

Service.



Self-study programme 280

# The Phaeton

## Auxiliary heater Thermo TOP C and supplementary heater Thermo TOP Z

Design and function



The use of heater units that work independently of the engine is continually rising. They are offered as an accessory for retrofit or as an optional extra by the manufacturer.

The petrol engine Phaeton features an auxiliary heater as an optional extra that heats the interior when the engine is not running.

For diesel engines, the Phaeton is fitted as standard with a supplementary heater that boosts coolant heating when the engine is running.

In this way, the operating temperature of the engine is reached faster and is maintained throughout operation at an equal level.

This self-study programme provides you with an overview of the auxiliary heater and the supplementary heater installed in the Phaeton.



S280\_053

**NEW**



**Important Note**



**This self-study programme explains the design and function of new developments. The contents will not be updated.**

Please refer to the relevant service literature for current inspection, adjustment and repair instructions.

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# Introduction



## The auxiliary heater

The auxiliary heater is a wise choice as an accessory. The heater and ventilation function provides a comfortable environment in the interior, which is available as soon as you climb into the vehicle.

Frosted or steamed up windows inhibit all-round view. Therefore, they are a considerable risk in traffic situations.

Heavy winter clothing, when worn in the vehicle, results in loose seat belts as they are no longer comfortably taut against the body. The optimal efficiency of the seat belt is markedly impaired. A further disadvantage is that unsuitable clothing restricts freedom and thereby also the ability to react quickly to given situations.



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By heating up the interior before the journey is started, the windows are cleared. Good all-round view is guaranteed.

Less restrictive clothing in a preheated vehicle increases the efficiency of seat belt protection and reaction time of the wearer.



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Further, use of an auxiliary heater is financially viable. In many regions, the temperature on 100 days of the year is less than +5 °C, which equals a third of a year of operation.

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## The supplementary heater

The diesel engines in the Phaeton feature a heater that works to boost heat.

When the engine is started, the coolant is heated additionally by the supplementary heater. This helps diesel engines to make use of their good efficiency and reach their operating temperature in a short space of time.

The heat generated from the combustion process is an unavoidable side-effect. The energy stored within is converted partly into heat instead of power. This has the effect of reducing the degree of efficiency.

Direct injection diesel engines reach a high level of efficiency thanks to their optimised combustion process. The use of a supplementary heater supports the high level of efficiency in the engine by heating of the coolant. In addition, the passenger compartment is heated comfortably.



# Operation

## Activation

The auxiliary heater can be operated in a number of different ways:

- Immediate start is carried out via the front information display and operating unit, in the sub-menu of the air conditioning system.
- Programming a fixed start time is done via a timer in the same sub-menu.
- Additionally, the auxiliary heater can be started using a remote control.

### Immediate start

By pressing the auxiliary heater function button, the sub-menu can be accessed for auxiliary heater control.

The heater button allows manual activation and deactivation of the auxiliary heater.

### Front information display and operating unit

Heater button for immediate start



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## Timer preselection

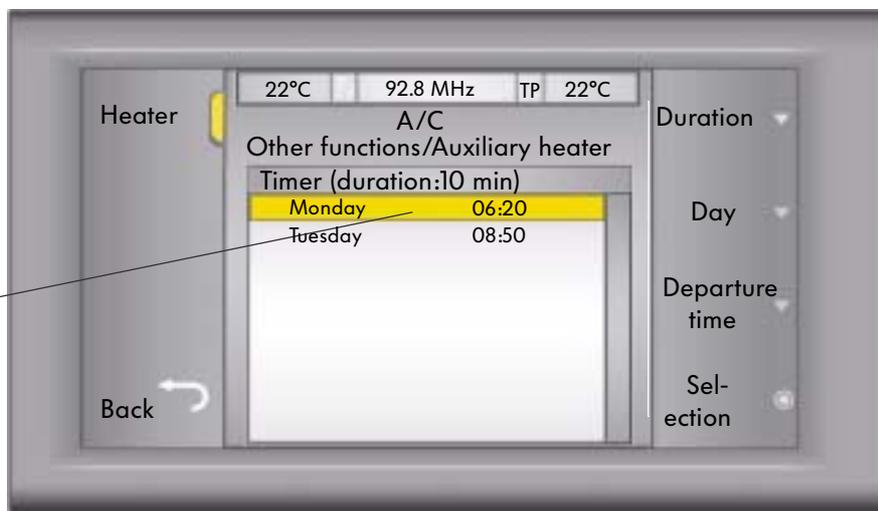
The start time for the heater can be programmed in the sub-menu. To do this, the weekday, the start time and the desired duration should be entered using the operating elements.

When the weekday and time have been reached, auxiliary heater operation will begin. In addition, the weekday will jump automatically to the next day.



### Display: Timer preselection

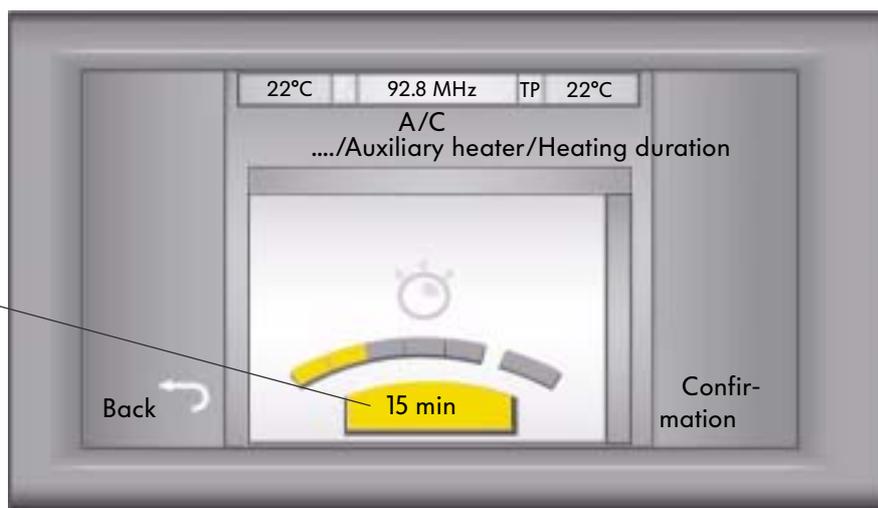
Display:  
Weekday,  
time



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### Display: Set duration

Display:  
Duration



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When the auxiliary heater is activated at temperatures above +22 °C, auxiliary ventilation is activated automatically.

# Operation

## Remote start

The auxiliary heater features an additional remote control, which is not integrated in the vehicle key.

With this remote control, the auxiliary heater is switched on and off remotely.

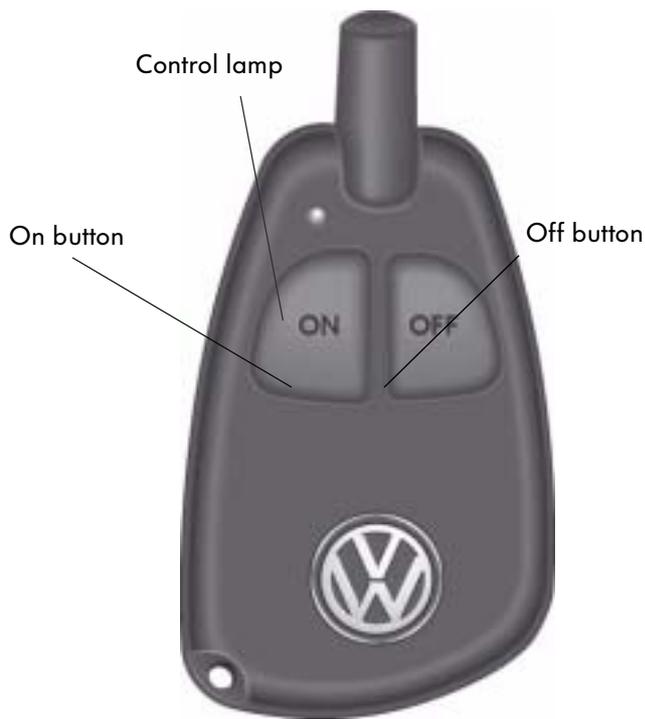
The on button serves to start the heater and the off button is used to switch it off.

