VECTOR ENGINE

V08 ENT M75
V08 ENT M11
V08 ENT M12

TECHNICAL AND REPAIR MANUAL

JULY 2006 EDITION

TECHNOLOGICAL EXCELLENCE

IVECO MOTORS

FPT POWERTRAIN TECHNOLOGIES

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Indications for consultation

The different engine versions are usually explained with common images and descriptions. In cases of considerable differences, they are explained separately.

Sections 1-2-3 are intended for sales personnel, to provide them with exact knowledge of the product's characteristics and enable them to meet the Customer's demands with precision.

The remaining sections are meant for personnel in charge of carrying out ordinary and extraordinary maintenance; with an attentive consultation of the chapter devoted to diagnosing, they will also be able to provide an effective technical assistance service.

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OVERVIEW

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IDENTIFICATION DATA

Identification Tag

Figure 1

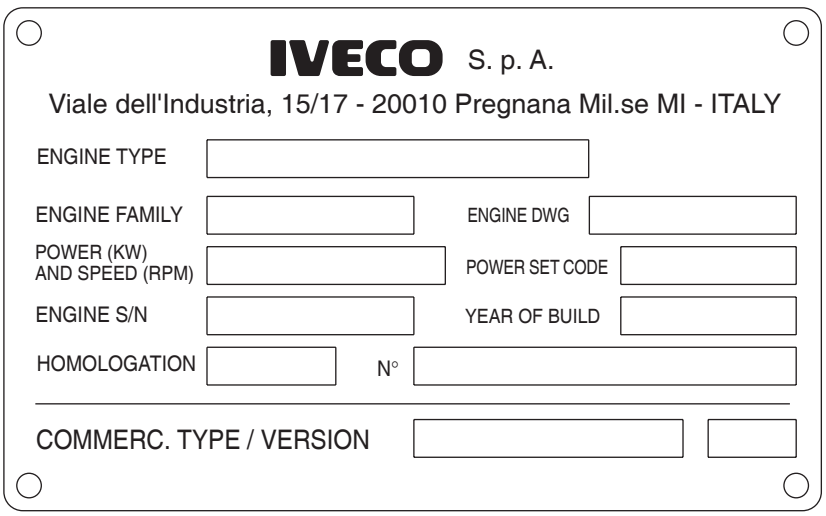

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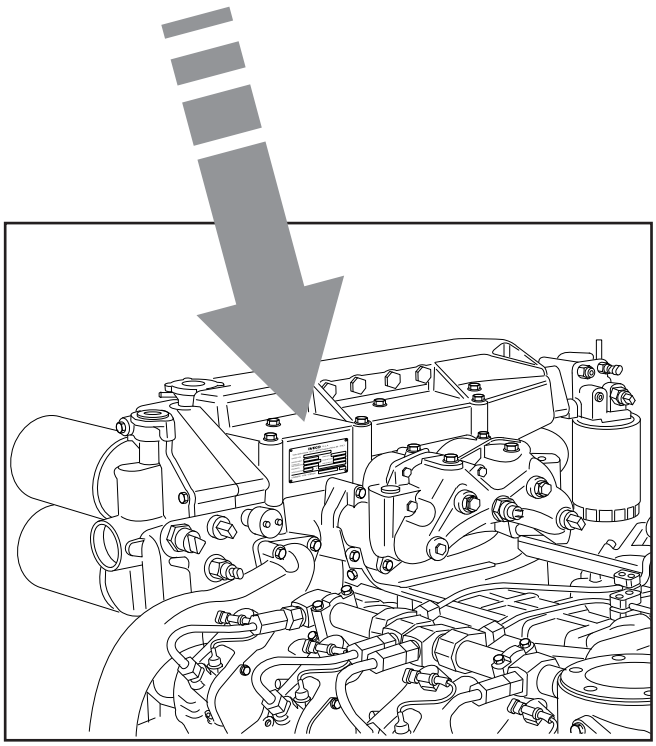
Figure 2

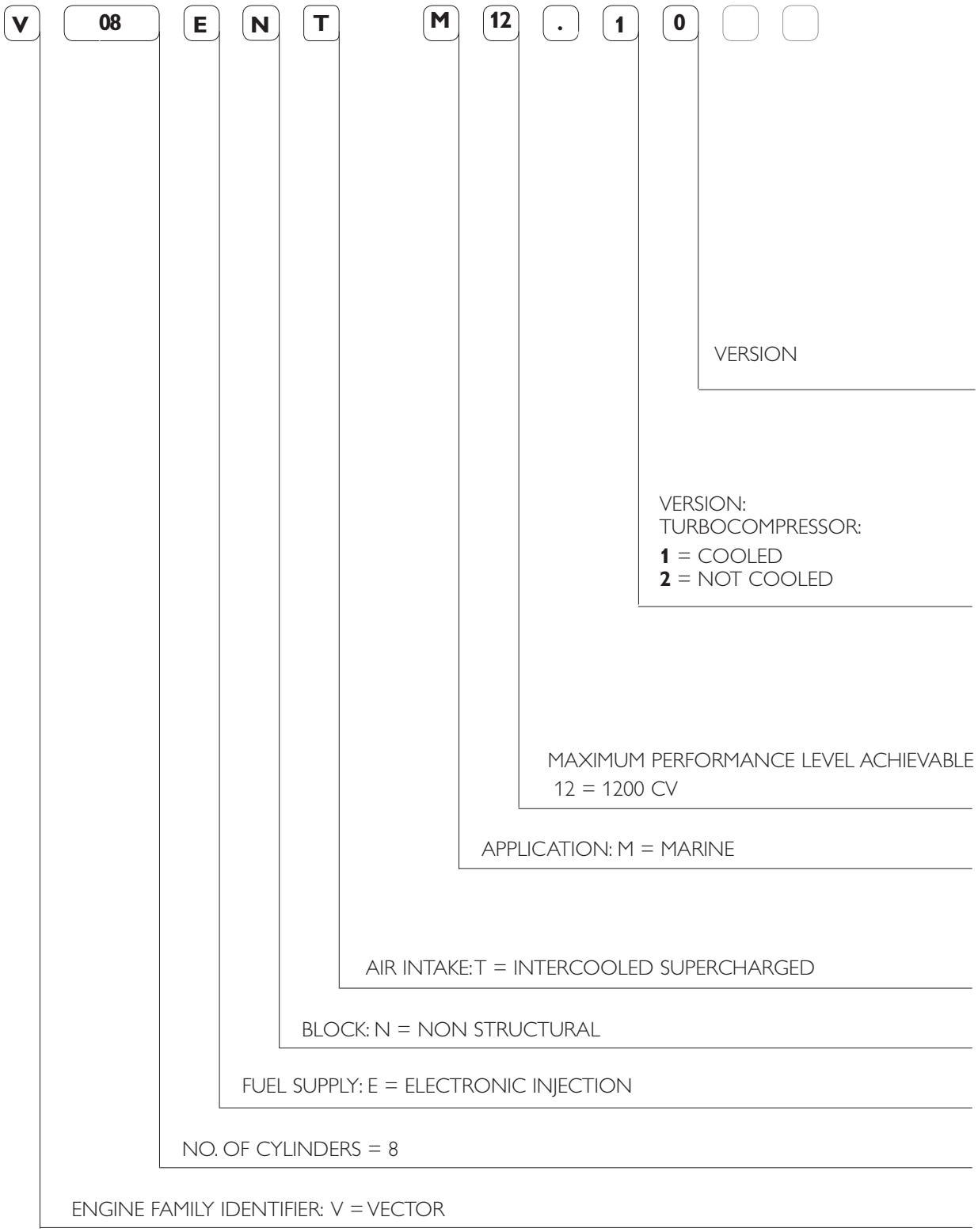


05_017_V

The engine identification data are stenciled on a tag positioned over the engine coolant tank

