



Thermo S

160/230/300/350/400

Operating and
service instructions

Operating and service instructions

General Information

Dear Spheros Customer,

We assume that the operation and function of your new heater will have been explained to you properly and to your complete satisfaction by the installing workshop / service outlet. This owner's handbook is designed to give you a brief summary of how to use the Thermo S 160/230/300/350/400 heaters.

The heater operation is unlimited without a change of the CO₂ adjustment up to an altitude of 1500 m above MSL and up to 2000 m above MSL if that is a short stay in such conditions (pass crossing, break).

In case of a permanent heater operation above 1500m the CO₂ setting should be readjusted, due to a change of the exhaust gas values depending on environmental conditions.

Service and safety instructions

For the heater exist type approvals according to ECE Regulations R122 (Heater) and R10 (EMC).

The heaters must be installed as described in the attached installation instructions. The installation must be checked pursuant to the statutory regulations governing installation work. Further details are given in the installation instructions.

The year in which the heater is used for the first time must be permanently marked on the heater's model plate by removing the inapplicable year numbers.

Ensure that the existing shut-off devices in the fuel return line are open prior to starting the heater.

When the coolant used in the vehicle's engine is renewed, after bleeding the vehicle's cooling system, pay attention to bleeding the heater carefully. Top up the coolant as described in the instructions supplied by the vehicle manufacturer.

Check the openings of the combustion air intake and exhaust outlet and clean them if necessary.

Switch off the auxiliary heating system before refueling.

The heater must not be operated:



Risk of fire,
explosion
and asphyxiation

- at filling stations and other refueling points.
- if the heater or its exhaust outlet is in locations where inflammable vapors or dust may form (e.g. close to fuel, coal, wood dust or cereal storage facilities).

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- if the heater or its exhaust outlet is located close to inflammable materials for example dry grass and leaves, cartons, paper etc.
- in enclosed areas (e.g. garages, hall without a suck off facility), not even if the digital timer or Tele Start is used.
- If the exhaust outlet of the heater is partial or fully obstructed (e.g. by soil or snow, as it may occur while move the vehicle backwards).

The heater must **not**:



- be exposed to temperatures exceeding 110°C (storage temperature). Exceeding this temperature may result in permanent damages.
- be operated without at least 20% of a brand name anti-freeze in the heating system water.

The heater **must**:



- be operated using the fuel type shown on the model plate and the rated voltage shown on the model plate (for further fuel types and operating limits, refer to the installation instructions).
- be shut down by removing the fuse in the event of extensive smoke development, unusual combustion noises or fuel odors.
The heater must not be used again until personnel trained by Spheros have examined it.
- be operated at least once per month for 10 minutes when the engine is cold and with the blower at its lowest setting. At the latest when the cold weather season starts the heater must be inspected by an expert.

Liability claims:



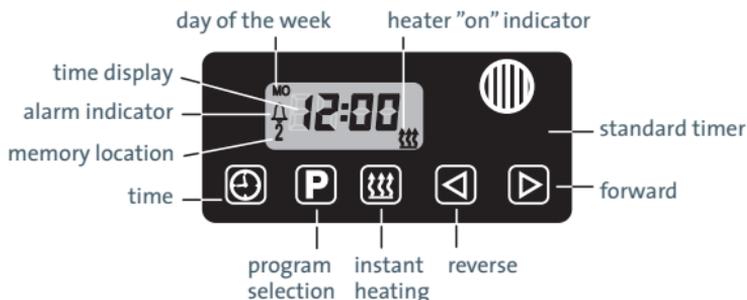
- Failure to follow the installation instructions and the notes contained therein will lead to all liability being refused by Spheros. The same applies if repairs are carried out incorrectly or with the use of parts other than genuine spare parts. This will lead to the invalidation of the type approval for the heater and therefore of its general operating license / ECE type licence.
- Liability claims can only be made if the claimant has verifiably considered all the servicing and safety instructions.

Operating and service instructions

Heater operation

The water heater can be switched on using either a switch or timer. Before you switch on the heater set the vehicle's heating system to "Warm".

Standard timer



General

The standard digital timer enables you to preset the start of the heater operation up to 7 days in advance.

It is possible to program 3 different starting times, only one of which can be activated.

The standard digital timer features a wake-up alarm function.

When the ignition is switched on, the timer displays the current time and the day of the week. When the heater is switched on, the display and the buttons are illuminated.

After the power supply has been connected, all symbols on the display

will flash. The current time and weekday must be set.

Operation

The timer can be operated in that all flashing symbols can be adjusted by means of the ◀ and ▶ buttons. If the buttons are not pressed within 5 seconds, the time displayed will be stored. If the ◀ and ▶ buttons are pressed for more than 2 seconds, the fast time-setting mode is activated.