For power supply of the remote control, a battery is necessary.

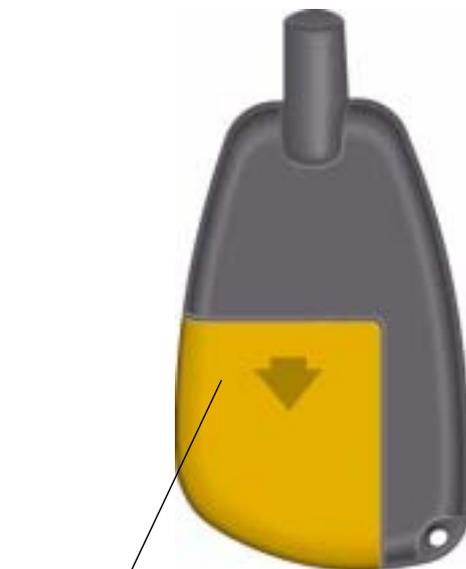
The range of the remote control in open areas is approx. 600 m.

The control lamp of the remote control lights up green when the auxiliary heater is switched on, and red when it is switched off.

## Remote control



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Opening for battery replacement

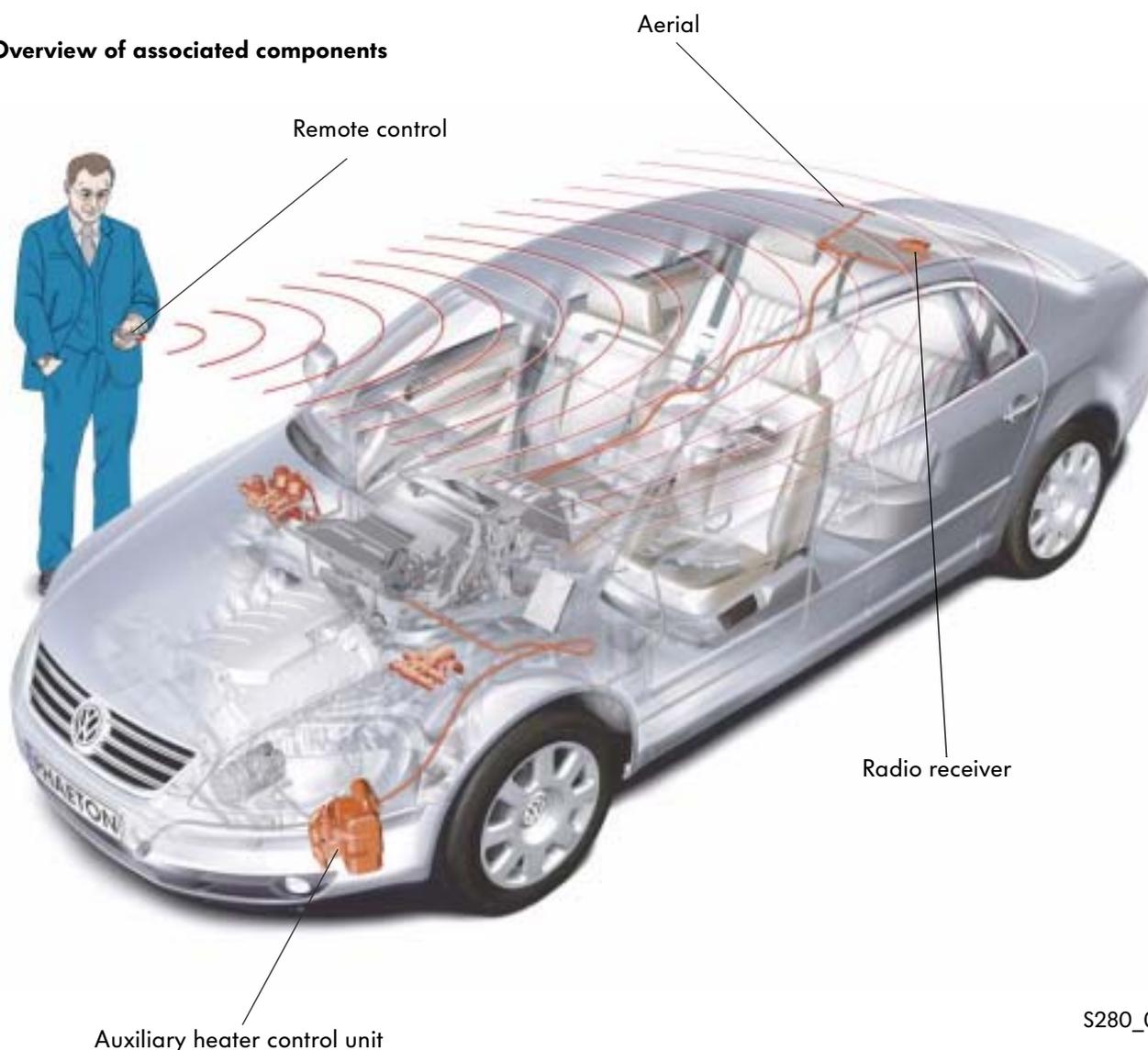
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The radio signal from the remote control is picked up by an aerial, which is installed in the upper area of the rear window, and transmitted to a receiver located beneath the rear shelf.

The signal is sent to the auxiliary heater control unit (J255) by pulse width modulated transmission along a special data lead.



### Overview of associated components



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The remote control must be coded to the radio receiver. A maximum of two remote controls can be coded. The work procedure necessary is described in the electronic service information system (ELSA).

# Overview

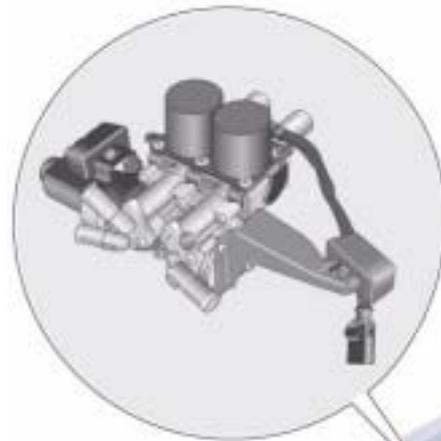
## Fitting locations

The components necessary for operation of the auxiliary heater or the supplementary heater are installed in the vehicle decentrally.

