Wood Gasification Boiler 20-60 kW

Instruction Manual

Contents

Dear Customers,

We are delighted to count you among our customers.

In order to guarantee satisfactory funtioning of your new boiler, you should first of all know how it must be operated, cleaned and maintained. In these instructions you will find information and advice that reach far beyond the boiler itself. For example, why safety fittings are necessary and how they funtion. Or how the quality and calorific value of firewood should be assessed.

Guarantee

You should also read the „Conditions for guarantees and liability". As a rule, these conditions will be fulfilled by a competent fitter. Nevertheless, we advise you to draw his attention to our guarantee conditions. All requirements we place on your heating system are designed to avoid damage, an undesireable occurence for owner and manufacturer alike. Intersting facts on this subject can be found on page 21 ff.

Optimum use of the controls installed in our boiler.

If the boiler has been put into operation by a specialist, use the controls only for information about your heating. You should nevertheless now be holding the instruction manual and a second booklet with control parameters. Two control levels are accessible to you.
At the CUSTOMER level you can set the controls according to your wishes and needs, withour the risk of altering the configuration made by the specialist. Help with examples can be found in the section „Setting the controls" on page 26ff.
At the SERVICE level changes and adjustments should only be made by a specialist, your fitter or customer service. Before making any adjustments yourself, you should always consult a specialist.

Read the instruction manual

carefully before starting up the system. This is the only way to ensure energy-saving and environmentally friendly operation or your new boiler

Take advantage of the specialist's knowledge and skills

Leave the mounting, installation, start-up and basic control settings to the specialist. Insist on an explanation and briefing on how your new heating system functions, how it is operated and maintained.

Longer guarantee period after start-up by our factory customer service.

If the newly installed boiler is started up by our customer service representative or an authorised partner company, we will grant an extended guarantee period. See the guarantee conditions valid at the time of purchase.

Service contract

The best service for your heating system is to be optained by concluding a service contract with your heating specialist or our customer service.

Conditions for guarantee and liability

We can only provide guarantee and accept liability for the proper function of your boiler if it is correctly installed and operated.

The guarantee and liability conditions will only be effective if the log wood boiler in question is used only for **space and water heating** with a maximum of 2,000 full-load hours per year and in particular if the following conditions are observed for installation and operation:

The boiler must be installed in a **dry space** in compliance with local building and fire protection regulations in the respective country.

The boiler can be fuelled with **air-dried logs (max. 20% moisture content) and wood briquettes**. Operating with unsuitable fuels in particular waste materials, coal or coke is – just like moist wood – not permissible (see page8).

Water is intended as a heat transfer medium. If special frost protection measures are necessary, 30% glycol may be added. **Decalcified water** must be used for filling the heating system for the frst time and refilling following repairs. For the initial filling the value of 20,000lt°dH for the system volume (in litres) multiplied by the hardness (German degrees of hardness) may not be exceeded. The **pH value** should be set to **between 8 and 9**. Refilling with calciferous fresh water should be kept to a minimum in order to limit the formation of boiler scale. Sufficient **shutoff valves** should be installed in order ro avoid draining large amounts of water in the event of repairs. Leaks in the system must be repaired immediately (see page 21).

A **minimum return temperature of 60°C** to the boiler must be guaranteed (see page 22).

A **safety valve (3 bar)** must be installed by the customer as protection against excess pressure and a **thermal drain valve (95°C)** as protection against overheating (see page 22).

An **adequately dimensioned expension vessel** or pressure maintaining device is required to be installed by a specialist as protection against air suction when the system cools down. Adequate **ventilation** must also be provided (see page 22). Operating the boiler with an open compensator will cause above-average boiler corrosion due to high air intake. For this reason, if the **expension vessel is open** we exclude **corrosion damage** on the boiler from the guarantee and liability undertaking.

Operating with a **smaller output** than that stated on the rating plate is **not permissible** (see page 23).

Excepting standard devices such as thermostats, only **components supplied by us** may be used for extending the controls.

Cleaning and **maintenance** work must be carried out as described in these operating instructions (page 17)

Repairs are only permissible **using spare parts supplied by us**. Exceptions are standard parts such as electric fuses or fastening material, provided they have the required properties and do not impair the safety of the system.

The **specialist carrying out the work shall be responsible** for correct installation in accordance with the instructions accompanying the boiler, relevant rules and safety regulations. If you as a customer have installed the heating system in whole or in part without the necessary professional training and, in particular, without the relevant practical experience, and have not had your **work inspected by a professional**, we must exclude defects in the supplied equipment and consequential damage resulting therefrom from our guarantee and liability undertaking

We reserve the right to make technical changes

In order to pass on to you the benefits of our ongoing development work, we reserve the right to make technical changes without prior notice. Printing and typing errors or modifications of any kind do not entitle the customer to make a claim. Individual fitting variations shown or described here are only available as an option. In the event of discrepancies between documents with regard to the scope of delivery, the particulars in our current price list shall prevail.

Flue renovation before it is too late

With the regulated induced draught fan and adjustable minimum exhaust gas temperature, your new boiler will for the most part fit existing flues without major adaption. However, it is advisable to have the suitability of your flue verified by a chimney sweep or constructor.

If the chimney draught exceeds 30 Pa in extremly high chimneys, a draught regulation flap is required.

Modern boilers have a higher level of efficiency than older models, together with smaller amounts of exhaust gas and significantly lower exhaust gas temperatures..

Especially flues with „too large diameters“ are no longer adequately heated. The water contained in the exhaust gas condenses in the chimney and slowly but surely destroys old masonry chimneys.

If the chimney diameter is too large, the discharge velocity and temperature are too low. The exhaust gas lacks the required energy to rise and in extreme cases the smoke may fall and creep along the rooftop.

If your chimney is not lined with water resistant material or its diameter is too large, the usual solution is to fit a moisture-resistant flue liner.
If the old chimney diameter is large enough, a flame-restistant ceramic pipe is preferable to a stainless steel pipe.

For non-moisture-resistant chimneys of limited height it may be sufficient to raise the lower flue gas temperature treshold on the heating control to 180°C. An auxiliary air flap will also help to keep the chimney dry. If one is satisfied with these measures, the chimney should be checked to ensure that it really doeas remain dry. Please consult your chimney sweep in this matter.

Please bear in mind that the lifespan of chimneys is limited. If undertaken in good time and the chimney wall is still in good condition, it can be quickly and easily renovated by inserting a new pipe. However, if the exhaust gas condensate has penetrated the mortar joints, the chimney must be completely dismantled and reconstruced.

Measuring emissions

The laws and directives on measuring emissions can are different in each country. Please contact you local council for detailed information.

The boiler including flue liner should be cleaned a week or a least three days prior to the measurement.

Then operate the boiler normally. An interval of at least three days must be kept between cleaning and measuring to allow the dust swirled up by cleaning to settle. If the swirled up dust is measured, the reading for the dust value will be unduly high.

Avoid by all means cleaning on the day of measuring.

The accumulator tank must be cold at the start of the measurement

The accumulator tank should be run empty prior to measurement. This should preferably be done in the previous night, so that the boiler dos not switch to part-load during the masurement.

Standard fuel approved for the boiler must be used for the measurement, i.e. split half-metre logs approx. 8 to 10 cm in diameter, but not round logs.

Place the logs close together in the boiler. The fuel chamber should be at least three-quarters full.

Start of measurement half an hour after firing up.

The measurement should be taken no earlier than half an hour after firing up and no later than when the fuel chamber has burnt down to one third.

Fuel load is required for measurement.

Keep the [**I/O**]-button pressed for 5 seconds until „Emisssion measurement period 30 min.“ appears on the display and the LED in the [**I/O**]-button flashes. The boiler controls will ensure that the required amount of heat flows into the heating circuits and hot water tank. The boiler will revert to normal operation if the [**I/O**]-button is pressed again or automatically after 30 minutes.

How does the wood gasification boiler work?

Wood gasification

Before wood can burn, it must be converted into gas by applying heat. At 100°C the water contained in the wood escapes. At 200°C the material decomposes into 20% charcoal and 80% wood gas, a mixture of carbon dioxide, carbon monoxide, hydrogen, methane, methanol, various phenols, acetone and acetic acid. 400°C suffice for outgassing, but at least 900°C – better 1,100°C – are required to completely break up the phenols (wood tar) into combustible carbon, carbon monoxide and hydrogen. In addition to a high temperature, complex compounds take time to break up, which explains the long gas flame of a wood fire.

Large woodpile in fuel chamber

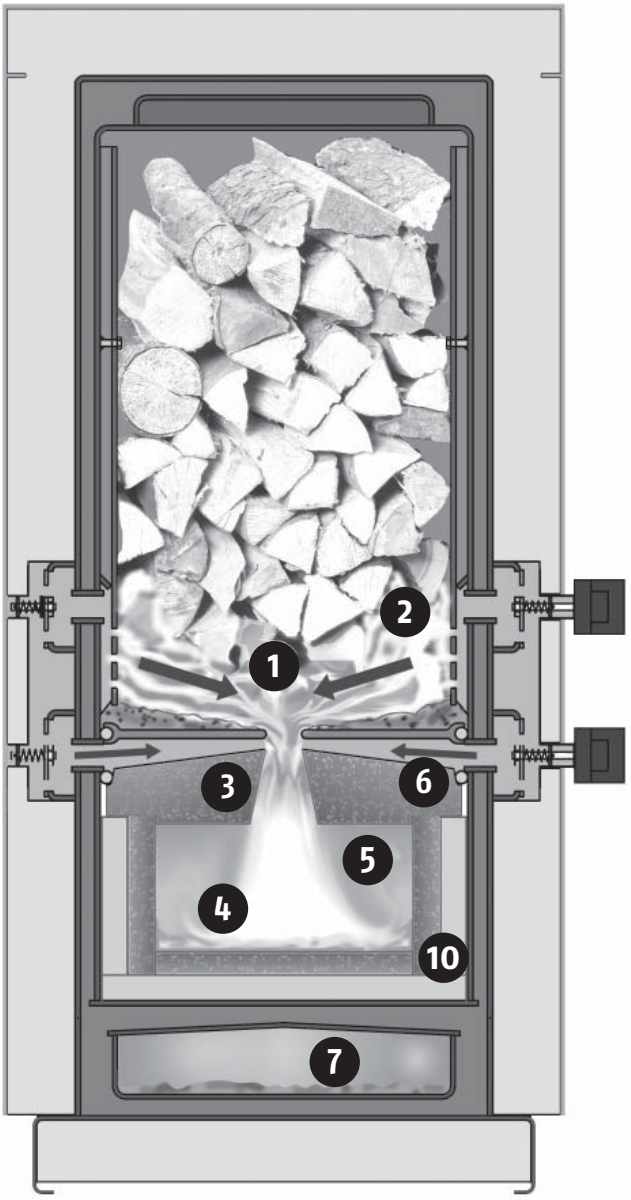
At the foot of the woodpile in the fuel chamber a small gasification fire is maintained (1) with controlled air intake (primary air). The boiler electronics regulate the gasification rate via the primary air intake (2). The wood gas is extracted downwards into a hot combustion chamber. This prevents the woodpile in the fuel chamber from outgassing in an uncontrolled manner and igniting. A boiler with a large wood capacity, slow burn-up and long burning period is thus possible.

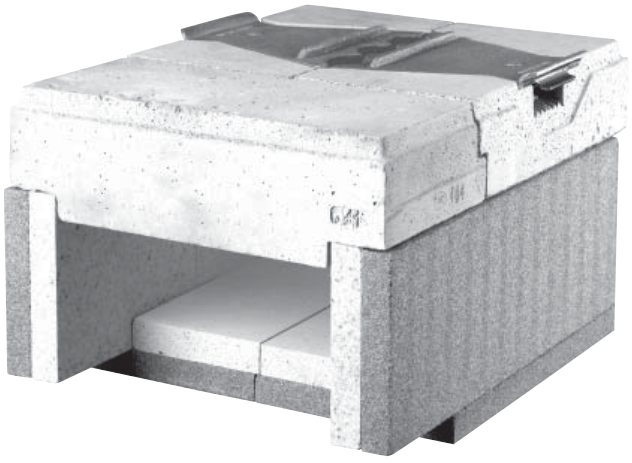
Mixing jet and complete swirl

A mixing jet (3) is located between the fuel chamber and combustion chamber. At this point pre-heated combustion air (secondary air) is added to the wood gas. The flame from the mixing jet is ejected at high speed onto the hot floor of the combustion chamber and is once again whirled around (4) to ensure that every combustible gas particle encounters sufficient oxygen for complete combustion.

Complete combustion in the glow zone

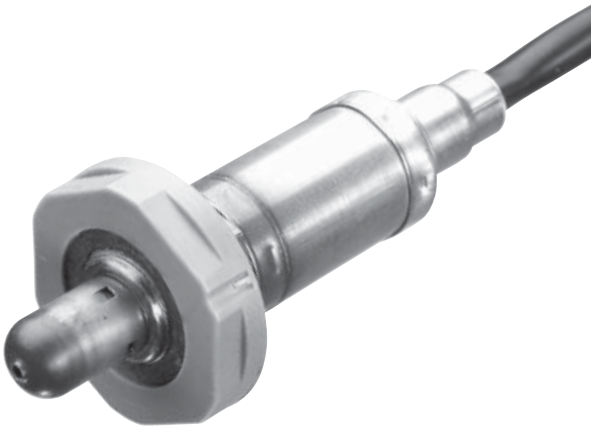
To achieve an uncooled combustion at high temperatures, the patented glow zone combustion chamber is made of highly refractory bricks and is additionally thermally insulated (5). In this glow zone the flame has sufficient time until the last stubborn carbon rings (phenols) break out of the lignin of the wood and burn at temperatures of between 900 and 1,100°C. We have thus succeeded in remaining below the magical limit of 100 mg/MJ carbon monoxide in the flue gas of a wood boiler.





Lambda probe and turbulent heat exchanger

Best fuel utilisation with lambda control



The wood gasification rate can be regulated via the primary air intake. With the lambda controlled secondary air (6) the combustion is kept in the clean range with a high rate of efficiency.

If too little air is taken in, there is not enough oxygen for complete combustion. But too much air also causes incomplete combustion. Too much air cools the fire. At below 700°C not all parts of the wood gas are burnt. Furthermore, too much air transports too much heat out of the boiler.

The lambda probe also guarantees optimum combustion and best fuel utilisation in daily use, not only with selected wood on the test stand.

Turbulent heat exchanger with simple cleaning

Only after complete combustion does the hot gas flow into the cold section of the boiler, where it passes its heat onto the boiler water. At first this takes place through a long ash collection channel (7) and then turbulently through the heat exchanger tubes fitted with turbulators.

The more turbulent, the better the gas particles come into contact with the tube wall, enabling maximum heat to be delivered to the heating water. Low exhaust gas temperatures and high levels of efficiency are thus achieved.

The turbulators in the heat exchanger tubes must be moved up an down by pulling about ten times on the cleaning lever before opening the boiler to add logs. The dislodged fly ash falls into the ash collecting channel and the heat exchanger always remains clean.

Induced draught adapts to the flue

With the induced draught concept a negative pressure prevails inside the entire boiler. This prevents carbonisation or flue gases from escaping from the boiler in any operating phase.

The induced draught fan manages with any flue, even those with small diameters. The speed regulator and continuously adjustable flaps for the combustion air make draught regulators in the flue almost unnecessary.

The minimum exhaust gas temperature setting prevents the occurrence of condensate in brick-lined chimneys and the low temperature capability of a modern chimney can be fully exploited..

A daily glance at the heating pressure gauge

If you have no more than three storeys including cellar, the pressure in the cold heating system should be between 1 and 2 bar.

It takes no special effort to cast a glance at the manometer of your log wood boiler once a day, or at least frequently. Most defects in a heating system, not only leaks but also boiling over leads to a lack of water.

If the volume compensation is insufficient, water will be ejected from the safety valve. Either the expansion vessel is too small, the membrane of the expansion vessel is ruptured or a stop-cock or valve between the heating system and the expansion vessel is closed (open, remove lever or hand wheel and suspend from the fitting with a wire).

After venting the radiators the system usually has to be refilled.

Minimum pressure

For minimum pressure in the cold system (in particular the accumulator tank cold from bottom to top), add three metres to the heated building height above the heating pressure gauge. The result is the minimum pressure in metres. Dividing the metres by ten will give you the minimum pressure in bar, as most pressure gauges are marked.

Return temperature to boiler at least 60°C

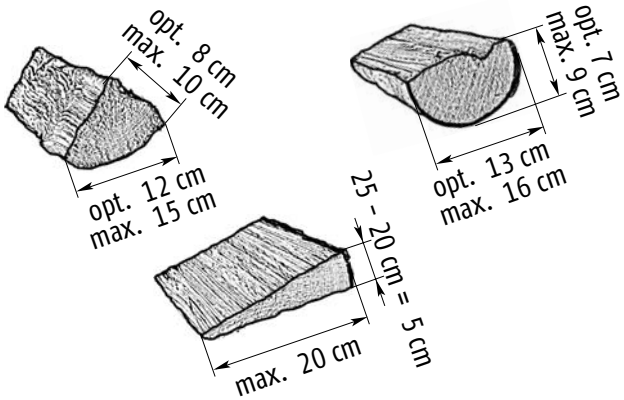
The boiler return temperature should be at least 60°C to eliminate corrosive condensate from the flue gases in the heat exchanger.

The return temperature is monitored. If the boiler return temperature is too low, a warning will be displayed.

Suitable fuel

The firewood must be air-dry, i.e. dried for at least one year with a moisture content of below 20% (see page 24).

Preferably half-metre logs with an average diameter of 10 cm. If the split surface is considerably longer, the log should be thinner, in extreme cases 20 to 5 cm.



Small material may only be used as a fuel together with larger logs. The smaller the material, the less may be added.

Wood briquettes 6 to 10 cm in diameter conforming to Austrian standard ÖNORM M 7135,

Germany: 1.BimSchV 15 Juli 1988 Fuel class 4

Only one oversize log per boiler filling

Chopping a rootstock into such thin pieces creates extra work. No more than one large rootstock may be added per boiler filling (top of pile).

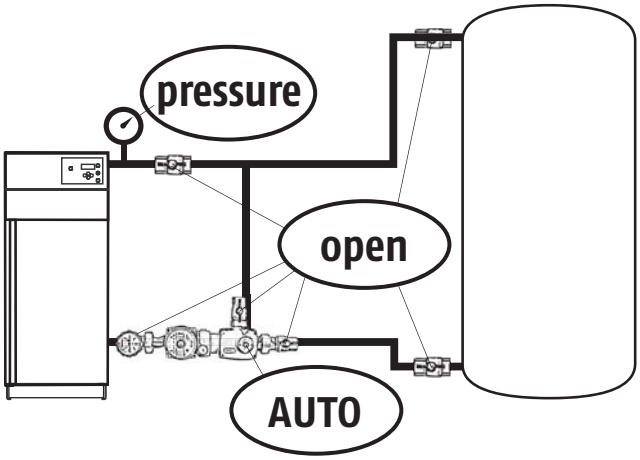
Unsuitable fuels

Wet material with a moisture content of over 20% may not be used as fuel. This will cause the formation of condensation water and corrosion to the walls of the fuel chamber.

