



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 in test drives using testing and measurement devices	3
2.3 Safety measures when working on the cooling system	4
2.4 Safety measures when working on the ignition system	4
3 Identification	6
3.1 Engine number/engine characteristics	6
4 Repair instructions	8
4.1 Cleaning rules	8
4.2 General instructions	8
4.3 General repair instructions	9
4.4 Foreign bodies on the engine	9
4.5 Contact corrosion	9
4.6 Connection installation and fastening	10
4.7 Radiator and capacitor installation	10
4.8 Check the vacuum system	10
10 - Removing and installing engine	11
1 Engine - remove and install	11
1.1 Engine - removal	11
1.2 Engine - separate gearbox	22
1.3 Engine - secure to engine and gearbox support	24
1.4 Engine - installation	26
1.5 Engine - remove and install, summarized instructions	29
2 Power-drive unit supports	32
2.1 Power unit brackets - assembly overview	32
2.2 Power unit bracket (engine side) - remove and install	35
2.3 Drive-train mounting (gearbox side) - remove and install	36
2.4 Pendulum support (torque limiter) - remove and install	39
2.5 Support the engine in assembly position	40
2.6 Drive train mountings - adjust	42
2.7 Drive train mounting adjustment - check	44
13 - Crankshaft group	45
1 Cylinder block (pulley side)	45
1.1 Poly-V belt mechanism - assembly overview	45
1.2 Cylinder block (pulley side) - assembly overview	47
1.3 Poly-V belt - remove and install	50
1.4 Poly-V belt tensioner - remove and install	52
1.5 Engine console - remove and install	53
1.6 Crankshaft pulley (vibration damper) - remove and install	57
1.7 Crankshaft seal (pulley side) - replace	60
2 Cylinder block (gearbox side)	63
2.1 Cylinder block (gearbox side) - assembly overview	63
2.2 Flywheel - remove and install	64
2.3 Crankshaft flange (flywheel side) - replace	66
3 Crankshaft	78
3.1 Crankshaft - dimensions	78
4 Pistons and conrods - remove and install	79
4.1 Pistons and conrods - assembly overview	79



4.2	Pistons - remove and install	82
4.3	Pistons, rings, and cylinders - check	83
4.4	Conrod and cap (new part) - separate	86
4.5	Conrod radial clearance - check	86
4.6	Oil spray jet and valve - remove and install	87
15	Cylinder head, valve gear	89
1	Engine cylinder head	89
1.1	Engine cylinder head - assembly overview	89
1.2	Cylinder head - remove and install	92
1.3	Cylinder head - remove and install, summarized instructions	100
1.4	Cylinder head cover with exhaust and inlet camshafts - remove and install	101
1.5	Cylinder compression - check	105
2	Toothed belt drive	108
2.1	Toothed belt - remove and install	108
2.2	Valve timing - check	112
2.3	Remove the camshaft toothed belt	116
3	Camshaft mechanism	129
3.1	Camshaft mechanism - assembly overview	129
3.2	Crankshaft - check axial clearance	131
3.3	Camshaft gasket (pulley side) - replace	132
3.4	Inlet camshaft regulator - remove and install	139
3.5	Exhaust camshaft sprocket - remove and install	144
3.6	Camshaft adjustment valve 1 N205 - remove and install	148
3.7	Valve stem sealant - replace	149
4	Inlet and exhaust valves	160
4.1	Valve guides - check	160
4.2	Valves - check	161
4.3	Valve dimensions	161
17	Lubrication	162
1	Crankcase/oil pump	162
1.1	Crankcase/oil pump - assembly overview	162
1.2	Engine oil	167
1.3	Lower sump - remove and install	168
1.4	Upper crankcase - remove and install	170
1.5	Oil pump - remove and install	174
2	Engine crankcase ventilation	177
2.1	Engine crankcase ventilation - assembly overview	177
2.2	Crankcase ventilation device - remove and install	178
3	Oil filter/Oil pressure switch F1	181
3.1	Oil pressure switch 0.3...0.6 bar F1 - remove and install	181
3.2	Oil pressure and Oil pressure switch F1 - check	182
3.3	Oil filter - remove and install	185
19	Cooling	187
1	Cooling system/coolant	187
1.1	Hose connection diagram for cooling system	187
1.2	Cooling system - check air-tightness	187
1.3	Coolant tank flap - check safety valve	190
1.4	Cooling system - drainage and replenishment	192
2	Water pump/coolant adjustment	199
2.1	Water pump/thermostatic valves - assembly overview	199
2.2	Thermostat valve - assembly overview	202
2.3	Water pump - remove and install	205



