact (corrosion). Check sensor and replace it if necessary
2339	Exhaust Temp monitoring: Diagnostic Fault Check for enhanced SRC-Min of fifth exhaust gas temperature	EnhSRCMin T5ExhTMon	OFF		none	NO	Exhaust Temperature Sensor after turbine measures wrong values	Check wiring and connectors for correct contact (corrosion). Check sensor and replace it if necessary
2A2A	Exhaust Temp monitoring: Diagnostic Fault Check for enhanced SRC-Min of sixth exhaust gas temperature	EnhSRCMin T6ExhTMon	ON	NOx Aftertrea tment	none	YES direct	Exhaust Temperature Sensor after turbine measures wrong values	Check wiring and connectors for correct contact (corrosion). Check sensor and replace it if necessary

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DTC	Description	Dfp Name	MIL	OBD System	Power red	Long Term Failure	Reason of failure	Possible failure correction
D193	Ambient pressure sensor: Physical Signal above maximum limit	EnvPPhysRng Hi	OFF		none	NO	Ambient pressure sensor inside ECU is defect	Replace ECU
E193	Ambient pressure sensor: Physical Signal below minimum limit	EnvPPhysRng Lo	ON	Compre hensive	none	YES potential	Ambient pressure sensor inside ECU is defect	Replace ECU
4193	Ambient pressure sensor: CAN message reports a defect	EnvPSig	OFF		none	NO	Ambient pressure sensor is defect	Check sensor and replace it if necessary
1193	Ambient pressure sensor: SRC High for Environment Pressure	EnvPSRCMa x	OFF		none	NO	Ambient pressure sensor inside ECU is defect	Replace ECU
2193	Ambient pressure sensor: SRC low for Environment Pressure	EnvPSRCMin	OFF		none	NO	Ambient pressure sensor inside ECU is defect	Replace ECU

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DTC	Description	Dfp Name	MIL	OBD System	Power red	Long Term Failure	Reason of failure	Possible failure correction
D2A3	Diagnostic Fault Check for Physical Signal above maximum limit	EnvTPhysRngHi	OFF		none	NO	Environment temperature sensor defective	Check or replace temperature sensor
E2A3	Diagnostic Fault Check for Physical Signal below minimum limit	EnvTPhysRngLo	ON	Comprehensive	none	YES potential	Environment temperature sensor defective	Check or replace temperature sensor
42A3	Ambient temperature sensor: DFC for CAN message	EnvTSig	OFF		none	NO	Ambient temperature sensor defective	Check sensor and replace it if necessary
12A3	Ambient temperature sensor: SRC High for Environment Temperature	EnvTSRCMax	OFF		none	NO	Sensor defective or short circuit in wiring to external source	Check wiring or replace sensor

DTC	Description	Dfp Name	MIL	OBD System	Power red	Long Term Failure	Reason of failure	Possible failure correction
22A3	Ambient temperature sensor: SRC low for Environment Temperature	EnvTSRCMin	OFF		none	NO	Sensor defective or short circuit wiring to ground	Check wiring or replace sensor
4354	Engine speed sensing: DFC for camshaft signal diagnosis - disturbed signal	EpmCaSI1ErrSig	OFF		none	NO	Cam Shaft speed signal not stable: - electrical intermittent open circuit - sensor not fixed correctly - electrical disturbances due to damaged isolation of wiring harness - electrical disturbances due to special electrical features	Check wiring, sensor installation and proper functioning of camshaft phase sensor (evaluate raw signals) Check if sensor fixed correctly (should not be moveable),check wiring harness and contacts, check if electrical lines with high electric performance a
4154	Engine speed sensing: DFC for camshaft signal diagnosis - no signal	EpmCaSI1NoSig	OFF		none	NO	Camshaft speed sensor defective Wiring harness "open circuit" Camshaft sensor not mounted	Check if snesor mounted correctly Check wiring harness Check sensor fucntionality and replace it if necessary
A354	Engine speed sensing: DFC for camshaft offset angle exceeded	EpmCaSI1OfsErr	OFF		engine stop (direct)	NO	Camshaft sensor position deviates form crankshaft position: - camshaft mal positioned (e.g. tooth belt: 1 tooth skipped) - camshaft position wheel mal positioned (if adjustable) - camshaft sensor position mal positioned (if adjustable) - crankshaft signa	Check correct postions of camshaft signal wheel and crankshaft signal wheel to piston position

DTC	Description	Dfp Name	MIL	OBD System	Power red	Long Term Failure	Reason of failure	Possible failure correction
4454	Engine speed sensing: Crankshaft signal disturbance	EpmCrSErrSig	ON	Comprehensive	YES (technical)	YES potential	- High vibration of crank shaft signal sensor - Intermettent open circuit of sensor - Electrical disturbances due to damaged isolation of wiring harness - Electrical disturbances due external electromagnetic disturbancies	Check if sensor fixed correctly (should not be moveable) Check wiring harness and contacts Check if electrical lines with high electric performance are additionally installed (components not validated by the vehicle manufacturer)
4254	Engine speed sensing: Crankshaft signal loss	EpmCrSNoSig	ON	Comprehensive	YES (technical)	YES potential	Crank shaft speed sensor defect Crank shaft speed sensor not mounted correctly Crank shaft speed sensor not connected electrically, open circuit or short circuit.	Check if crank shaft speed sensor mounted correctly Check wiring harness to open/short circuit Check crank shaft speed sensor for correct function and replace it if necessary
1176	Injector PCL: Corrected energising time of Zero Fuelling Calibration for injector 1 exceeds maximum value	ETClbETFltMax_0	OFF		none	YES potential	Clogged nozzles in the injector of cylinder 1, mechanical defect partially jamming the valve lift, implausible lambda signal	Check injector of cylinder 1 for blocked nozzles and jammed valve needle, check lambda sensor for plausible signals, replace injector if necessary

DTC	Description	Dfp Name	MIL	OBD System	Power red	Long Term Failure	Reason of failure	Possible failure correction
1276	Injector PCL: Corrected energising time of Zero Fuelling Calibration for injector 3 exceeds maximum value	ETClbETFlt Max_1	OFF		none	YES potential	Clogged nozzles in the injector of cylinder 3, mechanical defect partially jamming the valve lift, implausible lambda signal	Check injector of cylinder 3 for blocked nozzles and jammed valve needle, check lambda sensor for plausible signals, replace injector if necessary
1376	Injector PCL: Corrected energising time of Zero Fuelling Calibration for injector 4 exceeds maximum value	ETClbETFlt Max_2	OFF		none	YES potential	Clogged nozzles in the injector of cylinder 4, mechanical defect partially jamming the valve lift, implausible lambda signal	Check injector of cylinder 4 for blocked nozzles and jammed valve needle, check lambda sensor for plausible signals, replace injector if necessary
1476	Injector PCL: Corrected energising time of Zero Fuelling Calibration for injector 2 exceeds maximum value	ETClbETFlt Max_3	OFF		none	YES potential	Clogged nozzles in the injector of cylinder 2, mechanical defect partially jamming the valve lift, implausible lambda signal	Check injector of cylinder 2 for blocked nozzles and jammed valve needle, check lambda sensor for plausible signals, replace injector if necessary
2176	Injector PCL: Corrected energising time of Zero Fuelling Calibration for injector 1 below minimum value	ETClbETFlt Min_0	OFF		none	YES potential	Defective injector of cylinder 1, the injector could be jammed and cannot close entirely, implausible lambda signal	Check injector of cylinder 1 for proper functioning, check lambda sensor for plausible signals, replace injector if necessary

DTC	Description	Dfp Name	MIL	OBD System	Power red	Long Term Failure	Reason of failure	Possible failure correction
2276	Injector PCL: Corrected energising time of Zero Fuelling Calibration for injector 3 below minimum value	ETCIbETFlt Min_1	OFF		none	YES potential	Defective injector of cylinder 3, the injector could be jammed and cannot close entirely, implausible lambda signal	Check injector of cylinder 3 for proper functioning, check lambda sensor for plausible signals, replace injector if necessary
2376	Injector PCL: Corrected energising time of Zero Fuelling Calibration for injector 4 below minimum value	ETCIbETFlt Min_2	OFF		none	YES potential	Defective injector of cylinder 4, the injector could be jammed and cannot close entirely, implausible lambda signal	Check injector of cylinder 4 for proper functioning, check lambda sensor for plausible signals, replace injector if necessary
2476	Injector PCL: Corrected energising time of Zero Fuelling Calibration for injector 2 below minimum value	ETCIbETFlt Min_3	OFF		none	YES potential	Defective injector of cylinder 2, the injector could be jammed and cannot close entirely, implausible lambda signal	Check injector of cylinder 2 for proper functioning, check lambda sensor for plausible signals, replace injector if necessary
1399	DPF Exhaust Temp control: Desired Temperature before Oxicat not reached during DPF Regeneration	ETCtlInrLop CtVMax	OFF		none	NO	Difficult ambient conditions resp vehicle use (demanded temprature can not reached due to ambient conditions) Problems with temperature measurement before Oxicat (sensor defect or sensors before/after Oxicat interchanged) Problems with Air control or i	Check Temperature sensors Check air control system Check injection system

DTC	Description	Dfp Name	MIL	OBD System	Power red	Long Term Failure	Reason of failure	Possible failure correction
2399	DPF Exhaust Temp control: Desired Temperature before Oxicat exceeded during DPF Regeneration	ETCtlInrLopCtVMin	OFF		none	NO	Problems with temperature measurement before Oxicat (sensor defect or sensors before/after Oxicat interchanged) Problems with Air control or injection system	Check Temperature sensors Check air control system Check injection system
A399	DPF Exhaust Temp control: Control for increased temperature before Oxicat active for too long time (too long DPF Regeneration time)	ETCtlInrLopRpT	OFF		none	NO	Problems with temperature measurement before Oxicat (sensor defect or sensors before/after Oxicat interchanged) Problems with Air control or injection system	Check Temperature sensors Check air control system Check injection system
1499	DPF Exhaust Temp control: Desired Temperature after Oxicat not reached during DPF Regeneration	ETCtlOutrLopCtVMax	OFF		none	NO	Difficult ambient conditions resp vehicle use (demanded temprature can not reached due to ambient conditions) Problems with temperature measurement after Oxicat (sensor defect or sensors before/after Oxicat interchanged) Oxicat defective (does not burn	Check Temperature sensors Check Oxicat (execute service regeneration --> does tempa fter Oxicat increase with activated Post injection?) Check injection system
2499	DPF Exhaust Temp control: Desired Temperature after Oxicat exceeded during DPF Regeneration	ETCtlOutrLopCtVMin	OFF		none	NO	Problems with temperature measurement after Oxicat (sensor measures much too high temp) Problems with injection system (too lhigh post injection quantity)	Check Temperature sensors Check Oxicat (execute service regeneration --> does tempa fter Oxicat increase with activated Post injection?) Check injection system
A499	DPF Exhaust Temp control: Control for increased temperature after Oxicat active for too long time (too long DPF Regeneration time)	ETCtlOutrLopRpT	OFF		none	NO	Problems with temperature measurement after Oxicat (sensor defect or sensors before/after Oxicat interchanged) Oxicat defective (does not burn fuel) Problems with injection system (too low post injection quantity)	Check Temperature sensors Check Oxicat (execute service regeneration --> does tempa fter Oxicat increase with activated Post injection?) Check injection system

DTC	Description	Dfp Name	MIL	OBD System	Power red	Long Term Failure	Reason of failure	Possible failure correction
5171	Exhaust flap: No load error on power stage for Exhaust Flap Actuator	ExhFlpLPOL	OFF		none	YES potential	Broken or disconnected wiring or defective Exhaust Flap Actuator	Check of wiring, replace Exhaust Flap Actuator
5162	Exhaust Flap actuator: Over temperature error on power stage for Exhaust Flap Actuator	ExhFlpLPOvr Temp	OFF		none	YES potential	High battery voltage, high temperature inside ECU, high load or wiring problem	Check load and output, check wiring, replace ECU
6162	Exhaust Flap actuator: Short circuit to battery error on power stage for Exhaust Flap Actuator	ExhFlpLPSC B	OFF		none	YES potential	Short circuit of wiring to external source or defective exhaust flap actuator	Check of wiring or replace exhaust flap actuator
7162	Exhaust Flap actuator: Short circuit to ground error on power stage for Exhaust Flap Actuator	ExhFlpLPSC G	OFF		none	YES potential	Short circuit of wiring to ground or defective Exhaust Flap Actuator	First Check wiring, if no short circuit found replace Exhaust Flap Actuator
A362	Exhaust Flap actuator: sticking valve or loose connection	ExhFlpLPTm pErr	OFF		none	YES potential	Electrical problem in exhaust flap (loose connection) or sticking flap	Check exhaust flap, check electrical connection

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DTC	Description	Dfp Name	MIL	OBD System	Power red	Long Term Failure	Reason of failure	Possible failure correction
B162	Exhaust Flap actuator: Actuator reports an error by a defined SCG duration of PWM wiring	ExhFlpLPX2Err	OFF		none	YES potential	Internal failure in Exhaust flap actuator or Exhaust Flap blocked mechanically or problem of wiring (see separate documentation for Exhaust flap)	Check exhaust flap actuator and wiring
A162	Exhaust Flap actuator: Actuator reports an error by a defined SCG duration of PWM wiring	ExhFlpLPXErr	OFF		YES (technical)	YES potential	Internal failure in Exhaust flap actuator or Exhaust Flap blocked mechanically or problem of wiring (see separate documentation for Exhaust flap)	Check exhaust flap actuator and wiring
B262	Exhaust Flap actuator: Actuator reports an error by a defined SCG duration of PWM wiring	ExhFlpLPY2Err	OFF		none	YES potential	Internal failure in Exhaust flap actuator or Exhaust Flap blocked mechanically or problem of wiring (see separate documentation for Exhaust flap)	Check exhaust flap actuator and wiring
A262	Exhaust Flap actuator: Actuator reports an error by a defined SCG duration of PWM wiring	ExhFlpLPYErr	OFF		none	YES potential	Internal failure in Exhaust flap actuator or Exhaust Flap blocked mechanically or problem of wiring (see separate documentation for Exhaust flap)	Check exhaust flap actuator
A139	Oxicat Temp Monitoring: deviation from other sensors at cold start	ExhTMonPlaus_0	OFF		none	NO	Exhaust Temperature Sensor at exhaust collector inlet measures wrong values	Note: Too fast ambient temperature change, e.g. vehicle (and dedicated temperature sensor) exposed to sun shine after very cold night, or if the sensor is in a "warm air stream" (e.g. by additional engines like a cooling compressor for a cold compartment

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DTC	Description	Dfp Name	MIL	OBD System	Power red	Long Term Failure	Reason of failure	Possible failure correction
A239	Oxicat Temp Monitoring: deviation from other sensors at cold start	ExhTMonPlaus_1	OFF		none	NO	Exhaust Temperature Sensor before EGR exit measures wrong values	Note: Too fast ambient temperature change, e.g. vehicle (and dedicated temperature sensor) exposed to sun shine after very cold night, or if the sensor is in a "warm air stream" (e.g. by additional engines like a cooling compressor for a cold compartment
A72A	DPF Temp Monitoring: deviation from other sensors at cold start	ExhTMonPlaus_2	OFF		none	YES potential	Exhaust Temperature Sensor before DPF measures wrong values	Note: Too fast ambient temperature change, e.g. vehicle (and dedicated temperature sensor) exposed to sun shine after very cold night, or if the sensor is in a "warm air stream" (e.g. by additional engines like a cooling compressor for a cold compartment
A92A	SCR Temp monitoring: deviation from other sensors at cold start	ExhTMonPlaus_3	ON	NOx Aftertreatment	none	YES direct	Exhaust Temperature Sensor after DPF measures wrong values	Note: Too fast ambient temperature change, e.g. vehicle (and dedicated temperature sensor) exposed to sun shine after very cold night, or if the sensor is in a "warm air stream" (e.g. by additional engines like a cooling compressor for a cold compartment
A339	Exhaust Temp monitoring: deviation from other sensors at cold start	ExhTMonPlaus_4	OFF		none	NO	Exhaust Temperature Sensor after turbine measures wrong values	Note: Too fast ambient temperature change, e.g. vehicle (and dedicated temperature sensor) exposed to sun shine after very cold night, or if the sensor is in a "warm air stream" (e.g. by additional engines like a cooling compressor for a cold compartment
AA2A	Exhaust Temp monitoring: Diagnostic Fault check array for cold start condition of exhaust-gas temperatureMore	ExhTMonPlaus_5	OFF	NOx Aftertreatment	none	YES direct	Exhaust Temperature Sensor after turbine measures wrong values	Note: Too fast ambient temperature change, e.g. vehicle (and dedicated temperature sensor) exposed to sun shine after very cold night, or if the sensor is in a "warm air stream" (e.g. by additional engines like a cooling compressor for a cold compartment

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DTC	Description	Dfp Name	MIL	OBD System	Power red	Long Term Failure	Reason of failure	Possible failure correction
A739	Exhaust Temp monitoring: Diagnostic Fault check during cold start condition of exhaust-gas temperatures	ExhTMonPlausGen	OFF		none	NO	Several sensors have wrong measurement values. Too fast change of ambient temperature (e.g. due to sun shining in the morning after cold night...) --> see ambeint conditions	Check with ambient conditions, which sensors show highest deviation form intake air temperature in AFS, Boost temperature and Coolant temperature. If Boost temperature and coolant temperature are similar but higher than the exhaust temperatures --> failur
3139	Oxicat Temp monitoring: Diagnostic Fault check for Model based plausiblity check of first exhaust-gas temperature	ExhTMonPlausPos1	OFF		none	NO	Bad electrical wiring (e.g. corroded connector or damaged isolation of wire) or gain offset of sensor for Exhaust Temperature at exhaust collector inlet	Check wiring and connectors for correct isolation / contact Check sensor and replace it, if necessary Note: failure can also be caused, if the real exhaust temperature differes from the calculated one due to a failure in the engine like: wrong injection
3239	DPF Temp montioring: Diagnostic Fault check for Model based plausiblity check of second exhaust-gas temperature	ExhTMonPlausPos2	OFF		none	NO	Bad electrical wiring (e.g. corroded connector or damaged isolation of wire) or gain offset of sensor for Exhaust Temperature before EGR exit	Check wiring and connectors for correct isolation / contact Check sensor and replace it, if necessary Note: failure can also be caused, if the real exhaust temperature differes from the calculated one due to a failure in the engine like: wrong injection

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DTC	Description	Dfp Name	MIL	OBD System	Power red	Long Term Failure	Reason of failure	Possible failure correction
372A	SCR Temp monitoring: Diagnostic Fault check for Model based plausiblity check of third exhaust-gas temperature	ExhTMonPlausPos3	OFF	NOx Aftertreatment	none	YES direct	Bad electrical wiring (e.g. corroded connector or damaged isolation of wire) or gain offset of sensor for Exhaust Temperature before DPF	Check wiring and connectors for correct isolation / contact Check sensor and replace it, if necessary Note: failure can also be caused, if the real exhaust temperature differes from the calculated one due to a failure in the engine like: wrong injection
392A	Exhaust Temp monitoring: Diagnostic Fault check for Model based plausiblity check of first exhaust-gas temperature	ExhTMonPlausPos4	OFF	NOx Aftertreatment	none	YES direct	Bad electrical wiring (e.g. corroded connector or damaged isolation of wire) or gain offset of sensor for Exhaust Temperature after DPF	Check wiring and connectors for correct isolation / contact Check sensor and replace it, if necessary Note: failure can also be caused, if the real exhaust temperature differes from the calculated one due to a failure in the engine like: wrong injection
3339	Exhaust Temp monitoring: Diagnostic Fault check for Model based plausiblity check of second exhaust-gas temperature	ExhTMonPlausPos5	OFF		none	NO	Bad electrical wiring (e.g. corroded connector or damaged isolation of wire) or gain offset of sensor for Exhaust Temperature after turbine	Check wiring and connectors for correct isolation / contact Check sensor and replace it, if necessary Note: failure can also be caused, if the real exhaust temperature differes from the calculated one due to a failure in the engine like: wrong injection

DTC	Description	Dfp Name	MIL	OBD System	Power red	Long Term Failure	Reason of failure	Possible failure correction
3A2A	Exhaust Temp monitoring: Diagnostic Fault check for Model based plausiblity check of third exhaust-gas temperature	ExhTMonPlausPos6	OFF	NOx Aftertreatment	none	YES direct	Bad electrical wiring (e.g. corroded connector or damaged isolation of wire) or gain offset of sensor for Exhaust Temperature after turbine	Check wiring and connectors for correct isolation / contact Check sensor and replace it, if necessary Note: failure can also be caused, if the real exhaust temperature differes from the calculated one due to a failure in the engine like: wrong injection
5114	Cooling fan control: No load error	FanDIOOL	OFF		none	NO	Broken or disconnected wiring or defective relay	Check of wiring, replace fan actuator
8114	Cooling fan control: Over temperature error	FanDIOOvrTemp	OFF		none	NO	High battery voltage, high temperature inside ECU, high load or wiring problem	No reaction needed if failure isn't present after short time, check load and output, check wiring, replace ECU
6114	Cooling fan control: Short circuit to battery error	FanDIOSCB	OFF		none	NO	Short circuit of wiring to external source or defective fan actuator	Check of wiring or replace fan acutator

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DTC	Description	Dfp Name	MIL	OBD System	Power red	Long Term Failure	Reason of failure	Possible failure correction
7114	Cooling fan control: Short circuit to ground error	FanDIOSCG	OFF		none	NO	Short circuit of wiring to ground or defective fan actuator	Check of wiring or replace fan actuator
5124	Cooling fan control: Fan0 PWM, No load error	FanPWMOL_0	OFF		none	NO	Broken or disconnected wiring or defective relay	Check of wiring, replace fan actuator
5224	Cooling fan control: Fan1 PWM, No load error	FanPWMOL_1	OFF		none	NO	Broken or disconnected wiring or defective relay	Check of wiring, replace fan actuator
8124	Cooling fan control: Fan0 PWM, Over temperature error	FanPWMOvrTemp_0	OFF		none	NO	High battery voltage, high temperature inside ECU, high load or wiring problem	Check load and output, check wiring, replace ECU
8224	Cooling fan control: Fan1 PWM, Over temperature error	FanPWMOvrTemp_1	OFF		none	NO	High battery voltage, high temperature inside ECU, high load or wiring problem	Check load and output, check wiring, replace ECU

DTC	Description	Dfp Name	MIL	OBD System	Power red	Long Term Failure	Reason of failure	Possible failure correction
6124	Cooling fan control: Fan0 PWM, Short circuit to battery error	FanPWMSCB_0	OFF		none	NO	Short circuit of wiring to external source or defective fan actuator	Check of wiring or replace fan actuator
6224	Cooling fan control: Fan1 PWM, Short circuit to battery error	FanPWMSCB_1	OFF		none	NO	Short circuit of wiring to external source or defective fan actuator	Check of wiring or replace fan actuator
7124	Cooling fan control: Fan0 PWM, Short circuit to ground error	FanPWMSCG_0	OFF		none	NO	Short circuit of wiring to ground or defective fan actuator	Check of wiring or replace fan actuator
7224	Cooling fan control: Fan1 PWM, Short circuit to ground error	FanPWMSCG_1	OFF		none	NO	Short circuit of wiring to ground or defective fan actuator	Check of wiring or replace fan actuator
A5A6	Fuel Balancing Control: fuel correction for Injector of cylinder 1 outside tolerance range	FBCMon_0	ON	Fuel System	none	YES potential	Injector of Cylinder 1 fuel introduction outside tolerance range	Replace fuel injector of cylinder 1.

DTC	Description	Dfp Name	MIL	OBD System	Power red	Long Term Failure	Reason of failure	Possible failure correction
A6A6	Fuel Balancing Control: fuel correction for Injector of cylinder 3 outside tolerance range	FBCMon_1	ON	Fuel System	none	YES potential	Injector of Cylinder 3 fuel introduction outside tolerance range	Replace fuel injector of cylinder 3.
A7A6	Fuel Balancing Control: fuel correction for Injector of cylinder 4 outside tolerance range	FBCMon_2	ON	Fuel System	none	YES potential	Injector of Cylinder 4 fuel introduction outside tolerance range	Replace fuel injector of cylinder 4.
A8A6	Fuel Balancing Control: fuel correction for Injector of cylinder 2 outside tolerance range	FBCMon_3	ON	Fuel System	none	YES potential	Injector of Cylinder 2 fuel introduction outside tolerance range	Replace fuel injector of cylinder 2.
5172	Fuel filter heater: No load error in powerstage of fuel filter heating	FlFltHtOL	OFF		none	NO	Broken or disconnected wiring or defective fuel filter heater.	Check of wiring or replace fuel filter heater
8172	Fuel filter heater: Over Temperature error at ECM power stage	FlFltHtOvrTemp	OFF		none	NO	High battery voltage, high temperature inside ECU, high load or wiring problem	Check load and output, check wiring, replace ECU

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DTC	Description	Dfp Name	MIL	OBD System	Power red	Long Term Failure	Reason of failure	Possible failure correction
6172	Fuel filter heater: Short circuit to battery error in powerstage of fuel filter heating	FlFltHtSCB	OFF		none	NO	Short circuit of wiring to external source or inside fuel filter heater	Check of wiring, replace fuel filter heater
7172	Fuel filter heater: Short circuit to ground error in powerstage of fuel filter heating	FlFltHtSCG	OFF		none	NO	Short circuit of wiring to ground or inside fuel filter heater	Check of wiring, replace fuel filter heater
A2E1	Water in Fuel Determination: Water in Fuel	FlSys_WtDet	OFF		none	NO	Water in fuel filter Sensor defective	Clean fuel filter filter Check Sensor
21A1	Fuel tank level: fuel tank below critical level or danger of an air contaminated hydraulic system	FlSysTnkLo	OFF		none	NO	Empty Fuel tank Wrong signal of Tank level sensor	Fill up fuel tank Check fuel level sensor and its wiring (additional resistance on connectors...)

