

Contents

00 - Technical data	1
1 Identification	1
2 Safety information	2
3 Repair instructions	3
10 - Removing and installing engine	4
1 Removing and installing engine	4
1.1 Removing engine	4
1.2 Separating engine and gearbox	25
1.3 Securing engine to engine and gearbox support	33
1.4 Installing engine	36
2 Assembly mountings	41
2.1 Assembly overview - assembly mountings	41
2.2 Supporting engine in installation position	45
2.3 Removing and installing engine mountings	48
2.4 Removing and installing power unit mounting senders	49
2.5 Removing and installing gearbox mountings	51
2.6 Removing and installing power unit mounting control unit J931	54
2.7 Calibrating electrohydraulic engine mounting	56
2.8 Removing and installing gearbox mounting (rear)	57
3 Engine cover panel	59
3.1 Assembly overview - engine cover panel	59
3.2 Removing and installing engine cover panel	60
13 - Crankshaft group	62
1 Cylinder block (pulley end)	62
1.1 Assembly overview - cylinder block (pulley end)	62
1.2 Assembly overview - sealing flange (pulley end)	62
1.3 Removing and installing poly V-belt	62
1.4 Removing and installing poly V-belt tensioner	64
1.5 Removing and installing bracket for ancillaries	64
1.6 Removing and installing engine support	64
1.7 Removing and installing pulley	65
1.8 Renewing crankshaft oil seal (pulley end)	65
1.9 Removing and installing sealing flange (pulley end)	65
2 Cylinder block (gearbox end)	66
3 Crankshaft	67
4 Transmission shaft	68
5 Pistons and conrods	69
15 - Cylinder head, valve gear	70
1 Timing chain cover	70
2 Chain drive	71
2.1 Assembly overview - camshaft timing chains	71
2.2 Assembly overview - drive chain for high-pressure pump	71
2.3 Assembly overview - drive chain for oil pump	71
2.4 Removing camshaft timing chain from camshafts	71
2.5 Removing and installing camshaft timing chain	72
2.6 Removing and installing drive chain for high-pressure pump	72
2.7 Installing intermediate drive	72
3 Cylinder head	73



3.1	Assembly overview - cylinder head	73
3.2	Assembly overview - cylinder head cover	73
3.3	Removing and installing cylinder head	73
3.4	Removing and installing cylinder head cover	73
3.5	Removing and installing seals for injectors	74
3.6	Checking compression	75
4	Valve gear	76
4.1	Assembly overview - valve gear	76
4.2	Measuring axial clearance of camshaft	76
4.3	Measuring radial clearance of camshaft	76
4.4	Removing and installing camshaft	76
4.5	Removing and installing cam actuators	77
4.6	Removing and installing valve stem oil seals	79
5	Inlet and exhaust valves	80
17	Lubrication	81
1	Sump/oil pump	81
1.1	Assembly overview - sump/oil pump	81
1.2	Engine oil	81
1.3	Removing and installing lower part of sump	81
1.4	Removing and installing upper part of sump	81
1.5	Removing and installing oil pump	81
1.6	Removing and installing oil level and oil temperature sender G266	81
2	Engine oil cooler	82
2.1	Assembly overview - engine oil cooler	82
2.2	Removing and installing engine oil cooler	82
3	Crankcase breather	83
3.1	Assembly overview - crankcase breather system	83
3.2	Removing and installing crankcase breather module	83
4	Oil filter/oil pressure switches	84
4.1	Assembly overview - oil filter	84
4.2	Removing and installing oil temperature sender G8	84
4.3	Removing and installing oil pressure sender G10	85
4.4	Checking oil pressure	85
4.5	Removing and installing oil filter housing	85
4.6	Removing and installing valve for oil pressure control N428	85
19	Cooling	86
1	Cooling system/coolant	86
1.1	Connection diagram - coolant hoses	86
1.2	Checking cooling system for leaks	90
1.3	Draining and filling cooling system	90
2	Coolant pump/thermostat assembly	97
2.1	Assembly overview - coolant pump	97
2.2	Assembly overview - electric coolant pump	97
2.3	Assembly overview - thermostat	99
2.4	Assembly overview - coolant valves	99
2.5	Assembly overview - coolant temperature senders	100
2.6	Removing and installing electric coolant pump	100
2.7	Removing and installing coolant pump	103
2.8	Removing and installing housing for map-controlled engine cooling system thermostat F265	103
2.9	Removing and installing coolant temperature senders G62/G83	104
2.10	Removing and installing coolant temperature sender 3 G812	104
2.11	Removing and installing coolant valves	104