Furthermore, the following materials may not be used as fuel:
Waste material, plastics,
paper and cardboard (only for firing up),
sanding dust, wood shavings,
wood chips smaller than your thumb,
coal and coke,
materials normally prohibited under the respective air pollution legislation (state law), such as old railway sleepers, plastics, chipboard, impregnated wood ....

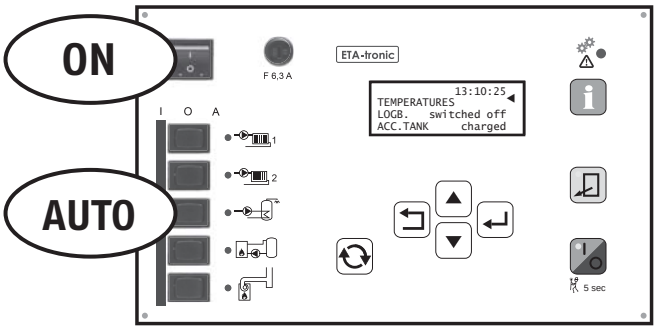
Water pressure OK and heating ducts open

Check the water pressure in the heating system (page 8). When the system is new or has not been in use for some time, check that the riser valve is at AUTO status (for ESBE mixing valve, that the hand-operated knob has engaged at the AUTO function) and that all shut-off devices in the heating ducts are open (ball valves always completely open so that the seals do not deteriorate). Valves open when turned anti-clockwise; to relieve the spindle from the fully-open position, turn back a quarter revolution.).



Switch on at mains switch

Normally the mains switch is on throughout the year. If it is switched off, switch on the mains supply. In response the display will light up and the program will be loaded (takes about 1 minute).



Turn all "manual-off-auto" switches to the AUTO position

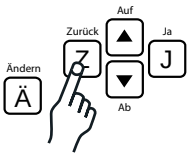
Check that all the "manual-off-auto" switches for the pumps and draught fan on the operating panel are at the AUTO position.

Only ignite the fire when the accumulator tank is empty.Check the accumulator tank load status.

In particular in summer and intermediate seasons, the fire may only be ignited or stoked when the accumulator tank is unloaded.

Press the [↩]-button several times and the [↵] button once to reach the submenu TEMPERATURES. The accumulator tank load status will be displayed in percent; this is calculated by the controls from the average of the three accumulator tank sensors between 30°C and 80°C..

If the accumulator tank cannot be discharged to below 30°C, for example in summer with high return temperatures from the hot water tank or in the case of hot-air heating, orientate yourself to the median and upper accumulator tank temperature displayed in the same submenu.

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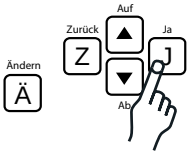
          13:10:25
TEMPERATURES      ◀
LOGB.  switched off
ACC.TANK    demands
```

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Boiler          20°◁
Exh.Gas         20°
HWT             15°
AccTank Charge  39%
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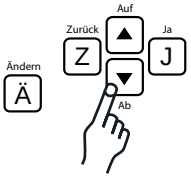
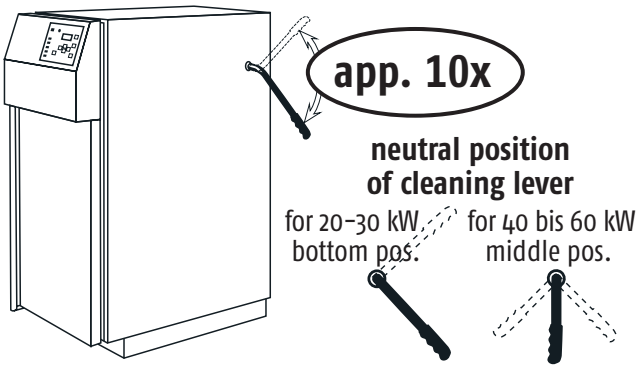



