

## Contents

<b>00 - Technical data</b>	<b>1</b>
<b>1 Identification</b>	<b>1</b>
<b>2 Safety precautions</b>	<b>2</b>
<b>3 Repair instructions</b>	<b>3</b>
<b>10 - Removing and installing engine</b>	<b>4</b>
<b>1 Removing and installing engine</b>	<b>4</b>
1.1 Removing engine	4
1.2 Securing engine to engine and gearbox support	23
1.3 Installing engine	23
<b>2 Assembly mountings</b>	<b>27</b>
2.1 Exploded view - assembly mountings	27
2.2 Removing and installing engine mountings	28
2.3 Supporting engine in installation position	30
<b>3 Engine cover panel</b>	<b>31</b>
<b>13 - Crankshaft group</b>	<b>32</b>
<b>1 Cylinder block (pulley end)</b>	<b>32</b>
1.1 Exploded view - cylinder block (pulley end)	32
1.2 Removing and installing poly V-belt	32
1.3 Removing and installing poly V-belt tensioner	32
1.4 Removing and installing vibration damper	32
1.5 Removing and installing bracket for ancillaries	32
<b>2 Cylinder block (gearbox end)</b>	<b>37</b>
<b>3 Crankshaft</b>	<b>38</b>
<b>4 Balance shaft</b>	<b>39</b>
<b>5 Pistons and conrods</b>	<b>40</b>
<b>15 - Cylinder head, valve gear</b>	<b>41</b>
<b>1 Timing chain cover</b>	<b>41</b>
1.1 Exploded view - timing chain cover	41
1.2 Removing and installing timing chain cover	41
1.3 Renewing oil seal for vibration damper	41
<b>2 Chain drive</b>	<b>42</b>
2.1 Exploded view - camshaft timing chains	42
2.2 Exploded view - drive chain for balance shaft	42
2.3 Removing and installing bearing saddle	42
2.4 Removing camshaft timing chain from camshafts	42
2.5 Removing and installing camshaft timing chain	43
2.6 Removing and installing drive chain for balance shaft	43
2.7 Checking valve timing	43
<b>3 Cylinder head</b>	<b>44</b>
3.1 Exploded view - cylinder head	44
3.2 Removing and installing cylinder head	44
3.3 Checking compression	46
<b>4 Valve gear</b>	<b>47</b>
4.1 Exploded view - valve gear	47
4.2 Removing and installing camshaft	47
4.3 Installing ball for slider	47
4.4 Removing and installing cam adjustment actuators	47
4.5 Removing and installing camshaft control valve 1 N205	47



