User manual

Top Light Zero

Innovative CO²-neutral
Quality Efficient
Know-how Sustainable

Please read these instructions in full before operating the system.

Important

Caution

Please note that even when the system is switched off, various functions are still operational!

(e.g.: the rust prevention unit: Pumps and mixers move periodically during the night hours in order to prevent the formation of deposits)

In order to be sure that no current is flowing through the system, your heating system must be disconnected from the mains!

When contacting customer services, please have the serial number and the precise system model ID to hand. These details can be found on the identification plate, which is located on the system's day tank.

„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.

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"

"The Biotech PZ65RL and PZ100RL has been recommended as suitable for use in smoke control areas when burning Wood Pellets."

"The Biotech Pellet Boilers have been recommended as suitable for use in smoke control areas when burning Wood Pellets"

Symbol (may not match the type plate on the boiler)

Contents

01 Information about the handbook

1.1 Symbols

Important information

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i Important information/instructions are highlighted in this way
(with lines above and below the text).

1.2 Concept explanation

Heat distribution
Indicates all components of the heating system used to store heat (buffer / hot water tank) or distribute it (the hot water circuit itself), as well as connections to alternative energy sources (solar system, external boiler).

02 General information

- The system may only be commissioned by our customer service department or a technician certified by us to do so.
- Pellet heating systems with nominal power of more than 50 kW must be equipped with a buffer storage tank sized to provide sufficient hot water for 1.5 hours operation once the daily service tank has been filled. The system switches itself off automatically at least once a day for cleaning (heat exchanger and grate cleaning). Depending on the amount of pellets remaining in the reservoir, along with its size and system power, the process (burning out / filling / ignition) may take up to 1.5 hours to reach nominal power output (100% power) – the buffer storage tank is not filled during this time.
- Recommendation: For long burner run times, to generate a constant chimney draft, to reduce start/stop emissions and maintenance requirements: Equip the heating system with a conventional buffer storage tank, thermosiphon buffer storage tank or combination storage tank. In practice, buffer storage tanks rated at 40 to 75 l/kW have proved to be effective solutions. Observe all local legislation regarding the use of buffer storage tanks. The system may only be operated when it can be guaranteed that running it for a period of no less than 2 hours draws 50% of the nominal boiler heat.
- Use only the type fuels we recommend- wood pellets atoccording EN 14961-2, Class A1+ A2 (Ø 6 mm). Only in this way will your pellet heating system operate with low emissions, cost effectively and without malfunctions. Failure to observe this rule may be dangerous, and voids the warranty/guarantee!
- Clean the pellet heating system at regular intervals, as specified in this handbook. Maintenance must be done by our customer service department or a certified partner. This not only ensures that the system and its safety equipment are safe to operate, but also that it runs efficiently and with low emissions. We strongly recommend that you stipulate a service contract. The specified cleaning and maintenance intervals are mandatory. Please note that damage caused by failure to observe the maintenance instructions is not covered by the warranty.

- Your pellet heating system has a thermal capacity that varies from 30% to 100% of nominal power, and is automatically self-regulating in relation to demand. The equipment should be run as far as possible at moderate to high power (depending on heating demand), in order to avoid unnecessary emissions in low power mode. It is best combined with a modulating room or heating controller to prevent unnecessary restarts and provide long combustion cycles.

- The manufacturer is not liable for any damage caused by unauthorised technical modifications to the system.

- Any work done on the system by unauthorised persons, and failure to observe these general instructions and the safety information given below, immediately voids the warranty.

- Only use original spare parts to replace damaged parts and components.

- Make sure to keep this handbook to hand in the boiler room.

- The pellet heating system described in the following instructions has been constructed and tested according to EN303-5.

- Observe the standard heating system regulations for the prevention of Legionella.

- IMPORTANT: When using a pellet heating system with 2 suction turbines (e.g. 100kW pellet heating boiler) the storage space is unevenly emptied (it cannot be emptied completely). Please plan for this eventuality by dividing the storage space by 60% to 40%.

- The system must be serviced at least once a year, and no less frequently than every 1500 hours of operation (for a power range of 80 - 100%) by a certified technician. If the system is NOT serviced, the warranty becomes void.

- The boiler is guaranteed for 5 years against leaks, and the electronics are guaranteed for 2 years; seals and consumable parts e.g. vacuum brushes are not covered.

- If necessary, all seals and consumable parts will be replaced during maintenance (at a cost). The system can only be serviced when it is cold. If the system has not been shut down sufficiently in advance and is still hot when the technician arrives, the resulting lost time will be charged separately in the invoice.

- Foreign objects in the fuel can damage the system.

- Please follow the UK Pellet Council guidelines for pellet delivery and storage (http://www.r-e-a.net/upload/ukpc_storage_guide.pdf), but always consult your local delivery company for advice.

- Applications with a high level of safety in relation to heating (hotels, process heating, etc.) must be implemented with bivalent or dual boiler configurations of a suitable size. In case of failure to observe these requirements we decline all liability due to damage caused by insufficient heat supply. Biomass heating systems must be supervised, depending on the system (by the building porter, maintenance staff, etc.), to ensure that the prescribed maintenance is done at the specified intervals!

- To ensure optimal operation of the heating system, sufficient combustion air must be available in the boiler room. Local regulations must be observed. Note that insufficient oxygen supply (ventilation) can result in malfunctions that are not covered by the warranty/guarantee. Ventilation openings must not be closed or obstructed in any way.

Data sheet for EN 14961-2, Class A1+ A2 (Ø 6mm) compliant wood pellets		
Parameter (unit)	ENplus-A1	ENplus-A2
Length (mm)	3.15 to 40 [1]	3.15 to 40 [1]
Dust content (%, weight)	≤ 1 [2]	≤ 1 [2]
Ash content (%, weight)	≤ 0.7 [3]	≤ 1.0 [3]
Ash reduction temperature (°C)	≥ 1200	≥ 1100

1) No more than 5% of the pellets may be longer than 40 mm, max. length 45 mm.

