

Torque

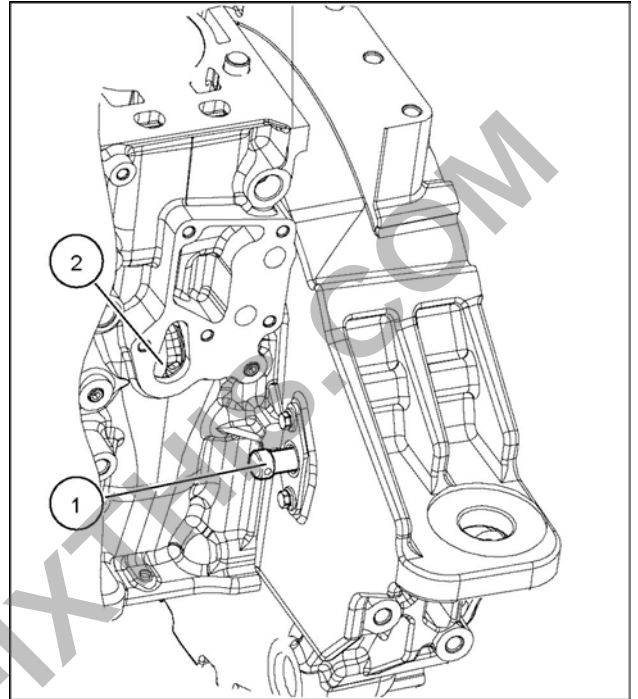
F5CE5454B, F5CE9454C, F5CE9454E, F5CE9454G, F5CE9484C, F5CE9484E, F5CE5454G*A001, F5CE5454B*A005, F5CE5454C*A003

DESCRIPTION	SIZE	TORQUE
Oil Pan		
Threaded cap with O-ring		45 - 55 N·m (33 - 41 lb ft)
Oil pan spacer	M8x1.25	20 - 30 N·m (15 - 22 lb ft)
Engine Block		
Crankshaft caps - Pre torque - Torque - Angle torque		45 - 55 N·m (33 - 41 lb ft) 75 - 85 N·m (55 - 63 lb ft) 85 - 95 °
Piston cooling nozzle		16 - 20 N·m (12 - 15 lb ft)
Conical thread cap	3/8"	35 - 45 N·m (26 - 33 lb ft)
Conical thread cap	1/8"	10 - 20 N·m (7 - 15 lb ft)
Water drainage cap		20 - 30 N·m (15 - 22 lb ft)
Oil turbo supply pipe fitting		35 - 45 N·m (26 - 33 lb ft)
Timing gearcase		
Conical thread cap		10 - 20 N·m (7 - 15 lb ft)
Gear cooling nozzle		10 - 20 N·m (7 - 15 lb ft)
Cover	M8x1.25	20 - 30 N·m (15 - 22 lb ft)
Ignition pump screw stud		3 - 5 N·m (27 - 44 lb in)
Timing pin seat cap		20 - 30 N·m (15 - 22 lb ft)
Gearcase	M8x1.25	20 - 30 N·m (15 - 22 lb ft)
Inspection cover		20 - 30 N·m (15 - 22 lb ft)
Flywheel housing		
Housing	M8x1.25 M12x1.75	30 - 40 N·m (22 - 30 lb ft) 115 - 125 N·m (85 - 92 lb ft)
Cylinder head		
Cylinder head - Stage 1 - Stage 2 - Stage 3	M15x1.5	120 - 140 N·m (89 - 103 lb ft) 85 - 95 ° 85 - 95 °
Cylinder head - Stage 1 - Stage 2 - Stage 3	M12x1.5	60 - 70 N·m (44 - 52 lb ft) 85 - 95 ° 55 - 65 °
Threaded cap		35 - 45 N·m (26 - 33 lb ft)
Overhead		
Rocker arm dowel		20 - 30 N·m (15 - 22 lb ft)
Overhead	M8x1.25	20 - 30 N·m (15 - 22 lb ft)
Valve adjusting nut		15 - 25 N·m (11 - 18 lb ft)
Intake Manifold		
Intake manifold	M8x1.25	20 - 30 N·m (15 - 22 lb ft)
Throw fastening to intake manifold		20 - 30 N·m (15 - 22 lb ft)
Exhaust Manifold		
Exhaust manifold		10 - 20 N·m (7 - 15 lb ft)

ENGINE - Service instruction - Finding Top Dead Center (TDC)

F5CE5454B, F5CE9454C, F5CE9454E, F5CE9454G, F5CE9484C, F5CE9484E, F5AE9454A, F5AE9454D, F5AE9484A, F5AE9484B, F5AE9484G, F5AE5484A, F5AE9454J, F5AE9454L, F5AE9484K

