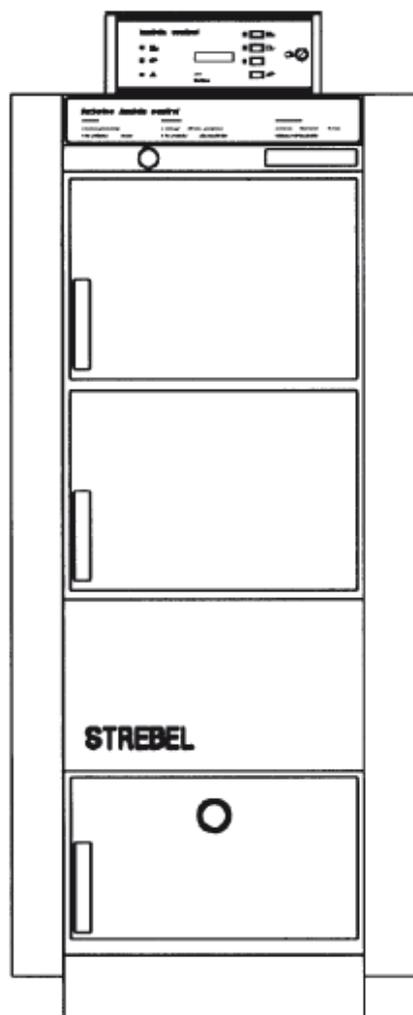
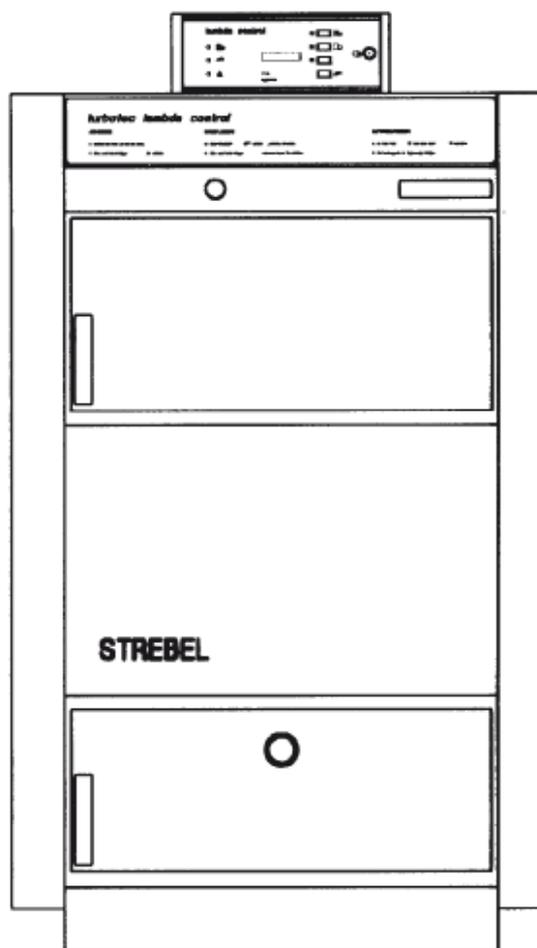


# Operating manual for the user

## turbotec lambda control 20-70 kW



Typen tt 20-30, 40S-70



Typen tt 40 und 60 L

thermostrom  **STREBEL**



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## Wood fuel Commissioning the control

Dear sir, dear madam,

The turbotec lambda control is the result of thermostrom's many years of technical experience. It is a highly-developed product that is neither to be compared to, nor judged by the conventional standards of wood burning in ovens and boilers of earlier generations. Therefore, please read this operating manual thoroughly and completely and follow the operating instructions.

If the operation is not clear to you, or if malfunctions occur, please contact your heating installer. Naturally, we are also at your service for information at any time. We hope that the operation of your heating system meets your expectations and we hope we can count you too as one of our many satisfied thermostrom customers.

Best regards  
**thermostrom**  
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### Wood fuel

The turbotec lambda control boiler is suitable for wood fuel (natural wood, i.e. not painted, coated or impregnated) up to a maximum length of 50 cm, or 100 cm in the case of type 60 L. When selecting the fuel, one must keep in mind that the calorific value of the wood is primarily dependent upon its water content.

For the purpose of simplified cost calculations, it can be assumed that 1 kg of wood with 20 % water content produces approximately the same calorific value of about 4 kWh (approx. 3500 kcal) for every kind of wood.

The calorific value decreases as the moisture content increases. In addition, the burning of wood with a high water content causes a decrease in effectiveness.