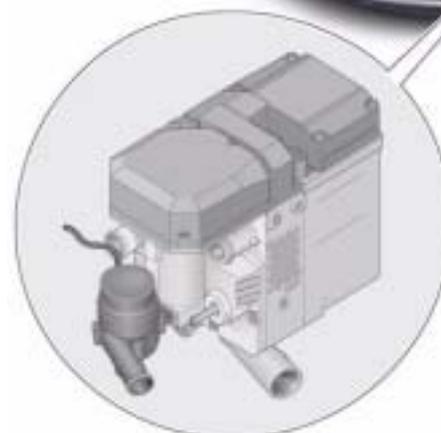


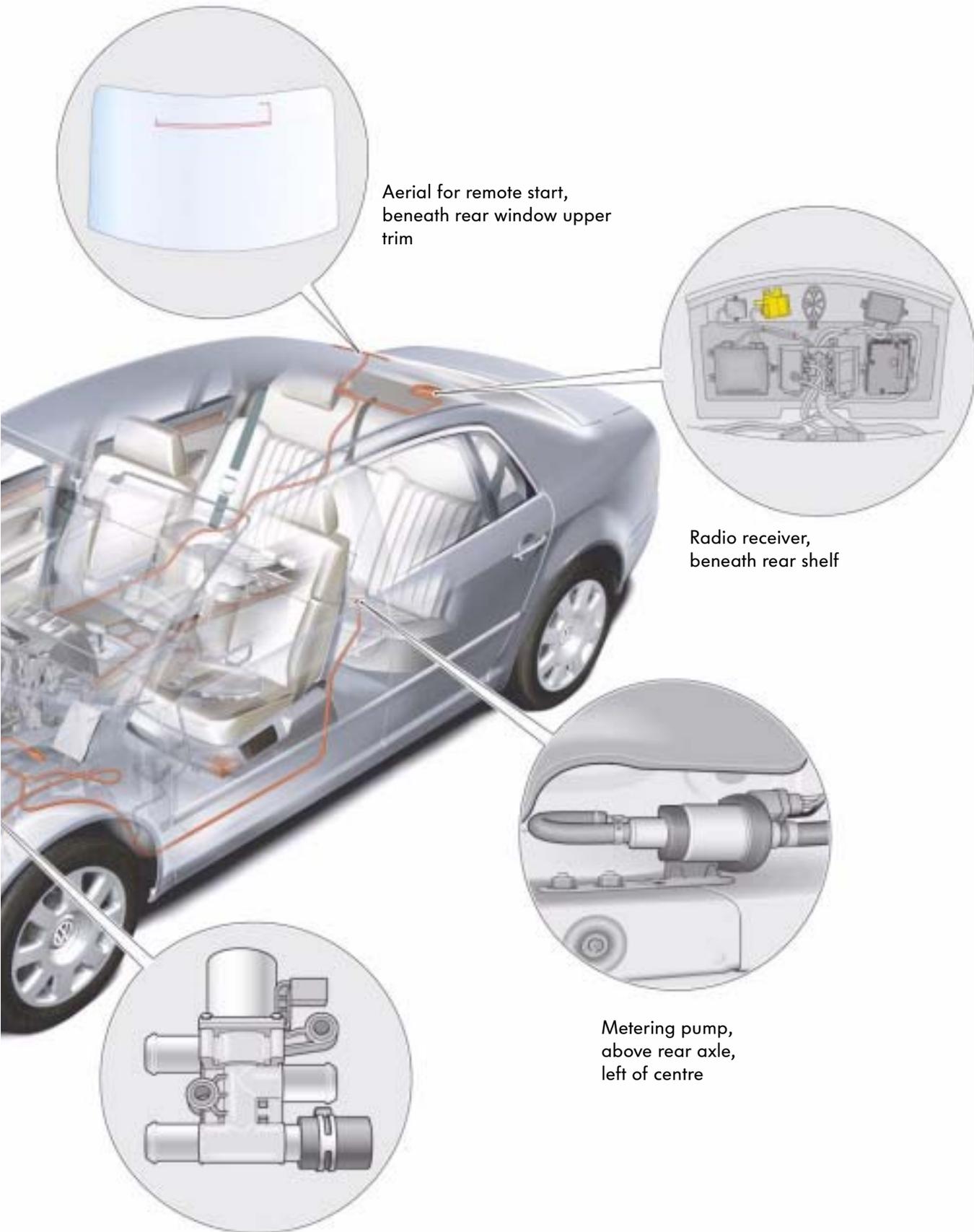
### Overview of fitting locations

Pump valve unit,  
front right in vicinity of plenum  
chamber



Auxiliary/supplementary heater  
with control unit,  
front left beneath wing





Aerial for remote start,  
beneath rear window upper  
trim

Radio receiver,  
beneath rear shelf

Metering pump,  
above rear axle,  
left of centre

Coolant shutoff valve,  
on left in engine compartment



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# Construction

## The components

The auxiliary heater and the supplementary heater consist of:

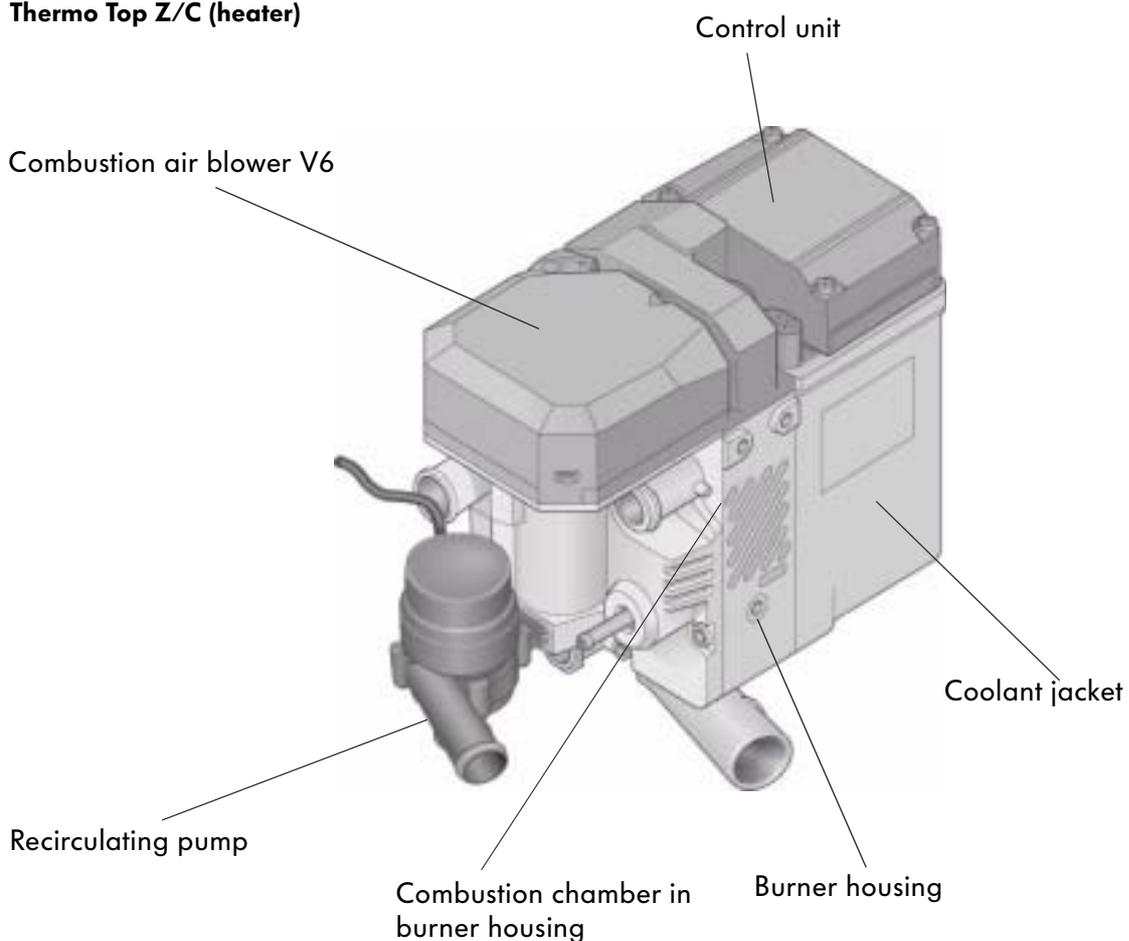
- recirculating pump V55,
- combustion air blower V6,
- control unit J255,
- burner housing,
- combustion chamber with flame pipe and glow plug Q9 (with flame monitor) in burner housing,
- coolant jacket.

Additional components are:

- metering pump V54 and
- coolant shutoff valve N279.