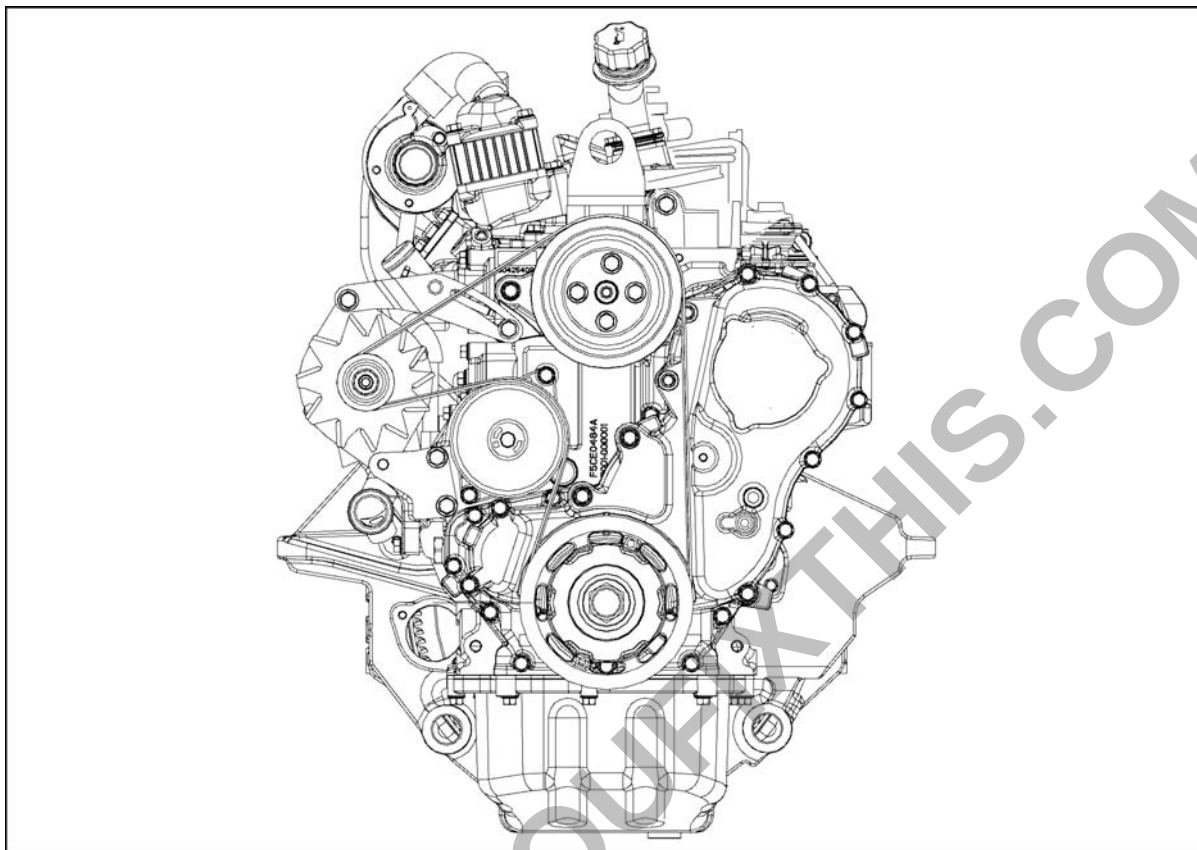
1. Fit the tool **380000150 (1)** through the case and into the port on the flywheel, as shown.
2. Using the tool **380000150 (1)** rotate the flywheel until the notch **(2)** is visible in the inspection hole and cylinder one is at T.D.C..