Please pay attention to the details given below:

Correction table for performance and burning time for good quality woods (beech, oak, fruit trees) and poor quality woods (includes all strongly resinous woods)

w%	c for wood quality	
	good	poor
5	1.10	1.10
10	1.05	1.05
20	1.00	0.90
25	0.95	0.85
30	0.85	0.80
40	0.75	0.70
50	0.65	0.60
60	0.55	0.50

w = water content of the wood in %  
c = correction factor

Calorific value x correction factor c = corrected calorific value

Example calculation for wood where w = 50 %

$$4 \text{ kWh} \times 0.65 = 2.6 \text{ kWh}$$

The relationship between water content, storage time and storage location of split logs can be seen from the table below

Storage time months	Storage	
	uncovered	covered
	water content in %	
3	44	36
9	26	23
18	17	15
24	16	14
30	15	13

Note:

- Split logs should be stored for at least 18 months
- Split logs must be split (max. edge length 15 cm)
- Square timbers and scrap planks are only suitable to a certain extent as fuel (split!)

### Commissioning the control

After turning on the main heating switch on site, the power supply to the control is activated and a self-test of the control is carried out automatically.

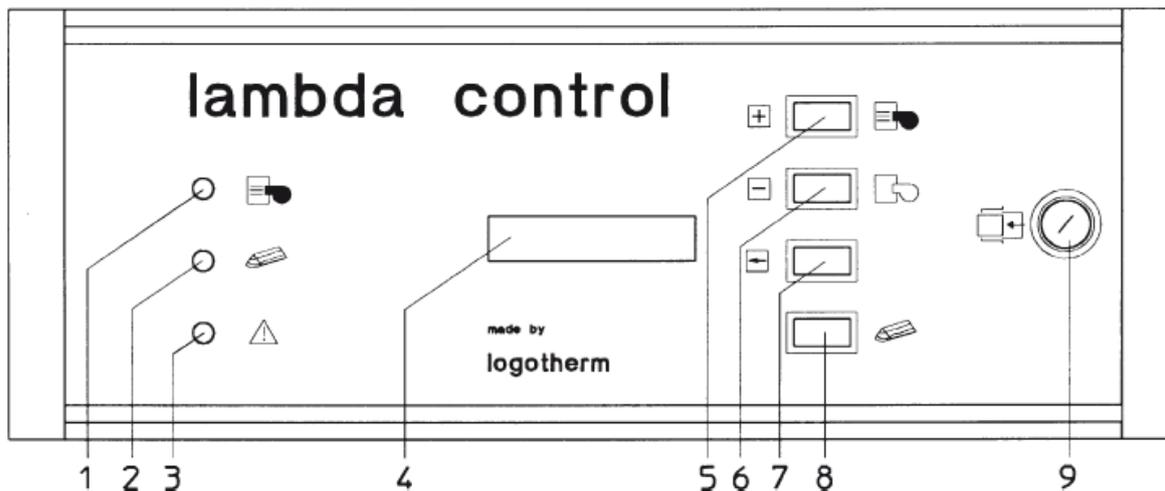
After completion of the self-test the control is ready for operation.

Alternately, the operating status and the boiler temperature appear on the display. In the event a malfunction is displayed after turning on the main heating switch, this must be fixed. (For precise information about this, please refer to the 'Troubleshooting' section).

**The main heating switch should in principle remain switched on, since otherwise important monitoring and protective functions cannot be performed.**

Following the combustion sequence, the control switches automatically to stand-by (energy efficiency function)

# Display and control elements



- 1 'Heating ON' indicator
- 2 'Add fuel' indicator
- 3 'Malfunction' indicator
- 4 Text display
- 5 'Heating ON / Plus' button

- 6 'Heating OFF / Minus' button
- 7 'Arrow' button
- 8 'Add fuel' button
- 9 Restart button for the safety temperature limiter (STL)

## 'Heating ON' indicator

Lights up when the combustion sequence is started by pressing the 'Heating ON' button or automatically due to the sufficient exhaust fume temperature.  
Goes out when the combustion sequence is stopped by pressing the 'Heating OFF' button or automatically due to spent fuel.

## 'Add fuel' indicator

Lights up when the heating function has been switched off and the heating requirement of the installation requires, respectively enables fuel to be added again.  
Blinks during the 'Add fuel' function.  
Goes out when the heating function is switched on or the 'Add fuel' function has been suspended.

## 'Malfunction' indicator

Lights up when malfunctions occur which prevent the continuation of the heating function, respectively do not allow the heating function to be switched on.  
Blinks if malfunctions occur which allow the continuation of the heating function, respectively the heating function to be switched on (automatic steering towards alternative program until the malfunction is fixed).  
Goes out when the malfunctions have been fixed and acknowledged.

