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Log boiler 20 - 60 kW

Operation

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Contents

1 General information 5

2 Preface 6

3 Warranty, guarantee and liability 8

4 Boiler functionality 10

5 Emission measurement 12

6 Safety 13

6.1 General information 13

6.2 Safety devices 13

7 Suitable fuels 15

8 Correct quantity of wood 16

9 Start-up 17

10 Operation 24

10.1 User interface 24

10.1.1 Overview 24

10.1.2 Setting the date and time 24

10.1.3 Changing the names of function blocks 25

10.1.4 Text menu navigation 26

10.1.5 Messages 27

10.2 [Boiler] function block – log boiler 28

10.2.1 Overview 28

10.2.2 Operating modes 29

10.3 [Buffer] function block - log boiler 32

10.3.1 Overview 32

10.3.2 Operating modes 34

10.3.3 Operation 35

10.3.4 Text menu 36

10.4 [Heating circuit] function block 40

10.4.1 Overview 40

10.4.2 Operating modes 42

10.4.3 The heating curve 43

10.4.4 Operation 45

10.4.5 Text menu 47

10.5 [Hot water tank] function block 50

10.5.1 Overview 50

10.5.2 Operating modes 51

10.5.3 Operation 52

10.5.4 Text menu 54

10.6 [Fresh water module] 2 pumps function block 56

10.6.1 Overview 56

10.6.2 Operating modes 57

10.6.3 Operation 57

10.6.4 Text menu 59

10.7 [Solar] function block 62
10.7.1 Overview 62
10.7.2 Operating modes 67
10.7.3 Text menu 67
10.8 [Aux.boiler] function block - with buffer 70
10.8.1 Overview 70
10.8.2 Operating modes 71
10.8.3 Operation 72
10.8.4 Text menu 73

11 Heating value 74

1 General information

Copyright

Subject to technical alterations

We reserve the right to make technical modifications without notice. Printing and typesetting errors or changes of any kind made in the interim are not cause for claims. Individual configurations depicted or described here are only optionally available. In the event of contradictions between individual documents regarding delivery scope, the information in our current price list applies.

Explanation of symbols

 Instructions and information

Layout of safety instructions

 **SIGNAL WORD!**

Type and source of danger

Possible effects

- Measures for avoiding the danger

Types of safety instruction

 **CAUTION!**

On non-compliance with this safety instruction, there is a risk of material damage.

 **WARNING!**

On non-compliance with this safety instruction, there is a risk of physical injury.

 **DANGER!**

On non-compliance with this safety instruction, there is a risk of major physical injury.

2 Preface

Dear Customer,

This user manual provides important information and instructions, to ensure safe and satisfactory operation of your product.

Please take the time to look through it.

Warranty and guarantee

You should also read the "Conditions for warranty, guarantee, liability" (see page 8) carefully. As a rule, these conditions will be satisfied by a professional heating technician. Nevertheless, inform the technician of our warranty conditions. All of the requirements we impose are intended to prevent damage that neither you nor we wish to occur.

Read the user manual

Please read the user manual carefully before starting up the system. This is the only way to ensure that you can operate your new boiler efficiently and with minimum environmental impact.

Take advantage of the knowledge and skills of an expert

Only allow an expert to assemble, install and commission the equipment and carry out the basic boiler settings. Insist on receiving an explanation and training on how your new boiler functions and how to operate and maintain it.

Extended warranty

We grant an extended warranty if the product is commissioned by an authorised partner company or by our own customer service.

In this connection, please note the warranty conditions applicable at the time of purchase.

Service agreement

You can ensure the best care for your heating system by taking out a service agreement with one of our certified contractors or our own customer service.

3 Warranty, guarantee and liability

Requirements

We can only accept liability for the function of our products if they are correctly installed and operated. This is only possible if the conditions below are complied with.

Maximum of 2,000 hours at full load per year

The boiler described in this user manual may only be used for heating and producing hot water, with no more than 2,000 full-load hours annually.

Installation in a dry room

For set-up, a dry room is required. In particular, only condensation dryers may be used as clothes dryers in the same room.

Observe local building and fire safety regulations

Local building and fire safety regulations must be observed.

Suitable fuel – logs

The log boiler is suitable for use with wood briquettes and air-dried split logs with no more than 20% water content. Use with unsuitable fuels, especially refuse, coal and coke, and also wet wood, is not permitted.

Ensure supply air is free from aggressive substances

The air supplied to the boiler must be free from aggressive substances such as chlorine and fluorine from solvents, cleaning agents, adhesives and propellants, or ammonia from cleaning agents, to prevent corrosion of the boiler and chimney.

Only fill with softened water

Water is the intended heat-transfer medium. For special antifreeze requirements, up to 30% glycol may be added. Softened water is required for the initial fill-up of the heating system and for refilling after repairs. Addition of hard water should be minimised to limit limescale build-up in the boiler.

For the initial fill-up, the lime content of all water in the heating system may not exceed the value of 20,000 lt°dH (system volume in litres multiplied by the hardness in degrees of German hardness).

pH value between 8 and 9

The pH value of water used to fill the heating system must be between 8 and 9.

Use a sufficient number of shut-off valves

Set enough shut-off valves to avoid bleeding large amounts of water during repairs. Any leaks in the system must be repaired at once.

Minimum return temperature 60°C

Ensure a minimum return temperature of 60°C to the boiler.

Install safety valve and thermal relief valve

A safety valve (triggered at 3 bar) as protection against excess pressure and a thermal relief valve (triggered at 97 °C) to protect against overheating must be installed by the contractor.

Provide a sufficiently large expansion tank or a pressure maintaining device

To prevent air from being drawn in while the system is cooling, the heating system professional must provide a sufficiently large expansion tank or a pressure maintaining device.

Open expansion tanks must not be used.

Sufficient power

Operation at lower power than the lowest power specified on the type plate is not permitted.

Expanding the control system

Only components provided by us may be used for expanding the control system, unless these are generally available standard devices, such as thermostats.

Regularly perform cleaning and maintenance

Cleaning and maintaining the product is essential. The required steps and intervals are either contained in this documentation or included as a separate document.

Repairs

Repairs are only permitted using spare parts provided by us. The only exceptions are commonly available standard parts such as electrical fuses or fastening materials, provided such parts have the necessary features and do not compromise the safety of the system.

Proper installation

The installing contractor is liable for proper installation according to the corresponding installation instructions and the relevant rules and safety regulations. If you as customer have installed the heating system partly or entirely without relevant training and in particular without up-to-date practical experience, without having the installation checked by a trained and responsible expert, we exclude defects in our delivery and consequential damages resulting from this cause from our warranty, guarantee and liability.

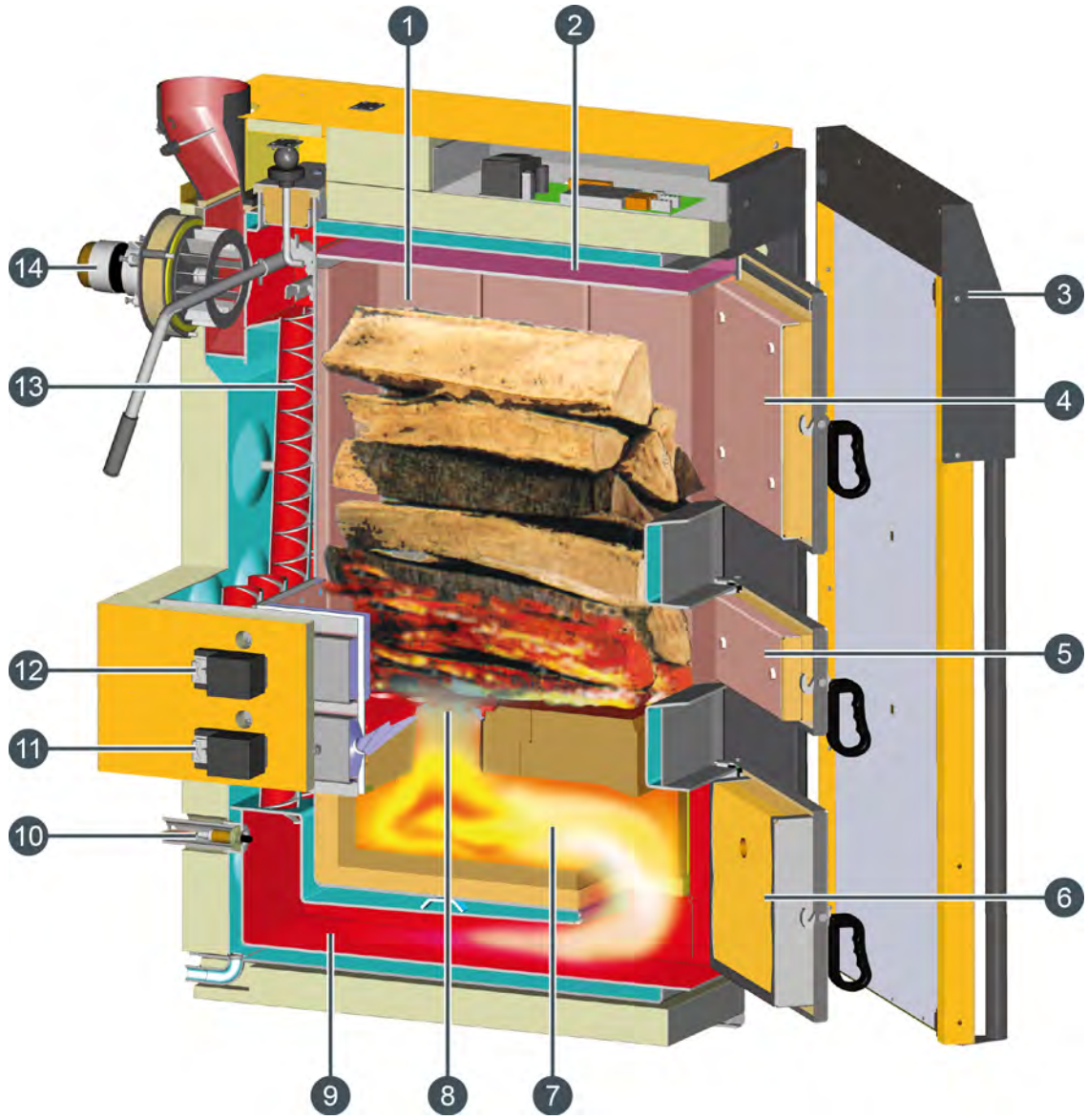
Repair of defects

For repairs of defects carried out by the customer or by a third party, ETA shall only bear the costs or remain obligated by warranty if this work was approved in writing in advance by the customer service of ETA Heiztechnik GmbH.

No tampering with boiler safety devices

Boiler safety devices such as those mentioned below must not be tampered with: Temperature monitoring and control devices, safety temperature limiters, safety valves and thermal discharge valves.

4 Boiler functionality



1 Fuel chamber
2 Carbonisation gas extraction
3 Insulation door
4 Fuel chamber door
5 Ignition door
6 Combustion chamber door
7 Combustion chamber
8 Grate with burn-through opening (mixing nozzle)
9 Ash collection duct
10 Lambda probe
11 Actuator for secondary air
12 Actuator for primary air
13 Heat exchanger with turbulators
14 Draught fan

How the boiler works

Wood gasification

Before wood can burn, it must first be converted into gas by application of heat. From 100°C, the moisture contained in the wood is driven off. From 200°C, the wood begins to decompose into 20% charcoal and 80% wood gas, a mixture of carbon dioxide, carbon monoxide, hydrogen, methane, methanol, various phenols, acetone and acetic acid. Gas is released from a temperature of 400°C. However, a temperature of at least 900°C is required to fully break down phenols (wood tar) into combustible carbon, carbon monoxide and hydrogen; 1100°C is better. In addition to a high temperature, breaking down complex compounds into wood gas also requires time; this explains why the gas flame of a wood fire lasts so long.

Large wood supply in fuel chamber

At the base of the stack of wood in the fuel chamber, a small gasification fire is maintained through a controlled flow of air (primary air). The boiler's control system regulates the output of the gasification fire via the flow of primary air. The wood gas is drawn downwards into a hot combustion chamber. This prevents the stack of wood in the fuel chamber from undergoing uncontrolled gasification and starting to burn and makes it possible to have a boiler with a large supply of wood that burns slowly for a long time.

Mixing nozzle and complete turbulence

A mixing nozzle is located between the fuel chamber and the combustion chamber. Here preheated combustion air (secondary air) is mixed with the wood gas. The flame exiting the mixing nozzle hits the hot bottom of the combustion chamber with high velocity and experiences further turbulence, ensuring that every bit of combustible gas finds sufficient oxygen for complete combustion.

Complete burnout in the glow zone

To achieve uncooled combustion at high temperatures, the patented glow-zone combustion chamber is made from refractory brick and is also thermally insulated. In this glow zone, the flame has enough time at temperatures between 900°C and 1100°C to break down and burn the very last of the resistant carbon rings (phenols) from the lignin in the wood. This enables the log boiler to go below the limit of 100 mg of carbon monoxide in the exhaust gas per MJ of output.

Optimum fuel efficiency with lambda control

Gasification of the wood (output) can be controlled via the flow of primary air. Through use of the lambda-controlled secondary air, combustion is kept clean and highly efficient. A lack of air means there is not enough oxygen for complete combustion. On the other hand, too much air also results in incomplete combustion as it cools the fire. Below 700°C, not all of the wood gas is burned. Too much air also pulls unused heat out of the boiler. The lambda probe ensures optimum combustion and maximum fuel utilisation in everyday operation.

Turbulent heat exchanger with simple cleaning

The hot gas only enters the cold section of the boiler following complete combustion. Once in the cold section, it transfers its heat to the boiler water, first while smoothly flowing through a long ash collection duct and then turbulently through heat exchanger tubes equipped with turbulators. The more turbulent the flow, the more the gas comes into contact with the tube walls, thus ensuring maximum transfer of heat to the boiler water. This ensures low exhaust temperatures and high efficiency. Pulling the cleaning lever about 10 times prior to opening the boiler to refill with fuel moves the turbulators up and down in the heat exchanger tubes. The resulting fly ash drops into the ash collection duct, leaving the heat exchanger clean.

Induced draught adjusts to flue

Thanks to the induced draught technique, the entire interior of the boiler is under negative pressure. This means that no smoke or low-temperature carbonisation gases can escape from the boiler regardless of the phase of operation. The draught fan accommodates every flue, even those with small cross-sections. Speed control and smoothly adjustable flaps for combustion air make draught limiters in the flue virtually unnecessary. Setting a minimum exhaust temperature keeps condensation from forming in masonry flues and allows the low-temperature capability of modern flues to be fully utilised.

5 Emission measurement

Why measure emissions?

It is a requirement for the carbon monoxide (CO) emissions of every boiler to be measured periodically. In Germany, this periodic measurement must also include a dust measurement.

There are several aspects of this that could go wrong, resulting in incorrect measurements even though the boiler fully and consistently complies with these limits when operating in accordance with the relevant standards.

Clean the boiler 3 - 5 days before the emission measurement

Thoroughly clean the boiler and flue pipe 3 - 5 days before the emission measurement. Once this is complete, heating can resume as usual.

This delay between cleaning and measurement is necessary in order to allow dust disturbed during cleaning to settle again. If the chimney sweep measures unsettled dust, the dust reading will be higher than normal and thus inaccurate.

CAUTION!

▶ Under no circumstances clean the boiler and flue pipe on the day of the measurement!

Buffer and boiler must be cold

Before the start of the emission measurement, the buffer and the boiler must have cooled down to ensure heat consumption in the heating system during the emission measurement.

Preferably the boiler should not be used in the night before the emission measurement.

Use half-metre split logs

Use half-metre split logs for the emission measurement. Place them as close together as possible in the fuel chamber to fill it as completely as possible.

However, keep the burn-through openings in the grate free.

Start up boiler 2 hours before emission measurement

Start up the boiler 2 hours before the arrival of the chimney sweep so that the boiler is heating before the emission measurement.

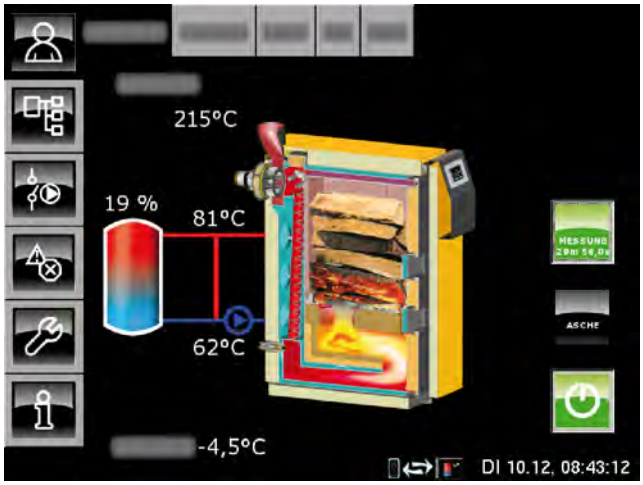
Ensure sufficient heat consumption

Open all radiator valves and turn radiator thermostats to maximum.

Emission measurement at full load

No doors on the log boiler may be opened during the emission measurement. Also, do not stoke the fire in the log boiler.

To start the emission measurement, press the [MEAS.] button in the boiler overview screen. As confirmation, the button lights up green and the countdown in the button begins.



The boiler now runs for 30 minutes at full load. The control system ensures that sufficient heat is channelled to the heating circuits and the hot water tank.

The emission measurement may only take place once the boiler has been operating in this way for at least 10 minutes (i.e. more than 10 minutes of the countdown have elapsed).

After the measurement

Switch the boiler back to normal mode by pressing [MEAS.]. As confirmation, the light in the button goes off.

If you do not press this button, the boiler will automatically switch back to normal mode after the set time (factory setting 30 minutes).

6 Safety

6.1 General information

Operation only by trained personnel

The product may be operated by trained adults only. Training may be provided by the heating technician or our customer service. Please read the associated documentation carefully in order to avoid errors during operation and maintenance.

The product may not be operated by persons with impaired physical, sensory, or mental capabilities. Persons who lack experience and knowledge as well as children may not operate, clean, or maintain the product.

Keep fire extinguishers in a clearly visible location

In Austria, the minimum requirement is an ABC powder extinguisher with 6 kg. An AB foam extinguisher with 9 litres, which produces less damage when used, is preferable. The fire extinguisher should be kept outside the boiler room, visible and easily accessible.

In Germany and Switzerland, fire extinguishers are not required for heating systems in private residences. In spite of this, we recommend having one in the house.

Storage of ash

The ash must be kept in non-flammable containers with covers. Do not put hot ash in the waste bin due to risk of fire.

6.2 Safety devices

Pump safety run, automatic heat dissipation at overtemperature

If the boiler temperature exceeds 87 °C (factory setting) for any reason, the pump safety run will start. All heating pumps and boiler pumps that are connected to the boiler control system are switched on to dissipate heat from the boiler.

This action prevents the boiler temperature from rising further and triggering further safety devices such as the safety temperature limiter and the thermal relief valve. The pump safety run is displayed on the screen as operating mode [Heat dissipation].

The heat dissipation is limited by the maximum flow temperature set in the heating circuits and the target hot water temperature.

Boiler overheating

If a boiler temperature of 90°C is reached, the control system switches the draught fan off and a warning message appears on the display.

Reasons for a boiler temperature increase include:

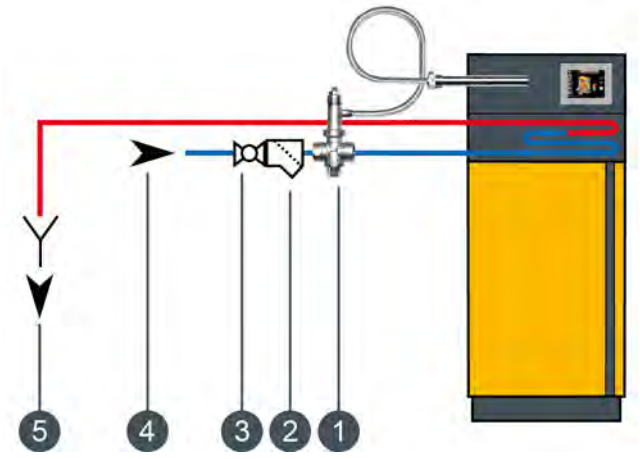
- too much wood in the fuel chamber
- heating circuits unexpectedly switched off
- heating pump failed
- heating line inadvertently shut off

Once the boiler temperature has fallen below 86°C, heating resumes automatically.

During such emergency shutdowns the wood continues to emit gas and the unburned wood gas causes tar deposits in the boiler and chimney.

Install thermal emergency cooling valve against overheating

The safety heat exchanger built into the boiler must be connected by the heating technician to the house's cold water supply via a thermal relief valve (opening temperature 97°C) to protect the boiler against overheating if the pump fails. The minimum pressure in the cold water pipe must be 2 bar.



1 Thermal emergency cooling valve
2 Strainer
3 Isolating valve; remove hand wheel
4 Cold water connection
5 Visible drain to sewer

Connect the supply line to the lower connector of the safety heat exchanger; the upper connector must serve as an outlet to the sewer. To prevent the supply line from being shut off accidentally, remove the levers from shut-off valves or the hand wheels from valves and hang them there with a piece of wire.

The discharge must have an easily visible flow path so malfunctions can be recognised. Direct the discharged water to the sewer via a siphon funnel or at least with a pipe into the ground so that nobody can be scalded if the valve is activated.

Even for cold water coming from a domestic well with its own pump, a thermal emergency cooling valve must be installed on the boiler. With a generously dimensioned air vessel, enough water for cooling will come even if there is a power failure. If the electricity supply is very uncertain, a dedicated air vessel for the thermal emergency cooling valve is required.

Safety shutdown by safety temperature limiter

For additional safety against boiler overheating, a safety temperature limiter is built into the boiler. When a boiler temperature of 105°C (tolerance 100 to 106°C) is reached, it blocks the draught fan so that it can no longer be switched on. When the boiler temperature decreases below 70°C again, the safety temperature limiter can be manually released for a restart of the boiler.

Install safety valve against overpressure

A safety valve with 3 bar opening pressure must be installed on the boiler. No shut-off valve may be installed between the boiler and the safety valve. If solar or other heat sources provide energy to the buffer storage tank via a heat exchanger, a safety valve (3 bar maximum) is also required on the buffer storage tank.

Normally an expansion tank that is too small or defective, or blocked heating lines, are the cause for activation of the safety valve. The safety valve must be on the boiler at the top of the flow in order to discharge heat in an emergency. Only this way can it reduce pressure by blowing out hot water and steam.

DANGER!

Safety valve outlet

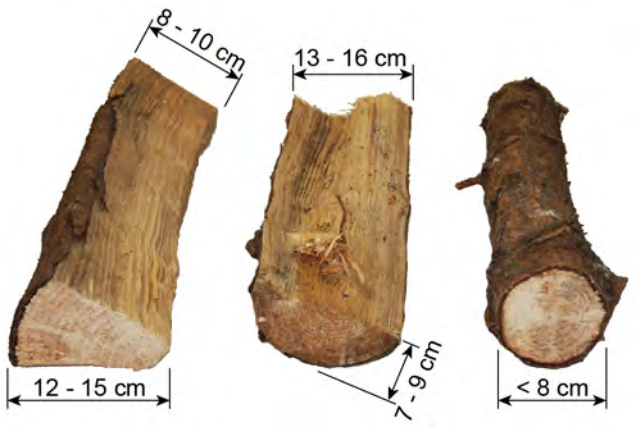
The safety valve outlet must be directed to the ground in a pipe so nobody is endangered by hot water or steam.