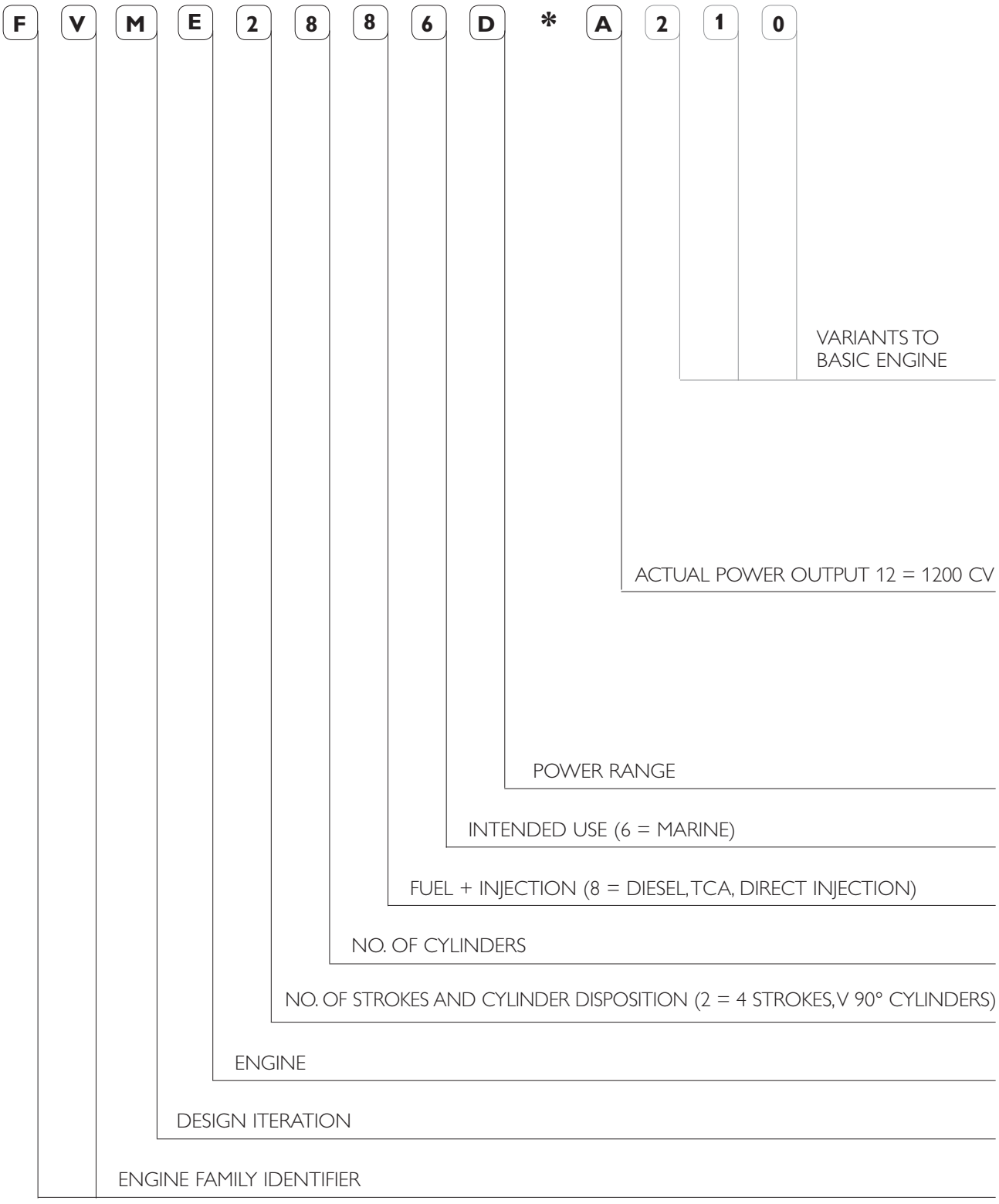
COMMERCIAL CODE

The purpose of the commercial code is to make it easier to understand the characteristics of the product, categorizing the engines according to their family, origins and intended application. The commercial code, therefore, cannot be used for technical purposes and to identify the engine's components, this is the purpose of the "ENGINE S/N".