## Text display

Switched on in the operating mode 'Heating ON' or by pressing a button in the operating mode 'Heating OFF'.  
Switched off in the operating mode 'Heating OFF' and at the end of a period of 15 minutes.

## 'Heating ON / Plus' button

### Function level 1:

Pressing this button activates the operating mode 'Heating ON'

### Function level 2:

Functions can be selected or settings changed by pressing this button.

# Control settings by the user

## Heating up

### **'Heating OFF / Minus button** Function level 1:

This button can be used to switch the operating mode to 'Heating OFF' or to end the 'Add fuel' function prematurely.

### Function level 2:

Functions can be selected or settings changed by pressing this button.

### **'Arrow' button**

This button is used to enter the Selection menu and to shift to Function level 2.

Pressing the button once again confirms the selected function or changed settings.

### **'Add fuel' button**

Pressing this button causes the induced draft fan to operate at high speed, and after 15 seconds the electromagnetic door opener is released for 10 seconds. The 'Add fuel' function is ended automatically after 10 minutes.

### **Restart button for the safety temperature limiter (STL)**

If the STL has tripped due to the boiler temperature being too high, and if the boiler temperature has gone down to approx. 80 °C, then the STL must be reset and the error acknowledged by pressing the restart button.

### **Controller settings by the user**

#### **Setting the boiler temperature**

Following the first commissioning of the control and the ensuing system settings by a professional, the following message appears on the text display:

```
Heating  
OFF
```

The Selection menu is entered by pressing the 'Arrow' button and the following message appears on the display:

```
S E L E C T I O N + _  
I N F O R M A T I O N
```

The menu item 'SETTINGS' is selected by pressing the 'Plus' button. The following appears on the text display:

```
S E L E C T I O N + _  
S E T T I N G S
```

The selected menu item is confirmed by pressing the 'Arrow' button. The following appears on the text display:

```
Boiler set point + _  
T K S [°C] ##
```

The value can be changed by pressing the 'Plus' or 'Minus' button.

Setting range: 70 – 85 °C  
By changing the boiler set point, the storage charging behaviour also changes. The value should only be changed after consulting your heating installer.

The changed value is saved by pressing the 'Arrow' button. Pressing the 'Arrow' button once again will take you via the next menu item back to the text display:

```
Heating  
OFF
```

### **Heating up**

#### **Heating up when the installation is cold**

During the initial commissioning, or after a long standstill, the following should be observed:

A 'cold' chimney has no, or too little outlet pressure, so that in this case the exhaust fumes are poorly expelled. Heating up will be facilitated if you heat up the chimney with paper through the cleaning hatch.

#### **Boiler operating behaviour**

Particular attention must be paid to the operating behaviour of the boiler in interaction with the hydraulic system, when starting from a cold condition. In doing so:

- the boiler must first of all heat up its own water content including its material weight,
- the water content of the heating system (pipes, radiators, thermal storage mass of the floor) must be heated up. Heat can only be released into the room after this heating process has been completed. The time to complete this process differs, depending on the water content in the heating system. This means that you may have to start heating up earlier due to this delay. During this heating up period the boiler produces its full power = rated power. The lambda control regulates the combustion sequence in such a way that the boiler power produced, corresponds with the actual power consumption of the heating system.

Standard values for the heating-up time in minutes for an increase in the boiler temperature from 20 °C to 70 °C – see table:

## Add fuel

Boiler type	Rated power kW	Heating-up time* in minutes
turbotec 20	20	40
turbotec 25	25	35
turbotec 30	30	30
turbotec 40	40	25
turbotec 40 S	40	40
turbotec 50	50	35
turbotec 60	60	30
turbotec 60 L	60	35
turbotec 70	70	25

(\*)The heating-up time in minutes should be considered to be standard value only (based on the rated power of the boiler, 86 % efficiency, non-return valve opens at 55 °C proportionally).

The prerequisites for this are:

- correct heating according to the operating manual,
- air-dried split logs (stored for 2 years), w = 20 % with calorific value approx. 4 kWh/kg

The following order of events must be adhered to when heating up the boiler:

- press the 'Add fuel' button.

The following appears on the text display:

**DO NOT OPEN!**  
Please wait!

- the induced draft fan operates at high speed and the 'Add fuel' indicator blinks
- the door opener is released after 15 seconds and the following appears on the text display:

**C A U T I O N**  
**OPEN SLOWLY!**

Filling door 1 (centre) can now be opened.  
Filling door 2 (top), the filling lid (60 L) and the ashes door remain closed!

- open the interior door using the operating hook
- switch off the induced draft fan by pressing the 'Minus' button, place 2 to 3 small split logs inside, cover with kindling

wood, place paper and cardboard on top and ignite from above.

