



## Contents

<b>00 - Technical data</b>	<b>1</b>
<b>1</b> <b>— Change history —</b>	<b>1</b>
<b>2</b> <b>Identification</b>	<b>2</b>
2.1 Engine number/engine characteristics	2
<b>3</b> <b>Safety instructions</b>	<b>4</b>
3.1 Safety measures regarding work on the fuel supply	4
3.2 Safety measures in test drives using testing and measurement devices	5
3.3 Safety measures when working on the ignition system	6
3.4 Safety measures when working on the exhaust system	6
3.5 Safety measures when working on the cooling system	6
<b>4</b> <b>Repair instructions</b>	<b>8</b>
4.1 Cleaning rules	8
4.2 General Notes	8
4.3 General repair instructions	8
4.4 Foreign bodies on the engine	9
4.5 Contact corrosion	9
4.6 Connection installation and fastening	9
4.7 Radiator and capacitor installation	9
<b>10 - Removing and installing engine</b>	<b>10</b>
<b>1</b> <b>Engine - remove and install</b>	<b>10</b>
1.1 Engine - removal	10
1.2 Engine - separate gearbox	21
1.3 Engine - secure to engine and gearbox support	26
1.4 Engine - installation	28
1.5 Engine - remove and install, summarized instructions	31
<b>2</b> <b>Power-drive unit supports</b>	<b>35</b>
2.1 Power unit brackets - assembly overview	35
2.2 Power unit bracket (engine side) - remove and install	38
2.3 Drive-train mounting (gearbox side) - remove and install	39
2.4 Pendulum support (torque limiter) - remove and install	42
2.5 Support the engine in assembly position	43
2.6 Drive train mountings - adjust	47
2.7 Drive train mounting adjustment - check	48
<b>13 - Crankshaft group</b>	<b>50</b>
<b>1</b> <b>Cylinder block (pulley side)</b>	<b>50</b>
1.1 Poly-V belt - assembly overview	50
1.2 Poly-V belt - remove and install	52
1.3 Poly-V belt tensioner - remove and install	54
1.4 Crankshaft pulley (vibration damper) - remove and install	55
1.5 Engine console - remove and install	56
1.6 Crankshaft seal (pulley side) - replace	60
<b>2</b> <b>Cylinder block (gearbox side)</b>	<b>64</b>
2.1 Cylinder block (gearbox side) - assembly overview	64
2.2 Flywheel - remove and install	68
2.3 Clutch Disk - removal and installation	69
2.4 Crankshaft flange (flywheel side) - replace	72
<b>3</b> <b>Crankshaft</b>	<b>86</b>
3.1 Crankshaft - dimensions	86
3.2 Crankshaft - check axial clearance	86
<b>4</b> <b>Pistons and conrods - remove and install</b>	<b>88</b>



