

## 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
3.2 Notes on odours in vehicles without air conditioner	9
3.3 Notes on odours in vehicles with air conditioner	10
<b>4 Repair instructions</b>	<b>12</b>
4.1 Rules for cleanliness	12
4.2 General notes	12
4.3 Contact corrosion	13
4.4 Routing and attachment of pipes, hoses and wiring	13
4.5 Installing radiators and condensers	13
4.6 Checking heating output	13
4.7 Checking cooling output	14
4.8 Checking air conditioning system functions - vehicles with high-voltage system	14
4.9 Working on refrigerant circuit	14
4.10 Paintwork repairs on vehicles with air conditioning system	15
4.11 Gaskets, seals	15
4.12 Notes on high-voltage components and potential equalisation lines	16
4.13 Use of impact wrenches	16
4.14 Identification plates	17
<b>5 Technical data</b>	<b>18</b>
5.1 Refrigerant capacities	18
5.2 Approved refrigerant oils and refrigerant oil capacities	18
5.3 Oil distribution	22
<b>80 - Heating</b>	<b>23</b>
<b>1 Safety information</b>	<b>23</b>
<b>2 Overview of fitting locations - heater</b>	<b>24</b>
2.1 Overview of fitting locations - components not located in passenger compartment	24
2.2 Overview of fitting locations - components in front passenger compartment	25
<b>3 Heater unit</b>	<b>26</b>
3.1 Assembly overview - heater unit	26
3.2 Removing and installing fresh air blower V2 with fresh air blower control unit J126	27
3.3 Removing and installing auxiliary air heater element Z35	27
3.4 Removing and installing temperature flap control motor V68	27
3.5 Removing and installing air recirculation flap control motor V113	27
3.6 Removing and installing air distribution flap control motor V428	27
3.7 Removing and installing dust and pollen filter	27
3.8 Removing and installing heat exchanger	27
3.9 Removing and installing heater unit	28
3.10 Dismantling and assembling heater unit	28



<b>4</b>	<b>Air duct system</b>	<b>29</b>
4.1	Assembly overview - routing of air flow and air distribution in passenger compartment	29
4.2	Removing and installing vents (front)	29
4.3	Removing and installing fresh air intake	29
4.4	Checking forced ventilation vents in passenger compartment	29
4.5	Removing and installing forced ventilation vents in passenger compartment	29
4.6	Checking plenum chamber water drain	29
<b>5</b>	<b>Operating and display unit</b>	<b>30</b>
5.1	Overview of fitting locations - operating and display unit	30
5.2	Removing and installing operating and display unit	30
<b>6</b>	<b>Further control components</b>	<b>31</b>
6.1	Removing and installing ambient temperature sensor G17	31
6.2	Removing and installing coolant shut-off valve N82	31
6.3	Removing and installing sunlight penetration photosensor G107	31
6.4	Removing and installing humidity sender in fresh air intake duct G657	31
6.5	Removing and installing left footwell vent temperature sender G261	32
6.6	Removing and installing front left chest vent temperature sensor G385	32
6.7	Removing and installing evaporator output temperature sender G263	32
<b>87</b>	<b>Air conditioning system</b>	<b>33</b>
<b>1</b>	<b>Safety information</b>	<b>33</b>
<b>2</b>	<b>Overview of fitting locations - air conditioner</b>	<b>34</b>
2.1	Overview of fitting locations - components not located in passenger compartment	34
2.2	Overview of fitting locations - components in front passenger compartment	38
2.3	Overview of fitting locations - components in rear passenger compartment	40
<b>3</b>	<b>Refrigerant circuit</b>	<b>43</b>
3.1	System overview - refrigerant circuit	43
3.2	Assembly overview - refrigerant lines	51
3.3	Assembly overview - condenser	65
3.4	Assembly overview - heat exchanger for heat pump operation	67
3.5	Assembly overview - heat exchanger for high-voltage battery	68
3.6	Removing and installing heat exchanger for heat pump operation	69
3.7	Removing and installing refrigerant receiver	74
3.8	Removing and installing heat exchanger for high-voltage battery	75
3.9	Removing and installing high-pressure sender G65	81
3.10	Removing and installing refrigerant pressure and temperature sender G395	83
3.11	Removing and installing refrigerant pressure and temperature sender 2 G826	86
3.12	Disconnecting and attaching refrigerant lines	88
3.13	Removing and installing refrigerant shut-off valve V424	90
3.14	Removing and installing refrigerant lines with internal heat exchanger	92
3.15	Removing and installing refrigerant lines in plenum chamber	99
3.16	Removing and installing expansion valve	108
3.17	Detaching and attaching refrigerant lines at expansion valve	110
3.18	Removing and installing condenser	112
3.19	Removing and installing non-return valves in refrigerant circuit	123
3.20	Detaching and attaching refrigerant lines at condenser	132
3.21	Removing and installing desiccant bag/desiccant cartridge	138
3.22	Removing and installing evacuating and charging valve (low-pressure and high-pressure sides)	141
3.23	Starting up air conditioner after charging refrigerant circuit	143
3.24	Cleaning air conditioner refrigerant circuit - vehicles with high-voltage system	146
<b>4</b>	<b>Heat pump valve unit</b>	<b>165</b>
4.1	Assembly overview - heat pump valve unit	165
4.2	Removing and installing heat pump valve unit	168
4.3	Dismantling and assembling heat pump valve unit	172