2) Particulates < 3.15 mm, dust content at last loading station.

3) Waterfree state (wf)

Electrical connection: 230 V, 50 Hz; 16 A fuse, delayed trip.
Disconnection via ground fault circuit interrupter (voltage limits per EN-50160).
CAUTION: ISO 60364 must be observed!
Operating limits: Max. ambient temperature 0-45° C; max. humidity 0-95 %

Only use original Biotech Energietechnik GmbH spare parts!
Biotech Energietechnik GmbH guarantees repairs and supply of spare parts for at least 10 years after the date of purchase!

03   Safety information and instructions

Read the safety information before operating the system!

Failure to observe the safety information can result in injury, danger to life and damage to the system and the building!

The current draw of the system-side equipment (boiler circuit pump, circulation pump, heating circuit pump, etc.) cannot exceed 1800 W.

A heating system emergency switch which cuts off heat generation while continuing the operation of the heating circuit must be installed outside the boiler room! (Not mandatory in Germany, but recommended) Disable this switch before running maintenance or repairs!

- The manufacturer is not liable for damage due to incorrect connection of the delivery and return circuits – do not swap the fittings. The connections must be removable and unstressed. Make sure the boiler can be vented when installing the pipes. Fit the system with shut-off equipment at suitable points to facilitate maintenance (e.g. Isolation valves, (ball cocks are a very specific valves fitted in a water resevoir tank) etc.).
- Before connecting the boiler to the heating circuit: Flush all pipes and free them of any residual foreign matter.
- Caution: The safety valve can be hazardous when it discharges! Convey the discharged water to a suitable drainage point.
- Before starting up the system, check that the boiler is watertight. Charge the boiler to the safety valve's trip pressure. Over pressurizing the system may cause damage to the pressure relief valve and other safety equipment. Run water-tightness tests as required by local regulations.
- Only fill the boiler when it is cold. The flow temperature may not exceed 40° C.
- The pellet heating system may only be operated when in perfect working order. Malfunctions and damage which compromise or threaten to compromise its safe operation must be resolved by our service department or a technician certified by us to do so.
- The system may only be installed by our customer service department or a technician certified by us to do so. The system has electrical components and rotating parts that could cause crushing hazard if not operated safely.
- Live cables (240volts) are routed under the panels and behind inspections hatches do not open unless authorised to do so.
- Never open the boiler's service hatches while it is operating; hot flue gas and ash may issue from them.
- Before cleaning the system, shut it down. Switch it off with its ON/OFF switch. Wait for the system to cool down (the boiler temperature is shown on the display). Emergency shut-off not always fitted. Should say 'do not work on the boiler until the boiler is suitable isolated from the mains electrical supply' or disconnect it form the mains.
- Before sweeping the combustion gas pipe/flue, the chimney sweep must switch the system off with the ON/OFF switch and wait for the remaining pellets to burn out (around 20 minutes). Possible hazard due to explosion risk from flue gas build up.

- Never use flammable fluids inside the combustion chamber.
- Never attempt to repair our systems yourself; contact our technical department when necessary.
- The system must be fitted with a "No smoking or open flames" notice (danger when filling the pellet reservoir).
- A certified fire extinguisher must be kept in the boiler room / installation room.
- Make sure the room is properly ventilated with fresh air.
- Shutting down the system over a certain period of time (e.g. summer time). Clean the system and remove all ash before shutting the system down. In order to prevent damage due to condensation, leave the boiler doors open to ventilate it.
- Lock the boiler room against unauthorised access, especially against children.
- Once a month, check the tightness and condition of the boiler doors and water fittings.
- Once a year, check the safety temperature limiter (STL) (this is done during maintenance or service).
- Do not remove, bypass or disable any safety or control equipment in any way.
- When cleaning the system, and when removing the ash, wear a dust mask, in order to prevent health hazards and potential damage.
- Before filling the fuel storage with a delivery truck, shut the system down (wait for 20 minutes).
- If the domestic hot temperature is set higher than 60° C, a thermostatic mixing valve must be installed (scalding hazard).
- The pellet heating system may only be installed and operated in proper structural sound and water tight room. The pellet boiler is not designed for use outdoors. It may only be used in machine rooms out of the way of water (drop, spray and jet).
- A air release valve must be installed at the top of the boiler.
- The heating system must be filled with heating water according to BS 7593, Code of practice for: Treatment of water in central heating systems.
- The pellet boiler must be fitted with safety equipment to protect it against water overpressure when connecting it to the water supply/heating circuit (e.g. pressure relief valve).
- The pellet boiler must be fitted with safety equipment to prevent non-potable water being sucked back into the water supply. Must incorporate a stop valve to BS1010, double check valve, and flexible pipe.
- The heating water must be inspected annually based on Standard BS 7593, Code of practice for: Treatment of water in central heating systems.
- The safety valve must be checked annually by a technician.
- The expansion tank must be checked by a technician on a regular basis .
- The ash discharge, automatic furnace and feeding device must be inspected regularly per No idea what this is could you please explain.
- The customer must implements fire safety regulations as required by the authorities!
- Please note that a variety of functions are still active even when the system is switched off! (This includes the frost protection system; the pumps and mixers are run from time to time at night to prevent the bearings from locking). The only way to be absolutely sure that no parts of the system are live is to disconnect it from the mains!
- Is this a low pressure switch cut-off. There are no legal reasons in the uk for this, do we need to fit one for warranty?

