FTD-ANL-SBT2003-640103006_B3 FTD-ANL-SBT2003-640103006_B3 - Electric auxiliary heater: E60, E61, E63, E64 - V.1, VIN: XXXXXXX

ISTA system version	**4.07.31.21115**	Data version	**R4.07.31**	Programming data	**-**
VIN	**XXXXXXX**	Vehicle	**5'/E60/SEDAN/520d/N47/AUTO/ECE/LL/2006/05**		
Int.lev.works	**-**	Int.lev.(cur.)	**-**	Int.lev.(tar.)	**-**
Mileage	**-**				

Electric auxiliary heater: E60, E61, E63, E64

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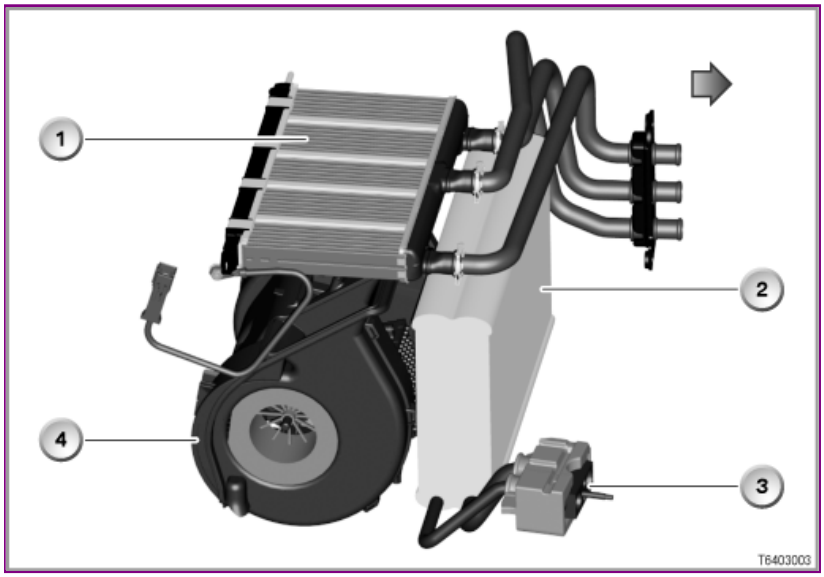
Installation location

The electric auxiliary heater is part of the heating system heat exchanger in the heating/air-conditioning system on vehicles with diesel engine. The heating system heat exchanger integrated into the heating/air-conditioning system, located above the blower and perpendicular to the evaporator.



Item	Description	Item	Description
1	Heating system heat exchanger with integrated electric auxiliary heater	2	Evaporator
3	Expansion valve	4	Blower
The arrow shows the direction of travel.			

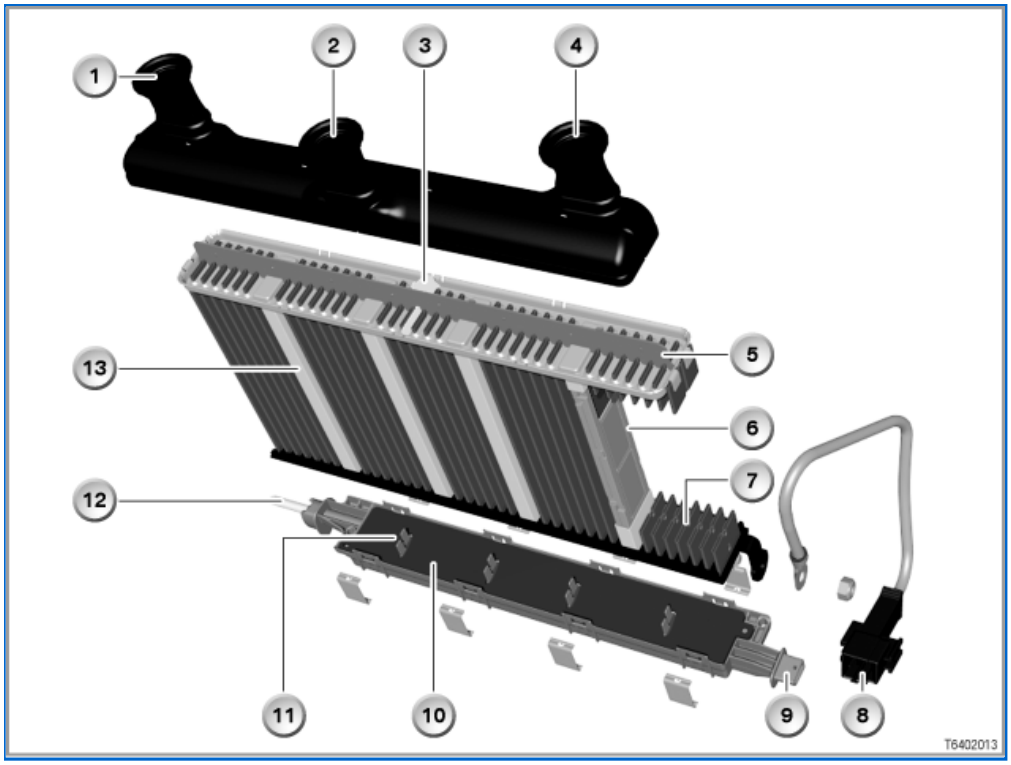
Construction

The electric auxiliary heater consists of 4 heating cells. Each heating cell contains 4 heating elements. The heating elements are grouped into pairs to form heating chains. A total of 8 heating chains can be selected in 8 heating levels.
The regulator for the electric auxiliary heater is secured directly on the heating system heat exchanger with clamps). Regulator and heating system heat exchanger form a single unit.

