



## Contents

<b>00 - Technical data</b>	1
1    Technical data	1
1.1 Engine number	1
1.2 Engine data	1
<b>01 - Self-diagnosis</b>	2
1    Read event memory	2
<b>10 - Removing and installing engine</b>	3
1    Removing and installing engine	3
1.1 Removing	4
1.2 Installing	7
1.3 Specified torques	8
1.4 Additional information and assembly work for vehicles with air conditioner	9
<b>13 - Crankshaft group</b>	11
1    Dismantling and assembling engine	11
1.1 Assembly overview - parts I and II	11
1.2 Assembly overview - part I, belt drive	13
1.3 Assembly overview - part II, chain drive system	14
1.4 Removing and installing poly-V belt	16
1.5 Removing and installing valve timing housing (timing case)	17
1.6 Removing and installing bracket for ancillaries	22
2    Cylinder block, sealing flange	24
2.1 Assembly overview	24
2.2 Removing and installing engine speed sender G28	25
2.3 Renewing crankshaft oil seal, pulley end	26
2.4 Removing and installing crankshaft pulley	28
2.5 Renewing crankshaft sealing flange, flywheel end	31
3    Crankshaft	40
3.1 Assembly overview	40
3.2 Crankshaft dimensions	41
4    Pistons and conrods	42
4.1 Assembly overview	42
4.2 Checking piston	43
4.3 Checking cylinder bores	44
4.4 Piston and cylinder dimensions	44
<b>15 - Cylinder head, valve gear</b>	45
1    Cylinder head	45
1.1 Engine differences	45
1.2 Assembly overview - cylinder head	46
1.3 Checking valve timing	50
1.4 Adjusting valve timing	55
1.5 Removing and installing timing chain and chain drive for oil pump	65
1.6 Removing and installing camshaft housing	72
1.7 Removing and installing cylinder head	78
1.8 Checking compression	83
2    Valve gear	85
2.1 Assembly overview	85
2.2 Checking camshaft axial clearance	87
2.3 Reworking valve seats	87



2.4	Checking valve guides .....	88
2.5	Renewing valve stem seals .....	89
<b>17 - Lubrication</b>	.....	<b>92</b>
1	<b>Parts of lubrication system</b> .....	<b>92</b>
1.1	Engine oil: .....	92
1.2	Assembly overview .....	92
1.3	Removing and installing sump .....	94
1.4	Removing and installing oil pump .....	96
1.5	Checking oil pressure and oil pressure switch .....	98
<b>19 - Cooling</b>	.....	<b>101</b>
1	<b>Parts of cooling system</b> .....	<b>101</b>
1.1	Assembly overview - parts of cooling system, body side .....	101
1.2	Assembly overview - parts of cooling system, engine side .....	103
1.3	Coolant hose connection diagram .....	106
1.4	Draining and adding coolant .....	107
1.5	Checking cooling system for leaks .....	110
1.6	Removing and installing cowling with radiator fan V7 .....	112
1.7	Removing and installing radiator fan V7 .....	113
1.8	Removing and installing radiator .....	114
1.9	Removing and installing coolant pump .....	116
<b>20 - Fuel supply system</b>	.....	<b>120</b>
1	<b>Parts of fuel supply system</b> .....	<b>120</b>
1.1	Assembly overview - fuel tank with attachments .....	120
1.2	Safety regulations for working on fuel supply .....	123
1.3	Rules for cleanliness .....	123
1.4	Emptying fuel tank .....	124
1.5	Removing and installing fuel delivery unit .....	128
1.6	Removing and installing external fuel gauge sender G with 2 cable connections .....	131
1.7	Removing and installing interior fuel gauge sender G .....	132
1.8	Removing and installing fuel tank .....	133
1.9	Removing and installing fuel filter .....	135
1.10	Crash fuel shut-off .....	136
1.11	Checking fuel pump .....	136
1.12	Bleeding fuel system .....	146
1.13	Parts of fuel supply system (LPG) .....	148
2	<b>Electronic power control (EPC)</b> .....	<b>164</b>
2.1	Assembly overview .....	164
3	<b>Activated charcoal filter system</b> .....	<b>165</b>
3.1	Assembly overview .....	165
3.2	Checking fuel tank breather .....	166
<b>24 - Mixture preparation - injection</b>	.....	<b>167</b>
1	<b>Injection system</b> .....	<b>167</b>
1.1	General notes on injection .....	167
1.2	Assembly overview - intake manifold .....	167
1.3	Assembly overview - fuel rail with injectors .....	169
1.4	Removing and installing injectors .....	169
1.5	Fuel rail, removing and installing gas rail .....	170
1.6	Removing and installing gas injectors .....	171
1.7	Removing and installing gas rail sensor G401 .....	172
1.8	Assembly overview - air filter .....	173
1.9	Removing and installing air filter housing .....	174
1.10	Cleaning throttle valve module J338 .....	175



1.11	Safety precautions .....	176
1.12	Rules for cleanliness .....	177
1.13	Technical data .....	177
1.14	Renewing filter for LPG system .....	177
1.15	Removing and installing vaporiser on vehicles which can be operated with liquid gas .....	186
<b>2</b>	<b>Checking components .....</b>	<b>190</b>
2.1	Checking injectors for leaks and quantity injected .....	190
<b>3</b>	<b>Engine control unit J623 .....</b>	<b>193</b>
3.1	Removing and installing engine (motor) control unit J623 .....	193
3.2	Vehicles with anti-theft secured engine control unit J623 .....	193
<b>4</b>	<b>Gas mode control unit J659 .....</b>	<b>195</b>
4.1	Removing and installing gas mode control unit J659 .....	195
4.2	Removing holder for gas mode control unit J659 .....	195
<b>26</b>	<b>- Exhaust system .....</b>	<b>197</b>
1	<b>Parts of the exhaust system .....</b>	<b>197</b>
1.1	Assembly overview - catalytic converters and attachments .....	197
1.2	Assembly overview - silencers with mountings, hatchback .....	199
1.3	Separating front and rear silencers .....	199
<b>28</b>	<b>- Ignition system .....</b>	<b>202</b>
1	<b>Ignition system .....</b>	<b>202</b>
1.1	Assembly overview - ignition system .....	202
1.2	Removing and installing ignition coils with output stage .....	203
1.3	Safety precautions .....	205
1.4	Test data, spark plugs .....	206