04   Boiler
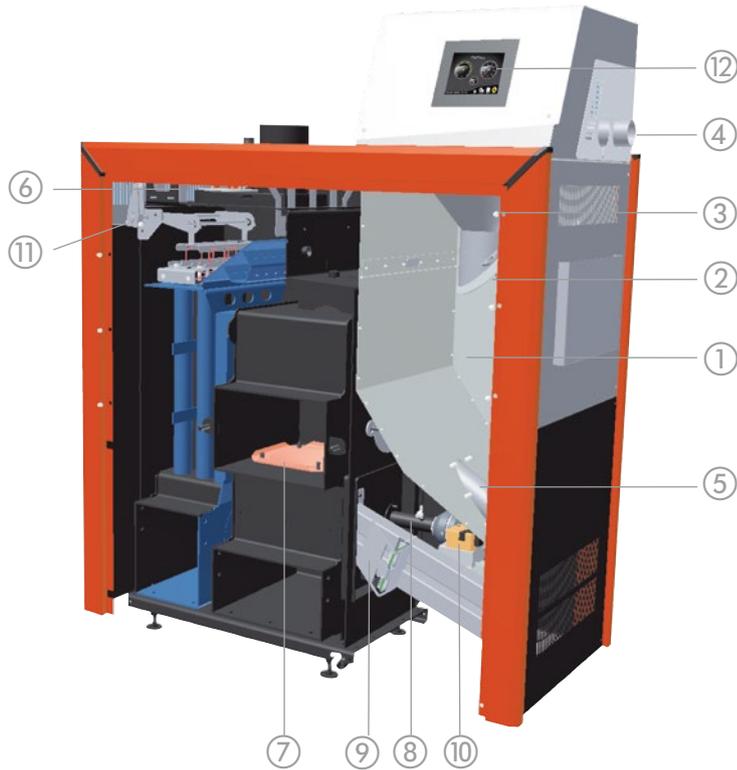
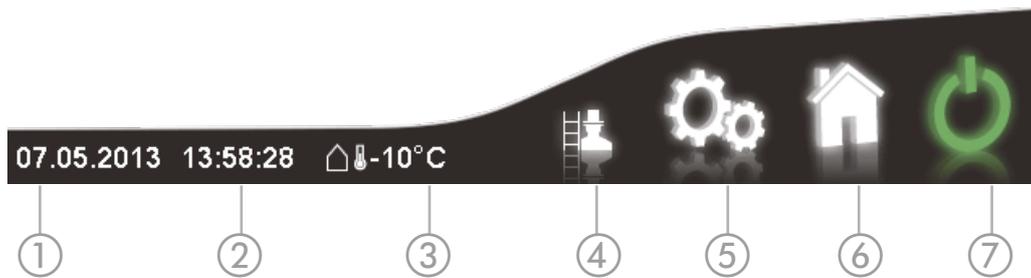|			
①	Reservoir	⑦	Burner
②	Vacuum flap	⑧	Ignition device
③	Separator	⑨	Air mass sensor
④	Vacuum generator	⑩	Grate cleaning drive
⑤	Worm drive	⑪	Heat exchanger cleaning
⑥	Lambda sensor	⑫	Controller

05   Using the controller

The controller is equipped with a pressure sensitive "resistive touchscreen". It therefore must be used differently from a smartphone with capacitive touchscreen, which responds to even a very light touch.
Do not use pointed or sharp objects on the touchscreen.

5.1 Cleaning

The touchscreen may only be cleaned with a soft cloth. To wet the cloth, use a monitor cleaning product (e.g. antistatic foam cleaner), water with detergent or alcohol. In order to prevent humidity from entering the device, spray the cleaning product onto the cloth and not directly onto the screen itself. Do not use abrasive products, chemicals, scouring agents or hard objects, as they can scratch and damage the screen.

5.2 Overview of controls and indicators

1	Date	Press to change/set the date
2	Time	Press to change/set the time
3	Outdoor temperature	-10° C, if no exterior temperature sensor is connected
4	Chimney sweep function	Only to be activated by authorised personnel
5	Settings/technician level	Opens the system page – the icon is displayed highlighted in white.
6	Overview page	Opens the overview page – the icon is displayed highlighted in white. Press again to switch between the overview page and the homepage
7	Main controller switch	

1	Current message	Displays information, warnings and faults which have not been acknowledged. Pressing the message opens the acknowledge dialogue.
2	Navigation path	Indicates which page is currently being displayed.

5.2.1. Basic controls

	Close	Closes the current selection/indicator window

i If a window is open with the "close" button in the top right hand corner (e.g. the numerical keyboard) - the contorls outside the window are disabled including the main on/off function.

	Back	Returns to the previous page
	Scroll up	Displays values higher up a list.
	Scroll down	Displays values further down a list.
21 22 23		Temperature setting: Right arrow = increase - left arrow = decrease

5.2.1.1 Numerical keypad
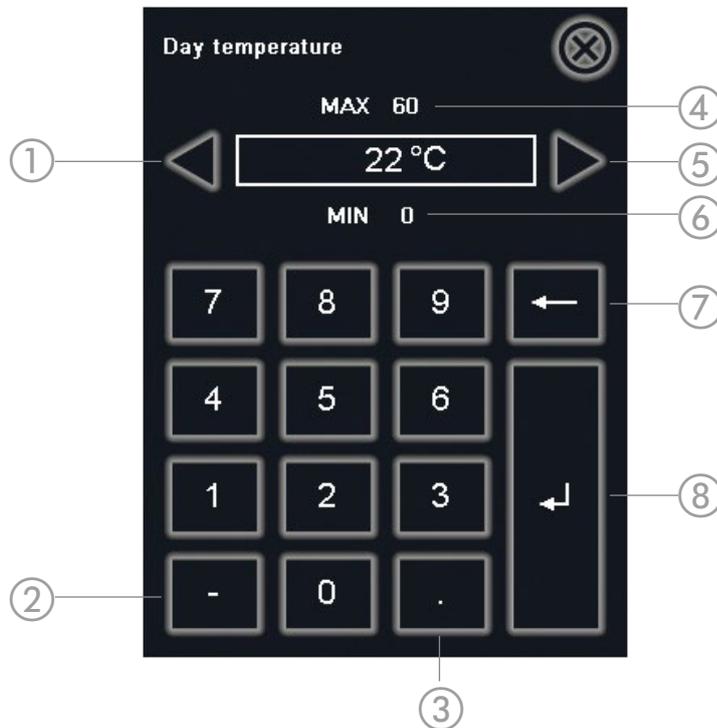
1	Left arrow	Decrease value by one unit
2	Minus	Assigns a negative sign to an existing (entered) value.
3	Point	Decimal point for non-integer numbers
4	Maximum value	Indicates the upper limit for an entry
5	Right arrow	Increase value by one unit
6	Minimum value	Indicates the lower limit for an entry
7	Cancel	Cancels the current value / deletes the most recently entered digit.
8	Accept	Accepts the entry and closes the keypad

5.2.2. System ON/OFF
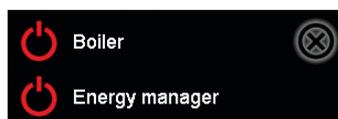
 Red: The system is OFF.

 Green: The system is ON.