- ▶ The safety valve outlet must be directed to the sewer via a clearly visible, open route (siphon funnel) so that malfunctions, especially a failure of the safety valve to close, can be recognised. If no sewer connection is available, the outlet must be directed to the ground in a pipe.

7 Suitable fuels

Suitable fuel

The firewood must be air-dry, i.e. it must have dried for at least one year and have a water content under 20%. We recommend using half-metre split logs with an average diameter of 10 cm.



Do not split round logs with a diameter under 8 cm; instead place them between the split logs in the middle.

Boards may only be added between the logs and in no case should they be included in the first layer as they would block the burn-through opening in the grate.

Small pieces of fuel may only be burned as a minor addition placed among the split logs, but never in the bottom layer. The smaller the pieces, the less of them may be added.

Wood briquettes measuring 6 cm to 10 cm in diameter in compliance with EN 14961-3.

Only 1 oversized split log or 1 stump piece can be placed in the top layer, but no more. Complete burning may require 2 combustion phases.

Unsuitable fuel

Wet fuel with a moisture content in excess of 20% may not be burned as it results in condensation which can lead to corrosion of the boiler's fuel chamber walls.

The following also may not be burned: rubbish, paper and cardboard (only for start-up), wood dust from sanding, sawdust, pieces of wood smaller than thumb-sized, coal and coke, and fuels generally prohibited by local air quality regulations, such as old railway sleepers, plastic-coated plywood, impregnated wood, etc.

The Clean Air Act 1993 and Smoke Control Areas

Under the Clean Air Act local authorities may declare the whole or part of the district of the authority to be a smoke control area. It is an offence to emit smoke from a chimney of a building, from a furnace or from any fixed boiler if located in a designated smoke control area. It is also an offence to acquire an "unauthorised fuel" for use within a smoke control area unless it is used in an "exempt" appliance ("exempted" from the controls which generally apply in the smoke control area).

The Secretary of State for Environment, Food and Rural Affairs has powers under the Act to authorise smokeless fuels or exempt appliances for use in smoke control areas in England. In Scotland and Wales this power rests with Ministers in the devolved administrations for those countries. Separate legislation, the Clean Air (Northern Ireland) Order 1981, applies in Northern Ireland. Therefore it is a requirement that fuels burnt or obtained for use in smoke control areas have been "authorised" in Regulations and that appliances used to burn solid fuel in those areas (other than "authorised" fuels) have been exempted by an Order made and signed by the Secretary of State or Minister in the devolved administrations.

The ETA SH 20, 30, 40, 50 and 60 kW boiler has been recommended as suitable for use in smoke control areas when burning air-dried billet wood (max. 20% water content).

Further information on the requirements of the Clean Air Act can be found here:
http://smokecontrol.defra.gov.uk/

Your local authority is responsible for implementing the Clean Air Act 1993 including designation and supervision of smoke control areas and you can contact them for details of Clean Air Act requirements.

8 Correct quantity of wood

When not much heating is needed only place a small amount of wood in the boiler

Absorbing all the heat from a boiler fully loaded with wood would require buffer storage tanks larger than needed for winter operation and also larger than those normally installed.

When less heat is required, i.e. for hot water in the summer, or during the evening shortly before the night set-back, only load the boiler with the amount of wood actually needed.

The table below displays the amount of wood needed for summer operation for different boiler sizes (= fuel chamber capacity), wood type, buffer volume and buffer charging status. Bear in mind that a "buffer top" temperature sensor that is installed too low reduces the usable volume.

If the living space already needs some heating, start with the amount of wood indicated in the table below. To establish the correct amount, approach the fully charged buffer state slowly, adding one or two more logs every heating cycle. If too much wood is loaded, an emergency shutdown of the boiler will occur. If the boiler overheats, the flow of air is stopped. The fire will go out, but the hot wood will continue to smoulder for a while and the unburned wood gas resulting from the lack of air can create tar deposits in the boiler and flue. If this occurs often, the boiler's heat exchanger will become clogged with tar.

Note the energy density of the fuel. The energy content of 50 litres of wood briquettes corresponds to 100 litres of beech wood or 150 litres of spruce.

The current buffer charging status is shown in the control system in the [Boiler] and [Buffer] overviews. It is shown in percent and is the average of the three buffer temperatures (top, middle, bottom) between 30°C (=0%) and 80°C (=100%).

SH20 / SH30			**Buffer charging status**				**SH40 / SH50 / SH60**		
Maximum fuel load			**Size of buffer storage tank (litres)**				**Maximum fuel load**		
Briquettes	**Beech**	**Spruce**	**3300**	**2200**	**1650**	**1100**	**Briquettes**	**Beech**	**Spruce**
			90%	85%	80%	70%			
			85%	78%	70%	55%			
		1/4	80%	70%	60%	40%			
	1/4		75%	63%	50%	25%			1/4
			70%	55%	40%	10%			
		1/2	65%	48%	30%	0%			
			60%	40%	20%		1/8	1/4	
			55%	33%	10%				
1/4	1/2	3/4	50%	25%	0%				1/2
			45%	18%					
			40%	10%					
		4/4	35%	0%					
			30%						
	3/4		25%				1/4	1/2	3/4
			20%						
			15%						
			10%						
			5%						
1/2	4/4		0%						4/4

9 Start-up

Check heating system's water pressure

In houses with up to three storeys, the optimum water pressure in a cold heating system is between 1 and 2 bar.
For a warm heating system, the optimum water pressure is between 1.5 and 2.5 bar.

If the water pressure is too low, fill the cold heating system to approx. 2 bar. Do not fill to a higher pressure, as water expands with increasing temperature and the water pressure also rises when the boiler is heating. The safety valve is activated at approx. 2.8 bar.

Open heating lines

If the system is new or has been out of operation for some time, verify whether the return riser mixing valve is in the "AUTO" position and all shut-off valves in the heating lines are open.

Always keep ball valves completely open to avoid ruining the seals. Open valves by turning anti-clockwise, and then turn back 1/4 turn from the fully open position to relieve pressure on the valve stem.

Check buffer charging status

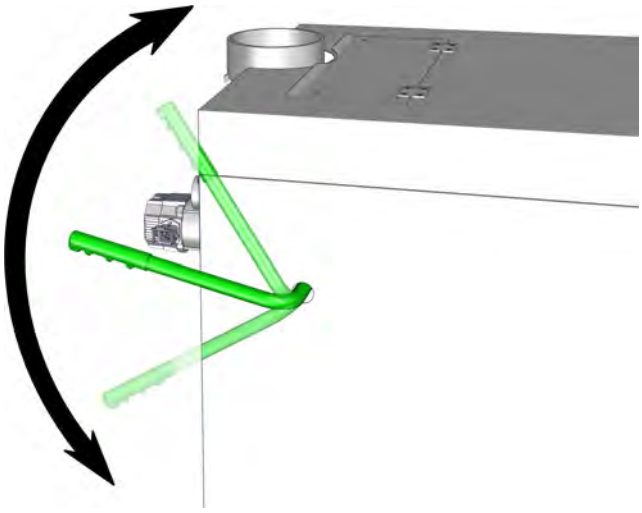
Before starting the boiler, check the current buffer charging status to avoid adding too much wood.

The table on page 16 shows how much wood should be added. The buffer charging status is shown in the boiler overview.

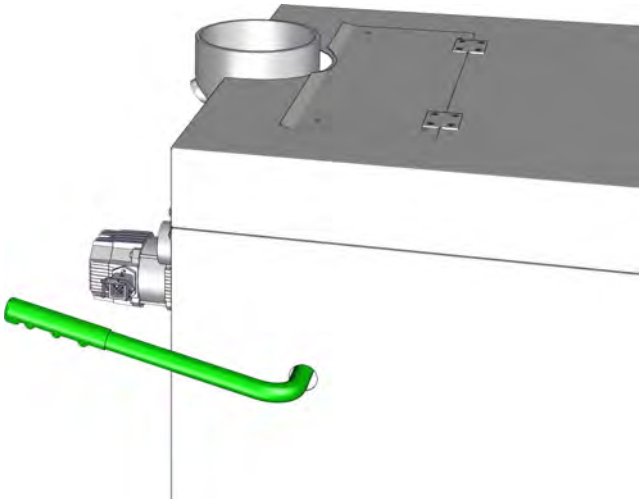
Pay particular attention to the different energy densities of the fuels and the lower heat consumption in summer.

Operate cleaning lever

With the insulation door still closed, clean the heat exchanger by operating (10x) the cleaning lever on the side.

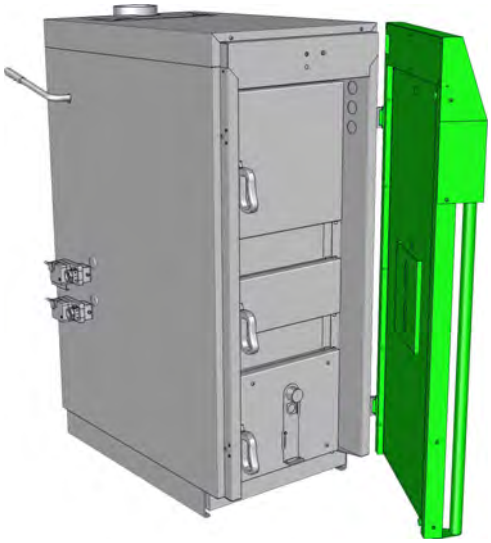


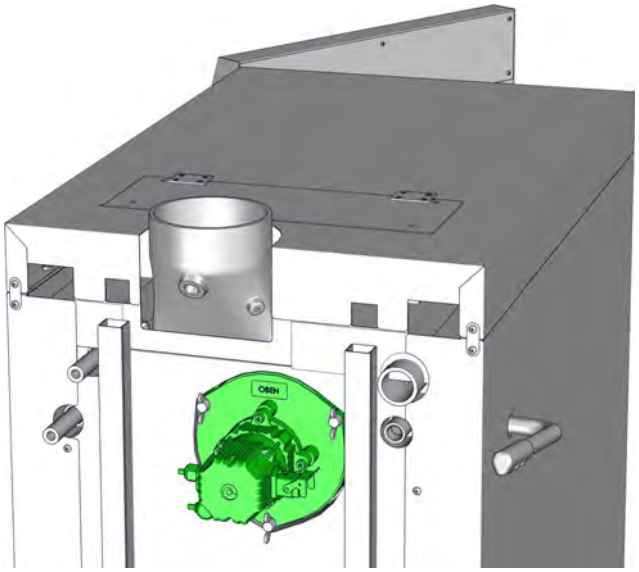
Afterwards, leave the lever pointing towards the rear of the boiler. Then the turbulators remain in position in the water-cooled heat exchanger.



Open insulation door, draught fan starts automatically

When the insulation door is opened, the draught fan starts automatically and the [On/Off] button shines green in the boiler overview. The operating mode changes to [Insulation door open].

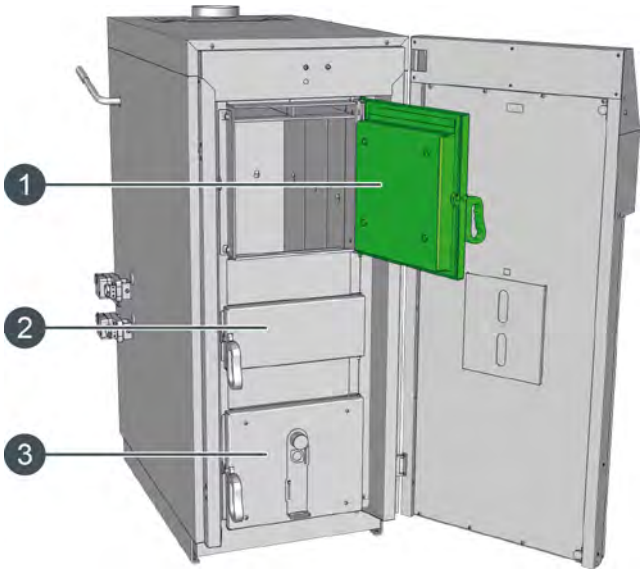




If the draught fan does not start, there is either a fault or an alarm. Check the messages on the screen.

Open fuel chamber door

The draught fan must be running before the fuel chamber door is opened so that any combustion gas can be extracted from the fuel chamber.



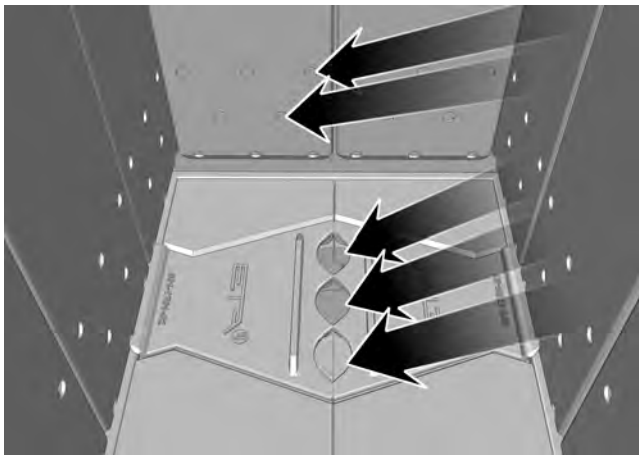
1 Fuel chamber door
2 Ignition door
3 Combustion chamber door

If the boiler has not safely cooled, no boiler doors may be opened without an operating draught fan. A sudden inflow of air in the presence of smouldering wood may result in an explosion.

The fuel chamber door is always closed during both start-up and heating operation. It is opened only when ash is removed from the boiler.

Check fuel chamber

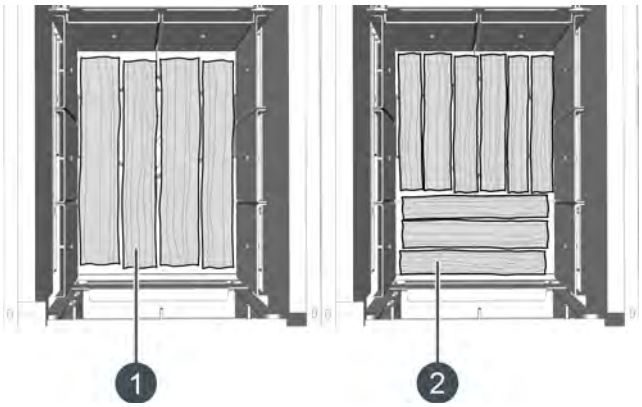
Use the poker to distribute ashes and charcoal evenly throughout the fuel chamber. In the panels, the two upper openings for primary air must be free.



Also, the 3 burn-through openings in the grate must stay open so that the fire reaches the combustion chamber during ignition.

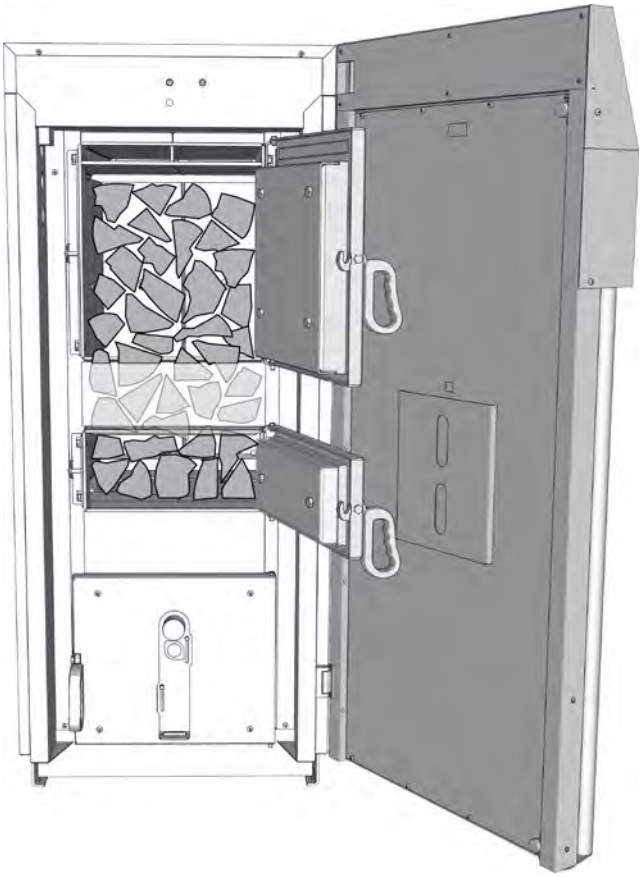
Place logs close together in fuel chamber

Add the required amount of closely spaced logs to the fuel chamber. Stack the logs instead of throwing them in at random. Always place the first layer of logs lengthwise.



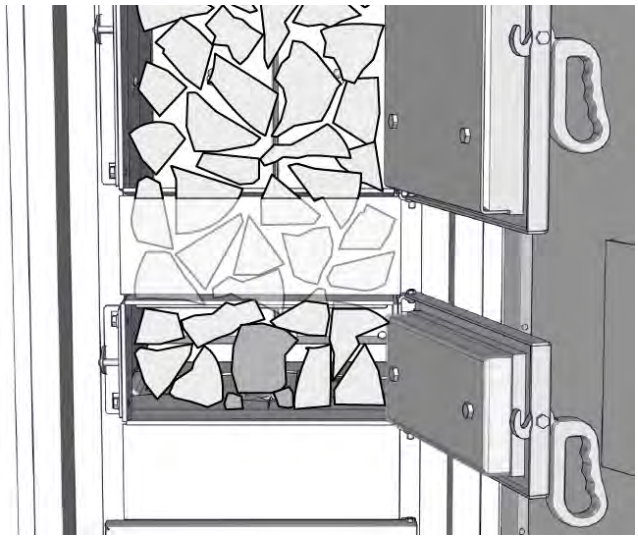
1 Half-metre logs

2 33 cm logs



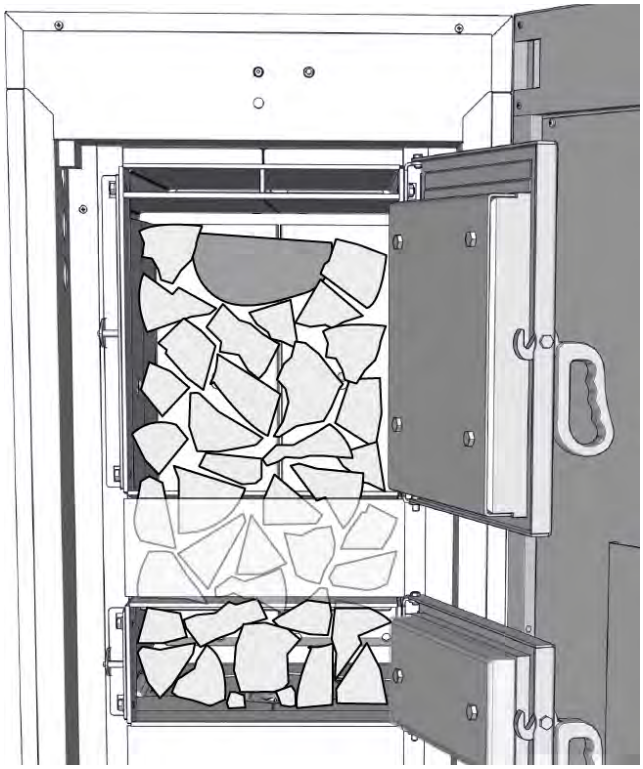
Adjust log over burn-through opening

Lift the bottom log above the burn-through opening with the poker and place pieces of charcoal (from the fuel chamber) or small pieces of wood under it so that the burn-through openings in the grate remain clear. To make ignition easier, next to the log on the left and right there should be a small gap separating it from the neighbouring logs.



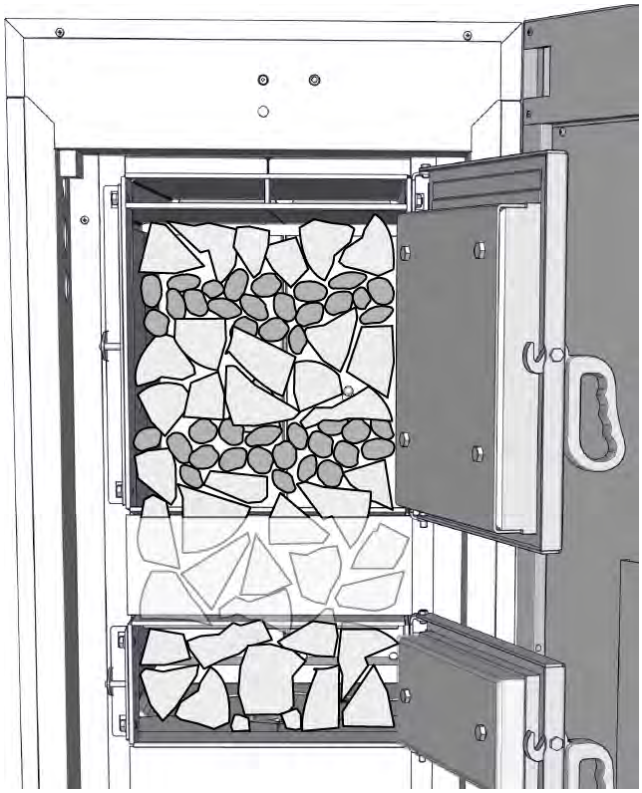
Place only one oversized log on top

Only one oversized split log or one stump piece can be placed in the top layers, but no more. Two combustion phases may be needed for complete burning.



Brushwood, coarse wood chips, unsplit logs and untreated wood waste should be added only as a secondary fuel among the split logs

First place half of the required amount of logs in the fuel chamber (at least 3 layers). Then alternately add the secondary fuel (brushwood, coarse wood chips, round logs, wood waste) and additional logs.

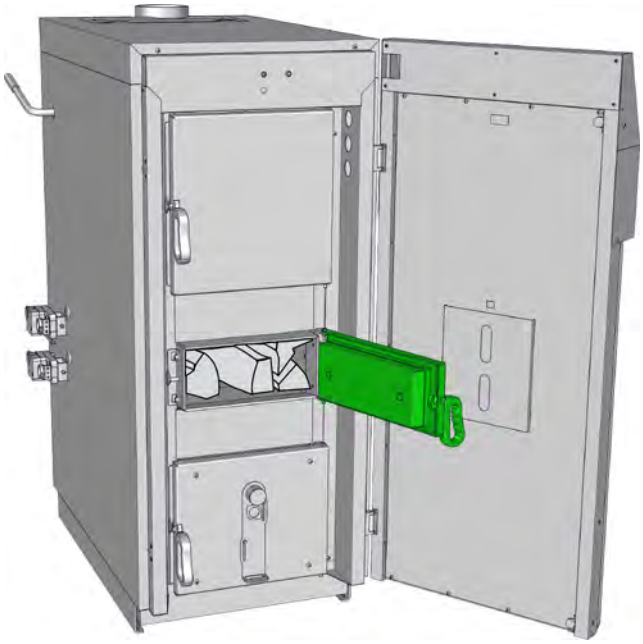


The smaller the pieces of secondary fuel are, the more logs must be added between them.

Under no circumstances should secondary fuel (brushwood, coarse wood chips, round logs, wood waste) be used for the bottom layer. Such fine material burns too quickly, resulting in incomplete combustion in the combustion chamber, which is still cold during start-up. As a result, tar can build up in the heat exchanger.