### Thermo Top Z/C (heater)



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## The recirculating pump V55

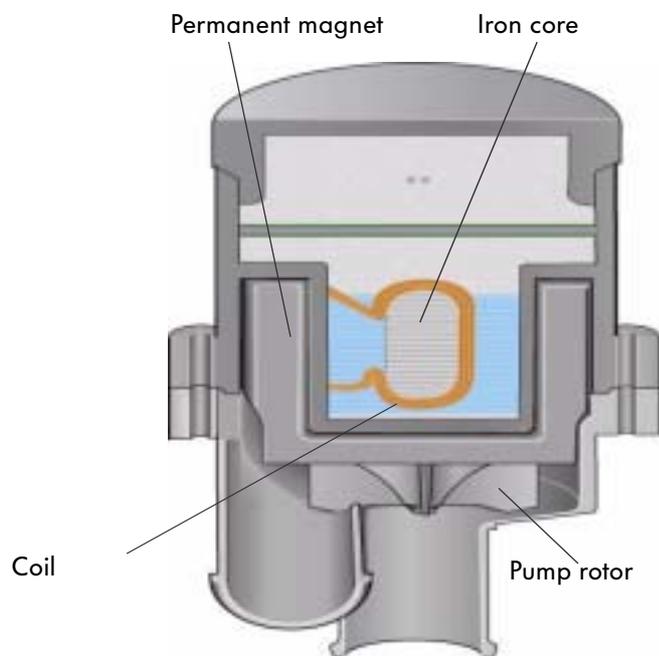
When the engine is switched off, coolant is circulated by a recirculating pump. This is actuated electrically by auxiliary heater control unit J255.

### Recirculating pump



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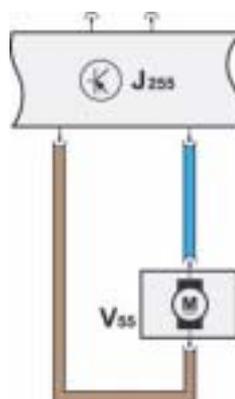
### Cross section



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### Actuation

Actuation is by the auxiliary heater control unit.



S280\_044



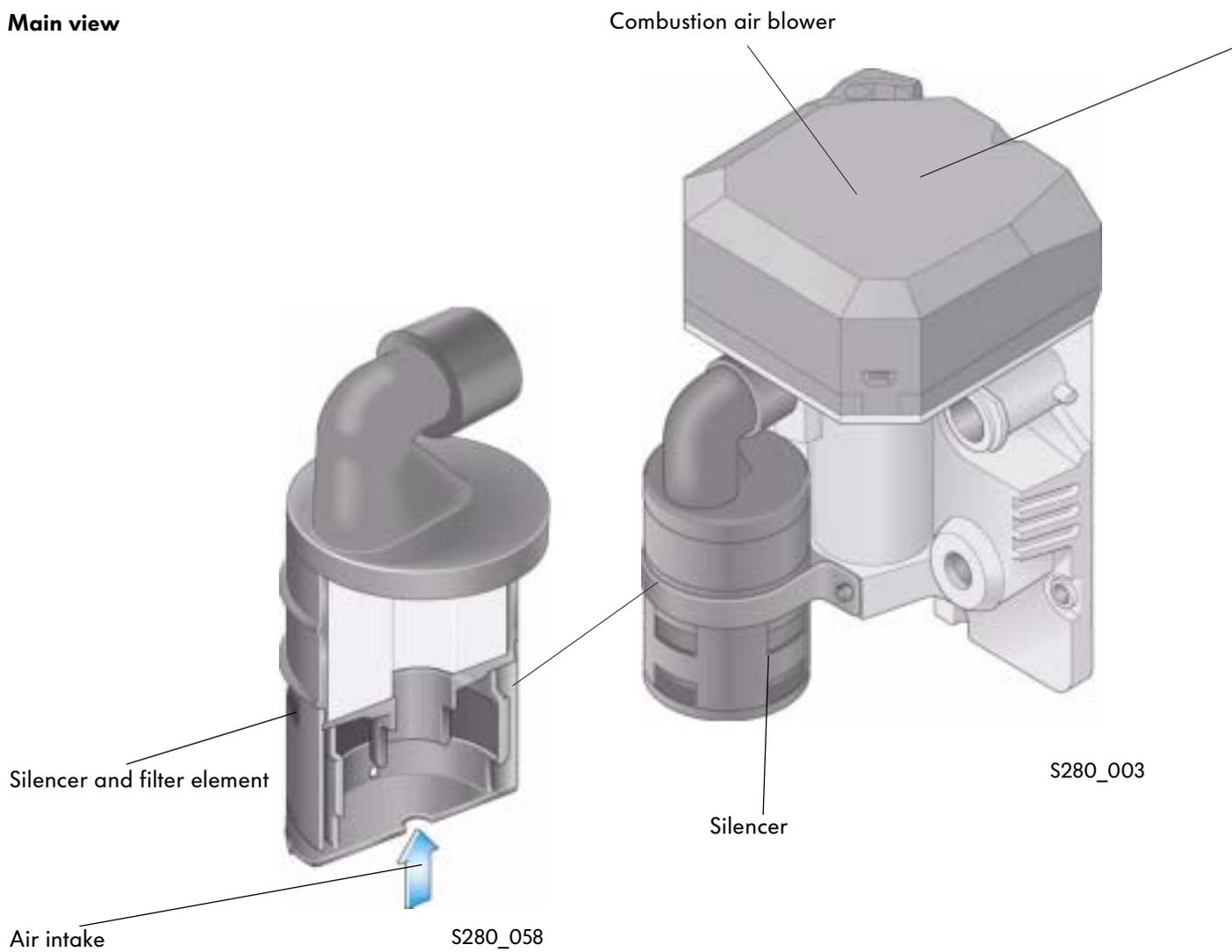
# Construction

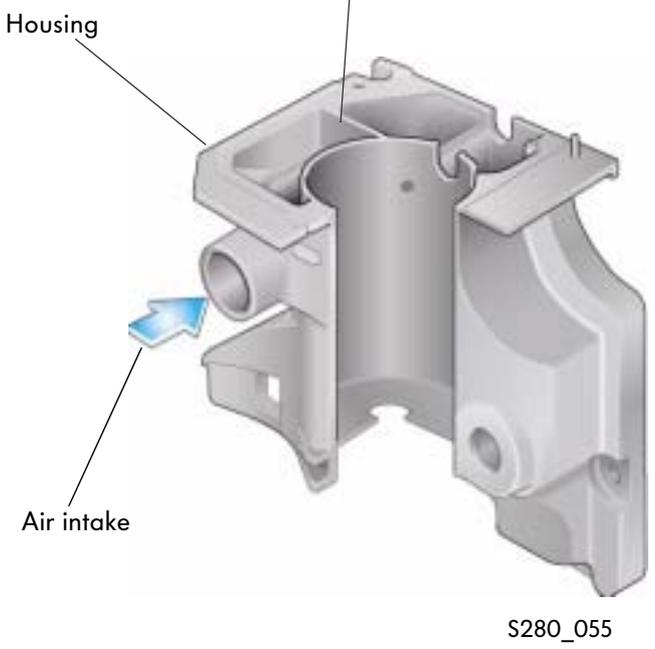
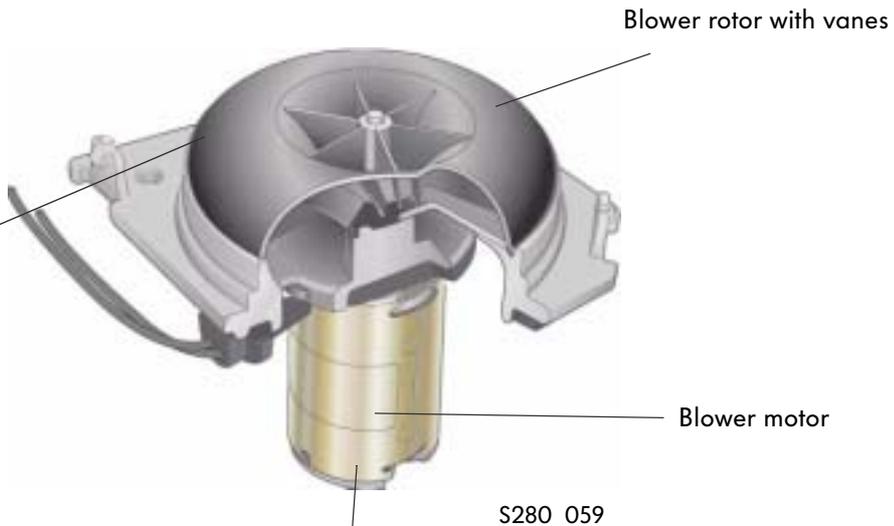
## The combustion air blower V6

The air required for combustion is drawn in via an air intake pipe with silencer by the combustion air blower, then via the air channel to the fuel evaporator (fleece) and further to the combustion chamber.