The following illustrations show:

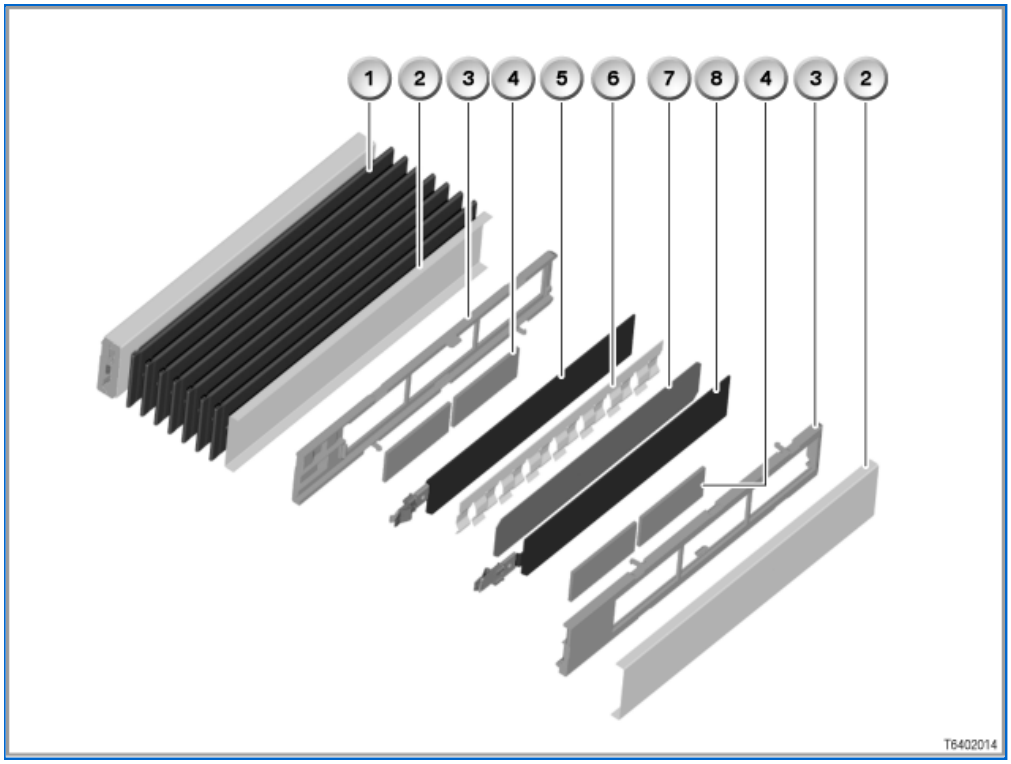
- the construction of the electric auxiliary heater
- the construction of a heating cell

Construction of the electric auxiliary heater



Item	Description	Item	Description
1	Water connection for feed line (left)	2	Water connection for return line (left and right)
3	Separating wall between left and right-hand heating feed line	4	Water connection for feed line (right)
5	Separating wall between heating feed and return lines	6	Heating cell (sectional view)
7	Fins in heating system heat exchanger	8	Terminal 31 (earth for electrical auxiliary heater)
9	LIN bus connector	10	Regulator for electrical auxiliary heater attached to heating system heat exchanger
11	Connector (positive connection) for heating chains 1 and 2	12	Terminal 30 (power supply for electrical auxiliary heater)
13	Heating cell (heat exchanger element in electric auxiliary heater)		

Construction of a heating cell



Item	Description	Item	Description
1	Fins in heating system heat exchanger	2	Heating cell housing and earth connection for heating elements
3	Plastic frame	4	Heating element
5	Positive contact plate for heating chain 1	6	Tensioning spring
7	Insulation between heating chain 1 and heating chain 2	8	Positive contact plate for heating chain 2

The heating elements are held in place by a plastic frame and a tensioning spring.