Close fuel chamber door, open ignition door

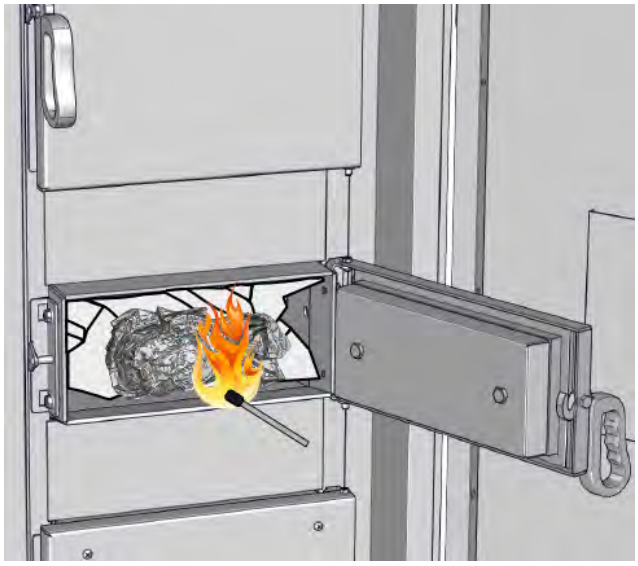
Close the fuel chamber door and then open the ignition door.



If the boiler is not to be started up yet, close both doors and in the boiler overview, press the [On/Off] button so that it shines red.

Ignite fire with cardboard and newspaper

Place crumpled paper or a few pieces of cardboard in front of the first layer of wood and ignite it. The draught fan sucks the flame over the tightly stacked logs, causing them to ignite more quickly. For heavy, smooth hardwood, larger pieces of kindling may be needed for ignition.

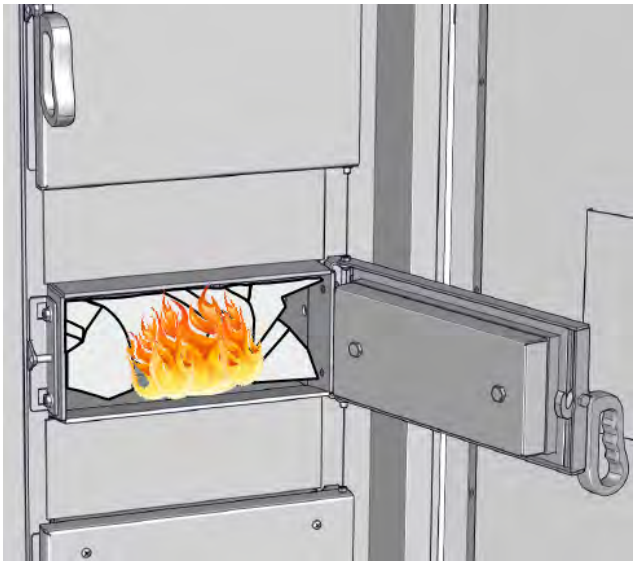


⚠ CAUTION!

Never use petrol, turpentine or similar materials as an "ignition aid": risk of explosion!

The ignition door should be kept open after ignition to monitor the progress of the fire. It should only be closed once the boiler's exhaust temperature has reached 100°C.

How long it takes the fire to start depends on the type of wood used; rough spruce may need only 2 minutes, smooth beech may require 5 minutes until the exhaust gas temperature reaches 100°C.



At 100°C exhaust temperature, close ignition door and insulating door

Once a few logs are burning well and the exhaust temperature is over 100°C, close the ignition door and the insulating door.

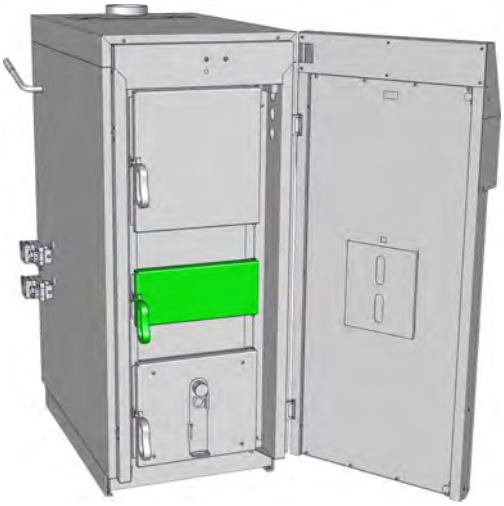
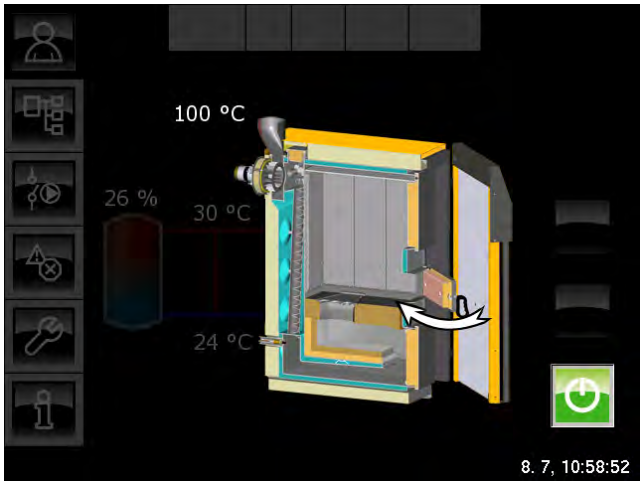


Fig. 9-1: Close ignition door

Fig. 9-2: Close insulation door

The exhaust temperature is displayed in the boiler overview. At over 100°C, an arrow appears to indicate that the ignition door should be closed.



When the insulating door is closed, the boiler automatically switches to [Ignition] mode and, once the residual oxygen content is below 15%, to [Heating] mode. The boiler is now in heating mode and regulates the combustion of the wood independently.

Avoid opening boiler doors unnecessarily

Avoid opening the insulating door and the fuel chamber door unnecessarily in [Heating] mode. That disrupts the boiler control and increases fuel consumption. Also keep the ignition door and the combustion chamber door closed.

⚠ CAUTION!

▶ Never open the insulating door and the fuel chamber door when the boiler is in [Calibrating lambda probe] or [Overtemperature] mode.

Completion of heating mode with ember burnout

Once the wood in the boiler has been burned (residual oxygen content over 15% for more than 5 minutes) or the exhaust temperature falls below 80 °C, the boiler automatically starts ember burnout ([Ember burnout] mode).

If the [ASH] button was not pressed, the boiler frees the secondary air ducts of ash with fresh air. Charcoal and embers remain in the boiler by design so that newly added wood can be ignited more easily.

Complete ember burnout for cleaning

For cleaning after the last heating operation, in the overview screen press the [ASH] button (which then shines green).

Ember retention is then deactivated and the boiler performs a complete ember burnout (duration approx. 1 hour), burning most of the charcoal in the fuel chamber to make subsequent cleaning of the boiler easier.

Adding fuel

You should only add fuel when the buffer charging status is below 30% and the fuel chamber has burned to empty.

If wood has been added and there are still embers in the boiler, it automatically tries to ignite the wood again. If the wood is hard to ignite and there are only a few remaining embers, it may help to push the charcoal together in the middle before refilling. If the remaining embers do not ignite the wood, light it with paper and cardboard through the ignition door.

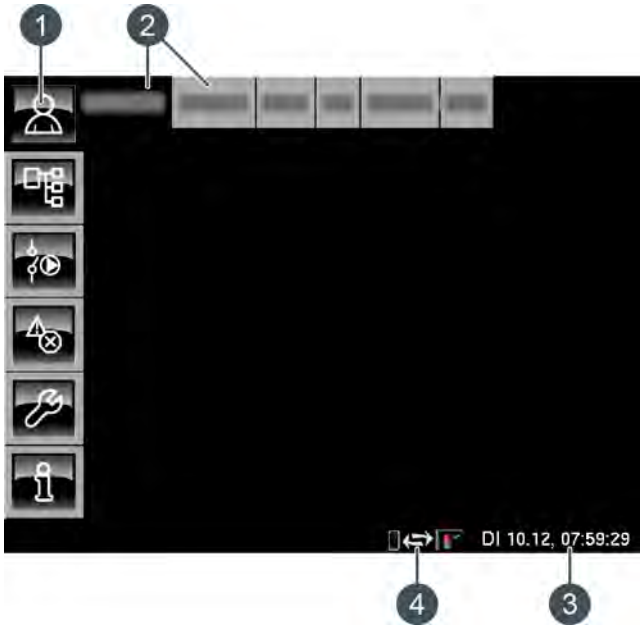
10 Operation

10.1 User interface

10.1.1 Overview

Touchscreen user interface

The touchscreen only displays function blocks that are required and configured to work with your heating system.



1 Menu buttons
2 Heating system function blocks
3 Date and time
4 Remote control (meinETA)

Overview

Displays an overview screen of the selected function block.

Text menu

Allows you to change parameters of the selected function block.

I/O menu

Enables a specialist to assign inputs and outputs and manually operate the outputs of the selected function block.

Messages

Messages of the selected function block (notifications, warnings or errors)

Toolbox

Toolbox for the specialist.

Help

Displays additional information for a parameter selected in the text menu. If additional information is available, the symbol in the button changes to .

10.1.2 Setting the date and time

Explanation

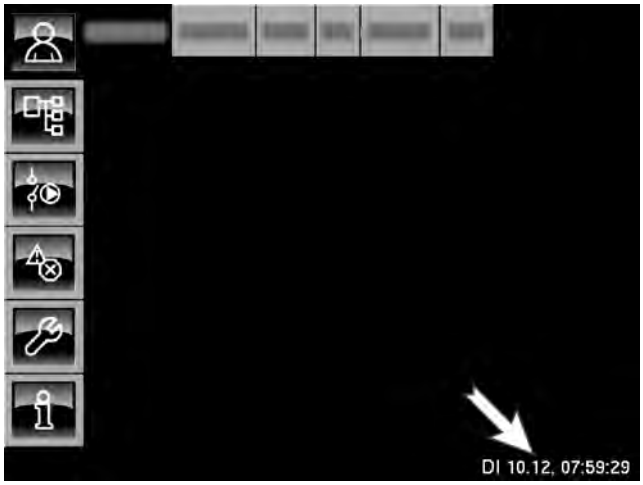
The ETAtouch control system allows you to adjust the date and time to suit your respective time zone.

The date and time are factory-set to Central European Time (UTC+01:00).

Changing the date and time

Press the button to open the function block overview screen.

Tap on the date or time at the bottom right-hand corner of the touchscreen.



A settings screen opens:

By tapping on [Day:], [Month:], [Year:] or [Time:], you can select the parameter that you wish to change.

Enter the new value and press [Accept] to save.

10.1.3 Changing the names of function blocks

Renaming function blocks

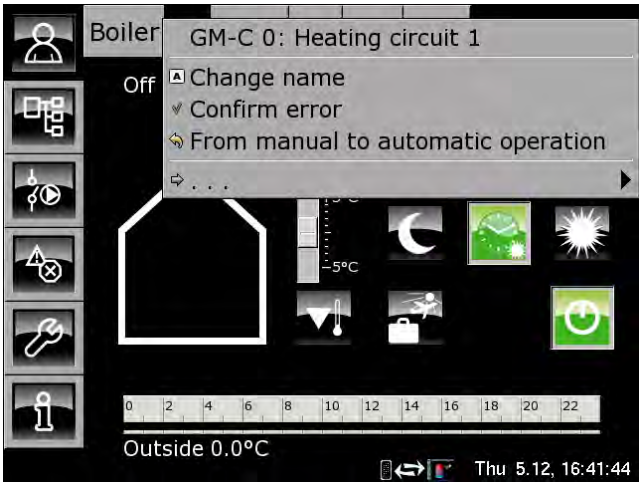
You can individually adapt the names of function blocks to make them easier for you to recognise.

If you are changing the names of function blocks, bear in mind that they should be kept short. This will make the touchscreen clearer.

Changing a name

Tap [HC] twice to rename this function block.

A small menu window opens:



Tap [Change name].

A keypad is displayed:

Enter the new name and press [Accept] to save.

To cancel the process and keep the original name, press [Cancel].

10.1.4 Text menu navigation

Using the text menu

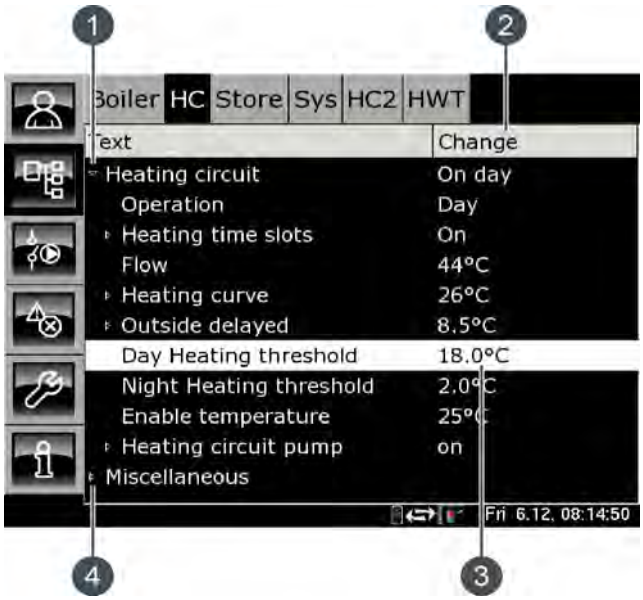
For each function block, there is a text menu. In this window, the available parameters are displayed and can be changed if necessary.

If additional information is available for a selected parameter, the symbol in the button changes to . This additional information is displayed when you press the button.

Only modify parameters if you know what their function is. Before any changes, read the relevant section of the user manual or configuration manual, or the additional information displayed when you press . If you cannot find sufficient information about a parameter, please consult a specialist.

Text menu overview screen

Press the button and [HC], for example, to open the text menu of this function block.



1 Submenu opens
2 [Value] or [Change]
3 Selected parameter
4 Submenu is available

Modifying parameters

Example: Change the [Day heat. lim.] parameter in the [HC] function block.

First, press [HC] to select the function block.

Press to switch to the function block's text menu. The parameter can be found under:

Heating circuit
Day heat. lim.

It is possible to modify certain parameters in order to adapt the heating system to your needs. When you select a parameter that can be changed, the [Value] field changes to the [Change] button.

Press the [Change] button or tap the parameter twice to open a settings window:

1 Name of the parameter
2 Factory settings
3 Adjustment range (minimum and maximum value)

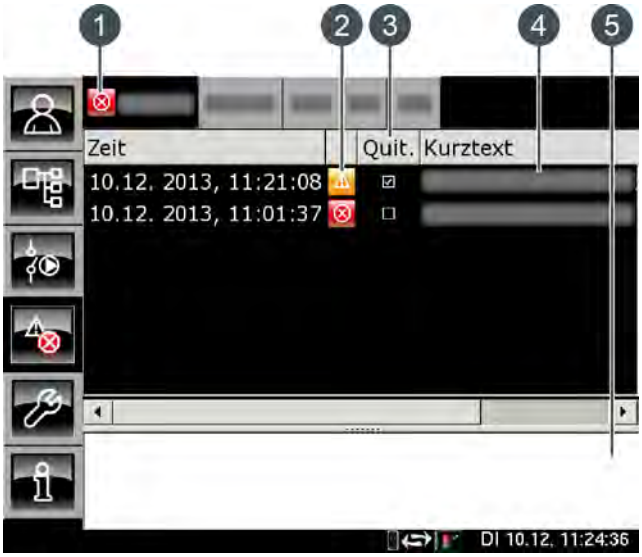
Enter the new value and press the [Accept] button to save.

Press the button to return to the overview window of the function block.

10.1.5 Messages

Overview of messages

Press the button to go to the messages overview of the selected function block.



1 Symbol for the highest priority type of all occurred messages
2 Symbol for the type of individual message
3 Button for acknowledging a message
4 Brief description of the message
5 Detailed description of the message

In the event of an error, alarm or warning in a function block, the symbol of the button changes.

The possible states are:

- No messages present
- There is a warning
- There is an error or alarm

Types of message

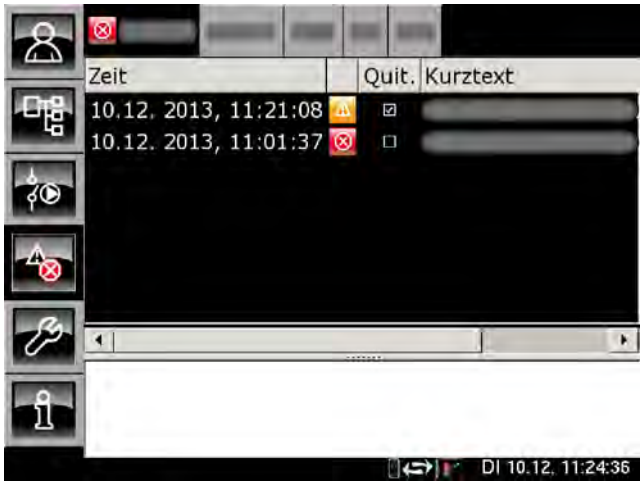
- Notification
  A notification does not interrupt operation, and therefore no acknowledgement is required. Notifications inform the user, for example, that pump anti-blocking protection has been activated.
- Warning
  A warning is displayed on failure of a function that is not absolutely essential for continued operation. It can be acknowledged before the cause of failure is remedied. However, it will continue to be displayed until the cause has actually been dealt with.
- Error, alarm
  An error or alarm stops operation. Some of these can be acknowledged before the cause of the problem is remedied. However, they will continue to be displayed until the cause has actually been dealt with.

  Other errors and alarms can only be acknowledged after the cause has successfully been remedied. You can then delete these messages with the [Confirm later] button.

  Once an error or alarm has been resolved and acknowledged, you must restart the boiler or the affected heating circuit by pressing the [On/Off] button.

Acknowledging an error

Press the button to open the message window of the selected function block.



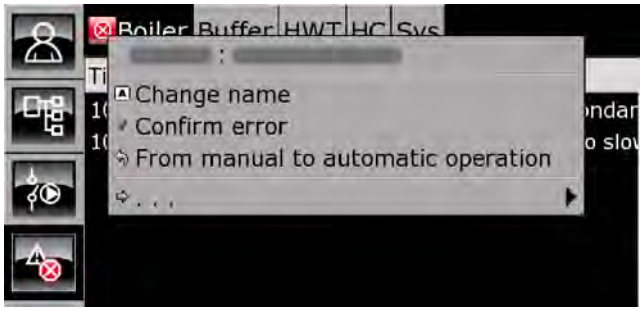
Select the message that you wish to acknowledge.

When you press [Conf.] or tap the row twice, a notice appears.

Press [OK] to acknowledge the message and delete it from the list.

Acknowledging all errors

Tap [Boiler] twice to acknowledge all errors for this function block. A small menu window opens. Tap on the [Confirm error] field in this window.



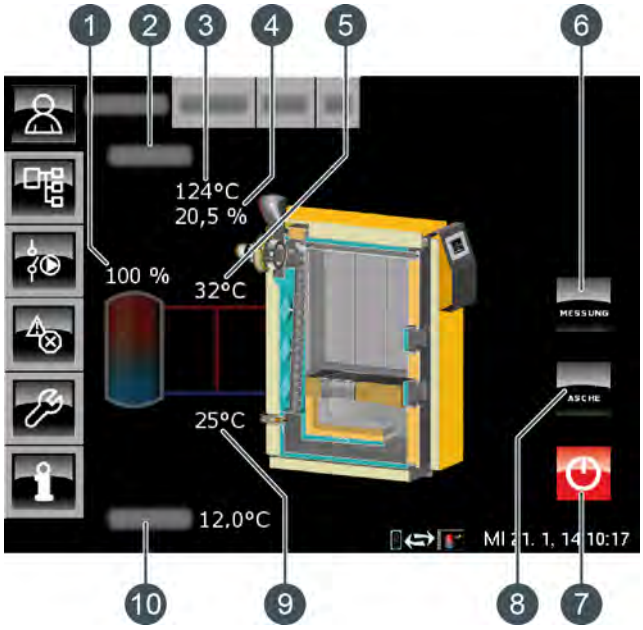
10.2 [Boiler] function block – log boiler

10.2.1 Overview

Boiler overview

Press the button and [Boiler] to open the boiler overview window. The overview screen shows you the current boiler mode and buffer charging status at a glance.

An ember burnout for subsequent cleaning and an emission measurement can be initiated in this view.



1 Buffer charging status
2 Operating condition
3 Exhaust temperature
4 Residual oxygen content of flue gas
5 Flow temperature
6 [MEAS.] button
7 Switch off boiler
8 Perform ember burnout [ASH]
9 Return temperature
10 Outside temperature

Perform ember burnout

If this button is pressed while the boiler is in heating mode, it will perform a complete ember burnout (duration approx. 1 hour). All embers and ash are burned to make subsequent cleaning easier.

Pressing this button again while heating ends the ember burnout.

Switch off boiler

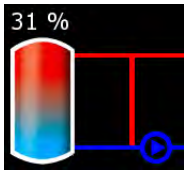
This button switches off the boiler when it is not starting up. The boiler is switched on by opening the insulating door.

MEAS.

The boiler must already be heating in order to press this button.

It switches the boiler to full load for a period of 30 minutes for the emission measurement. The heat is discharged into the buffer, the heating circuits and the hot water tank. When the 30 minutes are over, the boiler automatically switches back to normal mode.

Buffer storage tank and charging status



This symbol is displayed next to the boiler as soon as it supplies heat to the buffer.

The percent display shows the current buffer charging status.

Boiler functionality

When the insulating door is opened, the draught fan starts automatically and the button shines green. The operating mode changes from [Ready] to [Insulation door open]. The open insulation door is shown on the display.

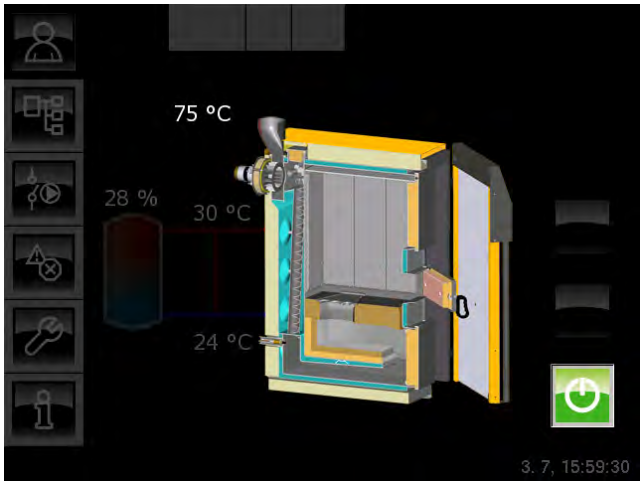


Fig. 10-1: Insulation door open

If the insulation door stays open for more than 30 minutes, an error message appears on the screen.

If there is a TWIN burner connected to the log boiler and the insulation door stays open longer than 1 minute, the TWIN burner is switched off by the control system, which assumes that the log boiler is being started up.

If the log boiler is not being started up, it can be switched off by pressing .

As soon as the fuel has been ignited and the exhaust temperature has exceeded 100°C, an arrow appears indicating that the ignition door and the insulation door should be closed.