4.1	Pistons and conrods - assembly overview	88
4.2	Pistons - remove and install	92
4.3	Pistons, rings, and cylinders - check	93
4.4	Pistons, rings, and cylinders - check	96
4.5	Connecting rod (radial clearance) - check	98
4.6	New conrod - separate	98
4.7	Oil injectors - remove and install	99
<b>15</b>	<b>- Cylinder head, valve gear</b>	<b>101</b>
<b>1</b>	<b>Engine cylinder head</b>	<b>101</b>
1.1	Engine cylinder head - assembly overview	101
1.2	Cylinder head cover - assembly overview	103
1.3	Engine cylinder head - remove and install	106
1.4	Cylinder head - remove and install, summarized instructions	113
1.5	Cylinder head cover with exhaust and inlet camshafts - remove and install	115
1.6	Compression - check	118
<b>2</b>	<b>Toothed belt drive</b>	<b>123</b>
2.1	Upper and lower cover of the mechanical distributor and console - assembly overview	123
2.2	Toothed belt - assembly overview	123
2.3	Valve timing - check	125
2.4	Remove the toothed belt from the camshafts	130
2.5	Toothed belt - remove and install	139
<b>3</b>	<b>Camshaft mechanism - repair</b>	<b>148</b>
3.1	Camshaft mechanism - assembly overview	148
3.2	Inlet camshaft regulator - remove and install	150
3.3	Exhaust camshaft sprocket - remove and install	156
3.4	Crankshaft - check axial clearance	160
3.5	Crankshaft seal - replace	161
3.6	Camshaft adjustment valve 1 N205 - remove and install	168
3.7	Valve stem sealant - replace	169
<b>4</b>	<b>Inlet and exhaust valves</b>	<b>180</b>
4.1	Valve guides - check	180
4.2	Valves - check	181
4.3	Valves - dimensions	181
<b>17</b>	<b>- Lubrication</b>	<b>182</b>
<b>1</b>	<b>Crankcase/oil pump</b>	<b>182</b>
1.1	Crankcase/oil pump - assembly overview	182
1.2	Lower sump - remove and install	186
1.3	Upper crankcase - remove and install	191
1.4	Oil pump - remove and install	195
1.5	Engine oil	198
<b>2</b>	<b>Engine oil cooler</b>	<b>199</b>
2.1	Engine oil cooler - assembly overview	199
2.2	Engine oil cooler - remove and install	199
<b>3</b>	<b>Engine crankcase ventilation</b>	<b>201</b>
3.1	Engine crankcase ventilation - assembly overview	201
3.2	Crankcase ventilation device - remove and install	202
<b>4</b>	<b>Oil filter/Oil pressure switch F1</b>	<b>205</b>
4.1	Oil filter/Oil pressure switch F1 - assembly overview	205
4.2	Oil pressure switch 0.3...0.6 bar F1 - remove and install	205
4.3	Oil pressure and Oil pressure switch F1 - check	207
4.4	Oil filter - remove and install	209
<b>19</b>	<b>- Cooling</b>	<b>211</b>



<b>1</b>	<b>Cooling system/coolant</b> .....	<b>211</b>
1.1	Hose connection diagram for cooling system .....	211
1.2	Cooling system - check air-tightness .....	212
1.3	Coolant tank flap - check safety valve .....	215
1.4	Cooling system - drainage and replenishment .....	217
<b>2</b>	<b>Coolant/cooling system water pump</b> .....	<b>225</b>
2.1	Water pump - assembly overview .....	225
2.2	Coolant temperature sensor - assembly overview .....	228
2.3	Water pump - remove and install .....	229
2.4	Water pump sprocket - remove and install .....	235
2.5	Thermostat valve - remove and install .....	236
2.6	Water pump toothed belt - remove and install .....	244
2.7	Coolant temperature sensor G62 - remove and install .....	247
<b>3</b>	<b>Cooling system piping</b> .....	<b>251</b>
3.1	Coolant system piping - Assembly overview .....	251
3.2	Cooling system piping - remove and install .....	251
<b>4</b>	<b>Radiator</b> .....	<b>254</b>
4.1	Radiator - assembly overview .....	254
4.2	Cowling with Radiator fan V7 - assembly overview .....	255
4.3	Radiator - remove and install .....	256
4.4	Cowling with Radiator fan V7 - remove and install .....	260
4.5	Radiator fan V7 - remove and install .....	261
<b>20</b>	<b>Fuel supply system</b> .....	<b>263</b>
<b>1</b>	<b>Fuel tank</b> .....	<b>263</b>
1.1	Fuel tank - assembly overview .....	263
1.2	Fuel tank - remove and install .....	265
1.3	Fuel tank - drain .....	272
<b>2</b>	<b>Fuel supply unit/Fuel level sensor</b> .....	<b>283</b>
2.1	Fuel pump (pre-supply pump) G6/Fuel gauge sensor G - assembly overview .....	283
2.2	Fuel pump (pre-supply pump) G6/Fuel gauge sensor G - remove and install .....	285
2.3	Fuel gauge sensor G - remove and install .....	290
2.4	Installation opening cover - remove and install .....	291
<b>3</b>	<b>Plug-in connectors</b> .....	<b>293</b>
3.1	Plug-in connectors - disconnect .....	293
<b>4</b>	<b>Fuel filter</b> .....	<b>299</b>
4.1	Fuel filter - remove and install .....	299
<b>5</b>	<b>Activated charcoal system</b> .....	<b>301</b>
5.1	Activated charcoal filter system - assembly overview .....	301
5.2	Activated charcoal filter - remove and install .....	303
5.3	Fuel tank ventilation - check .....	304
<b>6</b>	<b>Accelerator activation</b> .....	<b>311</b>
6.1	Accelerator pedal module - assembly overview .....	311
6.2	Accelerator pedal module GX2 - remove and install .....	311
<b>7</b>	<b>Fuel system pressurisation pump G6</b> .....	<b>313</b>
7.1	Fuel system pressurisation pump G6 - check .....	313
<b>8</b>	<b>Fuel lines</b> .....	<b>347</b>
8.1	Fuel lines - remove and install .....	347
<b>24</b>	<b>Mixture preparation - injection</b> .....	<b>352</b>
<b>1</b>	<b>Injection system</b> .....	<b>352</b>
1.1	Injection system - assembly overview .....	352
1.2	Combustion system - assembly overview .....	356
<b>2</b>	<b>Injection valves</b> .....	<b>359</b>