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ENGINE - Overview

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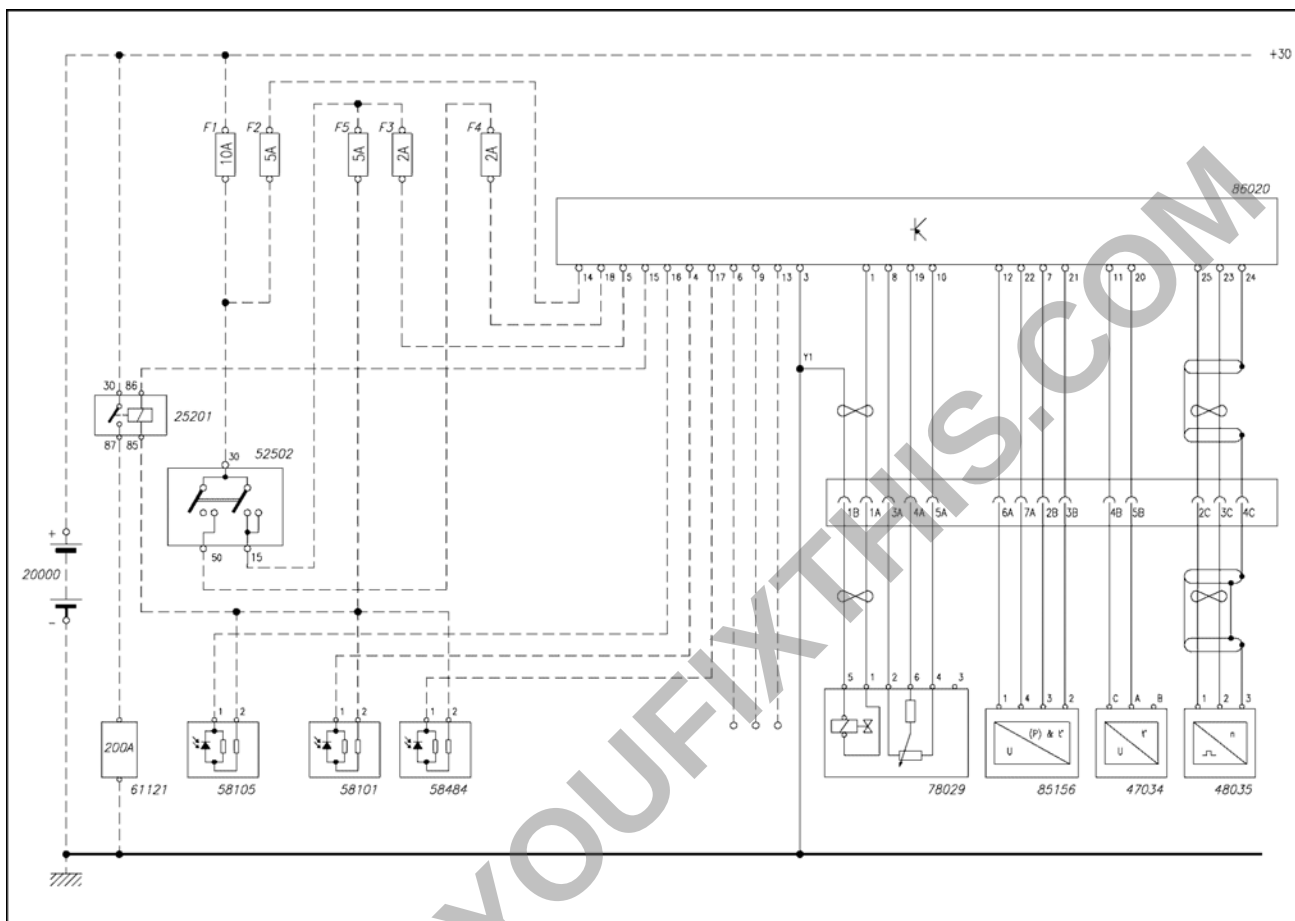


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ENGINE FRONT VIEW

Electronic control Control module - Electrical schema EGR System

F5CE5454B, F5CE5454G*A001, F5CE5454B*A005, F5CE5454C*A003, F5AE5484A



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Electrical Layout

20000 - Starter battery
25201 - Remote control for pre-heating switch
48035 - Engine rev. no. sensor
52502 - Key commutator for services with start
61121 - Resistor for engine pre-heating
58101 - Pre-heating (on) warning light

58105 - Engine high water temperature warning light
58484 - Diagnosis warning light
47034 - Engine water temperature sensor for EGR
78029 - EGR solenoid valve
86020 - EGR E.C.U.
85156 - Air pressure temperature sensor

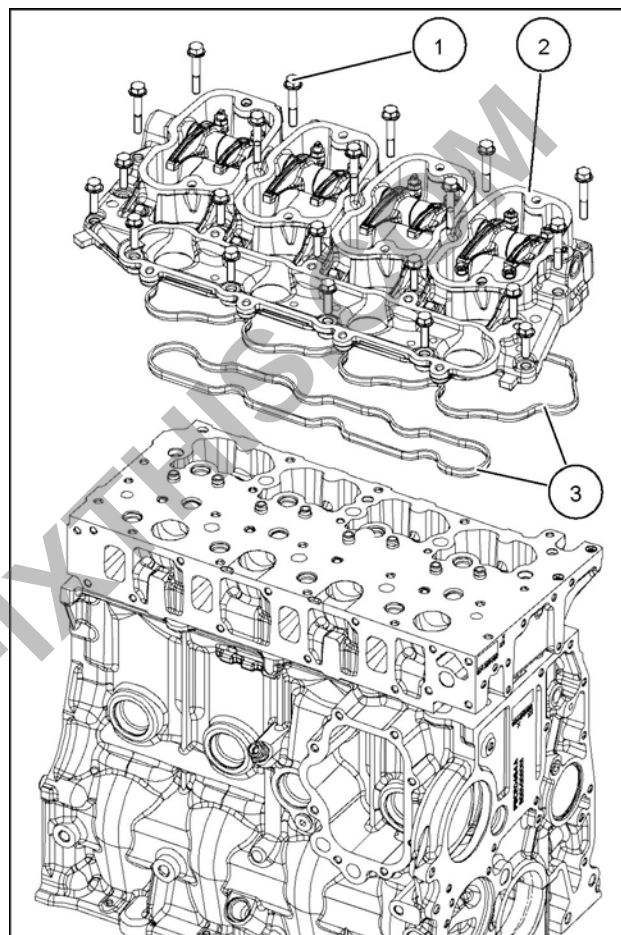
Turbocharger mounting stud		10 - 20 N·m (7 - 15 lb ft)
EGR Unit		
Heat exchanger fastening to valve unit		20 - 30 N·m (15 - 22 lb ft)
Heat exchanger fastening to throw		20 - 30 N·m (15 - 22 lb ft)
EGR fastening to intake manifold		20 - 30 N·m (15 - 22 lb ft)
Valve		5 - 15 N·m (4 - 11 lb ft)
Manifold fastening nuts		20 - 30 N·m (15 - 22 lb ft)
Manifold fastening rings		5 - 15 N·m (4 - 11 lb ft)
Pulley		
Engine crankshaft pulley		335 - 365 N·m (247 - 269 lb ft)
Connecting Rod		
Connecting rod cap - Pre-torque - Angle torque		45 - 55 N·m (33 - 41 lb ft) 65 - 75 °
Flywheel		
Flywheel - Pre-torque - Angle torque		25 - 35 N·m (18 - 26 lb ft) 85 - 95 °
Timing		
Phonic wheel		12 - 18 N·m (9 - 13 lb ft)
Thrust block		20 - 30 N·m (15 - 22 lb ft)
Gear		31 - 41 N·m (23 - 30 lb ft)
Injector		
Injector stud screw		21 - 29 N·m (15 - 21 lb ft)
Injector fastening nut - Pre-torque - Angle torque		10 - 20 N·m (7 - 15 lb ft) 25 - 35 N·m (18 - 26 lb ft)
LDA		
Manifold side		15 - 25 N·m (11 - 18 lb ft)
Pump side		15 - 25 N·m (11 - 18 lb ft)
Sensors		
Crankshaft speed sensor		5 - 15 N·m (4 - 11 lb ft)
Camshaft speed sensor		5 - 15 N·m (4 - 11 lb ft)
Water temperature sensor		31 - 41 N·m (23 - 30 lb ft)
Oil temperature sensor		20 - 30 N·m (15 - 22 lb ft)
Air pressure sensor		5 - 15 N·m (4 - 11 lb ft)
Fuel filter		
Union fixing to support		20 - 30 N·m (15 - 22 lb ft)
Fuel filter		20 - 30 N·m (15 - 22 lb ft)
Supply Pump		
Supply pump		20 - 30 N·m (15 - 22 lb ft)
Inlet		20 - 30 N·m (15 - 22 lb ft)
Fast clutch		20 - 30 N·m (15 - 22 lb ft)
Turbocharger		