 Yellow: Either the boiler or the heating circuit are on, but not both.

Press the main switch button to open the ON/OFF dialogue.

1	Separate main switch	Pressing this switch turns the boiler and heating circuit ON/OFF independently.

2	ON/OFF	Press to turn the system ON/OFF

Grey: Opens the time settings page (on the component detail pages)

Red: The time settings page is open

Up to three time windows can be set for each day of the week (Mon–Sun), in which the corresponding component is activated

In order to apply a given setting to multiple days, mark the days in question (left) by touching/swiping them (e.g. Mon-Fri with white background) BEFORE making the settings themselves. All settings made thereafter will apply to all the marked days.

MON	On) 06:00	22:00	Off) 06:00	10:00	Off) 16:00	22:00
TUE	On) 06:00	22:00	Off) 06:00	10:00	Off) 16:00	22:00
WED	On) 06:00	22:00	Off) 06:00	10:00	Off) 16:00	22:00
THU	On) 06:00	22:00	Off) 06:00	10:00	Off) 16:00	22:00
FRI	On) 06:00	22:00	Off) 06:00	10:00	Off) 16:00	22:00
SAT	On) 06:00	22:00	Off) 06:00	10:00	Off) 16:00	22:00
SUN	On) 06:00	22:00	Off) 06:00	10:00	Off) 16:00	22:00

Active: On) 06:00 | 22:00   Inactive: Off) 06:00 | 10:00
          ①   ②   ③

1	Time window status (active/inactive)	Press to turn the time window ON/OFF
2	Start time	
3	End time	

The start time must precede the end time. For 24-hour ("round the clock") operation, set the start time to 00:00 and the end time to 23:59.

5.3.1. User level

Start page

Overview

Storage

Solar

Hot water

Heating circuit

Buffer
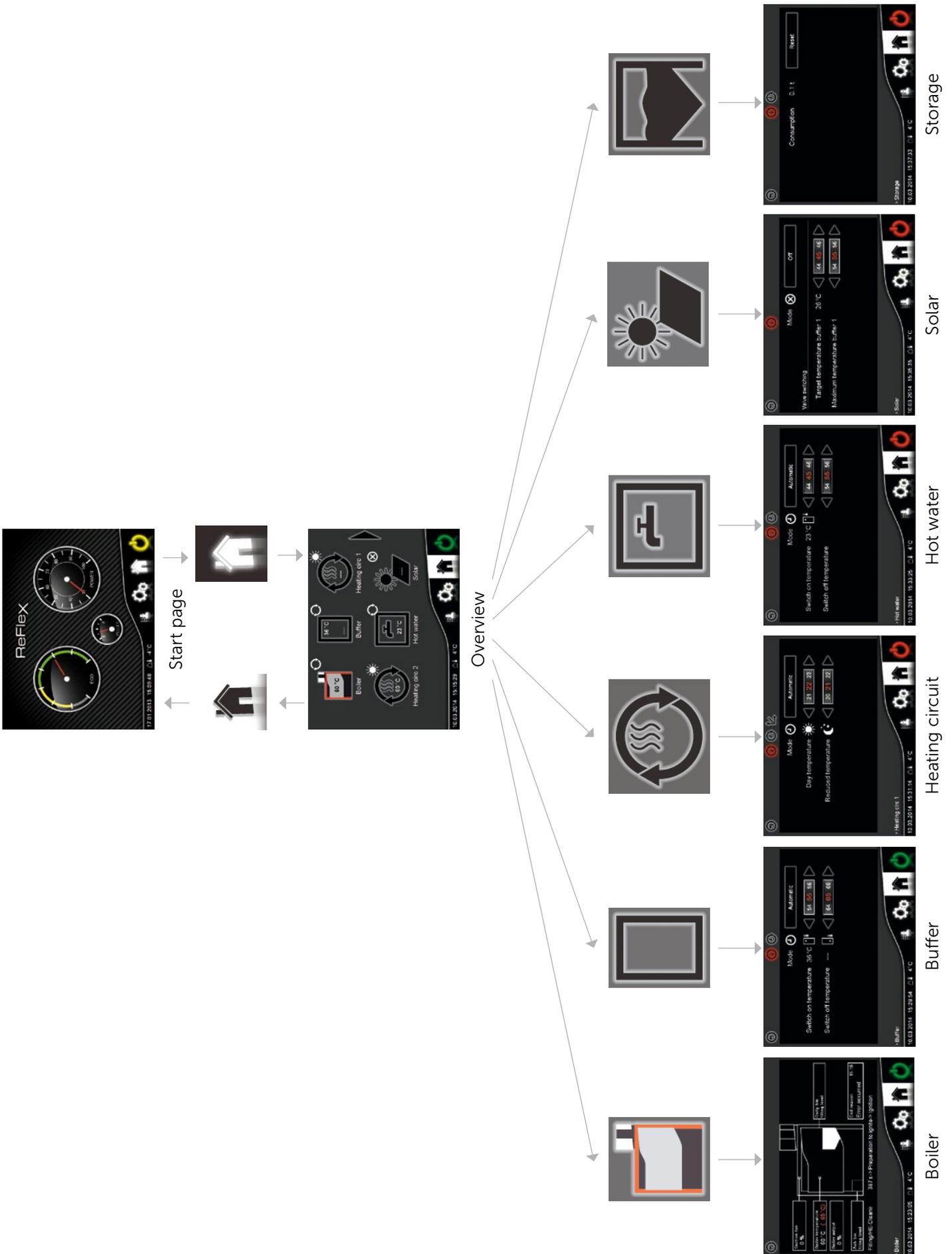
Boiler

5.3.1.1. Start page

1   Eco   Shows the combustion efficiency. It is normal for the indicator to move in the left (grey) zone during ignition, and does not indicate a defect.