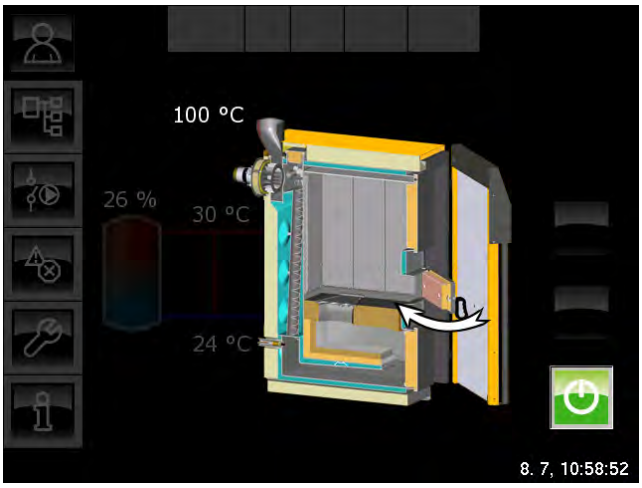


Fig. 10-2: Close ignition and insulation doors

When the insulation door is closed, the boiler switches to [Ignition] and later to [Heating] mode. Split logs and fire are depicted in the boiler.

As soon as the boiler is supplying heat to the buffer, the buffer pipes are completely displayed as is the boiler pump.

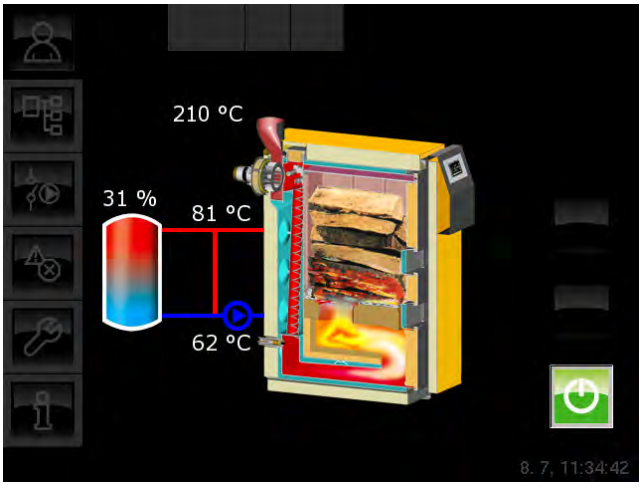


Fig. 10-3: Log boiler in heating mode

If the fuel in the boiler has been burned and the exhaust temperature is below 80°C, the boiler begins the ember burnout and afterwards switches to [Ready] mode.

If the [ASH] button was not pressed during heating, some charcoal and embers will remain in the boiler by design so that new fuel can be ignited more easily when it is added later.
If the button was pressed during heating, the boiler will perform a complete ember burnout.

10.2.2 Operating modes

Heating

The boiler is in heating mode and is channelling heat to the consumers.

Ember burnout

The fuel in the boiler is almost completely burned and the exhaust temperature is below 80°C.

Ready

The boiler is switched off and can be started up at any time.

Malfunction

A malfunction has occurred, preventing the boiler from heating. The cause can be found in the list of error messages.

Calibrating lambda probe

The lambda probe is undergoing automatic calibration. It is not possible for the unit to heat whilst in this mode.

Insulation door open

The boiler's insulation door is open. If the boiler was previously in [Heating] mode, it will switch back to this mode after the insulation door is closed.
If the boiler was previously in a mode other than [Heating], it will switch to [Ignition] mode after the insulation door is closed.

Ignition

The boiler's insulation door was opened earlier to add fuel or to start up the boiler. After the insulation door is closed, the boiler switches to this mode.

If the boiler is not being started up immediately, it can be switched off again by pressing the button. Then the button shines red.

Overtemperature

The boiler temperature has exceeded the maximum temperature [Boiler max]. The draught fan is switched off and a message appears on the screen indicating that less fuel needs to be added in future. Only when the boiler has cooled below 86°C will the draught fan switch on again and heating resume.

TWIN operation

Optional: only with additional TWIN burner

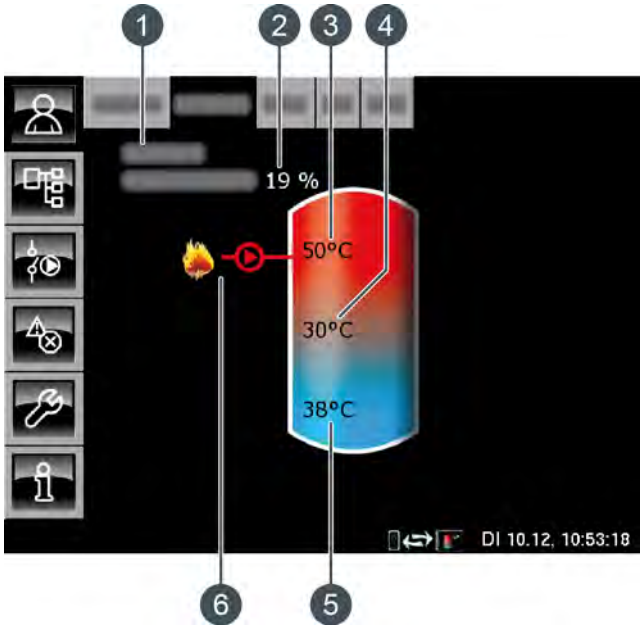
This mode appears when the buffer needs heat but the log boiler cannot provide it. Then the control system starts the TWIN burner to supply heat to the buffer. The current status of the TWIN burner is shown in the [Twin] FUB.

10.3 [Buffer] function block - log boiler

10.3.1 Overview

Overview of buffer storage tank for log boiler

Press the button and [Buffer] to open the overview screen of the buffer storage tank. Here the current temperatures, operating mode and charging status are displayed.



1 Operating mode
2 Buffer charging status
3 Temperature: Buffer top
4 Temperature: Buffer middle
5 Temperature: Buffer bottom
6 Charging by boiler

Buffer storage tank functionality with log boiler

By means of the 3 temperature sensors on the buffer, the current charging status is determined and displayed in the overview screen. It is needed to determine the correct amount of firewood to add.

The buffer is charged by the log boiler as soon as the buffer meets the necessary criteria.

Charging by boiler

This symbol is displayed when the buffer is being charged by the boiler.

Charging by solar heating system

Optional: For solar heating system.

This symbol indicates that the tank is being charged by the connected solar heating system.

The displayed temperature is the temperature of the solar panel.

Buffer charging status

By means of the 3 temperature sensors on the buffer, the current charging status is determined and displayed in the overview screen.

A charging status of 0% means that the buffer has only been charged to the configured [Return from consumers] temperature, or lower.
100% means that all 3 temperature sensors on the buffer have reached 80°C.

Timer HW charging times

Optional: For [Combin. tank].

With a combination tank, this timer displays the configured charging times for charging the hot water on the current day. These time slots are displayed as a black bar in the timer.

Buffer with solar heating system

Optional: only for [Solar charging]

On the overview screen, the additional temperature [Buffer bottom Solar] is displayed at the bottom right in the buffer storage tank.

The [Buffer middle] temperature sensor is no longer shown in the overview screen.

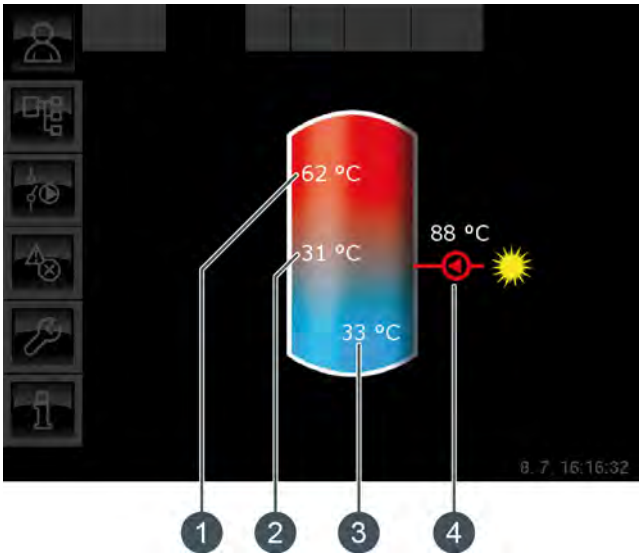


Fig. 10-4: Buffer with solar heating system

1 [Buffer top] temperature
2 [Buffer bottom] temperature
3 Temperature: Buffer bottom Solar
4 Charging by solar heating system, [Collector] temperature

Solar charging of the buffer is controlled by switching the solar panel pump on and off. Solar charging begins as soon as the [Collector] temperature is 5°C higher than the [Buffer bottom Solar] temperature. The solar charging symbol appears in the overview screen.

If the [Collector] temperature falls below the [Buffer bottom Solar], solar charging ends with the solar panel pump switching off.

The configurable [Buffer bottom max] temperature sets the limit for buffer charging by the solar heating system to prevent the buffer from overheating (see page 37).

Buffer with solar heating system and stratified charging valve

Optional: Only with [Solar charging] and [... additional solar charging in buffer middle]

The two temperatures [Buffer top Solar] and [Buffer bottom Solar] are displayed in the overview screen.

The [Buffer middle] temperature sensor is no longer shown in the overview screen.

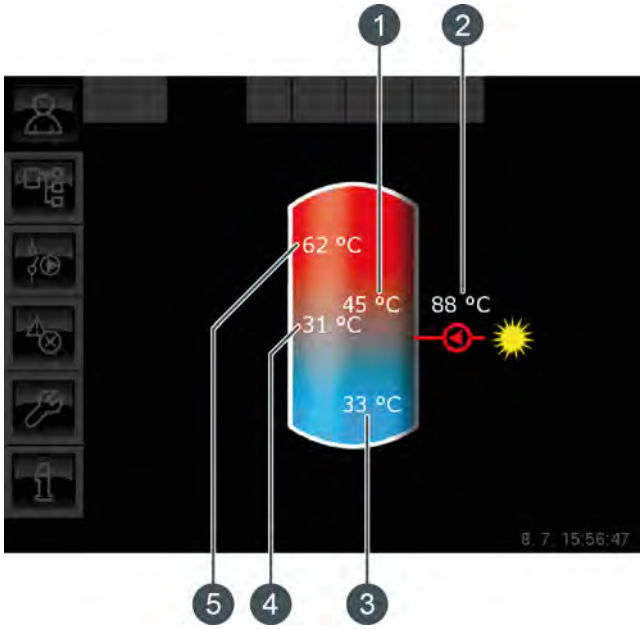


Fig. 10-5: Buffer with solar heating system and stratified charging valve

1 [Buffer top Solar] temperature
2 Charging by solar heating system, [Collector] temperature
3 [Buffer bottom Solar] temperature
4 [Buffer bottom] temperature
5 [Buffer top] temperature

The stratified charging valve on the buffer storage tank switches solar charging between [Buffer bottom] and [Buffer top]. During this process, the [Buffer top Solar] and [Buffer bottom Solar] temperatures are continuously compared with the [Collector] temperature.

The solar charging symbol is shown at the top or centre of the buffer, depending on which part of the buffer is currently being charged.

Combination tank (buffer with integrated hot water tank or coil)

Optional: for [Combin. tank]

If a combination tank (i.e. a buffer with integrated hot water tank or internal water heat exchanger) is installed, the hot water temperature is shown in the overview screen in the upper part of the buffer.

Additionally, the [HW charging times] timer is displayed; it is used to set the hot water temperatures and charging times (see page 35).

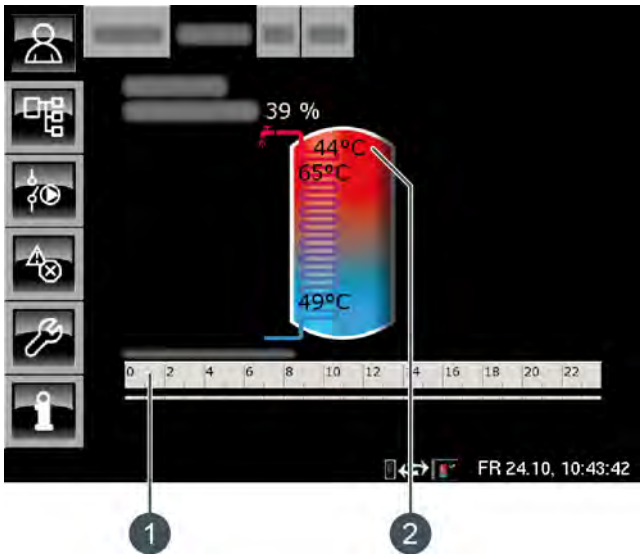


Fig. 10-6: Combination tank

1 [HW charging times] timer

2 [Hot water tank] temperature

10.3.2 Operating modes

Charged

The log boiler is not supplying any more heat and the top part of the buffer has exceeded the [Buffer target] temperature.

Demand

The buffer is demanding heat from the heat producer.

Chrg.

The boiler is supplying heat to the buffer.

FreezeProt

A temperature sensor in the tank has fallen below the [FreezeProt] temperature.

The frost protection limit is factory-set to 5°C.

ResidHeat

After the boiler heating phase, its residual heat is conveyed to the tank.

Heat dissipation

The tank is being charged to discharge excess heat from the boiler.

Sensor error

A temperature sensor is faulty. You can find this temperature sensor in the message list by pressing the button.

Solar heat diss.

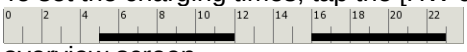
Excess heat is being taken from a buffer that is being charged by a solar heating system.

10.3.3 Operation

Setting charging times and temperature for hot water with a combination tank

With the combination tank, the additional [HW charging times] timer is used to set 3 different time slots and temperatures for the hot water for each day of the week.

Inside a time slot, the hot water is charged to the configured temperature. Outside a time slot, the hot water is charged to the configurable temperature [Set-back temperature between time slots:].

To set the charging times, tap the [HW charging times]  timer in the overview screen.

A screen opens:

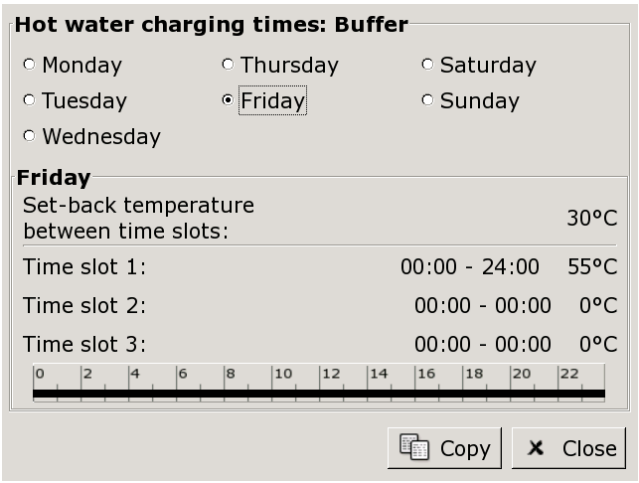


Fig. 10-7: Overview screen for hot water charging times

Select the individual time slots and hot water temperatures by tapping the row [Time slot 1:], [Time slot 2:] and [Time slot 3:].

A settings screen opens:

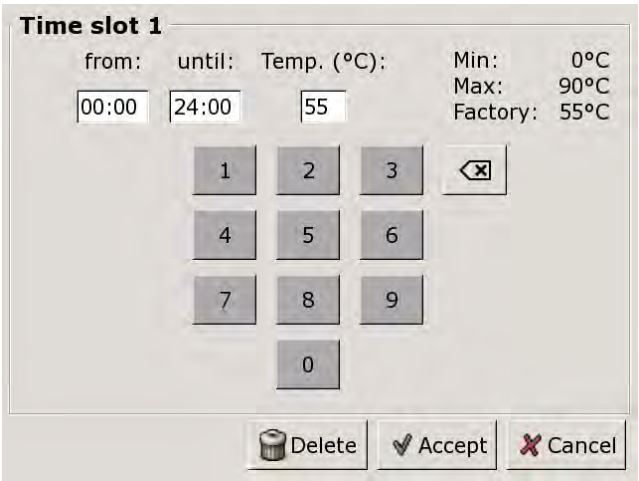


Fig. 10-8: Setting the time slot and hot water temperature

Enter the time slot and desired hot water temperature and press [Accept] to save. Set further time slots in the same way.

You can change the [Set-back temperature between time slots:] temperature in the overview screen of hot water charging times. To do so, tap the [Set-back temperature between time slots:] row and to select the desired temperature in the settings window.

After you have set the time slots, you can copy them for other days of the week. To do so, press the [Copy] button in the charging times overview screen. A screen opens showing the individual days of the week. Make your selection and press [Accept] to save.

Fig. 10-9: Copying time slots to days of the week

The overview screen of hot water charging times opens. You can close this by pressing [Close].

10.3.4 Text menu

Adjustable parameters

In function block [Buffer], switch to the text menu with the button.

- Buffer
  - Buffer top Solar[a]
    - Buffer top min. solar
    - Min. out. temp. Solar prio.
    - Priority
  - Buffer bottom Solar
    - Buffer bottom max
  - Extra solar heat
    - from outside temp.
    - at buffer top
    - at buffer bottom sol.
  - Priority

a. Only visible with solar heating system and buffer with 2 internal coils

Detailed descriptions of the parameters are provided below.

10.3.4.1 Buffer top min. solar

Explanation of [Buffer top min. solar]

Optional: Only for solar heating panels with stratified charging

With stratified charging by the solar heating system, this sets a minimum temperature for the top section of the buffer.
This way, solar charging only takes place in the top section once the solar panel is at least 7°C warmer than [Buffer top min. solar].

However, this minimum temperature only applies if the conditions for stratified charging are satisfied. If they are not, solar charging is switched to the bottom section of the buffer, to make use of the solar energy.

This parameter is factory-set to 30°C.

Modifying parameters

The parameter can be found under:

- Buffer
  - Buffer top Solar
    - Buffer top min. solar

Select the parameter and press the [Change] button. A settings window will open.

Enter the value and press the [Accept] button to save.

10.3.4.2 Min. out. temp. Solar prio.

Explanation of [Min. out. temp. Solar prio.]

This parameter sets the minimum value for the outside temperature, so that one of the conditions for solar priority and stratified charging of the buffer storage tank is satisfied.

This value is factory-set to 10°C.

Modifying parameters

The parameter can be found under:

- Buffer
  - Buffer top Solar
    - Min. out. temp. Solar prio.

or also in:

- Buffer
  - Buffer bottom Solar
    - Solar prio.
      - Min. out. temp. Solar prio.

Select the parameter and press the [Change] button. A settings window will open.

Enter the value and press the [Accept] button to save.

10.3.4.3 Priority of the upper and lower sections

Explanation of [Priority]

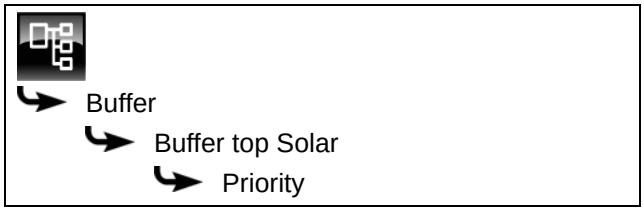
Optional: Only with solar heating system and buffer with 2 internal coils

This parameter sets the priority of the top and bottom sections of the buffer for solar charging. A high priority means that this section will be charged by the solar heating system first. A low priority means that it will be charged last.

The priority for the top section is factory-set to [High], and to [Middle] for the bottom section.

Modifying parameters

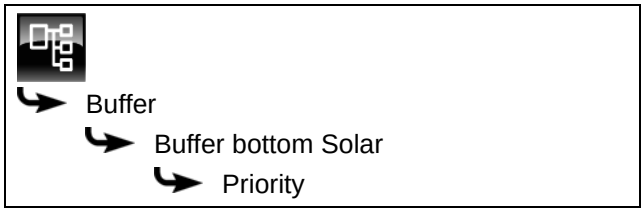
The priority for the top section is under:



Select the parameter and press the [Change] button. A settings window will open.

Make your selection and press the [Accept] button to save.

Set the priority for the bottom section of the buffer in the same way. You will find this in:



10.3.4.4 Buffer bottom max

Explanation of [Buffer bottom max]

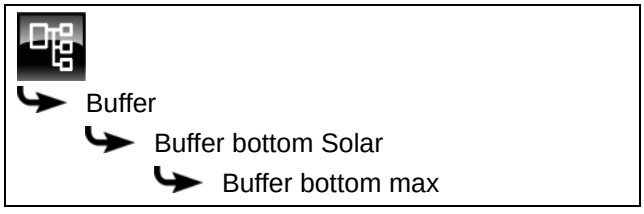
Optional: Only with solar heating systems

This switch-off temperature can only be set when the solar heating system is charging the buffer. This configurable temperature sets a threshold for how much the buffer can be charged by the solar heating system, in order to prevent the buffer from overheating. If the [Buffer bottom Solar] temperature sensor reaches the configured [Buffer bottom max] temperature, the solar panel pump of the solar heating system is switched off.

This parameter is factory-set to 90°C.

Modifying parameters

The parameter can be found under:



Select the parameter and press the [Change] button. A settings window will open.

Enter the value and press the [Accept] button to save.

10.3.4.5 Extra solar heat

Explanation of [Extra solar heat]

Optional: Only with solar heating systems

This function defines whether the buffer storage tank may convey this excess heat from the solar heating system to other consumers, even if they do not currently require any heat.

The following conditions must be met in order for the excess solar heat to be passed on in this way:

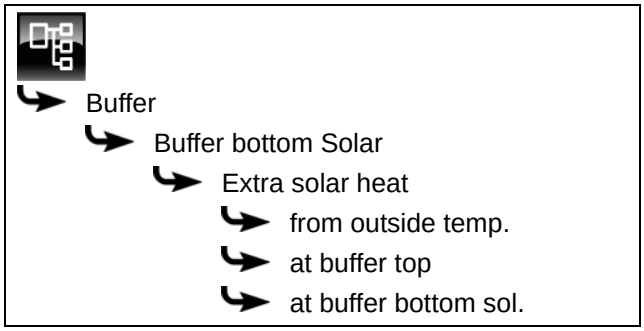
- The outside temperature must have exceeded the configurable value [from outside temp.] (factory setting 10°C).
- The [Buffer top] temperature in the buffer must have exceeded the configurable value of [at buffer top] (factory setting 100°C).
- The [Buffer bottom Solar] temperature in the buffer must have exceeded the configurable value of [at buffer bottom sol.] (factory setting 50°C).
- In the function block for the hot water tank, heating circuits or other buffer storage tanks. the [Solar heat diss.] parameter must be set to [Yes], so that the buffer can request these consumers to take on the excess solar heat.

The parameters [from outside temp.], [at buffer top] and [at buffer bottom sol.] can be configured in the buffer text menu.

The [Solar heat diss.] parameter can be configured in the text menu of the [HW] or [HC] function block.

Changing the conditions

The parameters can be found under:



Select the parameter and press the [Change] button. A settings window will open.

Enter the value and press the [Accept] button to save.

10.3.4.6 Priority of the buffer

Explanation of [Priority]

Optional: Only for solar heating systems with switchover between several tanks

This parameter sets the priority for solar charging of the buffer. A high priority means that this tank will be charged by the solar heating system first. A low priority means that it will be charged last.

The priority for the buffer is factory-set to [Middle].

Modifying parameters

The parameter can be found under:


Buffer
Priority

Select the parameter and press the [Change] button. A settings window will open.

