KDI 1903 M - 2504 M

WORKSHOP MANUAL

KOHLER. Diesel KDI



KOHLER.

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1			**GENERAL INFORMATION**	**12**
1.1			Useful information	12
	1.1.1		Useful Information -accident prevention - environmental impact	12
1.2			Manufacturer and engine identification	13
1.3			Identification of the main internal components of the engine and operating reference (BASE CONFIGURATION)	14
1.4			Identification of the external components of the engine (BASE CONFIGURATION)	16
2			**TECHNICAL INFORMATION**	**19**
2.1			Engine specifications	19
2.2			Engine dimensions (mm)	21
2.3			Performance diagrams	22
2.4			Oil	23
	2.4.1		SAE oil classification	23
	2.4.2		International lubricant specifications	23
2.5			Fuel	24
	2.5.1		Fuel for low temperatures	24
	2.5.2		Biodiesel fuel	24
	2.5.3		Emission-Related Installation Instructions	25
2.6			Coolant	25
2.7			Battery features	25
2.8			Periodic maintenance	26
2.9			Fuel system	27
	2.9.1		Supply system	27
	2.9.2		Fuel return circuit	28
	2.9.3		Injection pump	28
	2.9.4		Injector	29
	2.9.5		Fuel filter	29
	2.9.6		Electric fuel pump (optional)	30
	2.9.7		Guards for fuel injection circuit components	30
2.10			Lubrication circuit	31
	2.10.1		Lubrication circuit diagram	31
	2.10.2		Oil pump	32
	2.10.3		Oil filter	33
2.11			Coolant circuit	34
	2.11.1		Coolant circuit diagram	34
	2.11.2		Coolant pump	34
	2.11.3		Thermostatic valve	34
	2.11.4		Radiator (optional)	35
2.12			Intake and exhaust circuit	36
	2.12.1		Air filter (optional)	37
2.13			Electric system	38
	2.13.1		Engine electrical wiring (opzional)	38
		2.13.1.1	Connector panel on the engine/machine	39
		2.13.1.2	Accessories panel connector	39
		2.13.1.3	Wiring disconnection	40
2.14			Sensors and switches	41
	2.14.1		Fuel filter water detection sensor	41
	2.14.2		Oil pressure switch	41
	2.14.3		Coolant temperature sensor	41
	2.14.4		Air cleaner clogging switch	42
2.15			Electrical components	42
	2.15.1		Alternator	42
	2.15.2		Starter motor	42
	2.15.3		Cold starting device (Heater)	42
	2.15.4		Electric fuel pump (optional)	43
	2.15.5		Cold Start Advance	44
	2.15.6		Electro-Stop	44
	2.15.7		Fuse	44
	2.15.8		Control panel (optional)	44
2.16			Timing system and tappets	45
	2.16.1		Components identification	45
	2.16.2		Timing system phasing angles	46

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	2.16.3		Rocker arm pin	46
	2.16.4		Rocker arms	46
	2.16.5		Hydraulic tappets	47
		2.16.5.1	Hydraulic tappet operation	47
		2.16.5.2	Difficult operating conditions	47
2.17			Balancer device (optional - only KDI 2504)	48
2.18			Components handling	49
	2.18.1		Injection pump	49
	2.18.2		Injector	49
3			SAFETY INFORMATION	50
3.1			Before start-up	50
3.2			Safety precautions	50
3.3			General remarks	50
	3.3.1		Note for OEM	50
	3.3.2		Note for end user	50
3.4			Safety signal description	52
	3.4.1		Adhesive safety plates	52
	3.4.2		Warnings	52
	3.4.3		Safety guards	52
3.5			Information and safety signals	53
3.6			Safety and environmental impact	53
3.7			Location of safety signals on engine	54
4			STORAGE INFORMATION	55
4.1			Product preservation	55
4.2			Engine storage (up to 6 months)	55
4.3			Engine storage (over 6 months)	55
4.4			Engine starting after storage	55
5			INFORMATION REGARDING DISCHARGE OF LIQUIDS	56
5.1			Coolant	56
5.2			Engine oil	57
6			INFORMATION FOR REPLACING THE FUNCTIONAL UNITS	58
6.1			Injector and injection pump replacement	58
	6.1.1		Injection fuel pipes disassembly(injection pump/injectors)	58
	6.1.2		Rocker arms cover disassembly	58
	6.1.3		Fuel return pipes disassembly	59
	6.1.4		Injectors disassembly	59
	6.1.5		Injection pump disassembly	59
	6.1.6		Injection pump assembly	62
	6.1.7		Injector assembly	63
	6.1.8		Assembly of the injector return pipes	64
	6.1.9		Assembly Rocker arm cover	64
	6.1.10		Installation of the fuel injector pipes (pump injector/injectors)	65
6.2			Coolant pump replacement	66
	6.2.1		Disassembly	66
	6.2.2		Assembly	66
6.3			Replace the crankshaft pulley	67
	6.3.1		Disassembly	67
	6.3.2		Assembly	67
6.4			Oil pump replacement	68
	6.4.1		Coolant pump disassembly	68
	6.4.2		Engine pulley disassembly	68
	6.4.3		Timing system crankcase disassembly	68
	6.4.4		Oil pump disassembly	68
	6.4.5		Oil pump assembly	69
	6.4.6		Timing system crankcase assembly	69
	6.4.7		Crankshaft pulley assembly	70
	6.4.8		Coolant pump assembly	70
6.5			Oil pressure valve replacement	70
		6.5.1	Disassembly	70
		6.5.2	Assembly	70

