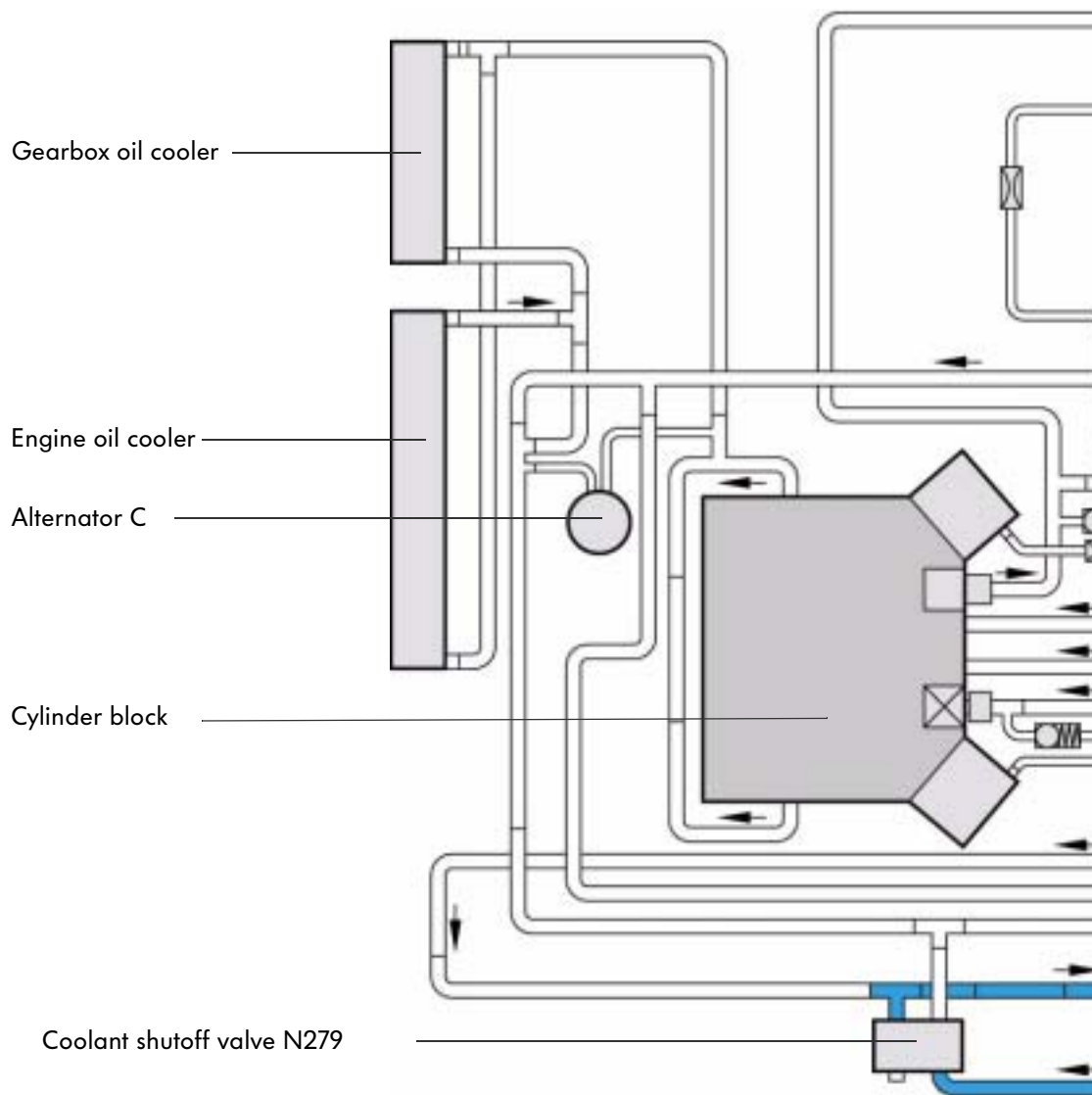
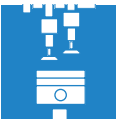


Coolant circuit

Connection of auxiliary heater in coolant circuit of W12 engine

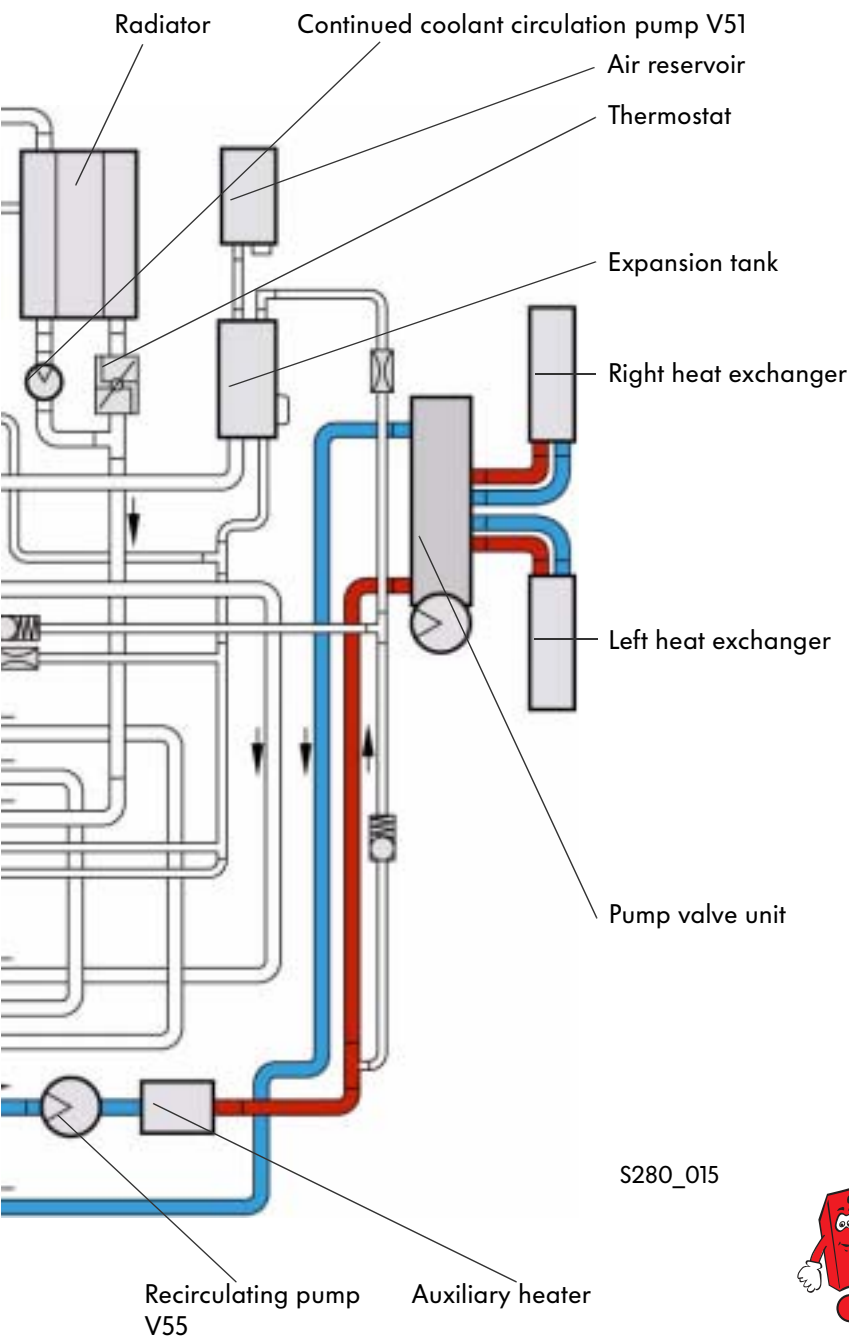
If the auxiliary heater is started when the engine is switched off, the coolant shutoff valve closes. The recirculating pump pumps coolant through the coolant jacket in the auxiliary heater to the pump valve unit, then through the heat exchanger inside the vehicle and back to the auxiliary heater. The vehicle interior is heated.