```
AccTank Charge  39%
AccTank top     64°
AccTank middle  43°
AccTank bottom  42°◁
```

Before opening the insulating door Clean the heat exchanger

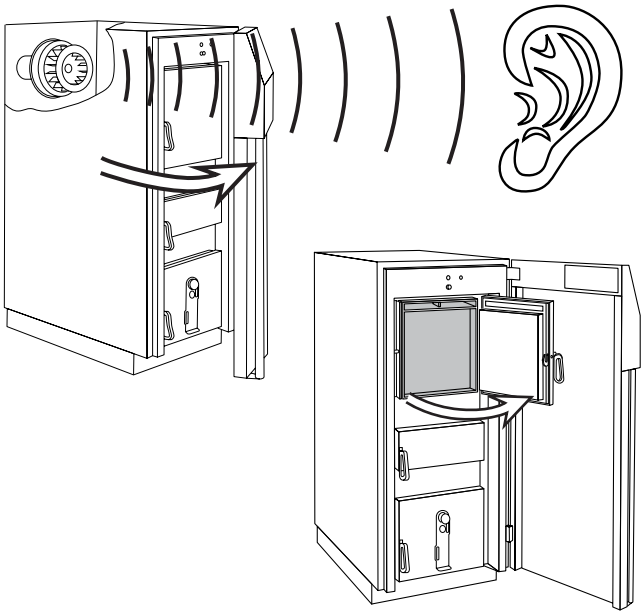
Clean the heat exchanger with a closed insulating door before lighting the fire; rattle the cleaning lever at the side of the boiler about ten times. In the 20 and 30 kW boilers leave it in the bottom position. In the 40 to 60 kW boilers leave it in the middle position (the turbulators should come to rest in the water-cooled heat exchanger tube)



Open the insulating door

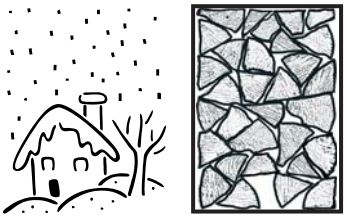
The draught fan will start up automatically. If you do not hear a fan:

- Either the fan has switched off due to the excess boiler temperature. An INFO "Excess boiler temperature => more heat removal" is displayed. Check the heat removal and wait until the boiler content has burned out.
- Or the "manual-off-auto" switch of the draught fan on the operating panel is not at the AUTO position.



The draught fan must be in operation

before the filling door (top boiler door) is opened. If the boiler is not guaranteed to be cold, do not open any boiler door when the draught fan is not running. If the wood is smouldering, the sudden draft of air may cause a flash-back.

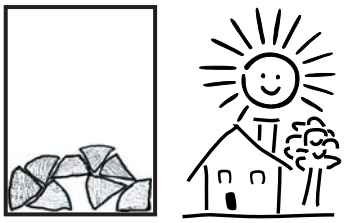


Open the filling door (top boiler door).

The combustion chamber door (lowest boiler door) must always remain closed, both in the start-up and burning phase. It is opened only for the removal of ash.

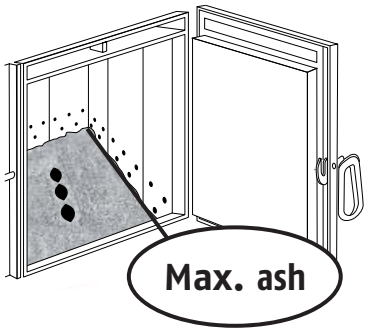
Heat with less wood for hot water in summer and between the seasons

Only partly fill the fuel chamber if the heating system is to be used only for hot water in summer or at low capacity between the seasons. See the table on page 13 for the correct fuel volume. Special attention must be paid to the differing energy density of the fuels. A full fuel chamber of spruce is equal to 2/3 of beech or 1/3 of briquettes.



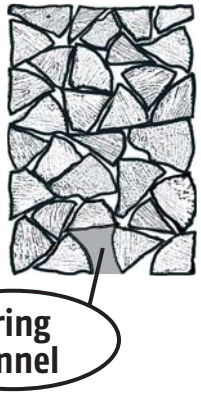
Keep primary air vents free of ash

Air holes are let into the hinged apron above the ash bed in the fuel chamber. The upper two rows must be kept free (ash removal see page 14).



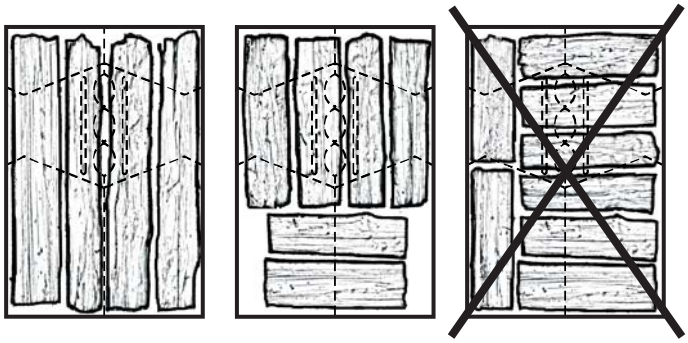
Leave a gap in the lowest layer of logs, so that the grate opening remains open.

On the one hand the grate openings may not be covered; on the other hand igniting is safe and easy with a firing tunnel.



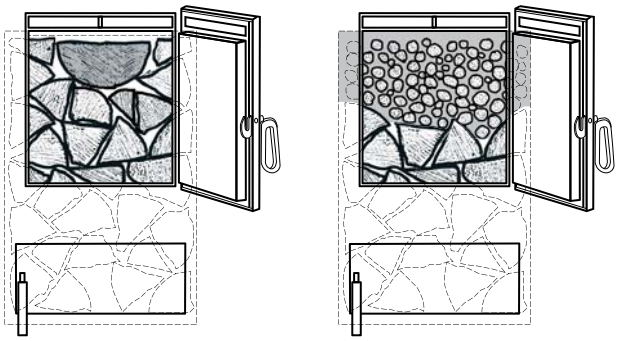
Stacking wood in the fuel chamber

The wood pile should be stacked, not arbitrarily thrown in. Short logs should also be placed lengthwise on the grate at the back. The remaining space towards the front can be filled cross-wise with logs. In this case insert a cardboard tube at the bottom as a firing tunnel.



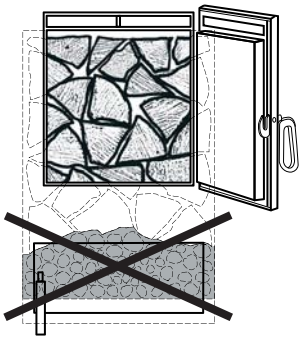
Only burn one oversize log on top

One oversize log or rootstock may be placed in the upper layers, but no more than this. It may require two burning phases to burn up completely.



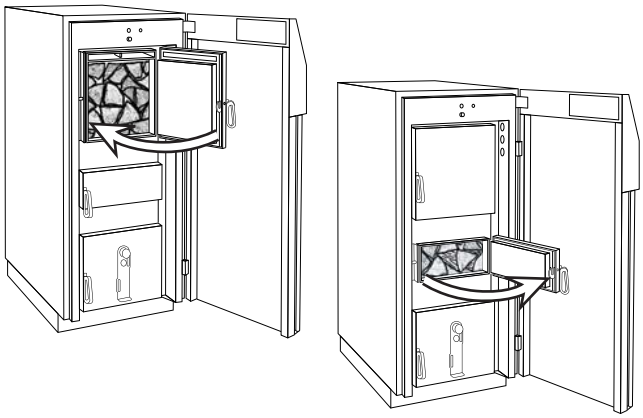
Brushwood, coarse wood chippings, joiner's waste may only be fired together with logs

If brushwood, coarse wood chippings or joiner's waste are added, fill the bottom half with the necessary amount of logs (at least three layers) and top up the fuel chamber with fine material, or lay alternative layers of logs and fine material. As a rule of thumb, the smaller the pieces, the less should be added.



Under no circumstances should the bottom layer consist of brushwood, coarse wood chippings or joiner's waste

This fine material burns too quickly. In the cold combustion chamber at the start the material does not burn up and the heat exchanger soots up.

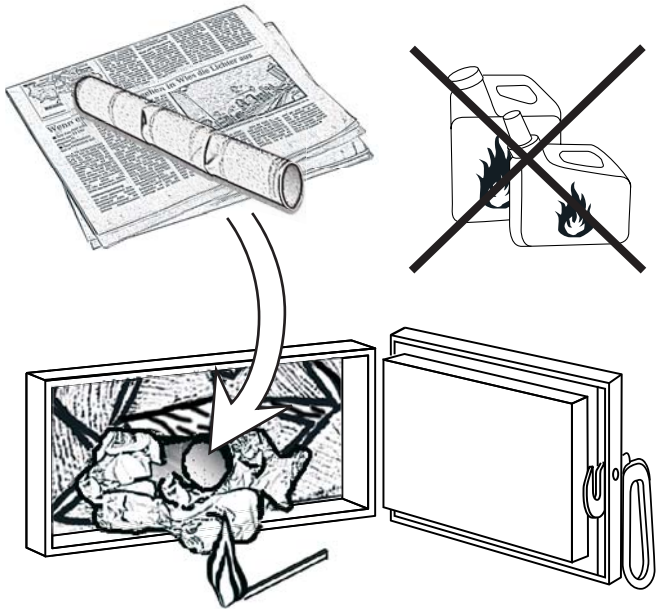


Close the filling door (top boiler door)

Open the firing door (middle boiler door)

Ignite the fire with cardboard and newspaper

Insert a cardboard tube into the firing tunnel or even above the bottom layer of logs (tip: cardboard tubes from kitchen paper rolls or two/three toilet paper rolls in a row serve as "flame throwers") together with 5 sheet of crumpled newspaper. If firing smooth hardwood, five to ten pencil to finger-thick wood shavings may be necessary.



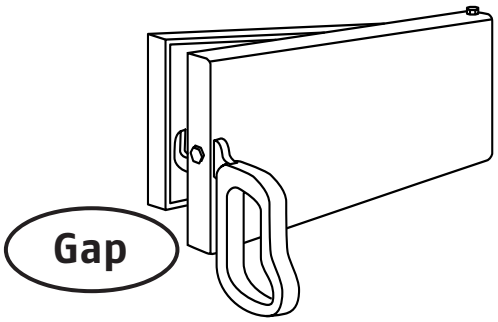
Do not use petrol, turpentine or similar

as a "kindling aid".

Danger of explosion!!!

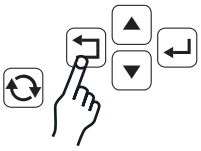
Close the firing door, leaving a small gap

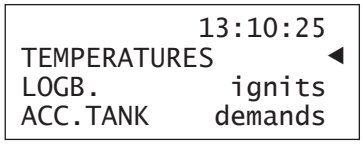
After igniting, leave the firing door (middle boiler door) slightly open.

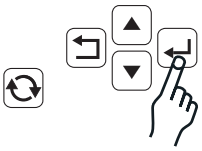


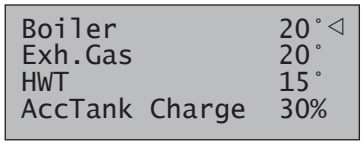
Understanding temperature displays on the controls

Do not close the firing door completely until some of the logs are well alight and the exhaust gas temperature increases to 100°C to 120°C. Press the [⮌] button several times and the [↵] button once to reach the submenu TEMPERATURES. This is wherethe exhaust gas temperature is displayed. The time it takes to catch fire depends on the type of wood. Raw spruce may take only 2 minutes, whereas smooth beech may take 5 minutes to reach 100°C exhaust gas temperature.



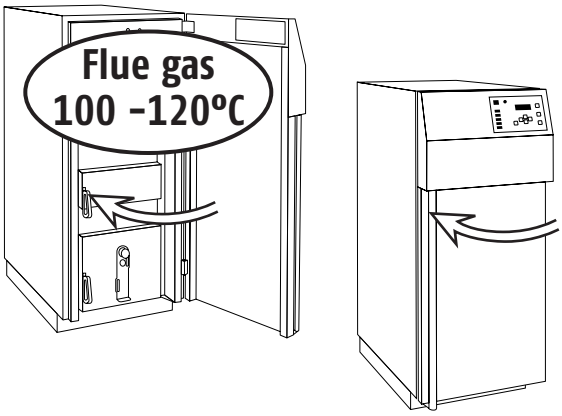






When 100°C to 120°C exhaust gas temperature has been achieved, close the firing and insulating doors

The electronic controls will automatically take over operation (in the event of a special configuration of the controls, it may be necessary to start the burning phase by pressing the [**I/O**]-button).



Green LED in the [I/O] button lights up

The green LED in the [**I/O**]-button must light up as confirmation that the controls have started the burning operation.

Adding logs

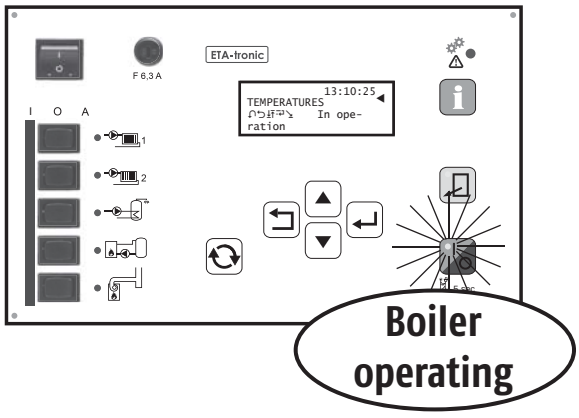
Normally there is no need to add logs until the accumulator tank charging status has fallen below 30% (shown in display of TEMPERATURES submenu) and the material in the fuel chamber has burned down (green LED in the [**I/O**]-button is not lit up).

If sufficient embers are in the fuel chamber, the newly added wood will ignite automatically.

If the wood is difficult to ignite and the remaining embers are low, it will help to push the charcoal together into the centre axis. Fill the fuel chamber with wood as when firing up. Leave the firing door slightly ajar until the exhaust gas temperature has reached 100°C to 120°C, then close all doors.

If the wood does not ignite from the remaining embers, set it alight by inserting paper or cardboard through the firing door.

Briefly check whether a warning appears on the display and the green LED in the [**I/O**]-button confirms that the controls have started the burning operation.



For low heating requirements place only a small amount of wood into the boiler

A larger accumulator tank volume than needed for winter operation and is normally installed, would be needed to utilise the total heat produced by a full boiler . If less heat is needed for hot water preparation in summer or in the evening shortly before the night temperature drop, fill the boiler only to the necessary level.

Press the [⮌]-button several times and the [↵] button once to reach the submenu TEMPERATURES. This is where the accumulator tank load status is displayed.

In the table below you will find the right wood quantity for summer operation, depending on the boiler size (fuel chamber volume), type of wood, accumulator tank volume and accumulator tank load status. Please note that a "accumulator tank top" temperature sensor that has been installed too low will reduce the useable volume.

When the living quarters must be heated a little, add more wood to the boiler than stated in the table below. For the correct amount, cautiously approach the full accumulator tank load, increasing the number of logs by one or two each time the boiler is stoked.

If too much wood is added, this will trigger an emergency shutdown of the boiler. Excess temperature of the boiler will cause the air intake to be interrupted. The fire will be extinguished, but the hot wood will continue to emit gas for some time. The wood gas not burnt due to lack of air will pollute the boiler and chimney with pitch. Once or twice, or in an emergency, that is no problem. But if it occurs every day, there will be a build-up of tar in the boiler's heat exchanger.

Take note of the energy density of the fuel

The energy content of 50-litre wood briquettes is equal to 100 litres of beech or 150 litres of spruce.

Accumulator tank load status

The accumulator tank load status is the average of the three accumulator tank temperatures between 30°C (=0%) and 80°C (=100%).

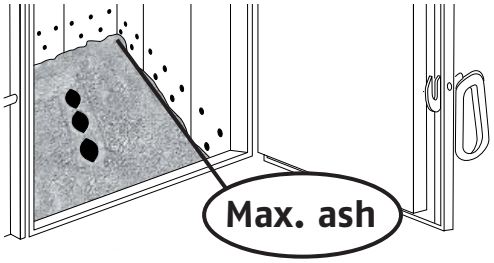
For hot water in summer or for a low heating requirement, fill only a small amount of wood into the boiler

20 and 30 kW boilers			Accumulator tank load in percent (read from boiler display)				40, 50 and 60 kW boilers		
Maximum fillin quantity			Size of the accumulator tank				Maximum fillin quantity		
Briquettes	Beech	Spruce	3.300 lt	2.200 lt	1.650 lt	1.100 lt	Spruce	Beech	Briquettes
			90%	85%	80%	70%			
			85%	78%	70%	55%			
		quarter	80%	70%	60%	40%			
	quarter		75%	63%	50%	25%	quarter		
			70%	55%	40%	10%			
		half	65%	48%	30%	0%			
			60%	40%	20%			quarter	eighth
			55%	33%	10%				
quarter	half	three-quarterl	50%	25%	0%		half		
			45%	18%					
			40%	10%					
		full	35%	0%					
			30%						
	three-quarterl		25%				three-quarter	half	quarter
			20%						
			15%						
			10%						
			5%						
half	full		0%				full		

Ash Removal

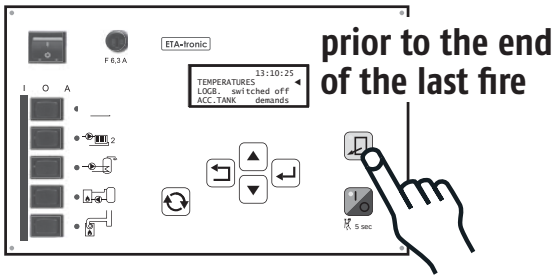
Remove the ash every week or two

In the fuel chamber the ash insulation is necessary for preserving the embers. For this reason, about 5cm of ashes should be kept in the fuel chamber. The time to remove ash is when it rises close to the primary air vents.



Interrupting ember preservation

After logs are added for the last time and the boiler doors have been closed, press the yellow "**Ash removal**" button. Ember preservation will be switched off and the boiler will burn empty. The "**Ash removal**" button can be kept depressed until shortly before the fire dies out.



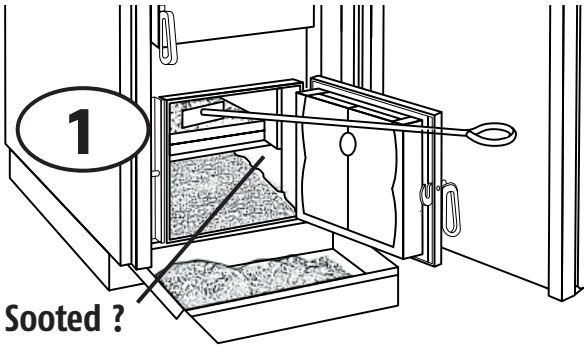
The walls of the ash collection channel may not be fouled with soot

They should be white to brown in colour. If they are black with soot, either too much wood was added with inadequate heat removal (page 13), or the fire poorly ignited when firing up (page 11), or in extremely rare cases the lambda measuring device delivers incorrect values (page 20).

First of all the combustion chamber and ash collection channel

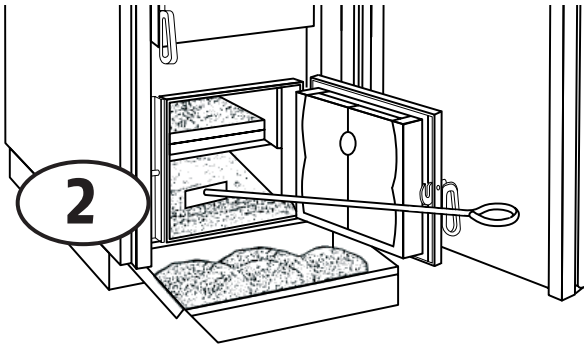
Use the rake to draw the ash from the combustion chamber and ash collection channel into the ash box. Do not push the ash to the back. The rear corner of the ash channel must also be cleared. No ash pile should be allowed to accumulate on the lambda probe.

If you leave the draught fan running during the ash removal process, clear the ash slowly and carefully from the boiler to avoid it being whirled up and blown up the flue into the open air.



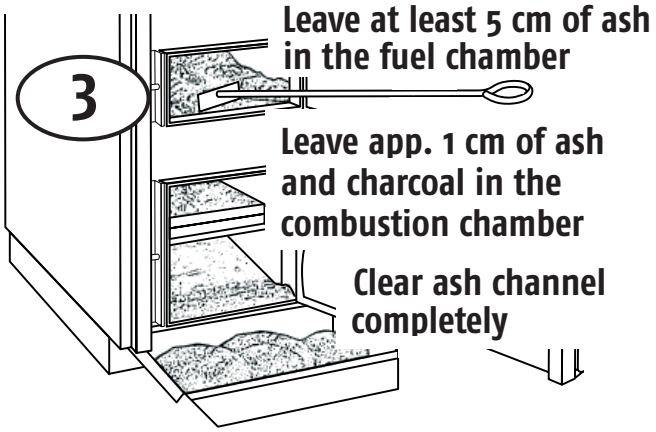
The ash-charcoal mixture from the fuel chamber remains in the combustion chamber

When the combustion chamber and ash channel have been cleared, rake only a part of the ash from the fuel chamber into the combustion chamber. A layer of ash at least 5cm thick should remain for ember preservation. Pieces of charcoal will also fall into the combustion chamber, and it is best to leave them there. The charcoal will burn up in the next firing cycle and the ash layer will protect the floor of the combustion chamber from excessive wear.



Fill no embers into the dustbine

If embers are still present in the ash, fill the ash into a fireproof container and leave it to stand for at least 2 days. Do not place it into the dustbin until you are sure there are absolutely no embers left in the ash.



Do not insert the ash box into the boiler

Although the ash box could be inserted into the ash channel with a boiler size of 40-60 kW, it is not intended for the purpose and would be destroyed by the high temperatures in the ash channel.

Automatic removal of excess energy

If, for whatever reason, the boiler water temperature rises above 87°C (factory default), the accumulator tank charging pump will be set into action (if it is not already operating). Above 88°C (factory default) the heating and hot water tank pumps connected to the boiler controls will be switched on, in order to remove the heat from the boiler. This prevents the boiler temperature from increasing further and triggering the safety precautions. Heat removal is thereby limited with the maximum water flow temperature setting of the heating circuits and the desired boiler temperature.

In this connection, check that the maximum flow temperature in "MC .." -> „Flow temp. MC .. MAX" is set correctly. In the case of under floor heating systems with plastic pipes the maximum temperature is 50°C, radiators with metal ducting will withstand temperatures of up to 85°C.

More heat removal – too much wood?

At a boiler temperature of 90°C (factory default) the draught fan will be switched off and the INFO message "Excess boiler temperature => less fuel" will appear on the display.

Either too much wood was added (see page 13), the heating circuits were unexpectedly switched off, a pump has failed or a heating duct was inadvertently closed.

Once the boiler has cooled down to under 86°C (factory default), heating operations will automatically be resumed. The INFO message must be acknowledged by pressing the [↵] button.

Warning: with every emergency shutdown by the boiler temperature control, the logs will continue to emit gas for a while. The non-burned wood gas will create a tar deposit inside the boiler and flue.

Boiler temperature control – emergency shutdown

At 96°C (tolerance range 93°C to 99°C) the boiler temperature control will switch off the induced draught fan and the message "Boiler temp control triggered" will appear on the display. Below 86°C the boiler will switch itself on again.

If the boiler temperature control triggers, please check that:

Boiler temp. SET VALUE is correctly set (70–85°C)
Boiler temp. MAX is correctly set (75–90°C) (SERVICE)
Firing and insulating doors are closed
Has the door contact switch been triggered?

Is there sufficient heat removal?
Has too much wood been added? (see page 13)

Thermal discharge safety device
(to be supplied by the fitter)

Independently of the boiler temperature control, the thermal discharge safety device will trigger in the range 92°C to 97°C. It permits drinking water to be released into the duct through a safety heat exchanger in the boiler. Excess heat is thus extracted from the boiler into the duct. The thermal drain valve is opened via a sensor system in which a liquid expands when heated (without electricity).

If the thermal drain valve is activated too often, check whether it is triggered at below 92°C and replace it if necessary.

Automatic deactivation by the STL:

As an additional safety precaution against boiler overheating, the boiler is fitted with a safety temperature limiter (STL) that switches off the draught fan when the boiler temperature reaches 105°C (tolerance range 99°C to 105°C). When the boiler temperature has fallen below 70°C the STL can be deactivated. The deactivating button is set into a drill hole in the door frame above the charging door. To deactivate it, it must be pushed deep into the hole, preferably with a match.

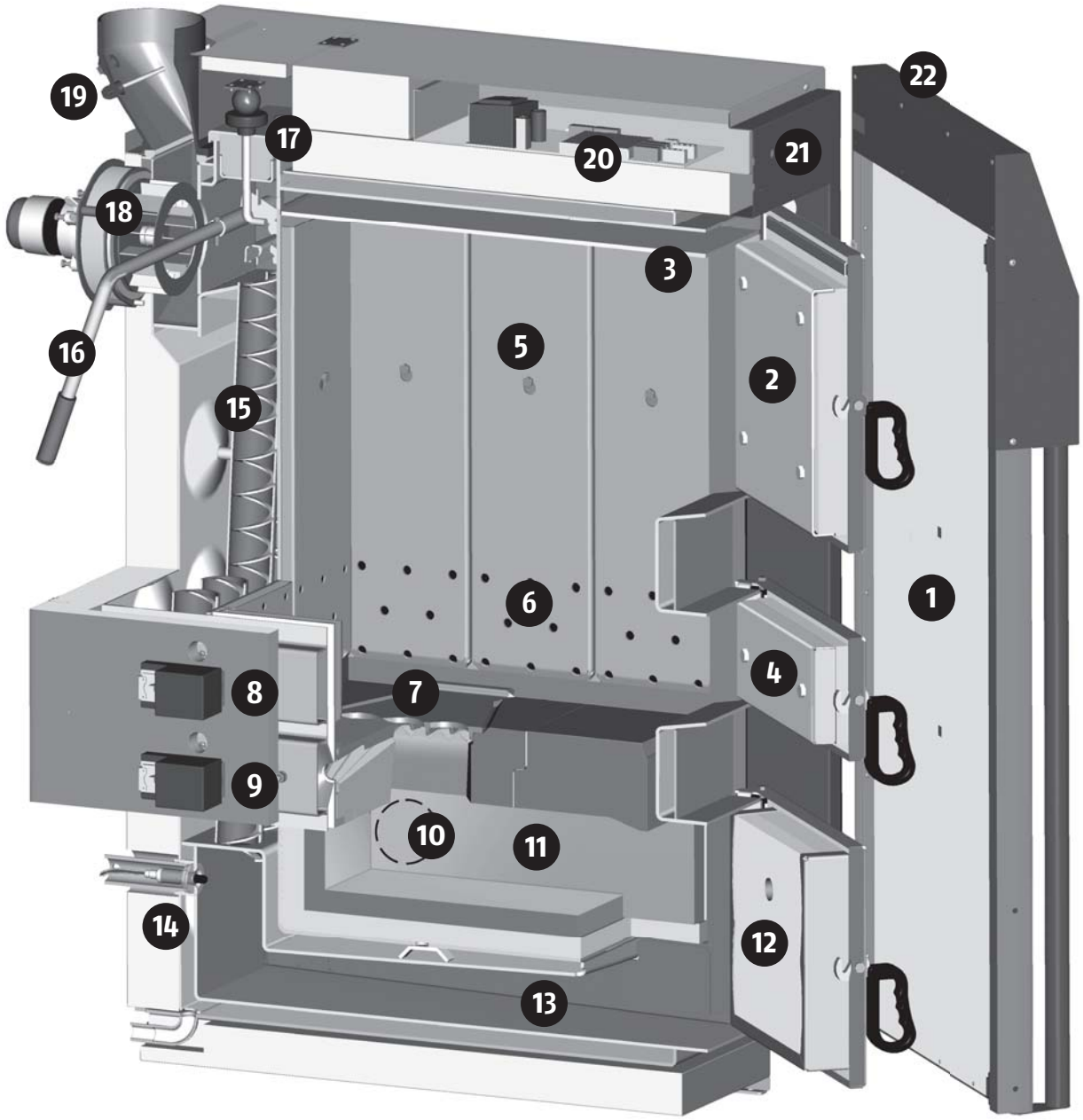
Safety valve (to be supplied by the fitter)

The most common cause of safety valve activation is when the expansion vessel is too small or the heating ducts are closed.

However, the safety valve also acts as a reserve safety device against boiler overheating when all other safety mechanisms have failed. For this purpose it must be mounted in the intake at the exit point of the boiler (in the return it cannot remove any heat). In rare cases, when neither the thermal drain valve nor the safety temperature limiter (STL) have been activated, the temperature and pressure will rise until the safety valve opens. If this occurs, the thermal discharge system device and safety temperature limiter (STL) must be checked for proper functioning.

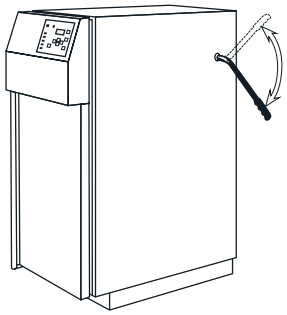
In the case of cold water drawn from a domestic well with one's own pump, a power cut may be the reason for failure of the thermal discharge system device. If this occurs frequently, a larger pressurised tank is required in the domestic water supply, or a separate pressurised tank for the thermal discharge system device.

Sectional view of boiler



1 **Insulating door**
2 **Filling door**
3 **Carbonisation gas suction channel**
4 **Firing door**
5 **Hinged apron** in fuel chamber
6 **Primary air vents** in the hinged apron
7 **Grate** with **secondary air vent** behind
8 **Primary air actuator**
9 **Secondary air actuator**
10 **Pellet burner connection** (only model SH-P)
11 **Hot, refractory-lined combustion chamber**
12 **Combustion chamber door**
13 **Ash collection channel**
14 **Lambda probe**
15 **Turbulators** in heat exchanger
16 **Cleaning lever**
17 **Heat exchanger cover**
18 **Exhaust gas fan** (induced draught)
19 **Exhaust gas temperature sensor**
20 **Controls**
21 **Safety temperature limiter (STL)**
Release knob inset into door frame
22 **Operating panel** mounted in the insulating door

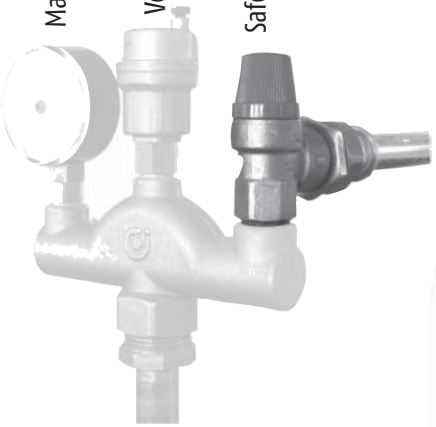
Each charging

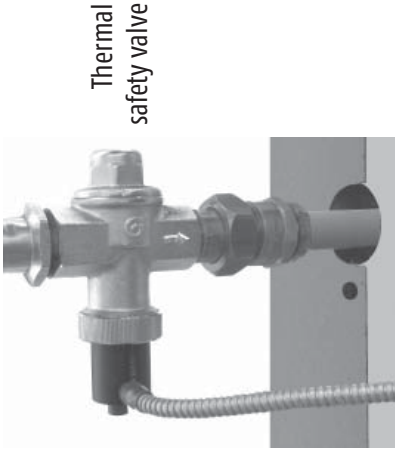


- Move the **cleaning lever** up and down about 10 times(before opening the insulating door, when the draught fan is inactive).
- Check **heating water pressure** (see page 8)

Every week or two

- **Remove ash** from the combustion chamber (see page 14).
- **Is the wall of the ash collection channel black with soot?**
  It should be white to brown. If the ash collector wall is black with soot, either too much wood was added when the heat removal was too low (see page 13), or the wood **did not ignite properly** because too little paper/cardboard was used (page 11), or in extremely rare cases the **lambda measuring device** delivers **incorrect values** (see page 20).
- Check that the **thermal drain system** and **safety valves** are tightly closed (exhaust gas ducts should not drip). To enable this optical check, the exhaust gas ducts of the safety devices must be conducted via a free flow segment, either through a siphon funnel to the channel or through a pipe to the floor (protection against scalding).



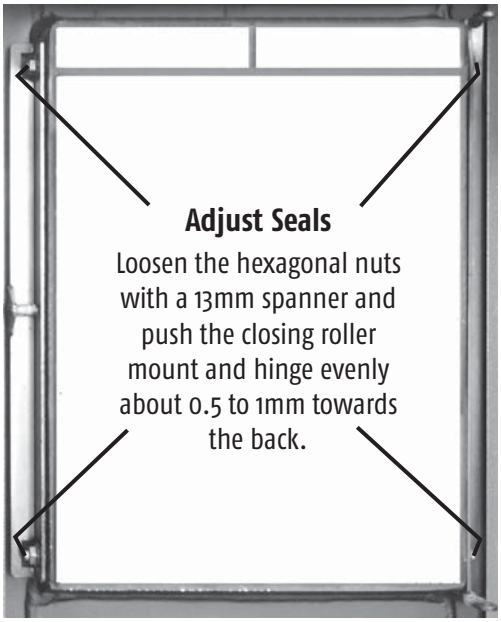


Cleaning and maintenance

Annually
A service contract is possible for these tasks:

- Check the **residual oxygen display** by switching on the boiler controls with the [**I/O**]-button. With open boiler doors and no fire, after 5 minutes the display (menu "LOGB." -> "Residual oxygen") must show at least 18% . If this is not the case, call customer service.

- Check that the **doors are air-tight**. The boiler handle must engage tightly (applying some pressure), the sealing edges of the doors must close evenly and leave a visible impression on the sealing bead. The seal between the carbonization gas suction channel and fuel chamber opening must be checked particularly carefully. Leaky sections can be identified by variations in the colouring on the sealing bead or with a cigarette lighter while the induced draught is running. The flame will be drawn through the leak.
  If leaks are found, it usually suffices to adjust the hinges and the closing roller mount (see picture). It is not always necessary to replace the sealing beads.

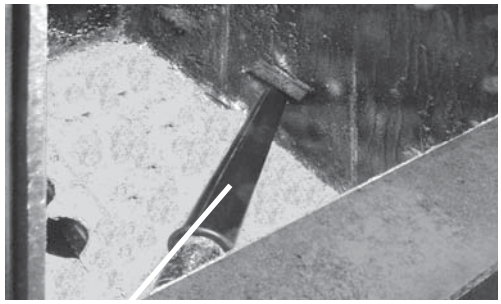


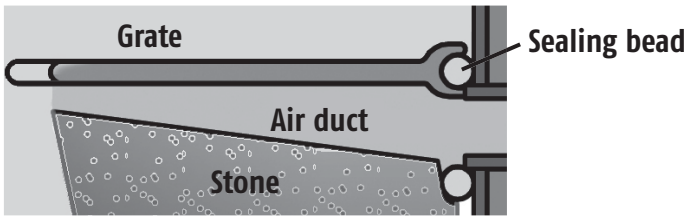
- Detach the **hinged plates** and remove the ash from behind them. The plates are suspended from a rivet in the upper fifth. Lift them slightly and swing out to remove.

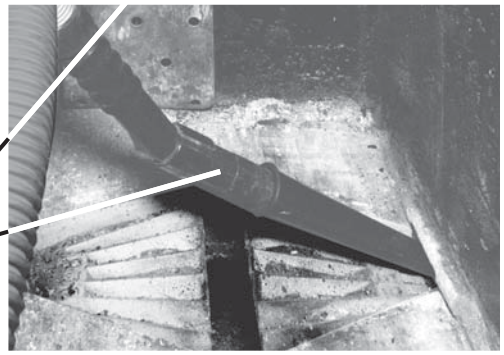
  Check the **primary air** intake vents (approx. 10cm above the fuel chamber floor behind the hinged plates) and clean with a vacuum cleaner

- Lift out the **cast grate** and remove the ash from the **air intake vents** and the **secondary air duct** below it.

  When placing the grate, ensure that the semi-circular sealing groove of the grate is seated on the sealing bead above the secondary air vent in the boiler wall.







Fire risk
Either wait with vacuuming until no embers are left in the boiler, or use a **vacuum cleaner** with a heat-resistant ash trap.

- Check that the **flue pipe** from the boiler to the chimney is **air-tight**. The points at which dust or flue gas escape can be recognised by discoloration.

  The flue gas pipe can be sealed with heat-resistant silicon 400°C and aluminium sealing tape. Since there are different alternatives for flue gas duct junction with the chimney, the chimney sweep should be consulted on leaks in the connection.

- Turn off the **mains switch** before embarking on the following tasks.

- **Flue pipes whose horizontal section is longer than one metre must be cleaned**

- Open the heat exchanger cover (at the top of the boiler in front of the flue gas duct) and remove the ash from the **heat exchanger collecting chamber** with a vacuum cleaner. Do not reclose the chamber until the induced draught fan has been cleaned.

  If the turbulators and their supporting brackets are fouled by pitch, the cause is often adding more wood to the boiler than actual heat requirement calls for (see page 13).

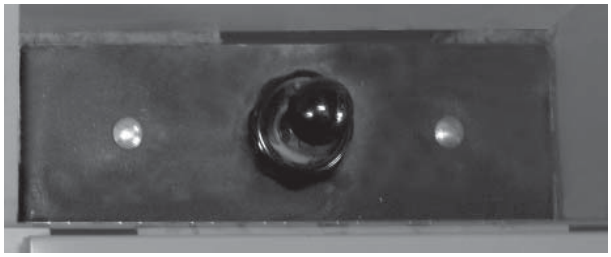
- Dismantle the **draught fan** and clean the impeller with a soft brush, toothbrush (not a wire brush) or compressed air. Watch out for balancing weights, to make sure that they are not lost or shifted. These are metal clips attached to the inside of the impeller blades. Cleaning must be carried out carefully and without the use of force, to ensure that the motor shaft is not distorted.

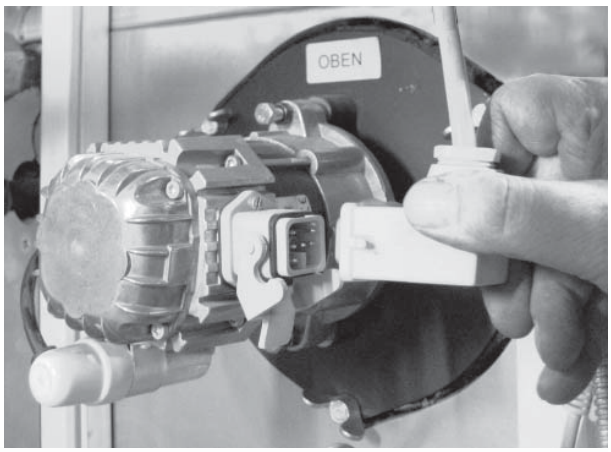
  The reason for fouling of the impeller is either (seldom) a defective lambda probe or (more often) a boiler repeatedly overfilled with wood despite low heating requirements (see page 13).

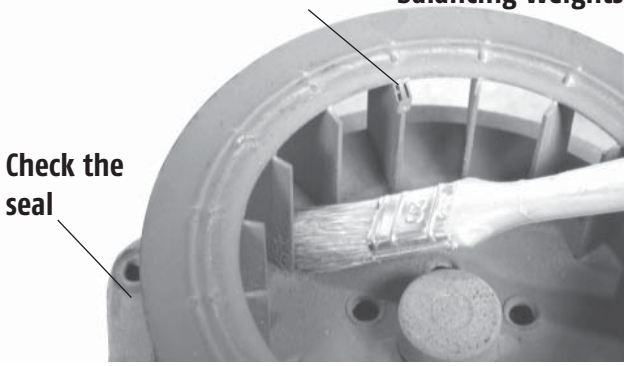
  Check the seal prior to installation. Make sure that the plug-in connection on the installed draught fan is pointing to the right (as seen from the back of the boiler).