- switch on the induced draft fan again by pressing the 'Add fuel' button; the 'Add fuel' indicator blinks for 10 minutes
- close the interior door; the filling door remains open
- wait until the control switches automatically to the operating mode 'Heating ON'; the following appears in the text display:

**Heating ON**

and the 'Heating ON' indicator **lights up**.

- open the interior door
- place wood lengthwise inside the boiler, the logs parallel to each other (not crosswise or diagonally)
- close the interior door and the filling door

If necessary, also place wood inside through filling door 2 or the filling lid (type 60 L). Press the 'Add fuel' button, then after 15 seconds:

- open filling door 2 and the interior door or the filling lid; the boiler can be filled to the top with wood
- close the interior door and filling door 2 or the filling lid

Important information:  
If the exhaust fume temperature exceeds 300 °C during the heating up process, there is a danger of overheating.

The following appears on the text display:

**Exhaust fume temperature too high [°C] ###**

and the 'malfunction' indicator **blinks**.

Stop adding fuel immediately! When the fuel has been used up, the control switches automatically into the operating mode 'Heating OFF' and the 'Heating ON' indicator **goes out**.

### Adding fuel

As a matter of principle, more fuel should be added only if the fuel has been used up totally, when heating is required and the 'Add fuel' indicator **lights up**.

- **Pull and latch** the operating handle of the **gas vent flap**
- Press the 'Add fuel' button.

The text display shows:

**DO NOT OPEN!**  
Please wait!

The induced draft fan operates at high speed and the 'Add fuel' indicator blinks for 10 minutes

- The door opener is released after 15 seconds and the text display shows:

**C A U T I O N**  
**OPEN SLOWLY!**

Filling door 1 (centre) can now be opened.  
Filling door 2 (top), the filling lid and the ashes door remain closed!

- Open the interior door using the operating hook
- Stir the fire bed to avoid the formation of voids
- Place wood lengthwise inside the boiler, the logs parallel to each other (not crosswise or diagonally)
- Close the interior door and filling door 1
- If necessary, also place wood inside through filling door 2 or the filling lid.

Press the 'Add fuel' button; open after 15 seconds filling door 2 and the interior door or the filling lid

- The boiler can be filled to the top with wood
- Wait until the control switches automatically to the operating mode 'Heating ON'; the text display shows:

**Heating ON**

and the 'Heating ON' indicator **lights up**.

- Close the interior door and filling door 2
- **Unlatch** the operating handle of the **gas vent flap and close the flap**.

# Additional control functions

Important information:

If the exhaust fume temperature exceeds 300 °C during the fuel addition procedure, there is a danger of overheating.

The following appears on the text display:

Exhaust gas temperature too high [°C] ###

and the 'malfunction' indicator **blinks**.

Stop adding fuel immediately!

- Close the interior door and the filling door
- **Unlatch** the operating handle of the **gas vent flap and close the flap**.

## Additional control functions

The Selection menu is entered by pressing the 'Arrow' button and the following message appears on the display:

SELECTION + \_  
INFORMATION

The desired menu item can be selected by pressing the 'Plus' or 'Minus' button.

The selected menu item is confirmed by pressing the 'Arrow' button.

The selection menu is abandoned automatically if no button is pressed for more than 30 seconds.

## Information

By selecting and confirming the menu item

SELECTION + \_  
INFORMATION

the information menu is called up and the following appears on the text display:

Information + \_  
END

The following information can be displayed by pressing the 'Plus' or 'Minus' button.

## Control program

Display of the control program according to which the combustion process is controlled (automatic switchover).

O<sub>2</sub> control program = standard program with O<sub>2</sub> probe  
TA control program = alternative program in the event of a malfunction of the O<sub>2</sub> probe

## Set target values

Display of the target values set by the user or the heating installer:

**TK S** = Boiler temperature (user)

**TSmax** = Max. storage tank temperature (installer)

**TSmin** = Min. storage tank temperature (installer)

**TKmin** = Min. boiler temperature (installer)

**O<sub>2</sub> S** = Residual oxygen content of the exhaust fumes (manufacturer)

**CO<sub>2</sub> S** = Carbon dioxide content of the exhaust fumes (calculated from the O<sub>2</sub> nominal value)

## Current actual values

Display of the current actual values

**TK I** = Boiler temperature

**TS I** = Storage tank temperature

**TA I** = Exhaust fumes temperature

**O<sub>2</sub> I** = Residual oxygen content of the exhaust fumes

**CO<sub>2</sub> I** = Carbon dioxide content of the exhaust fumes

**Lambda** = Air ratio

**ETA-F** = Combustion efficiency

## Exhaust fume temperature

Display of the highest exhaust fume temperature reached.