DTC	Description	Dfp Name	MIL	OBD System	Power red	Long Term Failure	Reason of failure	Possible failure correction
12D7	Injector Adjustement: Injection quantity correction value too high	FMOqCorOBDMax	OFF		none	YES potential	Calculated lambda may be wrong: air mass meter defect or injectors defect. Measured lambda-value wrong, check lambda sensor.	Check air mass meter, injectors and lambda sensor.
22D7	Injector Adjustement: Injection quantity correction value too low	FMOqCorOBDMin	OFF		none	YES potential	Calculated lambda may be wrong: air mass meter defect or injectors defect. Measured lambda-value wrong, check lambda sensor.	Check air mass meter, injectors and lambda sensor.
A26A	NOx Sensor (CAN): NOx Sensor detects not plausible values (NOx or Lambda)	FrmNOxSensNOx	none		none	NO	Short Circuit or Open wire in wiring harness Defective NOx Sensor	Check wiring harness Check NOx Sensor Note for EURO OBD application: this failure activates a Performance limitation due to legislation. Therefore after repair following procedure must be done, otherwise there is the risk tha performance limiter gets ac

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DTC	Description	Dfp Name	MIL	OBD System	Power red	Long Term Failure	Reason of failure	Possible failure correction
A36A	NOx Sensor Upstream (CAN): Nox Concentration invalid	FrmNOxSensUsNOx	ON	Exhaust Gas Sensor	none	YES direct	Short Circuit or Open wire in wiring harness Defective NOx Upstream Sensor	Check wiring harness Check NOx Upstream Sensor
1283	Fuel low pressure cycle: Maximum fuel pressure error in dynamic plausibility test (low pressure)	FuelPDynTstMax	OFF		none	NO	Inaccurate fuel pressure sensor or excessive fuel pressure in system	Check pressure sensor accuracy and if necessary replace sensor. Also check fuel pressure in system.
2283	Fuel low pressure cycle: Minimum fuel pressure error in dynamic plausibility test (low pressure)	FuelPDynTstMin	OFF		none	NO	Inaccurate fuel pressure sensor or too low fuel pressure in system	Check pressure sensor accuracy and if necessary replace sensor. Also check fuel pressure in system.

DTC	Description	Dfp Name	MIL	OBD System	Power red	Long Term Failure	Reason of failure	Possible failure correction
4383	Fuel low pressure cycle: DFC for CAN message of fuel pressure sensor (low pressure)	FuelPSig	OFF		none	NO	Sensor defect	Check Sensor
1383	Fuel low pressure cycle: SRC High for fuel pressure (low pressure cycle)	FuelPSRCMax	OFF		none	NO	Sensor defective or short circuit to external source	Check wiring or replace sensor
2383	Fuel low pressure cycle: SRC Low for fuel pressure (low pressure cycle)	FuelPSRCMin	OFF		none	NO	Sensor defective or short circuit to ground	Check wiring or replace sensor
D173	Fuel Temperature Sensor: Physical Signal above maximum limit	FuelTPhysRngHi	OFF		none	NO	Fuel temperature sensor defective	Check or replace sensor
E173	Fuel Temperature Sensor: Physical Signal below minimum limit	FuelTPhysRngLo	OFF		none	NO	Fuel temperature sensor defective	Check or replace sensor

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DTC	Description	Dfp Name	MIL	OBD System	Power red	Long Term Failure	Reason of failure	Possible failure correction
1173	Fuel Temp Sensor: SRC high for fuel temperature sensor	FuelTSRCMax	OFF		none	NO	Sensor defective or short circuit to external source	Check wiring or replace sensor
2173	Fuel Temp Sensor: SRC low for fuel temperature sensor	FuelTSRCMin	OFF		none	NO	Sensor defective or short circuit to ground	Check wiring or replace sensor
3173	Fuel Temperature Sensor: failed plausibility check at ECU start	FuelTVDPlaus	OFF		none	NO	Fuel temperature sensor defective	Check sensor
4181	Gear Box neutral: Check for error for CAN input	GbxNPosSig	OFF		none	NO	The gearbox neutral position switch is defective.	Check the gearbox neutral position switch.

DTC	Description	Dfp Name	MIL	OBD System	Power red	Long Term Failure	Reason of failure	Possible failure correction
5132	Glow lamp: No load error	GlwLmpOL	OFF		none	NO	Broken or disconnected wiring or defective glow lamp	Check of wiring or replace glow lamp
6132	Glow lamp: Short circuit to battery error	GlwLmpSCB	OFF		none	NO	Short circuit of wiring to external source or inside glow lamp	Check of wiring, replace glow lamp
7132	Glow lamp: Short circuit to ground error	GlwLmpSC G	OFF		none	NO	Short circuit of wiring to ground or inside glow lamp	Check of wiring, replace glow lamp
5144	Glow Plug: No load error	GlwPlgOL	OFF		none	NO	Broken or disconnected wiring or defective glow plug indicator lamp	Check of wiring or replace glow plug indicator lamp

DTC	Description	Dfp Name	MIL	OBD System	Power red	Long Term Failure	Reason of failure	Possible failure correction
8144	Glow Plug: Over temperature error	GlwPlgOvrTemp	OFF		none	NO	High battery voltage, high temperature inside ECU, high load or wiring problem or proble with glow plug (resp relay if system has a relay between ECU and glow plug)	No reaction needed if failure isn't present after short time, check load and output, check wiring, replace ECU
6144	Glow Plug: Short circuit to battery error	GlwPlgSCB	OFF		none	NO	Short circuit of wiring to external source or inside glow plug (resp relay if system has a relay between ECU and glow plug)	Check of wiring Check relay if available Check and replace glow plug
7144	Glow Plug: Short circuit to ground error	GlwPlgSCG	OFF		none	NO	Short circuit of wiring to ground or inside glow plug (resp relay if system has a relay between ECU and glow plug)	Check of wiring Check relay if available Check and replace glow plug
A144	Glow Plug: Defective Glow Plugs (monitored by Relay)	GlwPlgSVSFail	OFF		none	NO	Failure in glow plugs Failrue in wiring between Relay and glow plugs	Check wiring between glow plug relay and glow plugs Check glow plugs Check Glow plug relay

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DTC	Description	Dfp Name	MIL	OBD System	Power red	Long Term Failure	Reason of failure	Possible failure correction
A244	Glow Plug: Sticking Glow Plug Relay	GlwPlgSVSStkRly	OFF		none	NO	Failure in Glow plug relay	Check Glow plug relay or replace it
11A4	Engine speed exceeds the upper limit while High-Low Speed Demand is active	HLSDem_MonOBDMax	OFF		none	NO		
21A4	Engine speed falls below the lower limit while High-Low Speed Demand is active	HLSDem_MonOBDMin	OFF		none	NO		
5184	Air heater: Open load on Powerstage 0	IAirHtOL_0	OFF		none	NO	Broken or disconnected wiring or defective air heater	Check of wiring or replace air heater
5284	Air heater: Open load on Powerstage 1	IAirHtOL_1	OFF		none	NO	Broken or disconnected wiring or defective air heater	Check of wiring or replace air heater
8184	Air heater: Over temperature on Powerstage 0	IAirHtOvrTemp_0	OFF		none	NO	High battery voltage, high temperature inside ECU, high load or wiring problem	Check load and output, check wiring, replace ECU

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DTC	Description	Dfp Name	MIL	OBD System	Power red	Long Term Failure	Reason of failure	Possible failure correction
8284	Air heater: Over temperature on Powerstage 1	IAirHtOvrTemp_1	OFF		none	NO	High battery voltage, high temperature inside ECU, high load or wiring problem	Check load and output, check wiring, replace ECU
6184	Air heater: Short circuit to battery on powerstage 0	IAirHtSCB_0	OFF		none	NO	Short circuit of wiring to external source or inside air heater	Check of wiring, replace air heater
6284	Air heater: Short circuit to battery on powerstage 1	IAirHtSCB_1	OFF		none	NO	Short circuit of wiring to external source or inside air heater	Check of wiring, replace air heater
7184	Air heater: Short circuit to ground error on powerstage 0	IAirHtSCG_0	OFF		none	NO	Short circuit of wiring to ground or inside air heater	Check of wiring, replace air heater
7284	Air heater: Short circuit to ground error on powerstage 1	IAirHtSCG_1	OFF		none	NO	Short circuit of wiring to ground or inside air heater	Check of wiring, replace air heater
414A	Intake Air humidity Sensor: DFC for CAN message	IndAHSig	OFF		none	NO	Disturbed CAN signal transmission, sensor problem	Check the CAN for proper configuration and functioning, check air humidity sensor.

DTC	Description	Dfp Name	MIL	OBD System	Power red	Long Term Failure	Reason of failure	Possible failure correction
114A	Info: Intake Air humidity Sensor: Probably water droplets on Sensor	IndAHSRCMax	OFF		none	NO	Sensor full with water droplets or Sensor defective or short circuit to external source	NO action needed as long as the failure IndAHSRCMaxDly is not active. If failure IndAHSRCMaxDly is not active, check duration of failure active: If a single duration lasts longer than ~10 min --> there is probably an electrical failure. --> Check wiring
124A	Intake Air humidity Sensor: Defect Fault Check for Signal value above maximum limit	IndAHSRCMaxDly	OFF		none	NO	Sensor full with water droplets Sensor defective or short circuit to external source	Clean Sensor (dry it) Check wiring or replace sensor
214A	Intake Air humidity Sensor: SRC low for Induction Air Humidity	IndAHSRCMin	OFF		none	NO	Short circuit of wiring to ground or defective sensor	Check wiring and sensor

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DTC	Description	Dfp Name	MIL	OBD System	Power red	Long Term Failure	Reason of failure	Possible failure correction
A396	Injector: Number of injections is limited by charge balance of booster capacity	InjCrvInjLimChrgBal	OFF		none	YES potential	Application of number of requested injections not compatible with system capability or charging of injector booster insufficient	Check check battery voltage, check power supply of booster banks
A496	Injector: Number of injections is limited by quantity balance of high pressure pump	InjCrvInjLimQntBal	OFF		none	YES potential	Application of number of requested injections not compatible with system capability or high pressure pump efficiency limited due to ageing, insufficient rail pressure or too high fuel temperature.	Check fuel temperature, check presence of other failures regarding rail pressure deviation or fuel delivery. CHeck High pressure pump.
A596	Injector: Number of injections is limited by system	InjCrvInjLimSys	OFF		none	YES potential	Dataset application wrong, too high number of injections allowed.	Dataset should be replaced, contact Help Desk
2196	Injector: Number of injections is limited by runtime	InjCrvNumInjRtmLim	OFF		none	YES potential	Dataset application wrong, too high number of injections allowed.	Dataset should be replaced, contact Help Desk
2296	Injector: check of minimum rail pressure	InjVlvPresMin	OFF		none	YES potential	Rail pressure controller problem (pressure control valve or metering unit sticking), High Pressure pump efficiency to low or system leakages	Check presence of other more specific failures related to rail pressure controller. Check rail actuators, check rail or injector leakages

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DTC	Description	Dfp Name	MIL	OBD System	Power red	Long Term Failure	Reason of failure	Possible failure correction
B136	Injector: SRC max error in the voltage of the piezo actuator	IVActrVltgSRCMax	ON	Fuel System	none	YES potential	Failure in wiring harness between ECU and injectors Failure in injector (actuator) Failure in ECU (power stage)	Check wiring harness between ECU and injectors Check injectors Check/Replace ECU
B236	Injector: SRC min error in the voltage of the piezo actuator	IVActrVltgSRCMin	ON	Fuel System	none	YES potential	Failure in wiring harness between ECU and injectors Failure in injector (actuator) Failure in ECU (power stage)	Check wiring harness between ECU and injectors Check injectors Check/Replace ECU
A116	Injector Adjustement: IMA programming not correct for injector cyl 1	IVAdjDiaIVAdj_0	OFF		none	YES potential	Invalid IMA code has been programmed wrong programming/flashing of the EDC (initialization of EEPROM) internal defect of the ECU	Reprogram IMA code Reflash teh ECU (including EEPROM initialisation) if defect persists: replace EDC
A216	Injector Adjustement: IMA programming not correct for injector cyl 3	IVAdjDiaIVAdj_1	OFF		none	YES potential	Invalid IMA code has been programmed wrong programming/flashing of the EDC (initialization of EEPROM) internal defect of the ECU	Reprogram IMA code Reflash teh ECU (including EEPROM initialisation) if defect persists: replace EDC

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DTC	Description	Dfp Name	MIL	OBD System	Power red	Long Term Failure	Reason of failure	Possible failure correction
A316	Injector Adjustement: IMA programming not correct for injector cyl 4	IVAdjDiaIVAdj_2	OFF		none	YES potential	Invalid IMA code has been programmed wrong programming/flashing of the EDC (initialization of EEPROM) internal defect of the ECU	Reprogram IMA code Reflash teh ECU (including EEPROM initialisation) if defect persists: replace EDC
A416	Injector Adjustement: IMA programming not correct for injector cyl 2	IVAdjDiaIVAdj_3	OFF		none	YES potential	Invalid IMA code has been programmed wrong programming/flashing of the EDC (initialization of EEPROM) internal defect of the ECU	Reprogram IMA code Reflash teh ECU (including EEPROM initialisation) if defect persists: replace EDC
B116	Injector Adjustement: IMA/ISA programming not correct for cyl 1	IVAdjIVA_0	OFF		none	YES potential	Invalid IMA/ISA code has been programmed wrong programming/flashing of the EDC (initialization of EEPROM) internal defect of the ECU	Reprogram IMA/ISA code Reflash teh ECU (including EEPROM initialisation) if defect persists: replace EDC
B216	Injector Adjustement: IMA/ISA programming not correct for cyl 3	IVAdjIVA_1	OFF		none	YES potential	Invalid IMA/ISA code has been programmed wrong programming/flashing of the EDC (initialization of EEPROM) internal defect of the ECU	Reprogram IMA/ISA code Reflash teh ECU (including EEPROM initialisation) if defect persists: replace EDC

DTC	Description	Dfp Name	MIL	OBD System	Power red	Long Term Failure	Reason of failure	Possible failure correction
B316	Injector Adjustement: IMA/ISA programming not correct for cyl 4	IVAdjIVA_2	OFF		none	YES potential	Invalid IMA/ISA code has been programmed wrong programming/flashing of the EDC (initialization of EEPROM) internal defect of the ECU	Reprogram IMA/ISA code Reflash teh ECU (including EEPROM initialisation) if defect persists: replace EDC
B416	Injector Adjustement: IMA/ISA programming not correct for cyl 4	IVAdjIVA_3	OFF		none	YES potential	Invalid IMA/ISA code has been programmed wrong programming/flashing of the EDC (initialization of EEPROM) internal defect of the ECU	Reprogram IMA/ISA code Reflash teh ECU (including EEPROM initialisation) if defect persists: replace EDC
A146	Injector: Discharge-time out of range injector no 1	IVCtlTiDiff_0	ON	Fuel System	none	YES potential	Additional resistances in the wiring of injectors (connectors) Electric part of injectors ECU internal defect (Injector powerstage / Booster)	Check wiring Check injectors, replace them if necessary Replace ECU
A246	Injector: Discharge-time out of range injector no 3	IVCtlTiDiff_1	ON	Fuel System	none	YES potential	Additional resistances in the wiring of injectors (connectors) Electric part of injectors ECU internal defect (Injector powerstage / Booste	Check wiring Check injectors, replace them if necessary Replace ECU

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DTC	Description	Dfp Name	MIL	OBD System	Power red	Long Term Failure	Reason of failure	Possible failure correction
A346	Injector: Discharge-time out of range injector no 4	IVCtlTiDiff_2	ON	Fuel System	none	YES potential	Additional resistances in the wiring of injectors (connectors) Electric part of injectors ECU internal defect (Injector powerstage / Booster)	Check wiring Check injectors, replace them if necessary Replace ECU
A446	Injector: Discharge-time out of range injector no 2	IVCtlTiDiff_3	ON	Fuel System	none	YES potential	Additional resistances in the wiring of injectors (connectors) Electric part of injectors ECU internal defect (Injector powerstage / Booster)	Check wiring Check injectors, replace them if necessary Replace ECU
B146	Injector: Opening voltage out of range injector no 1	IVCtlUDiffUp_0	ON	Fuel System	none	YES potential	Additional resistances in the wiring of injectors (connectors) Electric part of injectors ECU internal defect (Injector powerstage / Booster)	Check wiring Check injectors, replace them if necessary Replace ECU
B246	Injector: Opening voltage out of range injector no 3	IVCtlUDiffUp_1	ON	Fuel System	none	YES potential	Additional resistances in the wiring of injectors (connectors) Electric part of injectors ECU internal defect (Injector powerstage / Booster)	Check wiring Check injectors, replace them if necessary Replace ECU

DTC	Description	Dfp Name	MIL	OBD System	Power red	Long Term Failure	Reason of failure	Possible failure correction
B346	Injector: Opening voltage out of range injector no 4	IVCtlUDiffUp_2	ON	Fuel System	none	YES potential	Additional resistances in the wiring of injectors (connectors) Electric part of injectors ECU internal defect (Injector powerstage / Booster)	Check wiring Check injectors, replace them if necessary Replace ECU
B446	Injector: Opening voltage out of range injector no 2	IVCtlUDiffUp_3	ON	Fuel System	none	YES potential	Additional resistances in the wiring of injectors (connectors) Electric part of injectors ECU internal defect (Injector powerstage / Booster)	Check wiring Check injectors, replace them if necessary Replace ECU
C146	Injector: Corrected opening Voltage out of range of cylinder 1	IVCtlUUp_0	ON	Fuel System	none	YES potential	Additional resistances in the wiring of injectors (connectors) Electric part of injectors ECU internal defect (Injector powerstage / Booster)	Check wiring Check injectors, replace them if necessary Replace ECU
C246	Injector: Corrected opening Voltage out of range of cylinder 3	IVCtlUUp_1	ON	Fuel System	none	YES potential	Additional resistances in the wiring of injectors (connectors) Electric part of injectors ECU internal defect (Injector powerstage / Booster)	Check wiring Check injectors, replace them if necessary Replace ECU

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DTC	Description	Dfp Name	MIL	OBD System	Power red	Long Term Failure	Reason of failure	Possible failure correction
C346	Injector: Corrected opening Voltage out of range of cylinder 4	IVCtlUUp_2	ON	Fuel System	none	YES potential	Additional resistances in the wiring of injectors (connectors) Electric part of injectors ECU internal defect (Injector powerstage / Booster)	Check wiring Check injectors, replace them if necessary Replace ECU
C446	Injector: Corrected opening Voltage out of range of cylinder 2	IVCtlUUp_3	ON	Fuel System	none	YES potential	Additional resistances in the wiring of injectors (connectors) Electric part of injectors ECU internal defect (Injector powerstage / Booster)	Check wiring Check injectors, replace them if necessary Replace ECU
A156	Injector: bank0, short circuit	IVDiaBnkShCir_0	ON	Fuel System	engine stop (direct)	YES potential	Short circuit in wiring or injector connected to bank 0	Check the wiring and injectors connected to bank 0.
A256	Injector: bank1, short circuit	IVDiaBnkShCir_1	ON	Fuel System	engine stop (direct)	YES potential	Short circuit in wiring or injector connected to bank 1.	Check the wiring and injectors.

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DTC	Description	Dfp Name	MIL	OBD System	Power red	Long Term Failure	Reason of failure	Possible failure correction
A356	Injector: bank0, short circuit on charge switch	IVDiaBnkShCirChSwt_0	ON	Fuel System	engine stop (indirect)	YES potential	Short circuit in wiring or injector connected to bank 0	Check the wiring and injectors connected to bank 0.
A456	Injector: bank1, short circuit on charge switch	IVDiaBnkShCirChSwt_1	ON	Fuel System	engine stop (indirect)	YES potential	Short circuit of high-side to battery or ground.	Check the wiring or replace injector.
B766	Injector: ECM internal failure of Injector actuation (chip error)	IVDiaChp	ON	Fuel System	none	YES potential	Defective ECM	Replace ECM
A166	Injector: non-classifiable error at cylinder 1 injector	IVDiaCylNoCls_0	ON	Fuel System	none	YES potential	Abnormal behaviour in injector of cylinder 1 is detected, symptoms cannot be matched to a specific problem	Replace fuel injector of cylinder 1.

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DTC	Description	Dfp Name	MIL	OBD System	Power red	Long Term Failure	Reason of failure	Possible failure correction
A266	Injector: non-classifiable error at cylinder 3 injector	IVDiaCylNoCls_1	ON	Fuel System	none	YES potential	Abnormal behaviour in injector of cylinder 3 is detected, symptoms cannot be matched to a specific problem	Replace fuel injector of cylinder 3.
A366	Injector: non-classifiable error at cylinder 4 injector	IVDiaCylNoCls_2	ON	Fuel System	none	YES potential	Abnormal behaviour in injector of cylinder 4 is detected, symptoms cannot be matched to a specific problem	Replace fuel injector of cylinder 4.
A466	Injector: non-classifiable error at cylinder 2 injector	IVDiaCylNoCls_3	ON	Fuel System	none	YES potential	Abnormal behaviour in injector of cylinder 2 is detected, symptoms cannot be matched to a specific problem	Replace fuel injector of cylinder 2.
5166	Injector: open load, injector cylinder 1	IVDiaCylNoLd_0	ON	Fuel System	none	YES potential	Open load for injector of cylinder 1 is detected.	Check wiring, replace fuel injector of cylinder 1.
5266	Injector: open load, injector cylinder 3	IVDiaCylNoLd_1	ON	Fuel System	none	YES potential	Open load for injector of cylinder 3 is detected.	Check wiring, replace fuel injector of cylinder 3.

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DTC	Description	Dfp Name	MIL	OBD System	Power red	Long Term Failure	Reason of failure	Possible failure correction
5366	Injector: open load, injector cylinder 4	IVDiaCylNoLd_2	ON	Fuel System	none	YES potential	Open load for injector of cylinder 4 is detected.	Check wiring, replace fuel injector of cylinder 4.
5466	Injector: open load, injector cylinder 2	IVDiaCylNoLd_3	ON	Fuel System	none	YES potential	Open load for injector of cylinder 2 is detected.	Check wiring, replace fuel injector of cylinder 2.
6166	Injector: short circuit, injector cylinder 1	IVDiaCylShCir_0	ON	Fuel System	engine stop (direct)	YES potential	Short circuit in wiring or injector	Check wiring, replace fuel injector of cylinder 1.
6266	Injector: short circuit, injector cylinder 3	IVDiaCylShCir_1	ON	Fuel System	engine stop (direct)	YES potential	Short circuit in wiring or injector	Check wiring, replace fuel injector of cylinder 3.
6366	Injector: short circuit, injector cylinder 4	IVDiaCylShCir_2	ON	Fuel System	engine stop (direct)	YES potential	Short circuit in wiring or injector	Check wiring, replace fuel injector of cylinder 4.

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DTC	Description	Dfp Name	MIL	OBD System	Power red	Long Term Failure	Reason of failure	Possible failure correction
6466	Injector: short circuit, injector cylinder 2	IVDiaCylShCir_3	ON	Fuel System	engine stop (direct)	YES potential	Short circuit in wiring or injector	Check wiring, replace fuel injector of cylinder 2.
7166	Injector: short circuit of high side to low side for injector of cylinder 1	IVDiaCylShCirHSLS_0	ON	Fuel System	engine stop (direct)	YES potential	Short circuit in wiring or injector	Check wiring, replace fuel injector of cylinder 1.
7266	Injector: short circuit of high side to low side for injector of cylinder 3	IVDiaCylShCirHSLS_1	ON	Fuel System	engine stop (direct)	YES potential	Short circuit in wiring or injector	Check wiring, replace fuel injector of cylinder 3.

DTC	Description	Dfp Name	MIL	OBD System	Power red	Long Term Failure	Reason of failure	Possible failure correction
7366	Injector: short circuit of high side to low side for injector of cylinder 4	IVDiaCylShCirHSLS_2	ON	Fuel System	engine stop (direct)	YES potential	Short circuit in wiring or injector	Check wiring, replace fuel injector of cylinder 4.
7466	Injector: short circuit of high side to low side for injector of cylinder 2	IVDiaCylShCirHSLS_3	ON	Fuel System	engine stop (direct)	YES potential	Short circuit in wiring or injector	Check wiring, replace fuel injector of cylinder 2.
B166	Injector: cylinder short circuit detected with plausibility check of injector of cylinder 1	IVDiaCylShCirMeas_0	ON	Fuel System	engine stop (direct)	YES potential	Short circuit in wiring or injector	Check wiring, replace fuel injector of cylinder 1.