4.4	Removing and installing refrigerant expansion valve 2 N637	175
<b>5</b>	<b>Air conditioner compressor</b>	<b>179</b>
5.1	Assembly overview - air conditioner compressor	179
5.2	Assembly overview - pulley	185
5.3	Detaching and attaching air conditioner compressor at bracket	195
5.4	Detaching and attaching refrigerant lines at air conditioner compressor	205
5.5	Removing and installing air conditioner compressor	212
5.6	Preparations for renewing pulley	220
5.7	Removing and installing pulley	221
<b>6</b>	<b>Control motors</b>	<b>232</b>
6.1	Overview of fitting locations - front control motors	232
6.2	Assembly overview - front control motors	236
6.3	General information and procedure for removing and installing control motors	243
6.4	Removing and installing fresh air flap control motor V438, operation	245
6.5	Removing and installing defroster flap control motor V107	248
6.6	Removing and installing air recirculation flap control motor V113	253
6.7	Removing and installing temperature flap control motor V68	255
6.8	Removing and installing rear temperature flap control motor V137	257
6.9	Removing and installing left temperature flap control motor V158	258
6.10	Removing and installing right temperature flap control motor V159	260
6.11	Removing and installing rear air distribution flap control motor V427	264
6.12	Removing and installing air distribution flap control motor V428	266
6.13	Removing and installing left side vent control motor V299	268
6.14	Removing and installing right side vent control motor V300	270
6.15	Removing and installing dash panel vent control motor V562	272
6.16	Removing and installing brackets for control motors at heater and air conditioning unit	274
<b>7</b>	<b>Front heater and air conditioning unit</b>	<b>287</b>
7.1	Assembly overview - heater and air conditioning unit	287
7.2	Assembly overview - attachments for heater and air conditioning unit (air distribution housing, heat exchanger etc.)	288
7.3	Assembly overview - air intake box of heater and air conditioning unit	291
7.4	Assembly overview - evaporator housing	293
7.5	Removing and installing evaporator	295
7.6	Cleaning evaporator	298
7.7	Removing and installing auxiliary air heater element Z35	304
7.8	Removing and installing heater and air conditioning unit	309
7.9	Detaching and attaching air intake box at heater and air conditioning unit	314
7.10	Removing and installing dust and pollen filter	315
7.11	Removing and installing fresh air blower V2 with fresh air blower control unit J126	316
7.12	Removing and installing heat exchanger	318
7.13	Removing and installing condensation drain	330
7.14	Checking condensation drain	333
<b>8</b>	<b>Air duct system</b>	<b>334</b>
8.1	Assembly overview - routing of air flow and air distribution in passenger compartment	334
8.2	Air intake and air outlet openings	346
8.3	Assembly overview - fresh air intake	351
8.4	Removing and installing footwell vent (driver side)	352
8.5	Removing and installing footwell vent (front passenger side)	353
8.6	Removing and installing air duct for glove compartment cooling	354
8.7	Removing and installing forced ventilation vents in passenger compartment	355
8.8	Checking forced ventilation vents in passenger compartment	356
8.9	Removing and installing fresh air intake	359
8.10	Checking plenum chamber water drain	361
8.11	Cleaning plenum chamber water drain	362
<b>9</b>	<b>Coolant circuit</b>	<b>364</b>



9.1	Integration of heater and air conditioner into coolant circuit .....	364
9.2	Removing and installing coolant shut-off valve N82 .....	365
9.3	Assembly overview - high-voltage heater (PTC) Z115 .....	368
9.4	Removing and installing high-voltage heater (PTC) Z115 (with high-voltage heater (PTC) control unit J848) .....	369
<b>10</b>	<b>Operating and display unit .....</b>	<b>374</b>
10.1	Overview of fitting locations - operating and display unit .....	374
10.2	Removing and installing operating and display unit .....	374
<b>11</b>	<b>Further control components .....</b>	<b>381</b>
11.1	Removing and installing rear chest vent temperature sensor G537 .....	381
11.2	Removing and installing vent temperature sender for rear left footwell G637 .....	383
11.3	Removing and installing sunlight penetration photosensor G107 .....	384
11.4	Removing and installing humidity sender in fresh air intake duct G657/air quality sensor G238 .....	385
11.5	Removing and installing ambient temperature sensor G17 .....	387
11.6	Removing and installing front chest vent temperature sensor G385/G386 .....	388
11.7	Removing and installing left footwell vent temperature sender G261 .....	392
11.8	Removing and installing right footwell vent temperature sender G262 .....	393
11.9	Removing and installing evaporator output temperature sender G263 .....	394
11.10	Removing and installing sensors G355/G397/G107 .....	396
11.11	Removing and installing thermal management control unit J1024 .....	397