

## Contents

<b>00 - Technical data</b>	<b>1</b>
1 <b>Identification</b>	1
2 <b>Safety information</b>	2
2.1 Safety precautions when working on the high-voltage system	2
2.2 Safety precautions when working in the vicinity of high-voltage components	3
2.3 Safety precautions for all vehicles	3
3 <b>Repair instructions</b>	4
3.1 Precautions when working on high-voltage components and potential equalisation lines	4
3.2 Rules for cleanliness when working on the high-voltage battery	4
3.3 Painting work on vehicles with high-voltage system	4
3.4 Repair instructions for all vehicles	5
4 <b>Assessing high-voltage system risk level</b>	6
4.1 Necessary qualifications	6
4.2 Work that requires high-voltage system to be de-energised	6
<b>10 - Removing and installing engine</b>	<b>9</b>
1 <b>Safety information</b>	9
2 <b>Removing and installing engine</b>	10
2.1 Removing engine	10
2.2 Securing engine to engine and gearbox support	56
2.3 Installing engine	56
3 <b>Assembly mountings</b>	63
3.1 Assembly overview - assembly mountings	63
3.2 Supporting engine in installation position	68
3.3 Removing and installing engine mountings	69
3.4 Removing and installing power unit mounting senders	73
3.5 Removing and installing gearbox mountings	74
<b>13 - Crankshaft group</b>	<b>80</b>
1 <b>Safety information</b>	80
2 <b>Cylinder block (pulley end)</b>	81
2.1 Assembly overview - cylinder block (pulley end)	81
2.2 Removing and installing poly V-belt	82
2.3 Removing and installing poly V-belt tensioner	83
2.4 Removing and installing vibration damper	83
2.5 Removing and installing bracket for ancillaries	83
2.6 Removing and installing engine support	83
3 <b>Cylinder block (gearbox end)</b>	88
4 <b>Crankshaft</b>	89
5 <b>Balance shaft</b>	90
6 <b>Pistons and conrods</b>	91
<b>15 - Cylinder head, valve gear</b>	<b>92</b>
1 <b>Safety information</b>	92
2 <b>Timing chain cover</b>	93
2.1 Assembly overview - timing chain cover	93
2.2 Removing and installing timing chain cover	93
2.3 Renewing oil seal for vibration damper	93
3 <b>Chain drive</b>	94
4 <b>Cylinder head</b>	95
4.1 Assembly overview - cylinder head	95

4.2	Removing and installing cylinder head .....	95
4.3	Checking compression .....	99
<b>5</b>	<b>Valve gear .....</b>	<b>100</b>
5.1	Assembly overview - valve gear .....	100
5.2	Removing and installing camshaft .....	100
5.3	Installing ball for slider .....	104
5.4	Removing and installing cam adjustment actuators .....	104
5.5	Removing and installing camshaft control valve 1 N205 .....	104
5.6	Removing and installing valve stem oil seals .....	105
<b>6</b>	<b>Inlet and exhaust valves .....</b>	<b>106</b>
<b>17 - Lubrication</b>	.....	<b>107</b>
1	Safety information .....	107
<b>2</b>	<b>Sump/oil pump .....</b>	<b>108</b>
2.1	Assembly overview - sump/oil pump .....	108
2.2	Engine oil .....	108
2.3	Removing and installing lower part of sump .....	108
2.4	Removing and installing oil pump .....	110
2.5	Removing and installing upper part of sump .....	110
2.6	Removing and installing oil level and oil temperature sender G266 .....	110
<b>3</b>	<b>Engine oil cooler .....</b>	<b>111</b>
<b>4</b>	<b>Crankcase breather .....</b>	<b>112</b>
<b>5</b>	<b>Oil filter/oil pressure switches .....</b>	<b>113</b>
5.1	Assembly overview - oil filter .....	113
5.2	Assembly overview - oil pressure switches/oil pressure control .....	113
5.3	Removing and installing oil pressure switch F22 .....	113
5.4	Removing and installing oil pressure switch for reduced oil pressure F378 .....	113
5.5	Removing and installing stage 3 oil pressure switch F447 .....	114
5.6	Removing and installing valve for oil pressure control N428 .....	114
5.7	Removing and installing piston cooling jet control valve N522 .....	114
5.8	Checking oil pressure .....	115
<b>19 - Cooling</b>	.....	<b>116</b>
1	Safety information .....	116
<b>2</b>	<b>Cooling system/coolant .....</b>	<b>117</b>
2.1	Connection diagram - coolant hoses .....	117
2.2	Overview of fitting locations - cooling system .....	125
2.3	Checking cooling system for leaks .....	127
2.4	Draining and filling cooling system .....	134
<b>3</b>	<b>Coolant pump/thermostat assembly .....</b>	<b>159</b>
3.1	Assembly overview - coolant pump/thermostat .....	159
3.2	Assembly overview - electric coolant pump .....	159
3.3	Assembly overview - coolant valves .....	161
3.4	Assembly overview - coolant temperature senders .....	165
3.5	Removing and installing electric coolant pump .....	167
3.6	Removing and installing coolant pump .....	178
3.7	Removing and installing toothed belt for coolant pump .....	179
3.8	Removing and installing actuator for engine temperature regulation N493 .....	180
3.9	Removing and installing coolant temperature sender G62 .....	180
3.10	Removing and installing radiator outlet coolant temperature sender G83 .....	181
3.11	Removing and installing coolant temperature sender for high-voltage system .....	182
3.12	Removing and installing coolant valves .....	194
<b>4</b>	<b>Coolant pipes .....</b>	<b>205</b>
4.1	Assembly overview - coolant pipes .....	205