DTC	Description	Dfp Name	MIL	OBD System	Power red	Long Term Failure	Reason of failure	Possible failure correction
B266	Injector: cylinder short circuit detected with plausibility check of injector of cylinder 3	IVDiaCylShCirMeas_1	ON	Fuel System	engine stop (direct)	YES potential	Short circuit in wiring or injector	Check wiring, replace fuel injector of cylinder 3.
B366	Injector: cylinder short circuit detected with plausibility check of injector of cylinder 4	IVDiaCylShCirMeas_2	ON	Fuel System	engine stop (direct)	YES potential	Short circuit in wiring or injector	Check wiring, replace fuel injector of cylinder 4.
B466	Injector: cylinder short circuit detected with plausibility check of injector of cylinder 2	IVDiaCylShCirMeas_3	ON	Fuel System	engine stop (direct)	YES potential	Short circuit in wiring or injector	Check wiring, replace fuel injector of cylinder 2.
A126	Injector: DC/DC converter shut off	IVPSplyDCDCOff_0	ON	Fuel System	engine stop (direct)	YES potential	Buffer capacitor cannot be charged, problem can be located in the capacitor or the powerstage itself.	Check presence of other failures connected to injector supply (short circuit), check capacitor, replace ECM if powerstage is responsible.

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DTC	Description	Dfp Name	MIL	OBD System	Power red	Long Term Failure	Reason of failure	Possible failure correction
A226	Injector: DC/DC converter shut offMore	IVPSplyDCDCOff_1	ON	Fuel System	engine stop (direct)	YES potential	Buffer capacitor cannot be charged, problem can be located in the capacitor or the powerstage itself.	Check presence of other failures connected to injector supply (short circuit), check capacitor, replace ECM if powerstage is responsible.
B126	Injector: stop of DC/DC converter failed	IVPSplyStopDCDC_0	ON	Fuel System	engine stop (direct)	YES potential	DC/DC converter cannot be shut off	Check presence of other failures connected to injector supply (short circuit), check capacitor, replace ECM if powerstage is responsible.
B226	Injector: stop of DC/DC converter failed	IVPSplyStopDCDC_1	ON	Fuel System	engine stop (direct)	YES potential	DC/DC converter cannot be shut off	Check presence of other failures connected to injector supply (short circuit), check capacitor, replace ECM if powerstage is responsible.
412E	Lambda sensor Wiring: Open circuit at the lambda sensor Nernst cell pin	LSUCircNernstSig	ON	Exhaust Gas Sensor	none	YES potential	Defect in wiring (open load in Nernst Cell (UN) line, Nernst cell; Due to SW bug: open load in heater line, K51) of the lambda sensor, defective lambda sensor	Check entire wiring of lambda sensor, check lambda sensor itself, if necessary replace lambda sensor (and reset all learning values in EEPROM with tester) Note for EURO OBD application: this failure activates a Performance limitation due to legislation.

DTC	Description	Dfp Name	MIL	OBD System	Power red	Long Term Failure	Reason of failure	Possible failure correction
422E	Lambda sensor Wiring: open circuit at the lambda sensor pump current pin - IP (lambda = 1 detection)	LSUCircPmp CurSig	ON	Exhaust Gas Sensor	none	YES potential	Defect in wiring (open load in IP line, pump current; of the lambda sensor, defective lambda sensor	Check entire wiring of lambda sensor, check lambda sensor itself, if necessary replace lambda sensor (and reset all learning values in EEPROM with tester) Note for EURO OBD application: this failure activates a Performance limitation due to legislation.
432E	Lambda sensor Wiring: Open circuit at the lambda sensor Virtual ground pin	LSUCircVirt GndSig	ON	Exhaust Gas Sensor	none	YES potential	Defect in wiring (open load in Virtual Ground (VG) line, virtual ground; Due to SW bug: open load in heater line, K51) of the lambda sensor, defective lambda sensor	Check entire wiring of lambda sensor, check lambda sensor itself, if necessary replace lambda sensor (and reset all learning values in EEPROM with tester) Note for EURO OBD application: this failure activates a Performance limitation due to legislation.
A14E	Lambda Sensing: Fault to indicate Dynamics of the sensor signal too small	LSUDynChk	ON	Exhaust Gas Sensor	none	YES potential	Defect in wiring of lambda sensor, defective lambda sensor, problems in injection system (e.g. leaky injectors) or EGR valve does not close in overrun condition	Check wiring, check injection system, replace lambda sensor (and reset all learning values in EEPROM with tester) Note for EURO OBD application: this failure activates a Performance limitation due to legislation. Therefore after repair following procedur

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DTC	Description	Dfp Name	MIL	OBD System	Power red	Long Term Failure	Reason of failure	Possible failure correction
462E	Lambda Sensor Heater: O2 concentration is outside the predefined window during Heater coupling detection	LSUHtCoupSig	ON	Exhaust Gas Sensor	none	YES potential	Defective lambda sensor	Replace lambda sensor (and reset all learning values in EEPROM with tester) Note for EURO OBD application: this failure activates a Performance limitation due to legislation. Therefore after repair following procedure must be done, otherwise there is the
111E	Lambda Sensor Heater: SCB error of the LSU Heater Powerstage	LSUHtrMax	ON	Exhaust Gas Sensor	none	YES potential	Short circuit of wiring to external source, defective lambda sensor or power stage	Check wiring and lambda sensor, if necessary replace lambda sensor (and reset all learning values in EEPROM with tester) or ECU. Note for EURO OBD application: this failure activates a Performance limitation due to legislation. Therefore after repair fo
211E	Lambda Sensor Heater: SCG error of the LSU Heater Powerstage	LSUHtrMin	ON	Exhaust Gas Sensor	none	YES potential	Short circuit of wiring to external ground, defective lambda sensor or power stage	Check wiring and lambda sensor, if necessary replace lambda sensor (and reset all learning values in EEPROM with tester) or ECU Note for EURO OBD application: this failure activates a Performance limitation due to legislation. Therefore after repair fol

DTC	Description	Dfp Name	MIL	OBD System	Power red	Long Term Failure	Reason of failure	Possible failure correction
311E	Lambda Sensor Heater: Over temperature error of the LSU Heater Powerstage	LSUHtrNpl	ON	Exhaust Gas Sensor	none	YES potential	High battery voltage, high temperature inside ECU, high load or wiring problem	No reaction needed if failure isn't present after short time, check load and output, check wiring and lambda sensor, if necessary replace lambda sensor (and reset all learning values in EEPROM with tester) or ECU Note for EURO OBD application: this fail
411E	Lambda Sensor Heater: Open Load error of the LSU Heater Powerstage	LSUHtrSig	ON	Exhaust Gas Sensor	none	YES potential	Broken or disconnected wiring or defective lambda sensor	Check wiring and lambda sensor, if necessary replace lambda sensor (and reset all learning values in EEPROM with tester) Note for EURO OBD application: this failure activates a Performance limitation due to legislation. Therefore after repair following p
172E	Lambda Sensing: Blow out maximum time exceeded (LSU heating insufficient)	LSULowBatt	ON	Exhaust Gas Sensor	none	YES potential	LSU heater problem	Replace LSU sensor

DTC	Description	Dfp Name	MIL	OBD System	Power red	Long Term Failure	Reason of failure	Possible failure correction
125E	Lambda Sensing: Fault code to indicate SRC High error for O2 calibration	LSUO2ClbMax	ON	Exhaust Gas Sensor	none	YES potential	Defect in wiring of lambda sensor, inaccurate or defective lambda sensor, problems with EGR actuators or injection system	Check wiring and accuracy of lambda sensor, check functioning of injection system and EGR actuators, if necessary replace lambda sensor (and reset all learning values in EEPROM with tester) Note for EURO OBD application: this failure activates a Performa
225E	Lambda Sensing: Fault code to indicate SRC Low error for O2 calibration	LSUO2ClbMin	ON	Exhaust Gas Sensor	none	YES potential	Defect in wiring of lambda sensor, inaccurate or defective lambda sensor, problems with EGR actuators or injection system	Check wiring and accuracy of lambda sensor, check functioning of injection system and EGR actuators, if necessary replace lambda sensor (and reset all learning values in EEPROM with tester) Note for EURO OBD application: this failure activates a Performa
115E	Lambda Sensing: O2 value above the max threshold	LSUO2Max	ON	Exhaust Gas Sensor	none	YES potential	Defect in wiring (open circuit at line IA (Pump Cell)), Excessive drifting in O2 concentration during overrun, Defective lambda sensor, Short circuit to external source	Reset the Calibration factor and measure the O2 signal in overrun phase. Let the system learn (see failure LSU_O2ClbMin or Max: testing conditions are equalt to learning condition) and read the voltage at motoring (O2 content = 20.95%). If the signal stil
215E	Lambda Sensing: O2 value below the min threshold	LSUO2Min	ON	Exhaust Gas Sensor	none	YES potential	Defect in wiring, defective lambda sensor, short circuit to ground	Check lambda sensor and its entire wiring, if necessary replace lambda sensor (and reset all learning values in EEPROM with tester) Note for EURO OBD application: this failure activates a Performance limitation due to legislation. Therefore after repair

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DTC	Description	Dfp Name	MIL	OBD System	Power red	Long Term Failure	Reason of failure	Possible failure correction
315E	Lambda Sensing: Oxygen concentration implausibly high at High Load	LSUO2Plaus MaxFLd	ON	Exhaust Gas Sensor	none	YES potential	Leakage or blockage in exhaust gas system, defect in wiring of lambda sensor, inaccurate lambda or air flow sensor, problems in injection system (e.g. blockage in injectors)	Check exhaust gas system, check wiring of lambda sensor, check accuracy of lambda and air flow sensor, check injection system, if necessary replace lambda sensor (and reset all learning values in EEPROM with tester) Note for EURO OBD application: this fa
345E	Lambda Sensing: Oxygen concentration implausibly high at Overrun	LSUO2Plaus MaxOvrRun	ON	Exhaust Gas Sensor	none	YES potential	Leakage or blockage in exhaust gas system, defect in wiring of lambda sensor, inaccurate lambda or air flow sensor, problems in injection system (e.g. blockage in injectors)	Check exhaust gas system, check wiring of lambda sensor, check accuracy of lambda and air flow sensor, reset all learning factors of LSU in EEPROM and recheck the accuracy of LSU, check injection system, if necessary replace lambda sensor (and reset all l
365E	Lambda Sensing: Oxygen concentration implausibly high at Part Load	LSUO2Plaus MaxPartLd	ON	Exhaust Gas Sensor	none	YES potential	Leakage or blockage in exhaust gas system, defect in wiring of lambda sensor, inaccurate lambda or air flow sensor, problems in injection system (e.g. blockage in injectors)	Check exhaust gas system, check wiring of lambda sensor, check accuracy of lambda and air flow sensor, reset all learning factors of LSU in EEPROM and recheck the accuracy of LSU, check injection system, if necessary replace lambda sensor (and reset all l
325E	Lambda Sensing: Oxygen concentration implausibly low at High Load	LSUO2Plaus MinFLd	ON	Exhaust Gas Sensor	none	YES potential	Leakage or blockage in exhaust gas system, defect in wiring of lambda sensor, inaccurate lambda or air flow sensor, problems in injection system (e.g. leaky injectors)	Check exhaust gas system, check wiring of lambda sensor, check accuracy of lambda and air flow sensor, reset all learning factors of LSU in EEPROM and recheck the accuracy of LSU, check injection system, if necessary replace lambda sensor (and reset all l

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DTC	Description	Dfp Name	MIL	OBD System	Power red	Long Term Failure	Reason of failure	Possible failure correction
335E	Lambda Sensing: Oxygen concentration implausibly low at Overrun	LSUO2Plaus MinOvrRun	ON	Exhaust Gas Sensor	none	YES potential	Leakage or blockage in exhaust gas system, defect in wiring of lambda sensor, inaccurate lambda or air flow sensor, problems in injection system (e.g. leaky injectors)	Check exhaust gas system, check wiring of lambda sensor, check accuracy of lambda and air flow sensor, reset all learning factors of LSU in EEPROM and recheck the accuracy of LSU, check injection system, if necessary replace lambda sensor (and reset all l
355E	Lambda Sensing: Oxygen concentration implausibly low at part Load	LSUO2Plaus MinPartLd	ON	Exhaust Gas Sensor	none	YES potential	Leakage or blockage in exhaust gas system, defect in wiring of lambda sensor, inaccurate lambda or air flow sensor, problems in injection system (e.g. leaky injectors)	Check exhaust gas system, check wiring of lambda sensor, check accuracy of lambda and air flow sensor, reset all learning factors of LSU in EEPROM and recheck the accuracy of LSU, check injection system, if necessary replace lambda sensor (and reset all l
116E	Lambda Sensing: Fault check for k-value exceeding maximum limit	LSUPresCo mpMax	ON	Exhaust Gas Sensor	none	YES potential	Wrong exhaust pressure caclulation due to: - wrong exhaust flow estimation (Boost pressure, Boost temperature or HFM out of range, EGR rate not OK --> all cases should cause a special failure activation) - wrong ambient pressure (ambient pressure sensor)	Check if there is a failure stored conserning exhaust pressure caclulation due to: - Boost pressure - Boost temperature - HFM out of range - EGR rate not OK - ambient pressure Replace Lambda sensor (and reset learning values in EEPROM with tester) No

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DTC	Description	Dfp Name	MIL	OBD System	Power red	Long Term Failure	Reason of failure	Possible failure correction
216E	Lambda Sensing: Fault check for k-value below minimum limit	LSUPresCompMin	ON	Exhaust Gas Sensor	none	YES potential	Wrong exhaust pressure caclulation due to: - wrong exhaust flow estimation (Boost pressure, Boost temperature or HFM out of range, EGR rate not OK --> all cases should cause a special failure activation) - wrong ambient pressure (ambient pressure sensor)	Check if there is a failure stored conserning exhaust pressure caclulation due to: - Boost pressure - Boost temperature - HFM out of range - EGR rate not OK - ambient pressure Replace Lambda sensor (and reset learning values in EEPROM with tester)
112E	Lambda sensor Wiring: Lambda Sensor inner Resistance calibration value too High	LSURiClbMax	ON	Exhaust Gas Sensor	none	YES potential	Defect in wiring of lambda sensor (heater lines), inaccurate or defective lambda sensor	Check wiring and accuracy of lambda sensor, if necessary replace lambda sensor (and reset the learning factors in EEPROM with tester) Note for EURO OBD application: this failure activates a Performance limitation due to legislation. Therefore after repai
212E	Lambda sensor Wiring: Lambda Sensor inner Resistance calibration value too Low	LSURiClbMin	ON	Exhaust Gas Sensor	none	YES potential	Defect in wiring of lambda sensor (heater lines), inaccurate or defective lambda sensor	Check wiring and accuracy of lambda sensor, if necessary replace lambda sensor (and reset the learning factors in EEPROM with tester) Note for EURO OBD application: this failure activates a Performance limitation due to legislation. Therefore after repai

DTC	Description	Dfp Name	MIL	OBD System	Power red	Long Term Failure	Reason of failure	Possible failure correction
223E	Lambda Sensor Supply: low battery voltage at the SPI chip	LSUSPIBattLowMin	ON	Exhaust Gas Sensor	none	YES potential	wiring defect, defective lambda sensor or SPI chip in ECU	Check Wiring of lambda sensor, if necessary replace lambda sensor (and reset the learning factors in EEPROM with tester) or ECU Note for EURO OBD application: this failure activates a Performance limitation due to legislation. Therefore after repair foll
452E	Lambda sensor Wiring: Fault check to indicate SPI chip error of lambda sensor	LSUSPISig	ON	Exhaust Gas Sensor	none	YES potential	SPI chip in ECU defective	Replace ECU
113E	Lambda Sensor Temperature: LSU sensor temperature Ri exceeds the maximum limit	LSUtExcMax	ON	Exhaust Gas Sensor	none	YES potential	Defect in wiring of sensor. Disconnected lambda sensor. Short circuit to ground in UN line. Defective lambda sensor.	Check entire wiring of the sensor and the sensor itself, check connection of lambda sensor, if necessary replace lambda sensor (and reset the learning factors in EEPROM with tester) Note for EURO OBD application: this failure activates a Performance lim

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DTC	Description	Dfp Name	MIL	OBD System	Power red	Long Term Failure	Reason of failure	Possible failure correction
213E	Lambda Sensor Temperature: LSU sensor temperature Ri is below the minimum limit	LSUtExcMin	ON	Exhaust Gas Sensor	none	YES potential	Disconnected lambda sensor. Open load in VM or UN sensor line Defect in wiring of sensor Defective lambda sensor	Check connection of lambda sensor, check entire wiring of the sensor and the sensor itself, if necessary replace lambda sensor (and reset the learning factors in EEPROM with tester) Note for EURO OBD application: this failure activates a Performance li
442E	Lambda sensor Wiring: O2 Voltage exceeds the threshold value for shunting	LSUWireIPSig	ON	Exhaust Gas Sensor	none	YES potential	shunt in wire connections of lambda sensor	check wiring of lambda sensor, if necessary replace lambda sensor (and reset the learning factors in EEPROM with tester) Note for EURO OBD application: this failure activates a Performance limitation due to legislation. Therefore after repair following p
612E	Lambda sensor Wiring: short to battery at Pump Cell (IA,IP), Nernst Cell (UN), or virtual ground VG	LSUWireSCB	ON	Exhaust Gas Sensor	none	YES potential	Short circuit to external source in one of the wiring lines of the lambda sensor, open load in virtual ground VG, defective LSU	Check entire wiring of lambda sensor, check lambda sensor itself, if necessary replace lambda sensor (and reset the learning factors in EEPROM with tester) Note for EURO OBD application: this failure activates a Performance limitation due to legislation.

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DTC	Description	Dfp Name	MIL	OBD System	Power red	Long Term Failure	Reason of failure	Possible failure correction
712E	Lambda sensor Wiring: short to ground at Pump Cell (IA,IP), Nernst Cell (UN), or virtual ground (VG)	LSUWireSCG	ON	Exhaust Gas Sensor	none	YES potential	Short circuit to ground in one of the wiring lines of the lambda sensor, defective LSU	Check entire wiring of lambda sensor, check lambda sensor itself, if necessary replace lambda sensor (and reset the learning factors in EEPROM with tester) Note for EURO OBD application: this failure activates a Performance limitation due to legislation.
1179	DPF Lube Oil monitoring: Fuel in oil has exceded the Maximum limit	LubFlMax	OFF		YES (technical)	NO	Excessive oil dilution by fuel due to post injections during particulate filter regeneration	Change lubrication oil and reset the fuel-in-oil calculation via tester, using UDS Routine Control Service (ID $0255)
A179	DPF Lube Oil monitoring: Fuel in oil has exceded the warning limit	LubFlWarn	OFF		none	NO	Excessive oil dilution by fuel due to post injections during particulate filter regenerations	Change lubrication oil and reset the fuel-in-oil calculation via tester, using UDS Routine Control Service (ID $0255)
A279	DPF Lube Oil monitoring: Soot in oil has exceded the Maximum limit	LubSot	OFF		none	NO	Soot accumulation in the lubrication oil too high	Change lubrication oil and reset the soot-in-oil calculation via tester, using UDS Routine Control Service (ID $0245)

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DTC	Description	Dfp Name	MIL	OBD System	Power red	Long Term Failure	Reason of failure	Possible failure correction
1351	PTO actuation: Defect Fault Check for signal value above maximum limit	MaxPTOSwt	OFF		none	NO	PTO switch defective (possible short circuit)	Check PTO switch and wiring
B145	Fuel metering unit: Error check for loose contact between metering unit (MeUn) and ECU	MeUnIntCtct	OFF		none	NO	Bad Contacts on Connector "Broken" wiring harness or Insulation (--> short circuits) Defective Metering Unit (MeUn)	Check Connector Check Wiring Harness Check Metering unit (MeUn)
5145	Fuel metering unit: open load of metering unit output	MeUnOL	OFF		none	NO	Broken or disconnected wiring, defective metering unit	Check of wiring or metering unit
A145	Fuel metering unit: over teperature of device driver of metering unit	MeUnOT	OFF		none	NO	High battery voltage, high temperature inside ECU, high load or wiring problem	Check of wiring or metering unit

DTC	Description	Dfp Name	MIL	OBD System	Power red	Long Term Failure	Reason of failure	Possible failure correction
6145	Fuel metering unit: short circuit to battery of metering unit output	MeUnSCB	OFF		none	NO	Short circuit of wiring to external source, defective metering unit	Check of wiring or metering unit
7145	Fuel metering unit: short circuit to ground of metering unit output	MeUnSCG	OFF		none	NO	Short circuit of wiring to ground, defective metering unit	Check of wiring or replace metering unit
1145	Fuel metering unit: signal range check high error of metering unit AD-channel	MeUnSRCMax	OFF		none	NO	Metering unit defective or short circuit to external source	Check wiring or replace metering unit
2145	Fuel metering unit: signal range check low error of metering unit AD-channel	MeUnSRCMin	OFF		none	NO	Metering unit defective or short circuit to ground	Check wiring or replace metering unit

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DTC	Description	Dfp Name	MIL	OBD System	Power red	Long Term Failure	Reason of failure	Possible failure correction
5112	OBD Lamp (MIL): No load error	MILOL	ON	Compre hensive	none	NO	Broken or disconnected wiring or defective MIL.	Check of wiring or replace MIL
8112	OBD Lamp (MIL): Over temperature error	MILOvrTem p	ON		none	NO	High battery voltage, high load and high ECU temperature, defective wiring, MIL or ECU	Check load and output, check wiring, replace MIL or ECU
6112	OBD Lamp (MIL): Short circuit to battery error	MILSCB	ON	Compre hensive	none	NO	Short circuit of wiring to external source	Check of wiring
7112	OBD Lamp (MIL): Short circuit to ground error	MILSCG	ON	Compre hensive	none	NO	Short circuit of wiring to ground	Check of wiring
2351	PTO actuation: Defect Fault Check for signal value below minimum limit	MinPTOSwt	OFF		none	NO	PTO switch defective (possible short circuit)	Check PTO switch and wiring

DTC	Description	Dfp Name	MIL	OBD System	Power red	Long Term Failure	Reason of failure	Possible failure correction
A186	Injectors: Misfiring: Too many detected misfires at cylinder 1	MisfDetMisfireCyl_0	OFF		none	NO	Severe loss of compression or fuel injection failure	Check the sealing of the combustion chamber (piston ring, cylinder head...), look for injection failures of cylinder 1
A286	Injectors: Misfiring: Too many detected misfires at cylinder 3	MisfDetMisfireCyl_1	OFF		none	NO	Severe loss of compression or fuel injection failure	Check the sealing of the combustion chamber (piston ring, cylinder head...), look for injection failures of cylinder 3
A386	Injectors: Misfiring: Too many detected misfires at cylinder 4	MisfDetMisfireCyl_2	OFF		none	NO	Severe loss of compression or fuel injection failure	Check the sealing of the combustion chamber (piston ring, cylinder head...), look for injection failures of cylinder 4
A486	Injectors: Misfiring: Too many detected misfires at cylinder 2	MisfDetMisfireCyl_3	OFF		none	NO	Severe loss of compression or fuel injection failure	Check the sealing of the combustion chamber (piston ring, cylinder head...), look for injection failures of cylinder 4

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DTC	Description	Dfp Name	MIL	OBD System	Power red	Long Term Failure	Reason of failure	Possible failure correction
A586	Injectors: Misfiring: Too many recognized misfires in more than one cylinder	MisfDetMisfireMul	OFF		none	NO	Severe loss of compression or fuel injection failure	If Failure Path for Misfiring of single cylinders are also stored: check the dedicated cylinders. If no Failure path of Misfiring of single cylidner is stored (this means more than 1.00- show misfiring): check all cylinders for correct injection and or c
F11C	ECU Internal: Diagnostic fault check to report implausibility error in ADC monitoring of accelerator pedal	MoCADCCmp	OFF		none	NO	ECM internal failure	Replace ECM
F21C	ECU Internal: Diagnostic fault check to report the ADC test error	MoCADCTst	OFF		none	NO	ECM internal failure	Replace ECM

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DTC	Description	Dfp Name	MIL	OBD System	Power red	Long Term Failure	Reason of failure	Possible failure correction
F31C	ECU Internal: Diagnostic fault check to report the error in Voltage ratio in ADC monitoring	MoCADCVltgRatio	OFF		none	NO	ECM internal failure	Replace ECM
F41C	ECU Internal: Diagnostic fault check to report errors in query-/response-communication	MoCComErrCnt	OFF		none	NO	Defective monitoring module or CPU (e.g. impaired functioning of the CPU clock) of the EDC. Disturbed SPI-Bus.	If error exists only temporary (i.e. injection reoccurs) error can be ignored and error deleted in the fault memory. In case of a permanent error the injection remains blocked and the ECU has to be replaced
F51C	ECU Internal: Diagnostic fault check to report errors in SPI-communication	MoCComSPI	OFF		none	NO	Disturbed SPI-Bus	If ECM functions correctly after recovery only temporary SPI error occurred and fault memory can be deleted and error ignored. If permanent SPI error is present and the ECM does not leave boot block --> Replace ECM