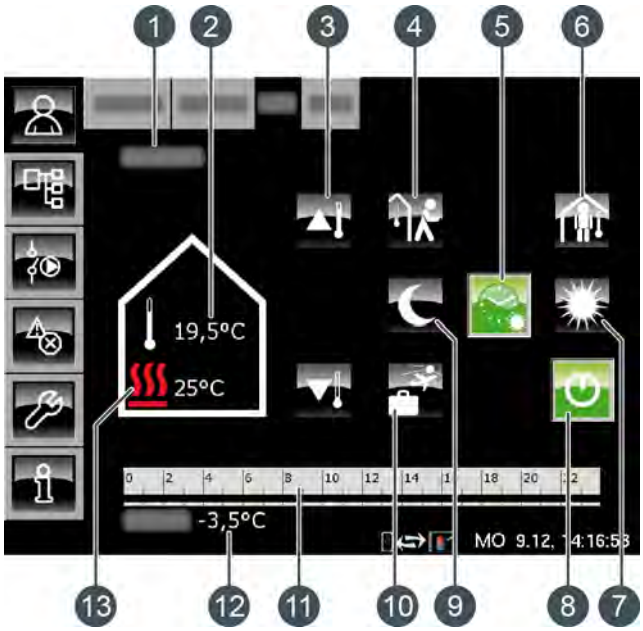
Make your selection and press the [Accept] button to save.

10.4 [Heating circuit] function block

10.4.1 Overview

Heating circuit overview screen

Press the button and [HC] to open the heating circuit overview screen. Each heating circuit can be adjusted in its own function block.



1 Operating mode
2 Current room temperature (only with the [Analogue RmSensor] or [Digital room sensor] option)
3 Slider
4 [away] button
5 [Auto] button
6 [home] button
7 [Day] button
8 [On/Off] button
9 [Night] button
10 [Holiday] button
11 [Heat times] timer
12 Outside temperature
13 [Flow] temperature

How the heating circuit works

Press [On/Off] to switch the selected heating circuit on or off. If the heating circuit is on, this button lights up green.

With the [Heat times] timer, you can set 3 different time slots for each day of the week (see page 45). These time slots are displayed as a black bar in the timer.

Press the [Day], [Auto] or [Night] buttons to swap between the different modes. The selected button then lights up green.

The slider adjusts the flow temperature of the heating circuit, and therefore the room temperature.

[Day] mode

Inside a time slot set with the [Heat times] timer, the heating circuit is in [Day] mode.

If a room sensor is installed, in this mode the heating circuit is set to the highest room temperature configured in the timer for the current day.
If there is no room sensor, the heating circuit runs using the [Day] heating curve.

[Night] mode

Outside a time slot set with the [Heat times] timer, the heating circuit is in [Night] mode.

If a room sensor is installed, in this mode the heating circuit is set to the reduced room temperature [Set-back temperature between time slots:] configured in the timer for the current day.
If there is no room sensor, the heating circuit runs using the [Night] heating curve.

On/Off

This button switches the heating circuit on and off. If the heating circuit is in operation, this button appears green.

Automatic mode [Auto]

This button switches the heating circuit to automatic mode [Auto]. Here, the time slot configured in the [Heat times] timer is used to automatically toggle between the [Day] (inside a time slot) and [Night] (outside a time slot) modes.

The symbol in the button changes depending on whether the heating circuit is currently inside or outside the configured time slot.

= inside a time slot

= outside a time slot

[Day] continuous operation

This button causes the heating circuit to run continuously in [Day] mode, and the time slots set in the [Heat times] timer are ignored.

[Night] continuous operation

This button causes the heating circuit to run continuously in [Night] mode, and the time slots set in the [Heat times] timer are ignored.

Current room temperature

Optional: Only with [Analogue RmSensor] or [Digital room sensor].

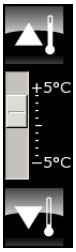
The installed room sensor displays the current, measured room temperature.

[Flow] temperature

The symbol only appears when the heating circuit is switched on.

The current [Flow] temperature for the heating circuit is displayed.

Slider



The slider adjusts the desired room temperature in the range +/- 5°C. You can increase or reduce the room temperature in increments of 0.5°C using the  and  buttons.

If a room sensor is installed, when you press the  and  buttons the target room temperature is displayed instead of the scale.

[Heat times] timer

This timer displays the configured time slot for the [Day] mode of the current day of the week. These time slots are displayed as a black bar in the timer.

[Holiday] mode

This button defines a period of time for switching the selected heating circuit to [Night] mode. The heating circuit is then switched to the lowest temperature configured in the [Heat times] timer.

[home] mode

This function is only available in [Auto] mode. This button switches the heating circuit to [Day] mode until the next configured time slot, ignoring the current set time slot.

Pressing [home] outside a time slot immediately switches the heating circuit to [Day] mode.

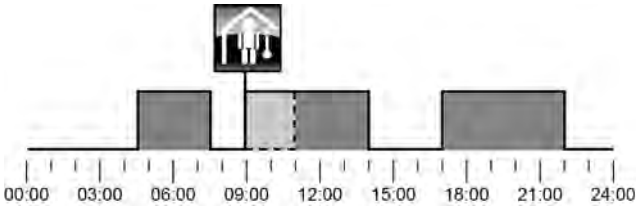


Fig. 10-10: Outside a time slot

Pressing [home] inside a time slot causes the next reduced temperature mode to be skipped.

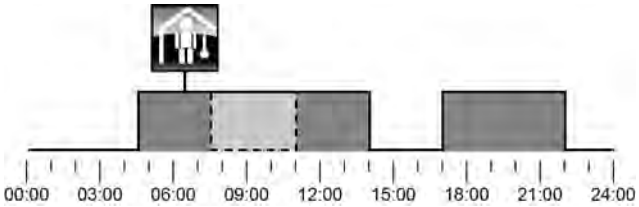


Fig. 10-11: Inside a time slot

[away] mode

This function is only available in [Auto] mode. This button switches the heating circuit to [Night] mode until the next configured time slot, ignoring the current set time slot.

Pressing [away] inside a time slot immediately switches the heating circuit to [Night] mode until the next time slot begins.

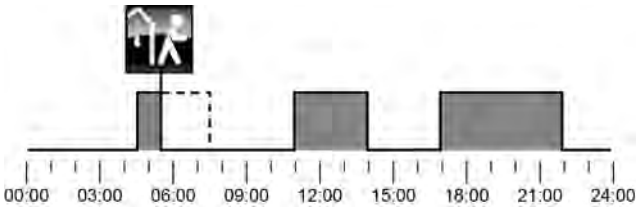


Fig. 10-12: Inside a time slot

Pressing [away] outside a time slot causes the next configured time slot to be skipped.

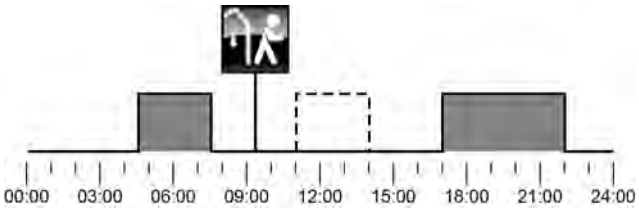


Fig. 10-13: Outside a time slot

10.4.2 Operating modes

Day on

The heating circuit is inside a time slot configured with the [Heat times] timer.

Night on

The heating circuit is outside a time slot configured with the [Heat times] timer.

Holiday on

The heating circuit is inside a holiday period configured with the [Holiday]  button. This mode continues until the end of the configured holiday period.

Enable off

The heating circuit is switched off because the [Boiler] temperature or [Buffer top] is below the required [Enable temperature] temperature.

Day tgt. off

The heating circuit is switched off because the [HeatCurve] temperature calculated on the basis of the [Day] heating curve is either below the room temperature measured by the room sensor, or below the [Off if HeatCurve below] temperature.

If no room sensor is installed, the heating circuit is switched off because the calculated [HeatCurve] temperature is below the required [Off if HeatCurve below] temperature.

Night tgt. off

The heating circuit is switched off because the [HeatCurve] temperature calculated on the basis of the [Night] heating curve is either below the room temperature measured by the room sensor, or below the [Off if HeatCurve below] temperature.

If no room sensor is installed, the heating circuit is switched off because the calculated [HeatCurve] temperature is below the required [Off if HeatCurve below] temperature.

H-day tgt. off

The heating circuit is inside a period configured with the [Holiday]  button. The heating circuit is switched off because the [HeatCurve] temperature calculated on the basis of the [Night] heating curve is either below the room temperature measured by the room sensor, or below the [Off if HeatCurve below] temperature.

If no room sensor is installed, the heating circuit is switched off because the calculated [HeatCurve] temperature is below the required [Off if HeatCurve below] temperature.

Room day off

The heating circuit is within a time slot, but switched off. The current room temperature is higher than the room temperature configured in the [Heat times] timer.

Room night off

The heating circuit is outside a configured time slot, and switched off. The current room temperature is higher than the room temperature configured in the [Heat times] timer.

H-day room off

The heating circuit is inside a period configured with the [Holiday]  button, but switched off. For the current room temperature is higher than the [Set-back temperature between time slots:] temperature configured in the [Heat times] timer.

Day heat. lim. off

The heating circuit is switched off because the current outside temperature is higher than the configured [Day heat. lim.] temperature.

Night heat. lim. off

The heating circuit is switched off because the current outside temperature is higher than the configured [Set-back heat limit] temperature.

H-day heat. lim. off

The heating circuit is inside a period configured with the [Holiday]  button, but switched off. For the current outside temperature is higher than the [Set-back temperature between time slots:] temperature configured in the [Heat times] timer.

Summer off

The heating circuit is switched off with the [On/Off]  button. The only active functions are frost protection, and the pumps' anti-blocking protection, which runs at midday every Saturday.

HW off

The heating circuit is switched off for hot water charging.

RoomFreezeProt on

The heating circuit is in operation because the current room temperature is below the [RoomFreezeProtLimit] temperature.

FlowFreezeProt on

The heating circuit is in operation because the current [Flow] temperature is below the [Flow freeze prot. limit] temperature.

ResidHeat on

The heating circuit does not supply any heat and the pump only continues running briefly, to discharge heat from the boiler.

HeatDiss on

The heating circuit is in operation because the boiler is running at overtemperature. The heating circuit is running at maximum temperature [Flow max].

Screed on

The heating circuit is in operation because the screed drying program is running.

Sensor error on

The heating circuit is in operation, even though the flow temperature sensor has a malfunction. It is running at a lower flow temperature to ensure frost protection.

Solar heat diss.

Excess heat is being taken from a buffer that is being charged by a solar heating system.

Locked off

The heating circuit was switched off by an external signal (= "locked").

10.4.3 The heating curve

Description of the heating curve

The heating curve regulates the flow temperature for the heating circuit. Each heating circuit has its own heating curve, as underfloor heating requires different settings from radiators.

The heating curve is defined by the two configurable parameters [Flow at -10°C] and [Flow at +10°C]. The result is a line: the [Day] heating curve. Based on the heating curve, the control system calculates the currently required flow temperature for the heating circuit in [Day] mode, depending on the current outside temperature. For example, an outside temperature of +3°C would result in a flow temperature of 45°C (see diagram below).

If a room sensor is installed for the heating circuit, the flow temperature calculated on the basis of the heating curve is corrected. The actual flow temperature will then differ from the calculated value.

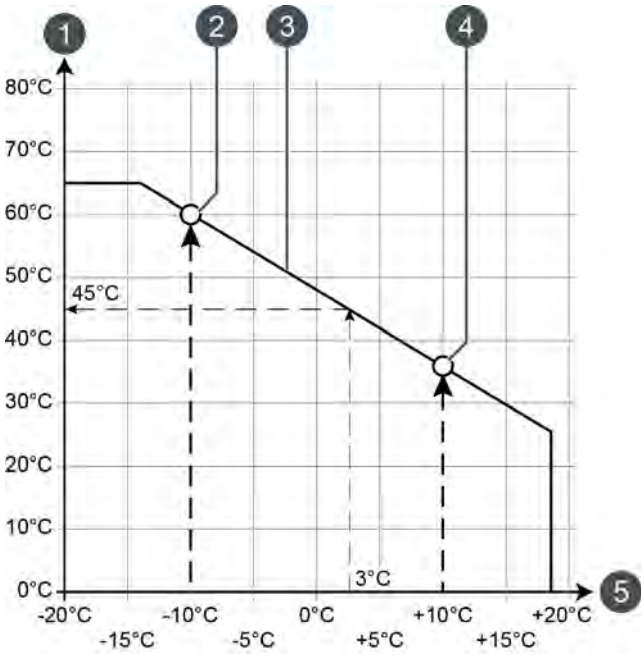


Fig. 10-14: [Day] heating curve

1 Flow temperature scale
2 Configurable parameter [Flow at -10°C]
3 [Day] heating curve
4 Configurable parameter [Flow at +10°C]
5 Outside temperature scale

The heating curve for [Night] mode is determined by a parallel shift of the [Day] heating curve. This shift is set via the [Set-back] parameter (see page 47).

The flow temperature for [Night] mode is determined on the basis of the outside temperature and the [Night] heating curve.

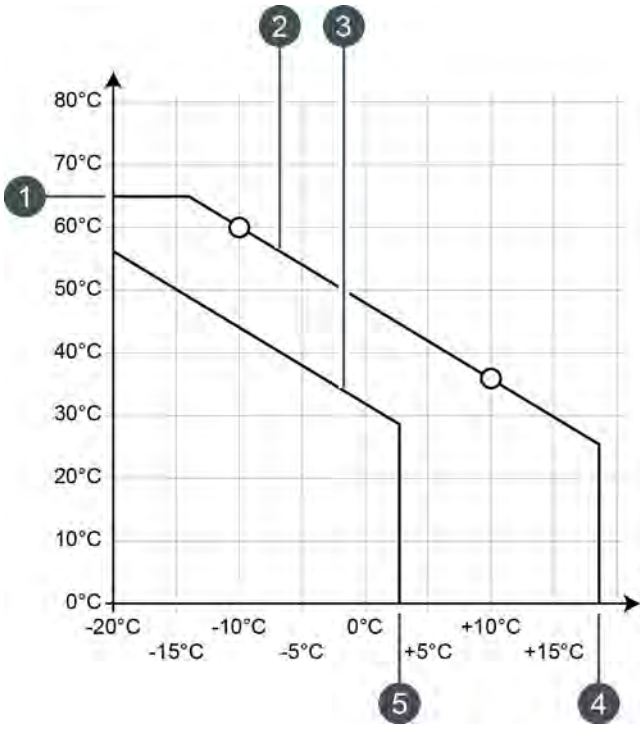


Fig. 10-15: [Night] heating curve

1 [Flow max]
2 [Day] heating curve
3 [Night] heating curve
4 [Day heat. lim.]
5 [Set-back heat limit]

If the current outside temperature exceeds the configured [Day heat. lim.] temperature in [Day] mode, the heating circuit is shut off. The same applies to [Night] mode, if the outside temperature exceeds the [Set-back heat limit] temperature. To set these parameters, see page 47.

The [Flow max] parameter determines the maximum flow temperature for the heating circuit, to protect it from overheating. The factory setting is 45°C for underfloor heating, and 65°C for radiators.

Adjusting the heating curve

If the heating circuit is always too hot or too cold in [Day] mode, you must adjust the heating curve. Do this by adjusting parameters [Flow at -10°C] and [Flow at +10°C].

Only ever make minor adjustments to these parameters: never more than 2°C for underfloor heating, and 4°C for radiators. You may need to adapt the heating curve again after a couple of days, but if you do it in small increments, it is more precise and energy efficient.

If the heating circuit is always too hot or too cold in [Day] mode in the transitional period (in spring or autumn), only reduce or increase the [Flow at +10°C] parameter.

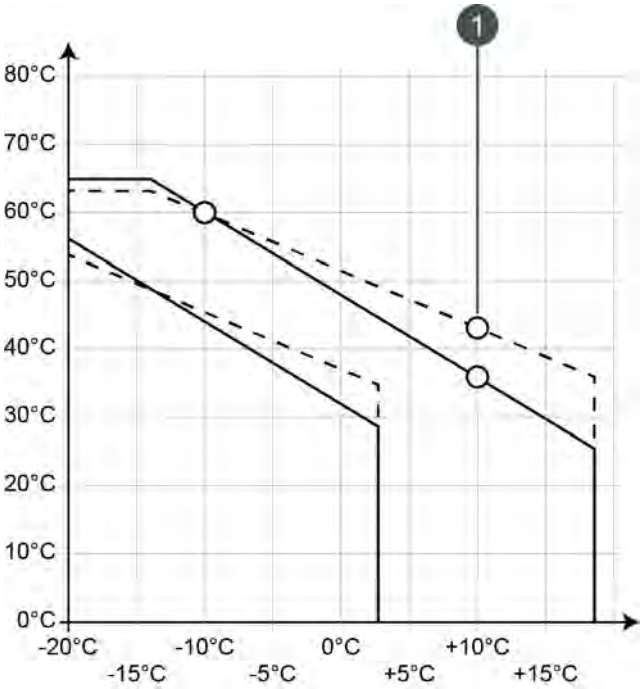


Fig. 10-16: Adjusting the heating curve in the transitional period

1 [Flow at +10°C]

If the heating circuit is always too hot or too cold in [Day] mode in the winter, only reduce or increase the [Flow at -10°C] parameter.

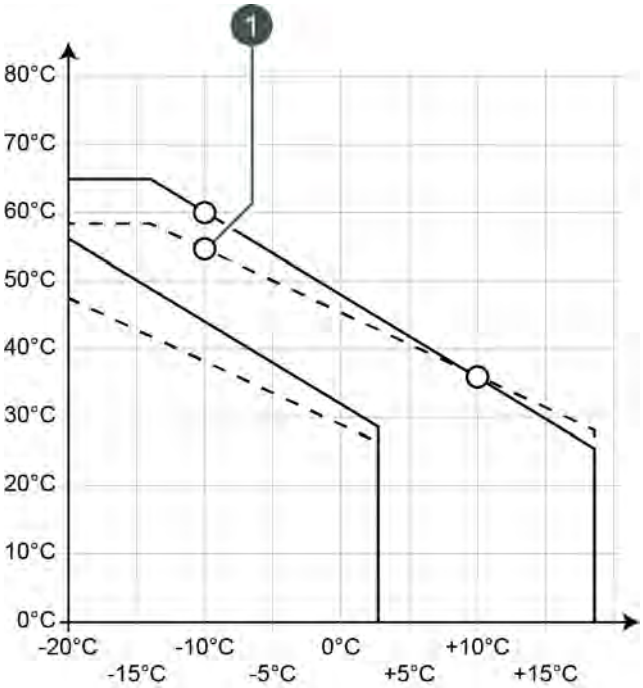


Fig. 10-17: Adjusting the heating curve in the winter

1 [Flow at -10°C]

You can change the parameters [Flow at -10°C] and [Flow at +10°C] in the text menu of the heating circuit in question, see page 47.

If the heating circuit is always too hot or too cold in [Night] mode, you only have to adjust the [Set-back] parameter, see page 47.

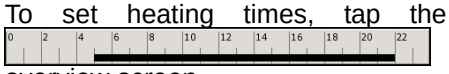
10.4.4 Operation

Adjusting heating times and room temperatures

With the [Heat times] timer, you can set 3 different time slots for the heating circuit for each day of the week.

Inside a time slot, the heating circuit is in [Day] mode. Outside a time slot, it is in [Night] mode.

If a room sensor is installed, the room temperature can be adjusted inside a time slot. Likewise, the reduced room temperature [Set-back temperature between time slots:] can be adjusted outside the time slot for each day of the week.

To set heating times, tap the [Heat times]  timer in the overview screen.

A screen opens showing an overview of heating times:

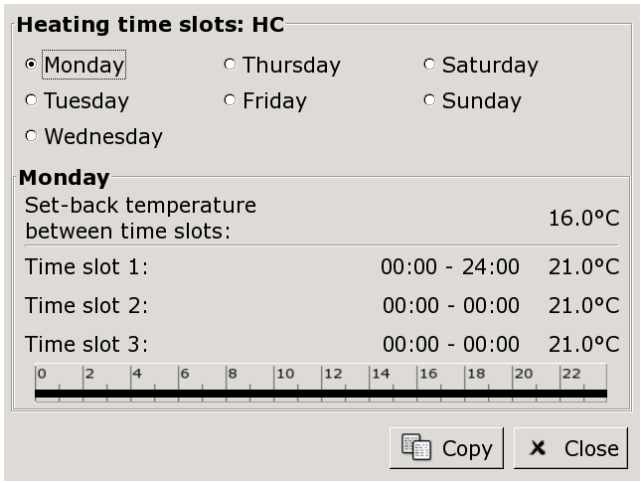


Fig. 10-18: Overview of heating times if a room sensor is installed

Select the individual time slots by tapping the row [Time slot 1:], [Time slot 2:] and [Time slot 3:].

A settings screen opens:

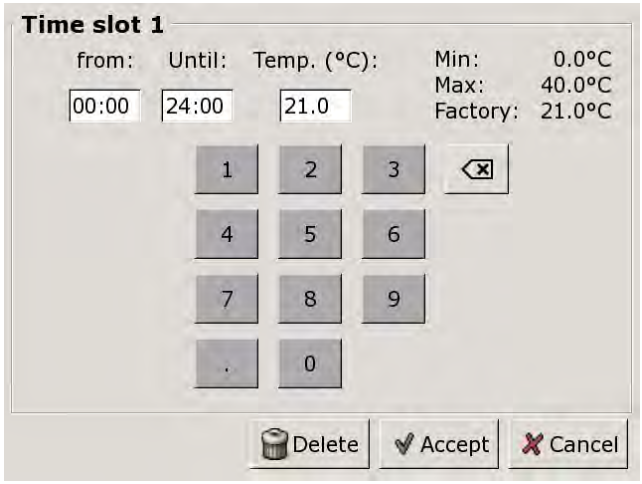


Fig. 10-19: Setting the time slot and room temperature

Enter the time slot and press [Accept] to save. Set further time slots in the same way.

You can change the temperature [Set-back temperature between time slots:] in the heating times overview screen. To do so, tap the [Set-back temperature between time slots:] row and to select the desired temperature in the settings window.

After you have set the time slots, you can copy them for other days of the week. To do so, press the [Copy] button in the charging times overview screen. A screen opens showing the individual days of the week. Make your selection and press [Accept] to save.

Fig. 10-20: Copying time slots to days of the week

The overview screen of heating times opens. You can close this by pressing [Close].

Holiday setting function

When you press the [Holiday] button, you can define a period during which the selected heating circuit is switched to [Night] mode. The heating circuit is then set to the lowest temperature [Set-back temperature between time slots:] configured in the [Heat times] timer.

To set this function, tap the [Holiday] button in the overview screen.

A settings screen opens:

Fig. 10-21: Setting the start of the holiday

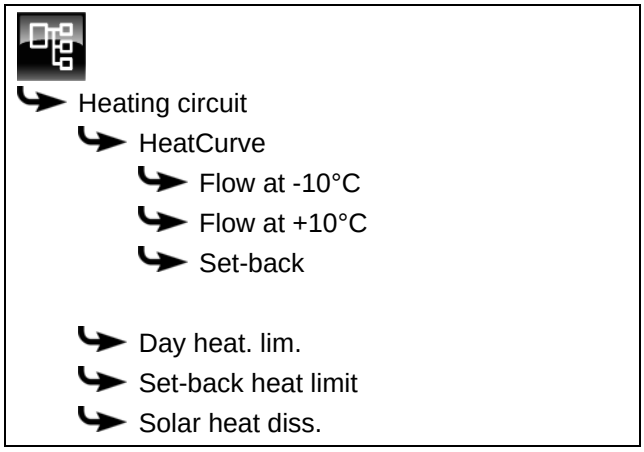
Enter the date and time for the start of the holiday. Press the button to enter the end of the holiday.

