

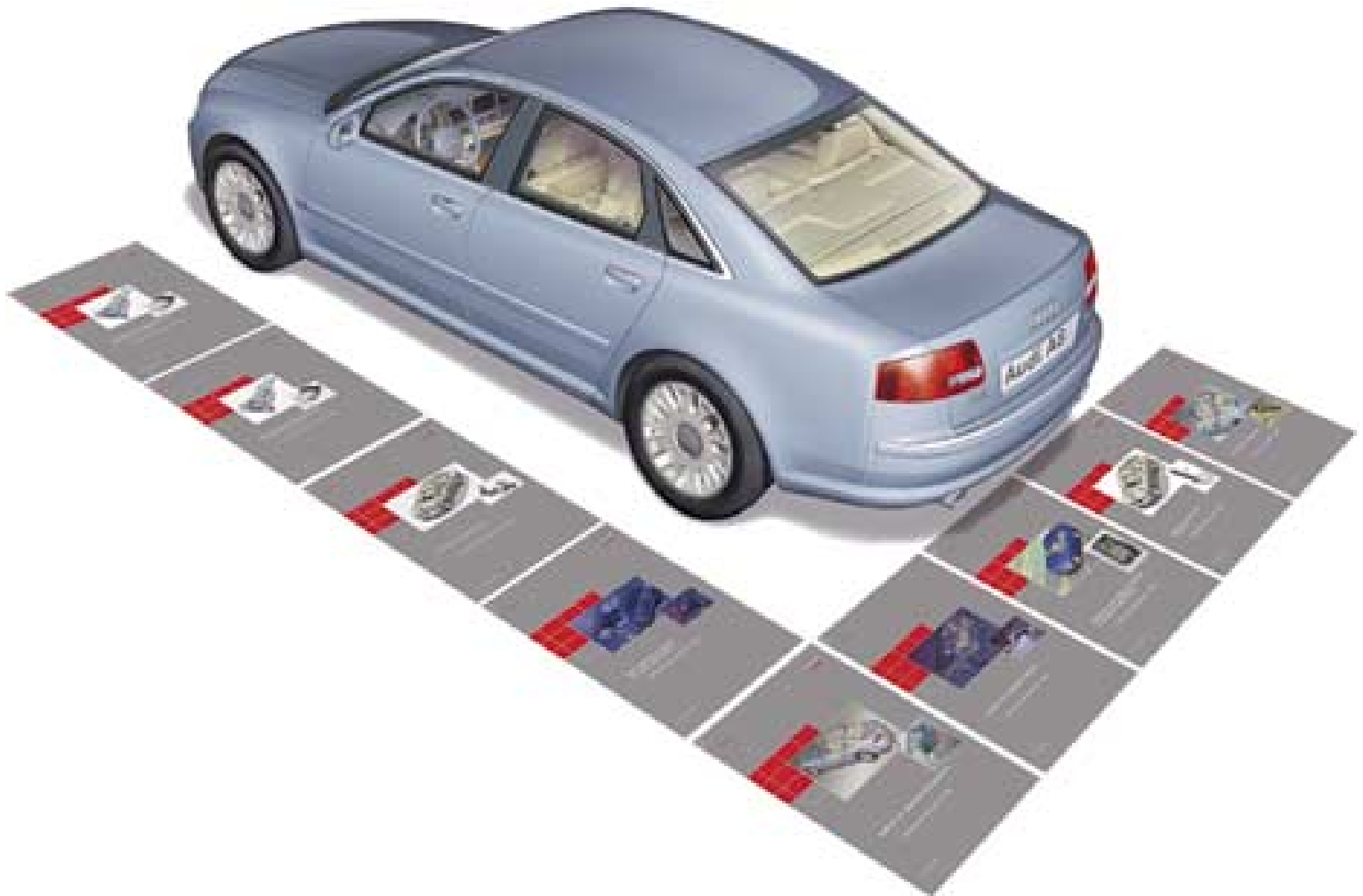


## AUDI A8 '03 - Technical Features

### Self Study Programme 282

## Complete vehicle information

The design and operation of the Audi A8 '03 are described in the following Self Study Programmes:



- SSP 283 – 6-speed automatic gearbox 09E in the Audi A8 '03 - Part 1
- SSP 284 – 6-speed automatic gearbox 09E in the Audi A8 '03 - Part 2
- SSP 285 – Running gear in the Audi A8 '03
- SSP 286 – New data bus systems - LIN, MOST, Bluetooth™
- SSP 287 – Audi A8 '03 - Electrical components
- SSP 288 – Audi A8 '03 - Distributed functions
- SSP 289 – Adaptive cruise control in the Audi A8 '03
- SSP 292 – Adaptive air suspension in the Audi A8 '03
- SSP 293 – Audi A8 '03 - Infotainment



Other helpful information on the Audi A8 '03 can be found on the adjacent CD ROMs.

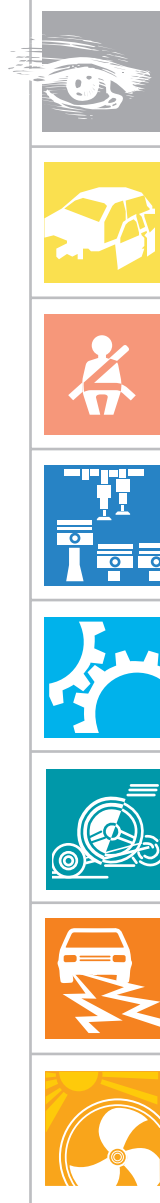


Electrical system



CAN data bus 2

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The Self Study Programme contains information on design features and functions.

**The Self Study Programme is not intended as a Workshop Manual. Values given are only intended to help explain the subject matter and relate to the software version applicable at the time of SSP compilation.**

Use should always be made of the latest technical publications when performing maintenance and repair work.

**New**



**Attention Note**



# Introduction



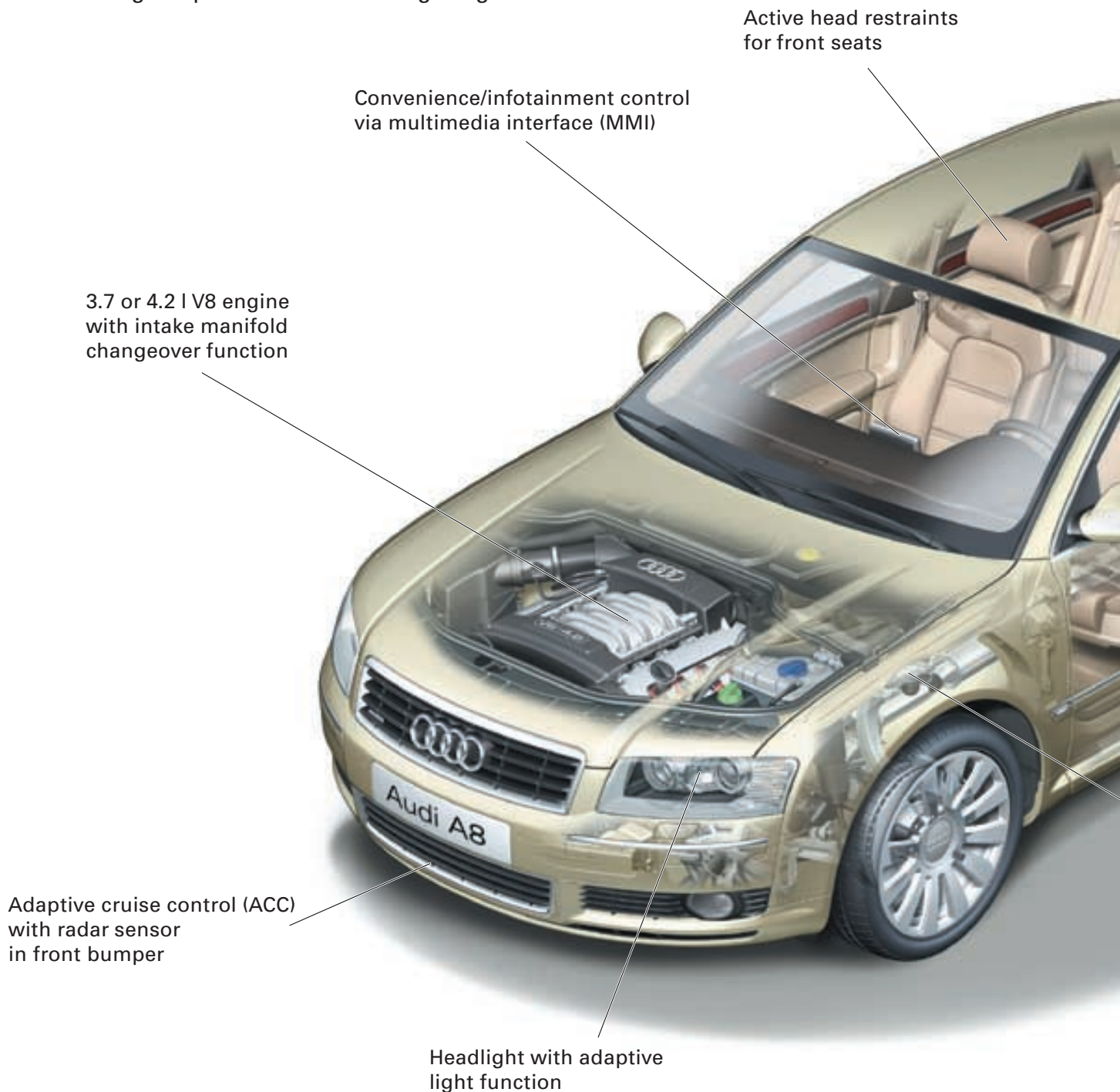
## Introduction

The new Audi A8 is designed to replace its predecessor of the same name which achieved a total production figure of 105,092 since its introduction in June 1994. This was the first standard saloon with aluminium body and epitomised a new philosophy in the luxury vehicle sector.