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DTC	Description	Dfp Name	MIL	OBD System	Power red	Long Term Failure	Reason of failure	Possible failure correction
F61C	ECU Internal: Diagnostic fault check to report multiple error while checking the complete ROM-memory	MoCROMErrXPg	OFF		none	NO	Corrupted datas in the ECM,ECM internal failure	Reprogram ECM, replace ECM
E11C	ECU Internal Check: Communication timeout from CPU to Monitoring Module	MoCSOPErrMMRespByte	OFF		none	NO	ECM internal failure	Contact Help desk
E61C	ECU Internal Check: Error during Shut Off Path test; uncertain cause (defective injector or shut-off path)	MoCSOPErrNoChk	OFF		YES (technical)	NO	ECM internal failure or injector problem	Contact Help Desk

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DTC	Description	Dfp Name	MIL	OBD System	Power red	Long Term Failure	Reason of failure	Possible failure correction
E21C	ECU Internal Check: Wrong set response time	MoCSOPErrRespTime	OFF		none	NO	ECM internal failure	Contact Help Desk
E31C	ECU Internal Check: Too many SPI errors during Shut Off Pathtest execution.	MoCSOPErrSPI	OFF		none	NO	ECM internal failure	Contact Help Desk
F81C	ECU Internal: Diagnostic fault check to report the error in undervoltage monitoring	MoCSOPLoLi	OFF		none	NO	ECM internal failure	Contact Help Desk

DTC	Description	Dfp Name	MIL	OBD System	Power red	Long Term Failure	Reason of failure	Possible failure correction
F91C	ECU Internal: Diagnostic fault check to report that line to powerstage supply is not working correct	MoCSOPMM	OFF		none	NO	ECM internal failure	Contact Help Desk
E41C	ECU Internal Check: OS timeout in the shut off path test. Failure setting the alarm task period.	MoCSOPOSTimeOut	OFF		none	NO	ECM internal failure	Contact Help Desk

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DTC	Description	Dfp Name	MIL	OBD System	Power red	Long Term Failure	Reason of failure	Possible failure correction
E71C	ECU Internal Check: Error during positive test	MoCSOPPsvTstErr	OFF		none	NO	ECM internal failure	Contact Help Desk
FA1C	ECU Internal: Diagnostic fault check to report the timeout in the shut off path test	MoCSOPTimeOut	OFF		none	NO	ECM internal failure	Contact Help Desk
FB1C	ECU Internal: Diagnostic fault check to report the error in overvoltage monitoring	MoCSOPUpLi	OFF		none	NO	ECM internal failure	Contact Help Desk

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DTC	Description	Dfp Name	MIL	OBD System	Power red	Long Term Failure	Reason of failure	Possible failure correction
F32C	ECU Internal: Diagnostic fault check to report the accelerator pedal position error	MoFAPP	OFF		none	NO	ECM internal failure or calibration error.	Contact Helpdesk
F42C	ECU Internal: Diagnostic fault check to report the engine speed error	MoFESpd	OFF		none	NO	ECM internal failure or calibration error.	Contact Helpdesk
FC2C	ECU Internal Check: Error in the plausibility of the injection energizing time	MoFInjDatET	OFF		none	NO	ECM internal failure or calibration error.	Contact Helpdesk

DTC	Description	Dfp Name	MIL	OBD System	Power red	Long Term Failure	Reason of failure	Possible failure correction
F52C	ECU Internal: Error in the plausibility of the start of energising angles	MoFInjDatPhi	OFF		none	NO	ECM internal failure or calibration error.	Contact Helpdesk
F72C	ECU Internal: Diagnostic fault check to report the error due to non plausibility in ZFC	MoFInjQnt	OFF		none	NO	ECM internal failure or calibration error.	Contact Helpdesk
F12C	ECU Internal: Diagnosis fault check to report the demand for normal mode due to an error in the PoI2 quantity	MoFMode1	OFF		none	NO	ECM internal failure or calibration error.	Contact Helpdesk

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DTC	Description	Dfp Name	MIL	OBD System	Power red	Long Term Failure	Reason of failure	Possible failure correction
F22C	ECU Internal: Diagnosis fault check to report the error to demand for an ICO due to an error in the Pol2 shut-off	MoFMode2	OFF		none	NO	ECM internal failure or calibration error.	Contact Helpdesk
FD2C	ECU Internal: Error in the plausibility of Pol3 efficiency.	MoFMode3	OFF		none	NO	ECM internal failure or calibration error.	Contact Helpdesk
F82C	ECU Internal: Diagnostic fault check to report the error due to Over Run	MoFOvR	OFF		none	NO	Electronic disturbances, requested torque increase via tester, wrong application of injection relevant parameters, defective ECU	Contact Helpdesk

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DTC	Description	Dfp Name	MIL	OBD System	Power red	Long Term Failure	Reason of failure	Possible failure correction
F92C	ECU Internal: Diagnostic fault check to report the error due to injection quantity correction	MoFQntCor	OFF		none	NO	ECU internal failure or calibration error.	Contact Helpdesk
FA2C	ECU Internal: Diagnostic fault check to report the plausibility error in rail pressure monitoring	MoFRailP	OFF		none	NO	ECU internal failure or calibration error.	Contact Helpdesk
FB2C	ECU Internal: Diagnostic fault check to report the error due to torque comparison	MoFTrqCmp	OFF		none	NO	ECU internal failure or calibration error.	Contact Helpdesk

DTC	Description	Dfp Name	MIL	OBD System	Power red	Long Term Failure	Reason of failure	Possible failure correction
F13C	ECU Internal: Diagnosis of lead torque limitation (for fuel pressure control) forced by ECU monitoring level 2	MonLimCurr	OFF		none	NO	ECU internal failure	Replace ECU
F23C	ECU Internal: Diagnosis of lead torque limitation (for Air Control) forced by ECU monitoring level 2	MonLimLead	OFF		none	NO	ECU internal failure or failure in the data set calibration of ECU or another vehcile cotnrol unit	Contact Help desk
F33C	ECU Internal: Diagnosis of engine torque limitation forced by ECU monitoring level 2	MonLimSet	OFF		none	NO	ECU internal failure or failure in the data set calibration of ECU or another vehcile cotnrol unit	Contact Help desk

DTC	Description	Dfp Name	MIL	OBD System	Power red	Long Term Failure	Reason of failure	Possible failure correction
117D	ECU Voltage Supply: Reported OverVoltage of Supply	MonUMaxSupply1	OFF		none	NO	Excessive voltage supply of a CJ945 component: High battery voltage, defective wiring, internal defect of the ECM	Check the battery for correct voltage supply, check wiring. If defect remains replace ECM (internal defect)
217D	ECU Voltage Supply: Reported UnderVoltage of Supply	MonUMinSupply1	OFF		none	NO	Insufficient voltage supply of a CJ945 component: Low battery voltage, defective wiring, internal defect of the ECM	Check the battery for sufficient voltage supply, check wiring. If defect remains replace ECM (internal defect)
A13D	ECU Main relay: Early opening defect of main relay	MRlyErlyOpng	ON	Comprehensive	none	NO	The Main Relay is switrched off directly by Key 15 instead of the request of ECU: - in case vehicle equipped with "main electrical switch": engine stopped by "main switch" instead of Key 15 OR Main switch disconnected before afterrun finished. - due to wr	In case of vehicle equipped with "main electrical switch": inform driver of correct engine shut off by Key 15. In case of vehicle equipped with electronic "main electrical switch": check electronic of main switch for correct working (if opens after after

DTC	Description	Dfp Name	MIL	OBD System	Power red	Long Term Failure	Reason of failure	Possible failure correction
A23D	ECU Main relay: DFC for stuck main relay error	MRlyStk	ON	Compre hensive	none	NO	Main relay has a short circuit or is mechanically stuck in closed position	Check wiring or replace main relay
3359	DPF pressure monitoring: Fault check for Hoseline connection of differential pressor sensor	NplHsChngP PFltDiff	ON	PM filter	YES (technical)	NO	Differntial pressure sensor of filter upside down, hoselines crossed	Check differential pressure sensor mounting and hoselines. Reset offset drift compensation for diff.pressure sensor using dedicated UDS Routine Control Service (ID $0253)
31F3	Crankcase differential pressure : Value measured at ECM shut off not plausible	NplPresSens CrCsP	OFF		none	NO	Inaccurate or defective crankcase differential pressure sensor, defect in the wiring	Check wiring and the accuracy of the crankcase differential pressure sensor and replace it if necessary

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DTC	Description	Dfp Name	MIL	OBD System	Power red	Long Term Failure	Reason of failure	Possible failure correction
3559	DPF pressure monitoring: Fault check for the pressure sensor plausibility	NplPresSensPPFltDiff	ON	PM filter	none	NO	Differential pressure sensor is inaccurate.	Check accuracy of differential pressure sensor.
3351	PTO actuation: Defect Fault Check for non plausible signal value	NplPTOSwt	OFF		none	NO	PTO switch defective	Check and replace PTO switch
F12F	Info: OBD Long Time failure: fuel system	OBDGenFaultClct1	OFF		none	YES direct (ControlMask)	NOx Level (HardNOx or Soft NOx) was exceeded and contemporanelly a failure of this system by FID_OBDGenFaultClct1 was activ	NONE - check the failure memory for other failures, which could have caused the activation of the long time failure (FID for this Long time failure group set?) and follow the repair action for that failure. If the failure was not yet validated (i.e. sti

DTC	Description	Dfp Name	MIL	OBD System	Power red	Long Term Failure	Reason of failure	Possible failure correction
F23F	Info: OBD Long Time failure: Reagent Quality	OBDGenFaultClct10	OFF		none	YES direct (ControlMask)	A failure of this system by FID_OBDGenFaultClct10 was activ	NONE - check the failure memory for other failures, which could have caused the activation of the long time failure (FID for this Long time failure group set?) and follow the repair action for that failure. If the failure was not yet validated (i.e. sti
F33F	Info: OBD Long Time failure: NOx Sensor	OBDGenFaultClct11	OFF		none	YES direct (ControlMask)	A failure of this system by FID_OBDGenFaultClct11 was activ	NONE - check the failure memory for other failures, which could have caused the activation of the long time failure (FID for this Long time failure group set?) and follow the repair action for that failure. If the failure was not yet validated (i.e. sti
F43F	Info: OBD Long Time failure: Oxygen sensor	OBDGenFaultClct12	OFF		none	YES direct (ControlMask)	A failure of this system by FID_OBDGenFaultClct12 was activ	NONE - check the failure memory for other failures, which could have caused the activation of the long time failure (FID for this Long time failure group set?) and follow the repair action for that failure. If the failure was not yet validated (i.e. stil

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DTC	Description	Dfp Name	MIL	OBD System	Power red	Long Term Failure	Reason of failure	Possible failure correction
F53F	Info: OBD Long Time failure:	OBDGenFaultClct13	OFF		none	YES direct (ControlMask)	A failure of this system which activates FID_OBDGenFaultClct13, is activ	NONE - check the failure memory for other failures, which could have caused the activation of the long time failure (FID for this Long time failure group set?) and follow the repair action for that failure. If the failure was not yet validated (i.e. stil
F63F	Info: OBD Long Time failure:	OBDGenFaultClct14	OFF		none	YES direct (ControlMask)	A failure of this system which activates FID_OBDGenFailtClct14, is activ	NONE - check the failure memory for other failures, which could have caused the activation of the long time failure (FID for this Long time failure group set?) and follow the repair action for that failure. If the failure was not yet validated (i.e. stil
F73F	Info: OBD Long Time failure:	OBDGenFaultClct15	OFF		none	YES direct (ControlMask)	A failure of this system which activates FID_OBDGenFailtClct15, is activ	NONE - check the failure memory for other failures, which could have caused the activation of the long time failure (FID for this Long time failure group set?) and follow the repair action for that failure. If the failure was not yet validated (i.e. stil

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DTC	Description	Dfp Name	MIL	OBD System	Power red	Long Term Failure	Reason of failure	Possible failure correction
F83F	Info: OBD Long Time failure:	OBDGenFaultClct16	OFF		none	YES direct (ControlMask)	A failure of this system which activates FID_OBDGenFailtClct16, is activ	NONE - check the failure memory for other failures, which could have caused the activation of the long time failure (FID for this Long time failure group set?) and follow the repair action for that failure. If the failure was not yet validated (i.e. still
F22F	Info: OBD Long Time failure: Injection timing system	OBDGenFaultClct2	OFF		none	YES direct (ControlMask)	NOx Level (HardNOx or Soft NOx) was exceeded and contemporanelly a failure of this system by FID_OBDGenFaultClct2 was activ	NONE - check the failure memory for other failures, which could have caused the activation of the long time failure (FID for this Long time failure group set?) and follow the repair action for that failure. If the failure was not yet validated (i.e. sti
F32F	Info: OBD Long Time failure: air System:	OBDGenFaultClct3	OFF		none	YES direct (ControlMask)	NOx Level (HardNOx or Soft NOx) was exceeded and contemporanelly a failure of this system by FID_OBDGenFaultClct3 was activ	NONE - check the failure memory for other failures, which could have caused the activation of the long time failure (FID for this Long time failure group set?) and follow the repair action for that failure. If the failure was not yet validated (i.e. stil

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DTC	Description	Dfp Name	MIL	OBD System	Power red	Long Term Failure	Reason of failure	Possible failure correction
F42F	Info: OBD Long Time failure: EGR System:	OBDGenFaultClct4	OFF		none	YES direct (ControlMask)	NOx Level (HardNOx or Soft NOx) was exceeded and contemporanelly a failure of this system by FID_OBDGenFaultClct4 was activ	NONE - check the failure memory for other failures, which could have caused the activation of the long time failure (FID for this Long time failure group set?) and follow the repair action for that failure. If the failure was not yet validated (i.e. sti
F52F	Info: OBD Long Time failure: SCR System	OBDGenFaultClct5	OFF		none	YES direct (ControlMask)	NOx Level (HardNOx or Soft NOx) was exceeded and contemporanelly a failure of this system by FID_OBDGenFaultClct5 was activ	NONE - check the failure memory for other failures, which could have caused the activation of the long time failure (FID for this Long time failure group set?) and follow the repair action for that failure. If the failure was not yet validated (i.e. sti
F62F	Info: OBD Long Time failure: SCR Temperature	OBDGenFaultClct6	OFF		none	YES direct (ControlMask)	NOx Level (HardNOx or Soft NOx) was exceeded and contemporanelly a failure of this system by FID_OBDGenFaultClct6 was activ	NONE - check the failure memory for other failures, which could have caused the activation of the long time failure (FID for this Long time failure group set?) and follow the repair action for that failure. If the failure was not yet validated (i.e. stil

DTC	Description	Dfp Name	MIL	OBD System	Power red	Long Term Failure	Reason of failure	Possible failure correction
F72F	Info: OBD Long Time failure: SCR Reagent Dosing:	OBDGenFaultClct7	OFF		none	YES direct (ControlMask)	NOx Level (HardNOx or Soft NOx) was exceeded and contemporanelly a failure of this system by FID_OBDGenFaultClct7 was activ	NONE - check the failure memory for other failures, which could have caused the activation of the long time failure (FID for this Long time failure group set?) and follow the repair action for that failure. If the failure was not yet validated (i.e. sti
F82F	Info: OBD Long Time failure: No Reagent dosing	OBDGenFaultClct8	OFF		none	YES direct (ControlMask)	NOx Level (HardNOx or Soft NOx) was exceeded and contemporanelly a failure of this system by FID_OBDGenFaultClct8 was activ	NONE - check the failure memory for other failures, which could have caused the activation of the long time failure (FID for this Long time failure group set?) and follow the repair action for that failure. If the failure was not yet validated (i.e. sti
F13F	Info: OBD Long Time failure: Empty Reagent Tank	OBDGenFaultClct9	OFF		none	YES direct (ControlMask)	A failure of this system by FID_OBDGenFaultClct9 was activ	NONE - check the failure memory for other failures, which could have caused the activation of the long time failure (FID for this Long time failure group set?) and follow the repair action for that failure. If the failure was not yet validated (i.e. stil

DTC	Description	Dfp Name	MIL	OBD System	Power red	Long Term Failure	Reason of failure	Possible failure correction
F17C	ECU Internal: Diagnostic fault check to report "WDA active" due to errors in query-/response communication	OCWDACom	OFF		none	NO	ECM internal failure	Contact Help Desk
217C	ECU Internal: Diagnostic fault check to report "ABE active" due to undervoltage detection	OCWDALowVltg	OFF		none	NO	ECM internal failure	Contact Help Desk
117C	ECU Internal: Diagnostic fault check to report "ABE active" due to overvoltage detection	OCWDAOvrVltg	OFF		none	NO	ECM internal failure	Contact Help Desk

DTC	Description	Dfp Name	MIL	OBD System	Power red	Long Term Failure	Reason of failure	Possible failure correction
A27C	ECU Internal: Error report "ABE/WDA active" due to an unknown reason	OCWDAReasUnkwn	OFF		none	NO	ECM internal failure	Contact Help Desk
A379	DPF Lube Oil monitoring: Critical time for oil dilution exceeded	OilLftRgnOilDil	OFF		YES (technical)	NO	Excessive engine running time under oil dilution conditions, due to retarded post injection for filter regeneration.	Replace engine oil and reset timer for oil dilution with tester using the dedicated UDS service "Routine Control ID =$245"
11B3	Oil Level sensor: Duty cycle greater than maximum	OilLvlMax	OFF		none	NO	Defect in the oil level sensor or its electronic module, defect in wiring connecting the sensor	Check wiring of sensor, check oil level sensor and the electronic module
21B3	Oil Level sensor: Duty cycle lesser than minimum	OilLvlMin	OFF		none	NO	Defect in the oil level sensor or its electronic module, defect in wiring connecting the sensor	Check wiring of sensor, check oil level sensor and the electronic module

DTC	Description	Dfp Name	MIL	OBD System	Power red	Long Term Failure	Reason of failure	Possible failure correction
31B3	Oil Level sensor: Plausibility Check	OilLvlNpl	OFF		none	NO	Defect in wiring, defect in oil level sensor or electronic module OR too many repetitions of: interruped engine afterruns (e.g. fast ignition key ON-OFF-ON), too short vehicle stand stills, time signal not received via CAN from Body Computer, engine start	Warm up the engine, turn ignition off and let the engine cool down entirely (afterrun must be completed), check wiring of sensor, check oil level sensor and the electronic module
A1B3	Oil Level sensor: Oil level sensor fault	OilLvlSens	OFF		none	NO	Defect in the oil level sensor or its electronic module, defect in wiring connecting the sensor	Check wiring of sensor, check oil level sensor and the electronic module
11C3	Oil pressure sensing: Diagnostic fault check for oil pressure below minimum limit	OilPMin	none		none	NO	Low oil pressure or digital oil pressure switch blocked	Check oil level and pressure, check oil pressure switch

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DTC	Description	Dfp Name	MIL	OBD System	Power red	Long Term Failure	Reason of failure	Possible failure correction
21C3	Oil pressure sensing: Plausibility check for oil pressure sensor	OilPNpl	none		none	NO	Oil pressure digital switch defective	Check oil pressure digital switch
14D3	Oil Temperature sensing: Oil temperature too high plausibility error	OilTNplHigh	OFF		none	NO	Inaccurate oil temperature sensor or defect (e.g. blockage, insufficient recirculation) in the oil system.	Check oil temperature sensor for accuracy and check oil system
D5D3	Oil Temperature sensing: Physical Signal above maximum limit	OilTPhysRng Hi	OFF		none	NO	Oil temperature sensor inaccurate or defective	Check or replace oil temperature sensor

DTC	Description	Dfp Name	MIL	OBD System	Power red	Long Term Failure	Reason of failure	Possible failure correction
E5D3	Oil Temperature sensing: Physical Signal below minimum limit	OilTPhysRng Lo	OFF		none	NO	Oil temperature sensor inaccurate or defective	Check or replace oil temperature sensor
44D3	Oil Temperature sensing: Signal error on CAN for Oil Temperature	OilTSig	OFF		none	NO	Oil temperature sensor defective	Check sensor
15D3	Oil Temperature sensing: SRC High for Oil Temperature	OilTSRCMax	OFF		none	NO	Sensor defective or wiring short circuit to external source	Check wiring or replace sensor
25D3	Oil Temperature sensing: SRC low for Oil Temperature	OilTSRCMin	OFF		none	NO	Sensor defective or wiring short circuit to ground	Check wiring or replace sensor

DTC	Description	Dfp Name	MIL	OBD System	Power red	Long Term Failure	Reason of failure	Possible failure correction
35D3	Oil Temperature: failed plausibility check at ECU start	OilTVDPlaus	OFF		none	NO	Oil temperature sensor drifted	Check sensor
3189	Oxicat Temp Monitoring: Passive monitoring of the oxidation catalyst	OxiCatMon PasMin	ON	NMHC catalyst	none	YES potential	Temperature sensors before and after Oxicat interchanged Oxicat thermal aged (too low efficiency) Post injection not working	Check correct connection of Temperature sensors at Oxicat Check / Replace Oxicat Check Injectors
3289	Oxicat: Monitoring of OxiCat im Rapid Heat Up	OxiCatMon RHU	OFF		none	NO	Temperature sensors before and after Oxicat interchanged Oxicat thermal aged (too low efficiency) Post injection not working	Check correct connection of Temperature sensors at Oxicat Check / Replace Oxicat Check Injectors

DTC	Description	Dfp Name	MIL	OBD System	Power red	Long Term Failure	Reason of failure	Possible failure correction
3143	Boost pressure: Ambient and Boost pressure are different at start	PCACDsEnvPPls	ON	Boost Pressure System	none	YES direct	Either the boost pressure or the ambient pressure sensor is is out of specification	Check which sensor deviates at engine stand still too much from the actual ambient pressure by: - Analysing ambient condition (Snap Shot) of failure occurrence - measuring both values with tester - Ambient pressure: By external tool or estimated: 1000 m
A143	Boost pressure: Over Boost Detection	PCACDsOvrBst	ON	Boost Pressure System	none	YES direct	Boost pressure regulation device of the the turbocharger is malfunctioning (sticking or blocked in closed position) or Boost pressure sensor measures too high pressure	Check for defects in the boost pressure control functionality and ensure proper functioning of the regulation device (e.g. VGT or wastegate): - PWM pressure transducer (if available) - VGT or Wastegate mechanism - control mechanism is correct, then check
D143	Diagnostic Fault Check for Physical Range Check low error	PCACDsPhysRngHi	ON	Boost Pressure System	none	YES direct	Inaccurate or defective pressure sensor, defect in the wiring	Check wiring and the accuracy of the pressure sensor and replace it if necessary

DTC	Description	Dfp Name	MIL	OBD System	Power red	Long Term Failure	Reason of failure	Possible failure correction
E143	Diagnostic Fault Check for Physical Range Check low error	PCACDsPhysRngLo	ON	Boost Pressure System	none	YES direct	Inaccurate or defective pressure sensor, defect in the wiring	Check wiring and the accuracy of the pressure sensor and replace it if necessary
4143	Boost pressure: CAN signal error for Boost pressure	PCACDsSig	ON	Boost Pressure System	YES (technical)	YES direct	Disturbed CAN signal transmission or Boost pressure sensor is defective	Check the CAN for proper configuration and functioning Check the Boost pressure sensor
1143	Boost pressure: SRC High Boost pressure sensor	PCACDsSRCMax	ON	Boost Pressure System	none	YES direct	Sensor defective or short circuit to external source	Check wiring or replace sensor

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DTC	Description	Dfp Name	MIL	OBD System	Power red	Long Term Failure	Reason of failure	Possible failure correction
2143	Boost pressure: SRC low for Boost pressure sensor	PCACDsSRCMin	ON	Boost Pressure System	none	YES direct	Sensor defective or short circuit to ground	Check wiring or replace sensor
1118	Boost pressure control: Too Low Boost pressure in closed loop control	PCRGovDvtMax	ON	Comprehensive	YES (technical)	YES direct	Mechanically blocked boost pressure actuator Electrical defect in actuator In case of VTG control by pressure or vacuum: No sub pressure at VTG actuator Foreign matter in the intake duct (deposits etc). Leakage in air system (e.g. tube compressor - Interc	Check mechanical and electrical functionality of the actuator for VTG If present: Check system of sub pressure Ensure that the EGR actuators are functioning correctly Check intake duct to deposits and/or leakages Check Boost pressure sensor Check EGR sys
2118	Boost pressure control: Too High Boost pressure in closed loop control	PCRGovDvtMin	ON	Comprehensive	YES (technical)	YES direct	Mechanically blocked boost pressure actuator Electrical defect in actuator Boost pressure sensor measures too high values	Check mechanical and electrical functionality of the actuator If there is not failure detected in VGT, check Boost pressure sensor

DTC	Description	Dfp Name	MIL	OBD System	Power red	Long Term Failure	Reason of failure	Possible failure correction
1218	Boost pressure control: VGT actuator output lower than expected	PCRPlausMax	OFF		none	NO	Defective boost pressure actuator (e.g. WG or VGT), defective air or vacuum supply (if present), intake duct blocked by foreign matter, EGR actuator jammed (closed position) or boost pressure sensor gives wrong signal (measured boost pressure higher than	Check boost pressure actuator for proper functioning, clean intake duct, ensure correct functioning of EGR actuators and EGR trhottle resp. exhaust flap Check Boost pressure sensor
2218	Boost pressure control: VGT actuator output higher than expected	PCRPlausMin	OFF		none	NO	Defective boost pressure actuator (e.g. WG or VGT), defective air or vacuum supply (if present), intake duct blocked by foreign matter, EGR actuator jammed (open position) or boost pressure sensor gives wrong signal (measured boost pressure lower than th	Check boost pressure actuator for proper functioning, clean intake duct, ensure correct functioning of EGR actuators and EGR trhottle resp. exhaust flap Check Boost pressure sensor

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DTC	Description	Dfp Name	MIL	OBD System	Power red	Long Term Failure	Reason of failure	Possible failure correction
1255	Pressure control valve: lerning factor too high	PCVfacAdaptMax	OFF		none	NO	The actual pressure is higher for a certain current than according specification. This can be caused by an addtional current through the pressure control valve (partial short circuit in wiring) which is not measured in ECU. Fuel pressure control valve no	Check wiring and pressure control valve. Replace pressure control valve and reset EEPROM learning datas resp. execute first learning with tester.
2255	Pressure control valve: lerning factor too low	PCVfacAdaptMin	OFF		none	NO	The actual pressure is lower for a certain current than according specification. This can be caused by a "current loss" by the wirning (partial short circuit in wiring) which does not go through the pressure cotnrol valve. Fuel pressure control valve not	Check wiring and pressure control valve. Replace pressure control valve and reset EEPROM learning datas resp. execute first learning with tester.