## Operating hours

Display of the number of operating hours in the operating mode 'Heating ON'.

## Standby hours

Display of the proportion of standby hours as a percentage of the operating mode 'Heating ON'.

## Malfunction

Display of the last malfunction. The Information menu is abandoned by pressing the 'Arrow' button.

## Settings

By selecting and confirming the menu item

SELECTION + \_  
SETTINGS

the settings menu is opened.

## Setting the boiler set point

The following appears on the text display:

Boiler set point + \_  
TK S [°C] ##

The value can be changed by pressing the 'Plus' or 'Minus' button.

Setting range: 70 – 85 °C

The changed value is saved by pressing the 'Arrow' button and the display gets to the next menu item.

## System settings

The following appears on the text display:

Service code with +  
END

The settings menu for the heating installer or the manufacturer is accessed by pressing the 'Plus' button (more detailed information can be found in the installation manual).

The settings menu is abandoned by pressing the 'Arrow' button. The setting menu is abandoned automatically if no button is pressed for more than 30 seconds.

# Chimney sweep test and safety test Unit test Cleaning

## Chimney sweep test and safety test

Only possible in the operating mode 'Heating ON'.

The chimney sweep test can be activated after the boiler has been cleaned, heated up and stoked up in accordance with the regulations.

By selecting and confirming the menu item

```
SELECTION + _  
CHIMNEY SWEEP TEST
```

the 'Chimney sweep test' menu is called up and the following appears on the text display:

```
CHIMNEY SWEEP TEST + _  
E N D
```

By pressing the 'Plus' or 'Minus' button, it can be selected whether the chimney sweep test should be performed at the rated power or with a partial load (emission check) or whether the safety test (check of the STL and thermal discharge safety device) should be performed.

The selected function is confirmed by pressing the 'Arrow' button.

The chimney sweep test at rated power, respectively with a partial load is cancelled:

- at the end of 30 minutes,
- at a boiler temperature higher than 88 °C (standby),
- in the operating mode 'Heating OFF'.

The safety test is finished:

- if the 'Plus' button is not pressed for 30 seconds,
- if the safety temperature limiter (STL) trips,
- at the end of 60 minutes
- in the operating mode 'Heating OFF'.

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## Aggregate test

Only possible in the operating mode 'Heating OFF'.

For safety reasons, the aggregate test may only be carried out when there is no fuel in the boiler.

By selecting and confirming the menu item

```
SELECTION + _  
AGGREGATE TEST
```

the test run is called up and the function of the aggregates can be tested.

The displayed function or displayed aggregate is **switched on** by pressing the 'Plus' button. The displayed aggregate is **switched off** by pressing the 'Minus' button.

You can progress to the **next test step** by pressing the 'Arrow' button.

The **test run can be ended prematurely** by pressing the 'Plus' and 'Minus' buttons simultaneously.

## Cleaning

### (Heating to 'OFF')

#### Removal of ashes

The ashes must be removed from the filling chamber and the ashes chamber regularly after 5 fillings (but at least once a week).

#### Filling chamber

After approx. five fillings, let the boiler burn out completely and then clean the filling chamber floor with the flat scraper and the primary air apertures with the poker; clean out the ashes through the grating in the flame duct. Do not remove the grating during this procedure, as otherwise the secondary air apertures in the burner port can get blocked by ashes!

Open the ashes door and remove the ashes from the flame duct and the boiler floor (tar coating on the side walls above the primary air apertures and on the rear wall of the boiler should not be removed!); close the ashes door. After that, heat up in accordance with the operating manual.

#### Flame duct and ashes chamber

After around five fillings (but in any case once a week), the flame duct and the ashes chamber must be cleaned of ashes using the flat scraper. If the boiler is not in operation during the summer, it is important that no ashes are left in the boiler (service life!)

#### Burner grating (weekly)

Clean the floor of the filling chamber, lift out the grating using the hook and clean the secondary air aperture and grating support in the burner. The secondary air apertures in the burner port must not be covered with ashes. Replace the grating.

# Cleaning the control Maintenance Important instructions

## Ancillary heating surface (monthly)

Remove the cleaning lid, lift up the exhaust fume baffle plate by about 10 cm and fix it using the poker. Cleaning can now take place at the rear and from the front through the ashes door using the scraper. Push the exhaust fume baffle plate back down (otherwise danger of overheating). Screw the cleaning lid back on tightly.

## Induced draft fan (annually)

At the end of the heating season, disconnect the fan from the mains by pulling the plug out of the multiple socket. Unscrew the fan and clean the fan blades with a brush (vacuum cleaner). Remount the fan and connect the plug again.