2   Power   Shows the boiler power (percent of nominal power)

3   Pellet   Shows the day container filling level (left = empty, right = full)

5.3.1.2. Overview page

Up to six components with their status and principal parameters are displayed on the overview page.
Pressing a component field opens the respective detailed page, where settings can also be made.
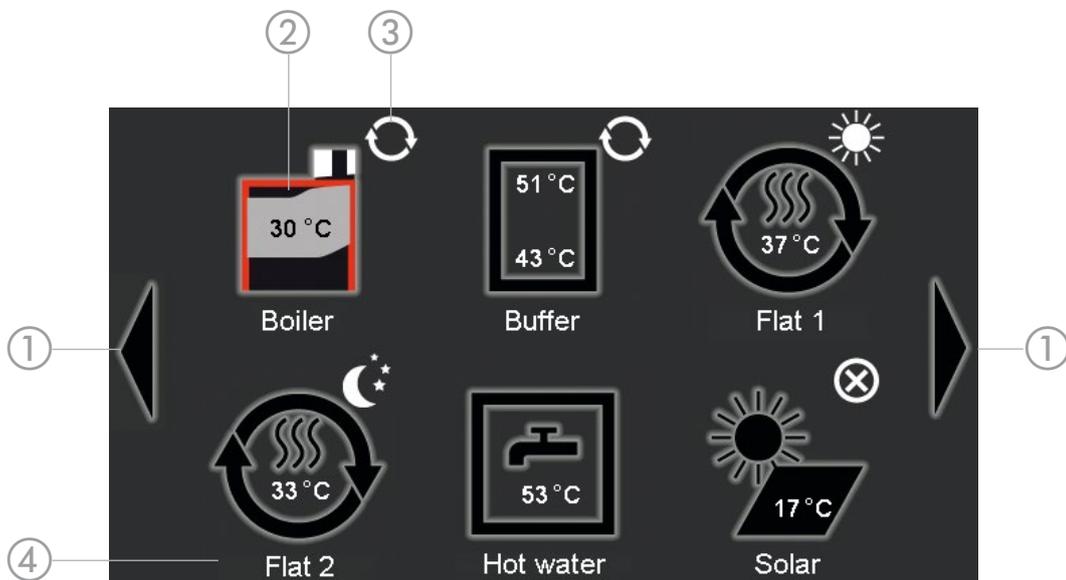
1	Navigation arrows	Used to switch between overview pages when more than six components are present
2	Component	
3	Status display	The status of each component is displayed at the top right.
4	Component designation	The name is used to identify the component, especially when the system has multiple components of the same type (e.g. heating circuit). The name can be modified in module configuration (see component designation, page 27)

Status display

The following symbols apply to multiple component types. Component-specific symbols are detailed below for each component separately.

⊗	OFF	The entire system/boiler/power distribution or component is switched off.
None Symbol	Ready	The component is in standby. When all start conditions are satisfied, it goes into active mode.
↻	Active	See description of component (below)
①	Warning	The component cannot operate properly. Messages (see page 21) are accompanied by a corresponding entry.
❄	Frost protection	

Components

Boiler with current boiler temperature		↻	Fill day container, prepare for ignition, ignition, STL process	
30 °C		🔥	Burn, heat, burn out, post-ventilate	
Buffer with upper and lower temperature		↻	Buffer charging in progress	
51 °C 43 °C				

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i Even though buffer loading is shown to be active, the charging pump is not necessarily running. The buffer charging pump is only activated when the boiler temperature is at least 3° C greater than the upper buffer temperature. When the boiler temperature is less than 1° C greater than the upper buffer temperature, the charging pump is switched off.

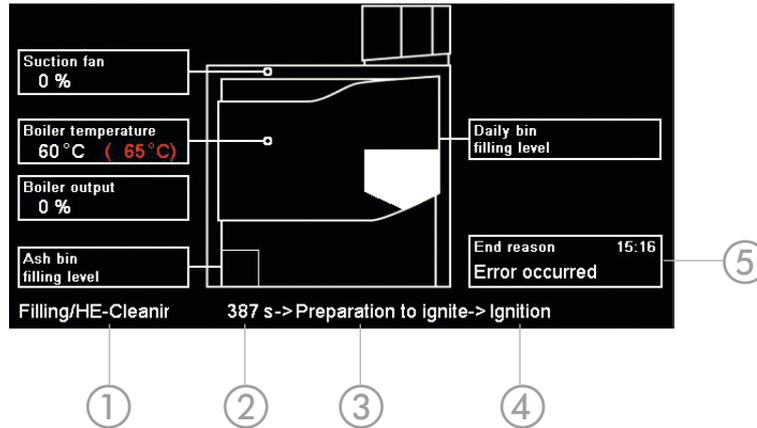|			
Hot water with current temperature	↻	Hot water charging active (see buffer information above)
53 °C			
Heating circuit with current flow temperature	☀	Day operation (within the set time window) The flow calculation is done in relation to the "Day temperature" setting
37 °C	☾	Lowering mode (outside the set time window). The flow calculation is done in relation to the "Reduced temperature" setting
	⛱	Summer mode. The heating circuit is switched off (pump off, mixer closed)
Solar with current collector temperature	↻	Solar charging active (pump running)
17 °C			