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6.6		Oil filter replacement	71
	6.6.1	Disassembly	71
	6.6.2	Assembly	71
6.7		Fuel filter replacement	71
	6.7.1	Disassembly	71
	6.7.2	Assembly	71
7		**DISASSEMBLY INFORMATION**	**72**
7.1		Recommendations for disassembly	72
7.2		Electric components disassembly	72
	7.2.1	Electric wiring	72
	7.2.2	Starter motor	72
	7.2.3	Belt and alternator	72
	7.2.4	Sensors and switches	72
	7.2.4.1	Oil pressure switch disassembly	72
	7.2.4.2	Coolant temperature sensor	73
	7.2.4.3	Fuel filter water detection sensor	73
7.3		Exhaust manifold disassembly	73
7.4		Coolant recirculation components disassembly	73
	7.4.1	Coolant pump	73
	7.4.2	Thermostatic valve	74
7.5		Crankshaft pulley disassembly	74
7.6		Lubrication circuit disassembly	74
	7.6.1	Oil pressure valve	74
	7.6.2	Timing system carter oil filling flange	74
	7.6.3	Timing system	75
	7.6.4	Oil pump	75
	7.6.5	Oil cooler unit	75
7.7		Intake manifold disassembly	76
7.8		Fuel system disassembly	76
	7.8.1	Fuel injection pipes	76
	7.8.2	Rocker arm cover	76
	7.8.3	Fuel return pipes	77
	7.8.4	Injector	77
	7.8.5	Injection pump	77
	7.8.6	Fuel filter	78
7.9		Timing system gear disassembly	78
7.10		Flange unit disassembly	79
	7.10.1	Flywheel	79
	7.10.2	Flange housing	79
7.11		Cylinder head unit disassembly	80
	7.11.1	Rocker arm pin	80
	7.11.1.1	Rocker arm	80
	7.11.2	Valve rods and bridges	80
	7.11.3	Cylinder head	81
	7.11.3.1	Valves	81
	7.11.3.2	Injector sleeve	82
	7.11.3.3	Valve stem gasket	82
	7.11.3.4	Lifting eyebolts	82
7.12		Oil sump unit disassembly	83
	7.12.1	Oil sump	83
	7.12.2	Oil intake pipe	83
	7.12.3	Oil vapour pipe	83
7.13		Engine block disassembly	84
	7.13.1	Crankshaft gasket flange	84
	7.13.2	Piston unit / connecting rod	84
	7.13.3	Lower semi-crankcase	85
	7.13.4	Crankshaft	86
	7.13.5	Piston	86
	7.13.5.1	Rings	87
	7.13.6	Breather room closing cover	87
	7.13.7	Camshaft	87
	7.13.8	Camshaft tappets	87
	7.13.9	Crankshaft bushings	88
	7.13.10	Cover 3at PTO	88

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2.10 Lubrication circuit

2.10.1 Lubrication circuit diagram

The oil pump is driven by the crankshaft on the timing system side.
On the parts of the systems shown in green on In the parts in green, the oil is in intake, in the parts in red, the oil is under pressure and in those in yellow the oil is returning towards the oil sump 2 (not under pressure).