2.4	Thermostats - remove and install	210
2.5	Water pump toothed belt - remove and install	216
2.6	Water pump sprocket - remove and install	217
2.7	Coolant temperature sensor G62 - remove and install	219
3	Cooling system pipes	222
3.1	Coolant system line - assembly overview	222
3.2	Cooling system line - remove and install	222
4	Radiator/Radiator fan	224
4.1	Radiator/Radiator fan - assembly overview	224
4.2	Fan cowl and radiator fan - assembly overview	225
4.3	Radiator - remove and install	226
4.4	Fan housing - remove and install	232
4.5	Radiator fan V7 - remove and install	234
20	Fuel supply system	235
1	Fuel tank	235
1.1	Fuel tank - assembly overview	235
1.2	Fuel tank - remove and install	237
1.3	Fuel tank - drain	245
2	Fuel supply unit/Fuel level sensor	256
2.1	Fuel pump (pre-supply pump) G6/Fuel gauge sensor G - assembly overview	256
2.2	Fuel pump (pre-supply pump) G6/Fuel gauge sensor G - remove and install	258
2.3	Fuel gauge sensor G - remove and install	263
2.4	Installation opening cover - remove and install	264
3	Plug-in connectors	266
3.1	Plug-in connectors - disconnect	266
4	Fuel filter	272
4.1	Fuel filter - remove and install	272
5	Activated charcoal system	274
5.1	Wiring diagram - Activated carbon filter system	274
5.2	Activated charcoal tank system - assembly overview	275
5.3	Activated charcoal tank - remove and install	277
5.4	Fuel tank ventilation - check	278
6	Accelerator activation	287
6.1	Accelerator pedal module - assembly overview	287
6.2	Accelerator pedal module GX2 - remove and install	287
7	Fuel system pressurisation pump G6	289
7.1	Fuel system pressurisation pump G6 - check	289
8	Fuel lines	312
8.1	Fuel lines - remove and install	312
24	Mixture preparation - injection	317
1	Injection system	317
1.1	Injection system - assembly overview	317
1.2	Combustion system - assembly overview	320
2	Injection valves	323
2.1	Fuel rail with injection valves - assembly overview	323
2.2	Injection valves - remove and install	325
2.3	Injection valves - check	327
3	Air cleaner	334
3.1	Air filter - assembly overview	334
3.2	Air filter - remove and install	335
4	Intake manifold	337
4.1	Intake manifold - assembly overview	337



4.2	Intake manifold - remove and install	339
4.3	Throttle butterfly valve control unit J338 - remove and install	342
4.4	Throttle valve control unit J338 - clean	344
5	Transmitters and sensors	346
5.1	Intake manifold pressure sensor G71 with Air intake temperature sensor G42 - remove and install	346
6	Engine control unit J623	348
6.1	Engine control unit J623 - remove and install	348
7	Lambda probe	350
7.1	Lambda probe - assembly overview	350
7.2	Lambda Probe G39 - remove and install	351
7.3	Lambda Probe after the catalytic converter G130 - remove and install	352
26	- Exhaust system	355
1	Silencer/exhaust pipes	355
1.1	Silencer - assembly overview	355
1.2	Silencer/exhaust pipes - detach	356
1.3	Centre silencer with rear silencer - remove and install	358
1.4	Centre silencer - remove and install	362
1.5	Rear silencer - remove and install	364
1.6	Exhaust system - tension free alignment	365
1.7	Exhaust system - check tightness	366
1.8	Pipe clamp installation position	367
2	Exhaust system	369
2.1	Emission control - assembly overview	369
2.2	Catalytic converter - remove and install	372
28	- Ignition system	376
1	Ignition system	376
1.1	Ignition system - assembly overview	376
1.2	Ignition coils with final power stage - assembly overview	378
1.3	Spark plugs Q - technical data	379
1.4	Ignition coil with final power stage - remove and install	379
1.5	Knock sensor 1 G61 - remove and install	383
1.6	Hall Sensor G40 - remove and install	384
1.7	Engine speed sensor G28 - remove and install	385
1.8	Heater control unit J65 - remove and install	387