Coolant circuit



Function

When voltage is applied to the shutoff valve, coolant can flow from the pump valve unit to the heater. When there is no voltage at the shutoff valve, coolant can flow from the pump valve unit to the engine.



S280_015



The pump valve unit is part of the vehicle heater and is described in SSP 271.

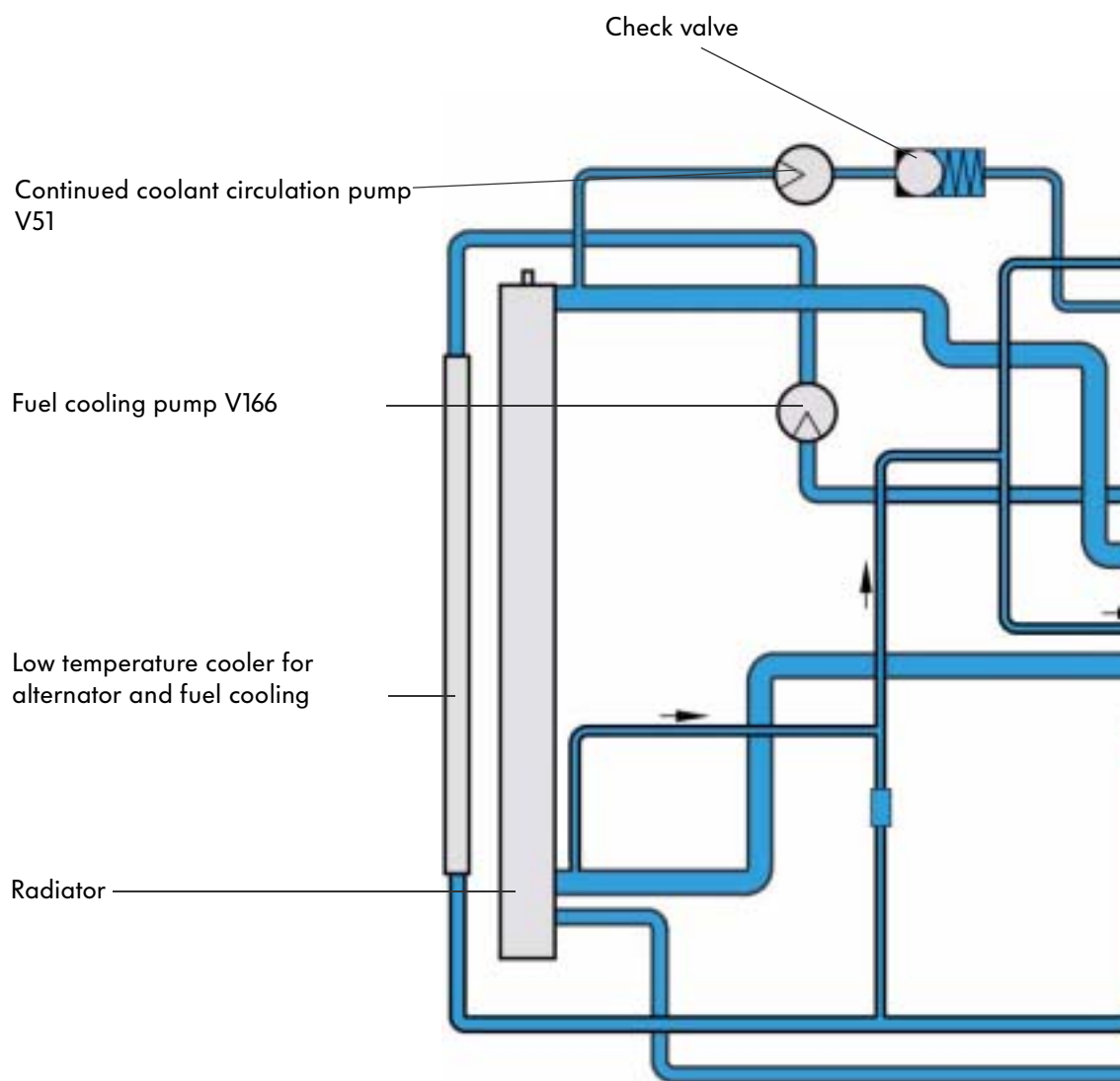
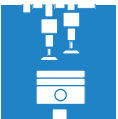


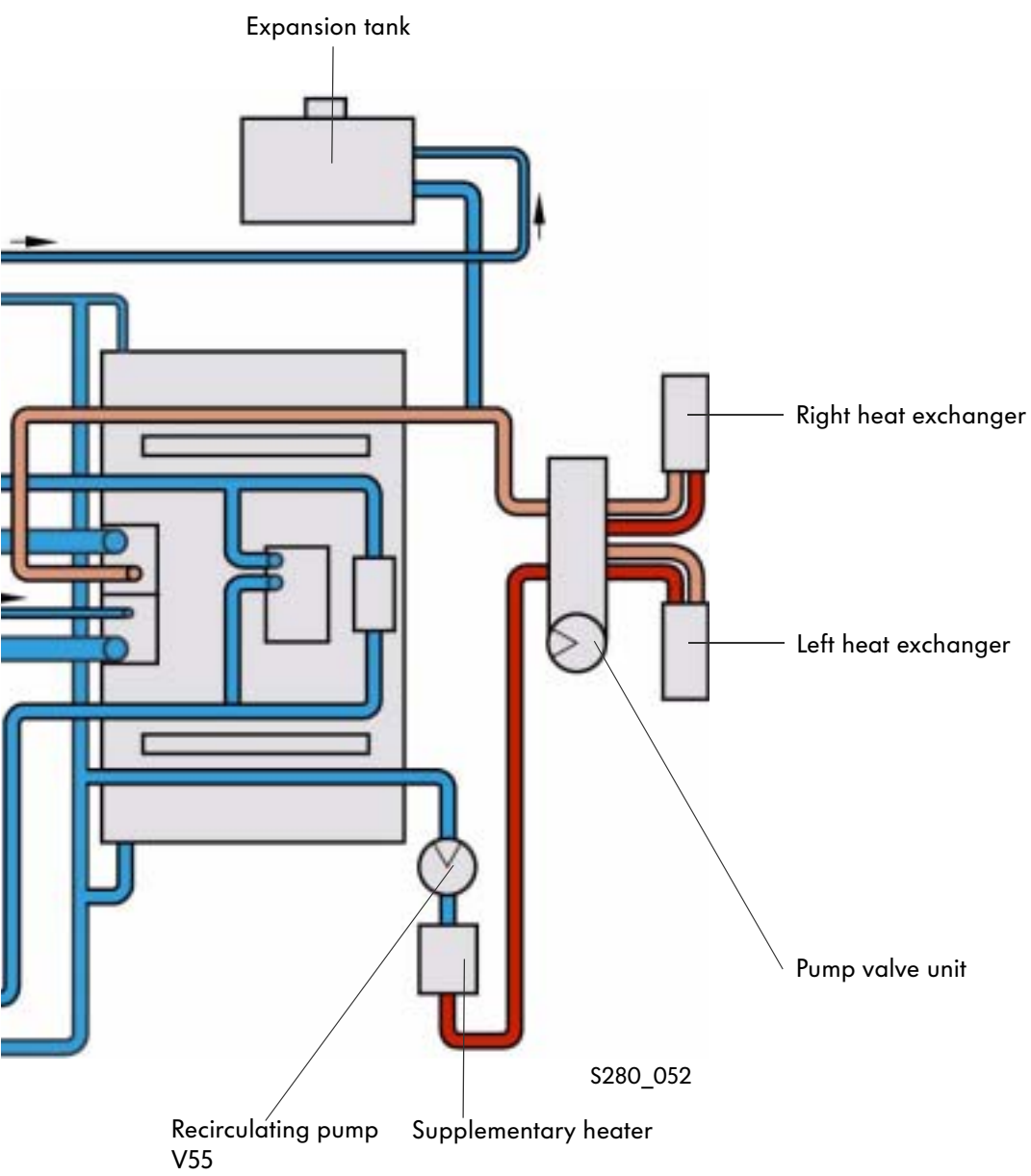
Coolant circuit

Connection of auxiliary heater in coolant circuit of V10 TDI engine

On the supplementary heater there is no coolant shutoff valve. The heater is permanently connected to the engine coolant circuit.