Tab. 2.17

COLOUR	DESCRIPTION
	Oil in intake
	Oil under pressure
	Oil returning to the oil sump

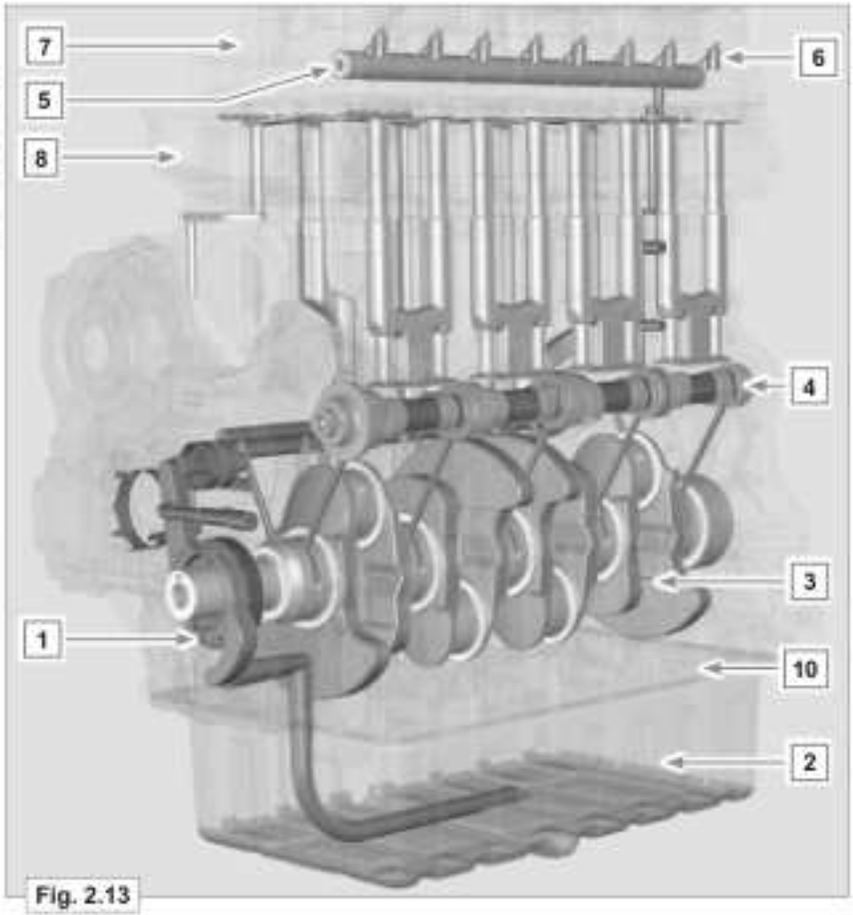


Fig. 2.13

Tab. 2.18

POS.	DESCRIPTION
1	Oil pump rotors
2	Oil sump
3	Crankshaft
4	Camshaft
5	Rocker arm pin
6	Hydraulic tappets
7	Rocker arm cover
8	Cylinder head
9	Upper crankcase
10	Lower crankcase
11	Oil filter
12	PTO 3rd/4th gear housing