The weight-saving Audi Space Frame ASF represented a major breakthrough in terms of enhanced vehicle dynamics, whilst at the same time solving the problem of increasing weight.

This body concept was further perfected in the Audi A2 and the design of the Audi A8 '03 reflects the experience gained from both projects.

The aim when developing the Audi A8 '03 was not merely to surpass its predecessor in terms of technical features and details.



Active head restraints  
for front seats

Convenience/infotainment control  
via multimedia interface (MMI)

3.7 or 4.2 l V8 engine  
with intake manifold  
changeover function

Adaptive cruise control (ACC)  
with radar sensor  
in front bumper

Headlight with adaptive  
light function

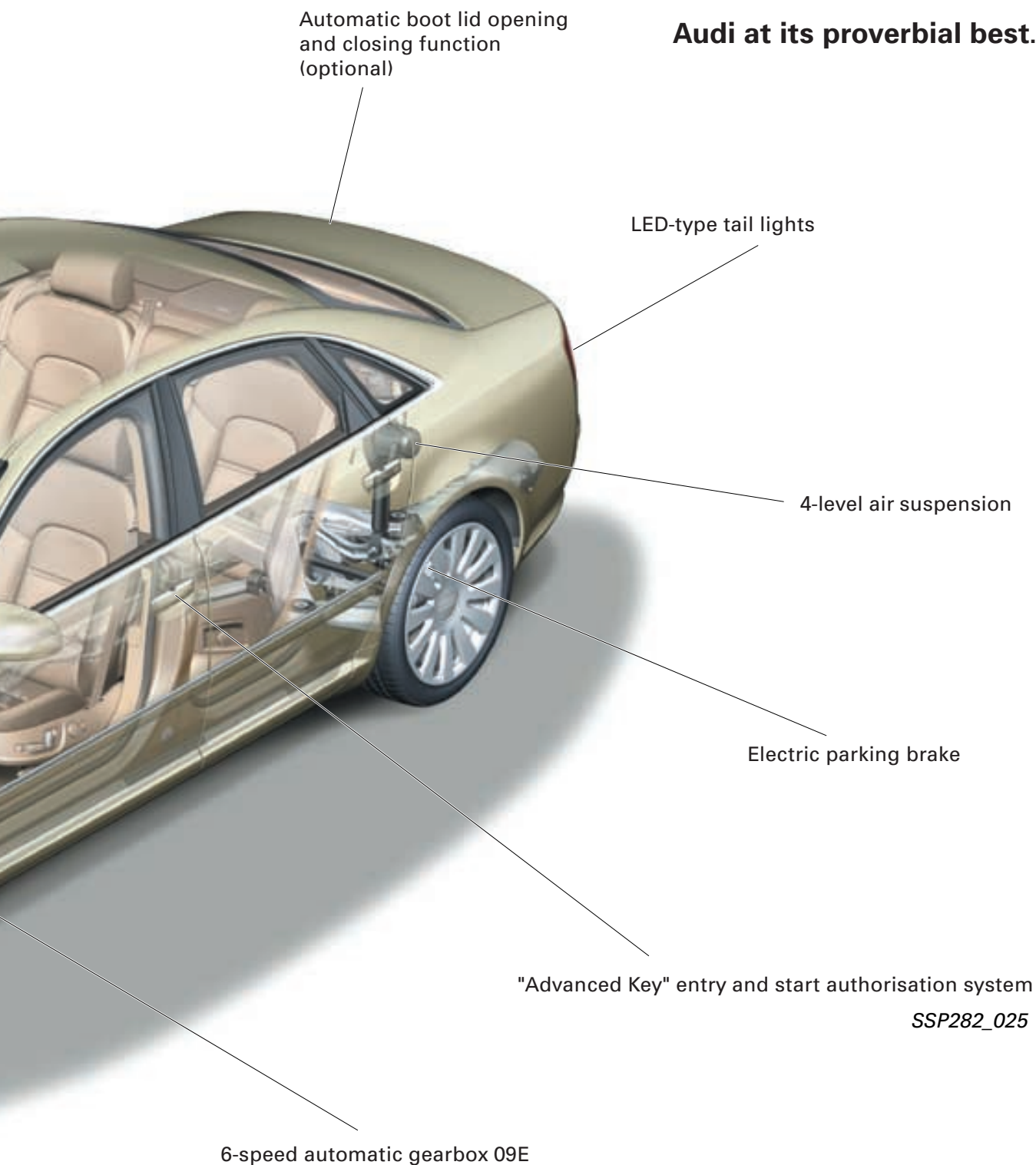


As the Audi flagship, the new Audi A8 is intended to symbolise the product identity of the next Audi generation.

An uncompromising sporty character, clear-cut design, innovative technological systems and the highest possible quality level combine to provide an unforgettable driving experience.

In other words:

## **Audi at its proverbial best.**



Automatic boot lid opening and closing function (optional)

LED-type tail lights

4-level air suspension

Electric parking brake

"Advanced Key" entry and start authorisation system

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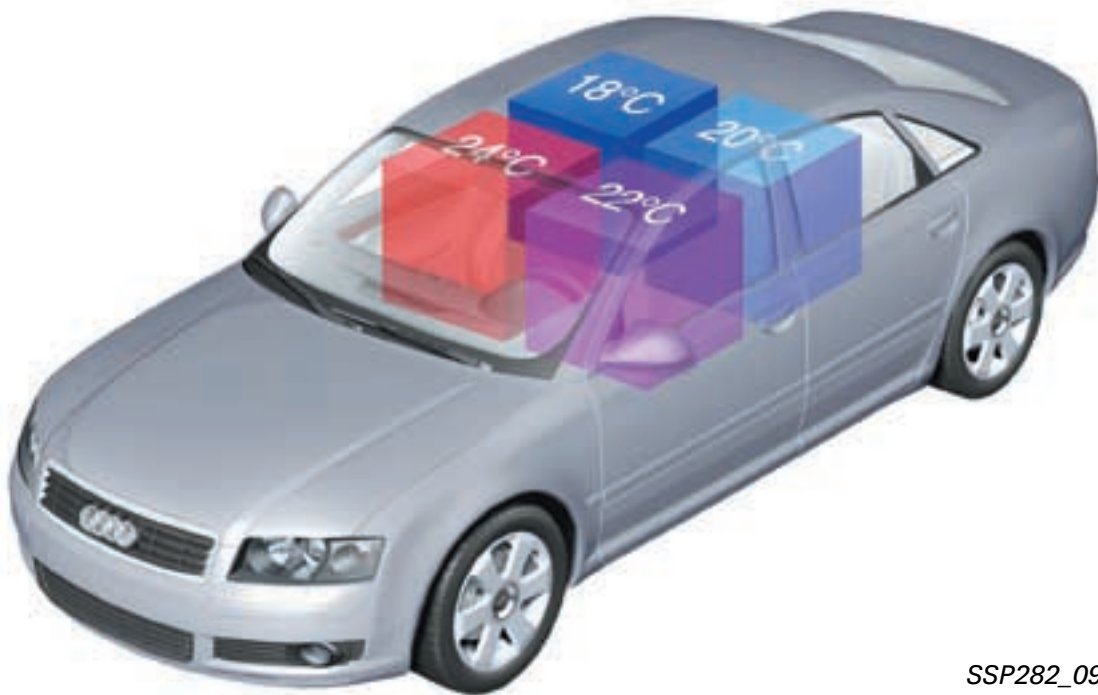
6-speed automatic gearbox 09E

# Heating/Air Conditioner

## Design and operation

The air conditioning system represents a more advanced version of the concept employed in the Audi A8 predecessor model with 2-zone climate control and features fully automatic regulation.

An optional feature for the Audi A8 '03 is 4-zone climate control, enabling both driver and all passengers to make individual settings independently of the climate control level selected for the other occupants.



