

## Contents

<b>00 - Technical data</b>	<b>1</b>
<b>1 Safety information</b>	<b>1</b>
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	3
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
<b>2 Identification</b>	<b>6</b>
2.1 Identification of heater and air conditioning unit	6
<b>3 General notes</b>	<b>8</b>
3.1 Type plates	8
<b>4 Repair instructions</b>	<b>9</b>
4.1 Rules for cleanliness	9
4.2 General notes	10
4.3 Contact corrosion	10
4.4 Routing and attachment of pipes, hoses and wiring	10
4.5 Installing radiators and condensers	10
4.6 Checking heating output - Q7 before product upgrade	11
4.7 Checking heating output - Q8 and Q7 from product upgrade onwards	16
4.8 Checking cooling output - Q7 before product upgrade	17
4.9 Checking cooling output - Q8 and Q7 from product upgrade onwards	31
4.10 Checking air conditioning system functions - vehicles with high-voltage system	32
4.11 Working on refrigerant circuit	32
4.12 Refrigerant circuit seals	32
4.13 Notes on high-voltage components and potential equalisation lines	33
4.14 Use of impact wrenches	33
4.15 Identification plates	34
<b>5 Technical data</b>	<b>35</b>
5.1 Refrigerant capacities	35
5.2 Approved refrigerant oils and refrigerant oil capacities	37
5.3 Oil distribution	47
<b>80 - Heating</b>	<b>48</b>
<b>1 Safety information</b>	<b>48</b>
<b>2 Overview of fitting locations - heater</b>	<b>49</b>
<b>87 - Air conditioning system</b>	<b>50</b>
<b>1 Safety information</b>	<b>50</b>
<b>2 Overview of fitting locations - air conditioner</b>	<b>51</b>
2.1 Overview of fitting locations - components not located in passenger compartment	51
2.2 Overview of fitting locations - components in front passenger compartment	69
2.3 Overview of fitting locations - components in rear passenger compartment	75
<b>3 Refrigerant circuit</b>	<b>82</b>
3.1 System overview - refrigerant circuit	83
3.2 Assembly overview - refrigerant lines	105
3.3 Assembly overview - condenser	131
3.4 Removing and installing high-pressure sender G65	133
3.5 Removing and installing refrigerant pressure and temperature sender G395	135
3.6 Removing and installing refrigerant pressure and temperature sender 2 G826	145



3.7	Removing and installing refrigerant pressure and temperature sender 3 G827	154
3.8	Removing and installing refrigerant shut-off valve V424	157
3.9	Removing and installing non-return valves in refrigerant circuit	161
3.10	Assembly overview - heat exchanger for heat pump operation with refrigerant receiver	173
3.11	Removing and installing heat exchanger for heat pump operation with refrigerant receiver	175
3.12	Removing and installing refrigerant receiver	179
3.13	Assembly overview - heat exchanger for high-voltage battery	181
3.14	Removing and installing heat exchanger for high-voltage battery	184
3.15	Unfastening and assembling connection points in refrigerant lines	190
3.16	Disconnecting and attaching refrigerant lines	192
3.17	Removing and installing leadthrough for refrigerant lines in plenum chamber	195
3.18	Removing and installing refrigerant lines with internal heat exchanger	197
3.19	Removing and installing refrigerant lines in plenum chamber	200
3.20	Removing and installing refrigerant line (low-pressure side) in engine compartment - vehicles with high-voltage system	212
3.21	Removing and installing expansion valve	218
3.22	Removing and installing refrigerant lines from expansion valve (rear) to evaporator in rear heater and air conditioning unit	224
3.23	Removing and installing refrigerant lines from connection to expansion valve (rear)	226
3.24	Removing and installing condenser	228
3.25	Detaching and attaching refrigerant lines at condenser	233
3.26	Removing and installing desiccant bag/desiccant cartridge	236
3.27	Removing and installing evacuating and charging valve (low-pressure and high-pressure sides)	239
3.28	Starting up air conditioner after charging refrigerant circuit	242
3.29	Cleaning air conditioner refrigerant circuit - vehicles with high-voltage system and heat pump function	246
3.30	Cleaning air conditioner refrigerant circuit - vehicles with high-voltage system and without heat pump function	265
<b>4</b>	<b>Heat pump valve unit</b>	<b>274</b>
4.1	Assembly overview - heat pump valve unit	274
4.2	Removing and installing heat pump valve unit	275
4.3	Dismantling and assembling heat pump valve unit	284
4.4	Removing and installing refrigerant expansion valve 1 N636 / refrigerant expansion valve 2 N637	286
<b>5</b>	<b>Air conditioner compressor</b>	<b>294</b>
5.1	Assembly overview - air conditioner compressor	294
5.2	Assembly overview - pulley	301
5.3	Detaching and attaching air conditioner compressor at bracket	311
5.4	Detaching and attaching refrigerant lines at air conditioner compressor	318
5.5	Removing and installing air conditioner compressor	328
5.6	Preparations for renewing pulley	345
5.7	Removing and installing pulley (without magnetic clutch)	346
5.8	Removing and installing pulley with air conditioning system magnetic clutch N25	350
<b>6</b>	<b>Control motors</b>	<b>356</b>
6.1	Overview of fitting locations - front control motors	357
6.2	Assembly overview - front control motors	367
6.3	Overview of fitting locations - rear control motors	388
6.4	Assembly overview - rear control motors	390
6.5	General information and procedure for removing and installing control motors	394
6.6	Removing and installing fresh air flap control motor V438 , operation	398
6.7	Removing and installing defroster flap control motor V107	400
6.8	Removing and installing left footwell flap control motor V108	402
6.9	Removing and installing right footwell flap control motor V109	404
6.10	Removing and installing left centre vent control motor V110	406
6.11	Removing and installing right centre vent control motor V111	407
6.12	Removing and installing air recirculation flap control motor V113	409