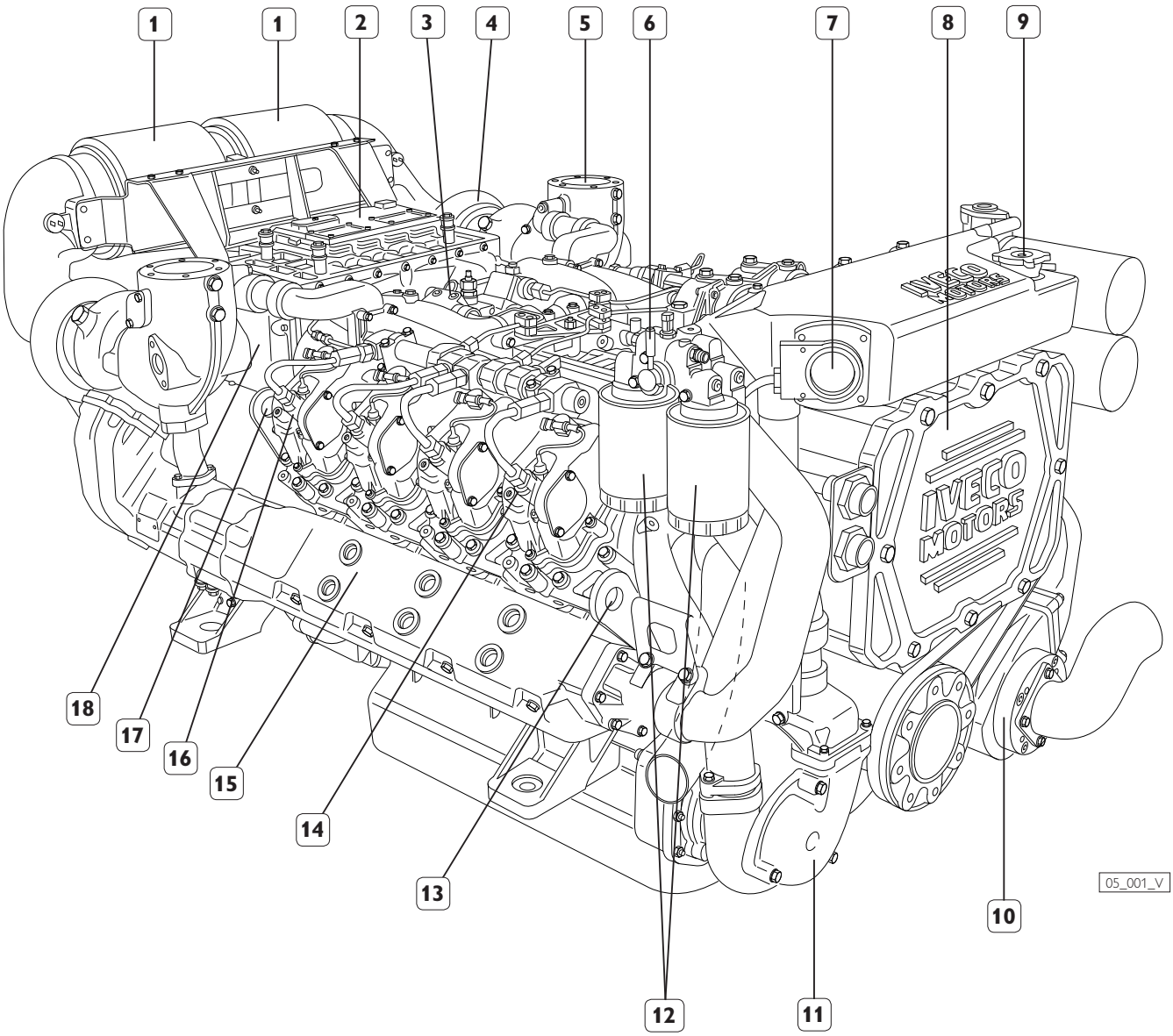
PRODUCT MODEL NUMBER

The model number is assigned by the manufacturer; it is used to identify the main characteristics of the engine, and to characterize its application and power output level. It is stamped on the cylinder block, near the cylinder head no.4 support surface.



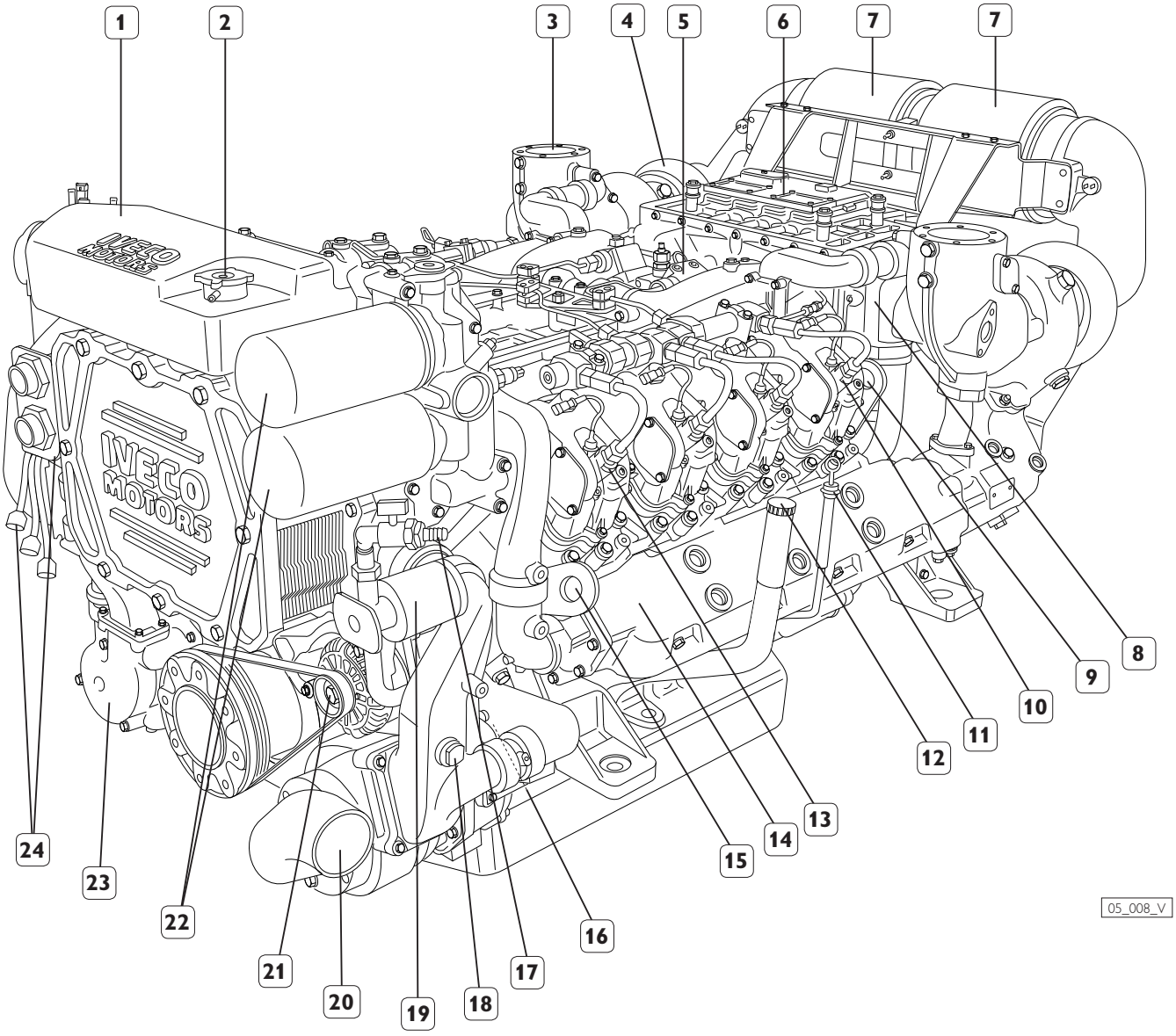
ENGINE PARTS AND COMPONENTS

Figure 3



1. Intake air filter - 2. EDC Electronic Central Unit - 3. Common rail high pressure injection pump - 4. Cooled turbo-charger - 5. Exhaust gas outlet - 6. Lever for switching fuel filters - 7. Engine coolant level sensor - 8. Water/water heat exchanger - 9. Pressurization cap for coolant tank - 10. Sea water pump - 11. Engine coolant pump - 12. Fuel filters - 13. Lifting padeyes - 14. Cylinder 1 electro-injector - 15. Cooled exhaust manifold - 16. Cylinder 4 electro-injector - 17. Lifting padeyes - 18. Air-sea water heat exchanger.

