

Contents

00 - Technical data	1
1 Safety precautions	1
1.1 Safety precautions when working on air conditioners	1
1.2 Safety precautions when handling refrigerants	1
1.3 Safety precautions when working on vehicles with high-voltage system	2
1.4 Safety precautions when working in the vicinity of high-voltage components	2
1.5 Safety precautions when working on vehicles with start/stop system	3
1.6 Safety precautions when using testers and measuring instruments during a road test	3
1.7 Safety precautions when working on the cooling system	4
1.8 Safety precautions when working on vehicles with auxiliary/supplementary heater	4
2 Identification	5
2.1 Identification of heater and air conditioning unit	5
3 General notes	7
3.1 Type plates	7
4 Repair instructions	8
4.1 Rules for cleanliness	8
4.2 General notes	8
4.3 Contact corrosion	9
4.4 Routing and attachment of pipes, hoses and wiring	9
4.5 Installing radiators and condensers	9
4.6 Checking heating output	10
4.7 Checking cooling output	10
4.8 Checking air conditioning system functions - vehicles with high-voltage system	10
4.9 Working on refrigerant circuit	11
4.10 Paintwork repairs on vehicles with air conditioning system	11
4.11 Refrigerant circuit seals	12
4.12 Notes on high-voltage components and potential equalisation lines	14
4.13 Use of impact wrenches	14
4.14 Identification plates	15
5 Technical data	16
5.1 Refrigerant capacities	16
5.2 Approved refrigerant oils and refrigerant oil capacities	17
5.3 Oil distribution	22
80 - Heating	24
1 Safety information	24
2 Overview of fitting locations - heater	25
87 - Air conditioning system	26
1 Safety information	26
2 Overview of fitting locations - air conditioner	27
2.1 Overview of fitting locations - components not located in passenger compartment	27
2.2 Overview of fitting locations - components in front passenger compartment	33
2.3 Overview of fitting locations - components in rear passenger compartment	35
3 Refrigerant circuit	38
3.1 System overview - refrigerant circuit	39
3.2 Assembly overview - condenser	52
3.3 Assembly overview - refrigerant lines	54
3.4 Assembly overview - heat exchanger for heat pump operation	81
3.5 Assembly overview - heat exchanger for high-voltage battery	82
3.6 Removing and installing heat exchanger for heat pump operation with refrigerant receiver	82
3.7 Removing and installing refrigerant receiver	87