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DTC	Description	Dfp Name	MIL	OBD System	Power red	Long Term Failure	Reason of failure	Possible failure correction
A255	Pressure control valve: number of startup attempts exceeded the limit	PCVNoStrt	OFF		none	NO	Pressure can not rise fast enough during cranking due to: - very high fuel temperatures during starts (check ambient conditions) - leaky fuel pressure control valve - wrong positon of the fuel quantity cotnrol valve (MPROP) - bad efficiency of high pressu	Check ambient conditions: if fuelt temperature > 80° C --> this could be the reason for the failed start --> check the reason for high fuel temperature. Check Fuel rail pressure control valve Ceck Fuel system for leakages and the high pressure pump for e
5155	Pressure control valve: open load of pressure control valve output	PCVOL	OFF		engine stop (indirect)	NO	Broken or disconnected wiring or defective pressure control valve	Check of wiring or replace relay or pressure control valve
A155	Pressure control valve: over temperature of device driver of pressure control valve	PCVOT	OFF		engine stop (indirect)	NO	Short circuit of wiring or internal failure of pressure control valve	Check of wiring and pressure control valve.

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DTC	Description	Dfp Name	MIL	OBD System	Power red	Long Term Failure	Reason of failure	Possible failure correction
6155	Pressure control valve: short circuit to battery of pressure control valve output	PCVSCB	OFF		YES (technical)	NO	Short circuit of wiring to external source or internal failure of pressure control valve	Check of wiring and pressure control valve.
7155	Pressure control valve: short circuit to ground of pressure control valve output	PCVSCG	OFF		engine stop (indirect)	NO	Short circuit of wiring to ground or internal failure of pressure control valve	Check of wiring and pressure control valve.
1155	Pressure control valve: signal range check high error of pressure control valve AD-channel	PCVSRCMax	OFF		YES (technical)	NO	Short circuit (to ground) or broken contact in wire or pressure control valve itself. Possibly also failure in ECU powerstage	Check wiring and pressure control valve.

DTC	Description	Dfp Name	MIL	OBD System	Power red	Long Term Failure	Reason of failure	Possible failure correction
2155	Pressure control valve: signal range check low error of pressure control valve AD-channel	PCVSRCMin	OFF		YES (technical)	NO	Short circuit in wire or pressure control valve itself. Possibly also failure in ECU powerstage	Check wiring and pressure control valve.
1169	DPF model plausibility: Ash load in DPF has exceeded the limit	PFltAshLdMax	OFF		none	NO	Accumulated ashes has reached maximum volume.	Replace the filter or remove it and wash it.
1159	DPF pressure monitoring: Diagnostic fault check for maximum pressure differential charecterstics	PFltCharPDiffMax	OFF		YES (technical)	NO	Filter is clogged or not installed correctly (exhaust flow restricted)	Check filter for proper installation and function

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DTC	Description	Dfp Name	MIL	OBD System	Power red	Long Term Failure	Reason of failure	Possible failure correction
2159	DPF pressure monitoring: Diagnostic fault check for minimum pressure differential charecterstics	PFltCharPDiffMin	ON	PM filter	YES (technical)	NO	Filter is not installed or has an internal breakthrough	Check filter for proper installation and function (no black smoke at exhaust pipe)
2169	DPF model plausibility: Diagnostic fault check for damaged particulate filter	PFltDstrMin	ON	PM filter	none	NO	Cracked or dismounted particulate filter	Check if black smoke is visible at exhaust pipe.
AA69	DPF model plausibility: FIlter soot accumulation below expected minimum	PFltEff	ON	PM filter	none	NO	Filter efficiency too low	Check DPF integrity

DTC	Description	Dfp Name	MIL	OBD System	Power red	Long Term Failure	Reason of failure	Possible failure correction
A169	DPF model plausibility: Diagnostic fault check for SRC high in Flow Resistance	PFltEngPrt	ON	PM filter	YES (technical)	NO	DPF is clogged. Filter regeneration was not successful or not possible.	Launch service regeneration via tester and check filter and exhaust system.
A969	DPF model plausibility: Forced Regeneration Error	PFltFrdRgn	OFF		none	NO	Problem of regeneration, which is shown with dedicated Failure (see there)	According the proposal a dedicated failure concerning regeneration
AB69	Monitoring for too frequent regeneration of the particulate filter	PFltFreq	OFF		none	NO	Inefficient DPF regeneration.	

DTC	Description	Dfp Name	MIL	OBD System	Power red	Long Term Failure	Reason of failure	Possible failure correction
A269	DPF model plausibility: Fault path for maximum number of locked regenerations for HD	PFltLckHDNumRgn2	OFF		none	NO	See Dfp_PFltLckRgn, only here an error is triggered specifically for a regeneration request of 2	Check filter and state variable of saturation model, look for sensor errors
A369	DPF model plausibility: Fault path for maximum number of locked regenerations for HD	PFltLckHDNumRgn3	OFF		none	NO	See Dfp_PFltLckRgn, only here an error is triggered specifically for regeneration request of 3	Check filter and state variable of saturation model, look for sensor errors
A469	DPF model plausibility: Fault path for maximum number of locked regenerations	PFltLckRgn	ON	PM filter	YES (technical)	NO	Special ambient conditions or vehicle use (city cycle) which lead to too low DPF temperature for real regeneration. Temperature sensor before Oxicat or before DPF show too low temperature, so system dose not detect real regeneration. Oxicat does not wor	Check temperature sensor before Oxicat and before DPF for correct measuring Check Oxicat Check DPF

DTC	Description	Dfp Name	MIL	OBD System	Power red	Long Term Failure	Reason of failure	Possible failure correction
51E2	DPF Control Lamp: No load error	PFltLmpOL	OFF		none	NO	Broken or disconnected wiring or defective lamp	Check of wiring or replace lamp
81E2	DPF Control Lamp: Over temperature error	PFltLmpOvrTemp	OFF		none	NO	High battery voltage, high temperature inside ECU, high load or wiring problem	No reaction needed if failure isn't present after short time, check load and output, check wiring, replace ECU
61E2	DPF Control Lamp: Short circuit to battery error	PFltLmpSCB	OFF		none	NO	Short circuit of wiring to battery	Check of wiring
71E2	DPF Control Lamp: Short circuit to ground error	PFltLmpSCG	OFF		none	NO	Short circuit of wiring to ground	Check of wiring

DTC	Description	Dfp Name	MIL	OBD System	Power red	Long Term Failure	Reason of failure	Possible failure correction
1269	DPF model plausibility: Fault path for too high regeneration request	PFltNumRgnMax	ON	PM filter	YES (technical)	NO	Special ambeint conditions and vehicle use wich does not allow correct DPF regeneration due to too low exhaust temperatures Temperature sensor before Oxicat and/or before DPF shows too low temperature Oxicat does not work correctly (bad HC burning) - in	Service regeneration should be performed to reduce soot mass in the filter If Service regeneration fails: see troubleshooting there.
2C69	Incomplete regeneration of the DPF	PFltRgnNoCompl	OFF		none	NO		
A569	DPF model plausibility: Diagnostic fault check for SRC high in Flow Resistance	PFltRgnPerm	OFF		none	NO	Special ambient conditions or vehicle use (city cycle) which lead to too low DPF temperature for real regeneration. Temperature sensor before Oxicat or before DPF show too low temperature, so system dose not detect real regeneration. Oxicat does not wor	Check temperature sensor before Oxicat and before DPF for correct measuring Check Oxicat Check DPF

DTC	Description	Dfp Name	MIL	OBD System	Power red	Long Term Failure	Reason of failure	Possible failure correction
1669	DPF model plausibility: Deviation between pressure differential and soot load charecterstics	PFltSotMsDvtMax	ON	PM filter	none	NO	Increased raw particulate engine emissions because of a problem with EGR, air mass sensor, injectors or injection timing deviation or particulate filter mounting problem (increased exhaust flow resistance) or differential pressure sensor deviation.	Check differential pressure sensor. check particulate filter mounting, check if other failure are present concerning EGR, air mass sensor or injectors.
2669	DPF model plausibility: Deviation between pressure differential and soot load charecterstics	PFltSotMsDvtMin	OFF		none	NO	Reduced particulate filter efficiency (filter breach) or differential pressure sensor deviation or raw particulate emissions lower than expected because of air/injection system daviation, EGR problem or injection timing deviation.	Check filter integrity (no black smoke at exhaust pipe), check differential pressure sensor, check if other failure are present concerning EGR, air mass sensor or injectors.
1869	DPF model plausibility: Maximum soot mass in DPF exceeded	PFltSotMsMax	OFF		none	NO	Regeneration could not be carried out for too long	Perform particulate filter service regeneration.
1769	DPF model plausibility: SRC High in DPF Flow Resistance	PFltSRCMaxFlwRstn	ON	PM filter	none	NO	Filter is clogged or not installed correctly, exhaust flow restricted Pressure difference sensor measures too high values	Check filter for proper installation and function Check Pressure Difference sensor over filter

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DTC	Description	Dfp Name	MIL	OBD System	Power red	Long Term Failure	Reason of failure	Possible failure correction
2769	DPF model plausibility: SRC Low in DPF Flow Resistance	PFltSRCMinFlwRstn	ON	PM filter	none	NO	Filter is not installed or has an internal breakthrough Difference pressure sensor measures too low value due to: - broken line before sensor . sensor itself	Check filter for proper installation and function (no black smoke at exhaust pipe) Check Hose line of Diffferential pressure sensor (upstrem DPF) Check Differential Pressure sensor
1C69	DPF emergency regeneration switch: Not plausible switch value	PFltSwtRgnNPL	OFF		none	NO	Emergency regeneration switch pressed at high vehicle speed or switch defective	Check emergency regeneration switch
325D	ECU internal Check: Not plausible fault: non strictly monotonus q curves quantity in conversion maps fuel quantity /torque	PhyModNonMonMapNpl	OFF		none	NO	Wrong application of the basic map for conversion of injection quantity to inner torque and vice versa (FMTC_trq2qBas_MAP).	Application error, the dataset has a faulty application and should not be used.
D243	Boost pressure sensor: Physical Signal above maximum limit	PIntkVUsPhysRngHi	ON	Boost Pressure System	none	YES direct	Inaccurate or defective boost pressure sensor, defect in the wiring	Check wiring and the accuracy of the boost pressure sensor and replace it if necessary

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DTC	Description	Dfp Name	MIL	OBD System	Power red	Long Term Failure	Reason of failure	Possible failure correction
E243	Boost pressure sensor: Physical Signal below minimum limit	PlntkVUsPhysRngLo	ON	Boost Pressure System	none	YES direct	Inaccurate or defective boost pressure sensor, defect in the wiring	Check wiring and the accuracy of the boost pressure sensor and replace it if necessary
3343	Boost Pressure: Diagnostic Fault Check for High Plausibility error	PlntkVUsPlsHi	ON	Boost Pressure System	YES (technical)	YES direct	Inaccurate or defective boost pressure sensor, defect in the wiring	Check wiring and the accuracy of the boost pressure sensor and replace it if necessary
3443	Boost Pressure: Diagnostic Fault Check for Low Plausibility error	PlntkVUsPlsLo	ON	Boost Pressure System	YES (technical)	YES direct	Inaccurate or defective boost pressure sensor, defect in the wiring	Check wiring and the accuracy of the boost pressure sensor and replace it if necessary
1243	Boost pressure sensor: Signal value above maximum limit	PlntkVUsSRCMax	ON	Boost Pressure System	YES (technical)	YES direct	Short circuit of sensor to external source or defective sensor	Check wiring or replace sensor
2243	Boost pressure sensor: Signal value below minimum limit	PlntkVUsSRCMin	ON	Boost Pressure System	YES (technical)	YES direct	Short circuite at wiring harness or inside the boost pressure sensor to ground or open circuit	Check of wiring or replace boost pressure sensor

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DTC	Description	Dfp Name	MIL	OBD System	Power red	Long Term Failure	Reason of failure	Possible failure correction
91BA	SCR Reagent Pump: Not Defrosted within time	PPCWUCResp	OFF		none	YES direct	Pump blocked heating system not OK	Contact Helpdesk as failure active due to a calibration failure: PPC_rDycPmpWUC not between 81 an 91% with 0.00%.
A149	Diagnostic Fault Check for Signal value above maximum limit -- Enhanced check	PPFltDiffEnhSRCMax	ON	PM filter	none	NO	Signal range check of the DPF differential pressure sensor. Upper limit exceeded, possibly Pressor sensor failure, connection tubes or filter substrate.	Please check differential pressure sensor as well as connection tubes. If failure remains, check particulate filter substrate if blocked.
B149	Diagnostic Fault Check for Signal value below minimum limit -- Enhanced check	PPFltDiffEnhSRCMin	OFF		none	NO	Signal range check of the DPF differential pressure sensor. lower limit exceeded, possibly Pressor sensor failure, connection tubes or filter substrate.	Please check differential pressure sensor as well as connection tubes. If failure remains, check particulate filter substrate if missing.
3149	Diagnostic Fault Check for dynamic plausibility	PPFltDiffNplDyn	ON	PM filter	none	NO	Dynamic plausibility check of the DPF differential pressure sensor. Possibly Pressor sensor failure, connection tubes or filter substrate.	Please check differential pressure sensor as well as connection tubes. If failure remains, check particulate filter substrate if missing.

DTC	Description	Dfp Name	MIL	OBD System	Power red	Long Term Failure	Reason of failure	Possible failure correction
C149	Diagnostic Fault Check for Hoseline Monitoring	PPFltDiffNplHsLn	ON	PM filter	none	NO	Hose connection upstream from the particle filter detached or completely blocked. Atmospheric pressure is constantly present at the pressure connection upstream from the particle filter.	Check mounting, check hoseline
D149	DPF differential pressure sensor: Sooted hoseline detected	PPFltDiffSot	ON	PM filter	none	NO	Hoseline to differential pressure sensor clogged or mounting incorrect	Check mounting, check hoseline
6149	DPF differential pressure sensor: SRC value above maximum limit	PPFltDiffSRCMax	OFF		none	NO	Short circuit of sensor to external source or defective sensor	Check wiring or replace sensor
7149	DPF differential pressure sensor: SRC value below minimum limit	PPFltDiffSRCMin	OFF		none	NO	Short circuit of wiring to ground or defective sensor	Check wiring or replace sensor

DTC	Description	Dfp Name	MIL	OBD System	Power red	Long Term Failure	Reason of failure	Possible failure correction
D249	DPF upstream pressure sensor: Physical Signal above maximum limit	PPFltUsPhys RngHi	OFF		none	NO	Inaccurate or defective DPF upstream pressure sensor, defect in the wiring	Check wiring and the accuracy of the pressure sensor and replace it if necessary
E249	DPF upstream pressure sensor: Physical Signal below minimum limit	PPFltUsPhys RngLo	OFF		none	NO	Inaccurate or defective DPF upstream pressure sensor, defect in the wiring	Check wiring and the accuracy of the pressure sensor and replace it if necessary
C249	Diagnostic fault check for frozen sensor	PPFltUsSens Frz	OFF		none	NO	DPF upstream pressure sensor is frozen due to very low temperature	No action needed, if temperature is above freezeing value sensor should work correctly
A249	DPF upstream pressure sensor: SRC value above maximum limit	PPFltUsSRC Max	OFF		none	NO	Short circuit of sensor to external source or defective sensor	Check wiring or replace sensor

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DTC	Description	Dfp Name	MIL	OBD System	Power red	Long Term Failure	Reason of failure	Possible failure correction
B249	DPF upstream pressure sensor: SRC value below minimum limit	PPFltUsSRC Min	OFF		none	NO	Short circuit of sensor to ground or defective sensor	Check wiring or replace sensor
51B2	Presupply pump: open load of pre-supply pump output	PSPOL	OFF		YES (technical)	NO	Broken or disconnected wiring or defective presupply pump	Check of wiring or replace presupply pump
81B2	Presupply pump: Over temperature error on ECU powerstage for Pre supply pump	PSPOvrTem p	OFF		YES (technical)	NO	High battery voltage, high temperature inside ECU, high load or wiring problem	No reaction needed if failure isn't present after short time, check load and output, check wiring, replace ECU
61B2	Presupply pump: short circuit to battery of pre-supply pump output	PSPSCB	OFF		YES (technical)	NO	Short circuit of wiring to external source or inside presupply pump	Check of wiring or replace presupply pump

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DTC	Description	Dfp Name	MIL	OBD System	Power red	Long Term Failure	Reason of failure	Possible failure correction
71B2	Presupply pump: short circuit to ground of pre-supply pump output	PSPSCG	OFF		YES (technical)	NO	Short circuit of wiring to ground or inside presupply pump	Check of wiring or replace presupply pump
A115	Fuel pressure control CPC: PCV position not plausible (too much closed) during rail press control "both devices"	RailCPC1	OFF		none	YES potential	Possible faults in high pressure part: injection nozzle stuck in open position, low efficiency of high pressure pump, internal leakage of injector, leaking pressure control valve Too low pressure at High pressure pump inlet due clogged filter, leaking lo	Check low pressure system for clogging (specially fuel filter) Che tubing between presupply and gear pump Check feeding of presupply pump (possibly low due to clogged tubes at tank outlet) Check hgih pressure part for leakages (internal / external) Ch
A215	Fuel pressure control CPC: fuel rail pressure below minimal threshold during rail press control "both devices"	RailCPC3	OFF		none	YES potential	Possible faults in high pressure part. injection nozzle stuck in open position, low efficiency of high pressure pump, internal leakage of injector, leaking pressure control valve, leaking high pressure part itself (tubing) Too low pressure at High pressu	Check low pressure system for clogging (specially fuel filter) Che tubing betweenmpresupply and gear pump Check feeding of presupply pump (possibly low due to clogged tubes at tank outlet) Check hgih pressure part for leakages (internal / external) Ch

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DTC	Description	Dfp Name	MIL	OBD System	Power red	Long Term Failure	Reason of failure	Possible failure correction
A315	Fuel pressure control CPC: fuel rail pressure exceeds maximal limit during rail press control "both devices"	RailCPC4	OFF		none	YES potential	Pressure control valve (PCV) stucks in closed position Too high current to PCV (due to partial short circuite) Metering Unit (MeUn) stuck if "full feeding position" Metering Unit (MeUn) without current Zero delivery trhottle clogged or pressure after Zero	Check Pressure control valve (PCV), if openning (PWM = 0%) Check metering Unit (MeUn), if closing (PWM = 100%) Check electric wiring to PCV and MeUn Check low pressure fuel tubes (return from CP to tank free?) Check zero delivery valve for correct wor
3115	Fuel pressure control CPC: PCV position not plausible (too much closed) during rail press control "both devices" with Low Fuel level in Tank	RailCPCTnk Lo1	OFF		none	YES potential	Possible faults in high pressure part: injection nozzle stuck in open position, low efficiency of high pressure pump, internal leakage of injector, leaking pressure control valve Too low pressure at High pressure pump inlet due clogged filter, leaking lo	Check low pressure system for clogging (specially fuel filter) Che tubing between presupply and gear pump Check feeding of presupply pump (possibly low due to clogged tubes at tank outlet) Check hgih pressure part for leakages (internal / external) Ch
1215	Fuel pressure control CPC: fuel rail pressure below minimal threshold during rail press control "both devices" with low Fuel level in Tank	RailCPCTnk Lo3	OFF		none	YES potential	Possible faults in high pressure part. injection nozzle stuck in open position, low efficiency of high pressure pump, internal leakage of injector, leaking pressure control valve, leaking high pressure part itself (tubing)	Possible faults in high pressure part. injection nozzle stuck in open position, low efficiency of high pressure pump, internal leakage of injector, leaking pressure control valve, leaking high pressure part itself (tubing)

DTC	Description	Dfp Name	MIL	OBD System	Power red	Long Term Failure	Reason of failure	Possible failure correction
2315	Fuel pressure control CPC: fuel rail pressure exceeds maximal limit during rail press control "both devices" with low Fuel level in Tank	RailCPCTnk Lo4	OFF		none	YES potential	Pressure control valve (PCV) stucks in closed position Too high current to PCV (due to partial short circuite) Metering Unit (MeUn) stuck if "full feeding position" Metering Unit (MeUn) without current Zero delivery trhottle clogged or pressure after Zero	Check Pressure control valve (PCV), if openning (PWM = 0%) Check metering Unit (MeUn), if closing (PWM = 100%) Check electric wiring to PCV and MeUn Check low pressure fuel tubes (return from CP to tank free?) Check zero delivery valve for correct wor
A125	Fuel pressure control Metering unit: Too low fuel rail pressure with MeUn Control	RailMeUn0	OFF		YES (technical)	YES potential	Leakage in the high pressure system: injection nozzle stuck in open position, low efficiency of high pressure pump, internal leakage of injector, leaking pressure control valve Too low pressure at High pressure pump inlet due clogged filter, leaking low	Check low pressure system for clogging (specially fuel filter) Che tubing between presupply and gear pump Check feeding of presupply pump (possibly low due to clogged tubes at tank outlet) Check hgih pressure part for leakages (internal / external) Ch
A225	Fuel pressure control Metering unit: Tool low fuel rail pressure concerning the fuel feeding with MeUn Control	RailMeUn1	OFF		none	YES potential	Leakage in the high pressure system: injection nozzle stuck in open position, low efficiency of high pressure pump, internal leakage of injector, leaking pressure control valve Too low pressure at High pressure pump inlet due clogged filter, leaking low	Check low pressure system for clogging (specially fuel filter) Che tubing between presupply and gear pump Check feeding of presupply pump (possibly low due to clogged tubes at tank outlet) Check hgih pressure part for leakages (internal / external) Ch

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DTC	Description	Dfp Name	MIL	OBD System	Power red	Long Term Failure	Reason of failure	Possible failure correction
A925	Fuel pressure (Rail) control: Leakage in high pressure system	RailMeUn10	OFF		none	YES potential	External leakage in the high pressure system. Pressure in back flow tube too high (i.e. back flow tube clogged) Pressure Control valve PCV does not close completely. Fuel pressure sensor signal shows wrong (mainly too low) values. Injectors leak inter	Check if system has no external leakage Check if back flow tube is free Check if PCV is tighten Check if fuel pressure sensor signal is correct Check if injectors close well Check High pressure pump delivery
A325	Fuel pressure control Metering unit: Too high fuel fuel pressure with MeUn on 0-delivery state	RailMeUn2	OFF		YES (technical)	NO	Metering unit stuck in open position, zero-delivery throttle clogged, metering unit without power due to electricel error. Low pressure side: Pressure before gear pump too high (e.g. by pressure relieve valve), pressure after zero-delivery throttle too hi	Check metering Unit (MeUn), if closing (PWM = 100%) Check electric wiring to PCV and MeUn Check low pressure fuel tubes (return from CP to tank free?) Check zero delivery valve for correct working
A425	Fuel pressure control Metering unit: Too high fuel fuel pressure with MeUn on 0-delivery state (second stage)	RailMeUn22	OFF		none	YES potential	Metering unit stuck in open position, zero-delivery throttle clogged, metering unit without power due to electricel error. Low pressure side: Pressure before gear pump too high (e.g. by pressure relieve valve), pressure after zero-delivery throttle too hi	Check metering Unit (MeUn), if closing (PWM = 100%) Check electric wiring to PCV and MeUn Check low pressure fuel tubes (return from CP to tank free?) Check zero delivery valve for correct working