Coolant circuit

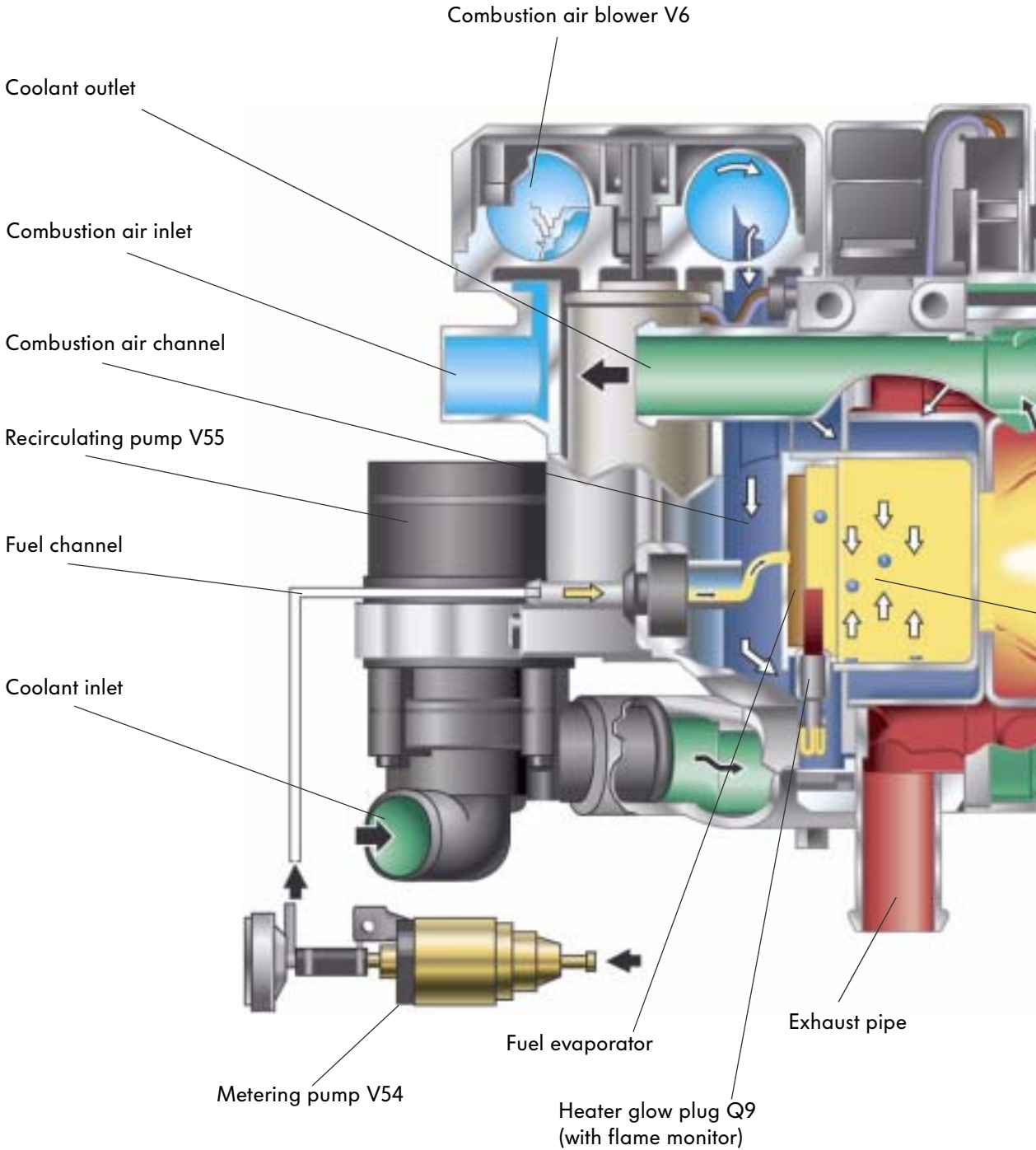




Function

Air supply

The air required for combustion is drawn via the combustion air intake from the combustion air blower and passed through the combustion air channel to the combustion chamber.



The fuel supply

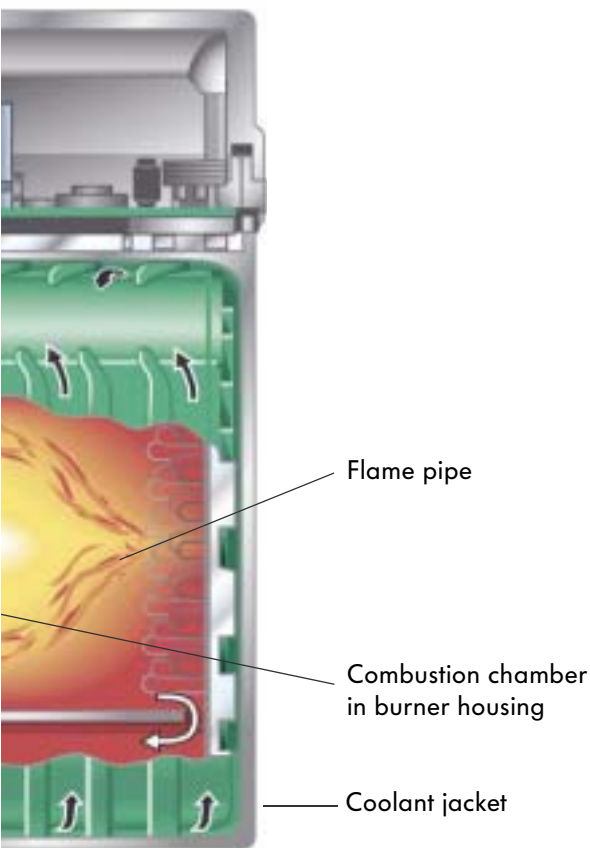
Fuel is supplied through the fuel channel. In the fuel evaporator (fleece), fuel is mixed with the combustion air, forming a combustible fuel-air mixture.

The glow plug with flame monitor ignites the mixture in the combustion chamber at the start.

Once operation has begun, ignition occurs at the flame front in the flame pipe.

During operation of the heater, the glow plug Q9 is supplied with only a small amount of energy from the control unit.

The electrical resistance of the glow plug can thus be used as a flame monitor.



The coolant

Coolant enters through the coolant inlet in the coolant jacket. Here, it is heated. The heated coolant flows out the coolant outlet into the coolant circuit.

S280_010

Operating stages

The auxiliary heater

Start phase

The auxiliary heater is started either:

- immediately,
- via the timer or
- using the remote control.

