



Contents

00 - Technical data	1
1 Identification	1
1.1 Engine number/engine characteristics	1
2 Safety instructions	3
2.1 Safety measures regarding work on the fuel supply systems	3
2.2 Safety measures in test drives using testing and measurement devices.	4
2.3 Safety measures when working on the cooling system	5
2.4 Safety measures when working on the ignition system	5
3 Repair instructions	7
3.1 Cleaning rules	7
3.2 Foreign bodies on the engine	7
3.3 Contact corrosion	7
3.4 Connection installation and fastening	7
3.5 Radiator and capacitor installation	8
10 - Removing and installing engine	9
1 Engine - remove and install	9
1.1 Engine - removal	9
1.2 Engine - gearbox separation	17
1.3 Engine - installation	18
2 Power-drive unit supports	20
2.1 Power unit brackets - assembly overview	20
2.2 Power-drive unit supports (engine side) - remove and install	21
2.3 Power-drive unit supports (gearbox side) - remove and install	23
2.4 Pendulum support (torque restrictor) - remove and install	25
2.5 Additional notes and installation works in vehicles with air conditioning	26
13 - Crankshaft group	27
1 Cylinder block (pulley side)	27
1.1 Poly-V belt - assembly overview	27
1.2 Poly-V belt - remove and install	28
1.3 Poly-V belt tensioner - remove and install	30
1.4 Crankshaft pulley (vibration damper) - remove and install	31
1.5 Crankshaft seal (pulley side) - replace	32
2 Cylinder block (gearbox side)	35
2.1 Cylinder block (gearbox side) - assembly overview	35
2.2 Flywheel - remove and install	36
2.3 Crankshaft flange (flywheel side) - replace	37
3 Crankshaft	46
3.1 Crankshaft dimensions	46
3.2 Crankshaft - check axial clearance	46
4 Pistons and connecting rods	48
4.1 Pistons and conrods - assembly overview	48
4.2 Pistons - remove and install	51
4.3 Pistons, rings, and cylinders - check	52
4.4 Connecting rod (radial clearance) - check	54
4.5 Oil injectors - remove and install	54
15 - Cylinder head, valve gear	56
1 Toothed belt drive	56
1.1 Upper and lower cover of the mechanical distributor and console - assembly overview ..	56
1.2 Toothed belt - assembly overview	57



1.3	Valve timing - check/adjust	58
1.4	Toothed belt - remove and install	62
2	Engine cylinder head	76
2.1	Engine cylinder head - assembly overview	76
2.2	Cylinder head cover	78
2.3	Engine cylinder head - remove and install	79
2.4	Cylinder head cover with exhaust and inlet camshafts - remove and install	83
2.5	Compression - check	92
3	Camshaft mechanism - repair	95
3.1	Camshaft mechanism - assembly overview	95
3.2	Camshaft adjustment valve 1 N205 - remove and install	96
3.3	Crankshaft - check axial clearance	97
3.4	Camshaft seal - replace	98
3.5	Valve rod sealant - replacement	104
4	Inlet and exhaust valves	113
4.1	Valve guides - check	113
4.2	Valves - check	114
4.3	Valves - dimensions	114
17	- Lubrication	115
1	Crankcase/oil pump	115
1.1	Engine oil	115
1.2	Crankcase/oil pump - assembly overview	115
1.3	Lower sump - remove and install	118
1.4	Upper crankcase - remove and install	121
1.5	Oil pump - remove and install	123
2	Engine oil cooler	126
2.1	Engine oil cooler - assembly overview	126
2.2	Engine oil cooler - remove and install	126
3	Engine crankcase ventilation	128
3.1	Engine crankcase ventilation - assembly overview	128
3.2	Crankcase ventilation device - remove and install	129
4	Oil filter/ Oil pressure switch F1	131
4.1	Oil filter/ Oil pressure switch F1 - assembly overview	131
4.2	Oil pressure switch 0.3...0.6 bar F1 - remove and install	131
4.3	Oil filter - remove and install	133
4.4	Oil pressure and Oil pressure switch F1 - check	133
19	- Cooling	136
1	Cooling system components	136
1.1	Cooling system - assembly overview	136
1.2	Hose connection diagram for cooling system	138
1.3	Cooling system - drainage and replenishment	140
1.4	Cooling system - check air-tightness	147
1.5	Coolant tank flap - check safety valve	148
2	Coolant/cooling system water pump	150
2.1	Water pump - assembly overview	150
2.2	Water pump - remove and install	152
2.3	Water pump sprocket - remove and install	157
2.4	Thermostat valve - removal and installation	158
2.5	Water pump toothed belt - remove and install	165
2.6	Coolant temperature sensor G62 - remove and install	167
3	Radiator	170
3.1	Radiator - remove and install	170