4.6	Removing and installing valve stem oil seals	47
<b>5</b>	<b>Inlet and exhaust valves</b>	<b>48</b>
<b>17</b>	<b>Lubrication</b>	<b>49</b>
<b>1</b>	<b>Sump/oil pump</b>	<b>49</b>
1.1	Exploded view - sump/oil pump	49
1.2	Engine oil	49
1.3	Removing and installing sump (bottom section)	49
1.4	Removing and installing oil pump	50
1.5	Removing and installing sump (top section)	50
1.6	Removing and installing oil level and oil temperature sender G266	51
<b>2</b>	<b>Engine oil cooler</b>	<b>52</b>
<b>3</b>	<b>Crankcase breather</b>	<b>53</b>
3.1	Exploded view - crankcase breather system	53
3.2	Removing and installing oil separator	53
<b>4</b>	<b>Oil filter/oil pressure switches</b>	<b>55</b>
<b>19</b>	<b>Cooling</b>	<b>56</b>
<b>1</b>	<b>Cooling system/coolant</b>	<b>56</b>
1.1	Connection diagram - coolant hoses	56
1.2	Checking cooling system for leaks	61
1.3	Draining and filling cooling system	61
<b>2</b>	<b>Coolant pump/thermostat assembly</b>	<b>68</b>
2.1	Exploded view - coolant pump/thermostat	68
2.2	Exploded view - electric coolant pump	68
2.3	Exploded view - coolant valves	70
2.4	Removing and installing electric coolant pump	71
2.5	Removing and installing coolant pump	75
2.6	Removing and installing toothed belt for coolant pump	76
2.7	Removing and installing thermostat	76
2.8	Checking thermostat	76
2.9	Removing and installing coolant temperature sender G62	77
2.10	Removing and installing coolant valves	78
<b>3</b>	<b>Coolant pipes</b>	<b>80</b>
3.1	Exploded view - coolant pipes	80
3.2	Removing and installing coolant pipes	81
<b>4</b>	<b>Radiator/radiator fans</b>	<b>86</b>
4.1	Exploded view - radiator/radiator fans	86
4.2	Removing and installing radiator	88
4.3	Removing and installing radiator fan V7	96
<b>21</b>	<b>Turbocharging/supercharging</b>	<b>99</b>
<b>1</b>	<b>Turbocharger</b>	<b>99</b>
1.1	Exploded view - turbocharger	99
1.2	Removing and installing turbocharger	99
1.3	Checking vacuum unit for turbocharger	103
1.4	Renewing vacuum unit for turbocharger	103
1.5	Adjusting vacuum unit for turbocharger	104
<b>2</b>	<b>Charge air system</b>	<b>105</b>
2.1	Exploded view - charge air system	105
2.2	Exploded view - hose connections for charge air system	107
2.3	Removing and installing charge air cooler	107
2.4	Removing and installing charge pressure sender G31	110
2.5	Checking charge air system for leaks	110

<b>24 - Mixture preparation - injection</b>	<b>111</b>
<b>1 Injection system</b>	<b>111</b>
1.1 Overview of fitting locations - injection system	111
1.2 Checking fuel system for leaks	124
<b>2 Vacuum system</b>	<b>125</b>
2.1 Checking vacuum system	125
2.2 Checking dual non-return valve	125
2.3 Removing and installing activated charcoal filter solenoid valve 1 N80	125
<b>3 Air cleaner</b>	<b>128</b>
3.1 Exploded view - air cleaner housing	128
3.2 Removing and installing air cleaner housing	130
<b>4 Intake manifold</b>	<b>133</b>
4.1 Exploded view - intake manifold	133
4.2 Removing and installing intake manifold	133
4.3 Removing and installing throttle valve module J338	144
4.4 Cleaning throttle valve module	144
4.5 Checking intake manifold change-over function	144
<b>5 Injectors</b>	<b>145</b>
<b>6 Senders and sensors</b>	<b>146</b>
6.1 Removing and installing intake air temperature sender G42	146
6.2 Removing and installing air mass meter G70	146
6.3 Removing and installing fuel pressure sender G247	146
6.4 Checking fuel pressure sender G247	146
<b>7 High-pressure pump</b>	<b>147</b>
<b>8 Lambda probe</b>	<b>148</b>
8.1 Exploded view - Lambda probe	148
8.2 Removing and installing Lambda probe	148
<b>9 Engine control unit</b>	<b>152</b>
9.1 Removing and installing engine control unit J623	152
9.2 Wiring and component check	156
<b>26 - Exhaust system</b>	<b>157</b>
<b>1 Exhaust pipes/silencers</b>	<b>157</b>
1.1 Exploded view - silencers	157
1.2 Removing and installing front exhaust pipe	164
1.3 Separating exhaust pipes/silencers	165
1.4 Stress-free alignment of exhaust system	168
1.5 Renewing tailpipes	172
1.6 Checking exhaust system for leaks	174
<b>2 Emission control system</b>	<b>175</b>
2.1 Exploded view - emission control system	175
2.2 Removing and installing catalytic converter	175
<b>28 - Ignition system</b>	<b>180</b>
<b>1 Ignition system</b>	<b>180</b>