# Functional description of independent/auxiliary heater E65

The independent and/or auxiliary heater (SH_ZH) is an integral part of the heating and air-conditioning system. The SH_ZH provides heat output inside the vehicle that is not dependent on the engine. **The control unit is fitted directly on the heater.** Communication in the overall vehicle takes place by means of K-CAN telegrams based on KWP 2000. The SH_ZH takes over activation of the components necessary for operation shown in the **brief description of components**.

## Brief description of components

### Control unit, independent/auxiliary heater

The function of the SH_ZH control unit **must be ensured when the voltage supply is applied**. The activation (switching on and off) always takes place in normal operation via K CAN telegram. **The control unit is the central component and it communicates alongside the independent/auxiliary heating components with the DME/DDE, the CAS, the IHKA and the instrument cluster, which jointly ensure the correct operating mode of the independent/auxiliary heating.** The control unit consists of the control unit, the temperature sensor, the overheating protection, the heat conductor and the connecting strip. The control unit is vented by the combustion-air chamber of the burner via an air hose. **Together with the burner housing, the control unit forms a single unit and must not be disassembled.**

### Burner housing

The burner housing contains a coolant inlet and outlet and the exhaust-gas outlet connection. **The burner housing accommodates the burner insert and together with the control unit forms a single unit.**

### Combustion-air fan unit

The combustion-air fan unit contains the combustion-air fan, the opening for the fuel line and the opening for the fuel supply connection. The combustion-air fan delivers the air needed for combustion to the burner insert.

### Burner insert

The fuel is distributed in the burner tube in the burner insert. Combustion of the fuel/air mixture takes place in the burner tube.

### Heater plug/flame monitor

**The heater plug/flame monitor located in the burner insert ignites the fuel-air mixture when the heater is started.** After starting, heater plug/flame monitor takes on the task of the flame monitor. **The heater plug/flame monitor is an electrical resistor.** When the heater plug/flame monitor is active, there is cyclical static monitoring of the heater plug resistance. -> Heater-filament breakage detection.

### Circulation pump (water pump of independent/auxiliary heater)

**The circulation pump is only fitted in the Thermo Top C, i.e. independent and auxiliary heater** and mounted on the combustion-air fan unit. The circulation pump ensure a flow of coolant in the vehicle/heater circuit. The pump is activated by the control unit and runs throughout the entire operation of the independent/auxiliary heater. In the event of repairs, **the circulation pump** can be replaced separately.

### Metering pump (fuel metering pump of independent/auxiliary heater)

The metering pump serves to supply the fuel from the vehicle's fuel tank. **In the event of repairs, the metering pump can be replaced separately.**

### Changeover valve

**The changeover valve switches between two separate water circuits:** the engine coolant circuit and the independent heater circuit. At zero current, the changeover valve is set to the engine coolant circuit. In the event of repairs, **the changeover valve** can be replaced separately.

### Integrated automatic heating/air conditioning

The independent/auxiliary heater is an integral part of the IHKA integrated heating and air-conditioning system. **The IHKA controls the independent/auxiliary heater in all operating modes.**

### Digital Motor/Diesel Electronics

**The Digital Motor/Diesel Electronics DME/DDE transmits cyclically every 200 ms the engine operating state** engine on or off, which is evaluated by the auxiliary/independent heater.

### Car Access System

**The Car Access System CAS transmits cyclically every 500 ms the terminal status** e.g. terminal R, terminal 15, which is evaluated by the independent/auxiliary heater.

### Central Gateway Module

The Central Gateway Module (ZGM) connects the byteflight, K-CAN, PT-CAN data buses and the diagnostic bus.

### Remote control for independent-heating functions

The independent-heating functions are activated by pressing the buttons on the remote control. In turn, the functions are actually executed by means of IHKA telegrams to the auxiliary/independent heater.

## Main functions

There are three different main functions. Independent heating, auxiliary heating and pseudo auxiliary heating.

**Implausibility**

When **criteria are identified** which **call for the auxiliary/independent heater to be deactivated**, it is first necessary to wait for the IHKA OFF command. Therefore, in this case, the auxiliary/independent heater starts a codable timer (default value: 10 seconds) within which the IHKA OFF signal must come. if it does not come, the auxiliary heating system switches off automatically and sends its status ”Off due to implausible operating mode”. This must be acknowledged by the IHKA (integrated automatic heating / air conditioning system) to enable a new start.

### Independent heating, petrol/gasoline and diesel

For independent heating, **the outside temperature must lie below 16°C in the case of preselected switching time**. Direct switching on via the Control Display is possible at all times.