6.13	Removing and installing rear temperature flap control motor V137 / rear left air quantity flap control motor V239	410
6.14	Removing and installing left temperature flap control motor V158	412
6.15	Removing and installing right temperature flap control motor V159	414
6.16	Removing and installing right B-pillar and footwell shut-off flap control motor V211	416
6.17	Removing and installing left B-pillar and footwell shut-off flap control motor V212	418
6.18	Removing and installing left side vent control motor V299	421
6.19	Removing and installing right side vent control motor V300	424
6.20	Removing and installing rear left temperature flap control motor V313	428
6.21	Removing and installing rear right temperature flap control motor V314	430
6.22	Removing and installing rear left chest vent control motor V315	432
6.23	Removing and installing rear right chest vent control motor V316	434
6.24	Removing and installing dash panel vent control motor V562	436
6.25	Removing and installing control motor for left footwell temperature flap V411	438
6.26	Removing and installing control motor for right footwell temperature flap V412	442
6.27	Removing and installing rear air recirculation flap control motor V421	445
6.28	Removing and installing rear air distribution flap control motor V427 / rear air quantity control motor V443 / rear right air distribution control motor V594	448
6.29	Removing and installing rear left air distribution control motor V593	450
6.30	Removing and installing rear right air quantity flap control motor V240	451
6.31	Removing and installing brackets for control motors on front heater and air conditioning unit	453
<b>7</b>	<b>Front heater and air conditioning unit</b>	<b>468</b>
7.1	Assembly overview - heater and air conditioning unit	468
7.2	Assembly overview - attachments for front heater and air conditioning unit (air distribution housing, heat exchanger etc.)	469
7.3	Assembly overview - air intake box of heater and air conditioning unit	472
7.4	Assembly overview - evaporator housing	474
7.5	Removing and installing evaporator	476
7.6	Removing and installing auxiliary air heater control unit J604 (with auxiliary air heater element Z35 )	479
7.7	Removing and installing heater and air conditioning unit	483
7.8	Detaching and attaching air intake box at heater and air conditioning unit	489
7.9	Removing and installing dust and pollen filter	489
7.10	Removing and installing fresh air blower V2 with fresh air blower control unit J126	491
7.11	Removing and installing heat exchanger	492
7.12	Removing and installing condensation drain	500
7.13	Checking condensation drain	502
<b>8</b>	<b>Rear heater and air conditioning unit</b>	<b>503</b>
8.1	Assembly overview - attachments for heater and air conditioning unit and air intake box	503
8.2	Removing and installing evaporator	507
8.3	Removing and installing heater and air conditioning unit	509
8.4	Removing and installing rear fresh air blower V80	515
8.5	Removing and installing rear fresh air blower control unit J391	518
8.6	Removing and installing heat exchanger	519
8.7	Checking condensation drain hose	520
<b>9</b>	<b>Air duct system</b>	<b>521</b>
9.1	Assembly overview - routing of air flow and air distribution in passenger compartment	521
9.2	Assembly overview - fresh air intake	539
9.3	Air intake and air outlet openings	542
9.4	Removing and installing air duct to dash panel vents (centre) - Q8 and Q7 from product upgrade onwards	550
9.5	Removing and installing air duct for vent (defrost function)	550
9.6	Removing and installing footwell vent (driver side)	551
9.7	Removing and installing footwell vent (passenger side)	551
9.8	Removing and installing air duct for glove compartment cooling	552
9.9	Removing and installing forced ventilation vents in passenger compartment	553