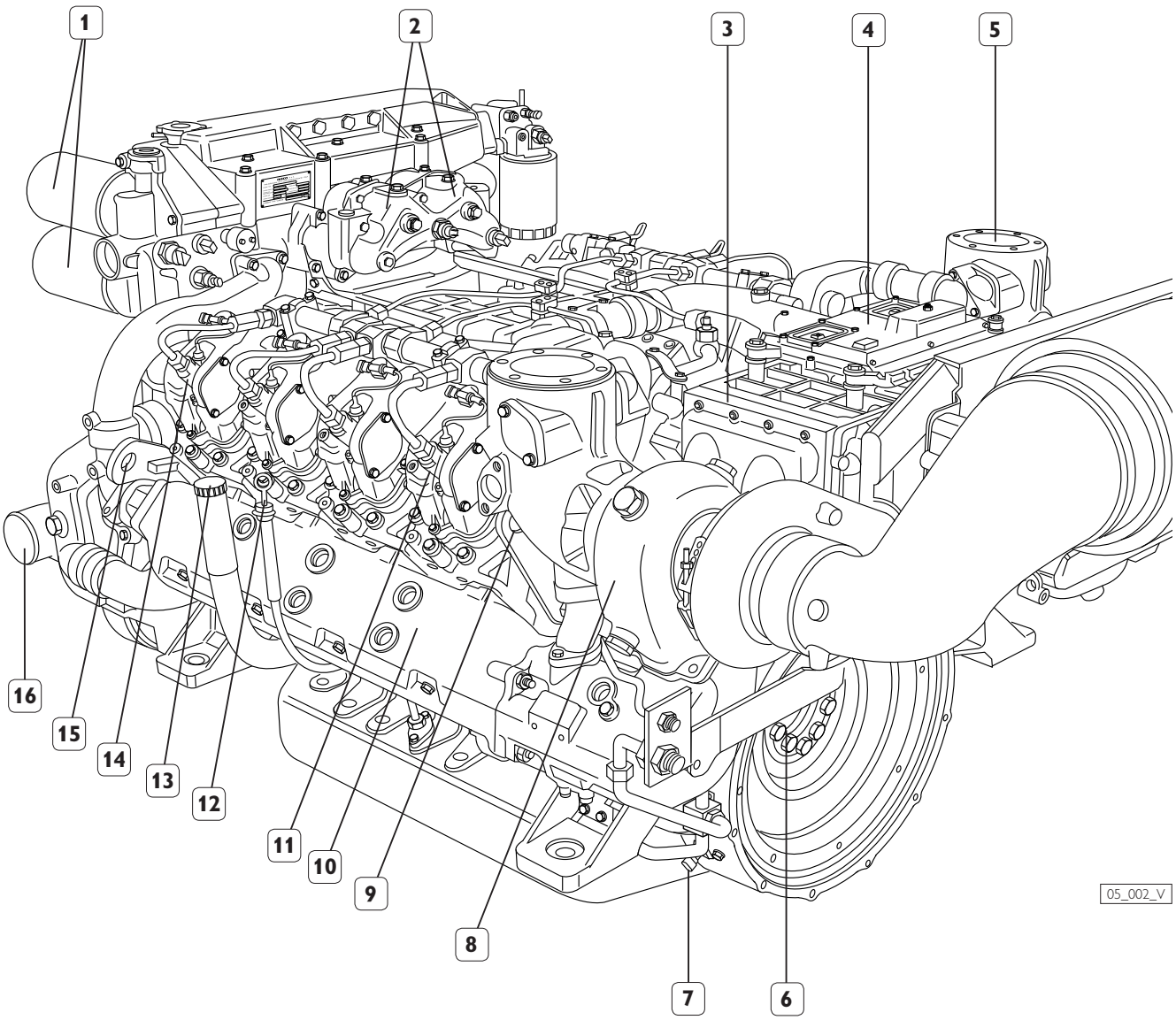
Figure 4



1. Engine coolant tank - 2. Pressurization cap for coolant tank - 3. Exhaust gas outlet - 4. Cooled turbo-charger - 5. Common rail high pressure injection pump - 6. EDC Electronic Central Unit - 7. Intake air filter - 8. Air-sea water heat exchanger - 9. Lifting padeyes - 10. Cylinder 8 electro-injector - 11. Lubricating oil dipstick - 12. Lubricating oil refill cap - 13. Cylinder 5 electro-injector - 14. Cooled exhaust manifold - 15. Lifting padeyes - 16. Location of the low pressure fuel transfer pump - 17. Tap and fitting for lubricating oil transfer - 18. Sacrificial anode - 19. Lubrication oil transfer electrical pump - 20. Sea water intake - 21. Alternator - 22. Lubricating oil filters - 23. Engine coolant pump - 24. Electrical equipment wiring connectors.