SSP282\_098

The following components are new features as compared to the systems previously fitted in the Audi A8:

- Humidity sender G355
- Evaporator outflow temperature sender G263
- Two versions: 2-zone front climate control with 12 control motors and 4-zone front and rear climate control with 15 control motors
- Rear climate control with electric rear additional heater as additional equipment ("4-zone system") – rear left and rear right footwell heater element Z42 and Z43
- Second control and display unit with 4-zone climate control, Climatronic control unit J255, rear Climatronic control and display unit E265
- Climate control menu in MMI (Multimedia Interface) for display of climate control set values and basic settings
- Front and rear seat heating and seat ventilation
- Heated windscreen Z2
- Energy management control unit J644

The interaction of these components in coordination with the entire air conditioning system forms a control loop and permits comfortable front and rear climate control to suit all requirements.



SSP282\_099



A distinction is made between two air conditioner unit versions

- 2-zone front and rear climate control
- 4-zone front and rear climate control

and three types of control and display unit

- Air conditioner control panel with no seat heating/ventilation
- Air conditioner control panel with seat heating
- Air conditioner control panel with seat heating and seat ventilation

(identified by part number index).

## Self-diagnosis

Fault diagnosis and measured value blocks for air conditioner and seat heating system can be read out by way of address words 08 "Air conditioner/heater electronics" and 28 "Rear climate control". The functions of and exact procedure for self-diagnosis and assisted fault-finding with VAS 5051 can be found in the Heating/Air Conditioner Workshop Manual for the relevant vehicle model.



## Operating principle

When the ignition is switched on, the Climatronic control unit J255 starts up with the same temperature, air distribution and fresh-air blower speed settings etc. as were applicable the last time the ignition was switched off by way of the appropriate key or using fingerprint recognition. If fingerprint recognition has been implemented, this has priority over key recognition (refer also to SSP 287 – Audi A8 '03 Electrical Components).

## Personalised settings

The following settings can be made for each climate control zone (front left, right and, optionally, with 4-zone climate control rear left and right):

- Left/right temperature
- Air flow
- Left/right air distribution
- Left/right seat heating
- Left/right seat ventilation
- Operating modes (AUTO for driver and front passenger, temperature-adjustable centre vents, automatically controlled recirculated-air mode, ECON)

The heated windscreen can be activated by way of the air conditioner defrost button or the air conditioner control unit automatically switches on the electric heated windscreen if the appropriate conditions are satisfied (windscreen defrost or automatic mode on cold starting).

The Climatronic J255 and heated windscreen J505 control units communicate by way of the LIN bus. The Climatronic control unit transmits the specified windscreen heating power to the heated windscreen control unit on the LIN bus.

Key recognition takes place in the case of remote control (radio or key transponder), with the driver identification control unit providing the Climatronic control unit J255 with the appropriate information by way of the CAN bus.

The electrically heated windscreen is only supplied with the amount of power which can currently be drawn from the electrical system without draining the battery. This is monitored by the energy management control unit J644.

As is the case with the Audi A4, the windscreen is heated by applying voltage to a metallic foil fitted in the glass (refer to SSP 213).

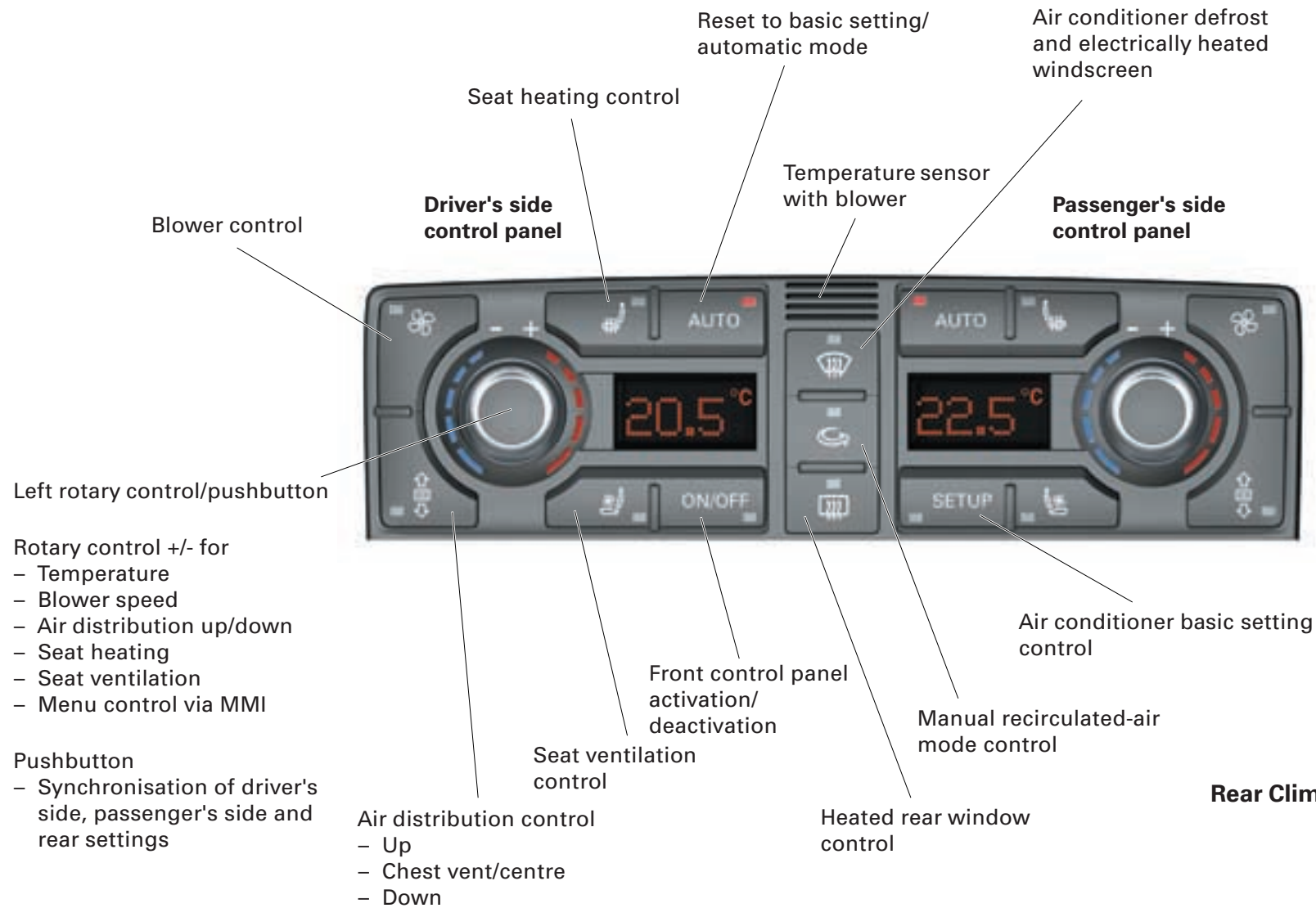


The Climatronic control unit J255 is connected to the convenience CAN, via which diagnosis is also performed.