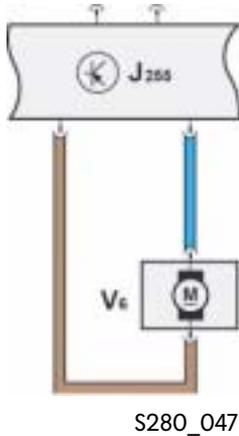
**Main view**





**Actuation**

The combustion air blower is supplied with voltage direct from the control unit via a two pin connector.



# Construction

## The auxiliary heater control unit J255

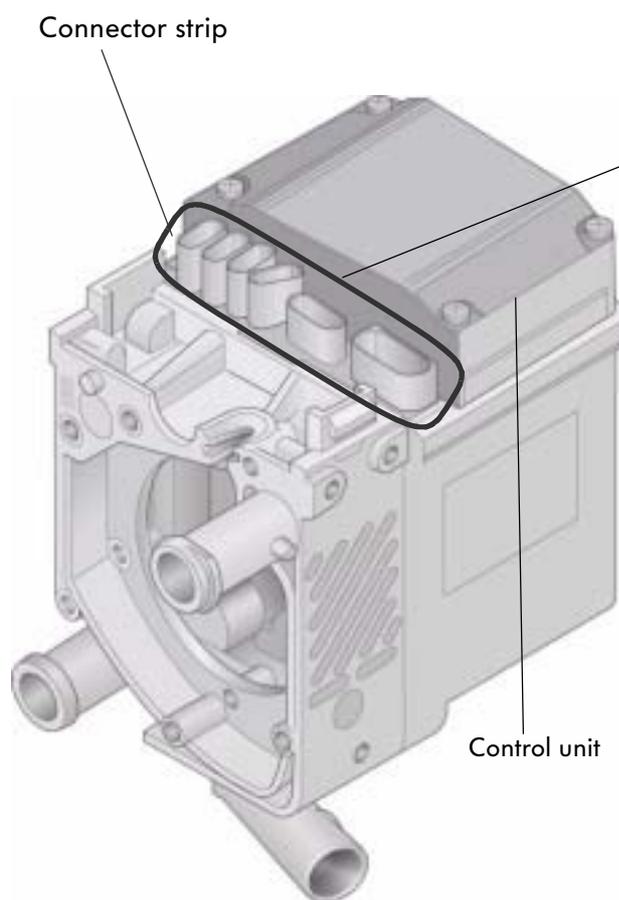
As primary control unit, the control unit guarantees the functional sequence and monitor heater operation.

Connection to the vehicle onboard electrical system is via a connector strip.

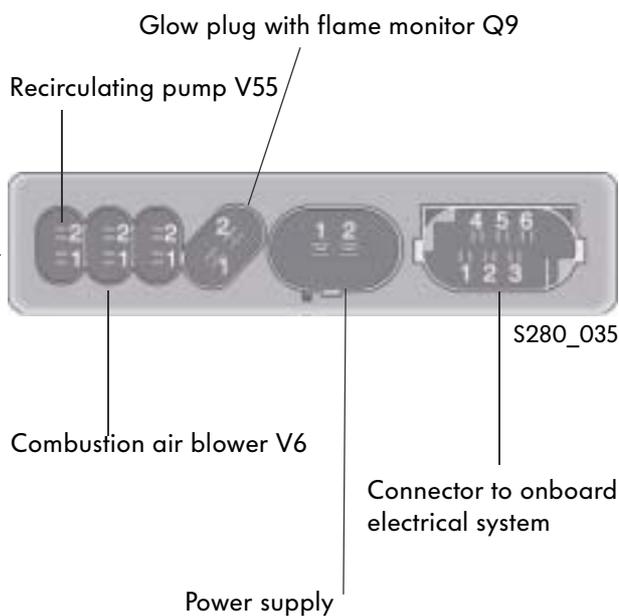
The supplementary heater and the auxiliary heater differ in control unit codes and connection to the coolant circuit. In addition, the auxiliary heater has a remote start function and a coolant shutoff valve.



**Main view**



S280\_004



### Temperature monitoring

Coolant temperature is monitored in the heater and heater operation is regulated via the temperature sender G241. At coolant temperatures above 125 °C, the heater is shut off and locked.

To unlock, follow the instructions on the diagnosis, testing and information system VAS 5051 and the electronic service information system (ELSA).