How it works

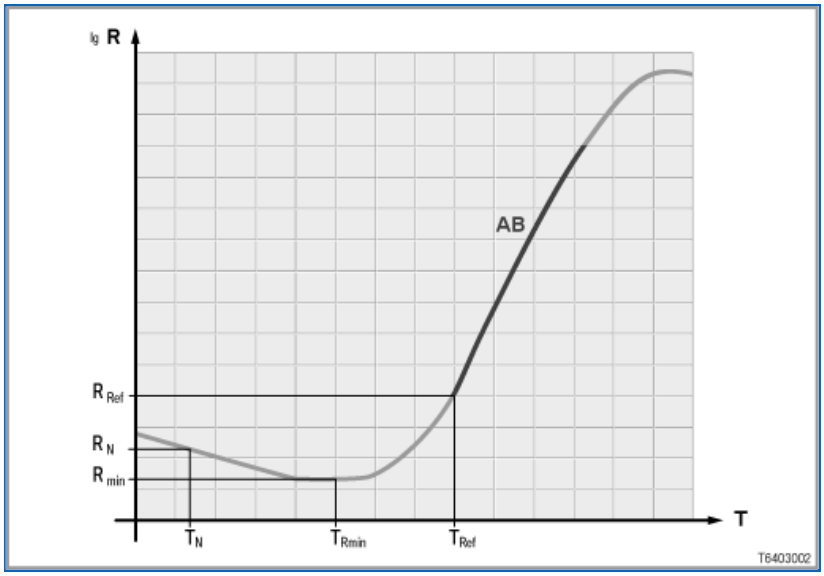
The following functions are explained:

- Heating element
- How the electric auxiliary heater is activated

Heating element

The heating element in the electric auxiliary heater are PTC resistors. The heating elements are made up of individual ceramic semiconductor resistors.

The following illustration shows the characteristic curve of a heating element.



Item	Description	Item	Description
AB	Operating range with linear, positive temperature coefficient (PTC)	T	Temperature
R_{lg}	Resistance (logarithmic representation)	T_N	Room temperature
R_{min}	Minimum resistance	T_{Ref}	Temperature at start of linear operating range
R_N	Resistance at room temperature	T_{Rmin}	Temperature of minimum resistance
R_{Ref}	Resistance at start of linear operating range		

From a certain temperature T_{Rmin}, the resistance of a heating element has a positive temperature coefficient. In other words, as the temperature rises, the electrical resistance of the heating element also increases. The maximum current draw is thus limited. In the operating range AB, the heating elements have an almost linear curve.

This electrical characteristic of the heating element resistance allows a maximum temperature of approx. 120 °C in the heating cell, which does not constitute a problem for the heating/air-conditioning system.

This ”physical” over-temperature protection is maintained even if the blower were to fail.

The temperature of the heating element rises quickly when current is applied (maximum operating temperature approx. 120 ° C). From about 80 °C, the heating element begins to reduce its current consumption. The heat from the heating element is fed into the heating cell. The airflow generated by the blower flows across the heating cell. This warms up the air-mass flow. The warm air is then fed into the vehicle interior.

How the electric auxiliary heater is activated

The electric auxiliary heater is activated by the IHKA control unit via the LIN bus. The DDE (digital diesel electronics) actuates the electric auxiliary heater with a pulse-modulated signal (PWM signal). The PWM signal from the DDE tells the electric auxiliary heater regulator the maximum available electrical power (depends on resources in the vehicles electrical system).

The regulator in the electric auxiliary heater automatically controls how the heating chains are switched on and off. The individual heating levels / heating chains are switched on/off with delayed switching times. This prevents larger current fluctuations in the vehicle electrical system.

The heating chains are switched on and off by the electric auxiliary heater regulator according to set parameters:

- Heat output setting
- Permissible number of heating chains
- Electrical system
- Priority for drivers side
- Limited maximum number of heating chains
- General conditions
- Self-check (safety functions)

Heat output setting

The heat output setting is made with the rotary switch and is converted into a specified value. On the IHKA Basic (without

left/right separation), the specified value for the drivers side applies.

Permissible number of heating chains

This parameter enables the heating chains to be activated and priorities to be assigned (depending on heating requirements for the driver's side and the front-passenger side). The input parameter corresponds to the maximum number of heating chains permitted.

Electrical system

This parameter provides information about the resources in the vehicle electrical system. With this information, the auxiliary heater regulator decides how many heating chains can be activated.

Priority for drivers side

This parameter ensures the drivers side is given preference. If an odd number of heating chains is activated, there will always be one heating chain more activated for the drivers side.

Limited maximum number of heating chains

This parameter provides information about the maximum number of heating chains that is permissible. The parameter depends on the resources available in the vehicle electrical system, the general conditions and the self-check functions.

General conditions

Depending on the ambient temperature, the maximum permissible number of heating chains may be limited.

If the defrost function is selected at the IHKA controls, the maximum number of heating levels is activated, depending on the resources available in the vehicle electrical system.

Self-check (safety functions)

The self-check of the electric auxiliary heater regulator includes the following protective functions:

- Overvoltage
- Undervoltage
- LIN bus signal failure
- Incorrect command
- Temperature monitoring as protection against thermal overload (heating chains OFF if temperature greater than 115 °C, heating chains ON again when temperature drops below 110 °C)
- Short-circuit detection
- Open circuit
- Reset (software reset)
- Monitoring of correct order in function sequence

If one of these protective functions is activated, all active heating chains will be switched off.

If one of the heating chains is recognised as being defective, the next heating chain will be used as a substitute.