3.8	Removing and installing heat exchanger for high-voltage battery	89
3.9	Removing and installing high-pressure sender G65	95
3.10	Removing and installing refrigerant pressure and temperature sender G395	97
3.11	Removing and installing refrigerant pressure and temperature sender 2 G826	100
3.12	Removing and installing refrigerant pressure and temperature sender, low-pressure side G1052	103
3.13	Removing and installing refrigerant pressure and temperature sender, high-pressure side G1053	103
3.14	Removing and installing refrigerant shut-off valve V424	105
3.15	Removing and installing refrigerant lines with internal heat exchanger	107
3.16	Removing and installing refrigerant lines in plenum chamber	115
3.17	Removing and installing leadthrough for refrigerant lines in plenum chamber	119
3.18	Removing and installing expansion valve	124
3.19	Removing and installing non-return valves in refrigerant circuit	138
3.20	Unfastening and assembling connection points of refrigerant lines - PR numbers KK1/KK3	148
3.21	Detaching and attaching refrigerant lines - PR numbers KK1/KK3	149
3.22	Removing and installing refrigerant lines to rear heater and air conditioning unit	152
3.23	Removing and installing condenser/gas cooler	154
3.24	Detaching and attaching refrigerant lines at condenser	157
3.25	Removing and installing accumulator - vehicles with R744	161
3.26	Removing and installing desiccant bag/desiccant cartridge - vehicles with R134a/R1234yf	163
3.27	Removing and installing evacuating and charging valve (low-pressure and high-pressure sides)	167
3.28	Starting up air conditioner after charging refrigerant circuit	169
3.29	Removing and installing pressure limiting valve (low-pressure side)	173
3.30	Cleaning air conditioner refrigerant circuit - vehicles with high-voltage system	174
4	Heat pump valve unit	193
4.1	Assembly overview - heat pump valve unit	193
4.2	Removing and installing heat pump valve unit	194
4.3	Dismantling and assembling heat pump valve unit	198
4.4	Removing and installing refrigerant expansion valve 2 N637	201
5	Air conditioner compressor	205
5.1	Assembly overview - air conditioner compressor	205
5.2	Assembly overview - pulley	212
5.3	Detaching and attaching air conditioner compressor at bracket	222
5.4	Detaching and attaching refrigerant lines at air conditioner compressor	230
5.5	Removing and installing air conditioner compressor	242
5.6	Preparations for renewing pulley	255
5.7	Removing and installing pulley (without magnetic clutch)	256
5.8	Removing and installing pulley with air conditioning system magnetic clutch N25	261
6	Control motors	268
6.1	Overview of fitting locations - front control motors	269
6.2	Assembly overview - front control motors	273
6.3	Overview of fitting locations - rear control motors	282
6.4	Assembly overview - rear control motors	284
6.5	General information and procedure for removing and installing control motors	287
6.6	Removing and installing fresh air flap control motor V438, operation	289
6.7	Removing and installing defroster flap control motor V107	292
6.8	Removing and installing left footwell flap control motor V108/control motor for left footwell temperature flap V411	296
6.9	Removing and installing right footwell flap control motor V109/control motor for right footwell temperature flap V412	298
6.10	Removing and installing left centre vent control motor V110	300
6.11	Removing and installing right centre vent control motor V111	302
6.12	Removing and installing air recirculation flap control motor V113	304

6.13	Removing and installing rear temperature flap control motor V137/rear left air quantity flap control motor V239	306
6.14	Removing and installing left temperature flap control motor V158	308
6.15	Removing and installing right temperature flap control motor V159	310
6.16	Removing and installing right B-pillar and footwell shut-off flap control motor V211	312
6.17	Removing and installing left B-pillar and footwell shut-off flap control motor V212	314
6.18	Removing and installing left side vent control motor V299	317
6.19	Removing and installing right side vent control motor V300	319
6.20	Removing and installing rear left temperature flap control motor V313	321
6.21	Removing and installing rear right temperature flap control motor V314	323
6.22	Removing and installing rear left chest vent control motor V315	325
6.23	Removing and installing rear right chest vent control motor V316	327
6.24	Removing and installing rear air recirculation flap control motor V421	329
6.25	Removing and installing rear air distribution flap control motor V427/rear right air distribution control motor V594	331
6.26	Removing and installing rear left air distribution control motor V593	334
6.27	Removing and installing control motor for left side window defroster flap V409	336
6.28	Removing and installing control motor for right side window defroster flap V410	338
6.29	Removing and installing rear right air quantity flap control motor V240	340
6.30	Removing and installing brackets for control motors on front heater and air conditioning unit	342
7	Front heater and air conditioning unit	353
7.1	Assembly overview - heater and air conditioning unit	353
7.2	Assembly overview - air intake box of heater and air conditioning unit	357
7.3	Assembly overview - evaporator housing	359
7.4	Removing and installing evaporator	361
7.5	Checking electric supplementary heater (auxiliary air heater control unit J604 with auxiliary air heater element Z35)	364
7.6	Removing and installing auxiliary air heater control unit J604 (with auxiliary air heater element Z35)	366
7.7	Removing and installing heater and air conditioning unit	370
7.8	Detaching and attaching air intake box at heater and air conditioning unit	377
7.9	Removing and installing dust and pollen filter	378
7.10	Removing and installing fresh air blower V2 with fresh air blower control unit J126	380
7.11	Removing and installing heat exchanger	382
7.12	Removing and installing condensation drain	391
7.13	Checking condensation drain	393
8	Rear heater and air conditioning unit	394
8.1	Assembly overview - attachments for heater and air conditioning unit and air intake box	394
8.2	Removing and installing evaporator	398
8.3	Removing and installing heater and air conditioning unit	401
8.4	Removing and installing rear fresh air blower V80	408
8.5	Removing and installing rear fresh air blower control unit J391	411
8.6	Removing and installing heat exchanger - vehicles with PR number 9AH	411
8.7	Checking condensation drain hose	415
9	Air duct system	417
9.1	Assembly overview - routing of air flow and air distribution in passenger compartment	417
9.2	Assembly overview - fresh air intake	423
9.3	Air intake and air outlet openings	424
9.4	Removing and installing air distribution housing (driver side)	432
9.5	Removing and installing air distribution housing (passenger side)	434
9.6	Removing and installing footwell vent (driver side)	436
9.7	Removing and installing footwell vent (front passenger side)	437
9.8	Removing and installing rear footwell vent	438
9.9	Removing and installing air duct for glove compartment cooling	438
9.10	Removing and installing forced ventilation vents in passenger compartment	439