- Check the boiler **safety valves** and, in the case of solar feed to the accumulator tank, the accumulator tank as well. The membranes of the safety valve may stick on the sealing seat due to excess temperature.

  Open the valve by turning the knob on top. Water must flow to the channel. Then the valve must be reclosed tightly. It may be necessary to open it several times until it closes tightly. If the valve drips, the seal is defective and must be replaced (heating fitter).







Cleaning and Maintenance

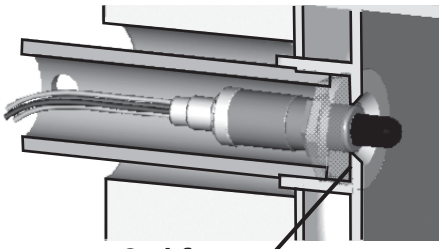
Every three years
or if prompted by the controls:

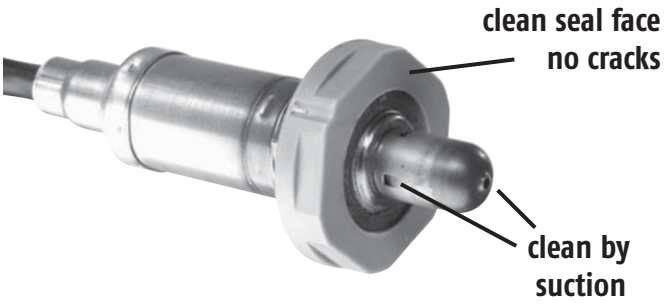
- The **thermal drain valve** and **safety temperature limiter (STL)** must be inspected at least every three years to ensure that they are functioning properly. This inspection may only be carried out by a professional.
- Dismantle the **lambda probe**: Switch the boiler off at the mains and unscrew the stay pipe with a small pipe wrench (water pump wrench) by inserting the wrench into the holes. Allow the probe to cool down, then clean with a vacuum cleaner, making sure that the openings in the sensor cover are completely clear.

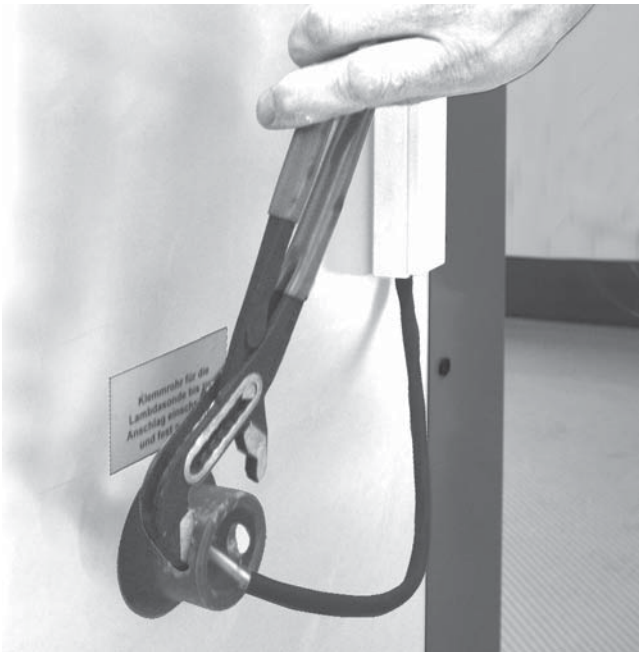
  If the plastic seal of the built-in flange is cracked, it must be replaced (order from customer service).

  The sealing seat in the boiler must be absolutely clean. Use a flashlight to check for ash crust; remove with a screwdriver and clean out the socket with a vacuum cleaner. The clamping pipe must be screwed tightly (20 kg with a 20cm lever).

  Excessive wear on the combustion chamber occurs either due to unsuitable fuel or faulty installation of the lambda probe. If incorrect admission of air by the lambda probe causes the controls to restrict air intake, the temperature in the combustion chamber will rise above the permissible level. Increased ceramic wear will be the consequence.







Service contract

In Germany the inspection and servicing of heating systems is prescribed by the Energy-Saving Regulation (EnEV). We recommend having your heating system serviced regularly in order to guarantee trouble-free, energy-saving and environmental friendly heating operation. The best solution is to take out a service contract with your heating specialist or our customer service.

Cleaning of housing and operating panel

The boiler housing and the operating panel should be wiped off with a moist cloth and (if necessary) a standard household cleaning agent (no scouring agent)

Approval, lime, corrosion, frost, strap-on sensor

Approval

Every heating system must be approved!

In Austria the mayor's or municipal office must be notified of installation and conversion;

in Germany the district chimney sweep or the building authority must be notified.

Operation only by familiarised persons

The system may only be operated by persons who have been properly briefed. The familiarisation may be performed by the fitter, heating engineer or our customer service. Please read the instruction manual carefully in order to avoid errors in the operation and maintenance of the boiler.

Children must be kept out of the boiler room!

First-time filling with decalcified water and sufficient stopcocks

ÖNORM H 5195-1 "Prevention of damage by corrosion and scale formation in closed warm-water-heating systems at operating temperatures of up to 100°C" and VDI 2035 "Guidelines for the prevention of damage by corrosion and scale formation in warm water heating systems" require decalcified water for heating systems with larger water volumes.

Since standard procedures do not enable problem-free full decalcification to 0°dH, at least the value of 20,000 lt °dH for system volumes (in litres), multiplied by the hardness (in German degrees of hardness) should not be exceeded. For example, with a system volume of 2,500 litres and filling water of 15°dH this gives a value of 37,500 lt °dH – which is too much. The

filling water must be decalcified to 8°dH for a volume of 2,500 litres (20,000 divided by 2,500).

Approx. 0.25 kg of boiler scale are contained in a cubic metre of water at 15°dH. On half a square metre of boiler heat exchanger wall (scaling concentrates on this small surface area) it would form a 0.2mm thick boiler scale crust. This does not sound very serious, but with 2 m³ accumulator tank and 1 m³ system volume this would mean a thickness of 0.6 mm. With thicker layers, the flow of heat through the boiler wall is already so restricted that the boiler wall is no longer adequately cooled and cracks may occur due to thermal stress.

In practical terms this means that the boiler will take no damage if the system is filled with water that has not been decalcified, assuming there is no need to repair the heating system and that no leaks occur during its service lifetime (defective bleeders or safety valve failing to close) forcing you to top the system up with water.

To make sure you have a sufficient safety margin for topping up, you must fill up the new system with decalcified water. Make sure you fill the system entirely with decalcified water before first boiler start-up. It is too late to change this after you have used the boiler as the scales from the non-decalcified filling will already have spread through the boiler.

To reduce the need to change the water in case of repairs to the system at a later time, you must have the ability to shut off all large volume components, such as accumulator tank, the boiler and the heating circuits to avoid introducing lime on topping up.

Corrosion protection

To keep corrosion to a minimum the pH value must be set to between 8 and 9 using suitable inhibitors (trisodium phosphate or caustic soda).

Frost protection

If a house with average insulation is left unheated at low winter temperatures for longer than five days, you will need some kind of active frost protection – at least a heating element in the accumulator tank.

If the building is unoccupied for longer periods of time in winter, you can add up to 30% anti-freeze to the water. To compensate for the disadvantage of lower heating capacity and greater flow resistance, you will typically need slightly higher flow temperatures.

Insulating the strap-on temperature sensor

If a pipe is not heat insulated in the vicinity of a temperature measuring point, the measured temperature value will be lower than the actual temperature. For this reason it is important not to do without or skimp the pipe insulation for boiler return line temperature sensors or heating circuit flow sensors.

In case of uninsulated pipes, you need at least 20 mm of rock wool as insulating material for 20 cm of the pipe length to insulate the measuring point.

Return, safety valve, thermal drain valve, compenastion ves-

Return temperature rise control

Wood contains water. If the temperature in the boiler is too low, water vapour from the flue gas will condensate on heat-exchanger surfaces. This can lead to corrosion and a leaky heat-exchanger. To prevent this, the water temperature at the boiler inlet must be at least 60°C. As the return line temperatures are typically lower, return temperature rise control is required – preferably with a mixing valve that adds hot water to the boiler return line within a controlled system.

The mixing valve also supports residual heat use. If the accumulator tank bottom is colder than the boiler when the fire is extinguished, the boiler control system opens the mixing valve once again, and switches the boiler pump on to make use of the residual heat.

Safety valvel

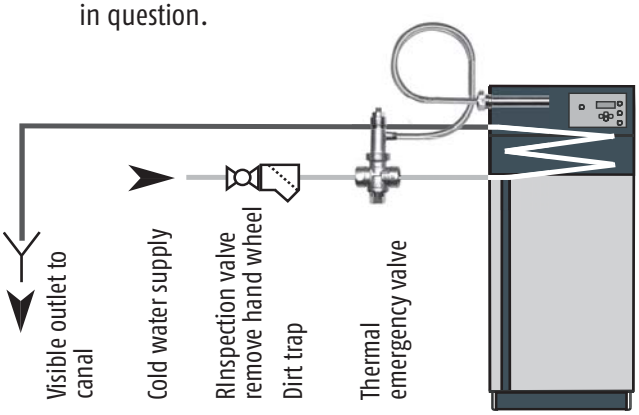
The heating system contractor must install a safety valve with a maximum opening pressure of 3 bar in the boiler flow line. A shut-off valve must not be fitted between the boiler and the safety valve. If solar energy or other sources of heat are fed to the accumulator tank by means of a heat exchanger, the accumulator tank must also be fitted with a safety valve (max. 3 bar).

To be able to dissipate heat in case of emergency, the safety valve must be fitted in the boiler flow line. This is the only way to dissipate heat by blowing out hot water and steam.

The outflow must be routed via a clearly visible, open channel (siphon funnel) to the canal for a clear view of malfunctions, and above all to allow valve closing failure to be detected. If there is no canal connection available, the blow out side of the valve must at least be routed through a pipe to the ground to avoid danger to life and limb when blowing out hot water or steam.

Thermal emergency valve

DThe safety heat-exchanger fitted in the boiler must be connected to the building's cold water supply via a thermal emergency valve (opening temperature 95°C) to protect the boiler against overheating in case of pump failure. The inlet must be fitted to the lower connector on the safety heat-exchanger, the upper connector acts as an outlet to the canal. To avoid inadvertent shutting off of the inflow, remove the lever on ball valves, or the hand wheel on valves and use a piece of wire to hang it on the fitting in question.



To be able to detect malfunctions visible routing of the discharge flow is required. The water exiting the system either reaches the canal via a siphon funnel, or is at least routed through a pipe to the floor to avoid danger of scalding if the valve is triggered.

If cold water is drawn from a well with a separate pump, a thermal drain valve still must be fitted to the wood gasification boiler. If you have a generously dimensioned air tank, water will still be available in case of power failure. If the power supply is erratic, a pressurised tank is required for the thermal drain valve.

Pressure compensation and ventilation

A membrane expansion vessel with a gross content of approximately 10% of the system volume, or a constant pressure system must be fitted to the system's return line between the boiler and the accumulator tank (see the clause on voiding the warranty on page 4). All shut-off elements in the path from the expansion vessel to the boiler and in the path to the accumulator tank must be implemented either as capped valves or the hand wheel or lever must be removed from the element (and hung on the valve with a piece of wire) to prevent inadvertent closing.

If the pressure difference between cold and hot heating (accumulator tank fully loaded) is above 1.5 bar for a single storey heating system, or more than 1 bar for a three-storey heating system, the espansion vessel is too small and must be enlarged

If you fail to install a sufficiently large expansion vessel, the system will take in air on cooling; this air will be absorbed by the cold water and transported

to the boiler. The air escapes from the water again at the point with the highest temperature. This is typically inside the boiler. This inevitably leads to the boiler wall rusting at the place where air escapes.

Automatic ventilation valves in the boiler flow line at the highest point in the distribution network, and at the top of the accumulator tank not only mitigate the danger of corrosion but also reduce the need to bleed radiators.

A minimum output level is necessary to achieve full and clean burning

The smaller the flame in the boiler, the lower the temperature will be in the combustion chamber. At about one third to one quarter of the nominal rating, the combustion temperature drops below 700°C. The tar components in the wood gas are no longer completely burnt off. This drastically impacts the efficiency (it can drop to below 50%), causes tar build up in the boiler's heat exchanger and in the chimney; it also causes unacceptable pollution due to unburnt hydrocarbons.

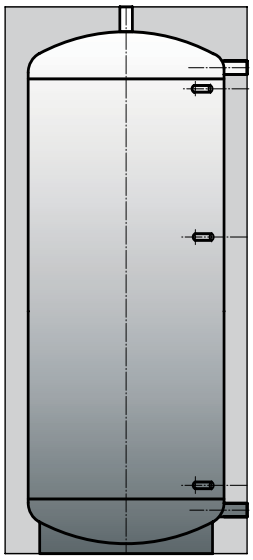
To use a wood-burning heating system in a clean and efficient way a minimum load is required; the best way to achieve this is to use an accumulator tank.

Why use an accumulator tank?

Many old wood-burning boilers that do not have accumulator tanks are still in use, so why do we need an accumulator tank with today's wood-burning systems? This is a frequently asked question: traditionally, in the days before heating control systems, the boiler used the thermal mass of the whole house as an accumulator. If the boiler is replaced, and the radiators are fitted with new thermostat valves and/or a control mixing system based on atmospheric conditions, the wood-burning boiler is operated at an too low output level in autumn and spring when the heating requirements are minimal. At low output levels, the temperature in the combustion chamber drops, but the wood gas production doesn't. Low flammability elements in the wood gas, such as tar or acetic acid no longer burn; instead they condensate (tar build-up) either in the boiler's heat exchanger or in the flue. Although you may not see this, it is certainly a danger to the environment.

To master low load operations, which are bound to occur with a modern, energy-saving controlled heating system, an accumulator tank is necessary. Heat produced by the boiler for which there is no meaningful use within the building is offloaded into an accumulator tank and retrieved by the heating system as needed, for example when the boiler is cold.

As a wood-burning boiler can't be switched off while there is still wood in the combustion chamber once it has been heated up, the accumulator tank must be able to store the energy produced by the wood in the fuel chamber.



No programmable thermostats required

The factory standard controls include week timers for two heating circuits.

If the heating pumps are controlled by the boiler controls, heat can be drawn from the boiler during temperature drop periods as long as there is wood in the boiler. This is very important if you accidentally put too much wood on in the evening, or if you intentionally heat up the boiler in anticipation of a cold night.

Programmable thermostats will switch off the heating pumps punctually at the preset time, even if you still have wood burning in the boiler, and even if the (undersized) accumulator tank is incapable of storing more heat. The only approach left open to the boiler is to stop air intake. Although this puts the fire out without the boiler overheating, the wood will continue to emit gas. The wood gas not burnt due to lack of air will pollute the boiler and chimney with pitch.

Split wood will dry out in just one summer

Why use dry split wood?

The water content for split wood in a logwood burner should be below 20% (air dry).

Damp wood with a water content of above 20% causes a moist climate in the fuel chamber. Corrosion of the boiler's fuel chamber can result from wood that is not sufficiently dry.

One summer is sufficient to dry out split firewood

If you use unsplit logs, like the one meter pieces typically stacked in forests, the logs will take two summers to dry.

However, you can speed up the process. If you fell the wood in winter (before the end of January), and split it immediately, you can achieve a moisture content of 15% by the following September. Split wood also burns far better than unsplit logs.

⚠ Unsplit logs take two months longer, and thus a second summer, to dry.

The best approach is to split the wood in lengths of 1m; split in half for a log diameter of up to 15 cm; quarter for up to 20 cm, split into sixths for up to 25 cm, and into eighths for up to 30 cm.

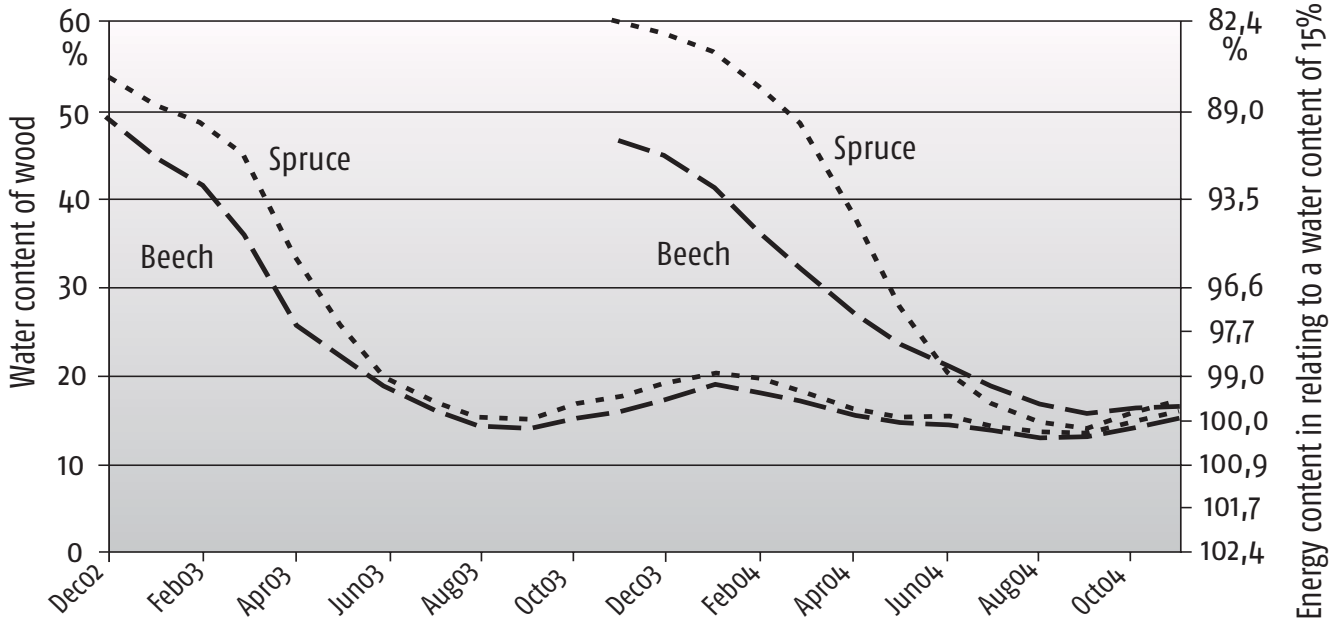
Store the wood in a windy place on a dry surface; stack on two logs or concrete pipes; cover the top only. Of course a sunny position is preferable, but it is more important to find a dry, windy place. Keep a gap between stacks. If you stack wood along a house wall, leave an air gap of at least 10cm between the wall and the stack of wood.

Wood stored outside in winter will absorb precipitated water. For this reason you should move the wood indoors in September, or temporarily store the wood in a warm room for a week before burning.

During storage the fuel value is impacted by processes similar to decay; depending on how dry storage conditions were, the loss can be between 1 and 3% per year. For this reason you should never store firewood for longer than 3 years.

Split the wood, store in a dry and windy place – one percent moisture more or less will not make a big difference

To sum up: only 2% fuel value lie between 20 and 10% water content. It is easy to achieve less than 20%, even if you cut the wood in summer, if you split the wood, and store it outdoors, but protected against the rain for a year.



Energy content of one cubic meter of wood

Fuel value of wood

Split wood is typically sold in stacks by the cubic meter. The energy content not only depends on the type of wood fuel. The amount of heat a cubic metre contains depends on whether you use unsplit round logs, 1 metre split logs, or stove-ready split logs, and on whether it is fresh from the forest or dried for firewood.

The wood volume stays constant from when it is freshly cut with 60% water content to the fibre saturation point at 25%. The wood starts to contract if dried below this point. It contracts, and this is why dry wood (15% water content) is more substantial than freshly cut wood. This is typically 5 to 6 % percent more for softwood, and 6 to 9 % for hardwood.

Logs are not typically straight. The longer the logs are, the less wood, and the more air you have per cubic metre. There is typically more air in „crooked" hardwood than in „straight" softwood.

There is one other difference: Round logs can typically be layered in a far more compact way than 1 metre split wood. If you split the wood yourself, buying round logs will give you up to 15% more wood.

Under practical conditions deviations in the order of +/-10% compared with theoretical values are to be expected. Up to 20% is possible in extreme cases. Not only because the wood is particularly straight or crooked, but because the density of the wood mass itself can vary.

Incidentally, if you order a cubic metre of beech firewood as 50 cm split logs from your wood dealer, the dealer is entitled to supply 0.85 m³ of half-metre split logs cut from 1 m³ of 1 metre split logs. To avoid unpleasant surprises ask your dealer how they measure a cubic metre (if the price is good, you can live with 0.85 m³).

Estimating your wood requirements

For each kilowatt of heating output 0.9 cubic metres of 50 cm beech split wood, or 1.3 m³ of spruce are needed per year.

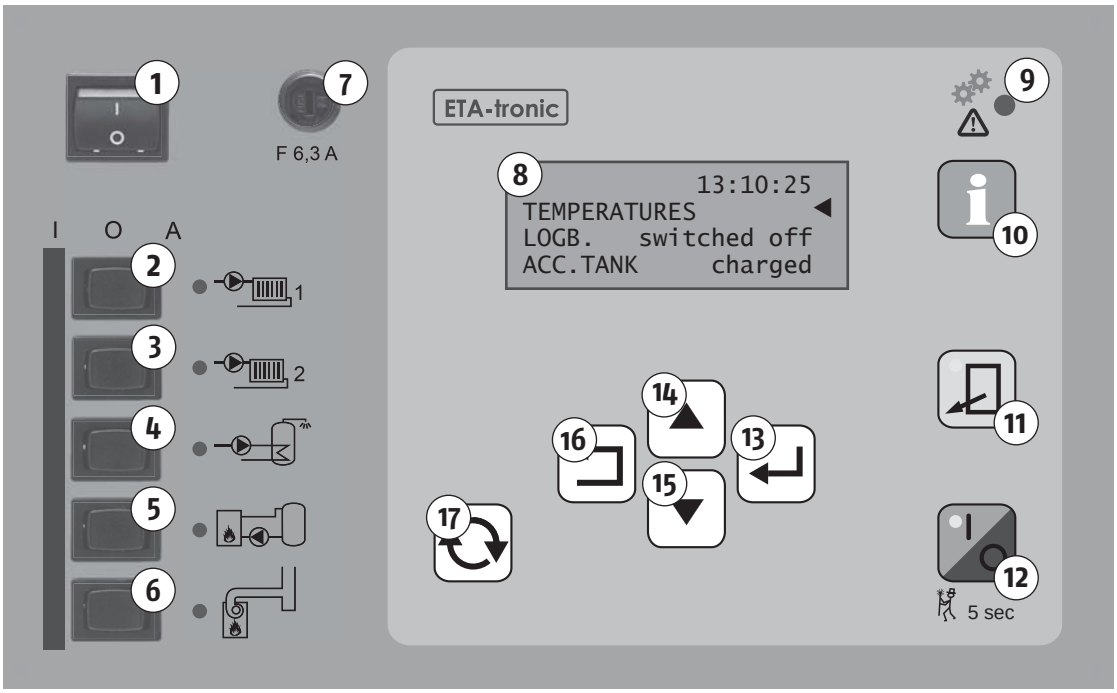
8 m³ of 50 cm split spruce or 5.5 m³ of beech will replace 1,000 litres of heating oil.

Energy content of one cubic meter of wood in kilowatt hours

The table assumes that the **firewood you use will be split and dry** (after one year's storage) with a water content of 15% when burnt even if it was moist when you bought it,.

	Round logs 1 m freshly cut w=30-60%	Round logs 1 m air dry w=15%	Split logs 1 m freshly cut w=30-60%	Split logs 1 m air dry w=15%	Split logs 50 cm freshly cut w=30-60%	**Split logs 50 cm air dry w=15%**	Split logs 33 cm freshly cut w=30-60%	Split logs 33 cm air dry w=15%
Softwood	**1m³ contains 0.65 solid m³**		**1m³ contains 0.56 solid m³**		**1m³ contains 0.62 solid m³**		**1m³ contains 0.64 solid m³**	
Fir	1.155	1.216	995	1.048	1.102	**1.160**	1.138	1.197
Spruce	**1.239**	**1.310**	**1.068**	**1.129**	**1.182**	**1.250**	**1.220**	**1.290**
Douglas fir	1.342	1.415	1.156	1.219	1.280	**1.350**	1.321	1.394
Pine	1.473	1.552	1.269	1.337	1.405	**1.480**	1.450	1.528
Larch	1.494	1.573	1.287	1.355	1.425	**1.500**	1.471	1.548
Hardwood	**1m³ contains 0.59 solid m³**		**1m³ contains 0.50 solid m³**		**1m³ contains 0.59 solid m³**		**1m³ contains 0.62 solid m³**	
Poplar	958	1.020	812	864	958	**1.020**	1.007	1.072
Willow	1.107	1.200	938	1.017	1.107	**1.200**	1.163	1.261
Alder	1.191	1.270	1.009	1.076	1.191	**1.270**	1.252	1.335
Maple	1.472	1.550	1.247	1.314	1.472	**1.550**	1.547	1.629
Birch	1.475	1.570	1.250	1.331	1.475	**1.570**	1.550	1.650
Ash	1.658	1.760	1.405	1.492	1.658	**1.760**	1.742	1.849
Oak	1.664	1.760	1.410	1.492	1.664	**1.760**	1.749	1.849
Beech	**1.655**	**1.800**	**1.403**	**1.525**	**1.655**	**1.800**	**1.739**	**1.892**
Robinia	1.743	1.920	1.477	1.627	1.743	**1.920**	1.832	2.018

Umrechnungsfaktoren von Festmeter in Raummeter nach A. Höldrich, H. Hartmann, M. Schardt (2006): „Rationelle Scheitholzbereitstellungsverfahren" Bericht 11 TFZ Straubing



1 **Mains switch**

2 **Heating pump 1**
„Man./Off/Auto"-switch and LED (green = operational)

3 **Heating pump 2**
„Man./Off/Auto"-switch and LED (green = operational)

4 **Hot water tank pump**
„Man./Off/Auto"-switch and LED (green = operational)

5 **Accumulator tank pump**
„Man./Off/Auto"-switch and LED (green = operational)

6 **Draught fan**
„Man./Off/Auto"-switch and LED (green = operational)

7 **Fuse** glass tube 6.3 A quick acting

8 **Display**

9 **Status LED**
green = operational, red = malfunction
flashing if system is set to „Manual"

10 „**INFO**" button for help texts,
explains setup and display values,
provides help for troubleshooting and error messages.

At SERVICE permission level, pressing the „INFO" button twice displays the terminal points (pins) for the inputs and outputs, and allows you to move the standard assignment to other pins.

11 „**Ash removal**" button disables ember preservation mode. If the LED is lit, the embers are burning down in the current firing cycle.

12 [**I/O**] button: the green LED on this button is lit if the boiler is in firing mode. LED is off if the boiler has burnt down. The factory default is for firing mode (induced draught starts) when the insulating doors are opened. You can use a special configuration to assign this start to the[**I/O**] button.

13 „Yes" button: : entry point for submenus,
confirm/save input values
acknowledge error messages.

14 „Up" button: cursor up, increase values.

15 „Down" button: cursor down, decrease values.

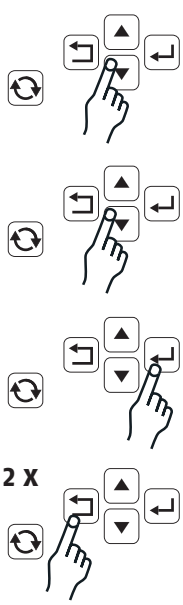
16 „Back" button: Back to parent menu or
quit a setting without saving.

17 „Change" button: Release the setting for modification, press twice to use the factory default.

Measuring emissions

Keep [**I/O**] button (12) pressed (for about 5 seconds) until "Emission measurement period 30 min." appears on the display (LED in the [**I/O**] button flashes). The boiler will revert to normal operations if the [**I/O**] button is pressed again or automatically after 30 minutes

Observe the instructions on page 5 for performing emission measurements