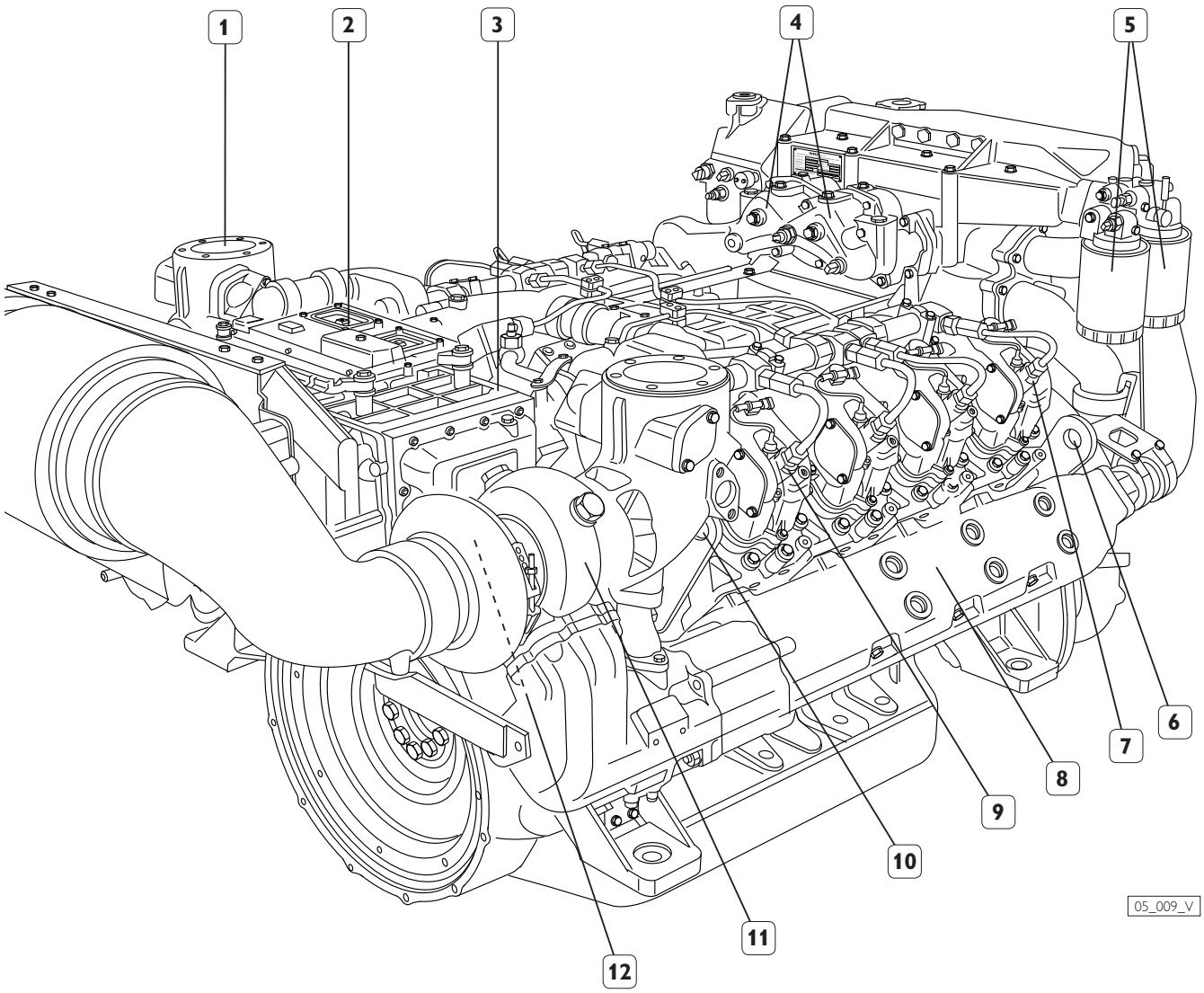
ENGINE PARTS AND COMPONENTS

Figure 5



1. Lubricating oil filters - 2. Location of thermostatic valves - 3. Air-sea water heat exchanger - 4. EDC Electronic Central Unit - 5. Exhaust gas outlet - 6. Fuel inlet and outlet fittings - 7. Crankshaft sensor - 8. Cooled turbo-charger - 9. Lifting padeyes - 10. Cooled exhaust manifold - 11. Cylinder 8 electro-injector - 12. Lubricating oil dipstick - 13. Lubricating oil refill cap - 14. Cylinder 5 electro-injector - 15. Lifting padeyes - 16. Sea water intake.

Figure 6



1. Exhaust gas outlet - 2. EDC Electronic Central Unit - 3. Air-sea water heat exchanger - 4. Location of thermostatic valves - 5. Fuel filters - 6. Lifting padeyes - 7. Cylinder 1 electro-injector - 8. Cooled exhaust manifold - 9. Cylinder 4 electro-injector - 10. Lifting padeyes - 11. Cooled turbo-charger - 12. Sacrificial anode (placed on the air/water heat exchanger).

ENGINE ARCHITECTURE

New design and cutting-edge injection system, VECTOR engines are the result of IVECO continuous commitment in research and development for innovative technologies. Thanks to the perfect integration of mechanics and electronics, they achieve the highest levels of efficiency and flexibility in many different uses. Aimed at conceptual choices and at the perfect tuning up of engines, compliance with emission control standards of today and for the years to come are ensured.

As far as performances and characteristics are concerned, VECTOR engines represent the ultimate response to power needs to increase productivity at low operating costs.

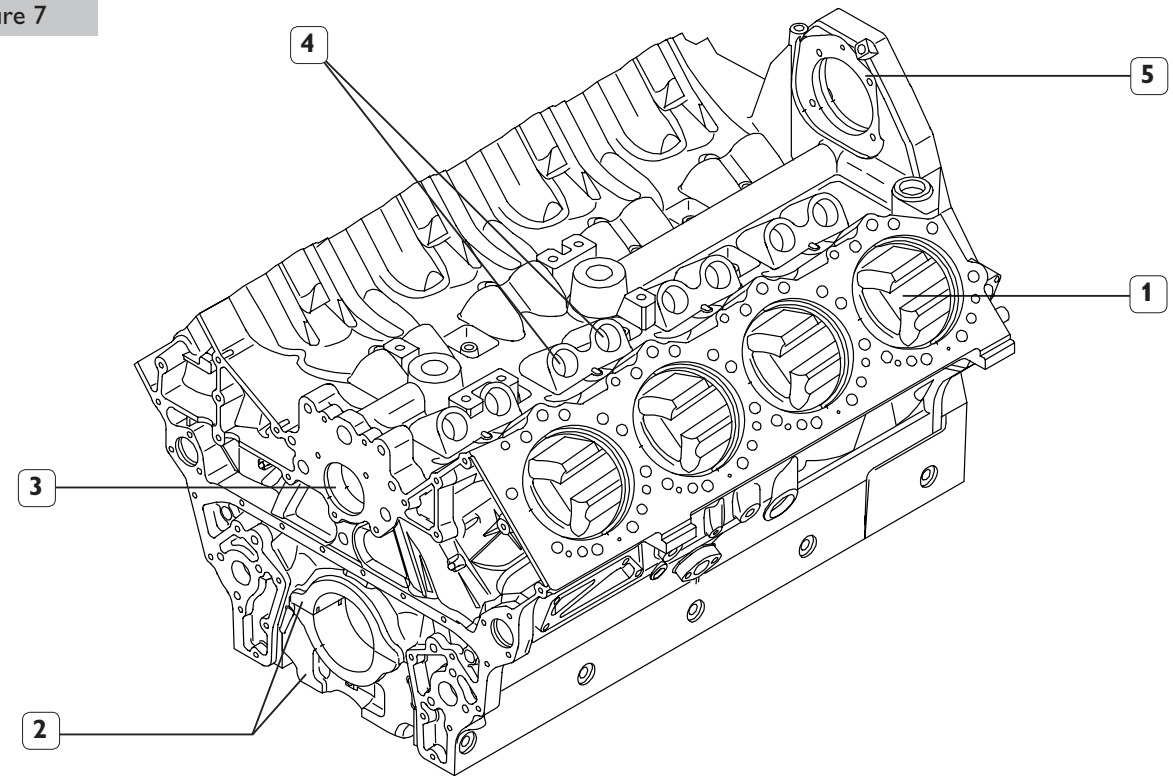
The perfect optimization of dynamic features allowed the minimization of vibrations and noise, which made them more suitable for high level comfort applications.

Also their electronic components contribute to their versatility; the electronic control unit, by monitoring countless parameters, provides a wide range of data, saved during running conditions, useful to carry out an efficient maintenance deadline schedule in favour of higher productivity. Through the CAN network, the different systems fully interact to harmonize the management of the entire boat or adapt the engine power output to the propulsive system needs. Thanks to its technical features, VECTOR 8V interprets the concept of adaptation to any customer's needs to its highest level.

VECTOR engines high performances originate from the exceptional thermodynamic efficiency achieved through the adoption of the "Common Rail" injection system, designed by IVECO and mounted for the very first time in the world on high power output engines. The high injection pressure, also available at low running, provides a very high acceleration reserve, coupled with unprecedented low operating costs.