Rocker assembly Housing - Remove

Prior operation:

Valve cover - Remove (B.10.A)

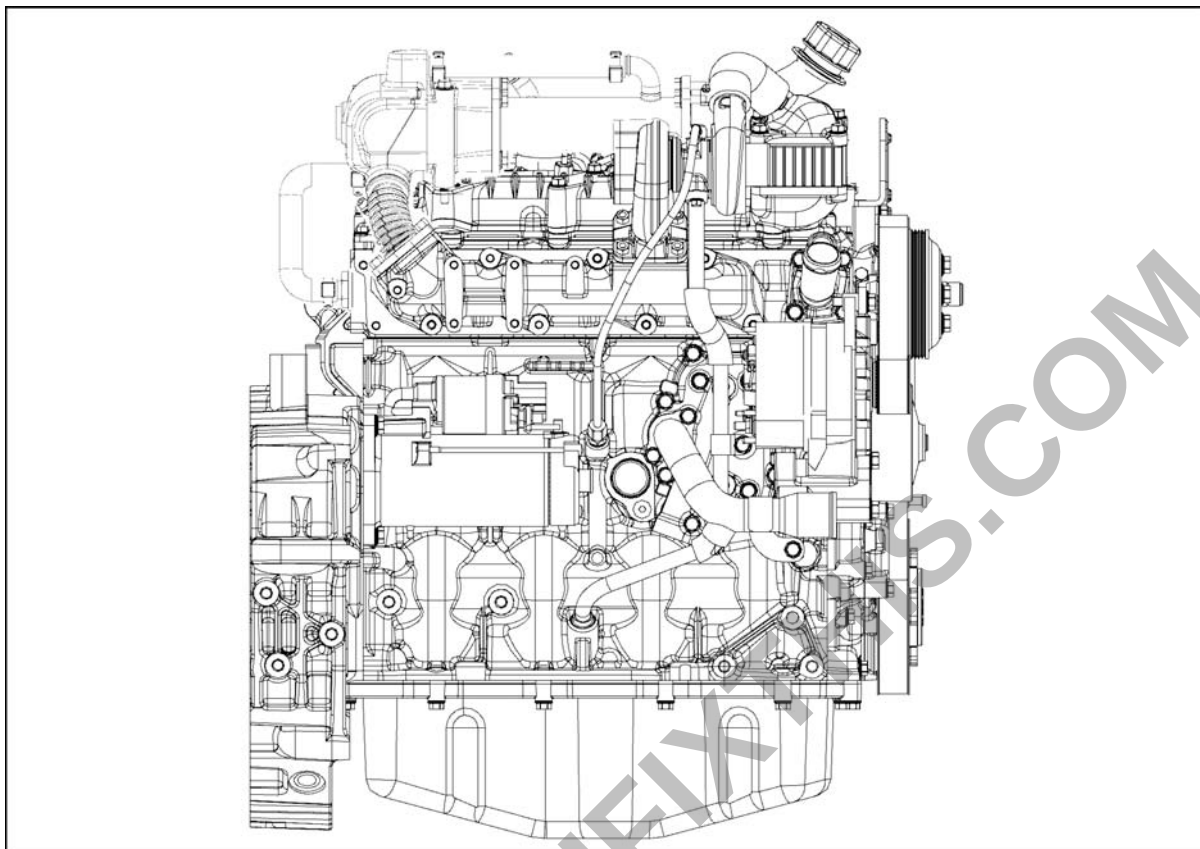
1. Loosen the fastening screws (1), remove the overhead holding the whole rocker arm unit (2) and recover the two gaskets (3).