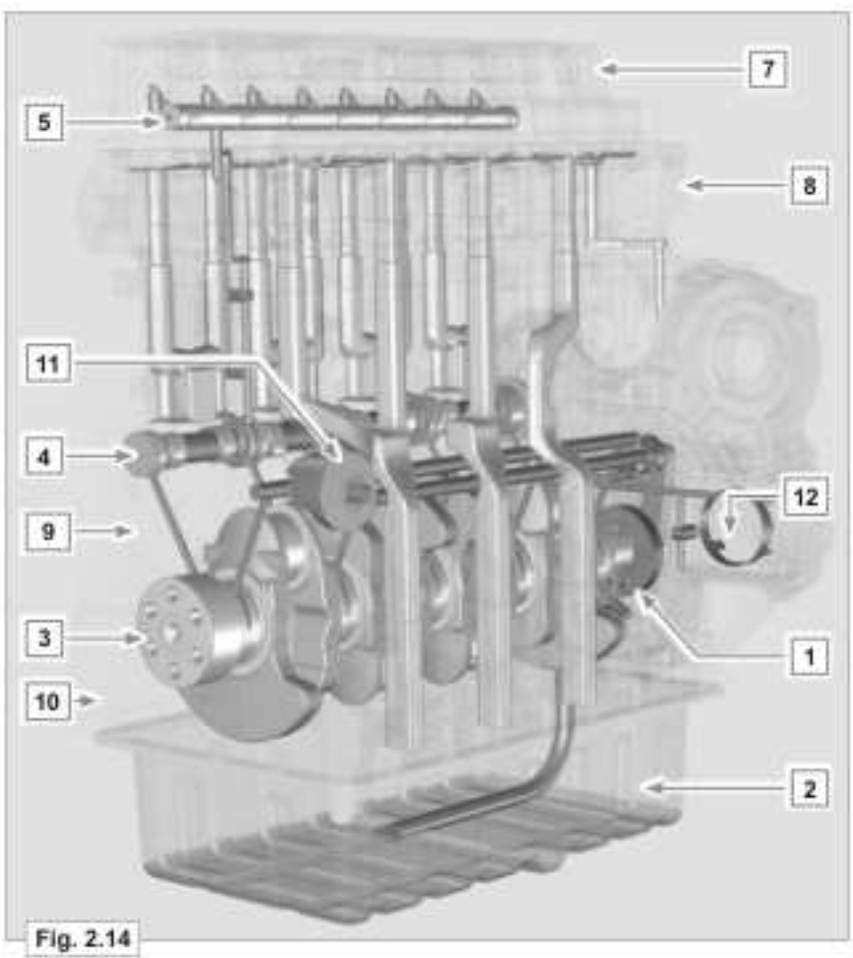


Fig. 2.14

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8.4.2 Checking the axial clearance of the crankshaft

Perform the operations described in **Par. 9.3.5** e **9.3.6.**

Using a dial gauge, measure the axial shift of crankshaft **E**.

Axial shift must be a **MIN** of 0.18 mm and **MAX** 0.38 mm..
If the values measured do not correspond, replace shoulder rings **D**.

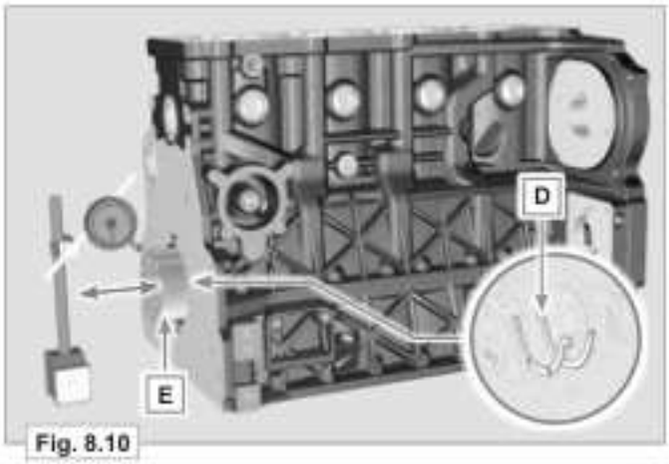


Fig. 8.10

8.5 Connecting rod - piston assembly

8.5.1 Connecting rod dimensions check

Important

- Before assembling the connecting rod and pistons (**Par. 9.3.7** and **9.3.8**), check that the difference in weight between the complete connecting rod and piston units do not exceed 8 gr to prevent weight imbalances during rotation of the crankshaft and consequent damage.
- Mark some references on the connecting rods, caps **Q**, pistons and gudgeon pins to prevent unintentionally confusing the components during assembly. Failure to do this may result in engine malfunctions..
- Connecting rod half-bearings **S** must be replaced at each assembly.

Check that the contact surfaces are perfectly clean and intact.

Assemble the connecting rod cap **Q** to the connecting rod with the half-bearings **S** and tighten capscrews **P** (tightening torque at **25 Nm**).
With a dial gauge, measure diameters B and D.
The **MAX** allowed value of wear for B and D is 0.06 mm.


Fig. 8.11

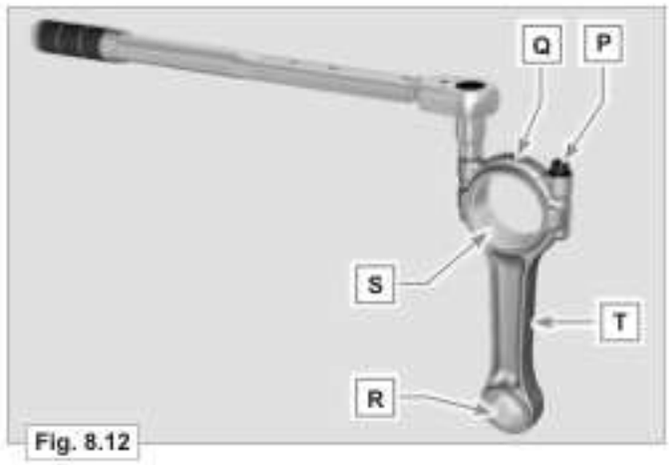


Fig. 8.12

Tab. 8.6

REF.	DIMENSIONS (mm)	CLEARANCE VALUE (mm)
A	169.980 - 170.020	
B	30.020 - 30.030	0.025 - 0.030
C	29.995 - 30.000	
D	54.035 - 54.066	
E	67.700 - 68.000	
F	29.750 - 29.790	