3.2	Cowling with Radiator fan V7 - remove and install	172
3.3	Radiator fan V7 - remove and install	173
20	Fuel supply system	174
1	Fuel supply system components	174
1.1	Fuel tank - assembly overview	174
1.2	Safety measures regarding work on the fuel supply systems	177
1.3	Cleaning rules	178
1.4	Cold start system components - remove and install	178
1.5	Fuel pump (pre-supply pump) G6 - remove and install	179
1.6	Fuel level sensor G - remove and install	182
1.7	Fuel reservoir - remove and install	182
1.8	Fuel shutoff in case of crash	185
1.9	Fuel pump (pre-supply pump) G6 - check	185
2	Engine power electronic adjustment (electronic accelerator)	197
2.1	Engine power electronic adjustment (electronic accelerator) - assembly overview	197
2.2	Electronic accelerator system operation	197
3	Activated charcoal filter system	199
3.1	Operation	199
3.2	Activated charcoal filter system components - repair	199
3.3	Fuel tank ventilation - check	200
24	Mixture preparation - injection	202
1	Injection system	202
1.1	Sensors, switches (intake side) - assembly overview	202
1.2	Sensor, ignition coils and lambda probe (exhaust side) - assembly overview	203
1.3	Injection system - assembly overview	203
2	Injection valves	207
2.1	Fuel rail with injection valves - assembly overview	207
2.2	Injection valves - remove and install	210
2.3	Injection valves - check	214
3	Air Filter	218
3.1	Air filter - assembly overview	218
3.2	Air filter - remove and install	219
4	Intake manifold	220
4.1	Intake manifold - assembly overview	220
4.2	Intake manifold - remove and install	221
4.3	Throttle butterfly valve control unit J338 - remove and install	223
4.4	Throttle valve control unit J338 - clean	224
4.5	Supply system pressure, fuel pressure gauge and residual pressure - check	225
5	READINESS code	231
5.1	Function	231
5.2	Creating and Interpreting the READINESS code	231
6	Transmitters and sensors	232
6.1	Intake manifold pressure sensor G71 with Air intake temperature sensor G42 - remove and install	232
7	Engine control unit J623	234
7.1	Engine control unit J623 - remove and install	234
8	Lambda probe	238
8.1	Lambda probe - assembly overview	238
8.2	Lambda probe - remove and install	239
26	Exhaust system	242
1	Exhaust gas purging	242



1.1	Front exhaust pipe with catalytic converters - assembly overview	242
1.2	Catalytic converters	243
1.3	Exhaust system - check air-tightness	246
28	Ignition system	247
1	Ignition system	247
1.1	Ignition system - assembly overview	247
1.2	Ignition coils with final power stage - assembly overview	249
1.3	Test data, spark plugs	249
1.4	Ignition coil with final power stage - remove and install	250
1.5	Knock sensor 1 G61 - remove and install	251
1.6	Hall Sensor G40 - remove and install	252
1.7	Engine speed sensor G28 - remove and install	253
1.8	Glow plug relay J52 and Heating control unit J65 - remove and install	255