```
          13:10:25
TEMPERATURES      ◄
LOGB.   switched off
ACC.TANK     charged
```

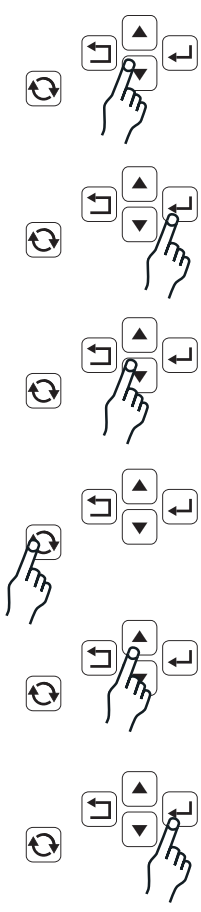
```
LOGB.  switched off
ACC.TANK    charged
HWT        charging
MC 1         ON DAY◄
```

```
Mode           AUTO◄
HEATING TIMES 1
Room 1          21°
HEATING CURVE   37°
```

```
          13:10:25
TEMPERATURES      ◄
LOGB.  switched off
ACC.TANK    charged
```

White display = main menu
Grey display = submenu

Pressing the [⮌] multiple times always takes you to the main menu from the main menu you can press [↵] once to go to the submenu with all the temperature.



```
LOGB.  switched off
ACC.TANK    charged
HWT TANK   charging
MC 1         On Day◄
```

```
Mode           AUTO◄
HEATING TIMES 1
Room 1          21°
HEATING CURVE   37°
```

```
heat until outdoor
...at day       18°
...at night      7°
EnableTemp  .   25°◁
```

```
heat until outdoor
...at day       18°
...at night      7°
EnableTeamp.    25°?
```

```
heat until outdoor
...at day       18°
...at night      7°
EnableTemp.     40°?
```