2.1	Fuel rail with injection valves - assembly overview	359
2.2	Fuel rail with injection valves - assembly overview	361
2.3	Fuel distributor - removal and installation	362
2.4	Injection valves - remove and install	365
2.5	Injection valves - check	366
2.6	Injection valves - clean	370
<b>3</b>	<b>Air cleaner</b>	<b>372</b>
3.1	Air filter - assembly overview	372
3.2	Air filter - remove and install	373
<b>4</b>	<b>Intake manifold</b>	<b>375</b>
4.1	Intake manifold - assembly overview	375
4.2	Intake manifold - remove and install	377
4.3	Throttle butterfly valve control unit J338 - remove and install	380
4.4	Throttle valve control unit J338 - clean	381
<b>5</b>	<b>Transmitters and sensors</b>	<b>383</b>
5.1	Intake manifold pressure sensor G71 with Air intake temperature sensor G42 - remove and install	383
<b>6</b>	<b>Engine control unit J623</b>	<b>385</b>
6.1	Engine control unit J623 - remove and install	385
<b>7</b>	<b>Lambda probe</b>	<b>387</b>
7.1	Lambda probe - assembly overview	387
7.2	Lambda probe - remove and install	388
<b>26</b>	<b>- Exhaust system</b>	<b>392</b>
<b>1</b>	<b>Silencer/exhaust pipes</b>	<b>392</b>
1.1	Silencer - assembly overview	392
1.2	Silencer/exhaust pipes - detach	393
1.3	Centre silencer with rear silencer - remove and install	395
1.4	Centre silencer - remove and install	399
1.5	Rear silencer - remove and install	401
1.6	Exhaust system - tension free alignment	402
1.7	Exhaust system - check tightness	403
1.8	Pipe clamp installation position	403
<b>2</b>	<b>Front exhaust pipe with catalytic converters</b>	<b>405</b>
2.1	Front exhaust pipe with catalytic converters - assembly overview	405
2.2	Catalysts - remove and install	408
<b>28</b>	<b>- Ignition system</b>	<b>411</b>
<b>1</b>	<b>Ignition system</b>	<b>411</b>
1.1	Ignition system - assembly overview	411
1.2	Ignition coils with final power stage - assembly overview	413
1.3	Test data, spark plugs	414
1.4	Ignition coil with final power stage - remove and install	414
1.5	Knock sensor 1 G61 - remove and install	417
1.6	Hall Sensor G40 - remove and install	418
1.7	Engine speed sensor G28 - remove and install	419
1.8	Heater control unit J65 - remove and install	421