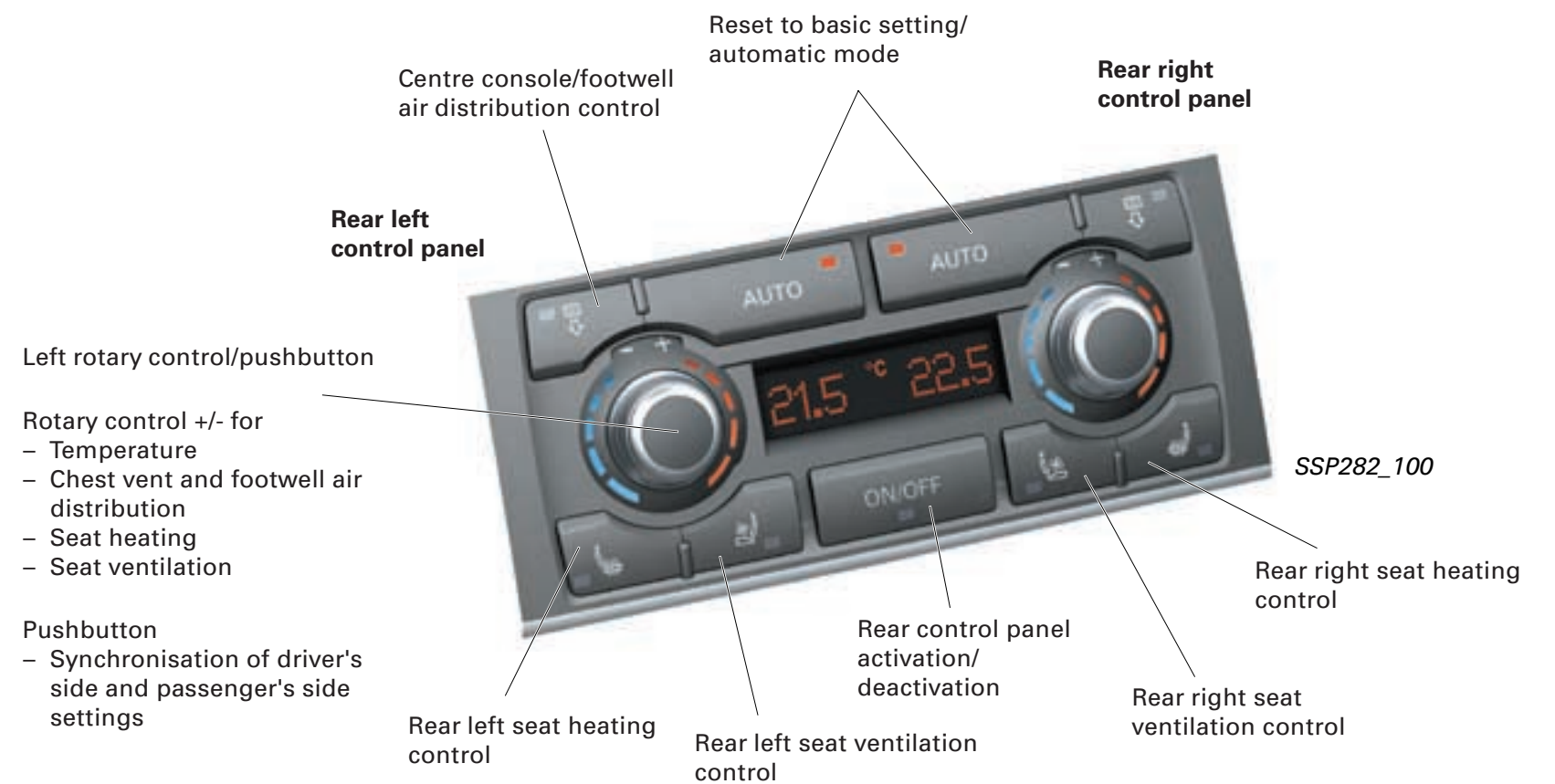
A manual air conditioning system is not available.

As in the Audi A4, the air conditioner compressor is regulated as a function of load and controlled externally by way of the compressor regulating valve (refer to SSP 240).

**Climatronic control unit J255**



**Rear Climatronic control and display unit E265**





## Air conditioning system control via MMI

All air conditioning system set values and basic settings (setup) can be displayed by way of the MMI. This applies both to the Climatronic control unit button functions and to setup.

If the air conditioning system is activated with the MMI switched on, the air conditioner function settings can be called up and altered by way of the multimedia control panel. The functions indicated in the corners of the displayed mask are activated using the softkeys.

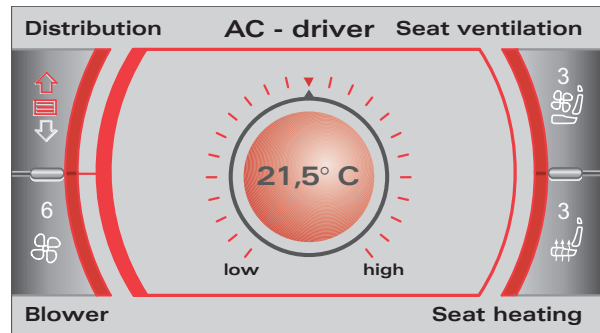
### Basic setting (setup)

The basic air conditioner settings can only be altered when the MMI is active. This involves pressing the SETUP button on the Climatronic control unit.

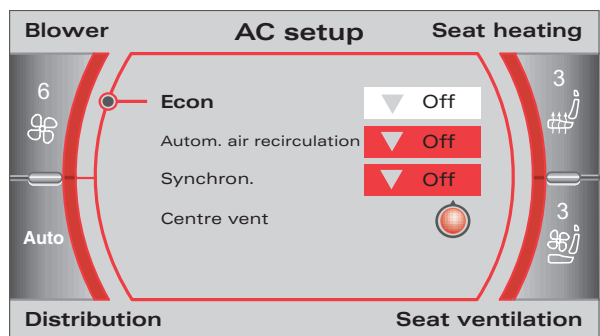
The following functions can be selected:

- ECON ON/OFF
- Automatic air recirculation active/inactive
- Synchronisation active/inactive
- Centre vent (temperature-adjustable) settings between - 3 and + 3
- Auxiliary heater active/inactive
- Auxiliary ventilation active/inactive
- Auxiliary heater/ventilation operating time 15 min./30 min./45 min./60 min.
- Auxiliary heater/ventilation timer status for timers T1, T2, T3 ON/OFF
- Solar mode active/inactive (solar cells C20)
- Rear control ON/OFF

The desired settings can be called up and altered with the driver's/front passenger's control knob on the Climatronic control unit.



SSP282\_112



SSP282\_113

The current air conditioner settings are stored automatically and assigned to the appropriate remote control key. On vehicles with Audi one-touch memory (optional), the current setting is also assigned to the corresponding fingerprint.



# Heating/Air Conditioner

## Blower unit/air routing

As opposed to the predecessor model, the air conditioner features an additional evaporator outflow temperature sender G263. This is installed in the air duct downstream of the evaporator and constantly transmits the air temperature downstream of the evaporator to the Climatronic control unit J255.



When replacing control motors, attention must be paid to the assignment of the flaps in the cam plate guides.

If the left or right centre chest vent is closed manually, the left/right centre vent control motor V110/V111 is closed automatically by the centre left/centre right G347/G348 vent sensor signal.

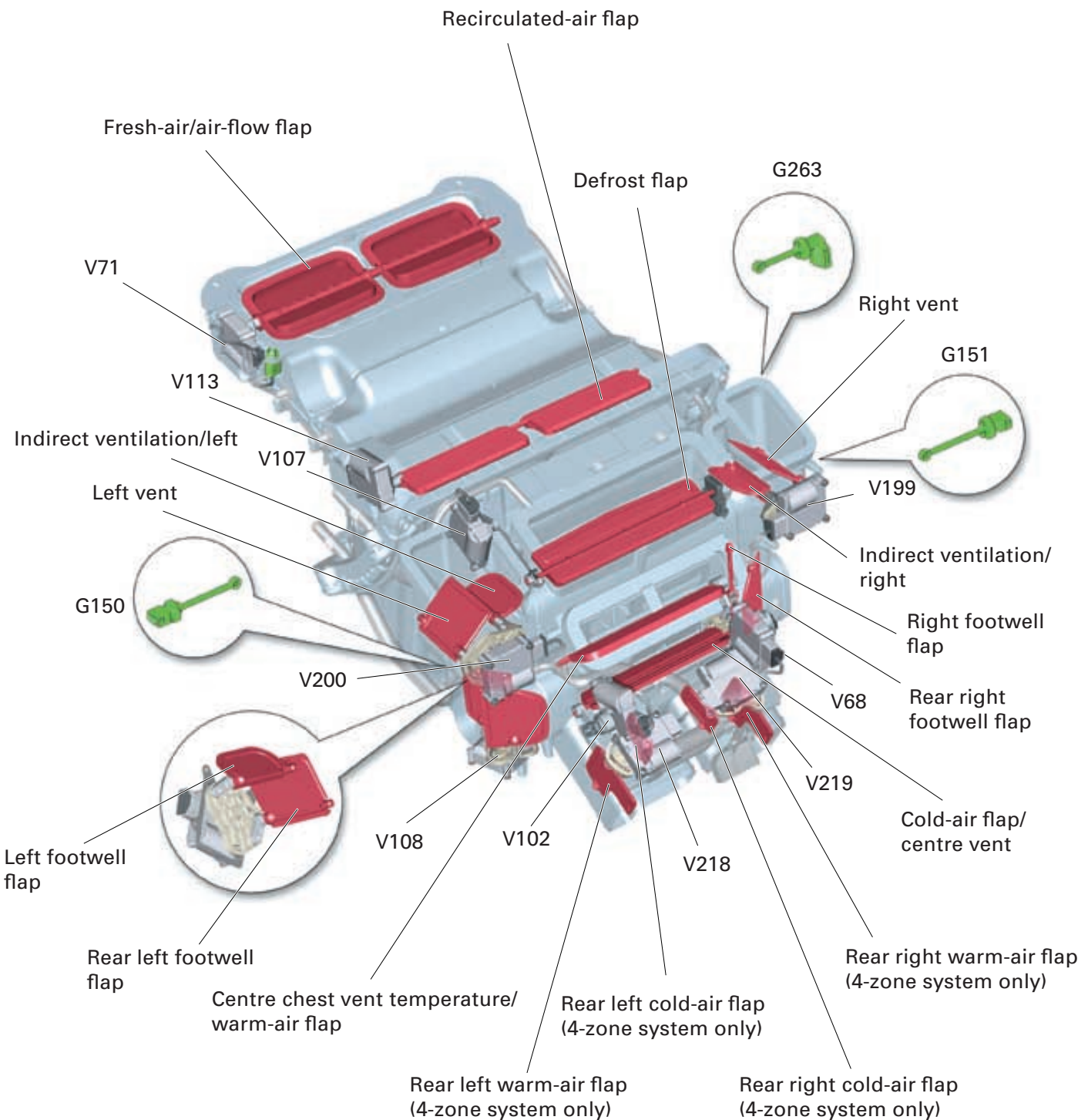
## Automatically controlled recirculated air mode