```
heat until outdoor
...at day       18°
...at night      7°
EnableTemp.     40°◁
```

Accessing and exiting submenus

1. Press the [▼]and [▲] keys
   to select the line you wish to access,
   gewünschte Einstiegszeile auswählen,

   solid black cursor
   ◄ indicates a submenu.

   An outline cursor
   ◁ indicates that there is no submenu available.

2. Press the [↵] to access the submenu.

3. Press the [⮌] to quit the submenu.

Changing settings (parameters)

For example the accumulator enable temperature for starting the pump on heating circuit 1: In the main menu use the [▼] and [▲] keys to go to the item `MK 1`, and press [↵] to access the submenu; then press [▼] and [▲] to access the `FreigabeTemp.` line.

1. Press the [↻] button to release for modifications.
   The cursor changes to a question mark and the value starts to flash.

2. You can press the [▼] and [▲] keys to modify the item.

   Press the [↻] button twice to use the factory default value.

3. Press the [↵] button to store the modified setting; the question mark becomes an arrow cursor again.

   or
   press the [⮌] button to cancel without saving, the question mark becomes an arrow cursor again and the original value is displayed.

Setting permissions

To change settings such as heating times, heating curves and hot water tank charging, you need a permission level of at least `Customer`. You can set this in the main menu.

First go back to the top menu by pressing the [⮌] button multiple times.

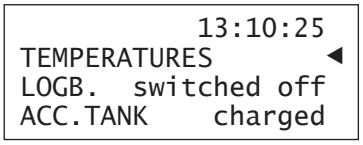
Press [▲] and [▲] to move the cursor to the `Password` line at the right of the display. This should read `Customer` . If not,

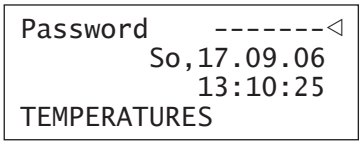
press [↻] to change,
the cursor changes to a question mark and four zeros start to flash.

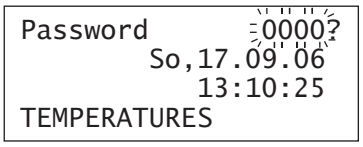
Pree [▲] to set to `0001` and then [↵] to save.

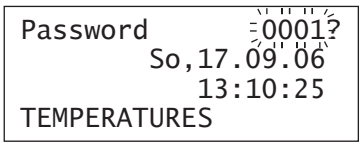
The `Customer` permission level appears, where you can set heating times, heating curves, room temperatures, the hot water tank charging, the date, time and similar items without endangering the system configuration specified by your heating expert.

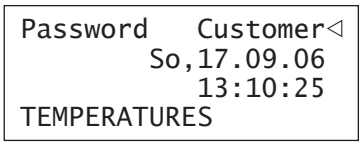
If you delete the password by pressing `0000` , you can only view the operating status, but not change any values (child protection).











Setting the date

In the main menu press [▼] and [▲] to move the arrow cursor to the date line, and then press [↻] to change the setting. The weekday starts to flash.

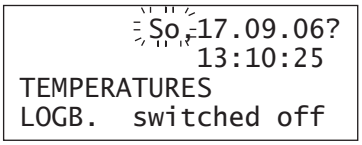
Press [▼] to set the weekday and then [↵] to save.

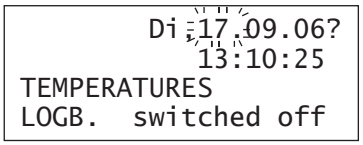
The day starts to flash. Press [▼] and [▲] to set the day and then [↵] to save.

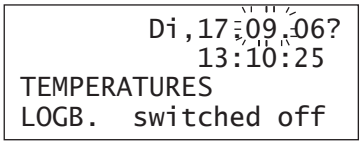
The month starts to flash. Press [▼] and [▲] to set the month and then [↵] to save.

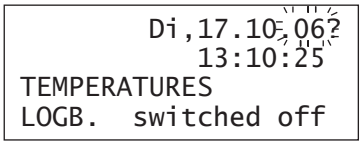
The year starts to flash. Press [▼] and [▲] to set the year and then [↵] to save.

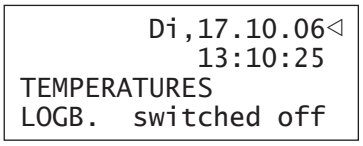
The question mark turns back into an arrow cursor, and the new date is saved.





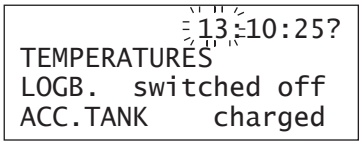


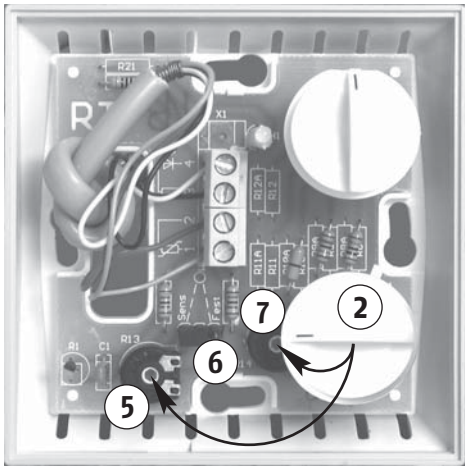


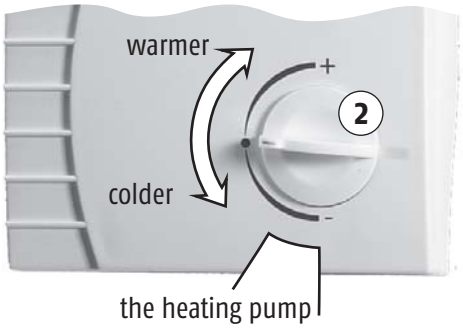


Setting the time

In the main menu press [▼] and [▲] to move the arrow cursor to the time line, and then press [↻] to change the setting. The hour starts to flash. Press [▼] and [▲] to set the hour and then [↵] to save. The minutes start to flash; set and store, and then go on to set and store the seconds.







the heating pump
is switched off in this range if the room sensor is disabled

Night-Clock-Day

You can use the operating mode switch (1) to toggle the following operating modes:

= NIGHT and/or night set-back
(Temperature setting in „MC .. (HP) -> Room ..“)

= AUTOmatic switchover between DAY and NIGHT
(Time setting in „MC .. (HP) -> HEATING TIMES .. “)

= DAY- and or heating operations despite higher outside temperatures, above the preset heating thresholds.
(Temperature settings in „MC .. (HP) -> Room ..“)

Disabling heating operations

In transitional periods you can set the selection switch (1) to the position to switch off the heating, and conversely switched on via or .

Room temperature adjustment

You can use the setup button (2) to increase the desired room temperature by up to 5°C, or reduce the value by up to 5°C.

The desired room temperature increase is subtracted from the measured room temperature by the room unit, whereas a room temperature decrease is added to the measured room temperature. Thus, the room temperature shown by the boiler controls only accurately reflects the room temperature if the room temperature adjustment is set to middle position.

Display LEDs „Add logs“ and „Malfunction“

LED (3) shows red = add logs requested.
LED (3) flashing red = WARNING, ERROR or ALARM.

Adjusting the room sensor

Press down the handle (4) to open the cover; set temperature adjustment (2) to middle position, use the potentiometers R13 (5) to adjust the measured room temperature. Use the temperature setup button (2) as a tool to adjust the temperature. The room temperature is shown in the „TEMPERATURES“ menu as „Room temp. MC ..“.

Switching off the room sensor function

If a room sensor is fitted in a room with an impairing factor such as a tiled stove, or in a room such as the kitchen, it is necessary to disable the room sensor function. If the room sensor is disabled, the temperature adjustment (2) value is applied directly to the flow temperature and the heating circulation pump is switched off at 3°C (factory default) temperature reduction at the adjustment button.

Press down the handle (4) to open the cover, and move the jumper (6) from the left-hand position (sensor) to the right „Fixed“. You need to set the parameters „SetValue Night“ and „SetValue Day“ in „MC (HP) -> Room temp.“ on the control unit to the same value of 21°C. You may need to adjust the fixed temperature value in the room unit to 21° C using potentiometer R14 (7).

Using the room sensor to switch off the heating in summer:

if a room sensor with remote control is installed, you can use ☾ to switch the heating on and ☼ to switch it off in summer (permanent operations even if the external temperature is above the heating threshold).

Or you can switch off manually at the control unit:

if you do not have a room sensor with remote control, you can use the controls to set the individual heating circuits to `Off Summer` in the „MC (HP)“ -> „Operations“ menu (see also the description later on).

Or you can use the controls to switch off automatically:

The factory default for the controls for heating systems with external temperature sensor in „AUTO (timer)“ operations is to stop heating at outside temperatures above 18°C in the daytime, and 7°C in the night time. Particularly if you have an automatic auxiliary boiler you can set automatic summertime heating system switch off by reducing the threshold temperatures; see the section „Outside temperature driven heating thresholds“ on page 32.

Never switch off via the „Manual-Off-Auto“ switches:

Do not use manual controls on the control panel for summertime heating switch-off. The manual pump controls must be set to „AUTO“ in summer to perform anti-blocking, or to dissipate excessive pump heat if too much fuel is placed in the fuel chamber (see page 15).

Operating mode „Off Summer“ or „AUTO“ without room sensor/remote control „DAY“ and „NIGHT“ settings

Press [⮌] multiple times in the main menu, then press [▼] and [▲] to move the arrow cursor to the right of the display to the `MC` or `HP` line; then press [↵] to confirm. A submenu starting with `Mode` appears. The following values may be shown in this line:

`AUTO` for automatic heating operations controlled by the week timer. You can use the remote control on the room sensor, or SMS, to change this operating mode to DAY or NIGHT without this being shown here. This setting also activates automatic, outside temperature driven summer switch-off.

`Off Summer` switched off for heating operations.

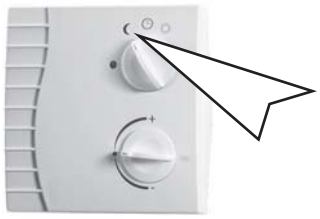
`Holiday` for night time set-back up to end of preset holiday (see page 38).

If you do not have a room sensor with remote control, you can also set the `DAY` and `NIGHT` operating modes here.

In our example, the current `Mode AUTO`. Press [↻] to change.The arrow at the right changes into a question mark and `AUTO` starts to flash.

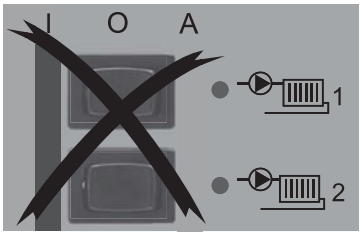
Press [▼] to set to `Off Summer` and then [↵] to save. The question mark cursor becomes an arrow and `Off Summer` is shown (non-flashing).

Press [⮌] once to go back. You will now see the `MC 1` or `HP 1` line. The text should now read `Off Summer` and the heating should switch off. If the `MC 1` oder `HP 1` shows a different text, refer to page 31 in this Instruction Manual to find out what the display means.



```
Mode      Off Summer◀
HEATING TIMES 1
Room 1           21°
HEATING CURVE    32°
```

```
Outside temp.    15°
heat until outside
...at day        18°◁
...at night       7°
```




```
            13:10:25
TEMPERATURES      ◀
LOGB.  switched off
ACC.TANK    charged
```

```
ACC.TANK    charged
HWT        charging
MC 1         On Day◀
HP 2         On Day
```

```
Moder           AUTO◀
HETAING TIMES 1
Room 1           21°
HEATING CURVE    32°
```

```
Mode           =AUTO?
HETAING TIMES 1
Room 1           21°
HEATING CURVE    32°
```

```
Mode      =Off Summer?
HETAING TIMES 1
Room 1           21°
HEATING CURVE    32°
```

```
Mode      Off Summer◀
HETAING TIMES 1
Room 1           21°
HEATING CURVE    10°
```

```
ACC.TANK    charged
HWT        charging
MC 1     Off Summer◀
HP 2         On Day
```

Using the room unit to change from summer to winter:

If you have installed room sensors, set the operating mode switch to position. If a GSM connector (mobile phone based remote control) is installed, set the operating mode switch to another position for a short time, and then back to the desired operating mode to delete the SMS remote command. For safety's sake, check the manual pump switches at the control panel. They must be in „AUTO" position. This would allow your heating system to restart after switching off via on the remote control in spring.

For systems without a room sensor, switching via boiler controls:

if you do not have a room sensor, switch from `Off Summer` to `AUTO` in the „MK (HP)" -> „Operations" menu (see also the previous page).

If your heating still won't start:

at the boiler control panel, first press the [⮌]-button multiple times to go to the top level menu (main menu), then press [▼] and [▲] to access the heating circuits. If you have installed a floor or radiator heating circuit with mixing valve, this circuit is referred to as a `MC` (mixing circuit) for short; without a mixer but with pump, it is referred to as a `HP` (heating pump). Heating circuits additionally have an ID starting with „1".

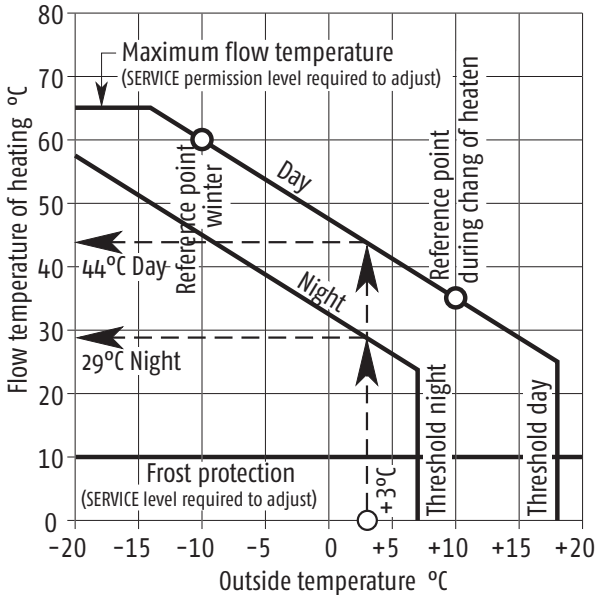
Press [▼] and [▲] to go to item `MC 1 ...`, if this line reads:

```
          13:10:25
TEMPERATURAES    ◄
LOGB.  In operation
ACC.TANK    charged
```

```
ACC.TANK    charged
HWT        charging
MC 1     Off Summer◄
HP 2 Offoutside>Day
```

`Off Summer`	Heating circuit off for summer operations - to switch to winter operations see section„Off Summer" or „AUTO" operating mode on the previous page.
`Off Outside>Day`	Heating circuit off as the outside temperature is higher than the preset heating threshold for heating operations; you may need to correct the heating threshold – see „Outside temperature-driven heating threshold" on page 32.
`Off Outside>Night`	Heating circuit off as the outside temperature is higher than the preset heating threshold for night set-back; you may need to correct the heating threshold – see „Outside temperature-driven heating threshold" on page 32.
`Off SetValueDay<R`	Heating circuit off as the preset flow temperature is lower than the day room temperature (via remote control) you may need to correct the heating curve – see section „Adjusting the flow temperature" page 33.
`Off SetValueNight<R`	Heating circuit off as the preset flow temperature is lower than the night room temperature (via remote control) you may need to correct the heating curve – see section „Adjusting the flow temperature" page 33.
`Off SetValueDay<`	Heating circuit off as the calculated preset flow temperature is lower than 18° C (without remote control) you may need to correct the heating curve – see section „Adjusting the flow temperature" page 33.
`Off SetValueNight<`	Heating circuit off as the calculated preset flow temperature is lower than 18° C (without remote control) you may need to correct the heating curve – see section „Adjusting the flow temperature" page 33.
`Off BoiTemp.<`	Heating circuit off as the boiler temperature is lower than the enable temperature; heat the boiler, or wait for the boiler to reach the enable temperature (63°C factory default).
`Off AccTemp.<`	Heating circuit off as the accumulator temperature is lower than the enable temperature (Menu „MC" or „HP" -> „EnableTemp.").
`OffAux.BoiTemp.<`	Heating circuit off as burner (aux. boiler) with 3-way valve is below enable temperature. (Menu „AUX.BOILER" -> „Aux. boiler pump" -> „Enable").
`On Day`	Heating circuit in heating mode (remote control set to „Timer AUTO"). Without a room sensor, you can choose between „DAY", „NIGHT" and „AUTO" in the „MC" or „HP" -> „Mode" menu.
`On Night`	Heating circuit in night time set-back mode (remote control set to „Timer AUTO"). Without a room sensor, you can select the operating mode in the „MC" or „HP" -> „Mode" menu.
`On Remote Day`	Heating circuit set to heating mode via remote control (operating mode switch or SMS). Without a room sensor, you can choose between „AUTO" and „NIGHT" in the „MC" or „HP" -> „Mode" menu.
`OnRemoteNight`	Heating circuit set to night time set-back mode via remote control (operating mode switch or SMS). Without a room sensor, you can choose between „AUTO" and „DAY" in the „MC" or „HP" -> „Mode" menu.
`WW Priority`	Heating circuit off as hot water preparation is active.
`Frost prot.`	Heating circuit activated for frost protection.
`On ExcessTemp`	Heating circuit activated due to boiler over temperature.
`Screed drying`	The heating circuit is in automatic „ScreedDrying" mode
`Malfunction`	See the „ERROR DISPLAY" menu and page 39.

Heating curve



This diagram shows the **factory default settings**.
If the control unit settings for your system have been modified, the settings may use a lower heating curve for under-floor heating, and a higher heating curve for radiator heating.

Day: The heating curve for daytime operations is set by two reference points. The control unit uses these points to calculate a characteristic based on the current outside temperature, the required flow temperature, for example at +3°C outside temperature and 44°C flow, or for -5°C outside and 54°C flow. If a room sensor is installed, this temperature is adjusted and the actual flow temperature can be higher or lower.

Heating threshold day: The heating system is switched off as of a configurable outside temperature (18°C in our example).

Night: The heating characteristic is dropped by a configurable value (night time temperature drop) compared to the daytime characteristic.

Heating threshold night: The heating system is inactive at night as of a configurable outside temperature (7°C in our example).

Maximum flow temperature: This threshold value protects your heating system. Under-floor heating is typically limited to 40°C, up to 85°C is possible for radiators with metal piping (SERVICE permission level required to adjust).

Frost protection: If the flow temperature or the temperature measured by the room sensor is below 10° C (this setting is

Outside temperature-driven heating threshold switches the heating off automatically

Press [⮌] multiple times in the main menu, then press [▼] and [▲] to move the arrow cursor to the right of the display to the `MC 1` line; then press [↵] to confirm.

```
ACC.TANK     charged
HWT          charging
MC 1           On Day◀
HP 2           On Day
```

A submenu starting with `Mode` appears.

```
Mode              AUTO◀
HEATING TIMES 1
Room 1             22°
HEATING CURVE      44°
```

Press [▼] and [▲] to access the `...at day` line, and then press [↻] to modify.

```
Outside Temp.      17°
heat until outside
...at Day          18°◁
...at night         7°
```

The arrow at the right changes into a question mark and the temperature value starts to flash.

```
Outside Temp.      17°
heat until outside
...at day          18°?
...at night         7°
```

Press [▼] and [▲] to set the new temperature for `...at day` and then press [↵] to save. The question mark cursor becomes an arrow, and the new temperature setting is shown (non-flashing).