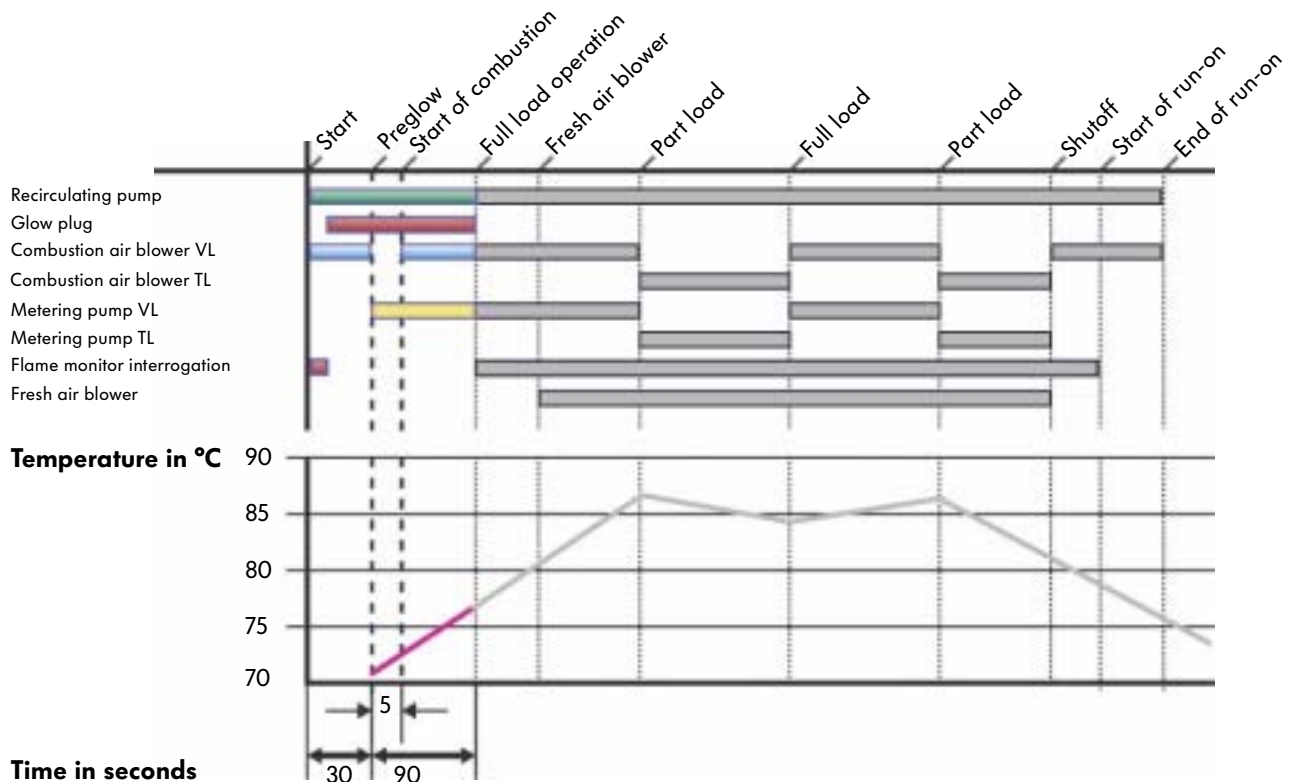
The combustion air blower and the recirculating pump are actuated.

The glow plug starts to glow and the combustion air blower pumps air into the burner insert.

After about 30 seconds, the metering pump starts to deliver fuel and the combustion air blower is switched off for about 5 seconds until a rich mixture has built up.

The output of the combustion air blower is increased in stages to full load and the fuel-air mixture is delivered to the combustion chamber. Combustion begins.

If no flame is formed or the flame dies, restart is initiated automatically. After a total of 90 seconds of fuel delivery without flame formation, the system is switched off until the ignition is switched on again (terminal 15).

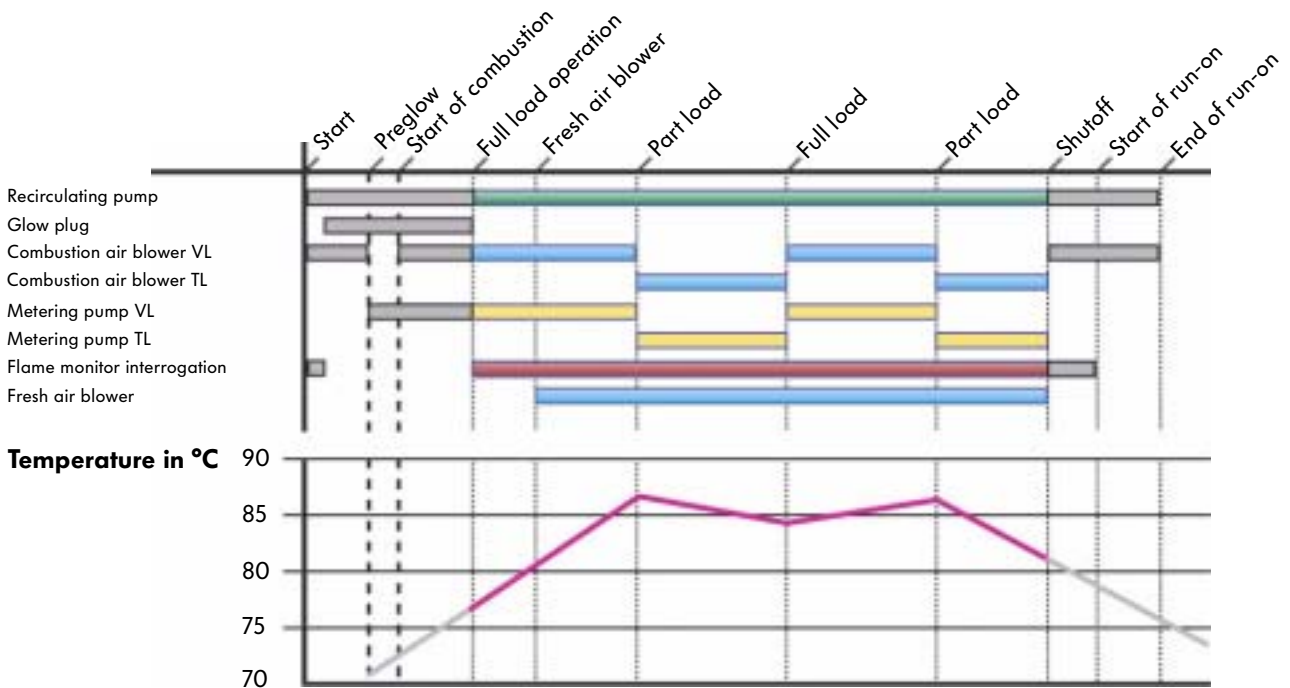


S280_036

Heating phase/regulated phase

When the coolant reaches a temperature of 87 °C, the heater is switched from full load to part load. This reduces the combustion air blower output and the metering pump delivers less fuel. If the coolant temperature drops to approx. 83 °C, full load is activated again.

At a coolant temperature of approx. 89 °C, heating is interrupted. When the coolant temperature drops to approx. 85 °C, heating is initiated once again.



S280_037



Operating phases

Run-on phase

The auxiliary heater is deactivated by:

- switching off the engine,
- switching off the auxiliary heater or
- expiration of the automatic heating duration (max. 60 minutes).

The metering pump is switched off, combustion stops, the combustion air blower and the recirculating pump run-on to cool down and are then switched off automatically.