Engine Block

Figure 7



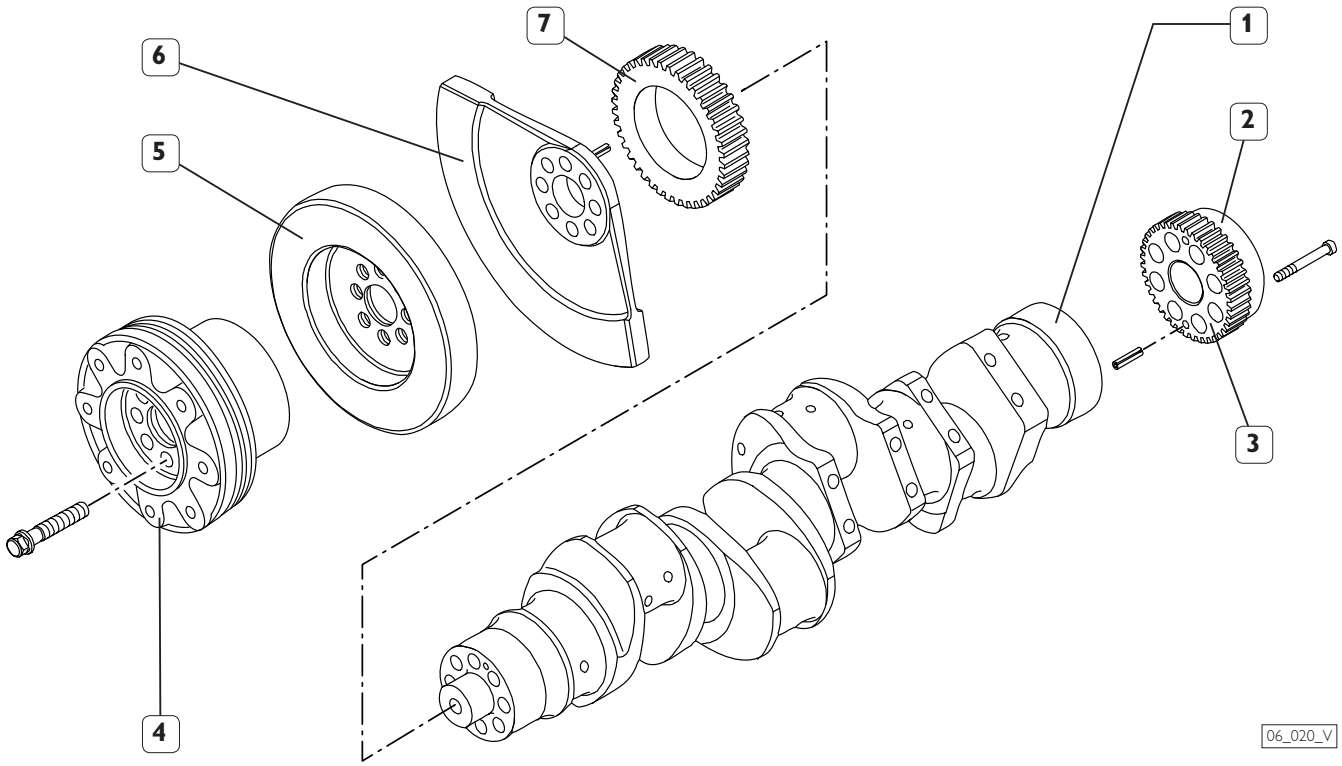
1. Cylinder liner housing - 2. Main bearings - 3. Camshaft bushings - 4. Tappet seats - 5. High pressure pump support.

The engine block has a cast iron structure housing (1) cylinder liner seat, main bearings (2), camshaft bushing housings (3) and tappets (4).
Furthermore, it has been designed with cooling fluid circulation chambers and pipes for moving parts lubrication.

Unlike previous engines, the high pressure pump support has been directly built on the engine block.

Driving shaft

Figure 8

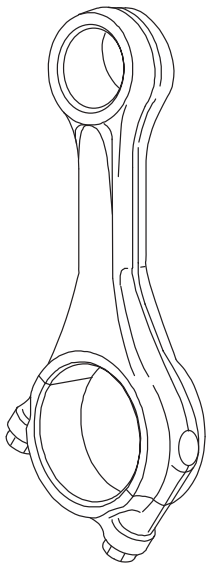


1. Driving shaft - 2. Hub for flywheel coupling - 3. Timing control gear - 4. Front pulley - 5. Damper flywheel - 6. Additional flywheel - 7. Cooling fluid pump control gear.

The driving shaft (1) has been die-casted in induction hardened steel and it rests on five induction tempered supports; internally, lubrication oil pipes have been designed to ensure oil circulation.
The cooling pump control gear (7), the additional flywheel mass (6) and the damper flywheel (5) are fitted on the front tang.
The timing control gear (3), the engine flywheel fastening hub (2) are fitted on the rear tang.
The main half bearings are in anti-friction alloy coated steel and the first one is fitted with a shoulder ring to limit the driving shaft axial play.
Parts 2 and 3 in the picture, assembled by negative allowance on the rear tang, cannot be replaced.
Front and rear gas rings are of drawer type with radial seal, requiring dedicated tools for their assembly and disassembly.

Connecting Rods

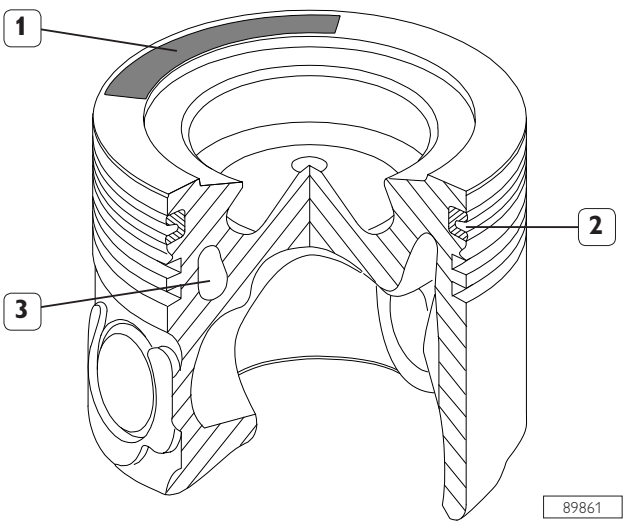
Figure 9



They are made in steel, manufactured by pressing, with small end oblique edged and cap separation obtained by fracture splitting technique.
Rod half bearings are made out of anti-friction coated steel. Each rod is marked on the body and cap by a code number identifying their coupling and the cylinder on which they are assembled to. The rod upper bushing **is not replaceable.**

Pistons

Figure 10



1. Stamping on "tappet side" - 2. Elastic ring tapezoidal cast iron shaped seat - 3. Annular chamber for cooling.

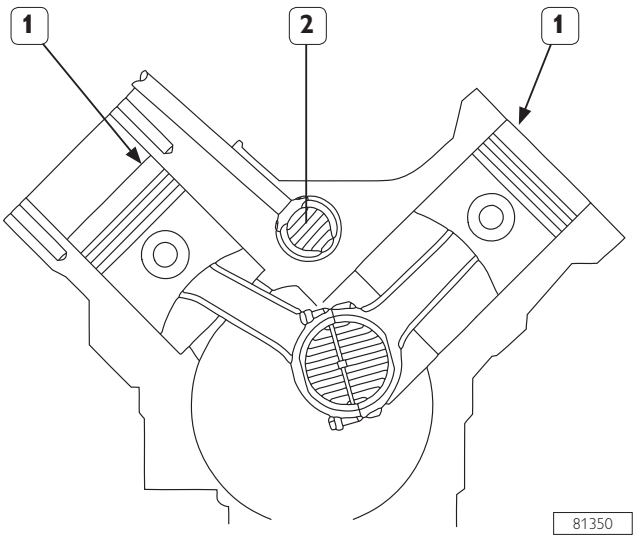
On the piston crown there is a high turbulence combustion chamber. The piston crown is cooled by the engine oil delivered by the spray nozzle mounted on the engine block. The engine oil delivered by the spray nozzle flows through the annular chamber obtained inside the piston, and it cools off its upper part.