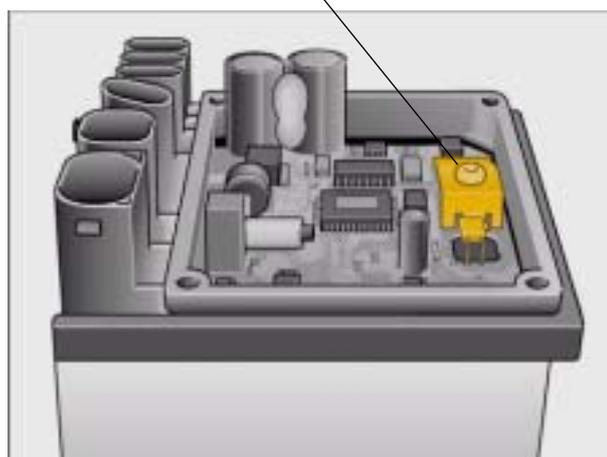
### Control unit opened



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Temperature sender



S280\_065

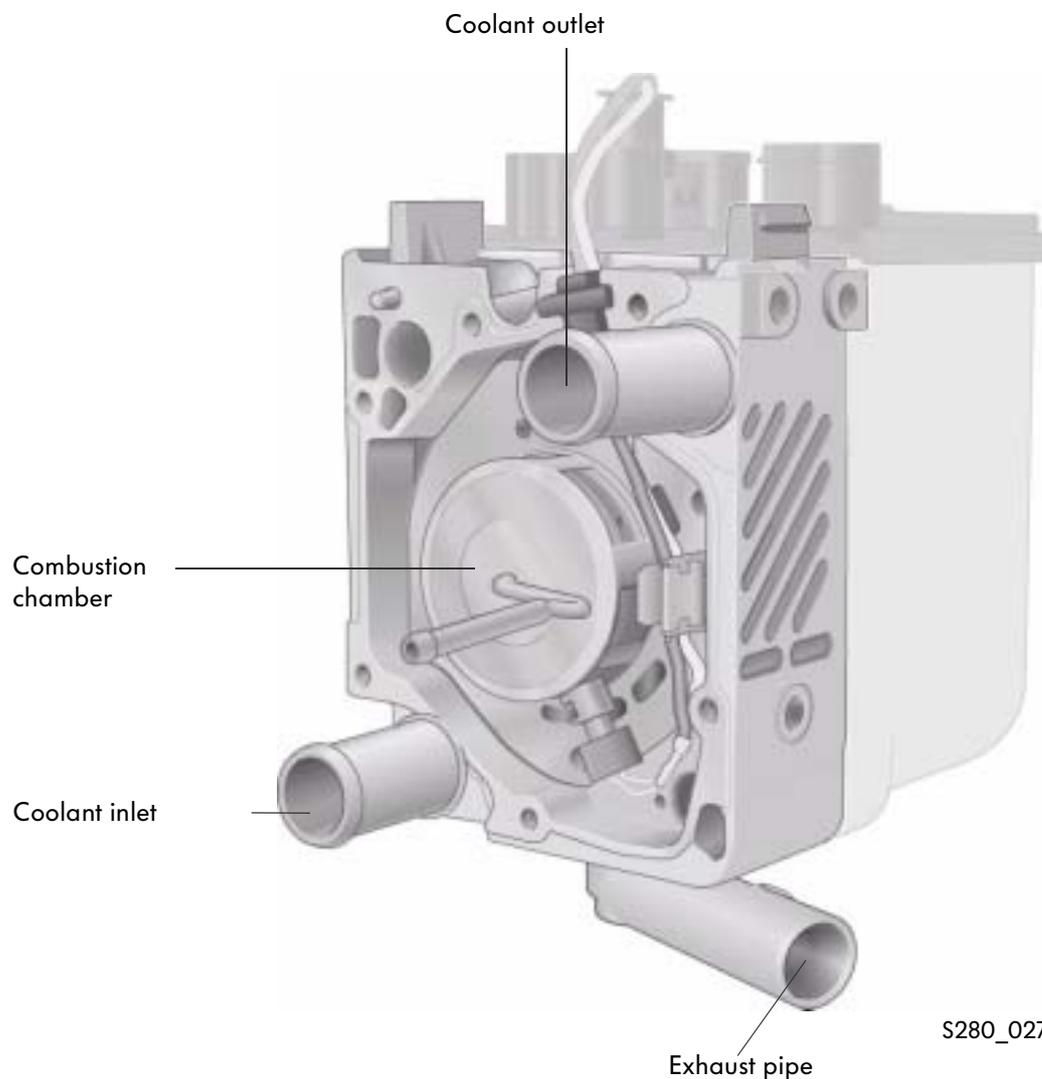
# Construction

## The burner housing

Located on the burner housing are:

- the coolant outlet,
- the exhaust pipe,
- the coolant inlet and
- the combustion chamber.

### Burner housing



Further, the burner housing houses the combustion chamber and forms a unit with the coolant jacket and the control unit.

## The combustion chamber with flame pipe and heater glow plug Q9 (with flame monitor)

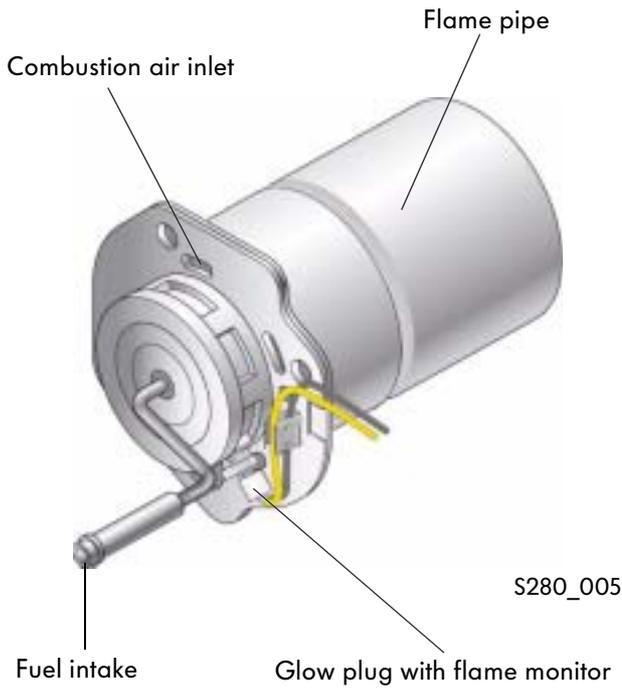
Formation of the fuel-air mixture takes place in the combustion chamber. This mixture is then burnt in the flame pipe.

The glow plug with flame monitor can be found in the combustion chamber. This ignites the fuel-air mixture initially. During the heating stage, the glowing walls of the combustion chamber ignite the fuel-air mixture.

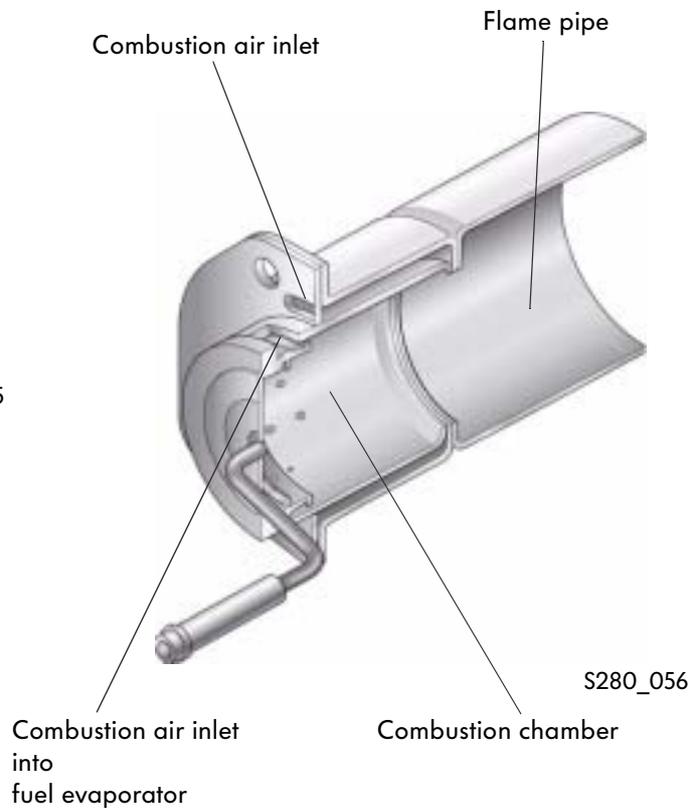
The glow plug is designed as an electrical resistor and features a flame monitor. It monitors the temperature of the flame during the whole phase of heating.



### Combustion chamber



### Combustion chamber cross section



# Construction

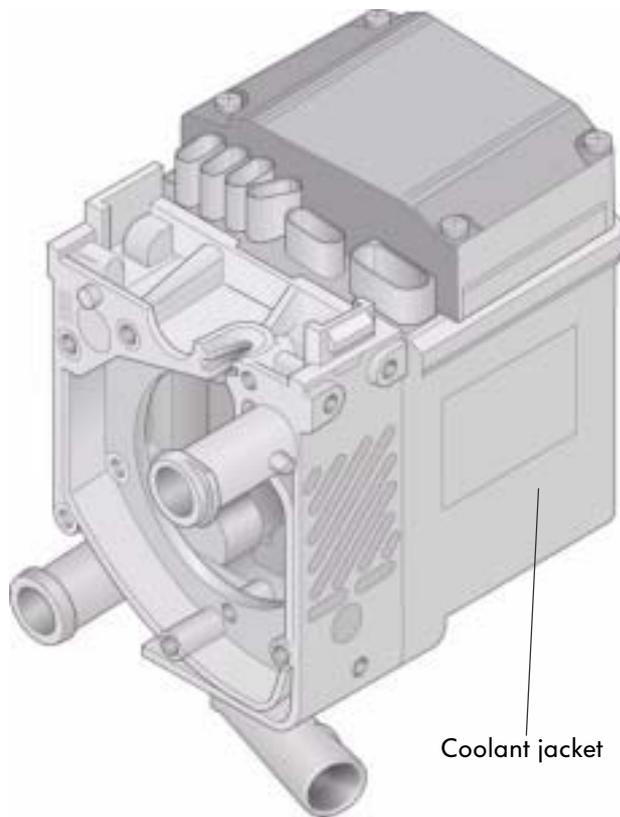
The coolant jacket.

The heat generated from combustion is conveyed to the coolant via the coolant jacket.