If the ignition is switched off while the heater is operating in the continuous mode, the remaining operating time of 15 minutes is displayed and the heater continues to operate for this period of time.

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Switching the heater on

Manually: by pressing the button  (continuous heating mode)
Automatically: by programming the heater starting time

Switching the heater off

Manually: by pressing the button 
Automatically: by programming the operating time
With the heater running: by programming the remaining operating time

Setting time/day of the week

Press the  button for more than 2 seconds - time of the day is flashing - and set the clock using the  and  buttons. Day of the week is flashing - adjust the day of the week.

Viewing the time

With the ignition switched off: press the  button

Programming heater starting time

Press the  button - the memory location is flashing - using the  and  buttons, set the heater starting time. Day of the week is flashing - set the day of the week. By repeatedly pressing the  button, memory locations 2 and 3 can be programmed or the time display mode can be reached.

Recalling/erasing preset times

Repeatedly press the  button until the desired memory location is displayed. To erase the preset time, press the  button several times until the time of the day is displayed instead of the memory location.

Programming duration of operating time

The heater must be switched off. Press the  button for 3 seconds - operating time is flashing - and set the desired operating time (10 to 120 minutes) using the  and  buttons.

Setting the remaining operating time

Set the desired remaining operating time (1 to 120 minutes) using the  and  buttons. The remaining operating time refers to the time the heater still continues to remain in operation. It can only be changed while the heater is in operation and the ignition switched off.

Setting the wake-up time

A wake-up time can only be programmed on the standard digital timer. The wake-up time is not bound to a specific day of the week. Repeatedly press the  button until the bell symbol  appears on the display. Set the desired wake-up time using the  and  buttons. The alarm clock turns off after 5 minutes or when one of the buttons is pressed.

Recalling/erasing the wake-up time

Repeatedly press the  button until the bell symbol  appears on the display - read off wake-up time. To erase the wake-up time: press the  button until the bell symbol  is no longer visible on the display.

Remote control

Possible by means of an optional external "instant heating" button

Operating and service instructions

Malfunction

During all active operating phases of the heater, all components, the operating voltage and functional irregularities are monitored and recorded.

Sole exception is the component test status in which the components are not monitored for faults.

A malfunction causes the heater to terminate its operation by a fault shutoff and to go into the fault lock-out mode to prevent the heater from an automatic combustion restart. At the same time the operation indication begins to flash with a specific code.

The fault lock-out occurs:

- o low voltage during a defined period
- o if combustion was not established during start-up
- o if the flame extinguishes during operation
- o extrinsic light
- o if the control device itself has failed or peripheral components are defective
- o if the counter threshold is reached because of a repeated reduction of the lower switching threshold to extend the heating duration (minimum combustion time)

Variants to reset the heater after a fault lock-out:

1. Switch off the heater and then turning it on again.
2. „Off“ and „On“ switching“ via the W-Bus S diagnostic interface
3. Reset the control device, e.g. through disconnecting it from the power supply.
4. Erase the data in the fault memory by means of the diagnostic tool.

Additional to the fault lock-out a heater lock-out occurs if safety related components are affected.

The heater lock-out occurs:

- o overheat protection has been activated, is disconnected or defective
- o water temperature sensor is defective
- o solenoid valve is defective
- o flame guard is defective
- o repeated malfunctions
- o repeated flame interruptions
- o flame within the purge cycle
- o control device malfunction or program error

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If a heater lock-out has occurred, the heater must be maintained and released by Spherotrained personnel.

Flash code

The kind of malfunction is indicated from the operating indication light through a flash code or if the standard timer is used in the display (operation display). The flash code is immediately generated after detection of the malfunction and will be kept until the heater is freed.

The flash code comprises of a burst (sequence) of 5 short flashes depicting the break and a defined number of long pulses corresponding to the malfunction number, which are to be counted. After that the cycle starts with 5 short flashes again and so on.

The meaning of the number of long pulses is shown in the table below.

Table: Flash codes

No. of Long pulses	Description of malfunction
0	Control Device malfunction (faulty checksum or no EOL programming)
1	No start within the safety time
2	Flame interruption, restart failed
3	Low voltage
4	Extrinsic light before starting or within the purge cycle
5	Flame guard defective
6	Temperature sensor / overheat protection defective
7	Solenoid valve defective
8	Combustion air fan motor defective
9	Circulating pump defective
10	Overheat protection has been activated
11	Electronic ignition unit defective
12	Heater fault lock-out, caused by several malfunctions or flame interruptions
13	Nozzle pre-heater defective
14	Minimum combustion time was not reached several times
15	Revolution signal faulty

Subject to modification