Finally, press [Accept] to save your entries. The heating circuits overview screen appears.

10.4.5 Text menu

Adjustable parameters

Select the respective heating circuit [HC], [HC2]... and press the button to switch to the text menu.



Detailed descriptions of the parameters are provided below.

10.4.5.7 Flow at -10°C and Flow at +10°C

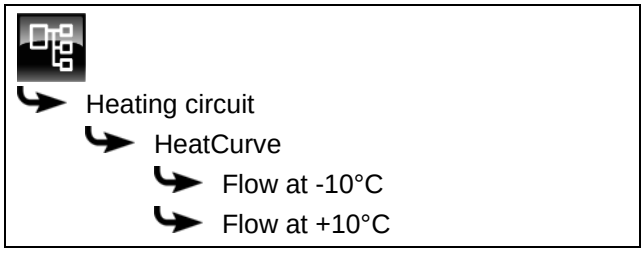
Explanation of [Flow at -10°C] and [Flow at +10°C]

The two adjustable parameters [Flow at -10°C] and [Flow at +10°C] are used to define the [Day] heating curve.

Based on the current outside temperature , the control system uses the heating curve to calculate the currently required flow temperature for the heating circuit in [Day] mode.

Modifying parameters

The parameters can be found under:



Select the parameter and press the [Change] button. A settings window will open.

Enter the value and press the [Accept] button to save.

10.4.5.8 Set-back

Explanation of [Set-back]

This parameter is used to set the parallel shift of the [Day] heating curve, in order to determine the [Night] heating curve.

This parameter is factory-set to 3°C for underfloor heating and 15°C for radiators.

Only make minor changes to this parameter, because when walls cool down too much, dramatically higher air temperatures are required to heat the room. Any energy savings will then be lost.

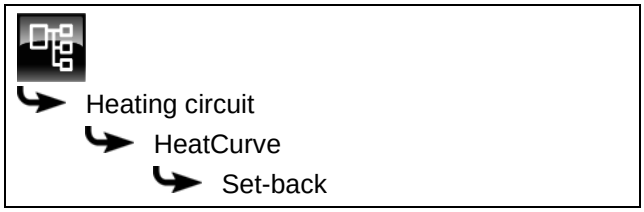
The following figures are a guide, depending on the configured temperature [Flow at -10°C] and the design of the heating circuit:

Temperature	Radiators		
Flow at -10°C	40°C	60°C	80°C
Set-back	5 - 8°C	10-15°C	15-22°C

Temperature	Underfloor heating	
Flow at -10°C	30°C	40°C
Set-back	3°C	5°C

Modifying parameters

The parameter can be found under:



Select the parameter and press the [Change] button. A settings window will open.

Enter the value and press the [Accept] button to save.

10.4.5.9 Day heat. lim. and Set-back heat limit

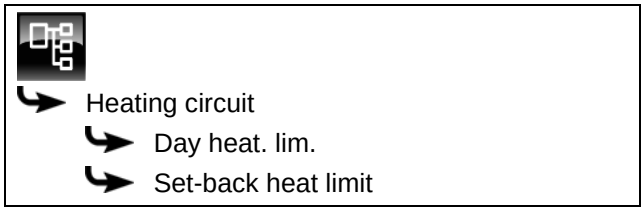
Explanation of [Day heat. lim.] and [Set-back heat limit]

The [Day heat. lim.] and [Set-back heat limit] parameters are used to set outside temperatures at which the selected heating circuit is shut off in [Day] or [Night] mode.

The [Day heat. lim.] parameter is factory-set to 18°C and the [Set-back heat limit] parameter to 2°C.

Modifying parameters

The parameters can be found under:



Select the parameter and press the [Change] button. A settings window will open.

Enter the value and press the [Accept] button to save.

10.4.5.10 Solar heat diss.

Explanation of [Solar heat diss.]

This parameter defines whether the selected heating circuit may use excess solar heat from the buffer.
If this parameter is set to [Yes], this heating circuit takes on the solar excess. The heating circuit switches itself on and a heating curve is calculated as if for an outside temperature of 0°C.

This parameter is factory-set to [No].
You must check the conditions for the [Extra solar heat] function in the text menu of the [Buffer] function block.

Modifying parameters

The parameter can be found under:

Heating circuit

Solar heat diss.

Select the parameter and press the [Change] button. A settings window will open.

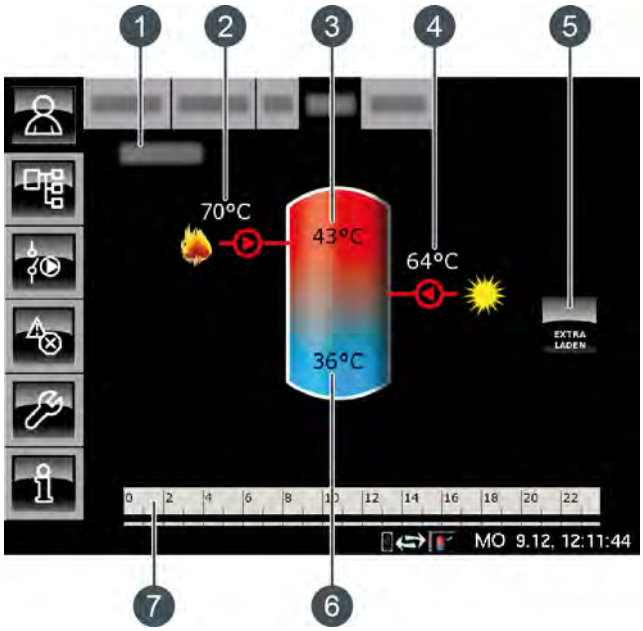
Make your selection and press the [Accept] button to save.

10.5 [Hot water tank] function block

10.5.1 Overview

Hot water tank overview screen

Press the button and [HW] to open the hot water tank overview screen. Here, the current temperatures and operating mode are displayed.



1 Operating mode
2 Charging by boiler
3 Temperature: Hot water
4 Charging by solar heating system
5 [Extra charge] button
6 Temperature: Hot water tank bottom
7 Timer: ChrgTimes

Extra charge

This button causes the hot water tank to be charged to the highest set temperature of all time slots and days of the week if the temperature has dropped below [Switch-on diff.], ignoring the current time slot.

Charging by boiler or buffer

This symbol is displayed when the hot water tank is being charged by the boiler or buffer.

The displayed temperature is the [Boiler] or [Buffer top] temperature.

Charging by solar heating system

Optional: For solar heating system.

This symbol indicates that the tank is being charged by the connected solar heating system.

The displayed temperature is the temperature of the solar panel.

Hot water tank with solar heating system

Solar charging of the hot water tank is controlled by the solar panel pump switching on and off. Solar charging begins as soon as the [Collector] temperature is 7°C higher than the [Hot water tank bottom] temperature. The solar charging symbol  appears in the overview screen.

If the difference between the [Collector] and [Hot water tank bottom] temperatures is less than the threshold value of 3°C, solar charging stops.

Timer HW charging times

This timer displays the set charging times of the current day for charging the hot water tank. These time slots are displayed as a black bar in the timer.

Timer Circulation times

Optional: For [Circulation pump].

This timer displays the set times of the current day for operating the circulation pump. These time slots are displayed as a black bar in the timer.

Lower part of hot water tank

Optional: For [Hot water tank bottom] or [Solar]

The temperature in the lower part of the hot water tank is only displayed if the additional temperature sensor [Hot water tank bottom] is installed.

How the hot water tank works

You can set different time slots and temperatures for each day of the week for charging the hot water tank. Inside a time slot, the hot water tank is charged to the configured temperature (see page 52).

Charging commences as soon as the current [Hot water] temperature is below the temperature set in the timer by the configurable value [Switch-on diff.]. The hot water tank then demands heat from the buffer or boiler.

Charging ends as soon as the current [Hot water] temperature has reached the temperature set in the timer. The operating mode then changes to [Charged].

If an additional temperature sensor [Hot water tank bottom] is installed for the lower part of the hot water tank, charging ends as soon as this sensor has reached the configurable temperature [HW bottom off].

If you also wish to charge the hot water tank outside the time slot, press the [Extra charge] button.

If a circulation pump is configured for the hot water, a second timer [Circulation times] is displayed for setting the operating times.

10.5.2 Operating modes

Demand

The hot water tank demands heat from the buffer or boiler. If the boiler is switched on and the buffer is unable to deliver sufficient heat, the boiler switches to heating mode.

Chrg.

The hot water tank is being charged by the boiler or buffer.

Extra charge

The [Extra charge] was pressed for charging the hot water tank outside the set time slots.

Delay

The charging pump of the hot water tank continues running briefly to discharge excess heat from the boiler.

Charged

The hot water tank has reached the set temperature [Hot water tank target].

Heat dissipation

The tank is being charged to discharge excess heat from the boiler.

FreezeProt

A temperature sensor in the tank has fallen below the [FreezeProt] temperature.

The frost protection limit is factory-set to 5°C.

Sensor error

A temperature sensor is faulty. You can find this temperature sensor in the message list by pressing the button.

Timer off

There is demand by the tank, but the current time is outside the time slot configured in the timer. The tank is therefore not charged.

Solar prio.

Solar priority has been activated, and tank charging by the boiler is disabled. The current time is inside a configured time slot for solar priority, and the current outside temperature is higher than the set temperature [Min. out. temp. Solar prio.].

Solar heat diss.

Excess heat is being taken from a buffer that is being charged by a solar heating system.

10.5.3 Operation

Adjusting charging times and temperatures for the hot water tank

The [HW charging times] timer enables you to configure 3 different times slots and temperatures for the hot water tank for each day of the week.

Inside a time slot, the hot water is charged to the configured temperature. Outside a time slot, the hot water is charged to the configurable temperature [Set-back temperature between time slots:].

The [Switch-on diff.] is also taken into consideration for the configurable temperature [Set-back temperature between time slots:].

To adjust the charging times, tap the [HW charging times]  timer in the overview screen.

A screen opens:

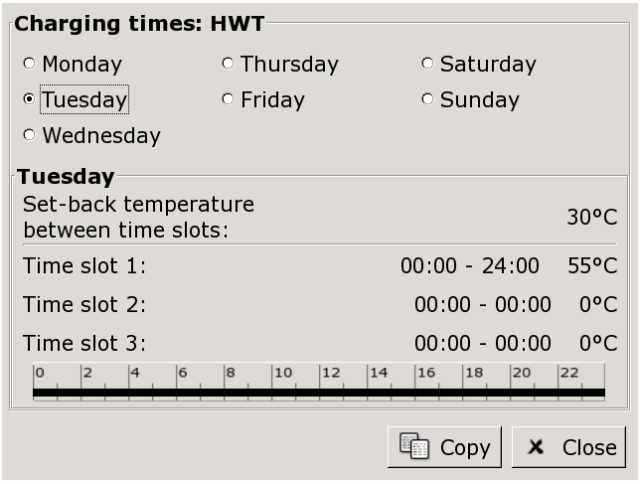


Fig. 10-22: Overview screen for hot water charging times

Select the individual time slots and hot water temperatures by tapping the row [Time slot 1:], [Time slot 2:] and [Time slot 3:].

A settings screen opens:

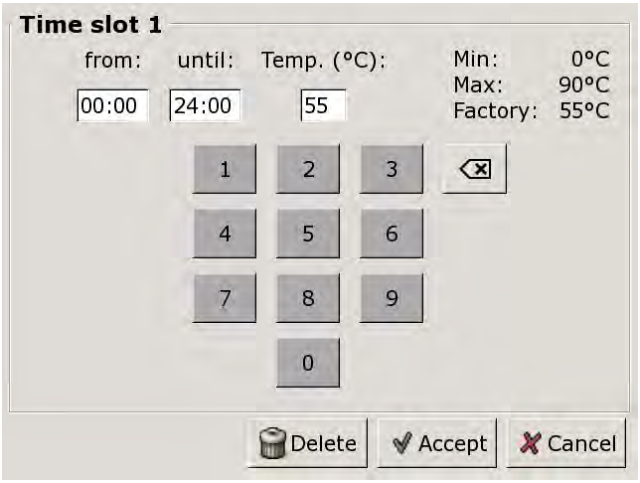


Fig. 10-23: Setting the time slot and hot water temperature

Enter the time slot and desired hot water temperature and press [Accept] to save. Set further time slots in the same way.

You can change the [Set-back temperature between time slots:] temperature in the overview screen of hot water charging times. To do so, tap the [Set-back temperature between time slots:] row and to select the desired temperature in the settings window.

After you have set the time slots, you can copy them for other days of the week. To do so, press the [Copy] button in the charging times overview screen. A screen opens showing the individual days of the week. Make your selection and press [Accept] to save.

Fig. 10-24: Copying time slots to days of the week

The charging times overview screen opens. You can close this by pressing [Close].

Setting circulation times for the circulation pump

With the [Circulation times] timer, you can set 3 different time slots for the circulation times of the circulation pump for each day of the week.

To set the circulation times, tap the [Circulation times]  timer in the overview screen.

A screen opens:

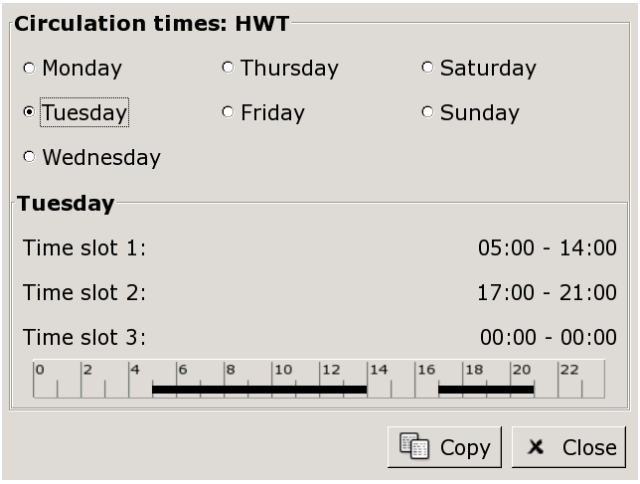


Fig. 10-25: Overview screen for circulation times

Select the individual time slots by tapping the row [Time slot 1:], [Time slot 2:] and [Time slot 3:].

A settings screen opens:

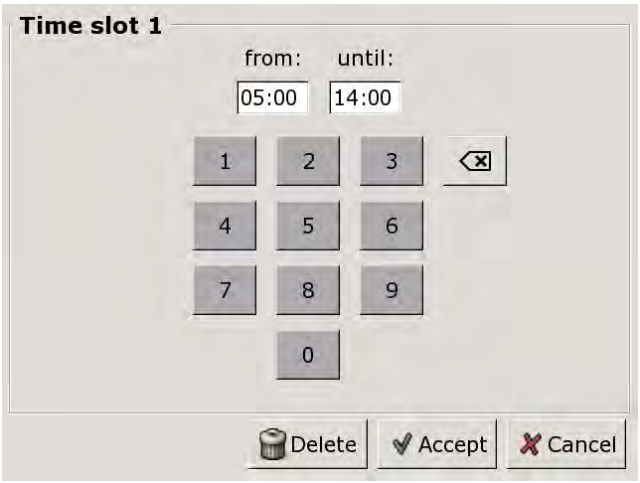


Fig. 10-26: Setting a time slot

Enter the time slot and press [Accept] to save. Set further time slots in the same way.

Set the circulation times to be as short as possible, to ensure good buffer stratification and prevent calcification.

After you have set the time slots, you can copy them for other days of the week. To do so, press the [Copy] in the circulation times overview screen. A screen opens showing the individual days of the week. Make your selection and press [Accept] to save.

Fig. 10-27: Copying time slots to days of the week

The circulation times overview screen opens. You can close this by pressing [Close].

10.5.4 Text menu

Adjustable parameters

In function block [HW], switch to the text menu with the button.

- Hot water tank
  - Switch-on diff.
  - HW bottom off[a]
  - Solar heat diss.[b]
  - Priority[c]
- Circulation[d]
  - Circulation runtime
  - Circulation pause

a. Only visible with additional temperature sensor

b. Only visible for buffers with solar heating system

c. Only visible for solar heating systems with switchover between several tanks

d. Only visible with additional circulation pump

Detailed descriptions of the parameters are provided below.

10.5.4.11 Switch-on diff.

Explanation of [Switch-on diff.]

This parameter regulates how far the current [Hot water tank] temperature can fall before the hot water tank again demands heat from the buffer or boiler.

This parameter is factory-set to 15°C. The current [Hot water tank] temperature may therefore fall 15°C below the value [Hot water tank target] set in the time slot. The hot water tank only demands heat from the buffer or boiler when this happens.

Modifying parameters

The parameter can be found under:

- Hot water tank
  - Switch-on diff.

Select the parameter and press the [Change] button. A settings window will open.

Enter the value and press the [Accept] button to save.

10.5.4.12 HW bottom off

Explanation of [HW bottom off]

Optional: Only with additional [Hot water tank bottom] temperature sensor

This parameter defines when charging of the hot water tank will end.

As soon as the additional [Hot water tank bottom] temperature sensor in the hot water tank reaches the adjustable [HW bottom off] temperature, charging of the hot water tank ends.

This parameter is factory-set to 10°C.

Modifying parameters

The parameter can be found under:

- Hot water tank
  - HW bottom off

Select the parameter and press the [Change] button. A settings window will open.

Enter the value and press the [Accept] button to save.

10.5.4.13 Solar heat diss.

Explanation of [Solar heat diss.]

Optional: Only for buffers with solar heating system

This parameter defines whether the hot water tank may take excess solar heat from the buffer.
If this parameter is set to [Yes], the hot water tank takes the solar excess up to the maximum temperature [Hot water tank max.].

This parameter is factory-set to [No].
You must check the conditions for the [Extra solar heat] function in the text menu of the [Buffer] function block.

Modifying parameters

The parameter can be found under:

- Hot water tank
  - Solar heat diss.

Select the parameter and press the [Change] button. A settings window will open.

Make your selection and press the [Accept] button to save.

10.5.4.14 Priority

Explanation of [Priority]

Optional: Only for solar heating systems with switchover between several tanks

This parameter sets the priority for solar charging of the hot water tank. A high priority means that this tank will be charged by the solar heating system first. A low priority means that it will be charged last.

The priority for the hot water tank is factory-set to [High].

Modifying parameters

The parameter can be found under:


Hot water tank
Priority

Select the parameter and press the [Change] button. A settings window will open.

Make your selection and press the [Accept] button to save.

10.5.4.15 Circulation runtime

Explanation of [Circulation runtime]

Optional: Only with circulation pump

This parameter sets the duration for operation of the circulation pump after it has been started. This period is only valid inside the set time slot.

After the set period has expired, the circulation pump is switched off for the configurable duration of the [Circulation pause] parameter.

Modifying parameters

The parameter can be found under:


Circulation
Circulation runtime

Select the parameter and press the [Change] button. A settings window will open.

Enter the value and press the [Accept] button to save.

10.5.4.16 Circulation pause

Explanation of [Circulation pause]

Optional: Only with circulation pump

This parameter sets the period (pause) after a circulation pump operating phase. The control system can only restart the circulation pump after this time has elapsed. This pause is only valid inside the set time slot.

Modifying parameters

The parameter can be found under:


Circulation
Circulation pause

Select the parameter and press the [Change] button. A settings window will open.

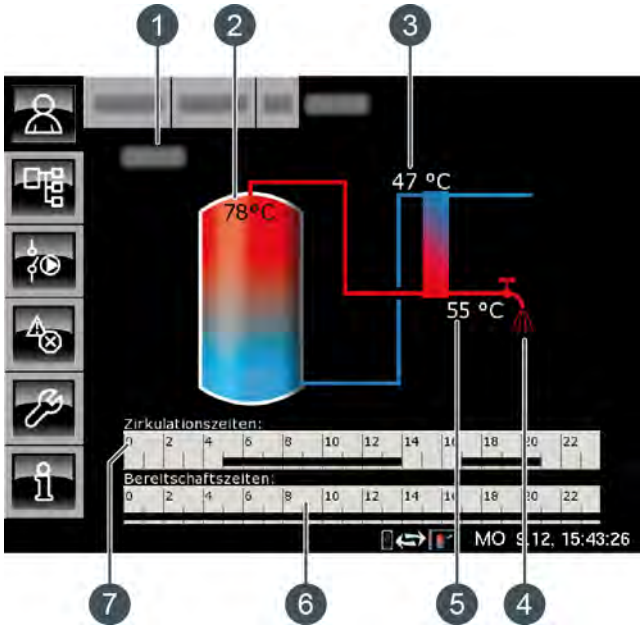
Enter the value and press the [Accept] button to save.

10.6 [Fresh water module] 2 pumps function block

10.6.1 Overview

Overview of the fresh water module (2 pumps)

You can return to the overview by pressing and [FWM].



1 Operating condition
2 Temperature [Buffer top]
3 Temperature [Primary return]
4 Display of hot water uptake
5 Temperature [Hot water]
6 Timer [Stand-by times]
This only appears if the hot water temperature is not set via the potentiometer (option [Target value can be set with rotary knob] is deactivated).
7 Timer [Circulation times]
This only appears if a circulation pump is installed and the [Self-learning] function is deactivated.

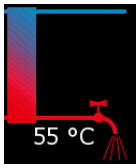
Function of the fresh water module

The desired hot water temperature is set with the potentiometer on the fresh water module. If during the configuration option [Target value can be set with rotary knob] is deactivated, the [Stand-by times] timer appears in the overview. With this you can set different time windows and hot water temperatures for every day of the week.
Inside these time windows, the upper part of the buffer is maintained at no lower than the configured hot water temperature. Outside the set time windows, the hot water is maintained at the lowest configured temperature of the 3 time slots, provided that the buffer is sufficiently hot.

If a circulation pump is installed for the hot water, it will be put into operation as "self-learning" by default. This means that the hot water taps of the last 2 weeks are stored. The operating times of the current day will be calculated from this and the circulation pump is started accordingly.
If this function is turned off, in the overview the timer [Circulation times] appears for manual setting of the operating times.

After commissioning, no more data is available for the "self-learning" circulation. That is why an operating period of about 4 weeks is required in the beginning, so that the control system can save sufficient data.

Heat exchanger

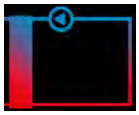


The tap symbol next to the heat exchanger is only displayed if the fresh water module is feeding hot water into the water mains. The temperature shown next to this is the temperature of the hot water currently being supplied.

If no hot water is being supplied, the heat exchanger is shown blue all the way through.

Circulation pump in operation

Optional: for [Circulation pump].



The pump symbol next to the heat exchanger appears when the circulation pump for hot water is in operation.

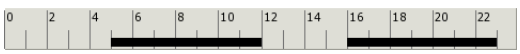
Timer Stand-by times

This is only displayed if option [Target value can be set with rotary knob] is deactivated

This timer displays the set charging times of the current day for charging the hot water tank. These time windows are displayed as a black bar in the timer.

Timer Circulation times

This only appears if a circulation pump is installed and the [Self-learning] function is deactivated.



This timer displays the set times of the current day to operate the circulation pump. These time windows are displayed as a black bar in the timer.