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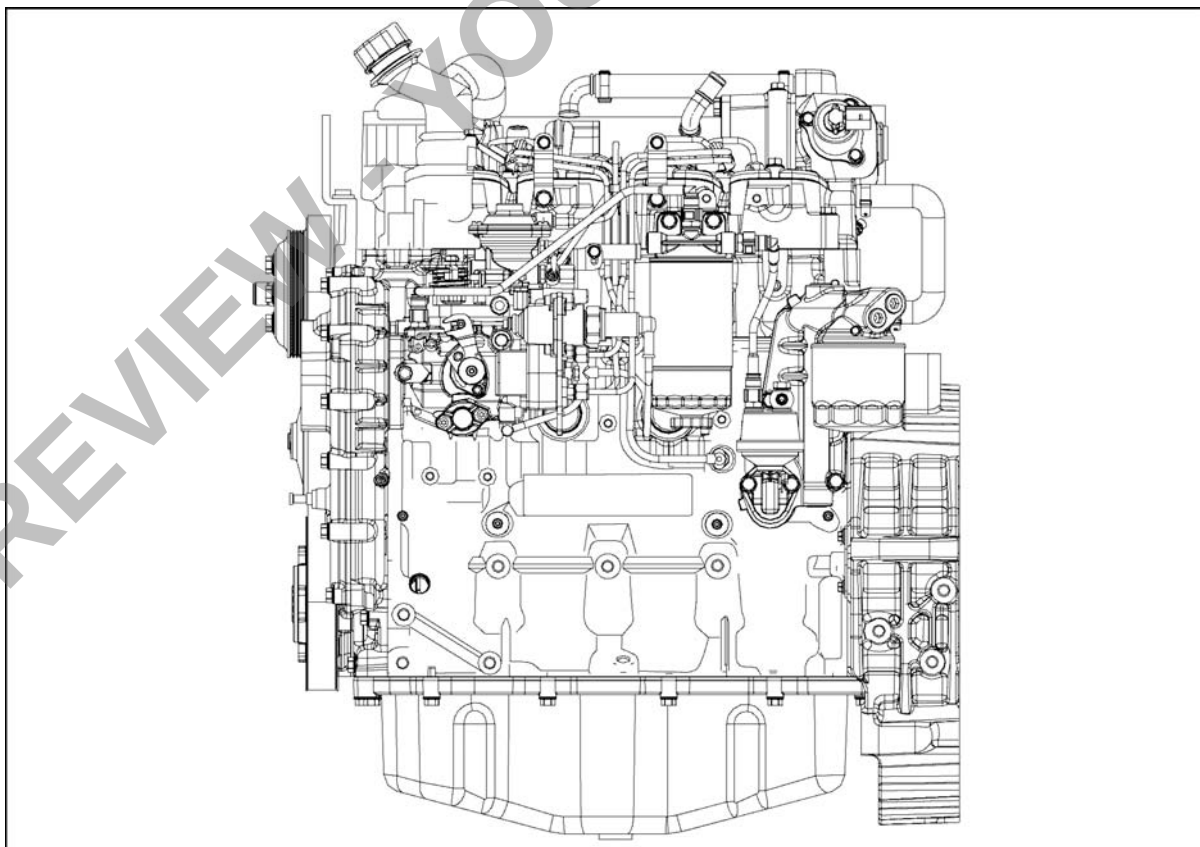
Next operation:

Rocker assembly Housing - Install (B.10.A)