3	Coolant pipes	107
3.1	Assembly overview - coolant pipes	107
3.2	Removing and installing coolant pipes	112
4	Radiator/radiator fans	130
4.1	Assembly overview - radiator/radiator fans	130
4.2	Assembly overview - radiator cowl and radiator fans	132
4.3	Removing and installing radiator	133
4.4	Removing and installing radiator cowl	137
4.5	Removing and installing radiator fan V7 / radiator fan 2 V177	138
21	- Turbocharging/supercharging	140
1	Turbochargers	140
1.1	Assembly overview - turbochargers	140
1.2	Assembly overview - charge air recirculation module GX37	140
1.3	Removing and installing turbochargers	140
1.4	Removing and installing charge air recirculation module GX37	141
1.5	Removing and installing sender 1 for turbocharger speed G688	142
1.6	Removing and installing sender 2 for turbocharger speed G689	143
1.7	Removing and installing temperature sender for engine cover panel G765	143
2	Charge air system	145
2.1	Assembly overview - charge air system	145
2.2	Assembly overview - hose connections for charge air system	148
2.3	Removing and installing charge air cooler	148
2.4	Checking charge air system for leaks	149
23	- Mixture preparation - injection	152
1	Injection system	152
1.1	Overview - fuel system	152
1.2	Overview of fitting locations - injection system	152
1.3	Filling and bleeding fuel system	165
1.4	Checking fuel system for leaks	165
2	Vacuum system	166
2.1	Connection diagram - vacuum system	166
2.2	Checking vacuum system	167
3	Air filter	168
3.1	Assembly overview - air filter housing	168
3.2	Removing and installing air filter housing	170
4	Intake manifold	172
4.1	Assembly overview - intake manifold	172
4.2	Removing and installing intake manifold	172
4.3	Removing and installing intake manifold flap control unit GX14 / intake manifold flap control unit 2 GX15	172
4.4	Removing and installing throttle valve module GX3 / throttle valve module 2 GX4	172
5	Injectors/high-pressure reservoir (rail)	174
5.1	Assembly overview - injectors	174
5.2	Checking injectors	174
5.3	Performing adaption of correction values for injectors	174
5.4	Checking for injectors sticking open	174
5.5	Checking return flow rate of injectors with engine running	176
5.6	Checking return flow rate of injectors at starter cranking speed	176
5.7	Checking pressure retention valve in fuel return line	176
5.8	Removing and installing injectors	176
5.9	Removing and installing high-pressure pipes	178
5.10	Removing and installing high-pressure reservoir (rail)	178
6	Senders and sensors	181



6.1	Removing and installing intake air temperature sender G42 / intake air temperature sender 2 G299	181
6.2	Removing and installing air mass meter G70 / air mass meter 2 G246	182
6.3	Removing and installing intake manifold pressure sender G71	182
6.4	Removing and installing fuel temperature sender G81	183
6.5	Removing and installing fuel pressure sender G247	183
6.6	Removing and installing fuel pressure sender for low pressure G410	183
6.7	Removing and installing pressure differential sender G505	183
6.8	Checking fuel pressure regulating valve N276	184
6.9	Removing and installing fuel pressure regulating valve N276	186
7	High-pressure pump	187
7.1	Assembly overview - high-pressure pump	187
7.2	Removing and installing high-pressure pump	187
8	Lambda probe	188
8.1	Assembly overview - Lambda probe	188
8.2	Removing and installing Lambda probe	190
8.3	Removing and installing NOx senders	191
8.4	Removing and installing particulate sensor G784	194
9	Engine control unit	197
9.1	Assembly overview - engine control unit	197
9.2	Removing and installing engine control unit J623	197
26	Exhaust system	200
1	Exhaust pipes/silencers	200
1.1	Assembly overview - silencers	200
1.2	Removing and installing silencers	202
1.3	Stress-free alignment of exhaust system	203
1.4	Checking exhaust system for leaks	204
2	Emission control system	205
2.1	Assembly overview - emission control system	205
2.2	Removing and installing emission control module	207
2.3	Removing and installing ammonia trap	213
2.4	Removing and installing exhaust flap control unit J883	215
3	SCR (selective catalytic reduction) system	217
3.1	Assembly overview - reducing agent tank	217
3.2	Assembly overview - reducing agent supply line	219
3.3	Releasing pressure in SCR system	219
3.4	Draining reducing agent tank	219
3.5	Removing and installing reducing agent tank	220
3.6	Removing and installing injector for reducing agent N474	223
3.7	Removing and installing control unit for reducing agent metering system J880	224
4	Exhaust gas temperature regulation	225
4.1	Assembly overview - exhaust gas temperature regulation	225
4.2	Removing and installing parts of exhaust gas temperature regulation	225
5	Exhaust gas recirculation	230
5.1	Assembly overview - exhaust gas recirculation system	230
5.2	Removing and installing exhaust gas recirculation cooler	230
5.3	Removing and installing exhaust gas recirculation temperature sensor G98	230
5.4	Removing and installing pressure sender for exhaust gas recirculation G691	230
6	Exhaust manifolds	232
6.1	Assembly overview - exhaust manifolds	232
6.2	Removing and installing exhaust manifolds	232
28	Glow plug system	233
1	Glow plug system	233

1.1	Assembly overview - glow plug system	233
1.2	Removing and installing glow plug	233
1.3	Removing and installing automatic glow period control unit J179 / glow period control unit 2 J703	237
1.4	Removing and installing Hall sender G40	237
1.5	Removing and installing engine speed sender G28	238