5.3.1.3 Boiler

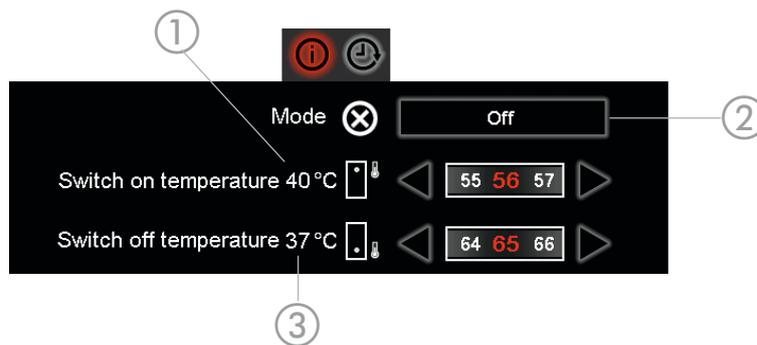| | Suction fan |
| 0 % |
| Boiler temperature |
| 60 °C (65 °C) |
| Boiler output |
| 0 % |
| Ash bin filling level |
| Filling/HE-Cleanir |

1 Current status / phase of boiler
2 Remaining duration of current phase (e.g. burning)
3 Next phase of boiler
4 Phase after next phase of boiler
5 Cause of termination of most recent heating phase, with time of occurrence

5.3.1.4 Buffer

Charging starts when the time is within an active time window and the upper buffer temperature is below the "Switch on temperature" setting. If the lower buffer temperature rises to above the "Switch off temperature" setting, charging stops.
If the time window expires during a charge cycle, the cycle is continued until the deactivation temperature is reached.

1 Current upper buffer temperature (activation criterion)
2 Mode

	Off	The buffer is never charged (exception: see frost protection page 36)
	On	Charging is controlled as described above
	Automatic	Like On with summer mode: When all users connected to the buffer are Off or in summer mode (in case of heating circuits), the buffer itself is switched off until heat is required once more. If no users are assigned, it behaves as in On mode.

3 Current lower buffer temperature (deactivation criterion)

5.3.1.5 Hot water

Charging starts when the time is within an active time window and the hot water tank temperature is below the "Switch on temperature" setting. If the temperature rises to above the "Switch off temperature" setting, charging stops. If the time window expires during a charge cycle, the cycle is continued until the deactivation temperature is reached.
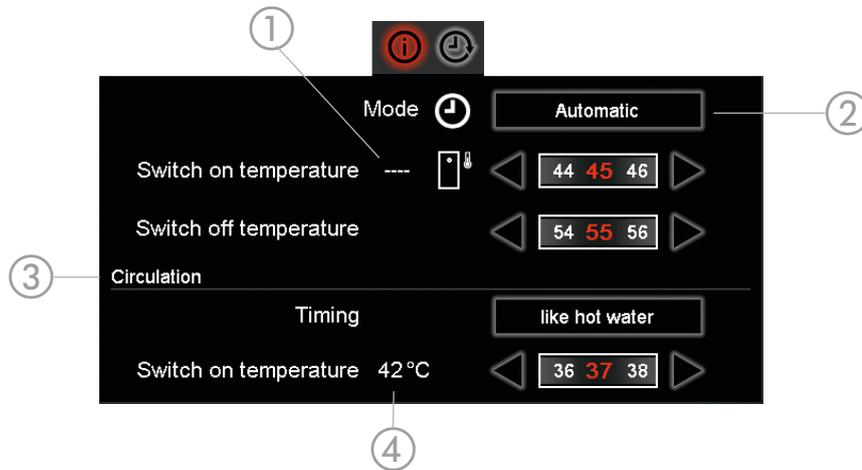
1	Current hot water temperature	(activation/deactivation criterion)
2	Mode	
	Off	The hot water is never heated (exception: see frost protection page 36)
	On	Charging is controlled as described above
3	Circulation time	
	like hot water	The same time settings apply as for hot water
	own	Specific circulation pump time settings can be applied (clock field displays)
4	Current circulation temperature	acts as activation/deactivation criterion (only displays when a temperature sensor is connected)

ℹ The circulation settings are only displayed when this option is enabled in module configuration.

Circulation

Without a temperature sensor, the circulation pump runs continuously during the activated time windows (according either to the hot water time settings or to its own circulation time settings). If a temperature sensor is present, the circulation pump runs during the activated time windows when the measured temperature is below the activation temperature setting. If the circulation temperature remains equal to / higher than the activation temperature for at least one minute, the pump stops running once more.
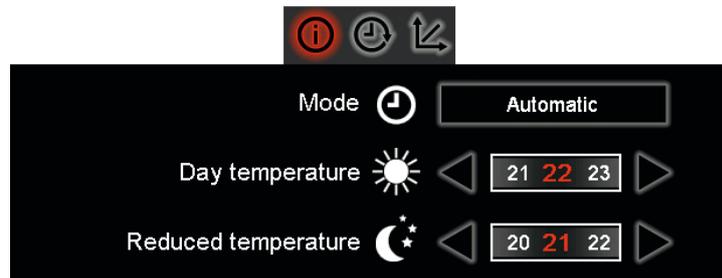
The heating circuit is controlled by the ambient temperature, i.e. the flow temperature is determined in relation to the outdoor temperature. Up to three time phases can be set per day, in which the target temperature is given by the "Day temperature" (in the living space). Outside these phases, the lower "Reduced temperature" takes effect.
Once the outdoor temperature exceeds the summer temperature (see summer temperature, page 25) for the duration of the switching delay (see switching delay, page 25), the heating circuit switches to summer mode. Switching to heating (Day/Lowering) happens in a similar way when the temperature drops below the winter temperature (see winter temperature, page 25).

A special summer deactivation occurs when the calculated target flow temperature lies below the minimum flow temperature setting.