Recirculated air mode is implemented automatically for a certain period

- If the windscreen washer system switch is actuated or
- In the event of actuation by the air quality sensor G238



|      |  |
|------|--|
| G150 | Left vent temperature sender                                   |
| G151 | Right vent temperature sender                                  |
| G263 | Evaporator outflow temperature sender                          |
| V68  | Temperature flap control motor                                 |
| V71  | Air-flow flap control motor                                    |
| V102 | Centre vent control motor                                      |
| V107 | Defroster flap control motor                                   |
| V108 | Left footwell flap control motor                               |
| V109 | Right footwell flap control motor<br>(not illustrated)         |
| V113 | Air-recirculation flap control motor                           |
| V199 | Front right defroster/chest vent<br>shutoff flap control motor |
| V200 | Front left defroster/chest vent<br>shutoff flap control motor  |
| V218 | Rear left vent control motor<br>(4-zone system only)           |
| V219 | Rear right vent control motor<br>(4-zone system only)          |



SSP282\_101

# Heating/Air Conditioner

## Electric rear additional heater

An electric rear additional heater is fitted under each front seat in the rear climate control footwell air ducts.



SSP282\_102

## Operation

Following a cold start or at low ambient temperatures, there is insufficient waste heat in the coolant to warm the rear of the vehicle by means of a conventional fluid-filled heater. In addition, the drop in temperature in the rear air duct is extremely high in the initial phase.

This problem has been solved by integrating two electric rear additional heaters into the rear footwell air duct.

These employ electrical energy from the vehicle electrical system to heat the air supplied to the passenger compartment. In this way, the heating function is available immediately following cold starting.

A further advantage is that independent temperature regulation (heating) can be provided for the rear footwell with the 4-zone system.

A supply of colder air to the rear climate zones as opposed to the front can be achieved by way of the centre chest vents.

The temperature can however only be reduced but not increased via these vents through the addition of cold air.

As in the predecessor model, two separately controlled heat exchangers permit the setting of different temperatures at front left/right. All occupants can therefore be provided with individual climate control.



As was the case with the predecessor model, in situ heat exchanger replacement is possible. The procedure involved is described in the current Workshop Manual.

# Notes

# Heating/Air Conditioner

## System layout

Fresh-air intake duct  
temperature sensor G89

Flap control  
motor potentiometers  
G92, G113, G135, G136,  
G137, G138, G139, G140,  
G143, G317, G318, G349,  
G350, G351, G352

Air quality sensor G238

Left/right vent temperature  
sender G150/G151

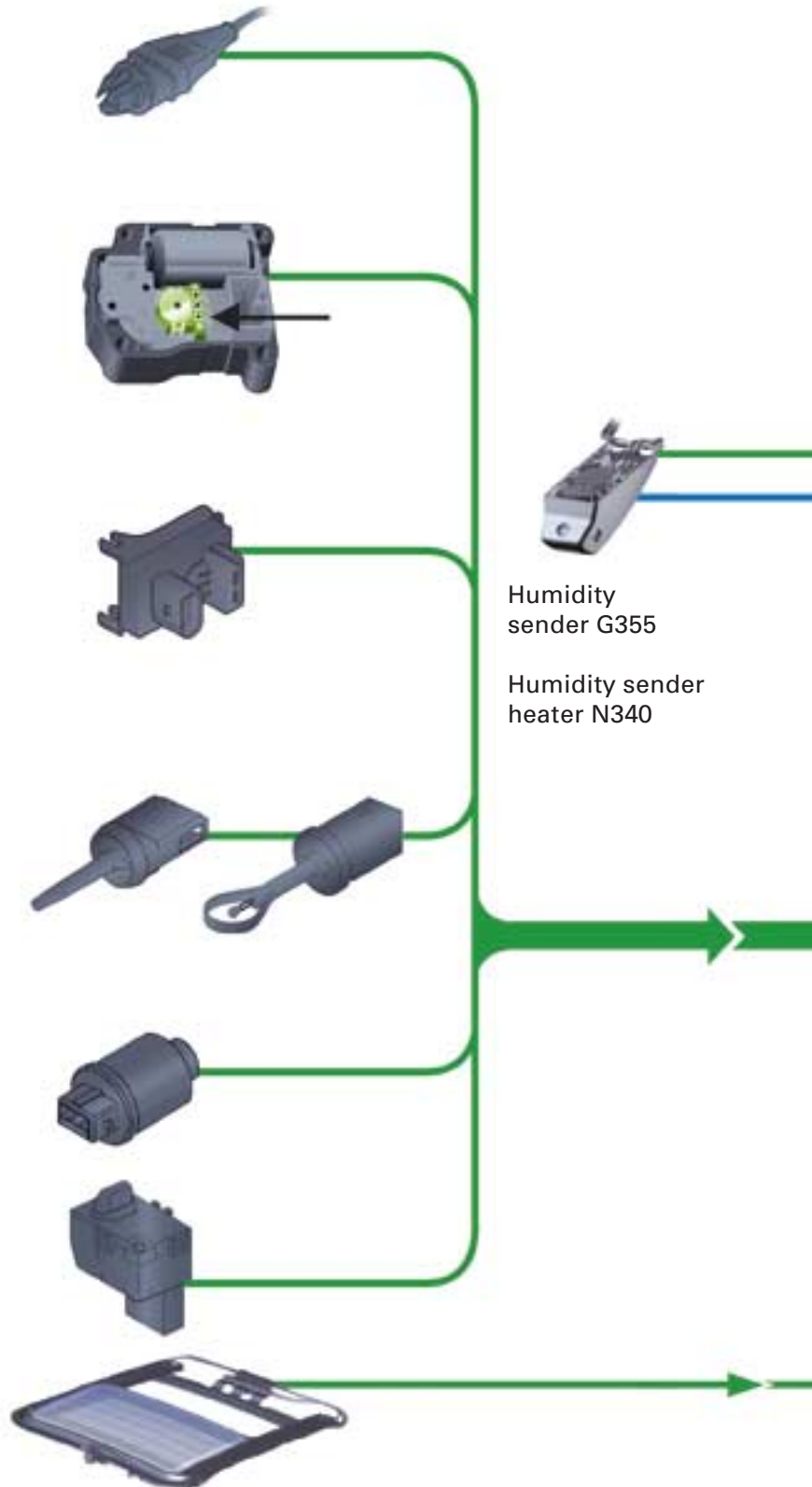
Centre vent temperature  
sender G191

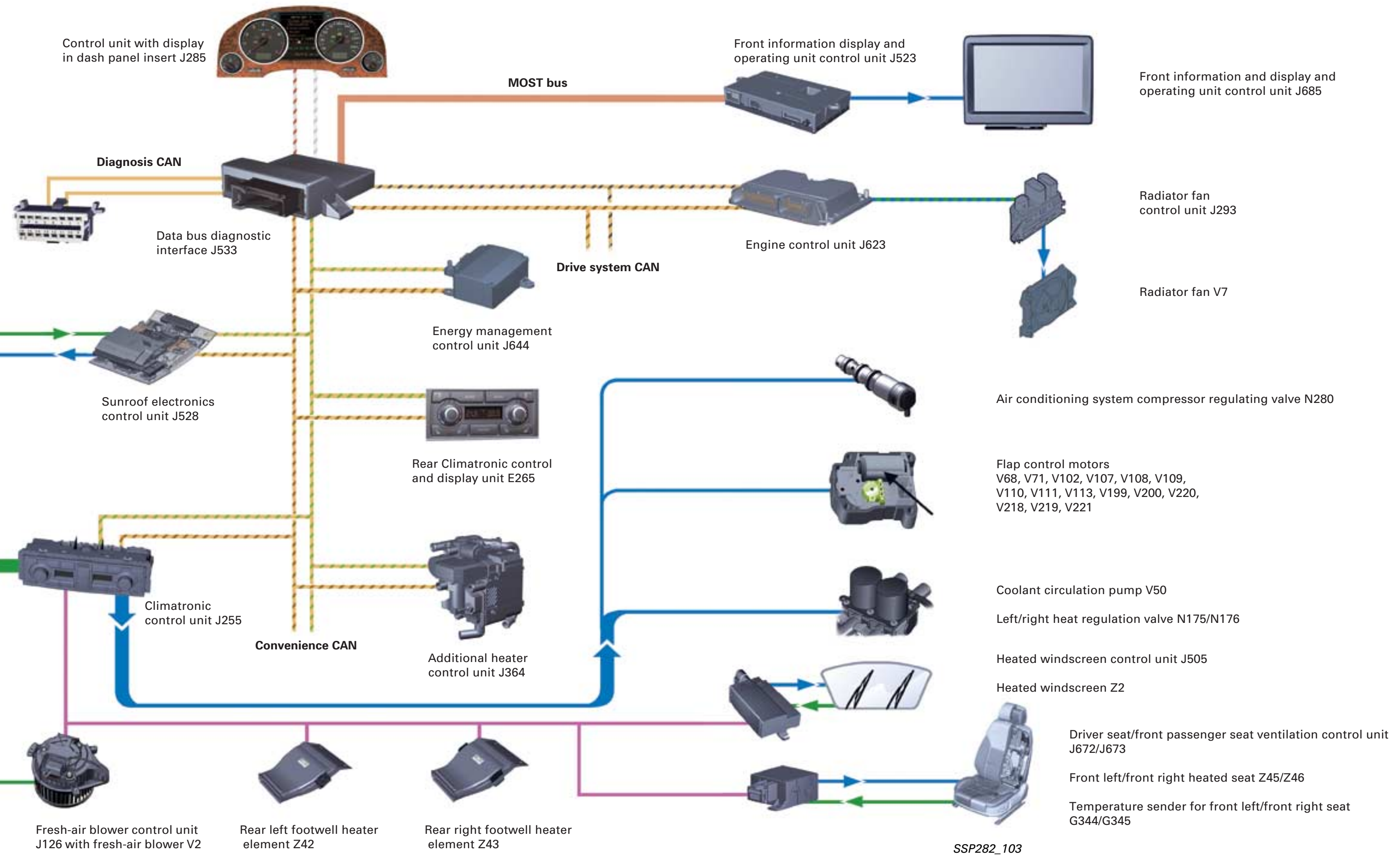
Evaporator outflow temperature  
sender G263