10.6.2 Operating modes

Ready

No hot water is currently being taken.

Working

Hot water is currently being supplied.

Buffer cold

Hot water is being supplied, but the buffer is not hot enough to reach the configured hot water temperature.

Primary return too warm

Hot water is being supplied, but the configured hot water temperature is being reduced because the [Primary return] temperature in the heat exchanger of the fresh water module is too high.

Malfunction

There is a fault in a temperature sensor of the fresh water module.

Circulation

The circulation pump is in operation.

Venting

The controller has found air in the fresh water module and automatic venting is in operation. For this, both pumps are operated at full speed for a short period of time to remove the air from the fresh water module. This can also take place multiple times sequentially.

Emergency operation

The fresh water module is in emergency mode because the admixing pump is defective. Currently, hot water is being delivered but it is only being produced with the buffer pump.

Without the admixing pump, calcification protection of the heat exchangers it not guaranteed. Protracted emergency mode can therefore calcify the heat exchanger.

Ready (Emergency operation)

The fresh water module is in emergency mode because the admixing pump is defective.

Without the admixing pump, calcification protection of the heat exchangers it not guaranteed. Protracted emergency mode can therefore calcify the heat exchanger.

10.6.3 Operation

Setting charging times and temperatures of the hot water module

With the [Stand-by times] timer, you can set different time slots and hot water temperatures for the fresh water module for every day of the week.

Inside these time slots, the upper part of the buffer is maintained at no lower than the configured hot water temperature.
Outside the set time slots, the hot water is maintained at the lowest configured temperature of the 3 time slots, provided that the buffer is sufficiently hot.

To set the charging times and temperatures, tap the overview screen on the [Stand-by times]  timer.

A screen opens:

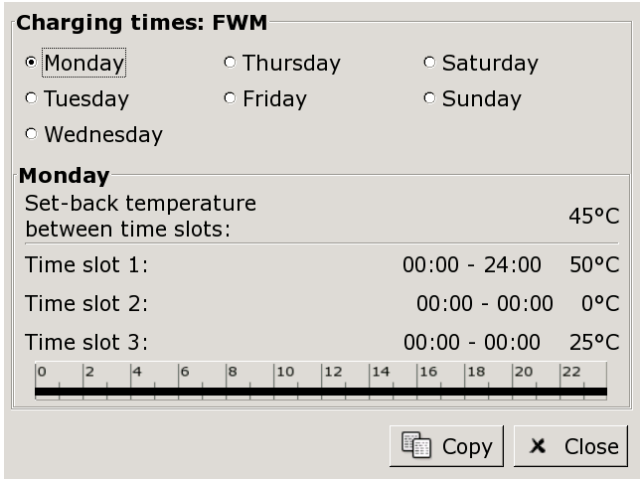


Fig. 10-28: Overview screen for hot water charging times

Select the individual time slots and hot water temperatures by tapping the row [Time slot 1:], [Time slot 2:] and [Time slot 3:].

A settings screen opens:

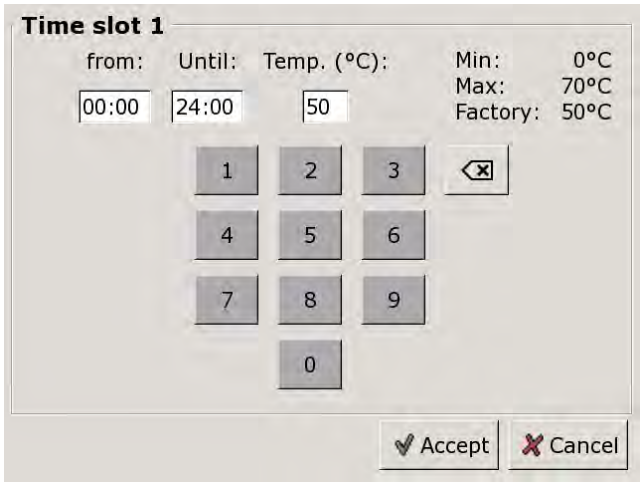


Fig. 10-29: Setting the time slot and hot water temperature

Enter the time slot and desired hot water temperature and press [Accept] to save. Set further time slots in the same way.

Set the hot water temperature as low as possible to prevent calcification.

After you have set the time slots, you can copy them for other days of the week. To do so, press the [Copy] button in the charging times overview screen. A screen opens showing the individual days of the week. Make your selection and press [Accept] to save.

Fig. 10-30: Copying time slots to days of the week

The overview screen of charging times and temperatures opens. You can close this by pressing [Close].

Setting circulation times for the circulation pump

With the [Circulation times] timer, you can set 3 different time slots for the circulation times of the circulation pump for each day of the week.

To set the circulation times, tap the [Circulation times]  timer in the overview screen.

A screen opens:

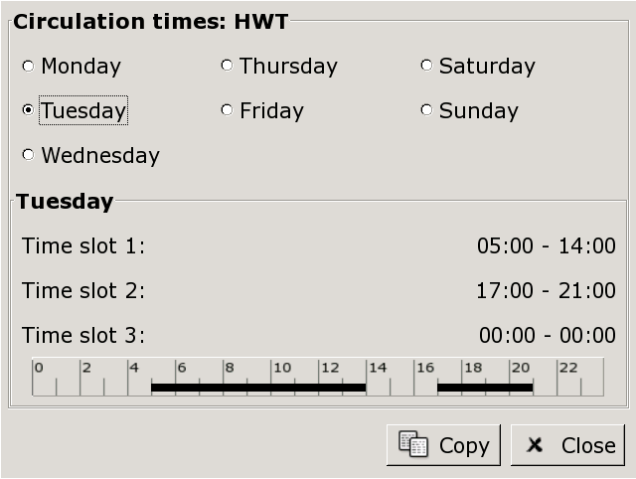


Fig. 10-31: Overview screen for circulation times

Select the individual time slots by tapping the row [Time slot 1:], [Time slot 2:] and [Time slot 3:].

A settings screen opens:

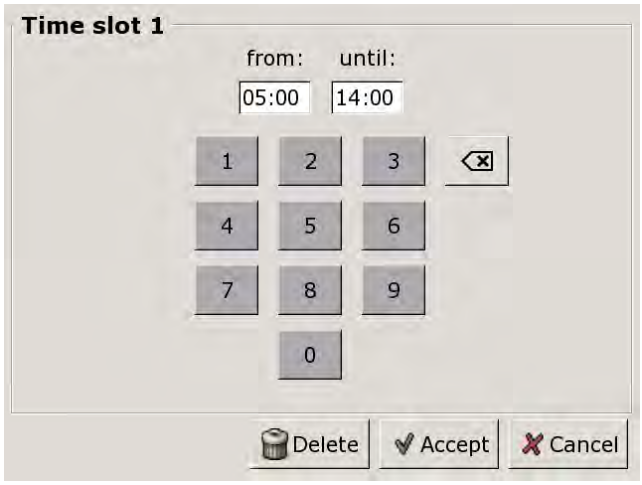


Fig. 10-32: Setting a time slot

Enter the time slot and press [Accept] to save. Set further time slots in the same way.

Set the circulation times to be as short as possible, to ensure good buffer stratification and prevent calcification.

After you have set the time slots, you can copy them for other days of the week. To do so, press the [Copy] in the circulation times overview screen. A screen opens showing the individual days of the week. Make your selection and press [Accept] to save.

Fig. 10-33: Copying time slots to days of the week

The circulation times overview screen opens. You can close this by pressing [Close].

10.6.4 Text menu

Adjustable parameters

In function block [FWM], switch to the text menu with the button.

- Hot water
  - Automatic venting
  - Emergency operation only with buffer pump
- Circulation
  - Self-learning
  - Circulation runtime
  - Circulation pause

Detailed descriptions of the parameters are provided below.

10.6.4.17 Function Automatic venting

Explanation of [Automatic venting]

This function attempts to remove introduced air from the fresh water module automatically.
If the function is activated and the controller detects air intake, both pumps are operated at full speed for a short period of time to remove the air from the fresh water module. This can also take place multiple times sequentially.

This function is activated by default. During venting, the hot water can briefly be hotter than the target temperature set.

Modifying parameters

The parameter can be found under:

- Hot water
  - Automatic venting

Select the parameter and press the [Change] button. A settings window will open.

Make your selection and press the [Accept] button to save.

10.6.4.18 Function Emergency operation only with buffer pump

Explanation of the [Emergency operation only with buffer pump] function

Emergency operation of the fresh water module can be activated with this function if the admixing pump is defective.
If it is activated, water heating is only provided by the buffer pump. Without the admixing pump, calcification protection of the heat exchangers is not guaranteed Protracted emergency mode can therefore calcify the heat exchanger.

This function is set to [No] by default.

Modifying parameters

The [Service] access level is required to perform modifications.

The parameter can be found under:

- Hot water
  - Emergency operation only with buffer pump

Select the parameter and press the [Change] button. A settings window will open.

Make your selection and press the [Accept] button to save.

10.6.4.19 Function Self-learning

Explanation of the [Self-learning] function

With this function, the operating times of the circulation pump of the last 2 weeks are saved. The operating times of the current day are calculated based on this and the circulation pump will be put into operation accordingly.

This function is set to [Yes] at the factory. If [No] is set, the timer appears for manual setting of the operating times in the overview.

Modifying parameters

The parameter can be found under:

- Circulation
  - Self-learning

Select the parameter and press the [Change] button. A settings window will open.

Make your selection and press the [Accept] button to save.

10.6.4.20 Circulation runtime

Explanation of [Circulation runtime]

Optional: Only with circulation pump

This parameter sets the duration for operation of the circulation pump after it has been started. This period is only valid inside the set time slot.

After the set period has expired, the circulation pump is switched off for the configurable duration of the [Circulation pause] parameter.

Modifying parameters

The parameter can be found under:

Circulation

Circulation runtime

Select the parameter and press the [Change] button. A settings window will open.

Enter the value and press the [Accept] button to save.

10.6.4.21 Circulation pause

Explanation of [Circulation pause]

Optional: Only with circulation pump

This parameter sets the period (pause) after a circulation pump operating phase. The control system can only restart the circulation pump after this time has elapsed. This pause is only valid inside the set time slot.

Modifying parameters

The parameter can be found under:

Circulation

Circulation pause

Select the parameter and press the [Change] button. A settings window will open.

Enter the value and press the [Accept] button to save.

10.7 [Solar] function block

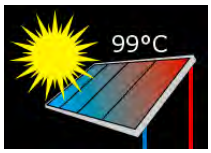
10.7.1 Overview

Versions of solar heating system

Press the button and [Solar] to open the solar heating system overview screen.

The ETAtouch control system is compatible with a great many versions, for enabling the integration of a solar heating system. The various versions are described below.

Solar heating system in operation



This symbol appears while the solar heating system is in operation and is supplying heat. The displayed temperature is the [Collector] temperature.

If the solar panel is displayed on its own without the lines, the solar heating system is switched off.

Priority of the tank or section

The number of stars indicates the configured priority of the tank or section.

3 stars indicate the highest priority. This tank or section is charged by the solar heating system first. One star denotes the lowest priority, so this tank or section is charged last.

If no stars are displayed, this tank or section is already sufficiently charged.

You can set the priority for each tank or section in the text menu of the relevant function block. So, for the buffer, use the buffer text menu.

Solar heating system with one tank

Only one tank is shown in the overview screen, regardless of whether the solar heating system is charging the buffer, the hot water tank or a solar tank (e.g., pool).
The temperature displayed in the tank is [Buffer bottom Solar] for a buffer, [Hot water tank bottom] for a hot water tank and [Current consumer temp.] for a solar tank.

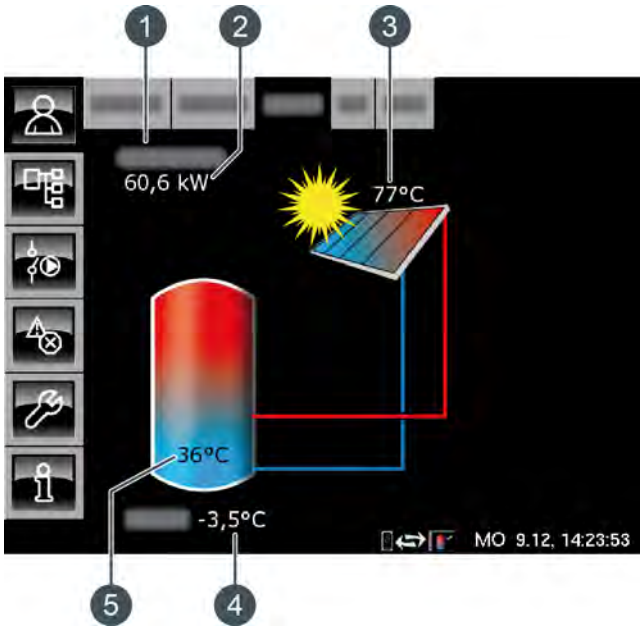


Fig. 10-34: Solar heating system with one tank

1 Operating status
2 Current output of the solar heating system
3 Temperature [Collector]
4 Outside temperature
5 Temperature of tank [Tank 1 bottom]

Control system:
The solar heating system is controlled by switching the collector pump on and off. This is switched on as soon as the collector has exceeded the minimum temperature [Collector min] and is warmer by the difference [Switch-on diff.] (factory setting 7 °C) than the tank being charged.
The speed of the collector pump is controlled in such a way that the collector supplies a temperature that is higher than the current tank temperature by the configurable offset [Target collector diff.].

When the tank has reached its maximum temperature, or if the collector is only warmer by the offset [Switch-off diff.] (factory setting 5 °C) than the tank, the collector pump is switched off.

The maximum temperature is factory-set to 90 °C for the buffer [Buffer bottom max] and 60 °C for the hot water tank [Hot water tank max.].

Solar heating system with several tanks

If the solar heating system is charging more than one tank - buffer and hot water tank, for example - these are shown in the overview screen. The lines always lead to the tank that is currently being charged.

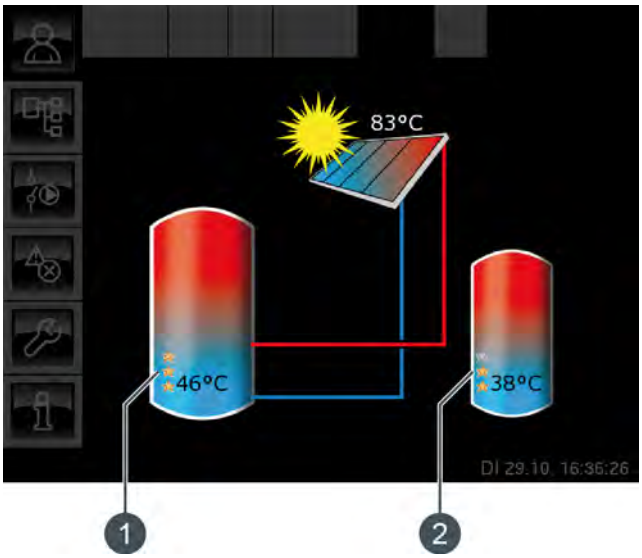


Fig. 10-35: Solar heating system with 2 tanks

1 Priority and temperature of the first tank

2 Priority and temperature of the second tank

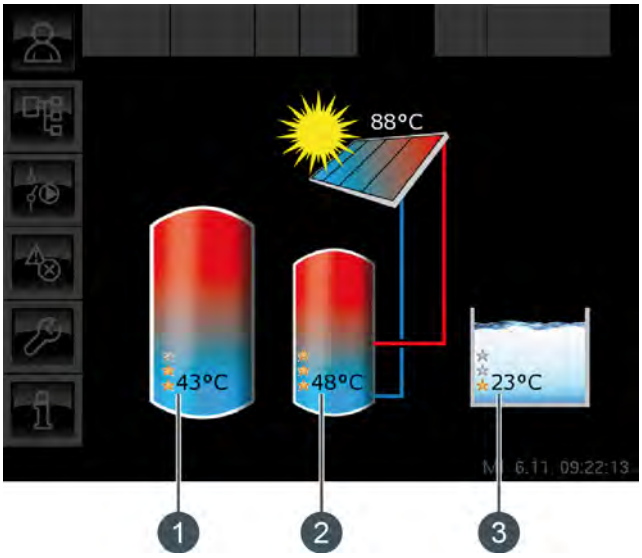


Fig. 10-36: Solar heating system with 3 tanks

1 Priority and temperature of the first tank

2 Priority and temperature of the second tank

3 Priority and temperature of the third tank (here, the [Sol. tank] function block)

Switching between tanks:

The collector pump is switched on as soon as the collector has exceeded the minimum temperature [Collector min] and is warmer by the difference [Switch-on diff.] (factory setting 7°C) than the temperature of the tank with the highest priority.

The sequence for switching from one tank to another is based on the configured priorities. The tank with the highest priority is charged first.

If the solar power is not sufficient for charging the tank with the highest priority (= collector is only warmer by the difference [Switch-off diff.] (factory setting 5 °C) than the tank currently requiring charging), the tank with the next highest priority is charged after the minimum time has elapsed (factory setting 20 minutes).

If the solar power increases once more, after the minimum time has elapsed solar charging switches back to the tank with the higher priority. This ensures that the tank with the highest priority is always charged first.

Uniform charging of tanks without consideration of individual priorities is also possible. However, the [Service] permission is required for this. Then you can use the [Changeover if diff. >] parameter in the solar heating system text menu to configure the temperature difference between the tanks.

Solar heating system for buffer with 2 coils

In the overview screen, the temperatures and configured priorities of the top and bottom sections are displayed.
The collector lines lead to the top or bottom section of the buffer, depending on which section is currently being charged.

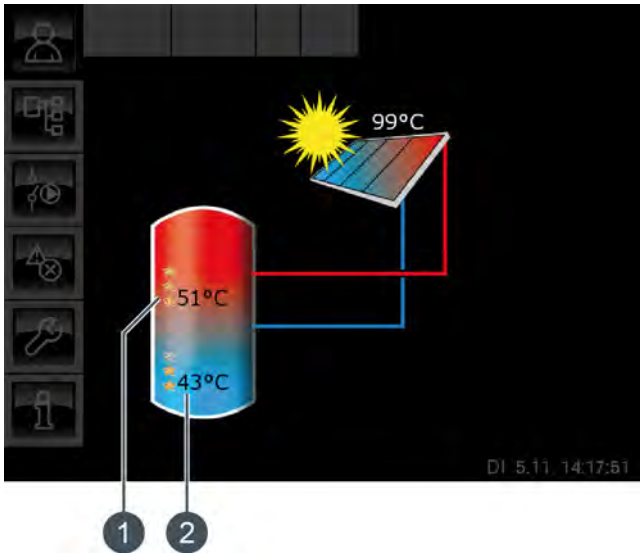


Fig. 10-37: Buffer with 2 coils

1 Temperature [Tank 1 top] and priority of top section
2 Temperature [Tank 1 bottom] and priority of bottom section

The [Tank 1 top] temperature corresponds to [Buffer top Solar] and temperature [Tank 1 bottom] corresponds to [Buffer bottom Solar].

Stratified charging via the solar heating system:

The purpose of stratified charging is to produce a sufficiently high temperature in the top part of the buffer, so that the boiler does not have to start up to provide hot water treatment.

A dedicated target temperature [Buffer target solar] is available for controlling stratified charging. You can find this in the buffer text menu under [Buffer] -> [Buffer top Solar] -> [Buffer target solar].
It is based on the current demand of the consumer or the minimum temperature [Buffer top min. solar].

Stratified charging takes place when the following three conditions are met:

- The boiler is not in operation
- The outside temperature is above 10 °C (factory setting [Min. out. temp. Solar prio.], see page 36)
- Temperature [Tank 1 top] is lower than [Buffer target solar]

The top section has the highest priority by default and is therefore charged first. As long as the [Tank 1 top] temperature is lower than [Buffer target solar], only the top section is charged.
If the solar heating system is supplying too little heat, the collector pump is switched off. It is restarted when the collector has exceeded the minimum temperature [Collector min] and is warmer by the difference [Switch-on diff.] (factory setting 7 °C) than [Buffer top Solar].

Once the top section has been charged up to the target temperature [Buffer target solar], solar charging takes place in the bottom section.
If the [Tank 1 top] temperature falls below the target temperature [Buffer target solar], the top section is charged once more.

The [Buffer top min. solar] parameter is used to set a minimum temperature for the top section of the buffer, see page 36.
This way, solar charging only takes place in the top section once the collector is warmer by the difference [Switch-on diff.] (factory setting 7 °C) than [Buffer top min. solar]. Up until this time, the bottom section of the buffer is charged.

If one of the above conditions is not satisfied, stratified charging does not take place in the top section, and only the bottom section of the buffer is charged.

Solar heating system with external heat exchanger

The heat exchanger and the [Secondary flow] and [Solar return] temperatures are shown in the overview screen.

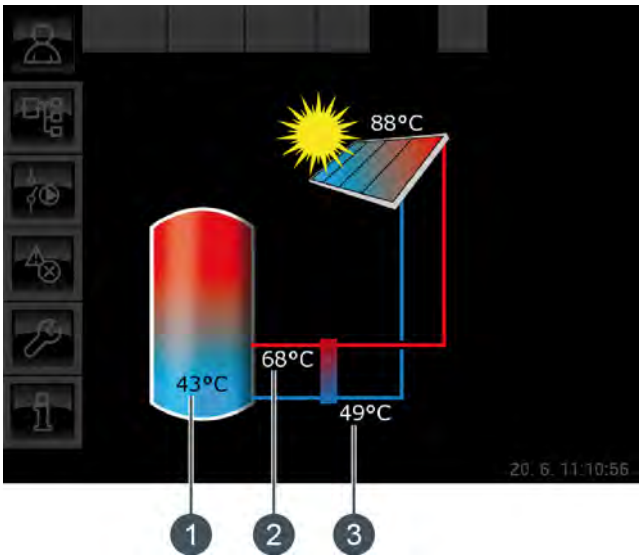


Fig. 10-38: Solar heating system with external heat exchanger

1 Temperature of tank [Tank 1 bottom]
2 [Secondary flow]
3 [Solar return]

Control system:

The collector pump is switched on as soon as the collector has exceeded the minimum temperature [Collector min] and is warmer by the difference [Switch-on diff.] (factory setting 7 °C) than the tank being charged.
The speed of the collector pump is controlled in such a way that the collector supplies a temperature that is higher than the current tank temperature by the configurable offset [Target collector diff.].

If the collector pump is in operation, the secondary pump starts up. This pump tries to adjust the temperature difference between the collector and [Secondary flow] to the temperature difference between [Solar return] and the tank. This is achieved by changing the speed of the secondary pump.

When the tank has reached its maximum temperature, or if the collector is only warmer by the offset [Switch-off diff.] (factory setting 5 °C) than the tank, the collector pump is switched off.

Solar heating system with external heat exchanger and stratified charging valve

The lines of the heat exchanger always lead to the section of the buffer that is currently being charged. In the upper and lower sections, the temperatures of the buffer and the configurable priorities are displayed.