DTC	Description	Dfp Name	MIL	OBD System	Power red	Long Term Failure	Reason of failure	Possible failure correction
A525	Fuel pressure control Metering unit: Fuel rail pressure below limit with MeUn Control	RailMeUn3	OFF		engine stop (indirect)	YES potential	Leakage in the high pressure system: injection nozzle stuck in open position, low efficiency of high pressure pump, internal leakage of injector, leaking pressure control valve Too low pressure at High pressure pump inlet due clogged filter, leaking low	Check low pressure system for clogging (specially fuel filter) Che tubing between presupply and gear pump Check feeding of presupply pump (possibly low due to clogged tubes at tank outlet) Check hgih pressure part for leakages (internal / external) Ch
A625	Fuel pressure control Metering unit: Fuel Rail pressure above maximum limit with MeUn Control	RailMeUn4	OFF		YES (technical)	YES potential	Metering unit stuck in open position, zero-delivery throttle clogged, metering unit without power due to electricel error. Low pressure side: Pressure before gear pump too high (e.g. by pressure relieve valve), pressure after zero-delivery throttle too hi	Check metering Unit (MeUn), if closing (PWM = 100%) Check electric wiring to PCV and MeUn Check low pressure fuel tubes (return from CP to tank free?) Check zero delivery valve for correct working
A725	Fuel pressure control Metering unit: Fuel Rail pressure above maximum limit with MeUn Control (second stage)	RailMeUn42	OFF		none	YES potential	Metering unit stuck in open position, zero-delivery throttle clogged, metering unit without power due to electricel error. Low pressure side: Pressure before gear pump too high (e.g. by pressure relieve valve), pressure after zero-delivery throttle too hi	Check metering Unit (MeUn), if closing (PWM = 100%) Check electric wiring to PCV and MeUn Check low pressure fuel tubes (return from CP to tank free?) Check zero delivery valve for correct working

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DTC	Description	Dfp Name	MIL	OBD System	Power red	Long Term Failure	Reason of failure	Possible failure correction
A825	Fuel pressure control Metering unit: Too low fuel rail pressure in fast transient condition with MeUn Control	RailMeUn5	OFF		engine stop (indirect)	NO	Leakage in the high pressure system: injection nozzle stuck in open position, low efficiency of high pressure pump, internal leakage of injector, leaking pressure control valve Too low pressure at High pressure pump inlet due clogged filter, leaking low	Check low pressure system for clogging (specially fuel filter) Che tubing between presupply and gear pump Check feeding of presupply pump (possibly low due to clogged tubes at tank outlet) Check hgih pressure part for leakages (internal / external) Ch
AA25	Fuel pressure control Metering unit: Leakage in high pressure system detected at idle	RailMeUn8	OFF		none	YES potential	Leakage in the high pressure system: injection nozzle stuck in open position, low efficiency of high pressure pump, internal leakage of injector, leaking pressure control valve Too low pressure at High pressure pump inlet due clogged filter, leaking low	Check low pressure system for clogging (specially fuel filter) Che tubing between presupply and gear pump Check feeding of presupply pump (possibly low due to clogged tubes at tank outlet) Check hgih pressure part for leakages (internal / external) Ch
1125	Fuel pressure control Metering unit: Too low fuel rail pressure with MeUn Control with empty Tank	RailMeUnTnkLo0	OFF		none	YES potential	Leakage in the high pressure system: injection nozzle stuck in open position, low efficiency of high pressure pump, internal leakage of injector, leaking pressure control valve Too low pressure at High pressure pump inlet due clogged filter, leaking low	Check low pressure system for clogging (specially fuel filter) Che tubing between presupply and gear pump Check feeding of presupply pump (possibly low due to clogged tubes at tank outlet) Check hgih pressure part for leakages (internal / external) Ch

DTC	Description	Dfp Name	MIL	OBD System	Power red	Long Term Failure	Reason of failure	Possible failure correction
1225	Fuel pressure control Metering unit: Tool low fuel rail pressure concerning the fuel feeding with MeUn Control with empty Tank	RailMeUnTnkLo1	OFF		none	YES potential	Leakage in the high pressure system: injection nozzle stuck in open position, low efficiency of high pressure pump, internal leakage of injector, leaking pressure control valve Too low pressure at High pressure pump inlet due clogged filter, leaking low	Check low pressure system for clogging (specially fuel filter) Che tubing between presupply and gear pump Check feeding of presupply pump (possibly low due to clogged tubes at tank outlet) Check hgih pressure part for leakages (internal / external) Ch
3125	Fuel pressure (Rail) control: Leakage in high pressure system with empty tank	RailMeUnTnkLo10	OFF		none	YES potential	External leakage in the high pressure system. Pressure in back flow tube too high (i.e. back flow tube clogged) Pressure Control valve PCV does not close completely. Fuel pressure sensor signal shows wrong (mainly too low) values. Injectors leak inter	Check if system has no external leakage Check if back flow tube is free Check if PCV is tighten Check if fuel pressure sensor signal is correct Check if injectors close well Check High pressure pump delivery
2225	Fuel pressure control Metering unit: Too high fuel fuel pressure with MeUn on 0-delivery state with empty tank	RailMeUnTnkLo2	OFF		none	NO	Metering unit stuck in open position, zero-delivery throttle clogged, metering unit without power due to electricel error. Low pressure side: Pressure before gear pump too high (e.g. by pressure relieve valve), pressure after zero-delivery throttle too hi	Check metering Unit (MeUn), if closing (PWM = 100%) Check electric wiring to PCV and MeUn Check low pressure fuel tubes (return from CP to tank free?)
2125	Fuel pressure control Metering unit: Too high fuel fuel pressure with MeUn on 0-delivery state (second stage) swith empty tank	RailMeUnTnkLo22	OFF		none	YES potential	Metering unit stuck in open position, zero-delivery throttle clogged, metering unit without power due to electricel error. Low pressure side: Pressure before gear pump too high (e.g. by pressure relieve valve), pressure after zero-delivery throttle too hi	Check metering Unit (MeUn), if closing (PWM = 100%) Check electric wiring to PCV and MeUn Check low pressure fuel tubes (return from CP to tank free?) Check zero delivery valve for correct working

DTC	Description	Dfp Name	MIL	OBD System	Power red	Long Term Failure	Reason of failure	Possible failure correction
2325	Fuel pressure control Metering unit: Fuel rail pressure below limit with MeUn Control with empty tank	RailMeUnTnkLo3	OFF		engine stop (indirect)	YES potential	Leakage in the high pressure system: injection nozzle stuck in open position, low efficiency of high pressure pump, internal leakage of injector, leaking pressure control valve Too low pressure at High pressure pump inlet due clogged filter, leaking low	Check low pressure system for clogging (specially fuel filter) Che tubing between presupply and gear pump Check feeding of presupply pump (possibly low due to clogged tubes at tank outlet) Check hgih pressure part for leakages (internal / external) Ch
1425	Fuel pressure control Metering unit: Fuel Rail pressure above maximum limit with MeUn Control with empty tank	RailMeUnTnkLo4	OFF		none	YES potential	Metering unit stuck in open position, zero-delivery throttle clogged, metering unit without power due to electricel error. Low pressure side: Pressure before gear pump too high (e.g. by pressure relieve valve), pressure after zero-delivery throttle too hi	Check metering Unit (MeUn), if closing (PWM = 100%) Check electric wiring to PCV and MeUn Check low pressure fuel tubes (return from CP to tank free?) Check zero delivery valve for correct working
1325	Fuel pressure control Metering unit: Fuel Rail pressure above maximum limit with MeUn Control (second stage) with empty tank	RailMeUnTnkLo42	OFF		none	NO	Metering unit stuck in open position, zero-delivery throttle clogged, metering unit without power due to electricel error. Low pressure side: Pressure before gear pump too high (e.g. by pressure relieve valve), pressure after zero-delivery throttle too hi	Check metering Unit (MeUn), if closing (PWM = 100%) Check electric wiring to PCV and MeUn Check low pressure fuel tubes (return from CP to tank free?) Check zero delivery valve for correct working
1525	Fuel pressure control Metering unit: Too low fuel rail pressure in fast transient condition with MeUn Control with empty tank	RailMeUnTnkLo5	OFF		none	NO	Leakage in the high pressure system: injection nozzle stuck in open position, low efficiency of high pressure pump, internal leakage of injector, leaking pressure control valve Too low pressure at High pressure pump inlet due clogged filter, leaking low	Check low pressure system for clogging (specially fuel filter) Che tubing between presupply and gear pump Check feeding of presupply pump (possibly low due to clogged tubes at tank outlet) Check hgih pressure part for leakages (internal / external) Ch

DTC	Description	Dfp Name	MIL	OBD System	Power red	Long Term Failure	Reason of failure	Possible failure correction
3225	Fuel pressure control Metering unit: Leakage in high pressure system detected at idle an empty fuel tank	RailMeUnTnkLo8	OFF		none	YES potential	Leakage in the high pressure system: injection nozzle stuck in open position, low efficiency of high pressure pump, internal leakage of injector, leaking pressure control valve Too low pressure at High pressure pump inlet due clogged filter, leaking low	Check low pressure system for clogging (specially fuel filter) Che tubing between presupply and gear pump Check feeding of presupply pump (possibly low due to clogged tubes at tank outlet) Check hgih pressure part for leakages (internal / external) Ch
A135	Fuel pressure control Pressure control valve: Too low fuel rail pressure with PCV control	RailPCV0	OFF		YES (technical)	YES potential	Leakage in the high pressure system: injection nozzle stuck in open position, low efficiency of high pressure pump, internal leakage of injector, leaking pressure control valve Too low pressure at High pressure pump inlet due clogged filter, leaking low	Check low pressure system for clogging (specially fuel filter) Che tubing between presupply and gear pump Check feeding of presupply pump (possibly low due to clogged tubes at tank outlet) Check hgih pressure part for leakages (internal / external) Ch
A235	Fuel pressure control Pressure control valve: Too low fuel rail pressure concerning set value PCV (PCV Control)	RailPCV1	OFF		engine stop (indirect)	YES potential	Leakage in the high pressure system: injection nozzle stuck in open position, low efficiency of high pressure pump, internal leakage of injector, leaking pressure control valve Too low pressure at High pressure pump inlet due clogged filter, leaking low	Check low pressure system for clogging (specially fuel filter) Che tubing between presupply and gear pump Check feeding of presupply pump (possibly low due to clogged tubes at tank outlet) Check hgih pressure part for leakages (internal / external) Ch
A335	Fuel pressure control Pressure control valve: Too high fuel rail pressure concerning set value PCV (PCV Control)	RailPCV2	OFF		YES (technical)	YES potential	Pressure Control Valve (PCV) stuck in close position, additional current trhough PCV due to electric problem in wiring, return flow tube from PCV cloggged	Check PCV for opening (PWM=0% --> no pressure) Check wiring harness for "external" electric power (short circuit) Check return tube from PCV to tank for clogging

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DTC	Description	Dfp Name	MIL	OBD System	Power red	Long Term Failure	Reason of failure	Possible failure correction
A435	Fuel pressure control Pressure control valve: Too high fuel rail pressure concerning set value PCV- second stage (PCV Control)	RailPCV22	OFF		none	YES potential	Pressure Control Valve (PCV) stuck in closed position additional current trhough PCV due to electric problem in wiring, return flow tube from PCV cloggged	Check PCV for opening (PWM=0% --> no pressure) Check wiring harness for "external" electric power (short circuit) Check return tube from PCV to tank for clogging
A535	Fuel pressure control Pressure control valve: minimum rail pressure not reached with PCV Control	RailPCV3	OFF		engine stop (indirect)	YES potential	Leakage in the high pressure system: injection nozzle stuck in open position, low efficiency of high pressure pump, internal leakage of injector, leaking pressure control valve Too low pressure at High pressure pump inlet due clogged filter, leaking low	Check low pressure system for clogging (specially fuel filter) Che tubing between presupply and gear pump Check feeding of presupply pump (possibly low due to clogged tubes at tank outlet) Check hgih pressure part for leakages (internal / external) Ch
A635	Fuel pressure control Pressure control valve: maximum rail pressure exceeded with PCV control	RailPCV4	OFF		YES (technical)	YES potential	Pressure Control Valve (PCV) stuck in close position, additional current trhough PCV due to electric problem in wiring, return flow tube from PCV cloggged Metering Unit (MeUn) stuck in full feeding position No electrical power to metering unit	Check PCV for opening (PWM=0% --> no pressure) Check wiring harness for "external" electric power (short circuit) Check return tube from PCV to tank for clogging Check metering Unit for 0-delivery (PWM=100% --> no delivery) Check wiring for metering u
A735	Fuel pressure control Pressure control valve: maximum rail pressure exceeded with PCV control (second stage)	RailPCV42	OFF		none	YES potential	Pressure Control Valve (PCV) stuck in close position, additional current trhough PCV due to electric problem in wiring, return flow tube from PCV clogged Metering Unit (MeUn) stuck in full feeding position No electrical power to metering unit	Check PCV for opening (PWM=0% --> no pressure) Check wiring harness for "external" electric power (short circuit) Check return tube from PCV to tank for clogging Check metering Unit for 0-delivery (PWM=100% --> no delivery) Check wiring for metering u

DTC	Description	Dfp Name	MIL	OBD System	Power red	Long Term Failure	Reason of failure	Possible failure correction
1135	Fuel pressure control Pressure control valve: Too low fuel rail pressure with PCV control with empty fuel tank	RailPCVTnkLo0	OFF		none	YES potential	Leakage in the high pressure system: injection nozzle stuck in open position, low efficiency of high pressure pump, internal leakage of injector, leaking pressure control valve Too low pressure at High pressure pump inlet due clogged filter, leaking low	Check low pressure system for clogging (specially fuel filter) Che tubing between presupply and gear pump Check feeding of presupply pump (possibly low due to clogged tubes at tank outlet) Check hgih pressure part for leakages (internal / external) Ch
1235	Fuel pressure control Pressure control valve: Too low fuel rail pressure concerning set value PCV (PCV Control) with empty fuel tank	RailPCVTnkLo1	OFF		engine stop (indirect)	YES potential	Leakage in the high pressure system: injection nozzle stuck in open position, low efficiency of high pressure pump, internal leakage of injector, leaking pressure control valve Too low pressure at High pressure pump inlet due clogged filter, leaking low	Check low pressure system for clogging (specially fuel filter) Che tubing between presupply and gear pump Check feeding of presupply pump (possibly low due to clogged tubes at tank outlet) Check hgih pressure part for leakages (internal / external) Ch
2235	Fuel pressure control Pressure control valve: Too high fuel rail pressure concerning set value PCV (PCV Control) with empty fuel tank	RailPCVTnkLo2	OFF		none	YES potential	Pressure Control Valve (PCV) stuck in close position, additional current trhough PCV due to electric problem in wiring, return flow tube from PCV clogged	Check PCV for opening (PWM=0% --> no pressure) Check wiring harness for "external" electric power (short circuit) Check return tube from PCV to tank for clogging
2135	Fuel pressure control Pressure control valve: Too high fuel rail pressure concerning set value PCV- second stage (PCV Control) with empty fuel tank	RailPCVTnkLo22	OFF		none	YES potential	Pressure Control Valve (PCV) stuck in closed position additional current trhough PCV due to electric problem in wiring, return flow tube from PCV clogged	Check PCV for opening (PWM=0% --> no pressure) Check wiring harness for "external" electric power (short circuit) Check return tube from PCV to tank for clogging

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DTC	Description	Dfp Name	MIL	OBD System	Power red	Long Term Failure	Reason of failure	Possible failure correction
2335	Fuel pressure control Pressure control valve: minimum rail pressure not reached with PCV Control wit empty fuel tank	RailPCVTnkLo3	OFF		engine stop (indirect)	YES potential	Leakage in the high pressure system: injection nozzle stuck in open position, low efficiency of high pressure pump, internal leakage of injector, leaking pressure control valve Too low pressure at High pressure pump inlet due clogged filter, leaking low	Check low pressure system for clogging (specially fuel filter) Che tubing between presupply and gear pump Check feeding of presupply pump (possibly low due to clogged tubes at tank outlet) Check hgih pressure part for leakages (internal / external) Ch
1535	Fuel pressure control Pressure control valve: maximum rail pressure exceeded with PCV control with empty fuel tank	RailPCVTnkLo4	OFF		none	YES potential	Pressure Control Valve (PCV) stuck in close position, additional current trhough PCV due to electric problem in wiring, return flow tube from PCV cloggged Metering Unit (MeUn) stuck in full feeding position No electrical power to metering unit	Check PCV for opening (PWM=0% --> no pressure) Check wiring harness for "external" electric power (short circuit) Check return tube from PCV to tank for clogging Check metering Unit for 0-delivery (PWM=100% --> no delivery) Check wiring for metering u
1435	Fuel pressure control Pressure control valve: maximum rail pressure exceeded with PCV control (second stage) with empty fuel tank	RailPCVTnkLo42	OFF		none	YES potential	Pressure Control Valve (PCV) stuck in close position, additional current trhough PCV due to electric problem in wiring, return flow tube from PCV clogged Metering Unit (MeUn) stuck in full feeding position No electrical power to metering unit	Check PCV for opening (PWM=0% --> no pressure) Check wiring harness for "external" electric power (short circuit) Check return tube from PCV to tank for clogging Check metering Unit for 0-delivery (PWM=100% --> no delivery) Check wiring for metering u
A233	Fuel pressure (Rail) sensor: Rail pressure raw value is intermittent	RailPGradMon	OFF		none	NO	Periodical loose of contact in the weiring, the connectors or sensor itself	Check wiring and connectors of Rail pressure sensor for good contacts. Check sensor, replace sensor if necessary and reset learning values in EEPROM / start New learning
1333	Fuel pressure (Rail) sensor: rail pressure raw value is above maximum offset	RailPOfsTstMax	OFF		YES (technical)	YES potential	Rail pressure sensor inaccurate	Ensure correct wiring and proper functioning of rail pressure sensor, Replace sensor if necessary and reset learning values in EEPROM / start New learning
2333	Fuel pressure (Rail) sensor: rail pressure raw value is below minimum offset	RailPOfsTstMin	OFF		YES (technical)	YES potential	Rail pressure sensor inaccurate	Ensure correct wiring and proper functioning of rail pressure sensor, replace sensor Replace sensor if necessary and reset learning values in EEPROM / start New learning

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DTC	Description	Dfp Name	MIL	OBD System	Power red	Long Term Failure	Reason of failure	Possible failure correction
1133	Fuel pressure (Rail) sensor: Sensor voltage above upper limit	RailPSRCMax	OFF		YES (technical)	NO	Short circuit of wiring to external source or defective pressure sensor	Check wiring and proper functioning of rail pressure sensor Replace sensor if necessary and reset learning values in EEPROM / start New learning
2133	Fuel pressure (Rail) sensor: Sensor voltage below lower limit	RailPSRCMin	OFF		YES (technical)	NO	Short circuit of wiring to ground or defective pressure sensor	Check wiring and proper functioning of rail pressure sensor Replace sensor if necessary and reset learning values in EEPROM / start New learning
A55A	Info: SCR reagent tank level below first warning level, DFC for triggering warning action dependent on filling level of reducing agent	SCRCtl_WarnStgy_WarnLvl1	none	NOx Aftertreatment	none	NO	Reducing agent tank level below first warning level	Refill reducing agent tank
A65A	Info: SCR reagent tank level below second warning level, DFC for triggering warning action dependent on filling level of reducing agent	SCRCtl_WarnStgy_WarnLvl2	OFF		none	NO	Reducing agent tank level below low second warning level	Refill reducing agent tank
A75A	Info: SCR reagent tank level below third warning level, DFC for triggering warning action dependent on filling level of reducing agent	SCRCtl_WarnStgy_WarnLvl3	OFF		none	NO	Reducing agent tank level below third warning level	Refill reducing agent tank
A85A	Info: SCR reagent tank level below fourth warning level, DFC for triggering warning action dependent on filling level of reducing agent	SCRCtl_WarnStgy_WarnLvl4	OFF		none	NO	Reducing agent tank level below fourth warning level	Refill reducing agent tank

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DTC	Description	Dfp Name	MIL	OBD System	Power red	Long Term Failure	Reason of failure	Possible failure correction
A7CA	SCR Reagent Feeding: UREA pressure too high	SCRMonMetCtlOvrPresErr	OFF	NOx Aftertreatment	none	YES direct	UREA level too low (suction of air) Back flow into tank clogged Pump control not OK (e.g. pump is running on max due to electr failure). UREA pressure sensor shows too high values.	Check if UREA level was OK whe failure occurred (see ambient conditions). Check if back flow line into tank is open (with test: adjust system to normal pressure (5bar) and check, if pressure is constant, if not, stop pump --> pressure must drop down (=sy
A6CA	SCR Reagent Feeding: UREA pressure too low	SCRMonMetCtlUndrPresErr	OFF	NOx Aftertreatment	none	YES direct	UREA level too low (suction of air) Leakage in the UREA system outside or internal (i.e. back flow into tank, leakage into pump housing, external leakage). Pump not delivering enough. Reveting valve blocked "open" (occurrence during normal operation -	Check, if enough UREA was in tank when failure occured (ambient conditions) Check if pump can reach enough pressure with tester: set system under normal pressure (5 bar) : - chek if there is an external leakage (visible check) - if 5bar reachable: open
A5CA	SCR Reagent Feeding: UREA pressure too high (2nd level)	SCRMonOvrPresErr	OFF	NOx Aftertreatment	none	YES direct	UREA level too low (suction of air) Back flow into tank clogged Pump control not OK (e.g. pump is running on max due to electr failure). UREA pressure sensor shows too high values.	Check if UREA level was OK whe failure occurred (see ambient conditions). Check if back flow line into tank is open (with test: adjust system to normal pressure (5bar) and check, if pressure is constant, if not, stop pump --> pressure must drop down (=sy
A2CA	SCR Reagent Feeding: Pressurisation after start not possible	SCRMonPresBuildUpErr	OFF	NOx Aftertreatment	none	YES direct	UREA level too low (suction of air) Suction tube leaky Leakage in the UREA system outside or internal (i.e. back flow into tank, leakage into pump housing, external leakage). Dosing valve blocked open. Pump not delivering enough. Reverting valve bloc	Check, if enough UREA was in tank when failure occured (ambient conditions) Check if pump can reach enough pressure with tester: set system under normal pressure (5 bar) : - chek if there is an external leakage (visible check) - if 5bar reachable: open
A3CA	SCR Reagent Feeding: Pressure release not possible	SCRMonPresRdcErr	OFF	NOx Aftertreatment	none	YES direct	Reverse vavle does not work (blocked closed). Back flow tube into tank clogged. UREA pressure sensor stuck.	Check if Back flow tube free. Check if Reverse valve works with tester: set UREA pressure to 5 bar (dosing valve closed) - wait unitl pressure stable - actuate reverse valve --> if pressure does not drop down --> revers valve does not work.
318A	SCR Dosing valve: Dosing Valve is Blocked closed	SCRPODPlausUDosVlv	OFF	NOx Aftertreatment	none	YES direct	Dosing valve blocked mechanically (or frozen)	Check if dosing valve opens. Check if tube between pump and dosing valve is free.

