HEATING SYSTEMS

# Thermo
# Thermo E
# Thermo S
# Thermo plus
# Thermo E+

## Maintenance plan

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SPHEROS

**Periodic heater maintenance**

The heater
1) should be operated for 10 minutes at least once a month and
2) checked by a professional according to the maintenance plan at the start of the heating season at the latest.
Observe the following maintenance intervals. These apply to normal applications of Spheros heaters.
The vehicle manufacturer's regulations and the relevant regulations of the Federal Railway Authority (EBA) and its technical service also apply.
The relevant workshop manual must be used to carry out the work. If the devices are used in other vehicles or applications, the intervals may be shortened or extended.
Please contact your responsible Spheros partner in such cases.

| Address of the operator | Date of maintenance |
|---|---|
| | Vehicle data |

## Heater data

| Type of heater:<br>Ident. no.:<br>Serial no.: | Operating/ control device data acc. to diagnosis DTT (Diagnose Thermo Test) | Date of commision |
|---|---|---|

Fuel Diesel fuel ☐ Biodiesel ☐ Heating oil EL ☐ Paraffinic fuels ☐

| **Check / Maintenance** | **Important notes** | **Check result** OK | not OK | **Measured values, accomplished repairs** |
|---|---|---|---|---|
| **1. Electrical connections**<br>a) Examine electrical plug connections and the wiring harness for visible damages, replace as required. | | ☐ | ☐ | |
| **2. Heat exchanger**<br>a) Check for external damage, discoloration caused by overheating and leaks.<br>b) Clean the heat exchanger inside and outside, remove soot and debris. | Determine overheating cause as needed (e.g. water circulation system), check overheat protection. | ☐<br>☐ | ☐<br>☐ | |
| **3. Fuel system**<br>a) Inspect fuel lines and connections for leakage.<br>b) Replace fuel filter insert with gasket. resp. replaceable filter. | Ensure connections to fuel flow and return lines are sealed tight!<br>When using biodiesel and paraffinic fuels, check TI.<br>Re-tighten screw connections and hose clamps. | ☐<br>☐ | ☐<br>☐ | |

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| Check / Maintenance | Important notes | Check result OK | Check result not OK | Measured values, accomplished repairs |
|---|---|---|---|---|
| c) Fuel pump / fuel hoses<br>**Note:** Observe technical information if biodiesel or FAME is used! | Replace the fuel pump every 5, the fuel hoses every 6 years, if biodiesel is used this interval is shortened | ☐ | ☐ | |
| d) Replace fuel screen with gasket in the pump. | **Technical Information Biodiesel / FAME see www.spheros.com** | ☐ | ☐ | |
| **4. Burner head** | | | | |
| a) Inspect combustion air intake opening for clear passage. | | ☐ | ☐ | |
| b) Inspect hood for damage. | Replace damaged parts. | ☐ | ☐ | |
| c) Depending on the version:<br>- Clean the viewing window (disk) of the flame guard or<br>- Check the dust protection tube of the flame guard and the lens of the phototransistor for contamination and clean if necessary, to do this, dismantle the dust protection tube. | | ☐ | ☐ | |
| d) Inspect condition of the ignition electrodes, if required adjust or replace them. | | ☐ | ☐ | |
| e) Replace atomiser nozzle. | | ☐ | ☐ | |
| f) Check solenoid valve for leaks. | Activate combustion air motor using the diagnostic tool (DTT), solenoid valve must be tight | ☐ | ☐ | |
| **5. Exhaust system** | | | | |
| a) Inspect exhaust line for clear passage or damage, clean or replace it as needed. | | ☐ | ☐ | |
| b) Remove combustion chamber from heat exchanger, inspect for damage and contamination, clean and replace as needed. | | ☐ | ☐ | |
| c) Insert combustion chamber and mount burner head. Ensure proper fit and tight connection to the heat exchanger. | | ☐ | ☐ | |
| d) Combined nuts (M8) for burner head attachment, tightening torque 7.5 +1 Nm, secure them. | Secure them with locking compound | ☐ | ☐ | |
| e) Measurements<br>Target values and procedures are outlined in the workshop manual | Limits acc. to Regulation ECE-R 122 | ☐ | ☐ | |
| Ambient temperature (° C)<br>Exhaust temperature (° C) | see technical data heater | ☐ | ☐ | |
| $CO_2$ (Vol.-%) at 24V | | | | |
| Thermo | 10 ±0.5 | ☐ | ☐ | |
| Thermo E 200 | 9.5 ±0.5 | ☐ | ☐ | |
| Thermo E 300 | 10.0 ±0.5 | ☐ | ☐ | |
| Thermo S | 9.5 +1.5 | ☐ | ☐ | |
| Thermo plus 160 | 9.5 +1.0 | ☐ | ☐ | |
| Thermo plus 230 | 9.0 +1.5 | ☐ | ☐ | |
| Thermo plus 300/350 | 9.5 +1.5 | ☐ | ☐ | |
| Thermo E+ 120 | 10.6 ±0.5 | ☐ | ☐ | |
| Thermo E+ 200 | 9.5 ±0.5 | ☐ | ☐ | |
| Thermo E+ 320 | 10 ±0.5 | ☐ | ☐ | |

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| Check / Maintenance | Important notes | Check result OK | Check result not OK | Measured values, accomplished repairs |
|---|---|---|---|---|
| $CO_2$ (ppm) at 19V | | | | |
| Rail versions | <1000 | ☐ | ☐ | |
| Smoke spot number acc. to Bacharach (all devices) | ≤ 4 | ☐ | ☐ | |
| Fuel pump pressure according to Workshop Manual | | | | |
| Thermo, Thermo S | 10 bar | ☐ | ☐ | |
| Thermo E 200, Thermo plus | 8 +1 bar | ☐ | ☐ | |
| Thermo E 320 | 9 +1 bar | ☐ | ☐ | |
| Thermo E+ | 9 +0.5 bar | ☐ | ☐ | |
| **6. Water system** | | | | |
| a) If available, inspect, clean as needed or replace water filter insert. | | ☐ | ☐ | |
| **7. Functional check (1x per month)** | | | | |
| a) If available, open shut-off valve of the fuel return line and water line. | | ☐ | ☐ | |
| b) Check fault memory, clear it as needed using the diagnostic tool (DTT). | | ☐ | ☐ | |
| c) Check heater functionality. | after at least 10 min heater operation | ☐ | ☐ | |
| **Attention:** During the maintenance, check all screw connections for tightness (for corresponding torque values see Workshop Manual). | | | | |

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