GENERAL DESCRIPTION

The Thermo 300 auxiliary heating system is used in conjunction with the vehicle’s heating system, in order to heat the passenger compartment and to defrost the vehicle’s windows in cold weather. It can also be used to preheat the engine (optional).

The auxiliary heating device functions regardless of the engine status, since it is connected to the cooling system, to the fuel lines and to the vehicle’s electrical system.

Its main components include the combustion air fan, the fuel pump with its nozzle block and nozzle, the heat exchanger and the combustion chamber plus the igniter box with igniter electrodes, and the electronic control unit.

The control unit is the principal component for controlling and monitoring combustion. The flame detector continuously monitors the flame condition during operation. The flame detector is a photo translator changing its resistance depending on the flame intensity. The signals are supplied to the control unit for processing.

The fuel pump, which delivers the fuel, is driven by the fan motor. The fuel is compressed in the pump to approximately 10 bars, and is sprayed by high pressure nozzle. A solenoid valve controls the fuel flow to the nozzle.
The heater is designed around the principle of heat exchange. Controlled by the temperature sensor, it operates intermittently. The auxiliary heater can be switched on using a switch, a timer, or via the air conditioning system, depending on the type of installation. See the Operator’s Manual for more information.

When switched on, the operating indicator light illuminates. The combustion air fan, fuel pump and circulation pump start operation. After 12 seconds of run-up time, the igniter is ready. The solenoid valve in the fuel pump opens and the nozzle sprays fuel into the combustion chamber to be ignited by the spark.

Fuel and air form a combustible mixture that combusts by the action of the ignition device. As soon as the flame detector informs the control unit that combustion is in progress, the ignition device turns itself off.

The hot combustion gases are routed to the end of the flame tube, where they heat indirectly the heating surfaces of the heat exchanger, thus transmitting that heat to the cooling liquid.

After reaching operating temperature, the control unit takes over to provide controlled operation by activation and deactivation of the burner maintaining a constant temperature in the heat exchanger.

When the system is shut down, the solenoid valve in the fuel pump shuts off the fuel supply. The flame is extinguished, but the combustion air fan continues to function. During this time, the combustive air expels the remaining gases out of the combustion chamber. The recirculation pump continues to dissipate the heat present in the heat exchanger to avoid local overheating. The operating indicator light remains lit. After about two minutes, the shutdown is complete and the combustion air fan, as well as the recirculation pump, shut down.

**Figure 2 - Thermo 300 Auxiliary Heater (internal and external views)**
NOTE:
In case of failure of the auxiliary heating device, the system automatically shuts down.

It is possible to start the heating device again during the shutdown cycle. In this case, the burner starts functioning immediately following the start-up period.

If the heater is turned off, by the action of shutting off the ignition, battery power must be maintained to the heater for at least two minutes. This allows the combustion air fan to cool down and clean the combustion chamber of any fumes.

NOTE:
See section 14: HEATING AND VENTILATION for more information on the recirculating pump.

USE OF BIODIESEL IN AUXILIARY HEATERS

Biodiesel is more aggressive than commonly used diesel fuel and may damage non-suited materials in the fuel system (gaskets, hoses, etc.).

CAUTION:
Refer to the manufacturer's technical information bulletin regarding the use of biodiesel fuels in auxiliary heaters. If the auxiliary heater is operated with biodiesel, the replacement of the fuel pump and fuel hoses is mandatory every four years.

INSTALLATION

The auxiliary heating device is accessible by the auxiliary heating device access door, at the rear of the vehicle, on the street side. See the manufacturer's documentation for more information on the installation of the auxiliary heating device.

NOTE:
If the vehicle is equipped with an auxiliary heating device installed on a sliding drawer, the drawer must be fully extended to facilitate access to the auxiliary heating device. In this case, see the heading ACCESS TO THE AUXILIARY HEATING DEVICE in the annex to this section.

NOTE:
Optional installations are possible. See ANNEX A of this section for more information.

NOTE:
Ensure that maintenance to the auxiliary heating device is performed correctly, to maintain the unit in good working order.

NOTE:
For more information on how to check, maintain and troubleshoot the auxiliary heater, see the manufacturer's documentation.

NOTE:
When closing up the unit after maintenance, always make sure that the cotter pin, nuts and hinge bolts, are correctly secured.

CAUTION:
If the bus requires electric welding, the heater must be disconnected electrically from the bus heater (disconnect the positive and negative connections).

CAUTION:
Never disconnect the battery while the heater is operating, or the heater may overheat.

CAUTION:
Always turn off the heater when filling the fuel tank.