DTC	Description	Dfp Name	MIL	OBD System	Power red	Long Term Failure	Reason of failure	Possible failure correction
319A	SCR Reverting Valve: Reverting Valve is Blocked closed	SCRPODPlausURevVlv	OFF		none	NO	Reverse vavle does not work (blocked closed). Back flow tube into tank clogged. UREA pressure sensor stuck.	Check if Back flow tube free. Check if Reverse valve works with tester: set UREA pressure to 5 bar (dosing valve closed) - wait unitl pressure stable - actuate reverse valve --> if pressure does not drop down --> revers valve does not work.
C2AA	SCR Tank heater: Urea tank heater is faulty	SCRPODTnkTempResp	OFF		none	NO	Heater in "air bubble" with frozen UREA --> check ambient conditions, if failure happened at temp < -10° --> possible reason. Tank heater defect Wiring harness defect	Check tank heater Check wiring harness
A1DA	SCR Reagent Tank Level: Maximum number restarts allowed with empty UREA Tank is exceeded	SCRRCntErr	OFF		none	NO	Empty UREA Tank UREA Level Sensor defective (at empty position) Possibly frozen UREA and Sensor in "air bubble"	Fill Up UREA Check UREA Level Sensor Defreeze UREA Tank, if frozen Note:To prevent "critical situation", 8.00- further restarts can be activated by the Service tester to give the possibilit to drive to the next UREA filling station or repair station. T
F15C	Immobilizer: DFC to show the status of fuel released or blocked	Sia	OFF		none	NO	Immobilizer is inhibiting fuele release	Check reason for immobilizer intervention (defective key was used or or wrong key was used (possibly carjacker with fake key) or communication between key and ICU disturbed)
F25C	Immobilizer: DFC to indicate that TEN-code or UC-code received if ECU is learned.	SiaCode	OFF		none	NO	TEN-code received OR UC-code received if ECU is learned, immobilizer is defective or it has been replaced and not yet learned	First learn of transponder starten
F35C	Immobilizer: DFC to indicate that no code is received via CAN.	SiaNoCode CAN	OFF		none	NO	CAN communication between ICM and ECM disturbed or interrupted	Check wiring, check other CAN messages disturbancies
F45C	Immobilizer DFC to indicate that wrong code is received.	SiaWrongCode	OFF		none	NO	Wrong ICU mounted on vehicle, OR ECM was replaced and immobilizer parameters not correctly programmed OR hardware problem in the ICU	Check ICU, check ECM Immobilizer programming
4351	PTO actuation: Defect Fault Check for Signal error	SigPTOSwt	OFF		none	NO	PTO Switch defective	Check and replace PTO switch

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DTC	Description	Dfp Name	MIL	OBD System	Power red	Long Term Failure	Reason of failure	Possible failure correction
41BA	SCR Reagent Pump: Signal error for CAN message	SigUPmpP	OFF	NOx Aftertreatment	none	YES direct	Disturbed CAN signal transmission or Sensor defective	Check Sensor. Check the CAN for proper configuration and functioning
1121	Accelerator Pedal: Signal Range Check High for APP1	SRCHighAPP1	OFF		none	NO	Short circuit of wiring to external source or inside accelerator pedal	Check wiring or replace accelerator pedal
1221	Accelerator Pedal: Signal Range Check High for APP2	SRCHighAPP2	OFF		none	NO	Short circuit of wiring to external source or inside accelerator pedal	Check wiring and accelerator pedal
2121	Accelerator Pedal: Signal Range Check Low for APP1	SRCLowAPP1	OFF		none	NO	Short circuit to ground in wiring or in accelerator pedal	Check wiring or replace accelerator pedal
2221	Accelerator Pedal: Signal Range Check Low for APP2	SRCLowAPP2	OFF		none	NO	Short circuit to ground in wiring or in accelerator pedal	Check wiring or replace accelerator pedal
11BA	SCR Reagent Pump: SRC high for Urea Urea Pump Module Pressure Sensor	SRCMaxUPmpP	OFF	NOx Aftertreatment	none	YES direct	Short circuit of sensor to external source or defective sensor	Check wiring and sensor
21BA	SCR Reagent Pump: SRC low for Urea Pump Module Pressure Sensor	SRCMinUPmpP	OFF	NOx Aftertreatment	none	YES direct	Short circuit of sensor to ground or defective sensor	Check wiring or replace sensor
A12D	ECU Power Stage 1: Error Sensor supply for sensors (if mounted): Accelerator Pedal 1, Cam Shaft , SCR Reagent pressure, VGT speed, VGT actuator position, EGR Diff. Pressure	SSpMon1	ON	Comprehensive	YES (technical)	YES direct	Excessive battery voltage, defect in wiring harness, electrical failure in connected sensors or in the ECM	Check battery voltage, check wiring for correct voltage supply of the connected sensor and the ECM. Replace ECM

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DTC	Description	Dfp Name	MIL	OBD System	Power red	Long Term Failure	Reason of failure	Possible failure correction
A22D	ECU Power Stage 2: Error Sensor supply for sensors (if mounted): Accelerator Pedal 2, Boost pressure , Fuel pressure in Rail, A/C pressure	SSpMon2	ON	Compre hensive	YES (technical)	YES direct	Excessive battery voltage, defect in wiring harness, electrical failure in connected sensors or in the ECM	Check battery voltage, check wiring for correct voltage supply of the connected sensor and the ECM. Replace ECM
A32D	ECU Power Stage 3: Error Sensor supply for sensors (if mounted): DPF Diff pressure, Oil Pressure, EGR valve Position, Air Humidity	SSpMon3	ON	PM filter	none	YES direct	Excessive battery voltage, defect in wiring harness, electrical failure in connected sensors or in the ECM	Check battery voltage, check wiring for correct voltage supply of the connected sensor and the ECM. Replace ECM
F16C	ECU Internal: Stop Counter Timer accuracy	StopCntTmr	OFF		none	NO	ECM internal problem	Contact Help Desk
5222	Service lamp Dashport: No load error	SVSOL	OFF		none	NO	Broken or disconnected wiring or defective diagnostic lamp.	Check of wiring or replace diagnostic lamp
8222	Service lamp Dashport: Over Temperature error	SVSOvrTemp	OFF		none	NO	High battery voltage, high ECU temperature and high load OR defective wiring, diagnostic lamp or ECU	Check load and output, check wiring, replace diagnostic lamp or ECU
6222	Service lamp Dashport: Short circuit to battery error	SVSSCB	OFF		none	NO	Short circuit of wiring to external source	Check of wiring
7222	Service lamp Dashport: Short circuit to ground error	SVSSCG	OFF		none	NO	Short circuit of wiring to ground	Check of wiring

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DTC	Description	Dfp Name	MIL	OBD System	Power red	Long Term Failure	Reason of failure	Possible failure correction
A16D	ECU SW Reset: Software Resets visible to all testers	SWReset_0	OFF		none	NO	Electronic disturbances, various hardware defects (ECU internal) or configuration problems	Analyze what error triggered the recovery (Read out label HWEMon_numRecovery and compare the value with the according table). If error occurs repeatedly, reprogram EDC. If error remains, replace EDC.
A26D	ECU SW Reset: Software Resets, visible to manufacturer Tester only	SWReset_1	OFF		none	NO	Electronic disturbances, various hardware defects (ECU internal) or configuration problems	Analyze what error triggered the recovery (Read out label HWEMon_numRecovery and compare the value with the according table). If error occurs repeatedly, reprogram EDC. If error remains, replace EDC.
A36D	ECU SW Reset: Invisibility Software Resets	SWReset_2	OFF		none	NO	Electronic disturbances, various hardware defects (ECU internal) or configuration problems	Analyze what error triggered the recovery (Read out label HWEMon_numRecovery and compare the value with the according table). If error occurs repeatedly, reprogram EDC. If error remains, replace EDC.
A321	Accelerator Pedal: it is the plausibility check between APP1 and APP2 and in case of potentiometer switch accelerator pedal, it is the plausibility check between APP1 and idle switch	SyncAPP	OFF		none	NO	Wiring problem, aged or defective accelerator pedal	Check wiring and accelerator pedal
C321	Accelerator Pedal: Diagnostic fault check of synchronism for double potentiometer and Low idle switch(LIS) .	SyncAPPDblPotLIS	OFF		none	NO	Wiring problem, aged or defective accelerator pedal	Check wiring and accelerator pedal
A45D	ECU Key 16: Defective T50 switch	T50Err	OFF		none	NO	Too long cranking request, short circuit in ignition key module or in wiring	Check ignition key module and wiring

DTC	Description	Dfp Name	MIL	OBD System	Power red	Long Term Failure	Reason of failure	Possible failure correction
1163	Air Temp in AFS: Physical Range high error for air temperature sensor	TAFSPhysRngHi	OFF		none	NO	Inaccurate or defective air temperature sensor, defect in the wiring	Check wiring and the accuracy of the air temperature sensor and replace it if necessary
2163	Air Temp in AFS: Physical Range low error for air temperature sensor	TAFSPhysRngLo	OFF		none	NO	Inaccurate or defective air temperature sensor, defect in the wiring	Check wiring and the accuracy of the air temperature sensor and replace it if necessary
1263	Air Temp in AFS: SRC high for air temperature sensor	TAFSSRCMax	OFF		none	NO	Short circuit of sensor to external source or defective sensor	Check wiring or replace sensor
2263	Air Temp in AFS: SRC low for air temperature sensor	TAFSSRCMin	OFF		none	NO	Short circuit of sensor to ground or defective sensor	Check wiring or replace sensor
D153	Boost temperature: Physical Signal above maximum limit	TCACDsPhysRngHi	OFF		none	NO	Inaccurate or defective temperature sensor, defect in the wiring	Check wiring and the accuracy of the temperature sensor and replace it if necessary
E153	Boost temperature: Physical Signal below minimum limit	TCACDsPhysRngLo	OFF		none	NO	Inaccurate or defective temperature sensor, defect in the wiring	Check wiring and the accuracy of the temperature sensor and replace it if necessary
1153	Boost temperature: SRC High for Boost Temperature sensor	TCACDsSRCMax	OFF		none	NO	Sensor defective or short circuit to external source	Check wiring or replace sensor

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DTC	Description	Dfp Name	MIL	OBD System	Power red	Long Term Failure	Reason of failure	Possible failure correction
2153	Boost temperature: SRC Low for Boost Temperature sensor	TCACDsSRCMin	OFF		none	NO	Sensor defective or short circuit to ground Note: This failrue can also be detected, if a very high boost temeprature occured (> 350°C) e.g. due to full flow of non cooled EGR or fire	Check wiring or replace sensor
3153	Boost temperature: Plausibility Check of the Boost Temperature sensor at cold start	TCACDsVDPlaus	OFF		none	NO	One of the 2 sensors has an offset or is miscalbrated Additional resistance in connector of the dedicated sensor	Checkt the ambient conditions to define which sensor is out of range Check the connector of sensor to corrosion Check the sensor itself
D2E3	Diagnostic Fault Check for Physical Signal above maximum limit	TECUPhysRngHi	OFF		none	NO	Inaccurate or defective temperature sensor, defect in the wiring	Check wiring and the accuracy of the temperature sensor and replace it if necessary
E2E3	Diagnostic Fault Check for Physical Signal below minimum limit	TECUPhysRngLo	OFF		none	NO	Inaccurate or defective temperature sensor, defect in the wiring	Check wiring and the accuracy of the temperature sensor and replace it if necessary
31E3	ECU Temperature sensing: SPI Error ECU temperature sensor (LM71)	TECUSPIErr	OFF		none	NO	Temperature sensor defective (inside ECM)	Replace ECM
A18C	ECU Internal: Defect Fault Check for activation of thermal management	ThmMngActv	OFF		none	NO	Excessive processor temperature reached, Internal ECM problem	If failure not sporadic , replace ECM

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DTC	Description	Dfp Name	MIL	OBD System	Power red	Long Term Failure	Reason of failure	Possible failure correction
118C	ECU Internal: Defect Fault Check for Signal value above maximum limit	ThmMngMaxTemp	OFF		none	NO	Excessive processor temperature reached, Internal ECM problem	If failure not sporadic , replace ECM
5137	EGR Throttle: No load error on power stage for Throttle Valve Actuator	ThrVlvOL	OFF		none	NO	Broken or disconnected wiring or defective Throttle Valve Actuator	Check of wiring, replace Throttle Valve Actuator
8137	EGR Throttle: Over temperature error on power stage	ThrVlvOvrTemp	OFF		none	NO	High battery voltage, high ECU temperature and high load or defective wiring, power stage or Throttle Valve Actuator defective	Check battery voltage, wiring, power stage and Throttle Valve Actuator
6137	EGR Throttle: Short circuit to battery error on power stage for Throttle Valve Actuator	ThrVlvSCB	OFF		none	NO	Short circuit of wiring to external source or inside Throttle Valve Actuator	Check of wiring or replace Throttle Valve Actuator
7137	EGR Throttle: Short circuit to ground error on power stage for Throttle Valve Actuator	ThrVlvSCG	OFF		none	NO	Short circuit of wiring to ground or inside Throttle Valve Actuator	Check of wiring or replace Throttle Valve Actuator
1137	EGR Throttle: SRC High for TVA position	ThrVlvSRCMax	OFF		none	NO	Short circuit of wiring to external source or defective Throttle Valve Actuator.	Check of wiring or replace Throttle Valve Actuator.
2137	EGR Throttle: SRC low for TVA position	ThrVlvSRCMin	OFF		none	NO	Short circuit of wiring to ground or defective Throttle Valve Actuator.	Check of wiring or replace Throttle Valve Actuator.

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DTC	Description	Dfp Name	MIL	OBD System	Power red	Long Term Failure	Reason of failure	Possible failure correction
D253	Boost temperature: Physical Signal above maximum limit	TIntkVUsPhysRngHi	OFF		none	NO	Inaccurate or defective temperature sensor, defect in the wiring	Check wiring and the accuracy of the temperature sensor and replace it if necessary
E253	Boost temperature: Physical Signal below minimum limit	TIntkVUsPhysRngLo	OFF		none	NO	Inaccurate or defective temperature sensor, defect in the wiring	Check wiring and the accuracy of the temperature sensor and replace it if necessary
1253	Boost temperature: SRC high for air intake temperature	TIntkVUsSRCMax	OFF		none	NO	Short circuit of sensor to external source or defective sensor	Check wiring or replace sensor
2253	Boost temperature: SRC low for air intake temperature	TIntkVUsSRCMin	OFF		none	NO	Short circuit of sensor to ground or defective sensor	Check wiring or replace sensor
F26C	ECU Internal: Reported SPI errors of TIe6232	TIe6232Spi1	OFF		none	NO	ECM internal failure	Replace ECM
D119	Diagnostic Fault Check for Physical Signal below minimum limit	TOxiCatDsPhysRngHi	ON	NMHC catalyst	none	NO	Inaccurate or defective temperature sensor, defect in the wiring	Check wiring and the accuracy of the temperature sensor and replace it if necessary
E119	Diagnostic Fault Check for Physical Signal below minimum limit	TOxiCatDsPhysRngLo	ON	NMHC catalyst	none	NO	Inaccurate or defective temperature sensor, defect in the wiring	Check wiring and the accuracy of the temperature sensor and replace it if necessary
A119	Signal range check high	TOxiCatDsSRCMax	ON	NMHC catalyst	none	NO	Short circuit of sensor to external source or defective sensor	Check wiring and sensor

DTC	Description	Dfp Name	MIL	OBD System	Power red	Long Term Failure	Reason of failure	Possible failure correction
B119	Signal range check low	TOxiCatDsSRCMin	ON	NMHC catalyst	none	NO	Short circuit of sensor to ground or defective sensor	Check wiring or replace sensor
A319	Oxicat Temp Sensing: Defect Fault Check for "signal vnot plausible"	TOxiCatUsNpl	ON	NMHC catalyst	none	NO	An abnormal heating of the exhaust system has occurred or OxiCat upstream temperature sensor is inaccurate.	Let engine cool down before restarting and check sensor accuracy. If the real exhaust temperature really differes from the calculated one due to a failure in the engine like: wrong injection pressure, wrong injection begin wrong EGR rate the engine syste
D219	Diagnostic Fault Check for Physical Signal below minimum limit	TOxiCatUsPhysRngHi	ON	NMHC catalyst	none	NO	Inaccurate or defective temperature sensor, defect in the wiring	Check wiring and the accuracy of the temperature sensor and replace it if necessary
E219	Diagnostic Fault Check for Physical Signal below minimum limit	TOxiCatUsPhysRngLo	ON	NMHC catalyst	none	NO	Inaccurate or defective temperature sensor, defect in the wiring	Check wiring and the accuracy of the temperature sensor and replace it if necessary
1319	Oxicat Temp Sensing: Defect Fault Check for "signal value above maximum limit"	TOxiCatUsSRCMax	ON	NMHC catalyst	none	NO	Short circuit of sensor to external source or defective sensor	Check wiring and sensor
2319	Oxicat Temp Sensing: Defect Fault Check for "signal value below minimum limit"	TOxiCatUsSRCMin	ON	NMHC catalyst	none	NO	Short circuit of sensor to ground or defective sensor	Check wiring or replace sensor
6129	Diagnostic Fault Check for signal value above maximum limit	TPFltDsSRCMax	OFF		none	NO	Short circuit of sensor to external source or defective sensor	Check wiring and sensor

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DTC	Description	Dfp Name	MIL	OBD System	Power red	Long Term Failure	Reason of failure	Possible failure correction
7129	Diagnostic Fault Check for signal value below minimum limit	TPFltDsSRC Min	OFF		none	NO	Short circuit of sensor to ground or defective sensor	Check wiring or replace sensor
3229	Diagnostic fault check for plausibility of particle filter upstream temperature	TPFltUsNpl	OFF		none	NO	An abnormal heating of the exhaust system has occurred or DPF upstream temperature sensor is inaccurate.	Let engine cool down before restarting and check sensor accuracy. If the real exhaust temperature really differes from the calculated one due to a failure in the engine like: wrong injection pressure, wrong injection begin wrong EGR rate the engine syste
D229	Diagnostic Fault Check for Physical Signal below minimum limit	TPFltUsPhys RngHi	OFF		none	NO	Inaccurate or defective temperature sensor, defect in the wiring	Check wiring and the accuracy of the temperature sensor and replace it if necessary
E229	Diagnostic Fault Check for Physical Signal below minimum limit	TPFltUsPhys RngLo	OFF		none	NO	Inaccurate or defective temperature sensor, defect in the wiring	Check wiring and the accuracy of the air temperature sensor and replace it if necessary
6229	Defect Fault Check for "signal value above maximum limit"	TPFltUsSRC Max	OFF		none	NO	Short circuit of sensor to external source or defective sensor	Check wiring and sensor
7229	Defect Fault Check for "signal value below minimum limit"	TPFltUsSRC Min	OFF		none	NO	Short circuit of sensor to ground or defective sensor	Check wiring or replace sensor

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DTC	Description	Dfp Name	MIL	OBD System	Power red	Long Term Failure	Reason of failure	Possible failure correction
1128	Turbocharger control: Turbocharger position too much open (Too low boost pressure)	TrbChGovDvtMax	OFF		none	NO	Desired VGT actuator position can not be reached (valve is not enough opened) VGT actuator blocked mechanically VGT actuator sticks VGT actuator position sensor mismatched	Check Functionality of VGT actuator and the corresponding position
2128	Turbocharger control: Turbocharger position too much closed (Too high boost pressure)	TrbChGovDvtMin	OFF		none	NO	Desired VGT actuator position can not be reached (valve is too much opened) VGT actuator blocked mechanically VGT actuator sticks VGT actuator position sensor mismatched	Check Functionality of VGT actuator and the corresponding position
5128	Turbocharger control: Open load error for powerstage	TrbChHBrgOpnLd	ON	Comprehensive	YES (technical)	YES direct	Electrical problem of the VGT actuator: - broken wiring harness - no contact of conector - internal broken line in actuator	Check wiring harnes on open circuit Check VGT actuator on open circuit
1228	Turbocharger control: Over current error for H-bridge	TrbChHBrgOvrCurr	ON	Comprehensive	YES (technical)	YES direct	Electrical problem of the VGT actuator: - "short circuit" in wiring harness - internal "short circuit" in actuator	Check wiring harnes on partial short circuit Check VGT actuator on partial short circuit
8128	Turbocharger control: Over temperature error for H-bridge	TrbChHBrgOvrTemp	ON	Comprehensive	YES (technical)	YES direct	High battery voltage, high temperature inside ECU, high load or wiring problem	No reaction needed if failure isn't present after short time, check load and output, check wiring, replace ECU
6128	Turbocharger control: Short circuit to battery on Out1 error for H-bridge	TrbChHBrgShCirBatt1	ON	Comprehensive	YES (technical)	YES direct	Short circuit of wiring	Check of wiring
6228	Turbocharger control: Short circuit to battery on Out2 error for H-bridge	TrbChHBrgShCirBatt2	ON	Comprehensive	YES (technical)	YES direct	Short circuit of wiring	Check of wiring

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DTC	Description	Dfp Name	MIL	OBD System	Power red	Long Term Failure	Reason of failure	Possible failure correction
7128	Turbocharger control: Short circuit to ground on Out1 error for H-bridge	TrbChHBrgShCirGnd1	ON	Comprehensive	YES (technical)	YES direct	Short circuit of wiring	Check of wiring
7228	Turbocharger control: Short circuit to ground on Out2 error for H-bridge	TrbChHBrgShCirGnd2	ON	Comprehensive	YES (technical)	YES direct	Short circuit of wiring	Check of wiring
7328	Turbocharger control: Short circuit over load error for H-bridge	TrbChHBrgShCirOvrLd	ON	Comprehensive	YES (technical)	YES direct	Short circuit of wiring	Check of wiring
8228	Turbocharger control: Temperature dependent over current error for H-bridge	TrbChHBrgTempOvrCurr	ON	Comprehensive	YES (technical)	YES direct	Electrical problem of the VGT actuator: - "short circuit" in wiring harness - internal "short circuit" in actuator	Check wiring harnes on partial short circuit Check VGT actuator on partial short circuit
7428	Turbocharger control: Under voltage error for H-bridge	TrbChHBrg UndrVltg	ON	Comprehensive	YES (technical)	YES direct	Too high Voltage fluctuations in system internal failure of ECU	Check electricla system of vehicle Replace ECU
A228	Turbocharger control: Jammed valve	TrbChJamVlv	OFF		none	NO	VGT actuator can not be opened as desired within expected time VGT actuator blocked mechanically VGT actuator sticks VGT actuator position sensor mismatched	Check Functionality of VGT actuator and the corresponding position
A328	Turbocharger control: Long time drift of position sensor	TrbChLgTDrft	OFF		none	NO	The position sensor has too high deviation in fully closed or open position, that the learning correction factor will be too high: VGT actuator position sensor mismatched	Check Functionality of VGT actuator: - fully opened position reachable? - fully closed position reachable? - postion signal valid in both conditions?
A428	Turbocharger control: Jammed valve during offset learning	TrbChOfsLrnJamVlv	OFF		none	NO	Desired position can not be reached VGT actuator blocked mechanically VGT actuator sticks VGT actuator position sensor mismateched	Check Functionality of VGT actuator and the corresponding position

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DTC	Description	Dfp Name	MIL	OBD System	Power red	Long Term Failure	Reason of failure	Possible failure correction
5228	Turbocharger control: Open load of VTG actuator	TrbChOL	ON	Comprehensive	YES (technical)	YES direct	Broken or disconnected wiring, defective PWM actuator	Check of wiring, replace PWM actuator
8328	Turbocharger control: Over temperature of VTG actuator	TrbChOvrTemp	ON	Comprehensive	YES (technical)	YES direct	High battery voltage, high ECU temperature and high load or defective wiring, power stage or VGT actuator	Check wiring, power stage and VGT actuator
6328	Turbocharger control: Short circuit to battery of VTG actuator	TrbChSCB	ON	Comprehensive	YES (technical)	YES direct	Short circuit of wiring to external source or inside PWM actuator	Check of wiring, replace PWM actuator
7528	Turbocharger control: Short circuit to ground of VTG actuator	TrbChSCG	ON	Comprehensive	YES (technical)	YES direct	Short circuit of wiring to ground or inside PWM	Check of wiring, replace PWM actuator
A528	Turbocharger control: Short time drift of VGT position sensor	TrbChShTDrft	OFF		none	NO	Desired VGT actuator position can not be reached VGT actuator position sensor mismateched	Check Functionality of VGT actuator and the corresponding position
1328	Turbocharger control: Signal range check Max error on turbo charger actuator position sensor	TrbChSRCMax	OFF		none	NO	Short circuit of wiring to external source or defective turbocharger control	Check of wiring or replace turbocharger control
2328	Turbocharger control: Signal range check Min error on turbo charger actuator position sensor	TrbChSRCMin	OFF		none	NO	Short circuit of wiring to ground or defective turbocharger control	Check of wiring or replace turbocharger control
AD3B	Torque or speed control demand from ABS/ESR/ESP exceeding the maximum time	TSEACo_TSC1_TO_0	OFF		none	NO	Defect on ABS / ASR / ESP controller, CAN cable problem.	Check correct functioning of the CAN controller. Check wiring.
A74B	Torque or speed control demand from Driveline Retarder exceeding the maximum time	TSEACo_TSC1_TO_1	OFF		none	NO	Defect on Driveline Retarder controller, CAN cable problem.	Check correct functioning of the CAN controller. Check wiring.

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DTC	Description	Dfp Name	MIL	OBD System	Power red	Long Term Failure	Reason of failure	Possible failure correction
A45B	Torque or speed control demand from PTO exceeding the maximum time	TSEACo_TSC1_TO_2	OFF		none	NO	Defect on PTO Controller, CAN cable problem.	Check correct functioning of the CAN controller. Check wiring.
AC6B	Torque or speed control demand from Transmission Controller AMT exceeding the maximum time	TSEACo_TSC1_TO_3	OFF		none	NO	Defect on AMT controller, CAN cable problem.	Check correct functioning of the CAN controller. Check wiring.
A97B	Torque or speed control demand from Vehicle Controller exceeding the maximum time	TSEACo_TSC1_TO_4	OFF		none	NO	Defect on Vehicle Controller, CAN cable problem.	Check correct functioning of the CAN controller. Check wiring.
AE3B	Continuous negative torque control demand from ABS/ESR/ESP exceeding the maximum time	TSEACo_TSC1_TO_5	OFF		none	NO	Defect on ABS / ASR / ESP controller, CAN cable problem.	Check correct functioning of the CAN controller. Check wiring.
A84B	Continuous negative torque control demand from Driveline Retarder exceeding the maximum time	TSEACo_TSC1_TO_6	OFF		none	NO	Defect on Driveline Retarder controller, CAN cable problem.	Check correct functioning of the CAN controller. Check wiring.
AD6B	Continuous negative torque control demand from Transmission AMT exceeding the maximum time	TSEACo_TSC1_TO_7	OFF		none	NO	Defect on AMT controller, CAN cable problem.	Check correct functioning of the CAN controller. Check wiring.