9.10	Checking forced ventilation vents in passenger compartment	553
9.11	Removing and installing fresh air intake	554
9.12	Removing and installing cover for fresh air intake	558
9.13	Removing and installing plenum chamber water drain	559
9.14	Checking plenum chamber water drain	560
9.15	Cleaning plenum chamber water drain	561
<b>10</b>	<b>Coolant circuit</b>	<b>562</b>
10.1	Assembly overview - high-voltage heater (PTC)	562
10.2	Integration of heater and air conditioning unit into engine coolant circuit	565
10.3	Removing and installing coolant pump for high-voltage battery V590	571
10.4	Removing and installing high-voltage heater (PTC) Z115 / high-voltage heater (PTC) control unit J848	571
<b>11</b>	<b>Operating and display unit</b>	<b>585</b>
11.1	Overview - operating and display unit	585
11.2	Removing and installing operating and display unit	594
<b>12</b>	<b>Further control components</b>	<b>600</b>
12.1	Removing and installing sunlight penetration photosensor G107	600
12.2	Removing and installing external air quality and air humidity sensor G935 / air quality sensor G238 with humidity sender in fresh air intake duct G657	601
12.3	Removing and installing ambient temperature sensor G17	602
12.4	Removing and installing front chest vent temperature sensor G385 / G386	603
12.5	Removing and installing left footwell vent temperature sender G261	604
12.6	Removing and installing right footwell vent temperature sender G262	605
12.7	Removing and installing evaporator output temperature sender G263	605
12.8	Removing and installing rear right chest vent temperature sender G636 / rear left chest vent temperature sender G635 - vehicles with PR number 9AE	606
12.9	Removing and installing rear chest vent temperature sender G635 / G636 - vehicles with PR number 9AH/9AQ	606
12.10	Removing and installing vent temperature sender for rear footwell G637 / G638	608
12.11	Removing and installing dash panel temperature sensor G56	609
12.12	Removing and installing rear chest vent temperature sensor G537	610
12.13	Removing and installing thermal management control unit J1024	610
<b>13</b>	<b>Air quality improvement system</b>	<b>613</b>
13.1	Overview of fitting locations - air quality improvement system	613
13.2	Assembly overview - fragrance diffuser system	615
13.3	Removing and installing control unit for fragrance diffuser system J1101 with blower for fragrance diffuser system V686	617
13.4	Removing and installing function unit for fragrance diffuser system GX43	618
13.5	Removing and installing bracket for function unit for fragrance diffuser system GX43 and control unit for fragrance diffuser system J1101	619
13.6	Removing and installing control motor for fragrance diffuser system V687	621
13.7	Removing and installing temperature sensor for fragrance diffuser system G1056	622
13.8	Removing and installing hoses for fragrance diffuser system	622
13.9	Removing and installing control unit for air ionisation system J897	623
13.10	Removing and installing driver side ioniser J1105	624
13.11	Removing and installing rear passenger side ioniser J1108 - Q7 before product upgrade	626
13.12	Removing and installing passenger side ioniser J1106 - Q8 and Q7 from product upgrade onwards	626
13.13	Removing and installing air conditioner sensor for fine particle concentration G930	627