4.2	Removing and installing coolant pipes .....	208
4.3	Removing and installing coolant pipes for gearbox .....	216
<b>5</b>	<b>Radiator/radiator fans .....</b>	<b>220</b>
5.1	Exploded view - radiator/radiator fans .....	220
5.2	Assembly overview - auxiliary radiator .....	222
5.3	Exploded view - radiator cowl and radiator fan .....	223
5.4	Removing and installing radiator .....	224
5.5	Removing and installing radiator cowl .....	230
5.6	Removing and installing radiator fans .....	236
5.7	Removing and installing radiator for high-voltage cooling circuit .....	236
5.8	Removing and installing auxiliary radiator .....	239
<b>21</b>	<b>- Turbocharging/supercharging .....</b>	<b>242</b>
1	<b>Safety information .....</b>	<b>242</b>
<b>2</b>	<b>Turbocharger .....</b>	<b>243</b>
2.1	Exploded view - turbocharger .....	243
2.2	Removing and installing turbocharger .....	243
2.3	Removing and installing turbocharger air recirculation valve N249 .....	248
2.4	Removing and installing charge pressure positioner V465 .....	249
<b>3</b>	<b>Charge air system .....</b>	<b>251</b>
3.1	Assembly overview - charge air system .....	251
3.2	Assembly overview - hose connections for charge air system .....	256
3.3	Removing and installing charge air cooler .....	256
3.4	Removing and installing charge pressure sender G31 .....	261
3.5	Checking charge air system for leaks .....	262
<b>24</b>	<b>- Mixture preparation - injection .....</b>	<b>267</b>
1	<b>Safety information .....</b>	<b>267</b>
<b>2</b>	<b>Injection system .....</b>	<b>268</b>
2.1	Overview of fitting locations - injection system .....	268
<b>3</b>	<b>Air filter .....</b>	<b>281</b>
3.1	Assembly overview - air filter housing .....	281
3.2	Removing and installing air filter housing .....	283
<b>4</b>	<b>Intake manifold .....</b>	<b>286</b>
4.1	Exploded view - intake manifold .....	286
4.2	Removing and installing intake manifold .....	286
4.3	Removing and installing throttle valve module GX3 .....	291
4.4	Cleaning throttle valve module GX3 .....	291
4.5	Checking intake manifold change-over function .....	291
<b>5</b>	<b>Injectors .....</b>	<b>292</b>
5.1	Assembly overview - fuel rail with injectors .....	292
5.2	Removing and installing fuel rail .....	292
5.3	Removing and installing injectors .....	293
5.4	Renewing seals on injector .....	293
5.5	Cleaning injectors .....	293
<b>6</b>	<b>Senders and sensors .....</b>	<b>294</b>
6.1	Removing and installing intake manifold sender GX9 .....	294
6.2	Removing and installing fuel pressure sender G247 .....	294
6.3	Checking fuel pressure sender G247 .....	296
6.4	Removing and installing fuel pressure sender for low pressure G410 .....	296
<b>7</b>	<b>High-pressure pump .....</b>	<b>297</b>
7.1	Assembly overview - high-pressure pump .....	297
7.2	Removing and installing high-pressure pump .....	297
7.3	Removing and installing high-pressure pipe .....	297