```
Outside Temp.      17°
heat until outside
...at day          16°◁
...at night         7°
```

The heating threshold for `...at night` is also the frost protection temperature

⚠ For outside temperatures below 0°C you should at least switch on your heating system's pumps to warm up the cold parts of the heating system (pipes on outer walls) using the residual heat in the house. To ensure frost protection never set the night time threshold `...at night` below 3° for normal heating systems.

Adjusting the flow temperature

If the house is constantly too warm, or too cold, you will need to adjust the flow temperature. Press [⮌] multiple times in the main menu, then press [▼] and [▲] to move the arrow cursor to the right of the display to the heating circuit you wish to adjust, this is `MC 1`, in our example; then press [↵] to confirm.

A submenu starting with `Mode` appears. Press [▼] and [▲] to access the `HEATING CURVE` line, and then press [↵] to select it.

A submenu starting with `req. Flow Temp.` appears. In the first two lines you can compare the target flow temperature (first line) calculated by the control unit with the current flow temperature (second line). `req. Flow Temp` is a set of values calculated by the control unit by reference to the heating characteristic, heating times/night time temperature drop, room sensors adjustment, outside temperature driven heating thresholds, frost protection and maximum flow temperature.

Press [▼] three times to view the settings for the heating curve. The curve is displayed in the form of two reference points, one for `-10° outside` and the second for `+10° outside`.

If you feel at outside temperatures above zero

too hot or too cold, you can adjust the flow temperature for `+10° outside` and leave the temperature settings for -10°C unchanged.

If you feel at outside temperatures below zero

too hot or too cold, you can adjust the flow temperature for `-10° outside` and leave the temperature settings for +10°C unchanged. Was the flow temperature correct at the start of the heating season, or was it adjusted?

The control unit uses these two temperature reference points to calculate a heating curve and based on this the flow temperature required for the current outside temperature. The night curve is linked via the night time temperature drop value to the day time curve, and is thus automatically adjusted.

Thus move the cursor to the `-10° outside` line in winter, and to the `+10° outside` line during change of heaten. Press [↻] to change. The arrow at the right changes into a question mark and the temperature value starts to flash.

Press [▼] and [▲] to set the temperature and then [↵] to save. The question mark cursor becomes an arrow, and the new temperature setting is shown (non-flashing).

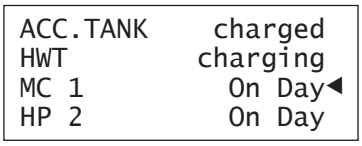
For under-floor heating with plastic pipes, never set a temperature of more than 40°C.

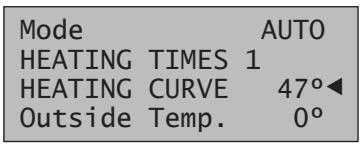
Always make gradual adjustments. Never more than 3° for under-floor heating and never more than 6° for radiators. You may need to readjust after one or two days. But gradual adjustments are more precise and also ensure more economic use of energy.

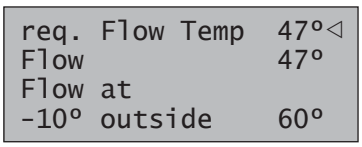
Night Set-back

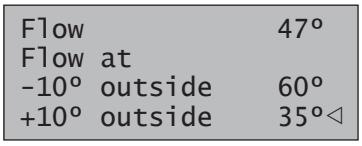
The set-back temperature should not be too high. The energy saved during the night would than be needed to heat up the cold house in the morning.

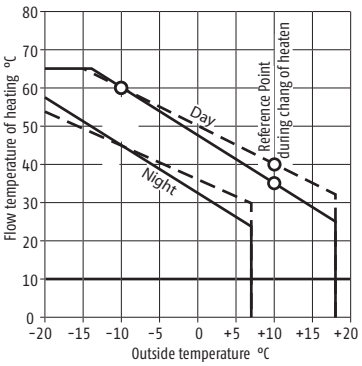
Standard values:	Radiators			Underfloor
-10°outside	40°C	60°C	80°C	30 - 40°C
Night set-back	5 - 8°C	10 - 15 °C	15 - 22°C	3- 5°C

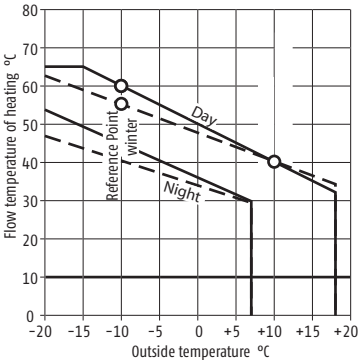


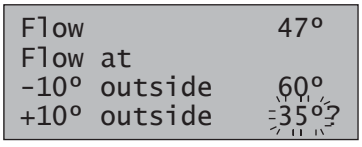


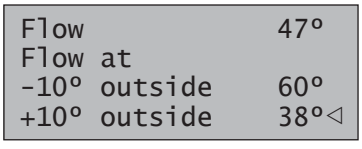


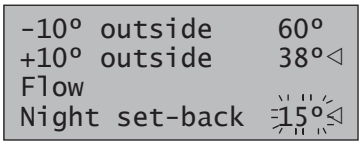












Room temperature target value (only with room sensor)

If you frequently use the maximum or minimum settings on the room sensor when adjusting the room temperature, or if you wish to modify the night time temperature drop values, you must adjust the room temperature target values at the control unit. Press [⮌] multiple times in the main menu, then press [▼] and [▲] to move the arrow cursor to the right of the display to the heating circuit you wish to adjust, this is `MC 1`, in our example; then press [↵] to confirm.

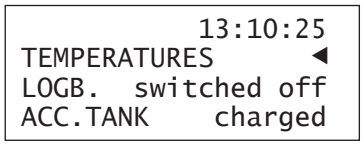
A submenu starting with `Mode` appears. Press [▼] and [▲] to access the `Room 1` line, and then press [↵] to select it.

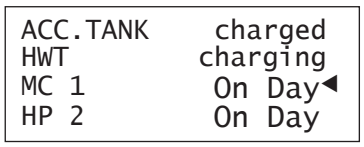
The `Room 1` displayed is not the current room temperature

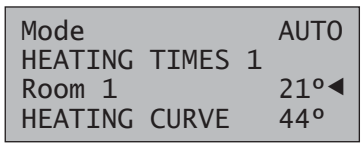
⚠ The desired room temperature increase is subtracted from the measured room temperature by the room unit, whereas a room temperature decrease is added to the measured room temperature . The temperature adjustment value set at the room unit must be at middle position for the temperature value shown by the boiler control unit to match the actual room temperature.

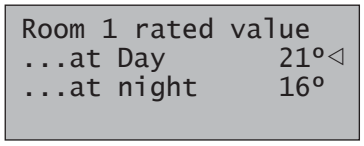
Press [▼] and [▲] to access the `...at Day` or `...at Night` lines, and then press [↻] to change.

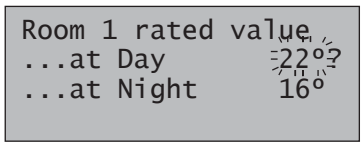
The arrow at the right changes into a question mark and the temperature value starts to flash. Press [▼] and [▲] to set the temperature and then [↵] to save. The question mark cursor becomes an arrow, and the new temperature setting is shown (non-flashing).











Adjusting the Heating Times

FLet's assume you wish to extend the daytime temperature period to 11.00 pm on Friday and Saturday.

Press [⮌] multiple times in the main menu, then press [▼] and [▲] to move the arrow cursor to the right of the display to the heating circuit you wish to adjust, this is `MC 1`, in our example; then press [↵] to confirm.

A submenu starting with `Mode` appears. Press [▼] and [▲] to access the `HEATING TIMES 1` item, and then press [↵] to select it.

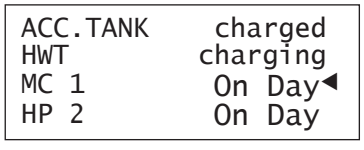
In the menu that then appears, press [▼] and [▲] to select Friday `Fr` and then press [↵] to access the menu.

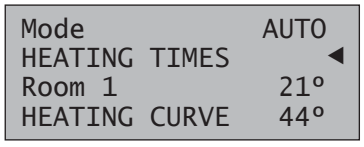
In the menu that then appears, press [▼] and [▲] to access the last line `16:00-20:00` and then press [↵].

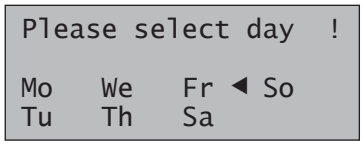
The first hour value starts to flash. As you do not wish to adjust the start time, press [↵] twice to access the hour value for heating end.

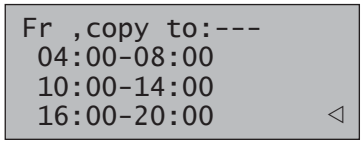
When the time you wish to adjust starts to flash, press [▼] and [▲]to adjust, and then press [↵] to store the value. Then press [↵] again to go to the next number, or store your changes at the end of the line.

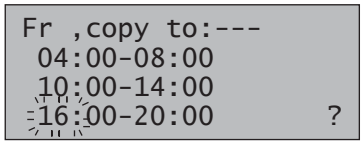
To copy the time you have set to Saturday, press [▲] to access the top line `Fr ,copy to:---`, and then press [↻] When you access this item, the word `ALL` for all days will flash. Press [▼] and [▲] `Sa` Saturday, and then press [↵] to select. To show that the copy operation has been completed `Sa ?` changes to `--- ◁`.

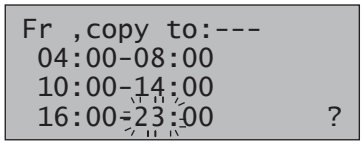


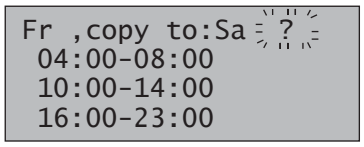












Hot water tank charging outside of the programmed charging times

Let's imagine you fired the boiler too late, outside the hot water tank charging time window, and the hot water tank is empty. You have the option of initiating hot water charging between the normal charging times.

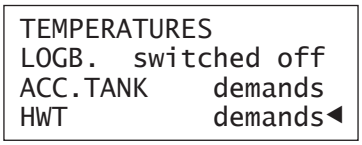
Press [▼] and [▲] in the main menu to access the `HWT` line, press [↵] to select,

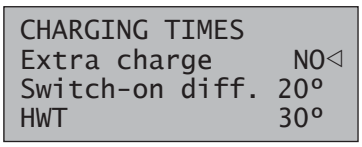
press [▼] to go to the `Extra charge` line, and then [↻] to access,

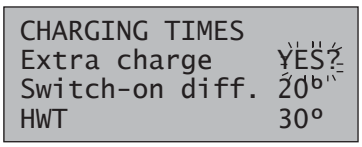
`NO` starts to flash,

press [▲] to change to `YES` then press [↵] to confirm.

Once the accumulator tank has reached a sufficient temperature to charge the hot water tank, the hot water tank will be charged outside of the normal heating period.







Hot water tank charging times and temperatures

You can set the hot water tank charging times to charge the accumulator tank around the clock without any time limits.

In the main menu (press [↩] multiple times), use [▼] and [▲] move the arrow cursor to the `HWT` line at right edge of the display, and then press [↵] to access the line; press [↵] again to access the first line of the submenu `CHARGING TIMES`.

A screen with a list of days appears. You can press [▼] and [▲] to select a day. Press [↵] to access Monday. A screen with three time windows appears.

Press [▼] and [▲] access the first time window line, and then press [↻] to modify.

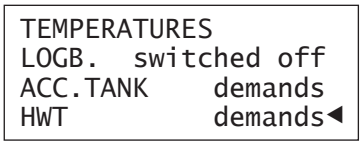
The time window start hour value starts to flash; press [▼] and [▲] to set the time.

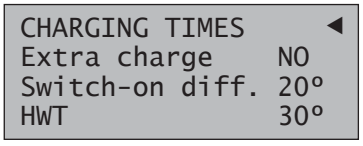
By pressing [↵] four times the minutes and the end of the charging time will stay the same and the hot water tank temperature starts flashing. Pressing [▼] and [▲] allows to adjust the temperature.

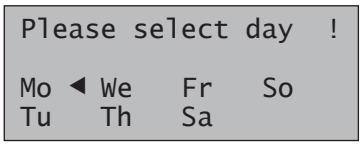
Press [↵] to store the set times and temperatures.

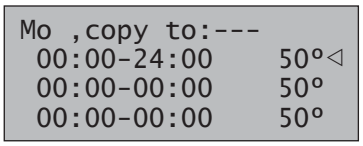
You can set the second time window using the same method as for the first. Make sure you avoid overlapping times, and set any windows you do not need to 00:00-00:00.

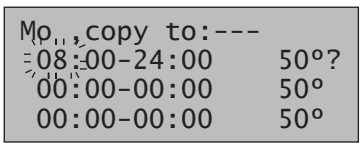
To copy, go to the first line `Mo ,copy to:---`, then press [↻] to access. You can press [▼] and [▲] to select individual days, or alternatively select all days. In our example, we will be selecting `ALL` and then pressing [↵]. to copy. To show that the copy operation has been completed, flashing `ALL?` changes to `--- ◁`.

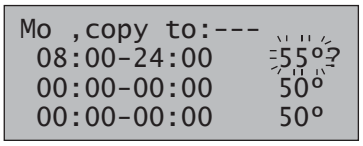


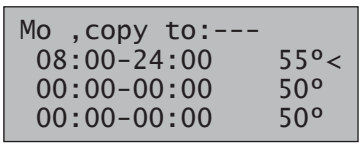


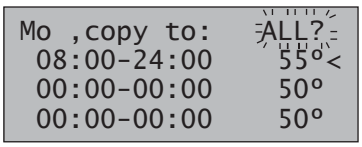


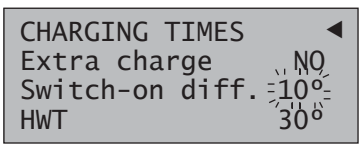












Circulation pump

The circulation pump times should be set sparingly (only for times when you use the bathroom) to avoid mixing the water in the hot water tank, and thus save energy.

Press [▼] und [▲] in the main menu to access the `HWT` line, then press [↵] to access,

a menu starting with `CHARGING TIMES` appears,

press [▼] to go to the `CIRCULATION TIMES` line, and then [↻] to access,

press [↵] to select Monday or [▼] and [▲] to select another day.A time schedule with circulation times appears.

Press [↻] to access the first time window for editing,the time window start hour value starts to flash; press [▼] und [▲] to set the time, and then press [↵] to go to the minutes,

the minutes start to flash and can be adjusted by pressing [▼] and [▲] then press [↵] to go to the time window end hour value,

press [▼] and [▲] to set the hours, and then [↵] to move on to the minutes,

Press [▼] und [▲] to set the minutes, and then [↵] to set the number of circulation pump runs per hour.

The initial setting should not use more than four starts per hour. If you then notice that the hot water pipes are cooling out too quickly, you can increase the number of starts per hour. Or you could try a comparative test with 4 starts per hour in one time window, and 5 starts in the other. Press [↵] a final time to store the time window along with the selected number of starts per hour.

You can set the second and third time window using the same method as for the first. Make sure you avoid overlaps, and set the final window to 00:00-00:00 if you do not need it.

To copy, go to the first line `Mo ,copy to:---` , then press [↻] to access. You can press [▼] and [▲] to select individual days, or alternatively select all days.In our example, we will be selecting `ALL` and then pressing [↵]. to copy. To show that the copy operation has been completed, flashing `ALL?` changes to `--- ◁` .

Press [↩] twice to quit the circulation times, and then press [▼] to access the last line of the menu `Operating Time` , press [↻] to access for changing; then press [▼] and [▲] to adjust, and [↵] Select a pump running time of max. 90 seconds as the initial setting. If you notice that the running time is too short, you can increase this value later.

```
TEMPERATURES
LOGB.  switched off
ACC.TANK    demands
BOILER      demands◄
```

```
CHARGING TIMES     ◄
Extra charge    NO
HWT             30°
HWT Pump         0%
```

```
HWT Pump         0%
CIRCULATION TIMES  ◄
Circulation PumpOFF
Operating Time 180s
```

```
Please select day!

Mo ◄ We   Fr   So
Tu   Th   Sa
```

```
Mo ,kopiere in:---
 05:00-24:00     4x?
 00:00-00:00     4x
 00:00-00:00     4x
```

```
Mo ,copy to:---
 05:30-24:00     4x?
 00:00-00:00     4x
 00:00-00:00     4x
```

```
Mo ,copy to:---
 05:30-06:00     4x?
 00:00-00:00     4x
 00:00-00:00     4x
```

```
Mo ,copy to:---
 05:30-06:30     4x?
 00:00-00:00     4x
 00:00-00:00     4x
```

```
Mo ,copy to:---
 05:30-06:30     5x?
 00:00-00:00     4x
 00:00-00:00     4x
```