High-pressure sender G65

Sunlight penetration  
photosensor G107

Solar cells in sunroof C20





# Heating/Air Conditioner

## Humidity sender G355



SSP282\_104

At low ambient temperatures, when the windscreen is extremely cold, the top third is particularly susceptible to fogging. To cover this area, the humidity sender G355 is fitted in front of the base of the rear view mirror.

The sender is designed to detect the following:

- Humidity level
- Sender ambient temperature and
- Windscreen temperature

All three functions are combined in the sender housing.

The humidity sender is intended for all equipment versions.

### Measurement of humidity level and corresponding temperature

#### Physical principles

Humidity measurement involves determining the water vapour content of the passenger compartment air. The capacity of air to absorb water vapour is governed by the air temperature. It is thus necessary to determine not only the humidity level but also the corresponding air temperature in the measurement area.

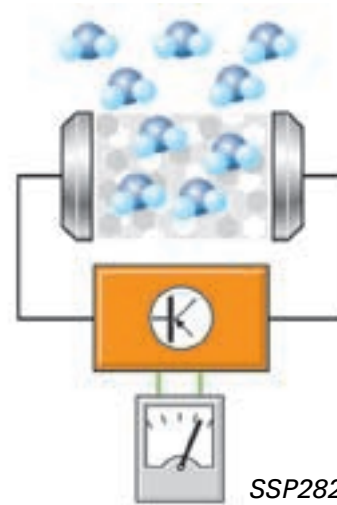
The sender data enable the air conditioning system to detect potential misting of the windscreen in good time. Before water vapour from the air in the passenger compartment can form on the windows, the output of the air conditioner compressor and the blower speed are automatically increased and the defrost flap is opened further. Dry air is then routed from the open defrost vents to the windscreen and side windows via the evaporator and heat exchangers.

The warmer the air, the more water vapour it can absorb. Water starts to condense if this water-vapour enriched air cools down again. This results in fine droplets forming on the windscreen.



## Operation

Measurement is performed by way of a special capacitor which can absorb water vapour. The water absorbed produces a change in the electrical properties and thus the capacitance of the capacitor. The capacitance measurement thus provides information on the humidity level. The sender electronics convert the measured capacitance into a voltage signal.



## Measurement of windscreen temperature

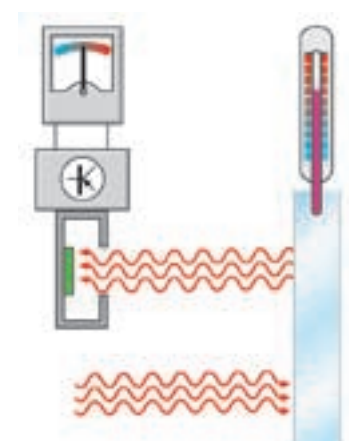
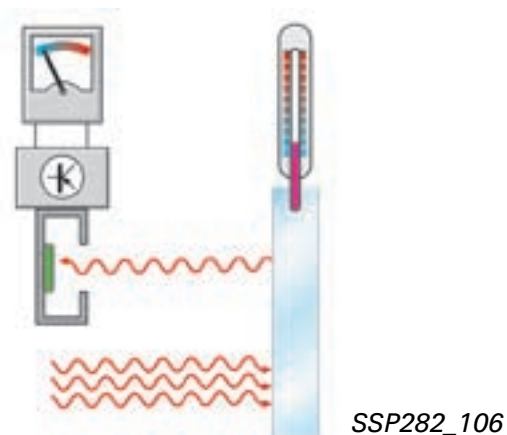
### Physical principles

All bodies exchange heat with their environment in the form of electromagnetic radiation. This electromagnetic radiation can include thermal radiation in the infrared range, visible light or ultraviolet components.

The wavelength of the radiation emitted depends on the temperature of the actual body. A change in the temperature of the body alters, for example, the infrared component of the radiation emitted. The temperature of the body can be determined in a non-contacting manner by measuring the infrared radiation emitted.

## Operation

The infrared radiation emitted by a body (windscreen) is measured by means of a highly sensitive infrared radiation sensor. A change in the temperature of the windscreen also produces a change in the infrared component of the thermal radiation emitted by the windscreen. This is detected by the sensor and converted by the sensor electronics into a voltage signal.

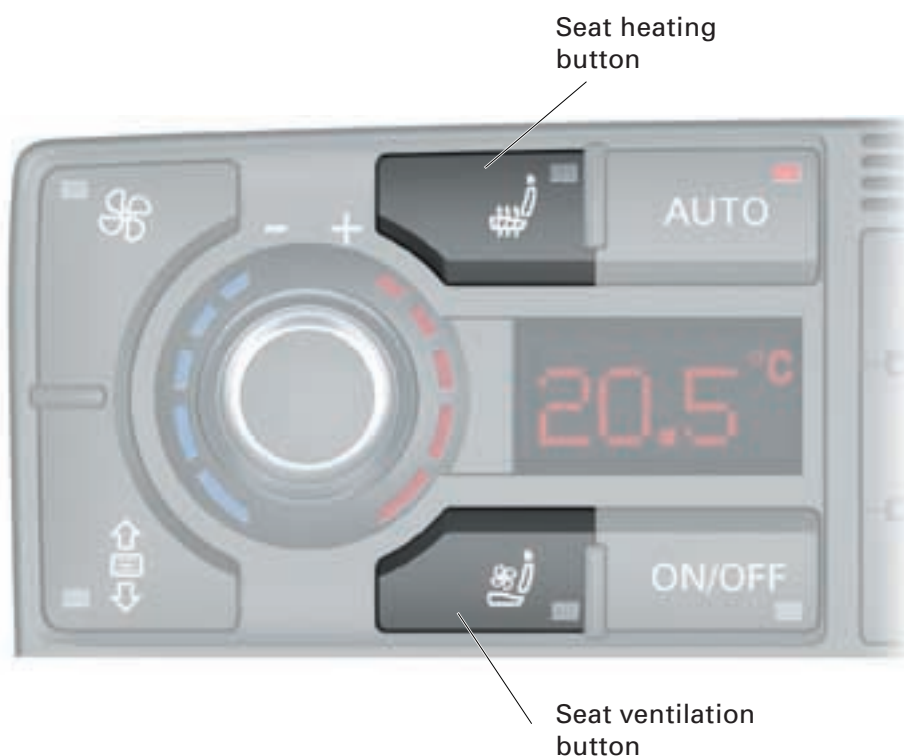


# Heating/Air Conditioner

## Climate-controlled seats with heating and ventilation function

The Audi A8 '03 can be fitted with front and rear climate-controlled seats as optional equipment. These seats offer a combination of seat heating and seat ventilation and can be regulated individually for each occupant.

The buttons for the seat heating and ventilation options are integrated into the front and rear control and display units (refer to Page 74).



SSP282\_107

The corresponding feedback LED lights after pushbutton activation of seat heating/seat ventilation. The selected seat heating/seat ventilation stage can be called up in the display segment of the Climatronic control unit J255 and in the MMI (Multimedia Interface) climate control menu. Once seat heating/seat ventilation has been activated, it remains active even after switching off the air conditioner by means of the ON/OFF button.

