



Contents

00 - Technical data	1
1 — Change history —	1
2 Safety instructions	2
2.1 Safety measures regarding work on the fuel supply	2
2.2 Safety measures for working on the injection and ignition system	2
3 Repair instructions	4
3.1 Cleanliness rules	4
4 Technical Data	5
4.1 Engine number	5
4.2 Engine characteristics	5
10 - Removing and installing engine	7
1 Engine - remove and install	7
1.1 Engine - removal	7
1.2 Engine - fasten to assembly stand	17
1.3 Engine - installation	18
2 Power-drive unit supports	21
2.1 Power unit brackets - assembly overview	21
2.2 Drive train mountings - alignment	23
13 - Crankshaft group	26
1 Cylinder block (pulley side)	26
1.1 Poly-V belt drive (elastic) - assembly overview	27
1.2 Cylinder block (pulley side) - assembly overview	29
1.3 Seal lid - replace	31
1.4 Poly-V belt (elastic) - remove and install	31
1.5 Crankshaft pulley - removal and installation	36
1.6 Crankshaft seal (pulley side) - replace	36
2 Cylinder block, gearbox side	40
2.1 Crankshaft and flywheel flanges - assembly overview	40
2.2 Flywheel - remove and install	42
2.3 Crankshaft flange (flywheel side) with Engine speed sensor G28 rotor - replace	43
3 Crankshaft	55
3.1 Crankshaft - assembly overview	55
3.2 Identifying engine bearing shells	56
3.3 Colour codes	58
3.4 Crankshaft - dimensions	58
4 Pistons and conrods	59
4.1 Pistons and conrods - assembly overview	59
4.2 Pistons, rings, and cylinders - check	61
4.3 Piston and cylinder - dimensions	64
15 - Cylinder head, valve gear	65
1 Engine cylinder head	65
1.1 Engine cylinder head - assembly overview	65
1.2 Cylinder head - remove and install	68
1.3 Compression - check	73
2 Toothed belt drive	76
2.1 Toothed belt semi-automatic tensioning pulley - check	76
2.2 Toothed belt - remove and install, adjust	77
3 Camshaft	84



3.1	Camshaft - assembly overview	84
3.2	Camshaft - check axial clearance	87
3.3	Camshaft seal - replace	89
3.4	Camshaft and cylinder head cover - remove and install	94
3.5	Valve stem sealant - replace	99
4	Inlet and exhaust valves	102
4.1	Valve seat - trim	102
4.2	Valve guides - check	104
17	- Lubrication	106
1	Lubrication system components	106
1.1	Lubricating system components - assembly overview	106
1.2	Engine oil	109
1.3	Crankcase - remove and install	110
1.4	Oil pump - remove and install	113
2	Oil filter / Oil pressure switch F1	118
2.1	Oil pressure switch F1 - remove and install	118
2.2	Oil pressure and Oil pressure switch F1 - check	118
2.3	Oil filter - replace	120
19	- Cooling	123
1	Cooling system components	123
1.1	Hose connection diagram for cooling system	123
1.2	Cooling system - drainage and replenishment	124
1.3	Cooling system - check air-tightness	133
1.4	Coolant tank flap - check safety valve	135
2	Water pump / coolant adjustment	137
2.1	Water pump - assembly overview	137
2.2	Thermostat valve - assembly overview	138
2.3	Water pump - remove and install	140
3	Radiator / Radiator fan	143
3.1	Radiator / Radiator fan - assembly overview	143
3.2	Radiator - remove and install	145
3.3	Cowling with Radiator fan V7 - remove and install	146
3.4	Radiator fan V7 - remove and install	147
20	- Fuel supply system	148
1	Fuel supply system components	148
1.1	Fuel tank components with accessories and fuel filter - assembly overview	148
1.2	Cold start system components - remove and install	154
1.3	Fuel tank - remove and install	155
1.4	Fuel reservoir (EU5) - remove and install	157
2	Fuel supply unit / fuel level sensor	161
2.1	Fuel pump (pre-supply pump) G6 - remove and install	161
2.2	Fuel gauge sensor G - remove and install	164
3	Activated charcoal filter system	165
3.1	Operation	165
3.2	Activated charcoal filter system - assembly overview	165
3.3	Magnetic valve 1 for activated charcoal filter N80 - remove and install	166
3.4	Fuel tank ventilation - check	167
4	Engine power electronic adjustment (electronic accelerator)	169
4.1	Engine power electronic adjustment (electronic accelerator) - assembly overview	169
4.2	Electronic accelerator system operation	169
5	Fuel pump (pre-supply pump) G6	171



5.1	Voltage supply of the Fuel pump (pre-supply pump) G6 - check	173
5.2	Fuel supply system output - check	175
5.3	Current consumption - check	180
5.4	Fuel pump (pre-supply pump) G6 retention valve - check	180
24	Mixture preparation - injection	182
1	Injection system	182
1.1	General instructions regarding the injection system	182
1.2	Injection system - assembly overview	182
1.3	Injection components - assembly overview	184
1.4	Technical Data	187
2	Injection valves	188
2.1	Fuel rail with injectors - assembly overview	188
2.2	Injection valves - check	188
2.3	Injection valves - clean	193
3	Air cleaner	195
3.1	Air filter - assembly overview	195
3.2	Air filter - remove and install	196
4	Intake manifold	198
4.1	Intake manifold - assembly overview	198
4.2	Throttle valve control unit J338 - clean	199
5	Component checks	201
5.1	Supply system pressure, fuel pressure gauge and residual pressure - check	201
6	READINESS code	207
6.1	Creating and Interpreting the READINESS code	207
7	Engine control unit J623	208
7.1	Engine control unit J623 - remove and install	208
7.2	Adjust components	209
7.3	Check the event memory in the Engine control unit J623 and delete it	210
26	Exhaust system	212
1	Rear muffler	212
1.1	Rear muffler - assembly overview	212
1.2	Silencer/exhaust pipes - detach	212
1.3	Exhaust system - tension free alignment	213
1.4	Pipe clamp installation position	214
2	Intake manifold with catalytic converter, front exhaust pipe and intermediate muffler	215
2.1	Intake manifold with catalytic converter, front exhaust pipe and intermediate muffler - assembly overview	215
28	Glow plug system	218
1	Ignition system	218
1.1	General instructions regarding the ignition system	218
1.2	Ignition system - assembly overview	218
1.3	Spark plugs Q - test data	220