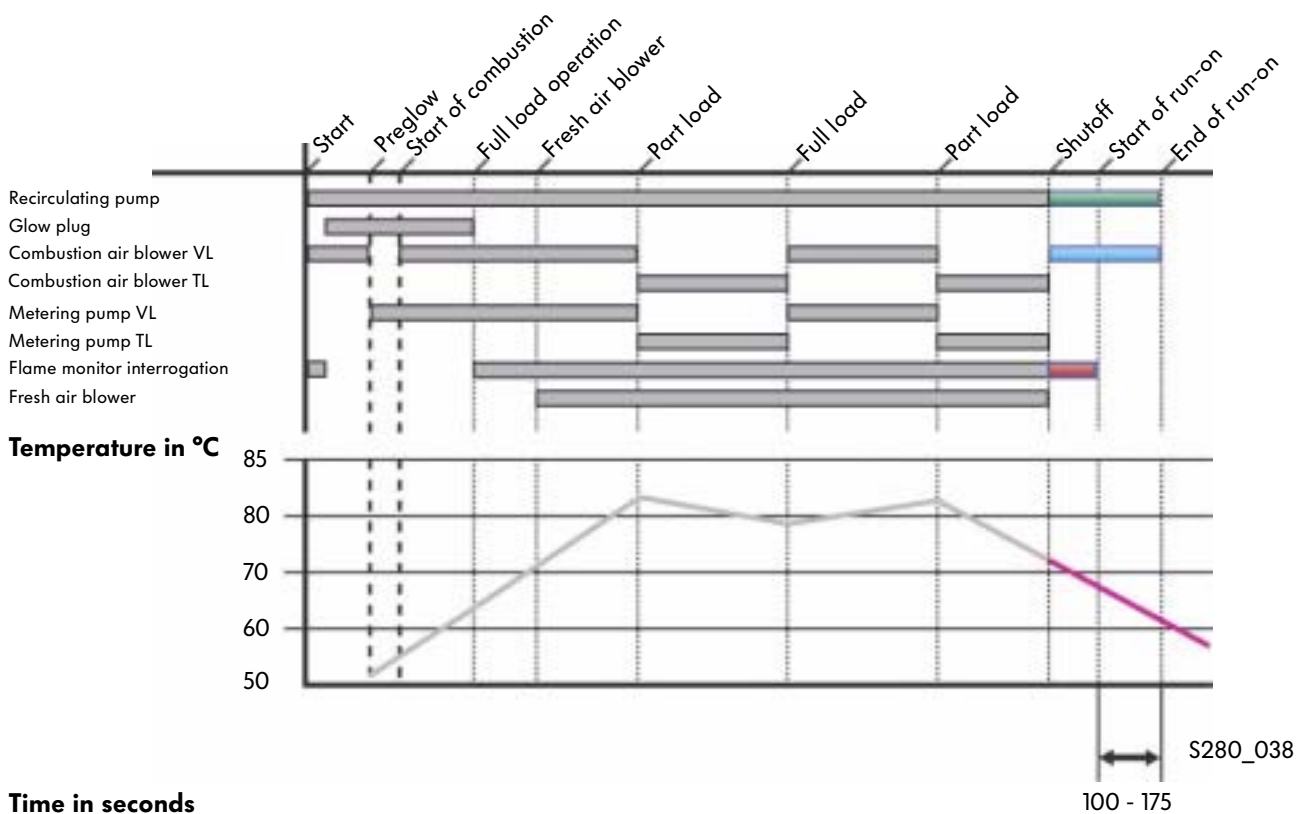
Run-on time depends on the type of heater and can be between 100 and 175 seconds.

The run-on time for petrol-driven heaters is:

- 168 seconds when switched off from full load
- 157 seconds when switched off from part load

The run-on time for diesel-driven heaters is:

- 175 seconds when switched off from full load
 - 100 seconds when switched off from part load
- There may be slight deviations in the given figures depending on the development of the software.



The supplementary heater (diesel engines)

Start phase

When the engine is started, the heater is made ready.

When the coolant temperature is below 60 °C, ambient temperature is below + 5 °C and the control unit has received an engine speed signal, start is initiated.

Heating phase

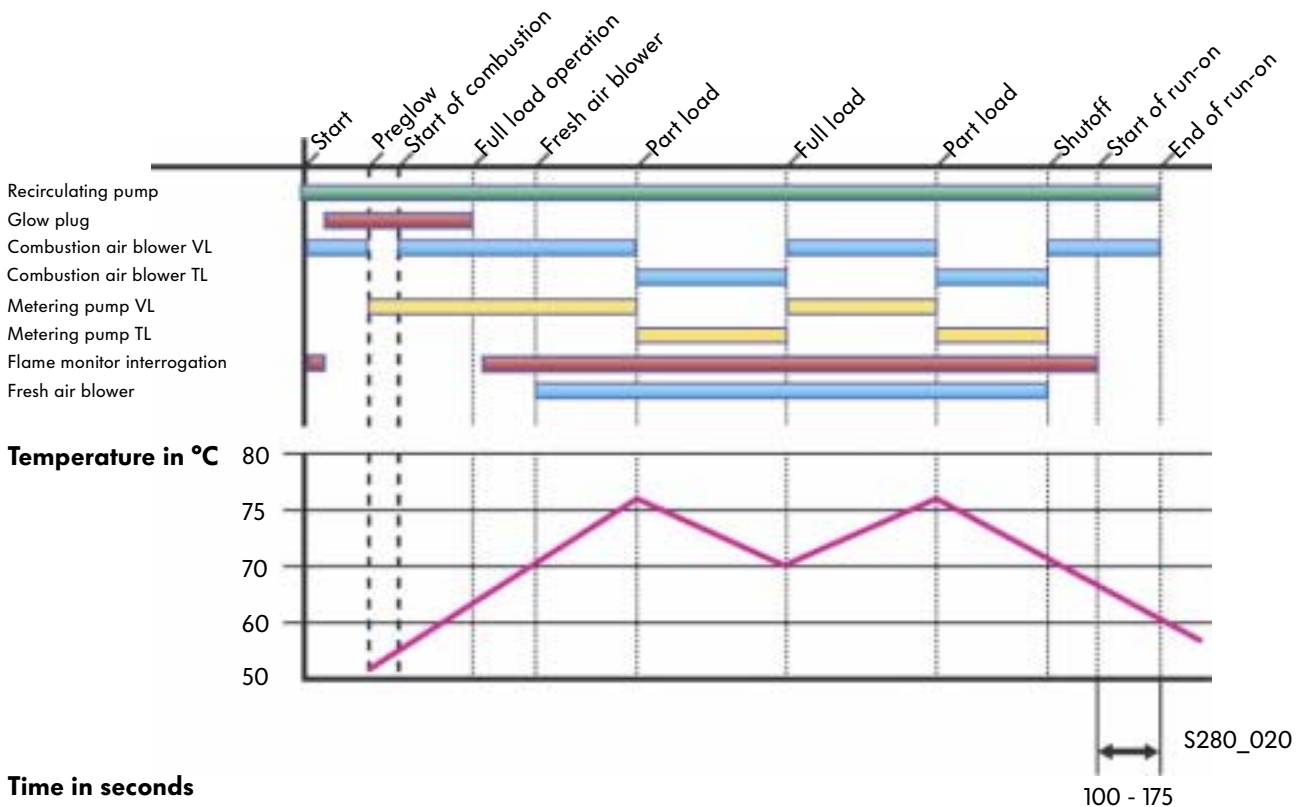
If the coolant reaches 78 °C, operation is interrupted. When the coolant temperature reaches 76 °C, full load operation is switched to part load. The transition from part load to full load comes at 70 °C and to part load at 65 °C.

Run-on phase

When the engine is switched off, the supplementary heater is stopped. Combustion is stopped and run-on begins.

The supplementary heater run-on time is:

- 175 seconds when switched off from full-load
 - 100 seconds when switched off from part-load
- There may be slight deviations in the given figures depending on the software version.



Deactivation

Deactivation conditions

The auxiliary heater and the supplementary heater are switched off for reasons of safety under certain conditions.

Vehicle-specific deactivation

The auxiliary heater is switched off when:

- the tank flap is opened,
- the fuel level is low,
- the onboard electrical system is placed under heavy load by the onboard electrical system control unit,
- an airbag is triggered by an accident
- heater output is sufficient during normal driving.