The use of seat ventilation leads to lower occupant skin temperatures. Automatic additional seat heating operation controlled as a function of temperature cancels the cooling effect and the air flow is warmed.

The ventilation function promotes pleasant conditions in the occupant's back and seat area and eliminates sweating more quickly.



Under normal circumstances, the seat ventilation function is deactivated automatically after approx. 30 minutes.

## Comfort seat



Seat climate control is achieved by way of integrated fans in the seat cushion and backrest. Air ducts in the seat padding convey the air warmed by the seat heating to the occupant through the fine perforations in the leather.

**!** The seat heating and seat ventilation functions are not incorporated into automatic climate control mode.

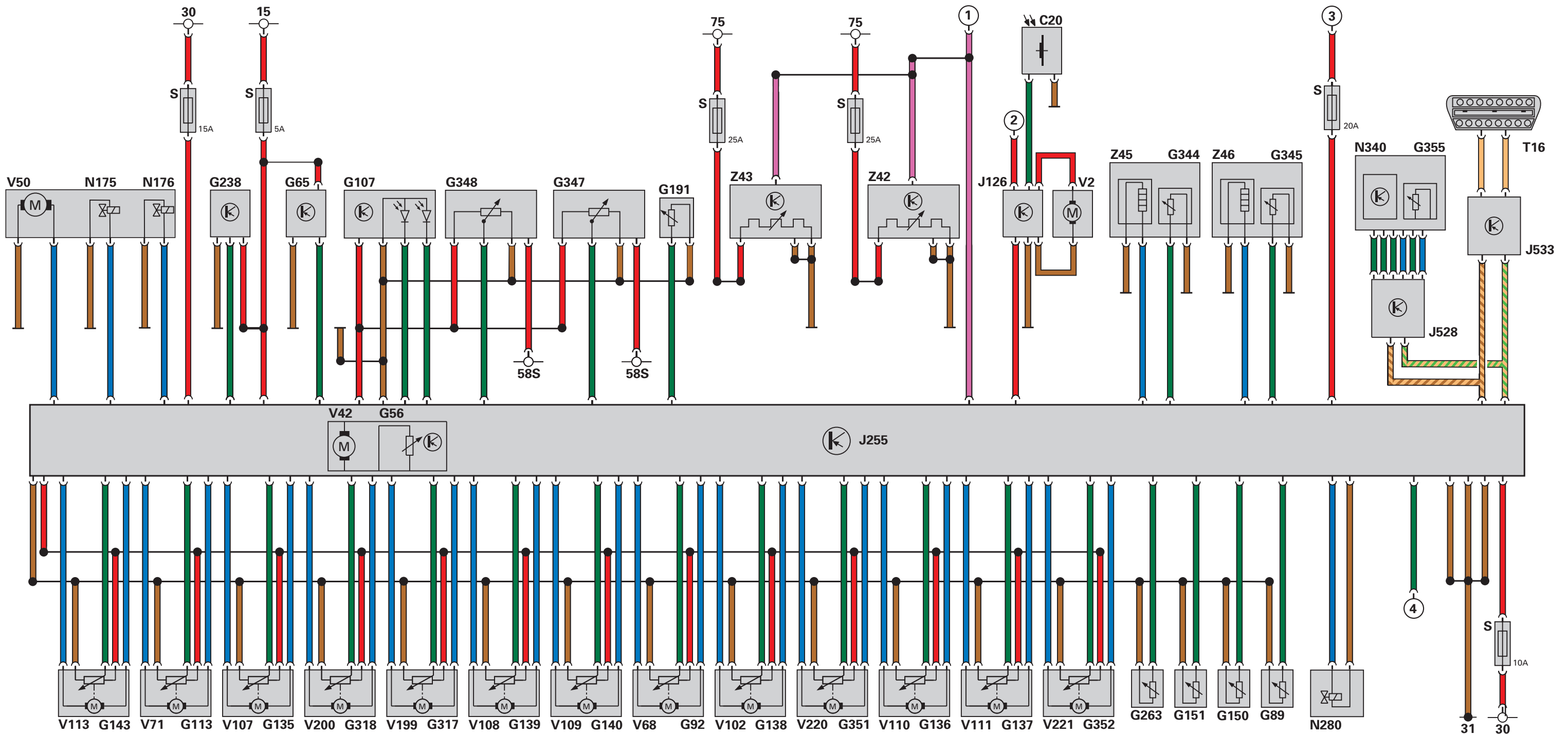


# Heating/Air Conditioner

## Block diagram for front air conditioner

### Key

|      |  |      |   |
|------|--|------|---|
| C20  | Solar cells  | J126 | Fresh-air blower control unit                               |
| G56  | Dash panel temperature sensor  | J255 | Climatronic control unit                                    |
| G65  | High-pressure sender   | J528 | Sunroof electronics control unit                            |
| G89  | Fresh-air intake duct temperature sensor                                   | J533 | Data bus diagnostic interface                               |
| G92  | Temperature flap control motor potentiometer                               | N175 | Left heat regulation valve                                  |
| G107 | Sunlight penetration photosensor   | N176 | Right heat regulation valve                                 |
| G113 | Air-flow flap control motor potentiometer                                  | N280 | Air conditioning system compressor regulating valve         |
| G135 | Defrost flap control motor potentiometer                                   | N340 | Humidity sender heater                                      |
| G136 | Left central vent control motor potentiometer                              | T16  | 16-pin connector (diagnostic connection)                    |
| G137 | Right central vent control motor potentiometer                             | V2   | Fresh-air blower  |
| G138 | Central vent control motor potentiometer                                   | V42  | Temperature sensor blower                                   |
| G139 | Left footwell flap control motor potentiometer                             | V50  | Coolant circulation pump                                    |
| G140 | Right footwell flap control motor potentiometer                            | V68  | Temperature flap control motor                              |
| G143 | Air recirculation flap control motor potentiometer                         | V71  | Air-flow flap control motor                                 |
| G150 | Left vent temperature sender   | V102 | Central vent control motor                                  |
| G151 | Right vent temperature sender  | V107 | Defroster flap control motor                                |
| G191 | Centre vent temperature sender   | V108 | Left footwell flap control motor                            |
| G238 | Air quality sensor   | V109 | Right footwell flap control motor                           |
| G263 | Evaporator outflow temperature sender                                      | V110 | Left central vent control motor                             |
| G317 | Front right defroster/ chest vent shutoff flap control motor potentiometer | V111 | Right centre vent control motor                             |
| G318 | Front left defroster/ chest vent shutoff flap control motor potentiometer  | V113 | Air-recirculation flap control motor                        |
| G344 | Temperature sender for front left seat                                     | V199 | Front right defroster/chest vent shutoff flap control motor |
| G345 | Temperature sender for front right seat                                    | V200 | Front left defroster/chest vent shutoff flap control motor  |
| G347 | Centre left vent sensor  | V220 | Rear left vent warm/cold flap control motor                 |
| G348 | Centre right vent sensor   | V221 | Rear right vent warm/cold flap control motor                |
| G351 | Rear left vent warm/cold control motor potentiometer                       | Z42  | Rear left footwell heater element                           |
| G352 | Rear right vent warm/cold control motor potentiometer                      | Z43  | Rear right footwell heater element                          |
| G355 | Humidity sender  | Z45  | Front left heated seat                                      |
|      |  | Z46  | Front right heated seat                                     |



SSP282\_109

**Colour code**

- = Input signal
- = Output signal
- = Positive supply
- = Earth
- = Convenience CAN High
- = Convenience CAN Low
- = LIN bus