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ENGINE RIGHT SIDE VIEW

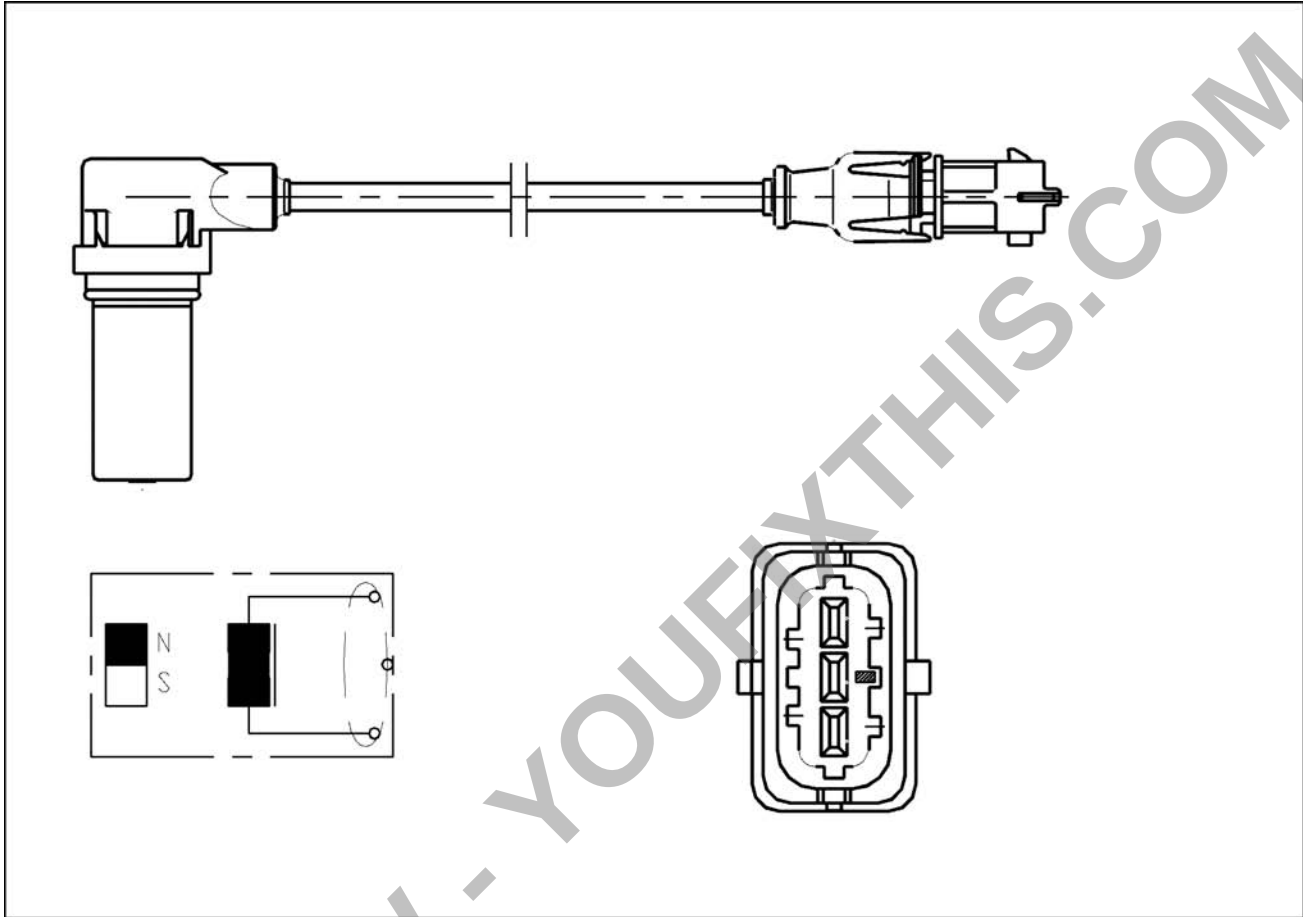


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ENGINE LEFT SIDE VIEW

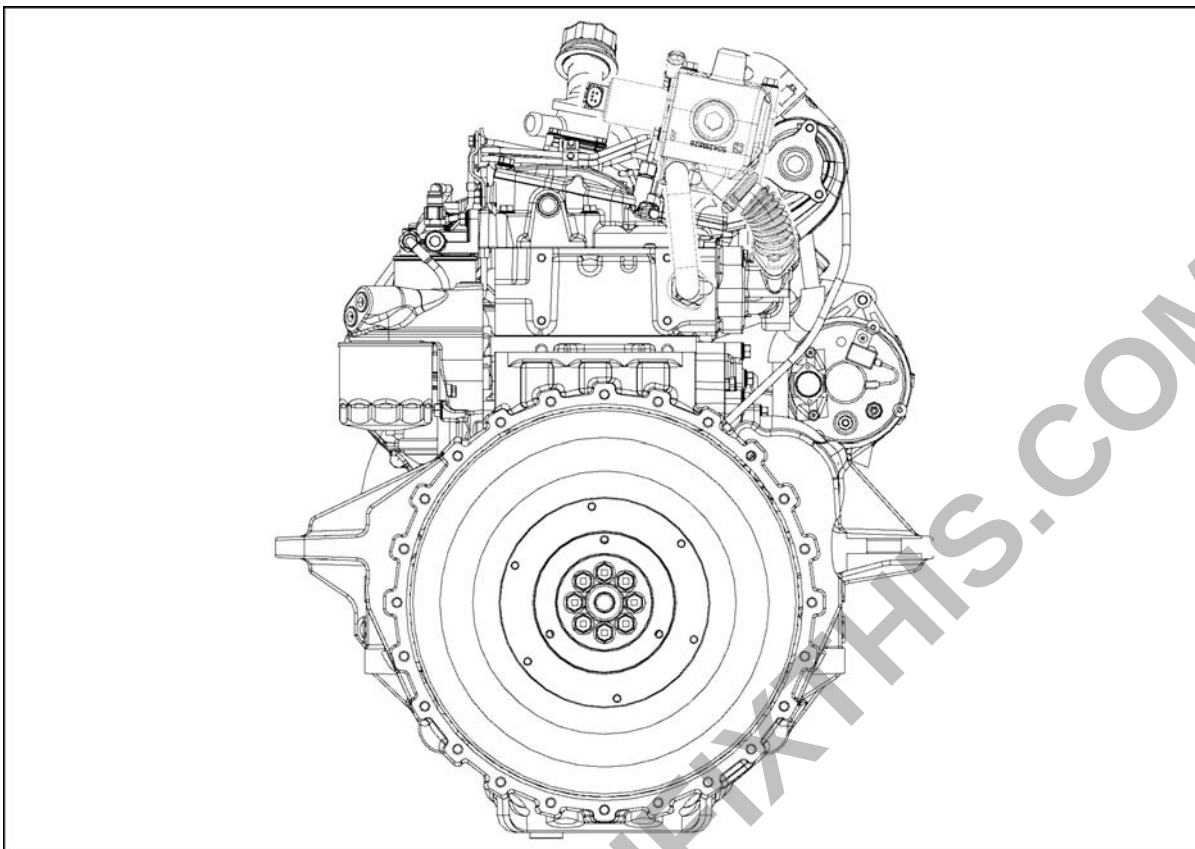
Sensing system Crankshaft sensor - Overview