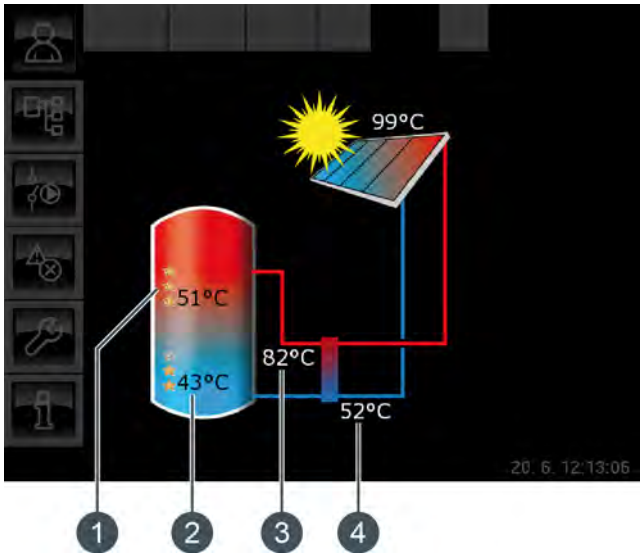


Fig. 10-39: External heat exchanger with stratified charging valve

1 Temperature [Tank 1 top] and priority of top section
2 Temperature [Tank 1 bottom] and priority of bottom section
3 [Secondary flow]
4 [Solar return]

The [Tank 1 top] temperature corresponds to [Buffer top Solar] and temperature [Tank 1 bottom] corresponds to [Buffer bottom Solar].

Stratified charging via the solar heating system:

The purpose of stratified charging is to produce a sufficiently high temperature in the top part of the buffer, so that the boiler does not have to start up to provide hot water treatment.

A dedicated target temperature [Buffer target solar] is available for controlling stratified charging. You can find this in the buffer text menu under [Buffer] -> [Buffer top Solar] -> [Buffer target solar]. It is based on the current demand of consumers and the minimum temperature [Buffer top min. solar].

Stratified charging takes place when the following three conditions are met:

- The boiler is not in operation
- The outside temperature is above 10 °C (factory setting [Min. out. temp. Solar prio.], see page 36)
- Temperature [Tank 1 top] is lower than [Buffer target solar]

The top section has the highest priority by default and is therefore charged first. As long as the [Tank 1 top] temperature is lower than [Buffer target solar], only the top section is charged.
If the solar heating system is supplying too little heat, the collector pump is switched off. It is restarted when the collector has exceeded the minimum temperature [Collector min] and is warmer by the difference [Switch-on diff.] (factory setting 7 °C) than [Buffer top Solar].

Once the top section has been charged to the target temperature [Buffer target solar], solar charging takes place in the bottom section.
After this, stratified charging is controlled based on the [Secondary flow] temperature. If this is at least 2 °C warmer than [Tank 1 top], the top section of the buffer is charged. If the [Secondary flow] temperature is colder than [Tank 1 top], the bottom section of the buffer is charged.

If the [Tank 1 top] temperature falls below the target temperature [Buffer target solar], the top section is charged once more.

The [Buffer top min. solar] parameter is used to set a minimum temperature for the top section of the buffer, see page 36.
This way, solar charging only takes place in the top section once the collector is warmer by the difference [Switch-on diff.] (factory setting 7 °C) than [Buffer top min. solar]. Up until this time, the bottom section of the buffer is charged.

Solar heating system with two solar panels

Both solar panels are always shown in the overview screen. If the second solar panel is also supplying heat, the lines to the tank are displayed for this panel.

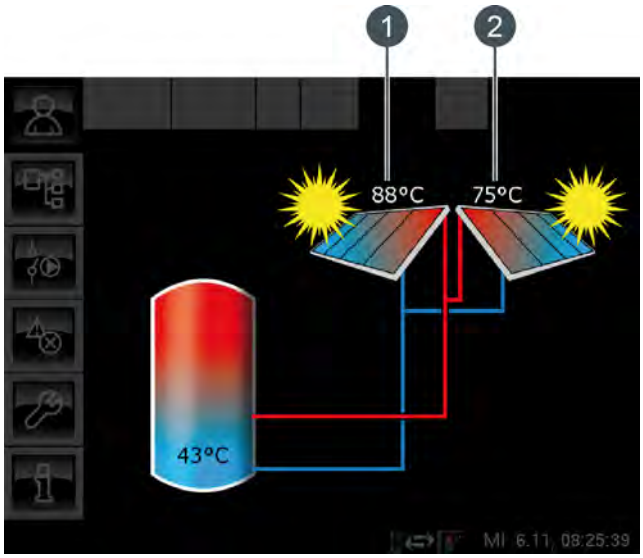


Fig. 10-40: Solar heating system with two solar panels

1 Solar panel 1
2 Solar panel 2

10.7.2 Operating modes

Solar panel temp. too low

The solar heating system is switched off because the solar panel is colder than the temperature in the tank. With a buffer, the [Buffer bottom Solar] temperature is compared. With a hot water tank, it is the [Hot water tank bottom] temperature.

Tank charged

The solar heating system is switched off because the connected tanks are completely charged. The buffer has reached the [Buffer bottom max] temperature (factory setting 90°C), or the hot water tank has reached the [Hot water tank max.] temperature (factory setting 60°C).

Solar panel temp. too high

The solar heating system is switched off because the solar panel has exceeded the configured maximum temperature [Collector max] (factory setting 120°C).

Working

The solar heating system is in operation.

Delay

The solar heating system is switched off, but the secondary pump still continues running briefly.

Emer. op.

There is a fault in the [Secondary flow] or [Solar return] temperature sensor. The solar heating system remains in operation, but is controlled only by the temperature of the solar panel.

Malfunction

There is a fault in the solar panel temperature sensor. The solar heating system is therefore switched off.

10.7.3 Text menu

10.7.3.22 Collector min

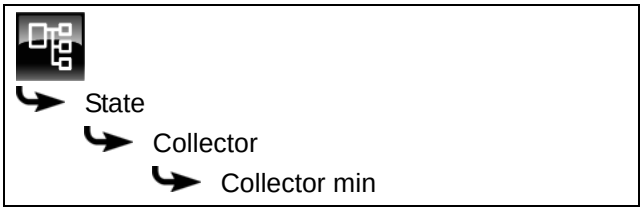
Explanation [Collector min]

This parameter sets the minimum temperature for starting the solar panel pump. The solar panel pump can only be started once the solar panel has exceeded this temperature.

Do not set this temperature too high, to ensure that heat can already be supplied to pre-heat the tank even when there is little sunlight. The ideal range is between 30-50°C. This parameter is factory-set to 30°C.

Modifying parameters

The parameter can be found under:



Select the parameter and press the [Change] button. A settings window will open.

Enter the value and press the [Accept] button to save.

10.7.3.23 Target collector diff.

Explanation [Target collector diff.]

This parameter sets the desired temperature difference between the solar panel and the connected tank (buffer or hot water tank). This temperature difference is controlled by adjusting the speed of the solar panel pump.

This parameter is factory-set to 10°C.

If the buffer is being charged by the solar heating system, the temperature of the solar panel [Collector] is compared with the buffer temperature [Buffer bottom Solar]. If the hot water tank is being charged, the [Hot water tank bottom] temperature is compared.

A **high temperature difference** results in a low speed of the solar panel pump. This way, a smaller quantity of water is conveyed through the solar panel. The water remains in the solar panel for a longer time, and therefore produces a higher working temperature in the panel. Consequently, a higher hot water temperature is achieved, but there are also more losses from the solar panel.

A **low temperature difference** results in a higher speed of the solar panel pump. A larger quantity of water is therefore conveyed through the solar panel. The water remains in the solar panel for a short time, and so also becomes less hot. The working temperature of the solar panel is therefore lower, but there are fewer losses via the solar panel.

Modifying parameters

The parameter can be found under:


State
Collector pump
Target collector diff.

Select the parameter and press the [Change] button. A settings window will open.

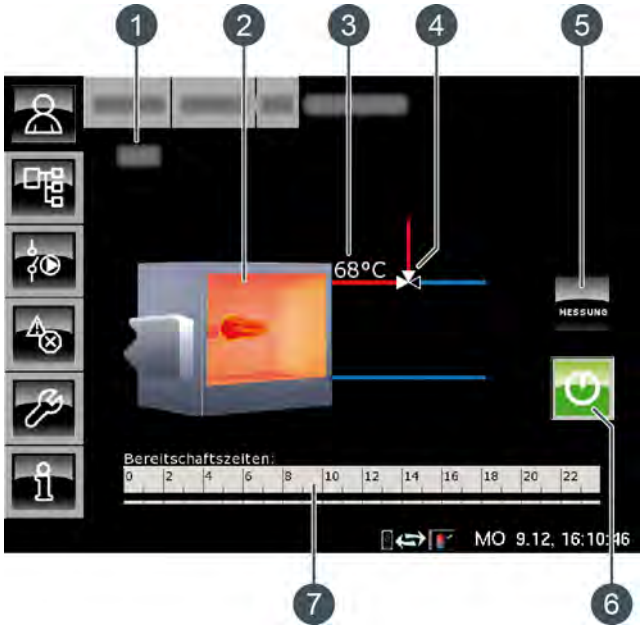
Enter the value and press the [Accept] button to save.

10.8 [Aux.boiler] function block - with buffer

10.8.1 Overview

Auxiliary boiler overview

Press and [Aux.boiler] to open the auxiliary boiler overview window.



1 Operating mode
2 Auxiliary boiler
3 [AuxBoilerTemp] temperature
4 Diverter valve (only with [Diverter valve] option)
5 [MEAS.] button
6 [On/Off] button
7 [Stand-by times] timer

Auxiliary boiler functionality

Use the [On/Off] button to enable or disable the auxiliary boiler for the ETA control system. If the auxiliary boiler is enabled (button shines green), the ETA control system can activate it when needed, but only within the configured times of operation.

The auxiliary boiler is only activated by the ETA control system if the buffer storage tank is unable to meet the required temperature.

After a demand for the auxiliary boiler by the ETA control system, the start of the auxiliary boiler can be delayed with the adjustable [Start lag] parameter; see page 73.

The [Stand-by times] timer is used to set the charging times for the auxiliary boiler; see page 72.

The [MEAS.] button switches the auxiliary boiler into emission measuring mode.

Auxiliary boiler with diverter valve

If there is a diverter valve installed between the auxiliary boiler and the buffer, the diverter valve appears in the overview with a red and blue line. The red line indicates which heat producer (auxiliary boiler or buffer) is currently supplying heat to the consumers. The blue line indicates the heat producer that is disabled and is not currently supplying any heat.

Switching from one heat producer to another only happens when the temperature of the auxiliary boiler [AuxBoilerTemp] exceeds the configured enabling temperature [Enable diverter valve] of the diverter valve. Only then does the diverter valve route the heat from the heat producer (auxiliary boiler or buffer) with the higher temperature to the consumers.

Auxiliary boiler with charging pump

If an additional charging pump is installed for the auxiliary boiler, the pump symbol is displayed in the overview when it is in operation.

The auxiliary boiler charging pump is only activated by the ETA control system when the [AuxBoilerTemp] temperature is greater than the adjustable [Enable AuxBoilChargePump] temperature. In addition, the auxiliary boiler temperature [AuxBoiler-Temp] must be greater than the buffer's [Tank temperature] temperature by at least the configured [Thermostat diff.] difference.

MEAS.

This button operates the auxiliary boiler for a period of 30 minutes for the emission measurement. When the 30 minutes are over, the auxiliary boiler automatically switches back to normal operation.

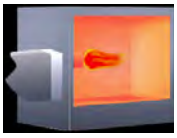
On/Off

This button enables and disables the auxiliary boiler. If the auxiliary boiler is enabled, this button appears green .

Timer Stand-by times

This timer shows the configured time slots for auxiliary boiler stand-by for the current day of the week. These time slots are displayed as a black bar in the timer.

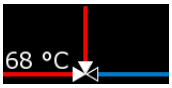
Auxiliary boiler



The flame in the auxiliary boiler is displayed when it is enabled in the ETA control system.

Diverter valve

Optional: only for [Diverter valve]



The red line indicates which heat producer (auxiliary boiler or buffer) is currently supplying heat to the consumers. The blue line indicates the heat producer that is disabled and is not currently supplying any heat.

Auxiliary boiler charging pump

Optional: only for [Aux.boiler charging pump]

This symbol is displayed when the auxiliary boiler charging pump is in operation.

10.8.2 Operating modes

Off

The auxiliary boiler has been disabled with the  button (switched off), so it cannot be put into operation by the ETA control system.

Ready

The auxiliary boiler is enabled and within the configured stand-by times.

On

The auxiliary boiler is in operation and is supplying heat to the heating system.

Measurement

The auxiliary boiler is in emission measuring mode for the duration of 30 minutes.

Malfunction

There is a fault in a temperature sensor.

Wait delay

A delay was set for operation of the auxiliary boiler. The auxiliary boiler waits for the configured duration of the delay ([Start lag] parameter). If there is still a demand by the ETA control system after this period ends, then the auxiliary boiler will begin operation.

Locked

The ETA control system has disabled the auxiliary boiler so that it cannot be in operation simultaneously with the boiler.

Timer off

The current time is outside the configured stand-by times.

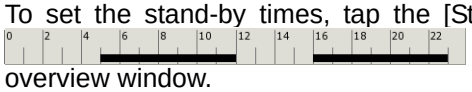
Overtemperature

The auxiliary boiler's temperature has exceeded the configured [AuxBoilerMax] temperature and the auxiliary boiler will therefore be switched off.

10.8.3 Operation

Setting auxiliary boiler stand-by times

The [Stand-by times] timer can be used to set 3 different time slots for auxiliary boiler stand-by for each day of the week.

To set the stand-by times, tap the [Stand-by times]  timer in the overview window.

A window opens:

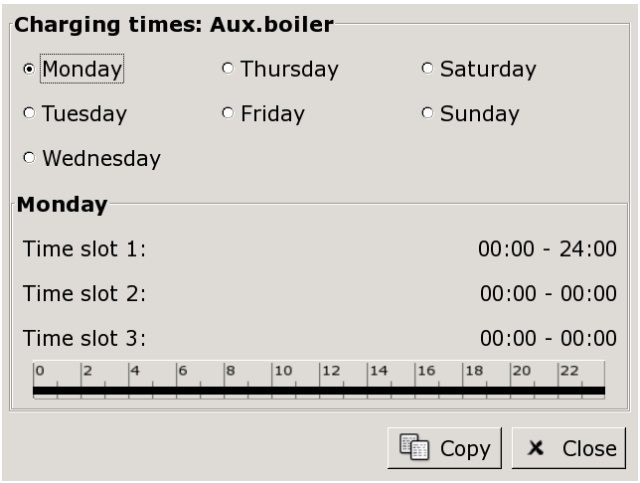


Fig. 10-41: Overview of stand-by times

Select the individual time slots by tapping the rows [Time slot 1:], [Time slot 2:] and [Time slot 3:].

A settings window opens:

Fig. 10-42: Setting a time slot

Enter the time slot and press [Accept] to save. Set the further time slots the same way.

After you have set the time slots, you can copy them for other days of the week. To do so, press [Copy] in the stand-by times overview. A window opens showing the individual days of the week. Make your selection and press [Accept] to save.

Fig. 10-43: Copying time slots to days of the week

The stand-by times overview appears. You can close it by pressing [Close].

10.8.4 Text menu

10.8.4.24 Start lag

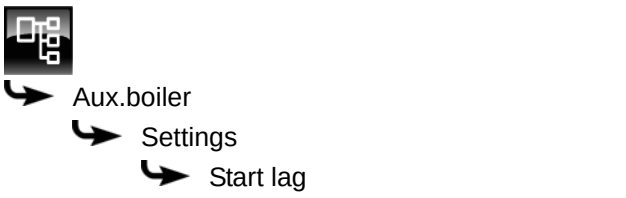
Explanation of [Start lag]

This parameter is used to set the duration of a delay in the operation of the auxiliary boiler after the ETA control system has demanded it.

If there is still a demand by the ETA control system after this period ends, then the auxiliary boiler will begin operation.

Modifying parameters

The parameter can be found under:



Select the parameter and press the [Change] button. A settings window will open.

Enter the value and press the [Accept] button to save.

11 Heating value

Split wood will dry out in just one summer

The moisture content of split logs intended for a log boiler should be below 20% (air dry).

Damp wood with a moisture content of above 20% creates a moist climate in the fuel chamber. Wood that is not sufficiently dry can cause the boiler's fuel chamber to rust through.

One summer is sufficient to dry out split firewood

Unsplit logs stacked as metre-long pieces in the forest will generally take two summers to dry.

However, it can be done faster. If the timber is felled in winter (before the end of January) and split immediately, a moisture content of 15% can be reached by September through air-drying. Split logs also burn 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 1 m immediately after felling: split in half for a log diameter of up to 15 cm, into quarters for a diameter up to 20 cm, into sixths for a diameter up to 25 cm, and into eighths for a diameter up to 30 cm.

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

Wood stored outside in winter will absorb moisture from precipitation. For this reason either move the wood to a covered location in September or at least temporarily store it in a warm room for a week before burning.

During storage the heating value is reduced by processes similar to decay; depending on how dry storage conditions are, the loss can be between 1% and 3% per year. For this reason, only store firewood for longer than 3 years in exceptional circumstances.

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

To sum up: the heating value changes by only 2% between 20% and 10% moisture 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 with protection against the rain for a year.

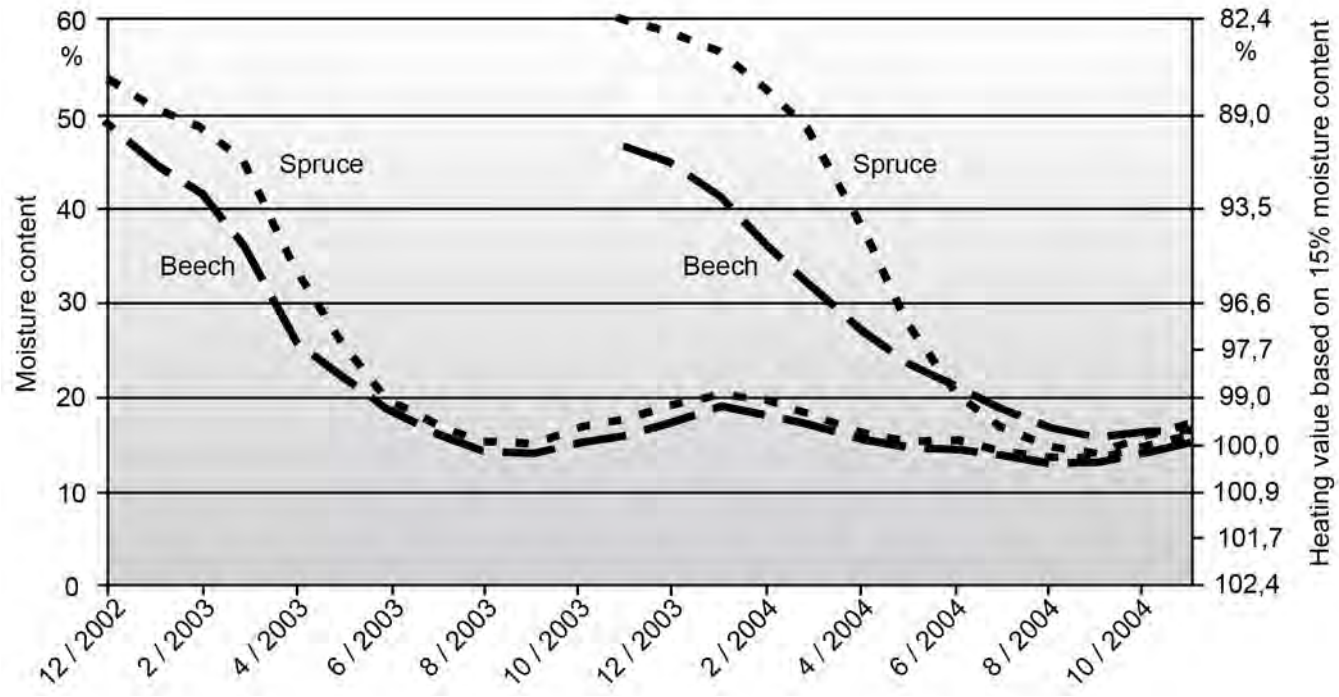


Fig. 11-1: Source: "Rationelle Scheitholzbereitsstellungsverfahren" (economical methods for preparing split logs), Report 11, TFZ Straubing, with heating values added by ETA.

Heating value of wood

Split wood is typically sold in stacks by the stere. The energy content does not only depend on the kind of wood. The amount of heat contained in a stere also

depends on whether the wood is unsplit round logs, metre-long split logs, or ready-to-burn 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 a moisture content of 60% to the fibre saturation point at 25%. The wood starts to contract if dried below this point. It shrinks, and this is why air-dried wood (moisture content of 15%) has more wood substance per stere than freshly cut wood. The difference is typically 5% to 6% for softwood, and 6% to 9% for hardwood.

Logs are not straight. The longer the logs are, the less wood and the more air is present per stere. There is typically more air in "crooked" hardwood than in "straight" softwood.

There is one further difference: round logs can typically be stacked in a far more compact way than metre-long split logs. If you split the wood yourself, buying round logs will give you up to 15% more wood per stere.

In practice, deviations on 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 also because the density of the wood mass itself can vary.

Incidentally, if you order a stere of ready-to-burn beech firewood as 50 cm split logs from your wood dealer, the dealer is entitled under current law to supply 0.85 m³ of half-metre split logs cut from 1 m³ of metre-length split logs. To avoid any unpleasant surprises, when ordering ask how your dealer measures a stere (if the price is good, you may find 0.85 m³ acceptable).

Estimating your wood requirements

Each kilowatt of heat output requires 0.9 steres of half-metre split beech logs, or 1.3 steres of split spruce per year.

In other words, 8 steres of half-metre split spruce logs or 5.5 steres of beech will replace 1000 litres of heating oil.

Energy content of one stere of wood in kilowatt hours

	Round logs fresh-cut 1 m	Round logs dry 1 m	Split logs fresh-cut 1 m	Split logs dry 1 m	Split logs fresh-cut 50 cm	Split logs dry 50 cm	Split logs fresh-cut 33 cm	Split logs dry 33 cm
Moisture content	**30-60%**	**15%**	**30-60%**	**15%**	**30-60%**	**15%**	**30-60%**	**15%**
Softwood	1 stere contains 0.65 m³		1 stere contains 0.56 m³		1 stere contains 0.62 m³		1 stere contains 0.64 m³	
Fir	1205	1269	1038	1093	1149	1210	1186	1249
Spruce	1299	1373	1119	1183	1239	1310	1279	1352
Douglas fir	1402	1478	1208	1274	1337	1410	1380	1455
Pine	1542	1625	1329	1400	1471	1550	1519	1600
Larch	1573	1656	1355	1427	1501	1580	1549	1631
Hardwood	1 stere contains 0.59 m³		1 stere contains 0.50 m³		1 stere contains 0.59 m³		1 stere contains 0.62 m³	
Poplar	958	1020	812	864	958	1020	1007	1072
Willow	1107	1200	938	1017	1107	1200	1163	1261
Alder	1191	1270	1009	1076	1191	1270	1252	1335
Maple	1472	1550	1247	1314	1472	1550	1547	1629
Birch	1475	1570	1250	1331	1475	1570	1550	1650
Ash	1658	1760	1405	1492	1658	1760	1742	1849
Oak	1664	1760	1410	1492	1664	1760	1749	1849
Copper beech	1655	1800	1403	1525	1655	1800	1739	1892
Hornbeam	1743	1920	1477	1627	1743	1920	1832	2018
Black locust	1743	1920	1477	1627	1743	1920	1832	2018