## Air duct (annually)

Unscrew the air duct and clean it using the scraper and a vacuum cleaner.

## Cleaning the control

Before doing this, it is essential to turn off the main heating switch or to disconnect the control from the mains by disconnecting the mains plug.

The operating panel of the lambda control can be cleaned using a moist cloth and a glass cleaning agent.

## O<sub>2</sub> probe (annually)

Detach the O<sub>2</sub> probe by unscrewing the cap nut, clean the probe head with a hand brush, clean out the mounting tube and carefully retighten the O<sub>2</sub> probe together with the seal (use a new seal if need be).

## Air box (annually)

Disconnect the plugs for the two air flap actuators and dismount the air control unit (but do not disassemble the control flap and actuator!) Clean the air box and the secondary air ducts using a vacuum cleaner.

Remount the air control unit together with the seals (use new seals if need be), connect the plugs again.

## Maintenance (Heating to 'OFF')

### Filling chamber

At the end of the heating period, clean the filling chamber floor and the primary air apertures using the scraper and poker. Remove ashes and wood scraps. The tar coatings on the walls of the filling chamber should not be removed.

### Door closure bolts

The door closure bolts must be oiled regularly.

### Sealing integrity of the doors

If smoke escapes through the doors, this is due to poor sealing caused by the sealing material yielding. The doors are adjustable on both the hinge and the closure sides and the sealing integrity can therefore be restored.

### Sealing integrity of the gas venting flap

The gas venting flap must lie tightly against the frame for proper, low-emission operation (see installation manual).

### Sealing integrity of the O<sub>2</sub> probe

The screw fitting of the O<sub>2</sub> probe must be checked for tightness (if necessary **carefully** re-tighten using a spanner).

### Safety devices

The reliability performance of the safety devices must be checked once a year by the heating installer or by another authorised person. The safety valve and the thermal discharge safety device must be checked. It is recommended to take out a service contract with a specialist firm!

## Important instructions

### Tripping of the thermal discharge safety device

If the maximum permissible boiler temperature of 100 °C is exceeded, the safety temperature limiter (STL) interrupts the power supply to the fan (to switch on the STL again, refer to the 'Troubleshooting' section). If the boiler temperature continues to rise, the 'thermo-mechanical valve' opens automatically via the temperature sensor. Cold water flows through the heat exchanger into the boiler and absorbs the excess heat. As a result, the boiler water is cooled down, preventing a dangerous operating condition. After cooling down, the system pressure, respectively the water level in the system, must be checked and the water topped up if necessary.

### Water level and water pressure in the heating system

Regular checks are necessary!

### Protective functions

The boiler must be cleaned thoroughly if it is not to be fired for a longer period of time (for precise information about this, please refer to the 'Cleaning' section). Power supply must be guaranteed also during the summertime via the main heating switch (no continuous heating operation). The control can then perform the integrated protective functions: venting of the boiler and protection of the aggregates against seizing up.

During the performance of the protective functions, the following appears on the display:

Protective functions Please wait
-------------------------------------

# Troubleshooting

## Troubleshooting

The control recognises malfunctions automatically and executes malfunction-related alternative programs or safety measures.

There are two malfunction categories: the 'malfunction' indicator either **lights up continuously** or it **blinks**.

### 'Malfunction' indicator lights up continuously

In the case of the following malfunctions, the **continuation** or switching on of the heating function is **not** possible and the malfunction indicator is activated automatically:

### Safety temperature limiter has tripped

STL tripped  
Reset!

Cause: boiler temperature is too high (no heat consumption, power failure, pump or valve defective). After the boiler temperature has dropped to approx. 80 °C due to heat consumption, the STL is reset by pressing the restart switch, thus automatically acknowledging the malfunction.

### Measured values of the exhaust fume temperature are incorrect

Exhaust fume temperature  
Measured values wrong

Causes: plug contact, sensor cable, control, exhaust fume sensor. After rectification of the malfunction it will be acknowledged by pressing the 'Arrow' button.

### Measured values of the boiler temperature are incorrect

Boiler temperature  
Measured values wrong

Causes: plug contact, sensor cable, control, boiler temperature sensor. After rectification of the malfunction it will be acknowledged by pressing the 'Arrow' button.

### Loss of control data

Data loss  
Control defective

Cause: data memory in the control is defective. The control must be repaired by the manufacturer.

### 'Malfunction' indicator blinks

In the case of the following malfunctions, the **continuation** respectively the switching on of the heating function is **possible** until the malfunction has been rectified:

The malfunction message is shown on the text display in the operating mode 'Heating OFF' and after the 'Arrow' button is pressed:

### Measured oxygen values

Oxygen  
Measured values wrong

Causes: plug contact, probe cable, O<sub>2</sub> probe dirty/worn or screw fitting of the O<sub>2</sub> probe and protective tube is loose, control. Check the O<sub>2</sub> probe by means of the aggregate test. If the result of the aggregate test is 'Probe OK', then the malfunction is automatically deleted.