Three elastic ring seats are located on the skirt; the first one has been obtained in a specific trapezoidal cast iron insert. Elastic rings perform different functions and have different shapes:

- the first piston ring has trapezoidal shape with ceramic chrome coating;
- the second piston ring has a rectangular "torsional tapered" shape;
- the third ring is fitted with a double scraper-ring pad with built-in spring.

The piston crown shows the sign "tappets side".

Figure 11

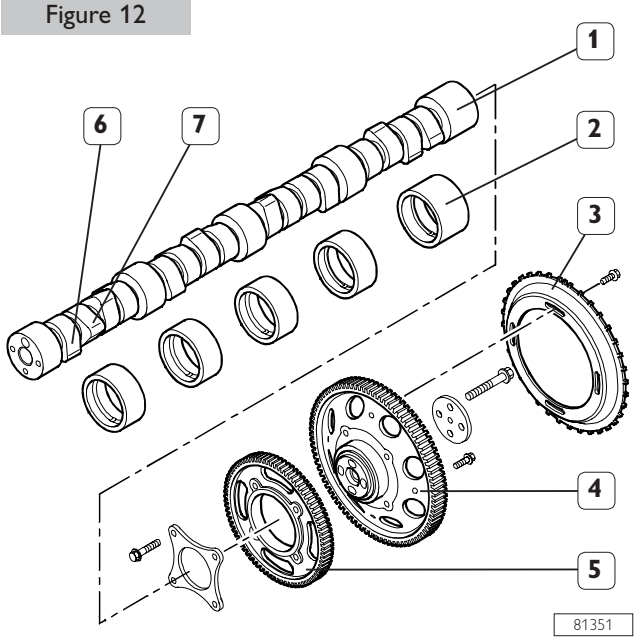


1. Tappets side - 2. Camshaft.

Timing Gears

Il comando degli organi della distribuzione è del tipo ad aste e bilancieri, con albero a camme alloggiato nel basamento e posto in rotazione direttamente dall'albero motore.

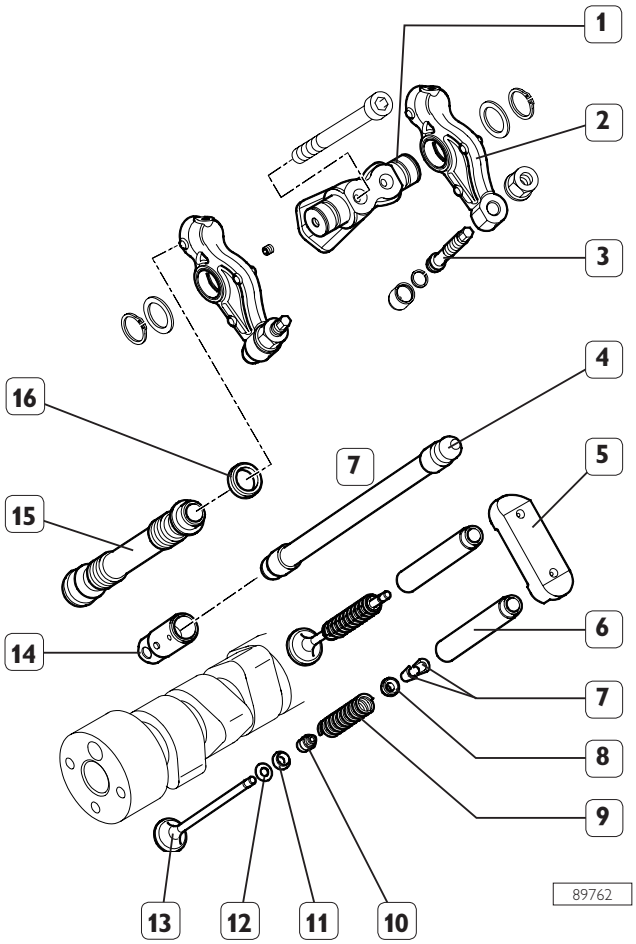
Figure 12



1. Timing gear - 2. Main bearings - 3. Phonic wheel - 4. Timing control gear - 5. High pressure pump (HPP) driven gear - 6. Intake valve control - 7. Exhaust valve control.

The camshaft rests on five supports; end, front and rear supports are provided with anti-friction coated steel bushings, assembled by negative allowance. Along the shaft, each cylinder has two control eccentrics respectively for intake (6) and exhaust (7).
The camshaft is actuated by the driving shaft by means of direct coupling straight-toothed gears. By means of the timing control gear, the driven gear is actuated, providing motion to the high pressure pump mechanism (HPP).
On the rear part of the timing control gear, a phonic wheel has been installed, as it plays a key role in the operation of the phase sensor.