CAUTION:
The heater must never be run in an enclosed space (e.g. garage, workshop), unless it is connected to an exhaust suction circuit. To prevent a fire in the exhaust pipe, provisions must be made to siphon fresh air between the unit and the hose.

Every month, every oil change or every 6,200 mi (10,000 km), even outside of the heating season, the heater should be operated occasionally for 10 minutes to ensure that startup will operate correctly. It prevents, for example, sticking and sealing of ceramic components inside the unit.
At least once a year, before the start of the heating season, check the following points on the auxiliary heater (routine maintenance must include inspection and cleaning of the auxiliary heater):

- Inspect heater for functioning and possible tune-up.
- Eliminate mineral build-up in the heating device.
- Remove any accumulated debris or clutter from around the heater, inlet and outlet.

**CAUTION:**

It is extremely important to check the exhaust pipe, as debris can infiltrate and block this area. Even under normal service, a blockage can occur very rapidly. The exhaust hose must be checked and cleaned out on a regular basis.

- Inspect mounting hardware for lost or loose items.
- Check exhaust tubing for cracks, blocking, missing or loose sections or clamps.
- Repair corroded or damaged wiring and connections, inspect fuses, switches. Clean battery connections and verify the condition of the batteries. Coat connections with anti-corrosive compound.
- Check for leaking or damaged fuel lines, clamps and connections. Check for proper routing and secure attachment.
- Replace the fuel pump nozzle and the fuel filter. The filter is installed on the pump's air intake pipe and is accessible through the access door to the auxiliary heating device. See Figure 3.

After each change of cooling liquid in the vehicle’s coolant system, purge the circuits of the heating device and the recirculation pump.

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**DRAINING THE COOLANT CIRCUIT**

**AUXILIARY HEATER CIRCUIT**

**NOTE:**

See section 09-302: ENGINE COOLING for the complete cooling system draining procedure.

Before draining the system, check for restrictions in the system (i.e. pinched hoses, air in the circuit, coolant pump operation, and polarity of coolant pump electrical connectors). Check coolant inlet and outlet on the pump. Coolant inlet to be fed by static pressure of engine cooling system, coolant pump discharge to lower connection on the heater

1. Fill the cooling system.
2. Disconnect the control thermostat.
3. Set the heater valve to maximum heat, if so equipped.
4. Turn heater on. This will start the coolant pump only.
5. Remove the upper heater hose clamp and push a screw driver in between the pipe and the hose to let air escape. Repeat at least four times with the engine running, or use the bleeder valve, if so equipped.
6. Reconnect the coolant hose and plug in the thermostat. Add coolant. Start the heater and check for operation.
7. After 5 minutes of operation, the difference in temperature between the input and the output should not exceed 10°C (18°F).

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**SPECIFICATIONS**

**AUXILIARY HEATER**

Manufacturer .................Spheros (formerly Webasto)
Heater type .................................................. Thermo 300
Control unit type.............................................. 1572D
Heat output ................................. 104,000 btu/hr
Fuel................................. Diesel #1, #2 or arctic and kerosene
Max. fuel consumption.............. 3.3 US gal/hr (12 liters/h)
Rated voltage .............................................. 24 V
Operation voltage ................................. 20 - 28 V
Power consumption ......................... 110 W
Min. cooling capacity ............... 2.64 US gal (10 liters)
SECTION 14-301.03A
AUXILIARY HEATER ON SLIDING TRAY

INSTALLATION ON A SLIDING RACK

ACCESSING THE AUXILIARY HEATER AND THE PUMP

This heading only applies to heaters that are installed on a sliding, drop-down rack.

1. Remove the two bolts at the front of the rack and loosen two screws at the rear of the rack. See Figures A1 and A2.
2. Remove the bolt holding the unit's exhaust to the rack.
3. Unscrew the pipe clamp and slide the exhaust to one side.
4. Disconnect the harness for the heater, if the routing of the wiring prevents full extension of the rack.
5. Slide the rack down and out.

INSTALLATION ON A PIVOTING SUPPORT

ACCESSING THE AUXILIARY HEATER AND THE PUMP

1. Loosen the two nuts that attach the frame of the support to the structure. See Figure A3.
2. Remove the bolts from the installation. See Figure A3.
3. Pivot the support downwards. See Figure A4.

**NOTE:**
It is not necessary to disconnect the hoses or the wiring. However, if wiring does interfere with the movement of the support, then disconnect it before pivoting the support.

4. Temporarily reinstall the hardware in the mounting holes to avoid misplacing them during maintenance or repair.
Figure A3 - Auxiliary Heater on Pivoting Support

Figure A4 - Pivoting the Auxiliary Heater Support

REMOVE THE NUTS AND THE BOLTS TO DETACH THE FRAME

PIVOT THE SUPPORT DOWNWARDS