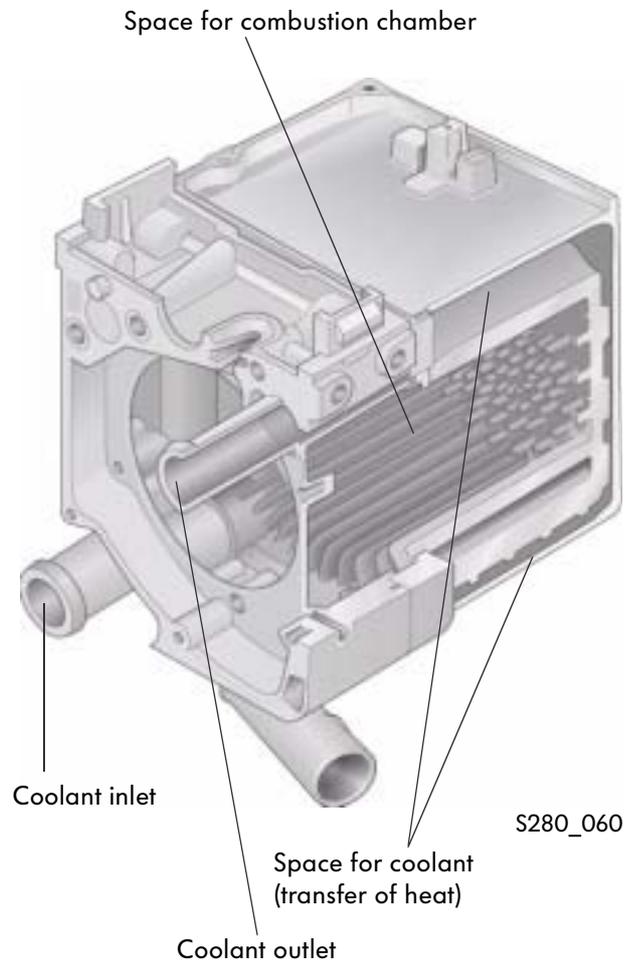
Coolant enters the housing via the coolant inlet of the coolant jacket (heat transmitter). The necessary heat is then drawn for heating. Coolant leaves the housing via the coolant outlet.



Main view



Coolant jacket cross section

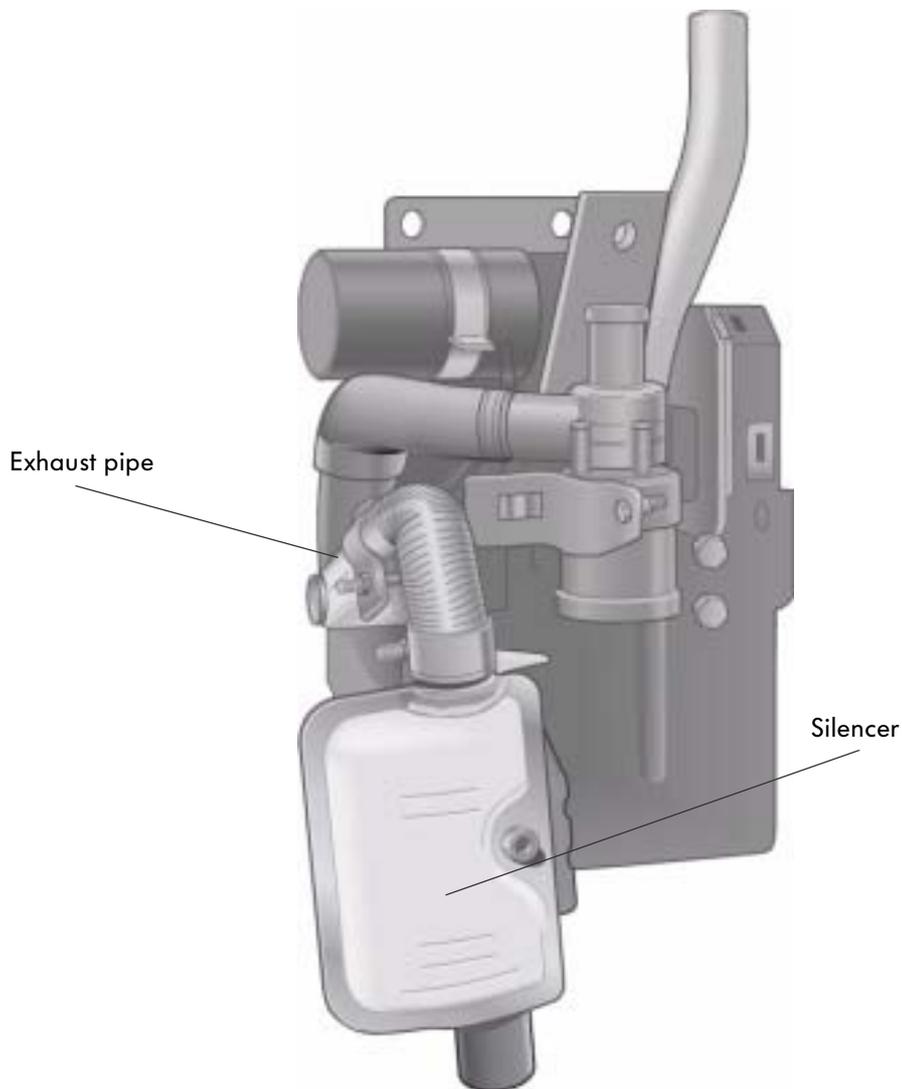


## The exhaust system

The heater features its own exhaust system, which consists of an exhaust pipe and silencer. The exhaust system channels the exhaust gas generated from heater combustion to the outside independently of the vehicle exhaust system.

In order to guarantee safe operation of the heater, the prescribed length of the exhaust system should not be altered.

The length is set to balance the combustion vibrations of the heater.



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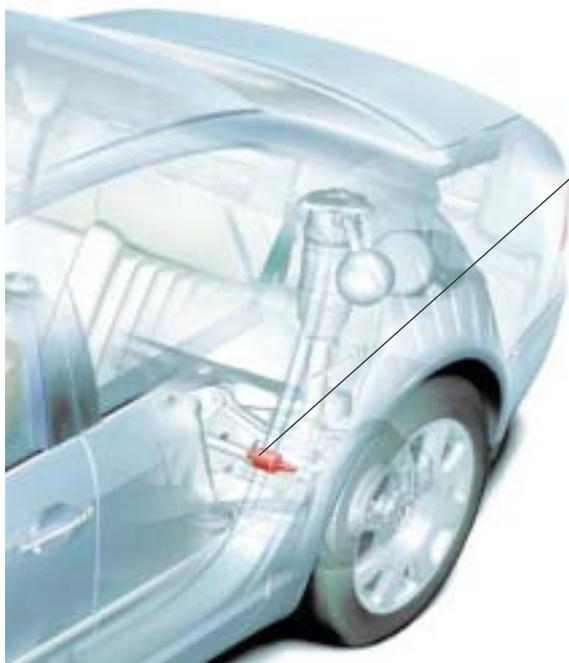


# Construction

## The metering pump V54

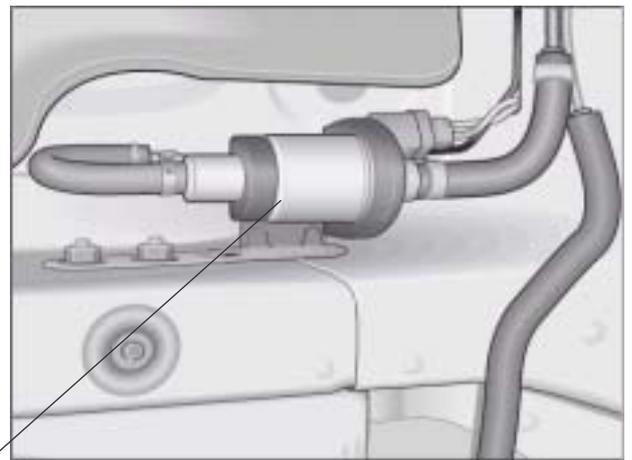
Supply of fuel from the fuel tank of the vehicle to the heater is by metering pump. The pump is designed as a combined supply, metering and shutoff system. This means that fuel is metered during operation and fuel supply is blocked when the heater is switched off.

### Fitting location



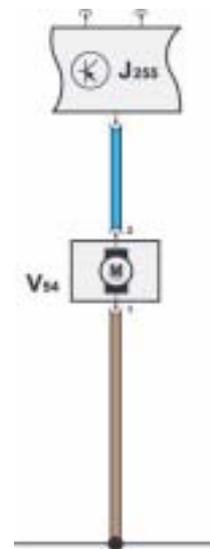
S280\_063

The metering pump can be found above the rear axle. To remove the pump, the rear axle has to be lowered. In order to ensure correct ventilation of the pump, the prescribed fitting location must not be changed.