<b>8</b>	<b>Lambda probe</b>	<b>298</b>
8.1	Assembly overview - Lambda probe	298
8.2	Removing and installing Lambda probe	298
<b>9</b>	<b>Engine control unit</b>	<b>299</b>
9.1	Assembly overview - engine control unit	299
9.2	Removing and installing engine control unit J623	300
<b>26</b>	<b>- Exhaust system</b>	<b>301</b>
1	<b>Safety information</b>	<b>301</b>
2	<b>Exhaust pipes/silencers</b>	<b>302</b>
2.1	Exploded view - silencers	302
2.2	Separating exhaust pipes/silencers	309
2.3	Removing and installing front silencers	311
2.4	Removing and installing silencers	314
2.5	Stress-free alignment of exhaust system	317
2.6	Checking exhaust system for leaks	318
2.7	Installation position of clamp	318
3	<b>Emission control system</b>	<b>321</b>
3.1	Assembly overview - emission control system	321
3.2	Removing and installing catalytic converter	321
3.3	Removing and installing particulate filter	324
3.4	Removing and installing exhaust flap control unit J883	326
4	<b>Exhaust gas temperature regulation</b>	<b>328</b>
4.1	Assembly overview - exhaust gas temperature regulation	328
4.2	Removing and installing exhaust gas temperature sender 3 G495	328
4.3	Removing and installing exhaust gas temperature sender 4 G648	330
5	<b>Secondary air system</b>	<b>331</b>
5.1	Assembly overview - secondary air system	331
5.2	Removing and installing secondary air pump motor V101	331
5.3	Removing and installing secondary air inlet valve N112	331
5.4	Removing and installing sender 1 for secondary air pressure G609	332
5.5	Removing and installing resonator for secondary air system	332
<b>28</b>	<b>- Ignition system</b>	<b>333</b>
1	<b>Safety information</b>	<b>333</b>
2	<b>Ignition system</b>	<b>334</b>
2.1	Assembly overview - ignition system	334
2.2	Removing and installing ignition coils	334
2.3	Removing and installing knock sensor 1 G61	335
2.4	Removing and installing Hall senders	335
2.5	Removing and installing engine speed sender G28	335
<b>93</b>	<b>- Electric drive systems</b>	<b>336</b>
1	<b>Safety information</b>	<b>336</b>
2	<b>High-voltage components</b>	<b>337</b>
2.1	Overview of fitting locations - high-voltage components	337
3	<b>Warning stickers</b>	<b>341</b>
3.1	Checking warning stickers	341
4	<b>High-voltage battery unit</b>	<b>346</b>
4.1	Assembly overview - high-voltage battery	346
4.2	Visually inspecting and classifying hybrid battery unit AX1	352
4.3	Removing and installing hybrid battery unit AX1	354
4.4	Checking high-voltage battery for leaks	372
4.5	Removing and installing battery regulation control unit J840	383

4.6	Removing and installing switching unit for high-voltage battery SX6 .....	384
<b>5</b>	<b>High-voltage battery components .....</b>	<b>389</b>
5.1	Assembly overview - high-voltage battery .....	389
5.2	Overview of fitting locations - battery modules .....	398
5.3	Overview of fitting locations - battery connectors .....	400
5.4	Determining mean cell voltage .....	401
5.5	Charging and discharging battery modules .....	402
5.6	Marking battery modules .....	403
5.7	Removing battery module .....	404
5.8	Installing battery module .....	434
5.9	Inspecting and classifying battery module .....	454
<b>6</b>	<b>Power and control electronics for electric drive .....</b>	<b>456</b>
6.1	Overview of fitting locations - power and control electronics for electric drive .....	456
6.2	Removing and installing power and control electronics for electric drive .....	459
6.3	Removing and installing bracket for power and control electronics for electric drive JX1 ..	464
<b>7</b>	<b>Electric drive motor .....</b>	<b>465</b>
7.1	Assembly overview - electric drive motor .....	465
7.2	Removing and installing three-phase current drive VX54 .....	468
7.3	Removing and installing centring sleeve .....	468
7.4	Removing and installing drive motor temperature sender G712 .....	470
7.5	Removing and installing drive motor rotor position sender 1 G713 .....	471
7.6	Removing and installing torsion damper .....	472
7.7	Removing and installing actuator for disengagement clutch V606 .....	474
7.8	Removing and installing coolant connection .....	476
7.9	Transporting three-phase current drive .....	478
7.10	Checking free movement of disengagement clutch .....	479
<b>8</b>	<b>High-voltage wiring .....</b>	<b>481</b>
8.1	Overview of fitting locations - high-voltage wiring .....	481
8.2	Removing and installing high-voltage wiring harness for high-voltage battery .....	489
8.3	Removing and installing high-voltage wiring harness for drive motor .....	495
8.4	Removing and installing high-voltage wiring for electrical air conditioner compressor ..	499
8.5	Removing and installing high-voltage wire for high-voltage heater (PTC) .....	502
<b>9</b>	<b>De-energising high-voltage system .....</b>	<b>514</b>
<b>10</b>	<b>Re-energising high-voltage system .....</b>	<b>517</b>
<b>11</b>	<b>Potential equalisation lines .....</b>	<b>519</b>
11.1	General notes - potential equalisation lines .....	519
11.2	Overview of fitting locations - potential equalisation lines .....	519
11.3	Potential equalisation measurement .....	521
11.4	Removing and installing potential equalisation lines .....	522
<b>12</b>	<b>Charging socket .....</b>	<b>527</b>
12.1	Assembly overview - charging socket .....	527
12.2	Charging system .....	529
12.3	Diagnosis of charging system .....	530
12.4	USB adapter for e-tron charging system .....	533
12.5	Removing and installing high-voltage battery charging socket 1 UX4 .....	534
12.6	Removing and installing module for battery charge selector buttons EX32 .....	540
<b>13</b>	<b>Charging unit for high-voltage battery .....</b>	<b>542</b>
13.1	Assembly overview - charging unit for high-voltage battery .....	542
13.2	Removing and installing charging unit 1 for high-voltage battery AX4 .....	545
13.3	Removing and installing bracket for charging unit 1 for high-voltage battery AX4 .....	550