```
Mo ,copy to:---
 05:30-06:30     5x
 19:00-21:00     4x
 00:00-00:00     0x◁
```

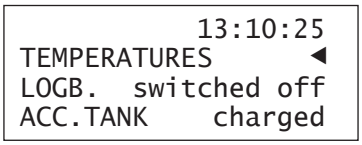
```
Mo ,copy to:   ALL?
 05:30-06:30     5x
 19:00-21:00     4x
 00:00-00:00     0x
```

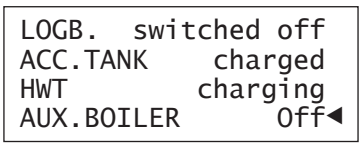
```
HWT Pump         0%
CIRCULATION TIMES
Circulation PumpOFF
Operating Time  90s?
```

Oil/gas/electric or pellet boilers

If an automatic auxiliary boiler is integrated with the wood burning boiler as a backup or peak load solution, this is indicated by the word AUX.BOILER in the main menu. If its operating status is shown as ENABLED und LOCKED simple blocking configuration is used. In other words when the wood-burning boiler is working, the auxiliary boiler (BURNER) is locked.

If the operating status for AUX. BOILER is shown as ON and OFF auxiliary boiler management is configured to support programming of the boiler start conditions (switchover from auxiliary boiler blocking to auxiliary boiler management is only possible with SERVICE permission level).





Four fundamentally different strategies for auxiliary boiler start are possible

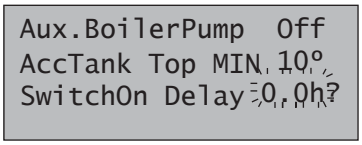
If the boiler is cold and the accumulator tank top is colder than the required flow temperature, and no fuel is added within a short period of time (2 hours in our example), the AUX. BOILER starts:

The wood burning boiler is fired mornings and evenings. AUX. BOILER switches on only if one of the scheduled fuelling times is missed:

If you wish to activate the AUX. BOILER for hot water but not for heating with an accumulator and attached boiler:

If you need permanent heat for a air convection heating system in hotels or catering, or for a hot water heat exchanger:

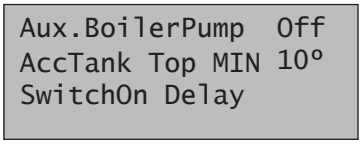
for example to adjust the switch-on delay, press [▼]aund [▲] to access the SwitchOn Delay , line, then press [↻] to access,



The cursor changes to a question mark and the value 0.0h starts to flash.

Set the new delay time (in hours) by pressing [▼] and [▲] ,

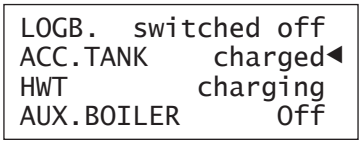
and then press [↵] to confirm. The question mark changes to an arrow and the and the new setting is shown (non-flashing).

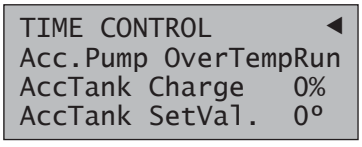


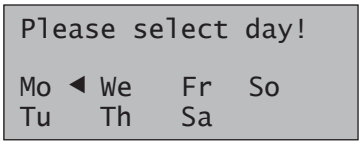
Week timer

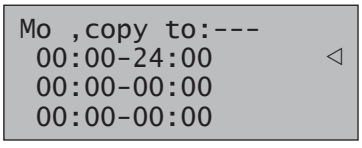
For auxiliary boiler management (without 3-way valve) a week timer is available in the PUFFER menu; this gives you the ability to limit the periods when the auxiliary boiler, and also the pellet burner will be used.

Settings follow the same procedure as for setting the heating times on page 34.





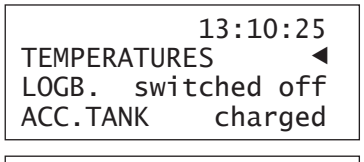


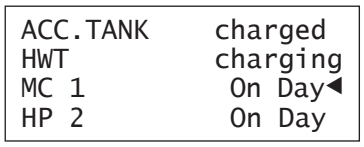


Holiday function; drops the heating temperature up to a specific date!

If an automatic auxiliary boiler or pellet burner is available, you can drop the heating temperature for the duration of your holiday, and automatically restart at the end of your holiday. You can also drop the temperature for one of several heating circuits up to a specific date.

If you wish to reduce the temperature by a large amount, you can adjust the temperature drop temperature in the „MC (HP) -> Room temp. -> SetValue Night“ menu (see page 34). Note that the temperature correction value (+/- 5°C) at the room sensor influences both the NIGHT temperature and the DAY temperature (=temperature to heat up to at end of holiday); for this reason, you should not adjust the temperature correction value under normal circumstances.



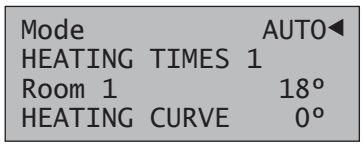


1. step, setting the end of your holiday

First go back to the top menu by pressing the [⮌] multiple times.

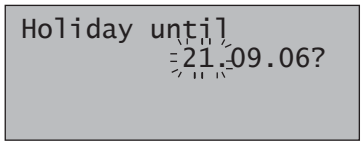
In the main menu press [▼] and [▲] move the arrow cursor to the MC 1 item, then press the [↵] key to access the submenu.

Press [↵] to access the Mode submenu.

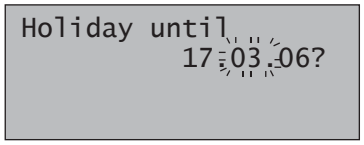


If the outside temperature is cold, or if you will be returning in the daytime, set this to one day before the end of your holiday.

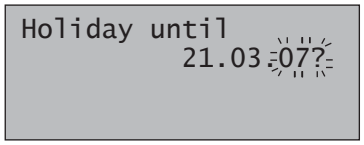
Press [↻] to change the date. The cursor changes to a question mark and the day starts to flash. Press [▼] and [▲] to set the day and then [↵] to save.



The month starts to flash. Press [▼] and [▲] to set the month and then [↵] to save.

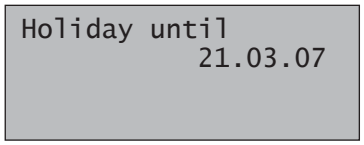


The year starts to flash. Press [▼] and [▲] to set the year and then [↵] to save.



The question mark cursor turns back into an arrow, and the new date for the end of your holiday saved.

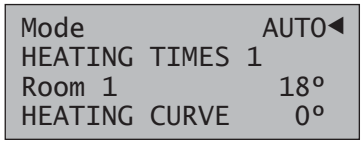
Press [⮌] to return to the parent menu level.



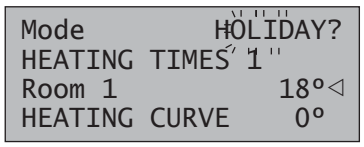
2. step, activating holiday temperature drop

Before going on holiday, you need to activate the holiday function (also in the „MC ..“ menu).

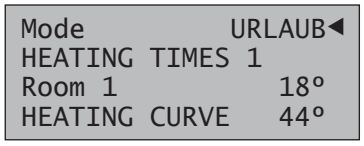
Press [↻] in the Mode to change values.



Press [▼] and [▲] HOLIDAY and then [↵] to save.

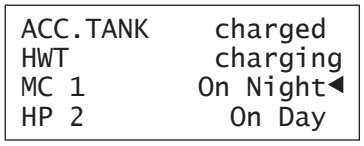


The question mark cursor turns back into an arrow and the heating enters temperature drop or night time mode.



Press [⮌] to return to the parent menu level. Night mode is shown for heating circuit MC 1 .

The heating circuit automatically switches back to „AUTO“ mode at 00:00 hours on the day set as the last day of your holiday.



An „Alarm/Error/Warning/Info“ display is deleted (acknowledged) by pressing any button. Press the „**INFO**“-button to display further information on any display. For „Alarm/Error/Warning“ pressing the „**INFO**“-button a second time displays the time when the event occurred.

Messages with a grey background typically only occur during commissioning and service work on the control unit.

Sorted by ALARM, ERROR, WARNING, INFO	Keyword in accordance to the 3. display line	**B** for log boiler controll **H** for heating extension	
ALARM	SafetyThermost. activated!	B	Wait for boiler temperature to drop to below 90 °C, and then unlock the safety thermostat (an unlocking button is located in a recess in the door frame; push the button firmly into the recess). If this error occurs more than twice a year, call customer service!
ALARM	Water shortage Alert!	B	Allow boiler to cool, and top up with heating water. If this error occurs more than twice a year, call customer service (the heating system may have a leak).
ERROR	230V supply Voltage not found!	H	230 V mains power for the heating extensions has failed, or the fuse in the housing is defective.
ERROR	Draught fan blocked check button	B	Set the switch for the exhaust gas blower on the control unit to „AUTO“, or the exhaust gas blower is blocked or defective.
ERROR	Bus-Connection to Pell.Control interr	B	The control unit is searching for a pellet control unit, as a TWIN boiler is configured. If this error occurs with a log wood boiler: Change the „BOILER TYPE“ to „Log wood boiler“ in „System configuration“ -> „WOOD BURNING BOILER“ -> „CONFIGURE“- If this error occurs with a TWIN boiler: Check the bus connection and power supply to the pellet burner control unit.
ERROR	Wrong Frequency	H,B	Switch off and back on at mains switch; if the message reoccurs, the software version (EPROM) does not match the mains frequency.
ERROR	Sensor broken!	H,B	The temperature sensor at the measuring point where the error message is shown is defective, not connected, or the wiring is broken. If a temperature of 0° is shown without an error message, no terminals have been assigned to the corresponding analogue input.
ERROR	Sensor shorted!.....	H	The temperature sensor at the measuring point where the error message is shown is defective, not connected, or the wiring is broken.
ERROR	Check: Lambda probe wired correctly?	B	Signal from lambda probe is not plausible. The signal and heating wires to the sensor may be cross connected.
ERROR	Fuse 24VAC broken!	H	Glass tube fuse 250 mA slow-blow on boiler control PCB left in front of transformer is defective.
ERROR	Air Valve-position not adjusted!	B	You need to set the „Servomotor“ parameter in the „System configuration“ menu -> „WOOD BURNING BOILER“ -> „CONFIGURE“ ->“FURTHER SETTINGS“ menu! (assembly of servomotors)
WARNING	Can-bus node number has been changed!	H,B	This appears after restarting if the switch position (on the board) for the CAN bus node number has been changed. For two identical boiler or board types, different node numbers must be set (default setting = 0).
WARNING	Cannot read Error Log	H,B	System warning on reading the error log. The error event history is no longer available.
WARNING	EE-read fault Input reference list	H,B	System warning on reading the EEPROMs. Manually reconfigured inputs must be reassigned; please contact customer service.
WARNING	EE-read fault Output ref. list	H,B	System warning on reading the EEPROMs. Manually reconfigured outputs must be reassigned; please contact customer service.

After Debugging Error and Alarms on the Control restatz the boiler using the[**I/O**]-Button

WARNING	EE-read fault Parameter list	H,B	System warning on reading the EEPROMs. Manually modified parameters have been reset to factory defaults; please contact customer service.
	Failed to read EE EE_SYSTEM_ERROR	H	SSystem warning on reading EEPROM. Settings must be repeated; please contact customer service.
	EEPROM set to factory default	H,B	The system has automatically been reset to the factory defaults, e.g. after installing a lower software version. You need to re-enter all settings!
	EPROM has been changed	H,B	System warning on programme change: an EPROM from another control unit has been inserted. All settings have been deleted!
	Screed MCx doesnt reach req. Temp.!	H,B	System was unable to reach screed target temperature for a longer period of time in screed drying mode. Output too high. The screed programme will not be switched back on until the target temperature has been achieved.
	Revers Circulation of Solar Panel	H,B	The difference between the solar panel temperatures and the outside temperature exceeded the warning threshold between 00:00 and 05:00 (configurable in the „Solar Panel“ menu). Non-return valves may be leaking.
WARNING	Remove Jumper	B	For the current configuration you need to remove the jumper on the boiler control PCB for mutual control of outputs in mixing mode. Jumper J6-MIX2 for L7 and L8 to plug S60 Jumper J7-MIX1 for L9 and L10 to plug S59 Jumper J8-PUX for L11 and L12 to plug S58
	Set Jumper		For the current configuration you need to remove the jumper on the boiler control PCB to disable mutual control of outputs.
WARNING	Remove Jumper	H	For the current configuration you need to remove the jumper on the heating circuit PCB to mutually block outputs in mixing mode. Jumper MI1_U for L1 and L2 to plug S7 Jumper MI2_U for L3 and L4 to plug S8 Jumper VEN_U for L5 and L6 to plug S9
	Set Jumper		Jumper J6-MIX2U for L7 and L8 to plug S60 Jumper J7-MIX1U for L9 and L10 to plug S59 Jumper J8-PUX_L for L11 and L12 to plug S58 For the current configuration you need to remove the jumper on the heating circuit PCB to remove blocking of outputs.
WARNING	Boiler Return Temp. too low!	B	Return line temperature has been too low for a longer period of time: Is the manual control button for the mixer set to the AUTO position? If you can turn the manual button on an ESBE mixing valve without pushing it in, turn it back and forth until it snaps into AUTO position. Make sure the return temperature rise control is working, the mixing valve is correctly fitted and correctly wired. Check if the sensor is sufficiently insulated.
	Front door opened for more than 1/2 h	B	Close insulating door, the error message and audible signal are cancelled. Door contact switch not actuated, or defective.
	Conf. requires additional Hardware	H,B	The hardware required for this configuration is not registered on the bus. Bus line, power supply or PCB faulty.
	Heating current of LambdaP. too low!	B	Lambda probe not connected. Power supply lines to lambda probe interrupted (two white wires) or lambda probe defective.
	Heating current of LambdaP. too high!	B	Lambda probe defective or short circuit in wiring.
	Lambda Probe doesnt reach req. Temp!	B	Power consumption of lambda probe heating is too high.

WARNING	New Software Version	H,B	Notice that a new software version has been installed.
	Room sensor MC x broken!	H,B	Room sensor mixing circuit (1, 2, 3, or 4) defective or wiring break.
	Upp. AirValve doesnt reach req.Position!	B	The upper or lower air valve is mechanically jammed (press the release mechanism on the motor and move manually, clean the rotary slide salve surface and spray with dry lubricant – Teflon spray); the air valve may be defective or incorrectly fitted (if the error occurs during commissioning).
	Low.Air Valve doesnt reach req.Position!		
	Upp. AirValve doesnt reach end Position		
	Low.Air Valve doesnt reach end Position		
INFO	Blocking Protection	H,B	In this part of the heating system the pumps run for 10 seconds, and the mixer for 3 minutes, to prevent jamming, once a week on Saturday afternoon, if the pumps and/or mixer were idle in the preceding week.
	Operate cleaning lever	B	This text always appears when the boiler has burned down, and is a reminder to actuate the cleaning lever.
	HWT-Charge has been started via SMS	H,B	A hot water tank charging operation was started by SMS command via a mobile phone outside of the specified charging times.
	Emission measurement duration: 30 min.	B	If you hold down the [**I/O**]-button for 5 seconds, all heat consumers generate full heat output for 30 minutes to allow for emission measurement.
	Sustaining blaze (AirValves closing)	B	The boiler enters ember preservation mode and the air flaps are closed.
	Heating Circuits have been reseted via SMS	H,B	The „Day/Timer/Night“ operating mode was reset to the operating mode set at the remote control/room sensor (to „Day/Auto/Night“ setting in the „MC“ => „Operation“ menu, if there is no remote control/room sensor fitted).
	Heating Circuits have been toggled via SMS	H,B	Day/Timer/Night operating mode was changed by SMS command via a mobile phone. The operating mode set at the remote control unit/room sensor is disabled. You can change mode at the remote control unit/room sensor to cancel the SMS command, and reinstall the setting at the remote control unit/room sensor.
	Heating Curve set to floor heating?	H,B	Before the screed heating programme enters the temperature drop phase, you need to set the heating curve for under-floor heating „HEATING CHARACTERISTIC „ => „Flow temperature at -10°C outside temp. and +10°C outside temp.“!
	Burndown of remain. blaze(AirValve open)	B	The „**Ash removal**“ button has been pressed.
	Do not switch off the boiler!	B	If the boiler is working, you cannot switch it off via the [**I/O**]-button, as switch-off must be disabled during heating operations.
	Boiler Temp.Limiter activated!	B	The boiler will switch on automatically when the boiler temperature drops below 90°C. Use less fuel in future, or use more heat output.
	Boiler over Temp. =>higher heat consumpt	B	The boiler will switch on automatically when the boiler temperature drops below 90°C. Use less fuel in future, or use more heat output.
	SolarP.Temp.>128° meas. range exceeded	H,B	Solar panel temperature outside of measuring range or sensor break.
	Detach smoke Tube clean O2 Probe!	B	This text appears every 6,000 operating hours to remind you to clean the lambda probe. If you cleaned the probe recently, there is no need to clean again. For more details on cleaning refer to page 20 of this guide.

Possible operating states **log wood boiler**

LOGB. door open	The front insulating door is open (door contact switch not actuated)..
LOGB. ingits	At start of heating (after switching on via the [**I/O**]-button)
LOGB. operating	Message for normal operations when the boiler has heated up.
LOGB. overtemp.	Appears when the preset „Boiler temp. MAX." is exceeded.
HOLZK. no fire	If the boiler fails to ignite or has burned down.
HOLZK. burndown	If you press the „**Ash Removal**" button, the fire is extinguished by burning off the embers.
HOLZK. switched off	The boiler has been switched off using the [**I/O**]-button.
HOLZK. on fault	Wood burning boiler malfunction.

Possible operating states **accumulator tank**

ACC.TANK charged	Accumulator tank is charged.
ACC.TANK demands	The accumulator tank is requesting heat.
ACC.TANK no demand	No heat request from the heating circuits or hot water tank.
ACC.TANK OFF Timer	Burner or auxiliary boiler not released by week timer.
ACC.TANK fault	Accumulator tank malfunction.

Mögliche Betriebszustände **Pufferladepumpe**

Acc.Pump ON	Accumulator charging pump running.
Acc.Pump OFF	Accumulator charging pump not running.
Riser Valve opens	Return line mixing valve opens before accumulator charging pump is switched on.
Acc.Pump manual	Accumulator tank pump switched to manual mode via „MAN./OFF/AUTO" switch on panel.
Acc.PumpOverTempRun	Charging accumulator tank because the maximum boiler temperature has been exceeded.

Possible operating states **hot water tank**

HWT charging	Hot water tank charging.
HWT charged	Hot water tank is charged.
HWT demands	Hot water tank is requesting heat.
HWT OverTempRun	Charging the hot water tank because the maximum boiler temperature has been exceeded.
HWT manual	HWT charging pump switched to manual mode via „MAN./OFF/AUTO" switch on panel.
HWT fault	Boilerfunktion gestört.

Possible operating states **hot water heat exchanger**

HOT WATER ON	Pump for hot water heat exchanger running.
HOT WATER OFF	Pump for hot water heat exchanger not running.
HOT WATEOverTempRUN	Pump for hot water heat exchanger switched on due to boiler over temperature.
HOT WATER fault	Hot water function malfunction.

Possible operating states **external burner** (automatic auxiliary boiler)

AUX.BOILER ENABLED	External aux. boiler enabled (aux. boiler lock must be configured).
AUX.BOILER LOCKED	External aux. boiler locked (aux. boiler lock must be configured).
AUX.BOILER ON	External aux. boiler requested (aux. boiler management must be configured).
AUX.BOILER OFF	External aux. boiler not requested (aux. boiler management must be configured).

Possible operating states **heating circuits 1-4** without mixing valve

HP 1 ON	Heating pump 1 in heating mode.
HP 1 OFF	Heating pump 1 switched off.
HP 1 Off AccTemp.<	Heating pump 1 has been switched off as accumulator tank is lower than the enable temperature.
HP 1 Off BoTemp.<	Heating pump 1 off, as burner (auxiliary boiler) with 3-way valve is below enable temperature.
HP 1 HW Prio	Heating pump 1 off, as hot water charging is running.
HP 1 frost prot.	Heating pump 1 switched on due to frost protection function.
HP 1 On overTemp	Heating pump 1 switched on due to boiler over temperature.
HP 1 fault	Heating circuit malfunction.

Possible operating states **mixed heating circuits 1-4**

MC 1 On day	Mixing circuit 1 in heating mode (remote control set to „Timer AUTO“).
MC 1 On night	Mixing circuit 1 in temperature drop mode (remote control set to „Timer AUTO“).
MC 1 on ext day	Mixing circuit 1 set to heating mode via remote control (remote switch or SMS).
MC 1 on ext night	Mixing circuit 1 set to night time temperature drop mode via remote control (remote switch or SMS).
MC 1 Off SPday<R	Mixing circuit 1 off as target flow temperature is lower than day time room temperature (with remote control).
MC 1 OffSPnight<R	Mixing circuit 1 off as target flow temperature is lower than night time room temperature (with remote control).
MC 1 Off SP day<	Mixing circuit 1 off as target flow temperature is below 18°C (without remote control).
MC 1 Off SPnight<	Mixing circuit 1 off as target flow temperature is below 18°C (without remote control).
MC 1 Off out>day	Mixing circuit 1 off as outside temperature is higher than preset heating threshold in heating mode.
MC 1 Off out>night	Mixing circuit 1 off as outside temperature is higher than preset heating threshold in night time temperature drop mode.
MC 1 Off Summer	Mixing circuit 1 off for summer operations.
MC 1 Off BoTemp.<	Mixing circuit 1 off, as boiler temperature lower than enable temperature.
MC 1 Off AccTemp.<	Mixing circuit 1 off, as accumulator temperature lower than enable temperature.
MC 1 AusBrenTemp.<	Mixing circuit 1 off, as burner (auxiliary boiler) with 3-way valve is below enable temperature.
MC 1 HW Prio.	Mixing circuit 1 off, as hot water charging is running.
MC 1 frost prot.	Mixing circuit 1 switched on due to frost protection function.
MC 1 On overTemp	Mixing circuit 1 switched on due to boiler over temperature.
MC 1 ScreedDry	Automatic screed heating on mixing circuit 1 see page 72.
MC 1 Fault	Mixing circuit malfunction.

Possible operating states **support pump**

SUPPORT PUMP On	Support pump (for local heating network) running.
SUPPORT PUMP Off	Support pump (for local heating network) not running.

Possible operating states **solar system**

SOLAR PANEL OFF	Solar pump off as temperature difference between solar panel and hot water tank is too low.
SOLAR PANEL ON	Solar pump is switched on; hot water tank charging.
SOLAR PANELOFFtemp>	Solar pump off as hot water tank bottom temperature has exceeded max. value.
SOLAR PANEL OFFSol>	The solar pump is switched off as the solar panel has exceeded the max. value.
SOLAR PANEL fault	Solar malfunction.

Possible operating states **thermostat function**

THERMOSTAT ON	Thermostat switched on.
THERMOSTAT OFF	Thermostat switched off.

In case of major changes to settings, add a new column with a date entry!	Heating Date																
Room	Room rated value ...at Day 21° ...at Night 16°																
HEATING CURVE	Flow at -10° outside +10° outside																
	Flow Night set-back 15°																
	Solar influence 0°																
heat until outside ...at Day 18° ...at Night 7°																	
Enable temp . 25°																	

Heating Times		0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
HP 1	Monday																									
HP 2	Tuesday																									
MC 1	Wednesday																									
MC 2	Thursday																									
MC 3	Friday																									
MC 4	Saturday																									
HWT	Sunday																									
HP 1	Monday																									
HP 2	Tuesday																									
MC 1	Wednesday																									
MC 2	Thursday																									
MC 3	Friday																									
MC 4	Saturday																									
HWT	Sunday																									
HP 1	Monday																									
HP 2	Tuesday																									
MC 1	Wednesday																									
MC 2	Thursday																									
MC 3	Friday																									
MC 4	Saturday																									
HWT	Sunday																									
HP 1	Monday																									
HP 2	Tuesday																									
MC 1	Wednesday																									
MC 2	Thursday																									
MC 3	Friday																									
MC 4	Saturday																									
HWT	Sunday																									

You can correct settings with a soft pencil!