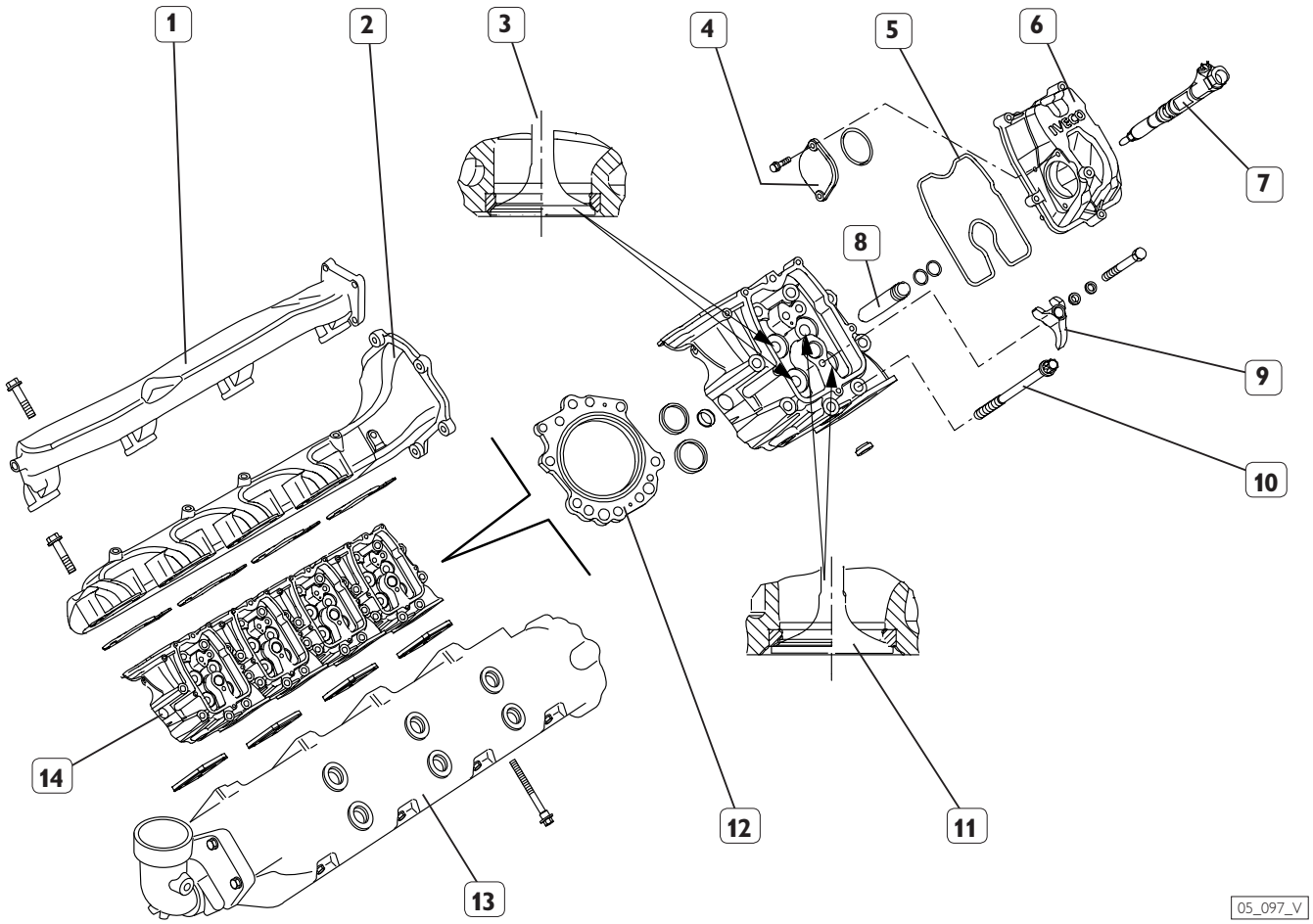
Figure 13



1. Rocker arm support - 2. Rocker arm - 3. Adjustment screws - 4. Rod - 5. Jumper - 6. Valve guide - 7. Half cones - 8. Cup - 9. Spring - 10. Gas ring - 11. Cup - 12. Spacer - 13. Valve - 14. Tappet - 15. Rod guide case - 16. Gas ring.

Cylinder Head

Figure 14



1. Cooling manifold - 2. Intake manifold - 3. Intake valve - 4. Tappet play adjustment lid - 5. Gasket - 6. Cylinder head cover - 7. Electronic injector - 8. Nozzle holder case - 9. Electronic injector fastening bracket - 10. Cylinder head fastening screw - 11. Exhaust valve - 12. Cylinder head gasket - 13. Cooled exhaust manifold - 14. Cylinder heads (right hand main bearing).

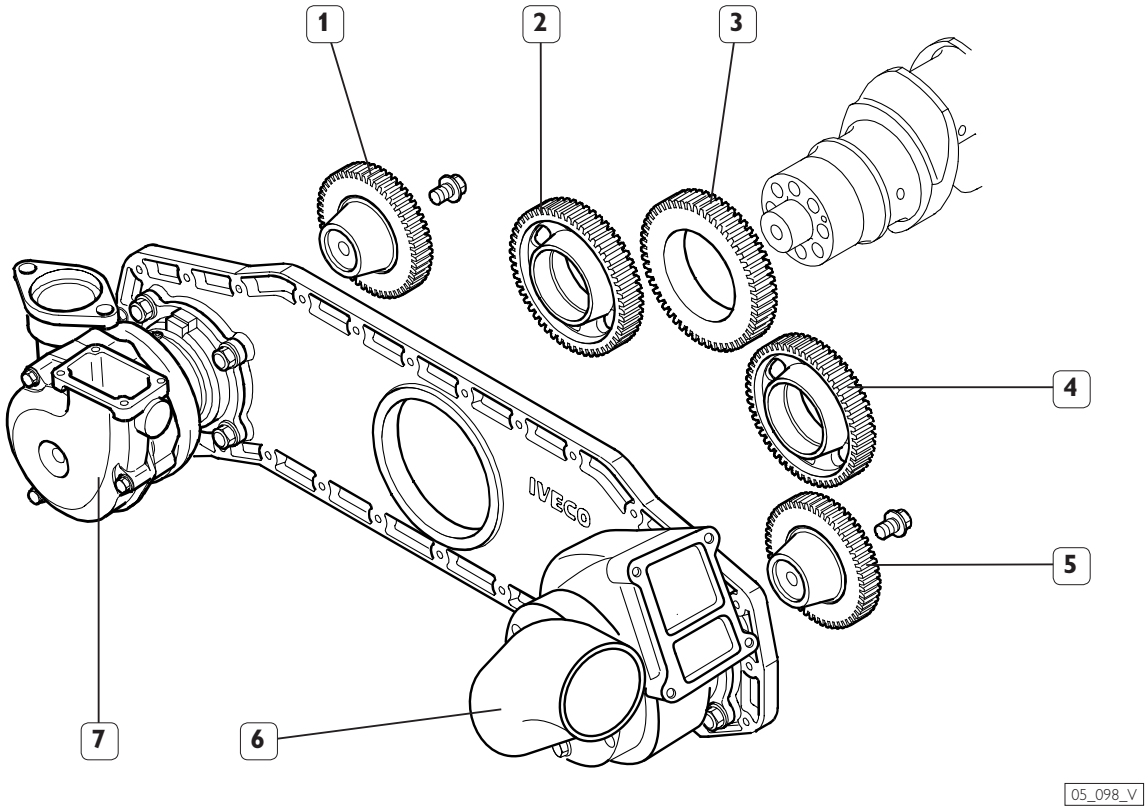
Cylinder heads consist of 8 independent units, featured by housings dedicated to the following components:

- ❑ Valve, with added elements;
- ❑ Tappets;
- ❑ Electronic injectors;
- ❑ Fuel delivery connections to electronic injectors.

Furthermore, an internal connection has been created with the aim of recovering unused fuel from electronic injectors, which is later on conveyed into dedicated pipes.
Each cylinder head is connected to the coolant manifold, as well as to the intake and exhaust manifolds.

Auxiliary Gears Control

Figure 15



1. Cooling fluid pump control gear - 2. Intermediate gear - 3. Gear on driving shaft - 4. Intermediate gear - 5. Sea water pump control gear - 6. Sea water pump - 7. Engine coolant pump.

Auxiliary gears are actuated by a gear (3) fitted on the driving shaft; by means of two intermediate gears (2) and (4), motion is transferred to the coolant pump control and to the sea water pump control gears.
Furthermore, a joint, connected to the sea water pump control (5), also actuates the low pressure pump (LPP) of the fuel system, located behind the gear box.

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