Important instruction:  
Only perform the aggregate test if there is no fire or residual embers in the boiler.

### Measured values of the storage tank temperature are incorrect

Storage tank temp.  
Measured values wrong

Causes: plug contact, sensor cable, control, storage tank temperature sensor. After rectification of the malfunction it must be acknowledged by pressing the 'Arrow' button.

### Boiler temperature too low

Boiler temperature  
too low [°C] ###

Causes: plug contact, cables, non-return valve, actuator drive, control.

After rectification of the malfunction it must be acknowledged by pressing the 'Arrow' button.

### Exhaust fume temperature too high

Exhaust fume temperature  
too high [°C] ###

Cause: exhaust fume temperature has exceeded 300 °C.

Refer to pages 5 & 6 'Important instruction'.

**Work on the electrical equipment may only be carried out by a qualified electrician after disconnecting the installation from the mains!**

# Short operating instructions of the lambda control

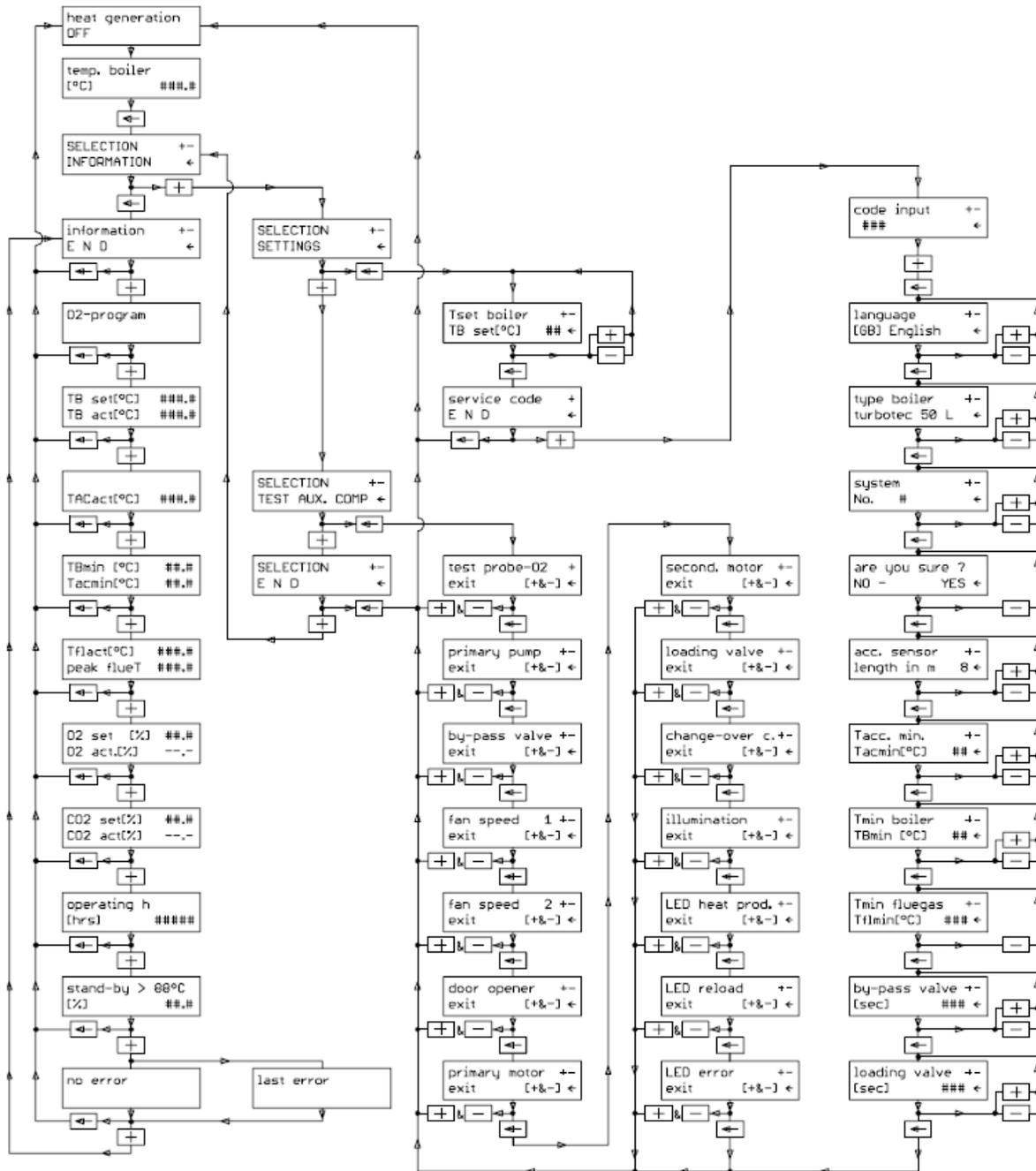
Operating condition 'Heating OFF'