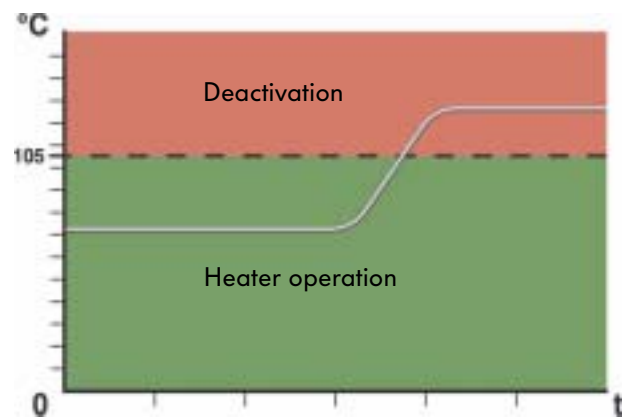
S280_024



Temperature related deactivation

If the coolant temperature rises above 105 °C during heater operation, fuel supply is interrupted.

In this instance, the heater will run-on for approx. 120 seconds. If there is a fault in the combustion air blower, there will be no run-on.



S280_028

Deactivation due to excessive or insufficient voltage

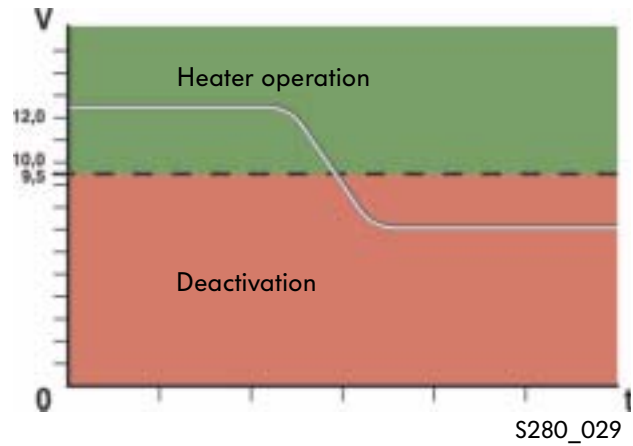
In addition to monitoring of the onboard electrical system voltage by the onboard electrical system control unit, the auxiliary heater control unit also deactivates the heater if excessive or insufficient voltage is detected.

Fixed deactivation due to insufficient voltage

If the battery voltage drops to below 9.5 volts for longer than 6 seconds, the heater is deactivated with a run-on time of 120 seconds.

Deactivation due to excessive voltage

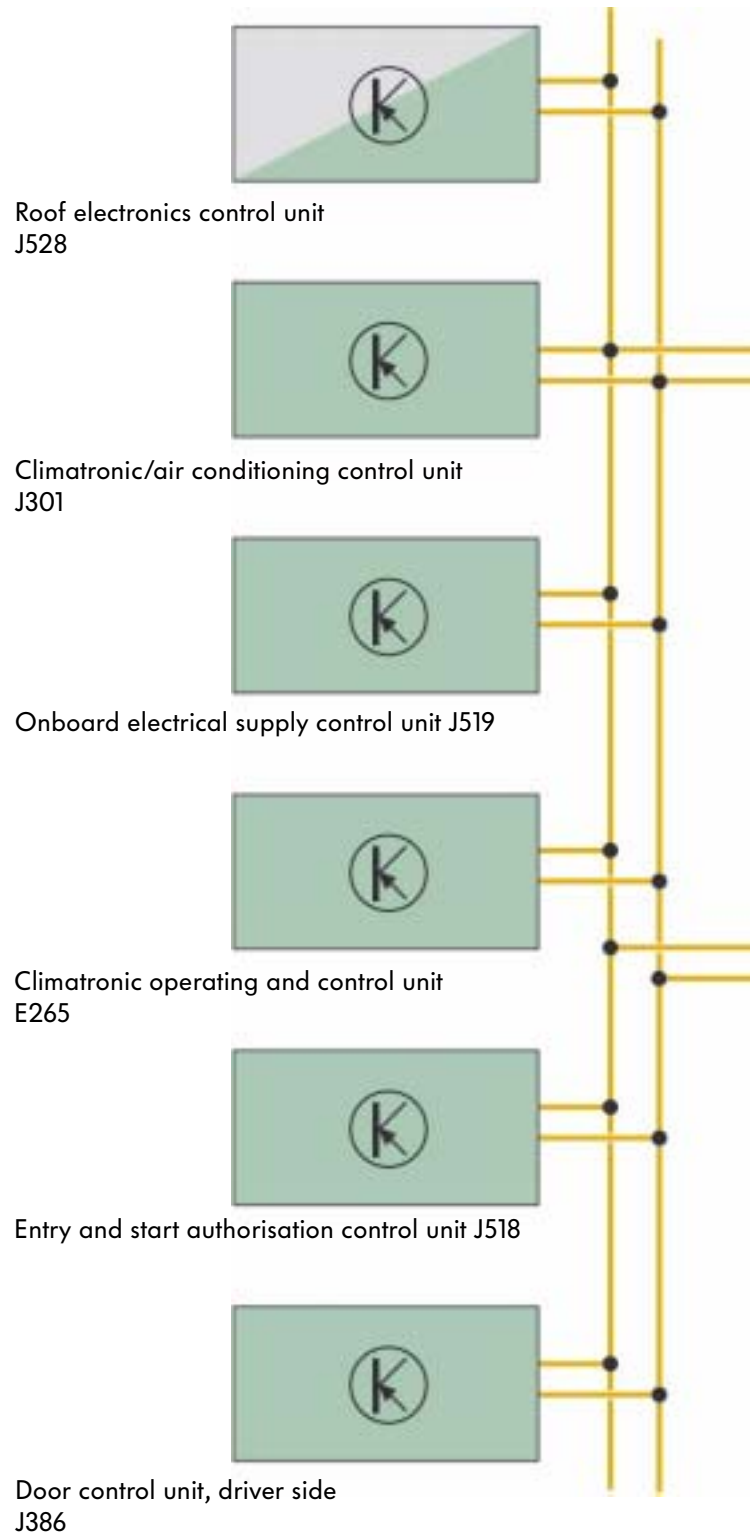
If the battery voltage exceeds 15.5 volts for more than 60 seconds, the auxiliary heater is deactivated.