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### Actuation



The metering pump is pulse-actuated via the control unit based on the required heater output.

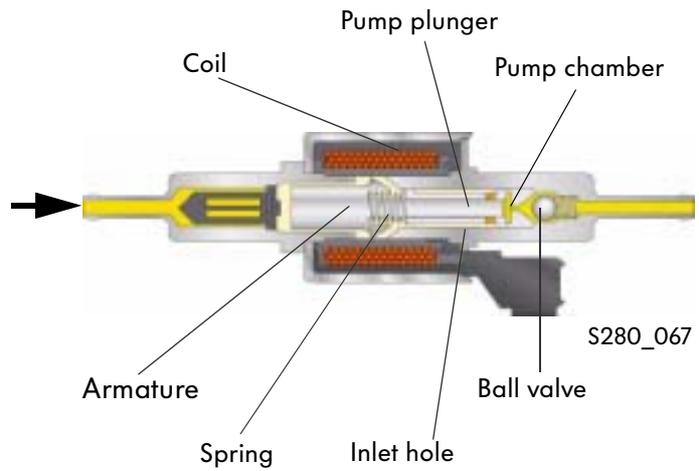
### Functional description

The metering pump is of the plunger type, in which the armature is attached permanently to the pump plunger.

### Supply of fuel

The metering pump is filled with fuel when there is no voltage.

When the coil is energised, the armature pushes the pump plunger against the spring. The pump plunger lifts up the ball valve and delivers fuel from the pump chamber. At the same time, the supply hole to the pump chamber is closed.

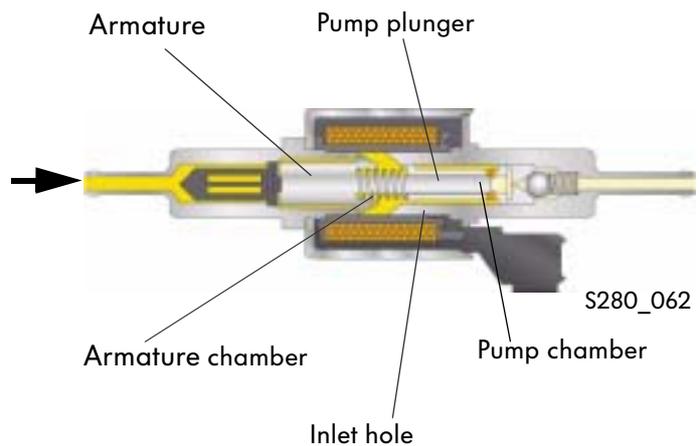


### Fuel suction

During this period, fuel flows in the armature chamber. When the coil is not energised, spring pressure forces the armature and the pump plunger back.

The resulting vacuum draws fuel into the pump chamber via the opened inlet holes.

This kind of operation allows a high level of metering accuracy, high durability and low noise generation.



An animated view of the function can be found on the internet at "[www.thomas-magnete.com](http://www.thomas-magnete.com)"

# Construction

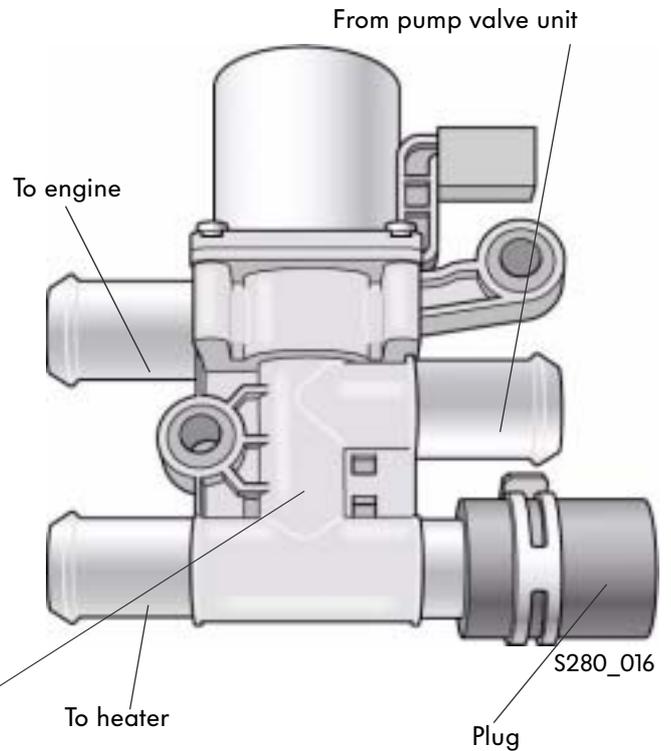
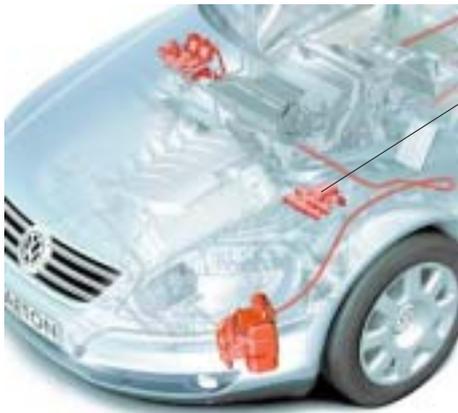
## Coolant shutoff valve N279

Only the auxiliary heater features a coolant shutoff valve. When the auxiliary heater is in operation, engine coolant circulation is separated from the heat exchangers to the interior. Separation is via the coolant shutoff valve.



### Fitting location

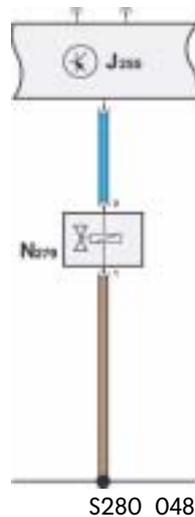
The coolant shutoff valve can be found on the left in the engine compartment.



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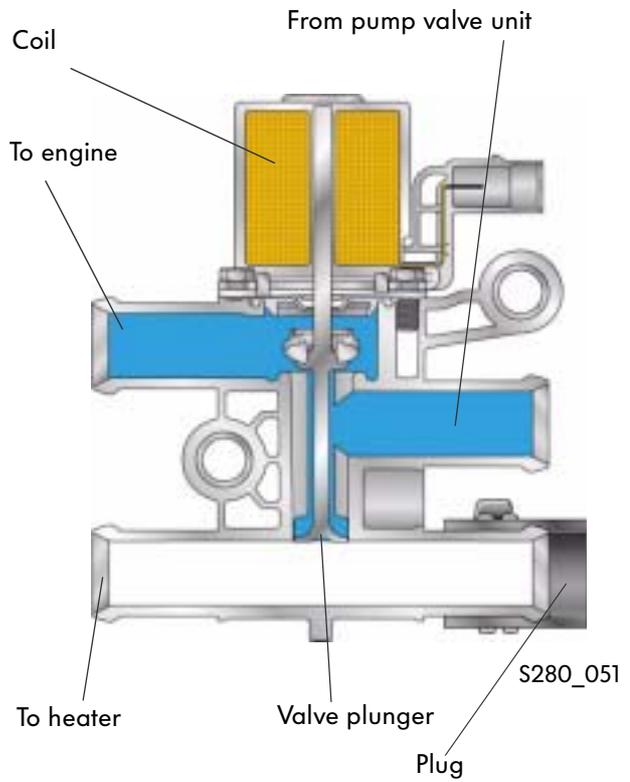
### Actuation

The auxiliary heater control unit actuates the valve directly.



**Normal operation**

When there is no power, the coolant shutoff valve connects the coolant circuit between the pump valve unit and engine circuit.



**Heater operation**

The shutoff valve is actuated and the pump valve unit is connected with the auxiliary heater. In this way, the interior of the vehicle is preheated and not the engine.