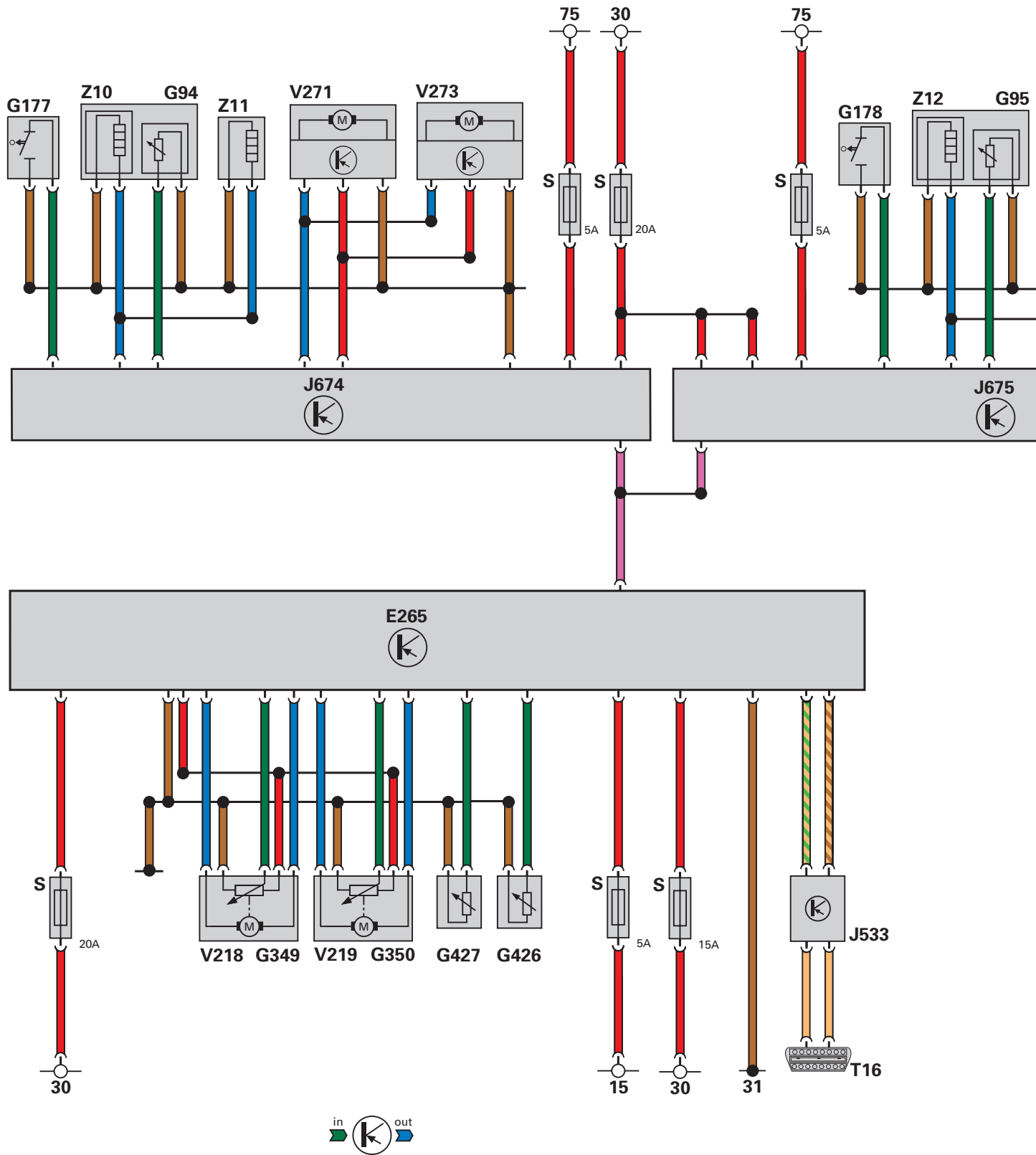


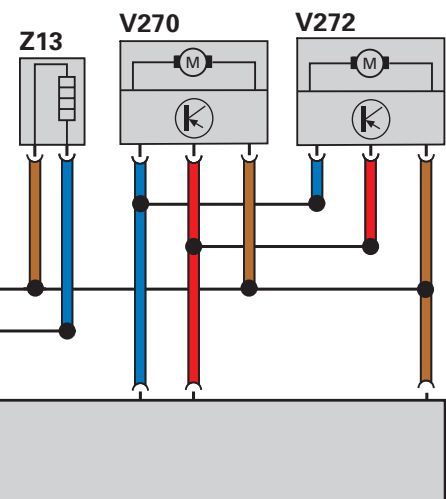
**Additional signals**

- ① Climate control LIN bus for
  - Heated windscreen control unit J505
  - Driver seat ventilation control unit J672
  - Front passenger seat ventilation control unit J673
- ② Terminal 30/blower
- ③ Terminal 30/front seat heating
- ④ Input/rear roller blind switch E149

# Heating/Air Conditioner

Block diagram for rear air conditioner





SSP282\_115

### Colour code

- = Input signal
- = Output signal
- = Positive supply
- = Earth
- = Convenience CAN High
- = Convenience CAN Low
- = LIN bus

### Key

- E265 Rear Climatronic control and display unit
- G94 Rear left seat temperature sensor
- G95 Rear right seat temperature sensor
- G177 Driver side rear seat occupied sensor
- G178 Front passenger side rear seat occupied sensor
- G349 Positioning motor potentiometer for rear left vent
- G350 Positioning motor potentiometer for rear right vent
- G426 Driver side rear seat temperature sensor
- G427 Passenger side rear seat temperature sensor
- J533 Data bus diagnostic interface
- J674 Driver side rear seat ventilation control unit
- J675 Front passenger side rear seat ventilation control unit
- T16 16-pin connector (diagnostic connection)
- V218 Rear left vent control motor
- V219 Rear right vent control motor
- V270 Rear right seat fan
- V271 Rear left seat fan
- V272 Rear right seat backrest fan
- V273 Rear left seat backrest fan
- Z10 Left heated rear seat
- Z11 Left heated rear seat backrest
- Z12 Right heated rear seat
- Z13 Right heated rear seat backrest



# Heating/Air Conditioner

## Auxiliary heater/coolant additional heater

An auxiliary heater is available as an option for all vehicle and engine versions. The auxiliary heater with petrol engines and additional heater with diesel engines are integrated into the engine coolant circuit. Vehicles with diesel engine are fitted with an additional heater as standard. On diesel engines with auxiliary heater, the activated auxiliary heater is also used as engine additional heater depending on temperature.



Design and operation are described in SSP 240 – Audi A2 Technical Features.

The cut-in time is "programmed" by way of the MMI system (Multimedia Interface) under the menu item "timer status".

## Operation with cut-in by way of remote control or timer

In the Audi A8 '03, the auxiliary heater is activated by the air conditioner. The heated coolant is initially supplied to the passenger compartment (primarily auxiliary heater mode). On attaining pre-determined temperature levels, engine pre-heating is then switched in in line with a characteristic curve.

### Activation sequence:

- 1 A remote control or timer signal is transmitted to the auxiliary heater control unit.
- 2 The auxiliary heater then transmits a signal via the CAN bus to the Climatronic control unit J255.
- 3 The control unit then decides as a function of desired temperature, ambient temperature and passenger compartment temperature whether auxiliary ventilation or auxiliary heating is to be employed. The setting of the auxiliary heater/ventilation function is shown in the setup menu in the MMI (Multimedia-Interface).

### 4.1 Auxiliary ventilation sequence

The energy management control unit J644 interrogates the battery capacity check function of the battery and energy management system to determine whether auxiliary ventilation can be accepted. In the event of acceptance, the fresh-air blower is actuated.





## 4.2 Auxiliary heating sequence

The level of fuel in the tank is interrogated. If the fuel tank is "empty", the auxiliary heating function is not permitted and the auxiliary heater symbol in the dash panel insert goes out. "Empty" roughly corresponds to the red display zone. The energy management control unit J644 checks whether there is sufficient energy to accept auxiliary heating. If this is the case, the auxiliary heater is switched on in the various operating modes depending on the characteristic temperature curve and the fresh-air blower is actuated. If the auxiliary heating temperature reaches a level of 30 °C, the fresh-air blower is activated and the coolant shutoff valve N279 pulsed in line with the characteristic curve.

The auxiliary heater is switched off automatically on completion of the operating time transmitted by the MMI system to the Climatronic control unit or it can be switched off using the remote control OFF button.

### Auxiliary heater circulation pump control

To speed up heating of the passenger compartment and to achieve a better "heat yield" in the air conditioner unit heat exchanger, the circulation pump V55 and coolant shutoff valve N279 are pulsed as a function of water temperature and the heating circuit flow rate is thus reduced.

An electric circulation pump is used for the auxiliary heater. It is not possible to reduce the supply voltage in the auxiliary heater control unit and the circulation pump is thus actuated at specific intervals to decrease its output.



If the engine is switched off again and not all additional heater criteria (temperature, time) are satisfied, the auxiliary heater remains in operation for any residual operating time before being deactivated. This function can be encoded.

### Additional control curve for "auxiliary heater" and "additional heater"

When the engine is on, the auxiliary heater and engine temperatures are constantly compared. A switch to the large coolant circuit is made as soon as the engine temperature exceeds the auxiliary heater temperature.

### Activation of auxiliary heater circulation pump with engine on (pulsed operation of circulation pump)

In order to be able to ensure a sufficient flow of water through the heat exchanger, the auxiliary heater circulation pump must additionally be switched on, as is the case for instance with the 12-cylinder engine.



# Heating/Air Conditioner

## Small coolant circuit with auxiliary heater

The small coolant circuit employed with auxiliary heating is designed to ensure rapid warming of the passenger compartment.

With the engine stopped, the coolant shutoff valve N279 switches to the small heating circuit until a defined temperature value has been attained. The coolant exiting from the heat exchangers via the pump/valve unit is conveyed by the circulation pump V55 into the auxiliary heater. After being warmed, the coolant is pumped back into the heat exchangers and initially heats the passenger compartment.



Design and operation are described in SSP 267 – The 6.0 I W12 engine in the Audi A8 - Part 1.