Important

- **Tab. 8.6** details the dimensional values of new components only.
- Check that the connecting rod and crankshaft half-bearings are coupled properly.
- Refer to the warnings in **Par. 8.4.1** for value D decreased.
- If the clearance value between B and D is not observed, you are required to replace bearing **R** (**Fig. 8.12**).

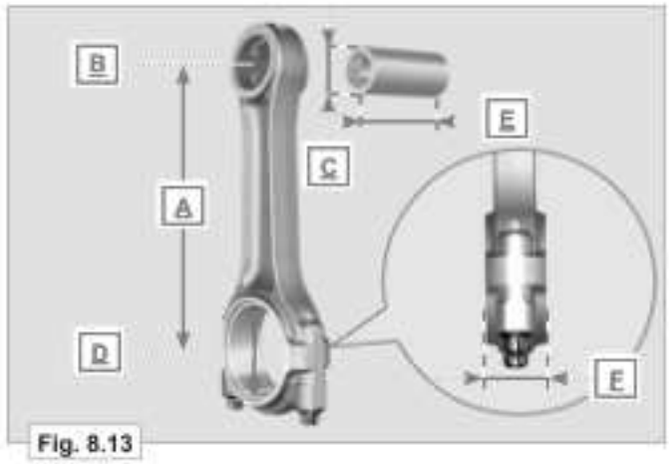


Fig. 8.13

Measure value A, C, D, E and F and confront them with those described in **Tab. 8.6**.
If the measured values do not follow those described in **Tab. 8.6**, replace connecting rod **T**.

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	POSSIBLE CAUSE	TROUBLES													
		Engine does not start	Engine starts and stops	No acceleration	Variable speed	Black smoke	White smoke	Low oil pressure	Oil level increase	Excessive oil consumption	Oil and fuel leaking out from the exhaust	Engine overheats	Inadequate performance	High noise level	The Warning Lamp switches on
LUBRICATION CIRCUIT	Oil level too high						■			■	■	■	■	■	
	Oil level low							■				■	■		
	Dirty or blocked pressure regulating valve							■							
	Worn oil pump							■							
	Air in the oil suction pipe							■							
	Oil suction hose clogged							■							
	Oil steam exhaust pipe clogged													■	
INJECTION	Damaged injectors	■		■		■	■		■		■	■	■	■	
	Damaged injection pump	■		■									■		
	Wrong injector IMA codes				■	■	■						■	■	
COOLING CIRCUIT	Insufficient coolant											■			
	Defective fan, radiator, or radiator cap											■			
	Blockage inside the radiator or the coolant ducts											■			
	Heat exchange surface of the radiator clogged											■			
	Defective thermostatic valve											■			
	Coolant leaking from the radiator, manifolds, crankcase or from the coolant pump											■			
	Defective or worn coolant pump											■			

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* *Alternatively to the capscrew replacements, with "Dri-loc"*

OPTIONAL COMPONENTS (CHAP. 11)

OIL DIPSTICK ON CYLINDER HEAD

Component	Thread (mm)	Torque (Nm)	Sealer
Oil dipstick tube fastening capscrew	M6x1	10	

HEATER

Component	Thread (mm)	Torque (Nm)	Sealer
Flange intake with heater fastening capscrew	M8x1.25	25	

IDLE GEAR (FOR 3TH /4TH PTO)

Component	Thread (mm)	Torque (Nm)	Sealer
Gear drilled fastening capscrew	M14x1.5		Molyslip

3TH PTO

Component	Thread (mm)	Torque (Nm)	Sealer
Pump support fastening capscrew	M8x1.25	25	Loctite 2701*
Pump fastening capscrew	M8x1.25	25	

4TH PTO

Component	Thread (mm)	Torque (Nm)	Sealer
Grooved crankshaft support fastening capscrew	M8x1.25	25	Loctite 2701*
Cover fastening capscrew (3rd PTO side)	M8x1.25	25	
Sump support fastening capscrew	TG6	10	
Pump fastening capscrew	M8x1.25	25	