It is an inductive type sensor placed on the front left side of the engine. It generates signals obtained by the magnetic flow lines closing up through the openings of a tone wheel splined on the engine crankshaft. The same signal is used to pilot the tachometer fitted on the vehicle instrument panel. It is connected to the Electronic Control Unit pins 25C (signal) and 24C (signal). The third pin is for shielding. The Sensor's resistance value is nearly **900 Ω** .



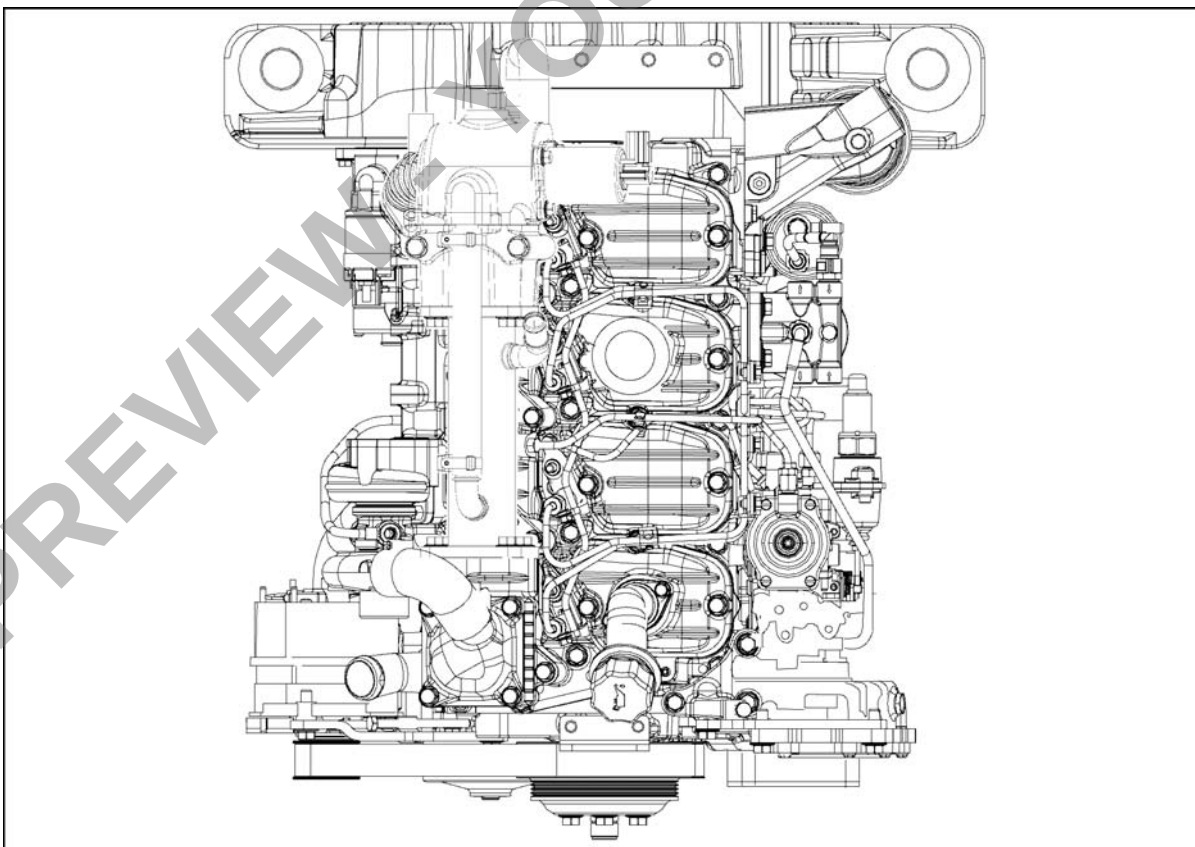
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Collector fastening screw nuts		20 - 30 N·m (15 - 22 lb ft)
Oil delivery inlet		20 - 30 N·m (15 - 22 lb ft)
Delivery pipe fastening screw		20 - 30 N·m (15 - 22 lb ft)
Drain pipe to heat exchanger		20 - 30 N·m (15 - 22 lb ft)
Drain pipe to turbo		10 - 20 N·m (7 - 15 lb ft)
Cooling pipe		
Water pipe to heat exchanger		20 - 30 N·m (15 - 22 lb ft)
Water pipe to the support		20 - 30 N·m (15 - 22 lb ft)
Conical threaded cap	3/8"	35 - 45 N·m (26 - 33 lb ft)
Oil		
Oil pressure control valve		40 - 50 N·m (30 - 37 lb ft)
Oil dipstick		20 - 30 N·m (15 - 22 lb ft)
Oil inlet pipe		10 - 20 N·m (7 - 15 lb ft)
Pickup tube to block		8 - 12 N·m (6 - 9 lb ft)
Pickup tube support		30 - 40 N·m (22 - 30 lb ft)
Oil filter cartridge union		40 - 50 N·m (30 - 37 lb ft)
Oil filter		20 - 30 N·m (15 - 22 lb ft)
Oil filter cartridge		16 - 20 N·m (12 - 15 lb ft)
Oil pump		
- Stage 1		10 - 20 N·m (7 - 15 lb ft)
- Stage 2		20 - 30 N·m (15 - 22 lb ft)
Heat exchanger		
Threaded caps		40 - 50 N·m (30 - 37 lb ft)
Exchanger unit		20 - 30 N·m (15 - 22 lb ft)
Heat exchanger		20 - 30 N·m (15 - 22 lb ft)
Thermostat		
Thermostat unit		20 - 30 N·m (15 - 22 lb ft)
Bleed vent		35 - 45 N·m (26 - 33 lb ft)
Fan support		
Water pump		20 - 30 N·m (15 - 22 lb ft)
Bearing		35 - 45 N·m (26 - 33 lb ft)
Fan support		20 - 30 N·m (15 - 22 lb ft)
Pulley		35 - 45 N·m (26 - 33 lb ft)
Alternator		
Alternator support		45 - 55 N·m (33 - 41 lb ft)
Alternator		45 - 55 N·m (33 - 41 lb ft)
Lifting		
Front hook		45 - 55 N·m (33 - 41 lb ft)
Rear hook		65 - 75 N·m (48 - 55 lb ft)
Injection Pump		
Pump gear		
- Pre-torque		16 - 20 N·m (12 - 15 lb ft)
- Torque		85 - 95 N·m (63 - 70 lb ft)