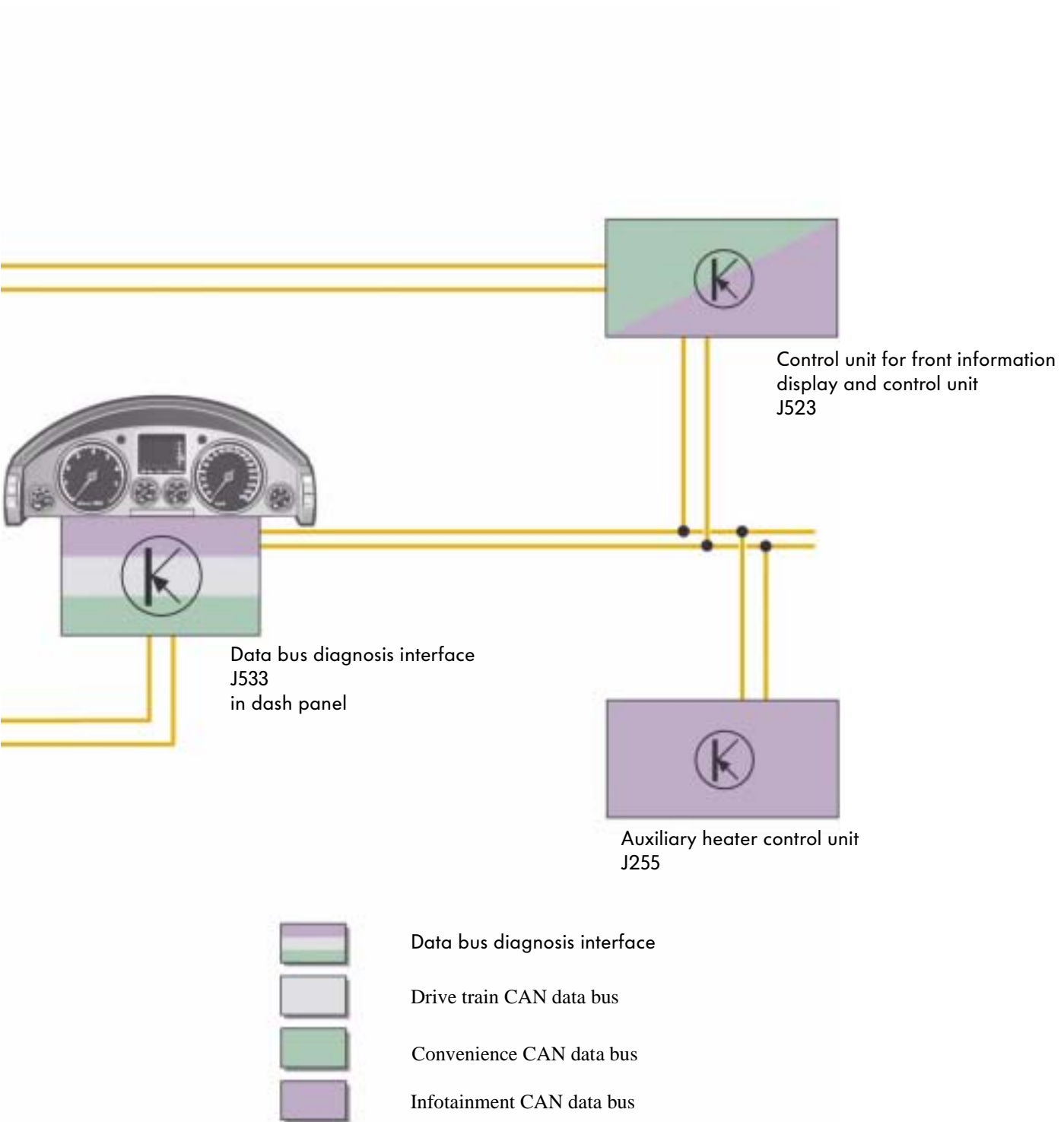


Networking

Communication via CAN data bus

The auxiliary heater control unit is connected with the other control units in the vehicle via the infotainment CAN data bus and the diagnosis data bus interface in the dash panel. All the necessary information can be exchanged with other control units via this data network.





S280_034

Networking

The data bus messages

A) Function	B) Message
Auxiliary heater messages received from remote commands and from modes of operation	Activation via remote control Activation of blower Activation of control LED
Commands and information to auxiliary heater control unit	Activation of auxiliary heater Tank warning on Convenience CAN data bus messages
Terminal information	Ignition on
Auxiliary heater operation	Operating commands e.g. auxiliary ventilation e.g. immediate start
Auxiliary heater operation	Auxiliary heater operating mode Heating duration
Programming of auxiliary heater	Start time
Actuation of auxiliary heater	Auxiliary heater operating mode
Auxiliary heater duration information	Auxiliary heater duration
Heater deactivation	Tank flap opened
Heater deactivation	Onboard electrical system critical battery level
Heater deactivation	Crash impact signal
Status information	Engine speed Ambient temperature Engine type



C) Sender	D) Receiver
Auxiliary heater control unit	Control unit with display unit in dash panel insert Climatronic/air conditioning control unit Roof electronics control unit Entry and start authorisation control unit Onboard electrical supply control unit Control unit for front information display and operating unit Climatronic/air conditioning operating and display unit
Control unit with display unit in dash panel insert	Additional water heater control unit
Control unit with display unit in dash panel insert	Auxiliary coolant heater control unit
Control unit with display unit in dash panel insert	Auxiliary heater control unit Climatronic/air conditioning control unit
Control unit for front information display and operating unit	Control unit with display unit in dash panel insert
Control unit for front information display and operating unit	Control unit with display unit in dash panel insert
Climatronic/air conditioning control unit	Climatronic/air conditioning operating and display unit Control unit with display unit in dash panel insert Control unit for front information display and operating unit
Control unit with display unit in dash panel insert	Climatronic/air conditioning control unit
Door control unit, driver side	Control unit with display unit in dash panel insert
Onboard electrical supply control unit	Control unit with display unit in dash panel insert
Control unit with display unit in dash panel insert on receipt of message from airbag control unit	Auxiliary heater control unit
Control unit with display unit in dash panel insert	Additional coolant heater control unit