BALANCE SHAFTS (4 CYLINDERS)

Component	Thread (mm)	Torque (Nm)	Sealer
Housing closing panel fastening capscrew	M6x1	8	
Shafts support fastening capscrew	M10x1.5	50	

REMOTE OIL FILTER

Component	Thread (mm)	Torque (Nm)	Sealer
Head fixing joint on crankcase	M20x1.5	25	Loctite 2701
Crankcase head nipple and oil filter support	M14x1.5	40	
Tube union on crankcase head	G3/8	30	
Tube union on filter support	G3/8	35	
Oil filter	M20x1.5	20	
Filter support head air bleeding cap	M8x1.25	25	

INTAKE CIRCUIT

Component	Thread (mm)	Torque (Nm)	Sealer
Air filter support plate fastening capscrew (on flange bell)	M8x1.25	25	
Air filter support fastening capscrew	M8x1.25	25	

EXHAUST CIRCUIT

Component	Thread (mm)	Torque (Nm)	Sealer
Muffler brace support fastening capscrew	M8x1.25	25	
Muffler fastening capscrew on muffler	M8x1.25	25	
Muffler fastening nut	M8x1.25	25	

COOLING CIRCUIT

Component	Thread (mm)	Torque (Nm)	Sealer
Blower fastening capscrew	M6x1	10	
Radiator support fastening capscrew	M16x1.5	150	
Shroud radiator fastening capscrew	M6x1	10	
Radiator lower brace fastening capscrew	M8x1.25	25	
Radiator on anti-vibrating	M8x1.25	25	
Vibration-damping nut fixing (on radiator support)	M8x1.25	25	
Anti-vibrating and brace fastening capscrew (upper)	M6x1	10	
Upper brace fastening capscrew (on engine cylinder head)	M8x1.25	25	
Side bulkheads fastening capscrew	M6x1	10	

ENGINE SUPPORT

Component	Thread (mm)	Torque (Nm)	Sealer
Side feet fastening capscrew (on flange bell or crankcase)	M12x1.75	50	
Rear feet fastening capscrew	M16x1.5	200	

* *Alternatively to the capscrew replacements, with "Dri-loc"*

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2.1 Engine specifications

Tab. 2.1

MANUFACTURER SPECIFICATIONS AND OPERATION			
GENERAL INFORMATION	UNIT OF MEASURE	KDI 1903 M	KDI 2504 M
Operating cycle		diesel - 4-stroke	
Cylinders	No.	3	4
Bore x stroke	mm	88x102	
Displacement	cm³	1861	2482
Compression ratio		17:1	
Intake		Atmospheric pressure	
Cooling		Liquid	
Crankshaft rotation (view from flywheel side)		Counterclockwise	
Combustion sequence		1-3-2	1-3-4-2
Timing System			
Valves per cylinder		4	
Timing System		Rods and rocker arms - Camshaft in the crankcase	
Tappets		Hydraulic	
Injection		Direct	
Engine dry weight	Kg	210	244
MAX inclination 30" continuous operation	α	25°	
MAX inclination 1' continuous operation	α	35°	
Volume of aspirated air (2600 rpm)	m³/h	2.2	2.9
POWER AND TORQUE			
GENERAL INFORMATION	UNIT OF MEASURE	KDI 1903 M	KDI 2504 M
MAX. operating speed	Rpm	2600	
MAX. operating power (ISO TR 14396 - SAE J1995 - CE 97/68)	kW	31	41
Maximum torque (at 1500 rpm)	Nm	133	170
Admissible axial load on crankshaft	Kg	300	
CONSUMPTIONS			
GENERAL INFORMATION	UNIT OF MEASURE	KDI 1903 M	KDI 2504 M
Specific fuel consumption (best point)	g/kWh	210	
Oil consumption	%Fuel	< 0.05	
FUEL SUPPLY SYSTEM			
GENERAL INFORMATION	UNIT OF MEASURE	KDI 1903 M	KDI 2504 M
Type of fuel		Diesel UNI-EN590 - ASTM D975	
High-pressure fuel injection pump		STANADYNE - DB	
Fuel supply		Low pressure electric pump	
Fuel filter			
Filtering surface	cm²	2300	
Degree of filtration	µm	5	
Maximum pressure at injection pump inlet	bar	0.2	

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