DTC	Description	Dfp Name	MIL	OBD System	Power red	Long Term Failure	Reason of failure	Possible failure correction
AA7B	Continuous negative torque control demand from Vehicle Controller exceeding the maximum time	TSEACo_TSC1_TO_8	OFF		none	NO	Defect on Vehicle Controller, CAN cable problem.	Check correct functioning of the CAN controller. Check wiring.
D41A	SCR Catalyst Temperature monitoring: Downstream temperature above physical maximum value	UCatDsTPhysRngHi	OFF		none	NO	UREA Catalyst temperature downstream sensor drifted or not correctly mounted Partial short circuit on wiring harness or sensor	Check sensor Check wiring
E41A	SCR Catalyst Temperature monitoring: Downstream temperature below physical minimum value	UCatDsTPhysRngLo	OFF		none	NO	UREA Catalyst temperature downstream sensor drifted or not correctly mounted Partial short circuit on wiring harness or sensor	Check sensor Check wiring
441A	SCR Catalyst Temperature monitoring: Downstream temperature sensor connected via CAN reports an error	UCatDsTSig	OFF		none	NO	Urea Catalyst downstream temperature defective	Check sensor and replace it if necessary
141A	SCR Catalyst Temperature sensing: SRC high for Catalyst temperature downstream	UCatDsTSRCMax	OFF		none	NO	Sensor defective or short circuit in wiring to external source	Check wiring or replace sensor
241A	SCR Catalyst Temperature sensing: SRC low for Catalyst temperature downstream	UCatDsTSRCMin	OFF		none	NO	Sensor defective or short circuit in wiring to ground	Check wiring or replace sensor

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DTC	Description	Dfp Name	MIL	OBD System	Power red	Long Term Failure	Reason of failure	Possible failure correction
D51A	SCR Catalyst Temperature monitoring: Upstream temperature above physical maximum value	UCatUsTPhysRngHi	OFF		none	NO	UREA Catalyst temperature upstream sensor drifted or not correctly mounted Partial short circuit on wiring harness or sensor	Check sensor Check wiring
E51A	SCR Catalyst Temperature monitoring: Upstream temperature below physical minimum value	UCatUsTPhysRngLo	OFF		none	NO	UREA Catalyst temperature upstream sensor drifted or not correctly mounted Partial short circuit on wiring harness or sensor	Check sensor Check wiring
451A	SCR Catalyst Temperature monitoring: Upstream temperature sensor connected via CAN reports an error	UCatUsTSig	OFF		none	NO	Urea Catalyst upstream temperature defective	Check sensor and replace it if necessary
151A	SCR Catalyst Temperature sensing: SRC high for Catalyst temperature upstream	UCatUsTSRCMax	OFF		none	NO	Sensor defective or short circuit in wiring to external source	Check wiring or replace sensor
251A	SCR Catalyst Temperature sensing: SRC low for Catalyst temperature upstream	UCatUsTSRCMin	OFF		none	NO	Sensor defective or short circuit in wiring to ground	Check wiring or replace sensor
323A	SCR Reagent Tank Level: Empty Urea Tank	UDCRdcAgRmn	Blink	NOx Aftertreatment	none	YES direct	Tank is empty	Refill Urea tank
313A	SCR Reagent Tank Level: Plausibility check of urea tank level	UDCstUTnkLvlPlaus	OFF		none	YES potential	Tank level sensor is drifted, or Urea injected quantity is drifted (wrong urea consumption calculation)	Check tank level sensor, check urea injection system for correct dosing

DTC	Description	Dfp Name	MIL	OBD System	Power red	Long Term Failure	Reason of failure	Possible failure correction
518A	SCR Dosing valve: Diagnostic error check for open load.	UDosVlvOL	OFF	NOx Aftertreatment	none	YES direct	Broken or disconnected wiring or defective Urea Dosing Valve Actuator	Check of wiring, replace Urea Dosing Valve Actuator
A18A	SCR Dosing valve: Dosing valve is overheated	UDosVlvOvht	OFF		none	YES potential	Dosing valve not enough cooled by Urea, system clogged? too high exhaust temperatures?	Check other failures connected too dosing system or exhaust, check Urea dosing quantity Check correct functionality of Dosing valve - if not guarantedd: replace it. Reset Overheating time in the EEPROm to 0.
818A	SCR Dosing valve: Diagnostic error check for overtemperature.	UDosVlvOvrTemp	OFF	NOx Aftertreatment	none	YES direct	High battery voltage, high ECU temperature and high load or defective wiring, power stage or Urea Dosing Valve Actuator defective	Check battery voltage, wiring, power stage and Urea Dosing Valve Actuator.
618A	SCR Dosing valve: Diagnostic error check for short circuit to battery.	UDosVlvSCB	OFF	NOx Aftertreatment	none	YES direct	Short circuit of wiring (Ground wire) to external source or inside Urea Dosing Valve Actuator	Check of wiring or replace Urea Dosing Valve Actuator
628A	SCR Dosing valve: Diagnostic error check for short circuit to battery on the high side switch.	UDosVlvSCBHS	OFF	NOx Aftertreatment	none	YES potential	Short circuit in the wiring (+ wire) to U-Batt Short circuit inside dosing valve actuator.	Check wiring harness Check Dosing valve actuator
718A	SCR Dosing valve: Diagnostic error check for short circuit to ground.	UDosVlvSCG	OFF	NOx Aftertreatment	none	YES direct	Short circuit of wiring (Ground Wire) to ground or inside Urea Dosing Valve Actuator	Check of wiring or replace Urea Dosing Valve Actuator
728A	SCR Dosing valve: Diagnostic error check for short circuit to ground on the high side switch.	UDosVlvSCGHS	OFF	NOx Aftertreatment	none	YES potential	Short circuit in the wiring (+ wire) to Ground Short circuit inside dosing valve actuator.	Check wiring harness Check Dosing valve actuator
A2AA	SCR Reagent Heating: DFC for failed heater release	UHCFailHtrRls	OFF		none	NO	The Power management could not release the Heater Power stages due to too low system voltage.	Check System Voltage If OK, check if there is a too high voltage drop between Control unit and Battery.

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DTC	Description	Dfp Name	MIL	OBD System	Power red	Long Term Failure	Reason of failure	Possible failure correction
65AA	SCR Reagent Heating: External short circuit error	UHCPLExtShCirErr	OFF		none	NO	Short circuit error in the wiring or the Urea Pressure Line Heater or Urea Module Supply Heater	Check wiring or replace defective heater
55AA	SCR Reagent Heating: general open circuit error Urea pressure Line/Module Supply Heater	UHCPLOLDurCtl	OFF		none	NO	Open circuit error in the wiring or the Urea Pressure Line Heater or Urea Module Supply Heater	Check wiring or replace defective heater
75AA	SCR Reagent Heating: PTC open circuit error	UHCPLPTCOpCirErr	OFF		none	NO	Open circuit error in the PTC element of Urea Pressure Line Heater or in the Urea Supply Module Heater	Check and replace heaters
95AA	SCR Reagent Heating: PTC short circuit error	UHCPLPTCShCirErr	OFF		none	NO	Short circuit in the PTC element of Urea Pressure Line Heater or in the Urea Supply Module Heater	Check and replace heaters
67AA	SCR Reagent Heating: External short circuit error	UHCTnkExtShCirErr	OFF		none	NO	Possible short circuit in the wiring or the Tank Heater	Check wiring and replace tank heater
57AA	SCR Reagent Heating: general open circuit error tank	UHCTnkOLDurCtl	OFF		none	NO	Open circuit error in the wiring or the Tank Heater	Check wiring or replace tank heater
77AA	SCR Reagent Heating: PTC open circuit error	UHCTnkPTCOpCirErr	OFF		none	NO	Open circuit error in the PTC element of Tank Heater	Check and replace tank heater
97AA	SCR Reagent Heating: PTC short circuit error	UHCTnkPTCShCirErr	OFF		none	NO	Short circuit in the PTC element of Tank Heater	Check and replace tank heater
B2AA	SCR Reagent Heating: Urea Tank is overheated	UHCTnkTOvht	OFF		none	NO	Tank heater permanently activated, tank temperature sensor drifted	Check tank heater, check temperature sensor
51AA	SCR Reagent Heating: No load error	UHtrPLOL	OFF		none	NO	Broken or disconnected wiring or defective relay	Check of wiring, replace Urea Pressure Line heater actuator

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DTC	Description	Dfp Name	MIL	OBD System	Power red	Long Term Failure	Reason of failure	Possible failure correction
13AA	SCR Reagent Heating: Diagnostic Fault Check for Physical Signal above maximum limit	UHtrPLPhysRngHiDia	OFF		none	NO	Possible internal short circuit in the heater or wiring	Check wiring and heater for short circuit
23AA	SCR Reagent Heating: Diagnostic Fault Check for Physical Signal below minimum limit	UHtrPLPhysRngLoDia	OFF		none	NO	Possible open load in the heater or wiring	Check wiring and heater
61AA	SCR Reagent Heating: Short circuit to battery error	UHtrPLSCB	OFF		none	NO	Short circuit of wiring to external source or inside SCR Reagent Heating	Check of wiring, replace SCR Reagent Heating
71AA	SCR Reagent Heating: Short circuit to ground error	UHtrPLSCG	OFF		none	NO	Short circuit of wiring to ground or inside SCR Reagent Heating	Check of wiring, replace SCR Reagent Heating
11AA	SCR Reagent Heating: SRC high for Urea pressure line Heater Diagnostic Signal	UHtrPLSRCMaxDia	OFF		none	NO	Wiring Harness defect (short circuit) Relay defect. Heating element in pressure line defect	Check Wiring Harness Check Relay Check Heating element in pressure line
21AA	SCR Reagent Heating: SRC low for Urea pressure line Heater Diagnostic Signal	UHtrPLSRCMinDia	OFF		none	NO	Wiring Harness defect (short circuit or Open load) Relay defect. Heating element in pressure line defect	Check Wiring Harness Check Relay Check Heating element in pressure line
52AA	SCR Reagent Heating: No load error	UHtrTnkOL	OFF		none	NO	Broken or disconnected wiring or defective Urea Tank Heater	Check of wiring, replace Urea Tank Heater
14AA	SCR Reagent Heating: Diagnostic Fault Check for Physical Signal above maximum limit	UHtrTnkPhysRngHiDia	OFF		none	NO	Possible internal short circuit in the heater or wiring	Check wiring and heater for short circuit

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DTC	Description	Dfp Name	MIL	OBD System	Power red	Long Term Failure	Reason of failure	Possible failure correction
24AA	SCR Reagent Heating: Diagnostic Fault Check for Physical Signal below minimum limit	UHtrTnkPhysRngLoDia	OFF		none	NO	Possible open load in the heater or wiring	Check wiring and heater
62AA	SCR Reagent Heating: Short circuit to battery error	UHtrTnkSCB	OFF		none	NO	Short circuit of wiring to external source or inside Urea Tank Heater	Check of wiring, replace Urea Tank Heater
72AA	SCR Reagent Heating: Short circuit to ground error	UHtrTnkSCG	OFF		none	NO	Short circuit of wiring to ground or inside Urea Tank Heater	Check of wiring, replace Urea Tank Heater
12AA	SCR Reagent Heating: SRC high for Urea tank Heater Diagnostic Signal	UHtrTnkSRCMaxDia	OFF		none	NO	Wiring harness (short circuit) Relay defect UREA Tank heater element defect	Check Wiring harness (short circuit) Check Relay Check UREA Tank heater element
22AA	SCR Reagent Heating: SRC low for Urea tank Heater Diagnostic Signal	UHtrTnkSRCMinDia	OFF		none	NO	Wiring harness (short circuit) Relay defect UREA Tank heater element defect	Check Wiring harness (short circuit) Check Relay Check UREA Tank heater element

DTC	Description	Dfp Name	MIL	OBD System	Power red	Long Term Failure	Reason of failure	Possible failure correction
1	0:	Unused	OFF	Boost Pressure System Comprehensive EGR Exhaust Gas Sensor Fuel System NMHC catalyst Misfiring NOx Aftertreatment PM filter		YES direct (ControlMask)		
14BA	SCR Reagent Pump: Pump motor speed deviation	UPmpMotNDvt	OFF		none	NO	Pump motor defective (blocked, possibly due to cristallisation (after long stind stall periode) or frozen UREA in case of cold ambient condition)	Check if Pump is delivering: If OK: failure is only sporadic (possibly long still stand periode or by frozen Reagent - check ambient conditions) --> probably no action needed. If failure appears several times --> replace pump module. If Not OK: Replace
51BA	SCR Reagent Pump: No load error on powerstage for urea pump motor	UPmpMotOL	OFF	NOx Aftertreatment	none	YES direct	Broken or disconnected wiring or defective relay	Check of wiring, replace Urea pump motor

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DTC	Description	Dfp Name	MIL	OBD System	Power red	Long Term Failure	Reason of failure	Possible failure correction
81BA	SCR Reagent Pump: Over temperature error on powerstage for urea pump motor	UPmpMotOvrTemp	OFF	NOx Aftertreatment	none	YES direct	High battery voltage, high temperature inside ECU, high load or wiring problem	No reaction needed if failure isn't present after short time, check load and output, check wiring, replace ECU
61BA	SCR Reagent Pump: Short circuit to battery error on powerstage for urea pump motor	UPmpMotSCB	OFF	NOx Aftertreatment	none	YES direct	Short circuit of wiring to external source or inside Urea pump motor	Check of wiring, replace Urea pump motor
71BA	SCR Reagent Pump: Short circuit to ground error on powerstage for urea pump motor	UPmpMotSCG	OFF	NOx Aftertreatment	none	YES direct	Short circuit of wiring to ground or inside Urea pump motor	Check of wiring, replace Urea pump motor
24BA	Info: SCR Reagent Pump: Pump Motor in Warm Up phase	UPmpMotWUC	none		none	NO	System in Warm Up State and Pump motor not yet free (i.e. Pump motzor driver did not report an "SCG" or "OL" failure for a duration between 1.30s and 1.70s	No Action needed (only info) Check failure memory: If failure "PPCWUCResp" stored: see there
D2BA	Diagnostic Fault Check for Physical Signal above maximum limit	UPmpPPhysRngHi	ON	NOx Aftertreatment	none	YES potential	Sensor in Pump module inaccurate or defective, defect in the wiring	Check wiring and the accuracy of the pressure sensor and replace it if necessary
E2BA	Diagnostic Fault Check for Physical Signal below minimum limit	UPmpPPhysRngLo	ON	NOx Aftertreatment	none	YES potential	Sensor in Pump module inaccurate or defective, defect in the wiring	Check wiring and the accuracy of the pressure sensor and replace it if necessary

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DTC	Description	Dfp Name	MIL	OBD System	Power red	Long Term Failure	Reason of failure	Possible failure correction
12BA	SCR Reagent pressure sensor: Drift to too high pressure	UPmpPPlausMax	OFF	NOx Aftertreatment	none	YES potential	Sensor in Pump module defective Possibly emptying not exectued correctly (clogged tubes, reverting valve not openning etc)	Check sensor signal: Set Pump speed to 0, wait 1 minute (to give to the system for pressure release), open dosing valve to 100%, wait again some seconds and measure the UREA pressure: the value must be near 0 (between -32768.00hPa and 32.77bar) If OK -
22BA	SCR Reagent pressure sensor: Drift to too low pressure	UPmpPPlausMin	OFF	NOx Aftertreatment	none	YES potential	Sensor in Pump module defective Possibly emptying not exectued correctly (clogged tubes, reverting valve not openning etc)	Check sensor signal: Set Pump speed to 0, wait 1 minute (to give to the system for pressure release), open dosing valve to 100%, wait again some seconds and measure the UREA pressure: the value must be near 0 (between -32768.00hPa and 32.77bar) If OK -
D13A	Reagent quality not conform	UQlSens	ON	NOx Aftertreatment	none	YES direct	The fluid in the reagent tank is not Urea or its quality is insufficient	Empty the tank and refill with correct fluid. Depending on the type of fluid found in the tank the system could be damaged.
519A	SCR Reverting Valve: No load error	URevVlvOL	OFF	NOx Aftertreatment	none	YES direct	Broken or disconnected wiring or defective Urea Reverting Valve Actuator	Check of wiring, replace Urea Reverting Valve Actuator
619A	SCR Reverting Valve: Short circuit to battery error	URevVlvSCB	OFF	NOx Aftertreatment	none	YES direct	Short circuit of wiring to external source or inside Urea Reverting Valve Actuator	Check of wiring, replace Urea Reverting Valve Actuator
719A	SCR Reverting Valve: Short circuit to ground error	URevVlvSCG	OFF	NOx Aftertreatment	none	YES direct	Short circuit of wiring to ground or inside Urea Reverting Valve Actuator	Check of wiring, replace Urea Reverting Valve Actuator
513A	SCR Reagent Tank level sensing: Tank level plausibility error	UTnkLvlPlausErr	OFF		none	NO	UREA Level Sensor defect	Check and Replace Sensor
613A	SCR Reagent Tank level sensing: Tank level sensor error	UTnkLvlSensErr	OFF		none	NO	Sensor Defect	Check Sensor and replace it if not OK
713A	SCR Reagent Tank level sensing: Tank level sensor monitoring error	UTnkLvlSensMon	OFF		none	NO	Sensor Supply defect Wiring harness defect Sensor defect	Check wiring harness Cehck Sensor

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DTC	Description	Dfp Name	MIL	OBD System	Power red	Long Term Failure	Reason of failure	Possible failure correction
132A	SCR Reagent Tank Temperature sensing: Diagnostic Fault Check for Physical Signal above maximum limit	UTnkTPhysRngHi	OFF		none	NO	Inaccurate or defective Urea tank temperature sensor, or defect in the wiring of the sensor	Check wiring and the accuracy of the Urea tank temperature sensor and replace it if necessary
232A	SCR Reagent Tank Temperature sensing: Diagnostic Fault Check for Physical Signal below minimum limit	UTnkTPhysRngLo	OFF		none	NO	Inaccurate or defective Urea tank temperature sensor, or defect in the wiring of the sensor	Check wiring and the accuracy of the Urea tank temperature sensor and replace it if necessary
412A	SCR Reagent Tank Temperature sensing: Signal error for CAN message	UTnkTSig	OFF		none	NO	Urea tank temperature sensor defective	Check sensor and replace it if necessary
112A	SCR Reagent Tank Temperature sensing: SRC high for Urea temperature sensor	UTnkTSRCMax	OFF		none	NO	Sensor defective or short circuit in wiring to external source	Check wiring or replace sensor
212A	SCR Reagent Tank Temperature sensing: SRC low for Urea temperature sensor	UTnkTSRCMin	OFF		none	NO	Short circuit of sensor to battery or defective sensor	Check wiring or replace sensor
4111	Vehicle speed sensor: Vehicle speed signal via CAN defective	VehVCANSig	OFF		none	NO	Defective or incorrect functioning of vehicle speed measuring device	Check speed measuring device for proper functioning
1211	Vehicle speed sensor: Maximum threshold error for vehicle speed	VehVMax	OFF		none	NO	Real overspeed, i.e. by engine tuning (??) Incorrect speed evaluation (depending on signal source by Wheel Speed Information, Tachograph Output, disturbed CAN)	Check measuring device and replace it if necessary. No action in case of real vehicle over speed or engine tuning

DTC	Description	Dfp Name	MIL	OBD System	Power red	Long Term Failure	Reason of failure	Possible failure correction
3311	Vehicle speed sensor: sensor not connected	VehVNplMon	OFF		none	NO	Defective vehicle speed sensor, wiring defect, wrong voltage supply	Check vehicle speed sensor, wiring harness and battery voltage
1711	Vehicle speed sensor: Physical signal range check High	VehVPhysRngHi	OFF		none	NO	Defective vehicle speed sensor.	Check vehicle speed sensor
2711	Vehicle speed sensor: Physical signal range check Low	VehVPhysRngLo	OFF		none	NO	Defective vehicle speed sensor.	Check vehicle speed sensor
3411	Vehicle speed sensor: Vehicle speed is not plausible to engine speed and torque	VehVPlaus	OFF		none	NO	Defective vehicle speed sensor. Engine driven under load without PTO (i.e. external PTO) In very cold sitaution possible due to "engine warming up at higher speed" and vehicle stand still (high torque request in case of "non liquid oil")	Check vehicle speed sensor Check if "external PTO" used Check if failure occured at very low engine temperature < -10°C)
1511	Vehicle speed sensor: short circuit to battery	VehVSRCHi	OFF		none	NO	Defective vehicle speed sensor, wiring defect, excessive voltage supply	Check vehicle speed sensor, wiring harness and battery voltage
2511	Vehicle speed sensor: short circuit to ground	VehVSRCLo	OFF		none	NO	Defective vehicle speed sensor, wiring defect, insufficient voltage supply	Check vehicle speed sensor, wiring harness and battery voltage
1611	Vehicle speed sensor: tachometer signal - pulse width too long	VehVTachMax	OFF		none	NO	Defect in the tachometer speed signal acquisition or wrong configuration of the device	Check tachometer for broken components and correct functioning, clean components or replace tachometer if necessary
2611	Vehicle speed sensor: tachometer signal - pulse width too short	VehVTachMin	OFF		none	NO	Defect in the tachometer speed signal acquisition or wrong configuration of the device	Check tachometer for broken components and correct functioning, clean components or replace tachometer if necessary

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DTC	Description	Dfp Name	MIL	OBD System	Power red	Long Term Failure	Reason of failure	Possible failure correction
4611	Vehicle speed sensor: tachometer signal - period duration too short	VehVTachSig	OFF		none	NO	Defect in the tachometer speed signal acquisition or wrong configuration of the device	Check tachometer for broken components and correct functioning, clean components or replace tachometer if necessary
5352	Vehicle speed limitation lamp: No load error	VSLimLmpOL	OFF		none	NO	Broken or disconnected wiring or defective vehicle speed limitation lamp	Check of wiring or replacement of vehicle speed limitation lamp
6352	Vehicle speed limitation lamp: Short circuit to battery error	VSLimLmpSCB	OFF		none	NO	Short circuit of wiring to external source or inside vehicle speed limitation lamp	Check of wiring, replace vehicle speed limitation lamp
7352	Vehicle speed limitation lamp: Short circuit to ground error	VSLimLmpSCG	OFF		none	NO	Short circuit of wiring to ground or inside vehicle speed limitation lamp	Check of wiring, replace vehicle speed limitation lamp

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DIAGNOSIS PER SYMPTOMS

SIGNALLED ANOMALY	BLINK CODE	EDC WAR-NING LIGHT	POSSIBLE CAUSE	POSSIBLE RELATED ANOMALIES	RECOMMENDED TESTS OR MEASURES	REMARKS
The battery goes flat quickly.	-	-	Pre-heating resistor powered continuously.	Local overheating.		
The engine will stop or won't start.	-	-	Fuel pre-filter clogged.			
Difficult start when the engine is either hot or cold.	-	-	The 3.5 bar valve on fuel return is stuck open.			
Slight overheating.	-	-	Either 0.3 bar tank return valve or return piping clogged.			
After the new vehicle has been delivered, the engine will stop after a short operation time.The tank holds a lot of fuel; all the rest is O.K.	-	-	Reversed tank suction / return pipes.			The engine is fed by the return pipe, the suction of which in the tank is lower. When the pipe sucks no more, the engine will stop.
Reduced power / difficult engine maneuverability.	-	-	Injection system / the engine operates with one cylinder failing: - injector plunger seizure; - valve rocker arm seizure.	Overheating	Engine test: cylinder efficiency test. If the trouble is not related to electric components (Blink code 5.x), the rocker arm holder shaft needs be disassembled. Check the rocker arm roller and bushing as well as the respective cam.	
Fuel consumption increase.	-	-	Air filter clogging with no signal from the warning light on the instrument board.	Smoke.	Check the cabling, connections and component.	

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SIGNALLED ANOMALY	BLINK CODE	EDC WAR-NING LIGHT	POSSIBLE CAUSE	POSSIBLE RELATED ANOMALIES	RECOMMENDED TESTS OR MEASURES	REMARKS
The engine does not reach the other speeds under load conditions.	-	-	The boosting pressure sensor provides too high values, which, in any case, fall within the range.	Smoke.		
The driver feels that the engine is not working correctly like it did before.	-	-	Impaired hydraulic performance of an injector.		Engine test: check-up	Replace the injector of the cylinder in which Modus detects lower performance levels (compared with the others) only after verifying that the control rocker arm adjustment is correct.
The driver feels that the engine is not working correctly like it did before.	-	-	Wrong adjustment of an injector control rocker arm.		Engine test: check up.	Perform correct adjustment, then repeat the engine test.
The engine operates with five cylinders; noise (knock).	-	-	Plunger seizure.	Possible overheating.	Engine test: cylinder efficiency.	Replace the injector of the cylinder in which the diagnosis instrument detects lower performance levels (compared with the others).
Replace the injector of the cylinder in which the diagnosis instrument detects lower performance levels (compared with the others).	-	-	Wrong adjustment of the injector control rocker arm (excessive travel) with impact on the plunger on the nozzle.	Possible mechanic damage to the areas surrounding the injector.	Engine test: cylinder efficiency.	Replace the injector of the cylinder in which the diagnosis instrument detects lower performance levels (compared with the others).
The engine will stop or won't start again.	-	-	Presence of air in the fuel supply circuit.	It might even not switch off; it might have operation oscillations, or start, yet with difficulty and after making many attempts.	Bleed air.	

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