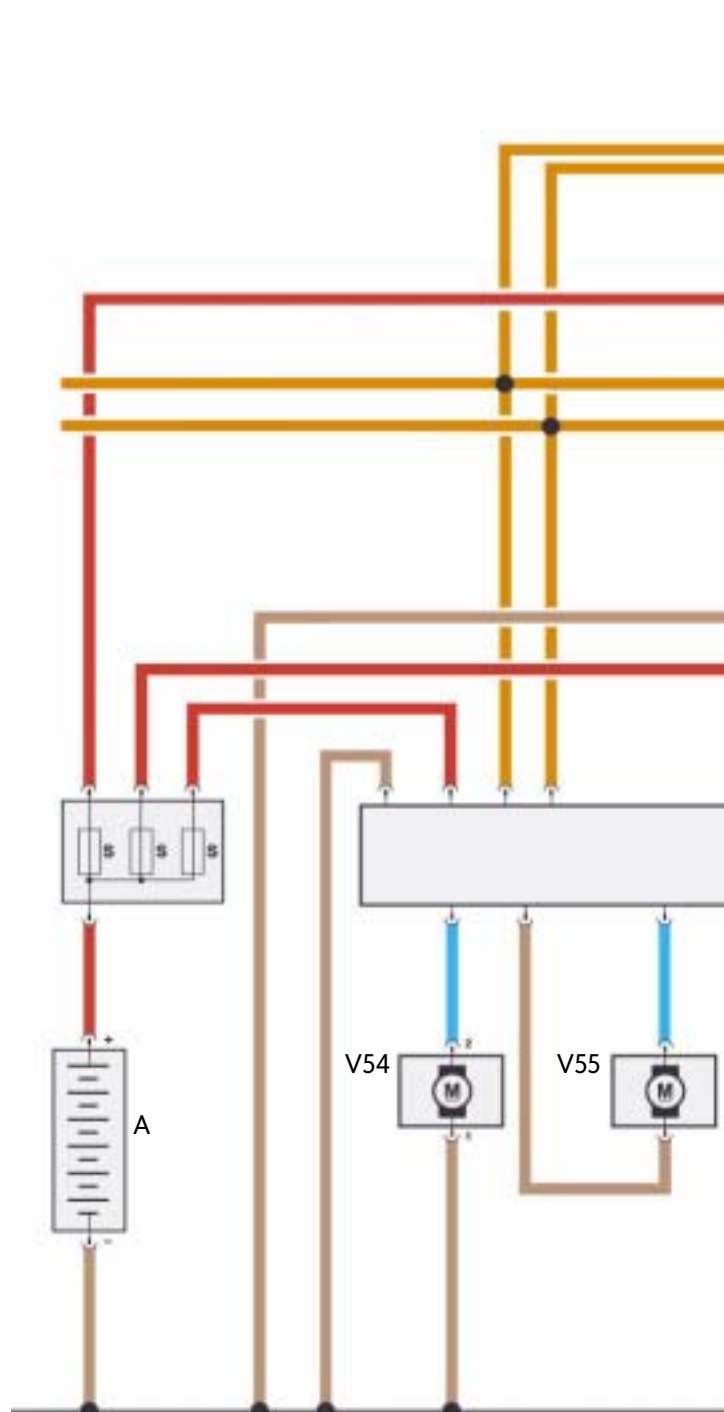
Functional diagram

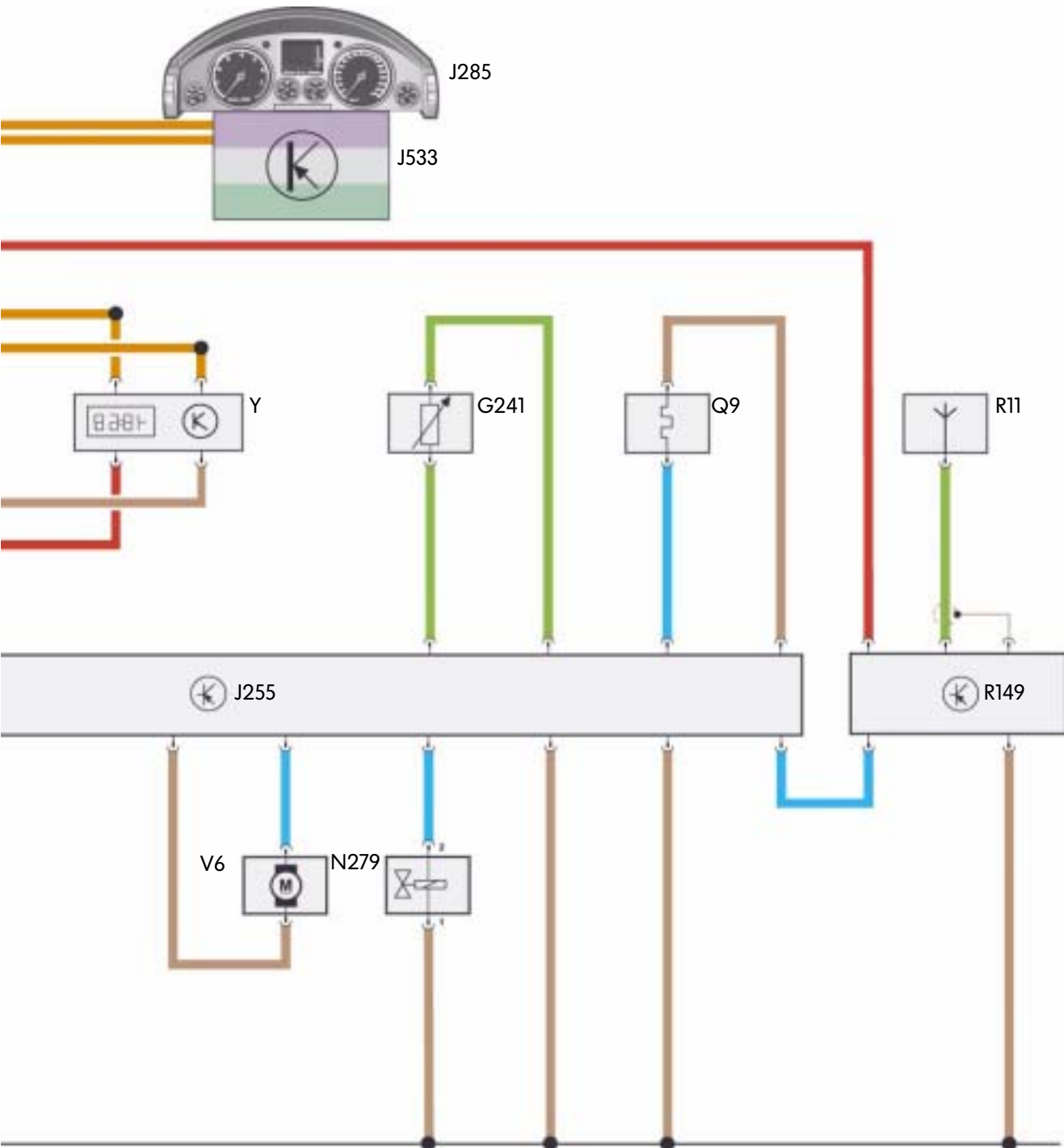
Key

- A Battery
- G241 Coolant temperature sender, heater
- J255 Auxiliary heater control unit on auxiliary heater
- J285 Control unit with display unit in dash panel insert
- J533 Data bus diagnosis interface
- N279 Coolant shutoff valve, heater
- Q9 Heater glow plug Q9 (with flame monitor)
- R11 Aerial
- R149 Auxiliary heater remote receiver, beneath rear shelf
- S Fuse
- V6 Combustion air blower
- V54 Metering pump
- V55 Recirculating pump
- Y Analogue clock



- Signal output
- Earth
- Signal output
- Positive
- Infotainment CAN data bus





S280_043



Diagnosis

Diagnosis can be carried out using the testing and diagnosis system VAS 5051.

Communication is via the diagnosis interface. The exchange of data between the diagnosis system and the diagnosis interface in the dash panel insert is via the COM lead.

Continued exchange of data is via the infotainment CAN data bus.

If the data bus is defective or the data bus diagnosis interface is defective, diagnosis is not possible.

A description of the individual diagnosis functions can be found in the guided fault finding program on the testing and diagnosis system VAS 5051. These are accessed automatically.

The following components are monitored by the diagnosis system:

- Auxiliary heater control unit
- Combustion air blower
- Glow plug
- Metering pump
- Coolant shutoff valve
- Recirculating pump

Additionally, the power supply and data bus communication are checked and any faults are stored in the fault memory.



Testing and diagnosis system VAS 5051





Data bus diagnosis interface



Combustion air blower



Glow plug



Metering pump



Recirculating pump



Shutoff valve



S280_018

Glossary

Diagnosis interface

The diagnosis interface is a virtual control unit in the dash panel insert. It transmits CAN data bus messages from one CAN data bus to the next and also transmits data from the COM lead to the CAN data bus lines

Loose belt

The distance between the seat belt and the upper body (thorax).

The heavier the clothing, the greater the distance between upper body and seat belt. This distance has to be balanced by the belt tensioner in a collision.

Degree of efficiency

The relationship between the energy supplied and energy returned. The chemical energy stored in the fuel is converted partly into mechanical energy and thereby into kinetic energy.

The remaining energy ends up as heat, exhaust gas and radiant energy.





Test yourself

1. The auxiliary heater is activated

- œ a) automatically when the ignition is switched on.
- œ b) by the on/off switch in the driver's door.
- œ c) by the immediate start function in the information display and operating unit.

2. The fixed start time is programmed

- œ a) by the timer preselection in the front information display and operating unit.
- œ b) by the preselection clock in the driver's door.
- œ c) by the analogue clock setting in the dash panel insert.

3. Remote start

- œ a) is initiated by dialing telephone number 0800 89 73 74 23 and giving the start time to the centre.
- œ b) is initiated by pressing the start button on the remote control.
- œ c) is initiated by pressing the open button on the ignition key.

4. When the engine is not running, the auxiliary heater heats

- œ a) the engine.
- œ b) the interior via the pump valve unit and the left and right heat exchangers.
- œ c) the interior via the pump valve unit and the left and right heat exchangers, the luggage compartment and the engine.



5. In the start phase of auxiliary heating

- œ a) the combustion air blower is switched off for 5 seconds so that a rich mixture is created.
- œ b) the metering pump is increased to 150 % delivery so that a rich mixture is created.
- œ c) the combustion air blower delivers more air to create a leaner mixture.

6. The auxiliary heater is switched off if

- œ a) during the start phase there is no independent flame.
- œ b) the coolant temperature rises above 105 °C.
- œ c) the battery voltage is less than 9.5 volts for six seconds.

7. The auxiliary heater control unit

- œ a) communicates with other control units in the vehicle via the drive train CAN data bus.
- œ a) communicates with other control units in the vehicle via the convenience CAN data bus.
- œ c) communicates with other control units in the vehicle via the infotainment CAN data bus and data bus diagnosis interface in the dash panel insert.



Notes





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