Basic settings

Mode	Heating circuit operating mode	
	Off	Pump off, mixer closed.
	Automatic	The flow temperature is calculated from the characteristic curve and the day/lowering time settings are observed. Switching between summer/winter modes is active.
	Day	The flow temperature is calculated from the day temperature characteristic curve. Lowering is deactivated. Switching between summer/winter modes is active.
	Set back temperature	The flow temperature is calculated from the lowering temperature characteristic curve. Switching between summer/winter modes is active.
	Room thermostat	The mode (day/lowering/auto) can be set on the room controller. If no room controller is connected, the heating circuit runs in auto mode.
	Fix	The flow temperature is regulated to the fixed temperature setting (see fixed flow temperature, page 25). The time settings have no effect. Switching between summer/winter modes is not active.
Day temperature	The target room temperature during the heating phases enabled with the time settings. In order for this temperature to actually be achieved in the room, the flow temperature characteristic curve must be set properly in relation to the building and the heating system (floor heating, wall-mounted radiators, etc.)	
Reduced temperature	The target room temperature outside the heating phases enabled with the time settings.	

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i   To make the heating circuit switch off during the lowering phase, the lowering temperature must be set so low that the flow temperature characteristic curve gives a target flow temperature below the minimum flow temperature.
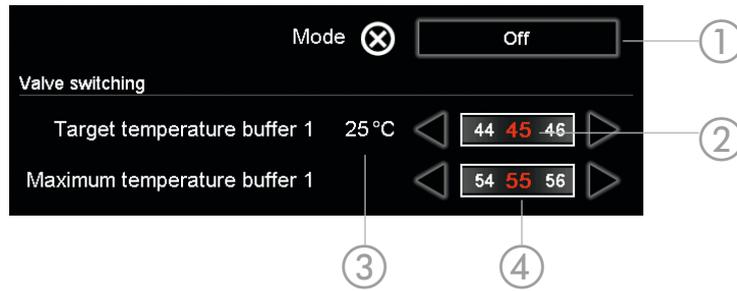

Flow temperature characteristic curve

The flow characteristic determines the relationship between the flow temperature and the outdoor temperature.
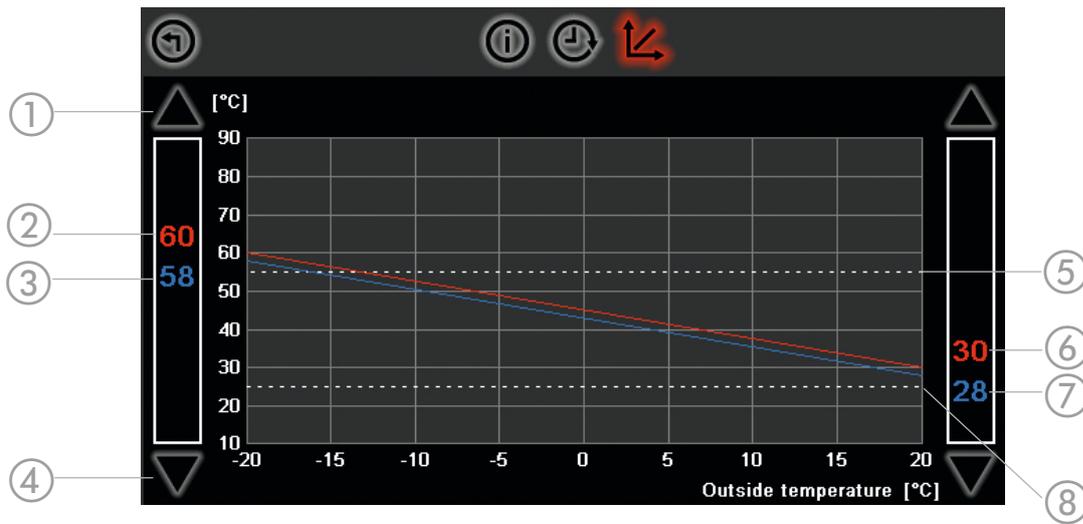
1	Up arrow	Increases the flow target temperature, left -20° C, right +20° C outdoor temperature
2	red value (left)	Day flow target temperature at -20° C outdoor temperature
3	blue value (left)	Lowering flow target temperature at -20° C outdoor temperature The difference between the day and lowering flow target temperatures is given by the difference between the day and lowering temperatures (see basic settings, page 17) multiplied by the "room influence"
4	Down arrow	Decreases the flow target temperature
5	dashed line (top)	Maximum flow temperature
6	red value (right)	Day flow target temperature at +20° C outdoor temperature
7	blue value (right)	Lowering flow target temperature at +20° C outdoor temperature
8	dashed line (bottom)	Minimum flow temperature

5.3.1.7 Solar

The solar pump runs when the collector exceeds the minimum temperature and is hotter than the tank. The controller can switch between two tanks.

1	Mode	
	Off	The solar pump never runs
	Automatic	Solar heating system running
2	Target temperature buffer 1	If the tank 1 temperature (e.g. hot water tank) lies below this value, the valve switches to tank 1. The temperature of tank 1 is combined with that of the collector as an activation/deactivation criterion for the solar pump.
3	Current buffer 1 temperature	
4	Maximum temperature buffer 1	If the tank 1 temperature is higher than this value, the valve switches to tank 2 (e.g. buffer storage tank). The temperature of tank 2 acts as an activation/deactivation criterion for the solar pump.