User:

- general information
- setting the boiler target temperature

Heating installer:

- aggregate test
- system settings



# Short operating instructions of the lambda control

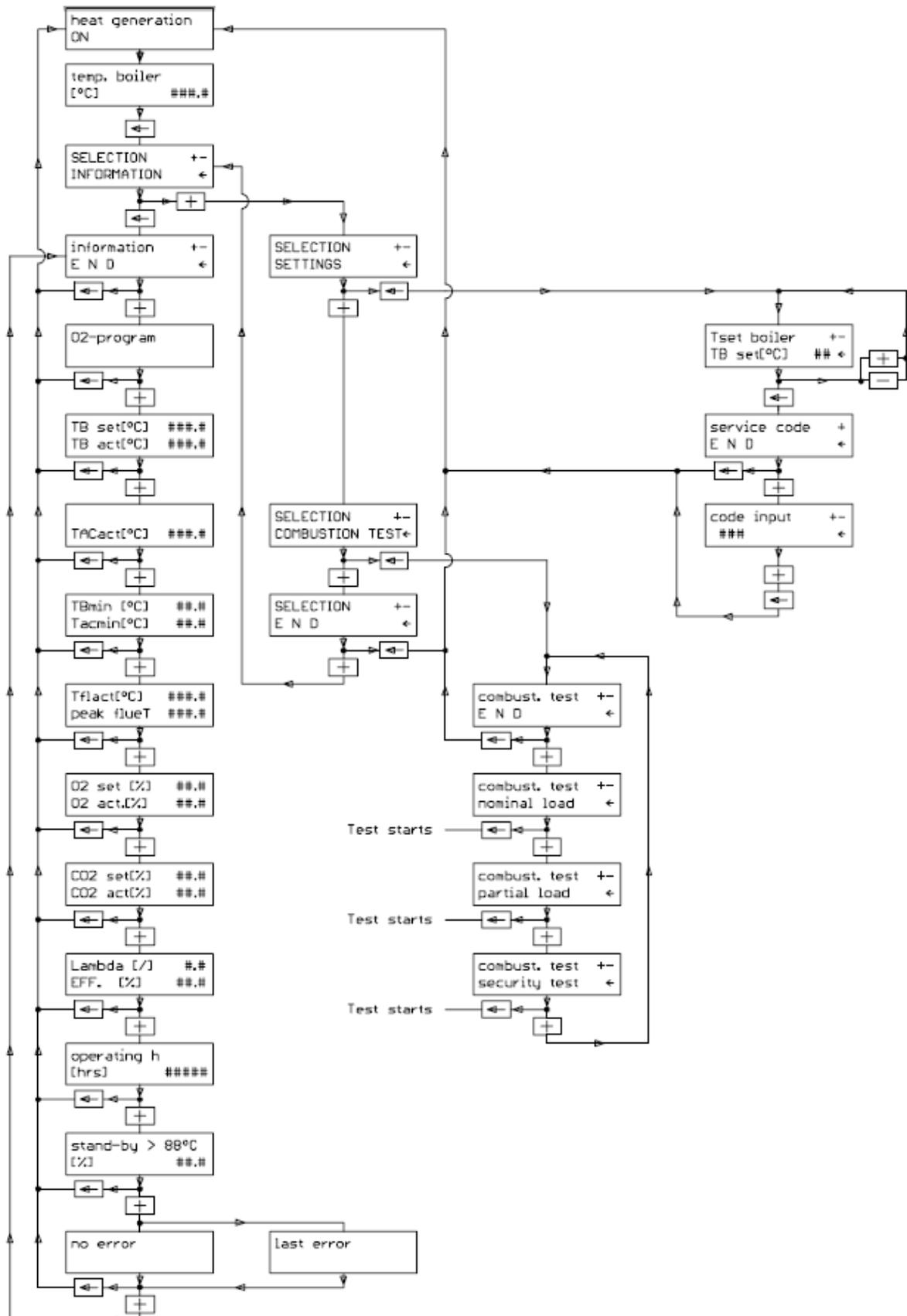
Operating condition 'Heating ON'

User:

- general information
- setting the boiler target temperature

Heating installer:

- chimney sweep test



# Notes