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ENGINE REAR VIEW



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ENGINE TOP VIEW

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Safety rules

Standard safety precautions

Be informed and notify personnel of the laws in force regulating safety, and provide documentation available for consultation.

- Keep working areas as clean as possible.
- Ensure that working areas are provided with emergency boxes. They must be clearly visible and always contain adequate sanitary equipment.
- Fire extinguishers must be properly identified and always be clear of obstructions. Their efficiency must be checked on a regular basis and personnel must be trained on proper interventions and priorities.
- Keep all emergency exits free of obstructions and clearly marked.
- Smoking in working areas subject to fire danger must be strictly prohibited.

Prevention of injury

- Wear suitable work attire and safety glasses with no jewelry such as rings and chains when working close to engines and equipment in motion.
- Wear safety gloves and goggles when performing the following operations:
 - Topping off or changing lubrication oils.
 - Using compressed air or liquids at a pressure greater than **2 bar (29 psi)**.
- Wear a safety helmet when working close to hanging loads or equipment working at head level.
- Always wear safety shoes and fitting clothes.
- Use protection cream for hands.
- Change wet clothes as soon as possible.
- In the presence of voltages exceeding **48 - 60 V**, verify the efficiency of the ground and mass electrical connections. Ensure that hands and feet are dry and use isolating foot boards. Workers should be properly trained to work with electricity.
- Do not smoke or start an open flame close to batteries and any fuel material.
- Place soiled rags with oil, diesel fuel or solvents in specially provided anti-fire containers.
- Do not use any tool or equipment for any use other than what it was originally intended for. Serious injury may occur.
- If running an engine indoors, make sure there is a sufficient exhaust fan in use to eliminate exhaust fumes.

During maintenance

- Never open the filler cap of the cooling system when the engine is hot. High temperature liquid at operating pressure could result in serious danger and risk of burn. Wait until the temperature decreases under **50 °C (122 °F)**.
- Never add coolant to an overheated engine and use only appropriate liquids.
- Always work when the engine is turned off. Certain circumstances require maintenance on a running engine. Be aware of all the risks involved with such an operation.
- Always use adequate and safe containers for engine fluids and used oil.
- Keep engine clean of any spilled fluids such as oil, diesel fuel, and or chemical solvents.
- Use of solvents or detergents during maintenance may emit toxic vapors. Always keep working areas aerated. Wear a safety mask if necessary.
- Do not leave soiled rags that may contain any flammable substances close to the engine.
- Always use caution when starting an engine after any work has been performed. Be prepared to cut off intake air in case of engine runaway.
- Never disconnect the batteries while the engine is running.

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