**Switch-on conditions** (each of the following points must be satisfied - AND condition)

- Telegram switch on SH_ZH (telegram comes from the IHKA and can be triggered by a preselected switch-on time at the Control Display, direct operation selection at the Control Display, Telestarter.)
- No fault
- No fault lockout of heater
- Engine OFF
- Range for fuel quantity more than 50 kilometres

**Switch-off conditions** (each of the following points necessitates switching off of the independent-heating procedure or prevents switching on - OR condition)

- Telegram switch off SH_ZH (telegram comes from the IHKA and can be triggered by Control Display, direct operation deselection at the Control Display, telestarter, heating time elapsed)
- Fault
- Heating time elapsed (usually 30 minutes)
- 10 seconds implausibility (see Implausibility with independent heating)
- Undervoltage detected

**Implausibilities / criteria** (each of the following points necessitates switching off of the independent-heating procedure - OR condition)

- Status, engine running
- Operating mode not equal to independent heating
- Deactivation of stationary consumers by power module
- Undervoltage

### Auxiliary heating, diesel only

In conjunction with the IHKA, the independent/auxiliary heater acts as an auxiliary heater to increase the heat output if needed.

**Switch-on conditions** (each of the following points must be satisfied - AND condition)

- Telegram switch on SH_ZH (telegram comes from the IHKA and auxiliary-heating conditions must be satisfied)
- No fault
- Status, engine running
- Terminal 15 ON

**Switch-off conditions** (each of the following points necessitates switching off of the auxiliary-heating procedure or prevents switching on - OR condition)

- Telegram switch off SH_ZH (auxiliary-heating conditions not satisfied)
- Fault
- 10 seconds implausibility (see Implausibility with auxiliary heating)
- Undervoltage detected

**Implausibilities / criteria** (each of the following points necessitates switching off of the auxiliary-heating procedure - OR condition)

- Status goes from engine running to engine off
- Terminal 15 OFF
- Operating mode not equal to auxiliary heating
- Undervoltage
- Missing telegrams from IHKA, CAS, DME (communication check)

### Pseudo auxiliary heating

The newly introduced pseudo auxiliary heating **serves to increase comfort** and is intended to prevent the changeover valve from being switched over to the large engine coolant circuit during the auxiliary-heating phase when the engine is started - which would result in a drop in the heating-water temperature and thus in reduced heat output.

**Switch-on conditions** (each of the following points must be satisfied - AND condition) Precondition is that independent heating is operating **and** the transition from ”**Engine not running**” to ”**Engine running**” is detected.

- Telegram switch on SH_ZH (telegram comes from the IHKA and is transmitted from terminal R cyclically, even with independent heating)
- Condition, pseudo auxiliary heating set (coding bit = 1)
- No fault
- Terminal 15 ON
- Status, engine running

**Switch-off conditions** (each of the following points necessitates switching off of the pseudo auxiliary-heating procedure or prevents switching on - OR condition) A distinction must be made between petrol/gasoline and diesel engines

- Operating mode auxiliary heating (diesel only), pseudo auxiliary heating or changeover valve off -> transition to auxiliary-heating mode
- Telegram switch off SH_ZH, reasons can be: Direct OFF, auxiliary-heating conditions not satisfied, petrol engine
- Fault
- 10 seconds implausibility
- Undervoltage

**Implausibility / criteria** (each of the following points necessitates switching off of the pseudo auxiliary-heating procedure - OR condition)

- Status, terminal 15 OFF
- Status, engine OFF
- IHKA must switch to auxiliary heating
- Operating mode not equal to pseudo auxiliary heating
- Undervoltage
- Missing telegrams from IHKA, CAS, DME (communication check)

## Service functions

**Overheating lock**

In the event of a **temperature-control failure or partial overheating, e.g. as a result of a lack of water**, the overheating protection switches off the independent/auxiliary heater permanently. If the overheating lock is activated, an **entry is made in the fault memory of the independent/auxiliary heater**.

**Heater lock**

The auxiliary heating system is permanently locked **if three malfunctions or three faults relevant to operation have occurred in sequence - i.e. without correct operation in between**. **For example, lack of fuel on a number of occasions could lead to failure to generate a flame**. Here, the heater lock is activated, which leads to an **entry in the fault code memory of the auxiliary heating system**. **This fault is not identical to the overheating lock fault.**

**Fault**

The fault lockout occurs when a fault is detected during operation and the auxiliary heating unit switches off.

**Restart**

- **Fault**
  It only needs to be switched OFF once to cancel the fault lockout. It can then be restarted.
- **Heater lock**
  The heater lock is unlocked using the service function ”Unlock auxiliary heating system” **AND** then by pulling the fuse of the auxiliary heating system (disconnect power).

## Country and coding versions

**Country versions**

No country versions present.

**Coding versions**

The independent/auxiliary heater is coded **once** at the factory. A distinction is made between **petrol/gasoline and diesel**-coded independent/auxiliary heaters. The independent/auxiliary heater **cannot be coded in the dealer organisation**.