9.11	Checking forced ventilation vents in passenger compartment	441
9.12	Removing and installing fresh air intake	442
9.13	Removing and installing cover for fresh air intake	444
9.14	Removing and installing plenum chamber water drain	445
9.15	Checking plenum chamber water drain	446
9.16	Cleaning plenum chamber water drain	446
10	Coolant circuit	447
10.1	Assembly overview - high-voltage heater (PTC) Z115	447
10.2	Integration of heater and air conditioning unit into engine coolant circuit	448
10.3	Removing and installing high-voltage heater (PTC) Z115 (with high-voltage heater (PTC) control unit J848)	453
11	Operating and display unit	458
11.1	Overview - operating and display unit	458
11.2	Removing and installing operating and display unit	459
12	Further control components	461
12.1	Removing and installing rear sunlight penetration photosensor G914	461
12.2	Removing and installing external air quality and air humidity sensor G935	462
12.3	Removing and installing ambient temperature sensor G17	463
12.4	Removing and installing front chest vent temperature sensor G385/G386	463
12.5	Removing and installing left footwell vent temperature sender G261	465
12.6	Removing and installing right footwell vent temperature sender G262	466
12.7	Removing and installing evaporator output temperature sender G263	467
12.8	Removing and installing rear right chest vent temperature sender G636/rear left chest vent temperature sender G635 - vehicles with PR number 9AU	468
12.9	Removing and installing rear left chest vent temperature sender G635 - vehicles with PR number 9AH	468
12.10	Removing and installing rear right chest vent temperature sender G636 - vehicles with PR number 9AH	469
12.11	Removing and installing vent temperature sender for rear footwell G637/G638 - vehicles with PR number 9AH	470
12.12	Removing and installing sensor for interior carbon dioxide concentration G929	471
12.13	Removing and installing dash panel temperature sensor G56	472
12.14	Removing and installing rear chest vent temperature sensor G537	473
12.15	Removing and installing humidity sender G355	473
12.16	Removing and installing thermal management control unit J1024	473
13	Air quality improvement system	475
13.1	Overview of fitting locations - air quality improvement system	475
13.2	Assembly overview - fragrance diffuser system	477
13.3	Removing and installing control unit for fragrance diffuser system J1101 with blower for fragrance diffuser system V686	481
13.4	Removing and installing function unit for fragrance diffuser system GX43	483
13.5	Removing and installing bracket for function unit for fragrance diffuser system GX43 and control unit for fragrance diffuser system J1101 - right-hand drive vehicles	485
13.6	Removing and installing control motor for fragrance diffuser system V687	486
13.7	Removing and installing temperature sensor for fragrance diffuser system G1056	487
13.8	Removing and installing ioniser control unit J897	488
13.9	Removing and installing driver side ioniser J1105	488
13.10	Removing and installing passenger side ioniser J1106	489