5.3.1.8 Storage

The specified consumption is only a guide, and is not intended to be the only criterion for ordering pellets. The storage filling level must be necessarily checked at regular intervals.
Once the storage has been refilled, the calculated consumption can be reset to 0.0 tons.
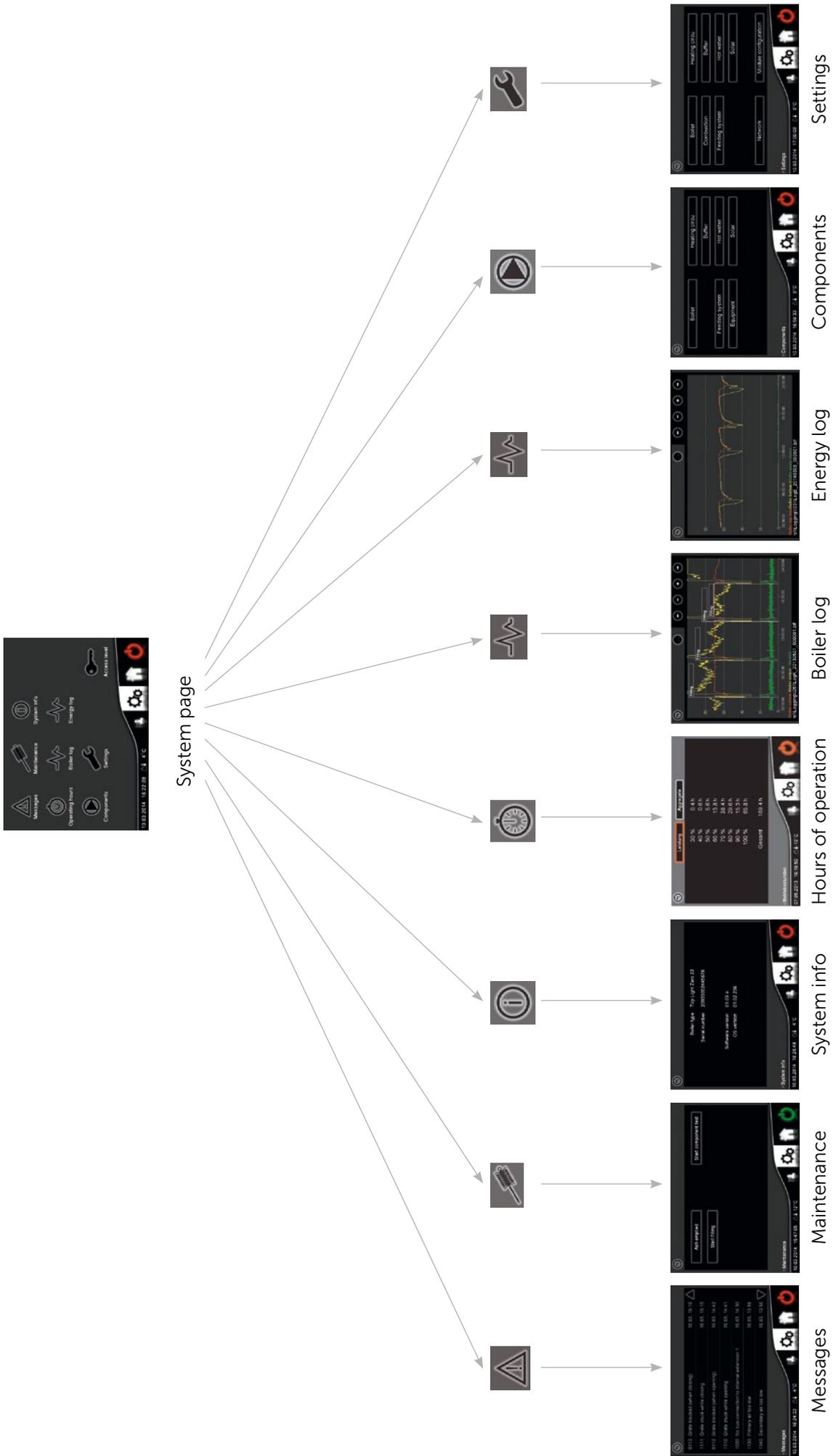
Time settings

In order to assure efficient operation, the filling of the day container should interrupt the heating cycle as little as possible, and occurs at the following conditions:
Boiler start during an active time window and filling level under 90 %, or
end of an active time window and filling level under 70 %.
Basically, the container should only be filled during an active time window. In order to assure hot water supply even at periods of peak demand or during a too short time window, the container is filled when the filling level lies below minimum level, even outside an active time window.
Filling can be started independently of the time settings on the maintenance page (see page 21).
If the automatic heat exchanger cleaning cycle is required (depending on the duration of heating), it runs at the same time as the daily bin is being filled.

System page

Settings

Components

Energy log

Boiler log

Hours of operation

System info

Maintenance

Messages

5.3.2.1 Messages

There are two types of messages:
Warnings/information, which allow the system to be operated further, and faults, which switch off the boiler. In order to start the boiler again, the fault must be eliminated and reset.
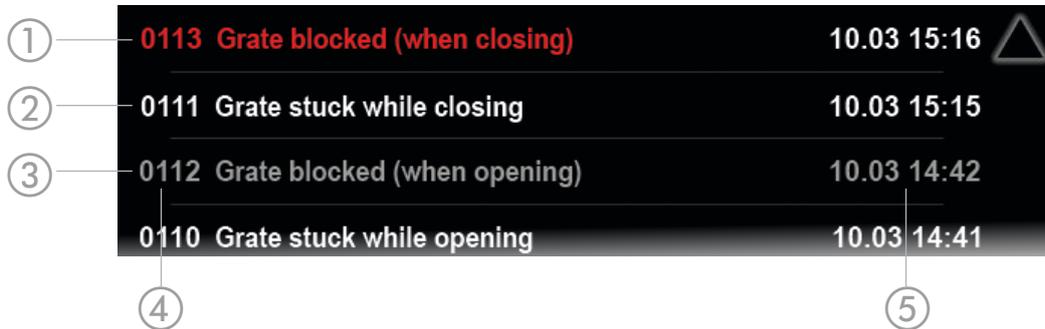
1	red text	Unacknowledged fault
2	white text	Unacknowledged warning/information
3	grey text	Acknowledged message (information/warning/fault)
4	Message number	Values of 1000 or higher are information/warning messages. If the message number is below 1000, it is a fault.
5	Date & time	Time of occurrence

Pressing the message opens the acknowledge dialogue.

5.3.2.2 Maintenance

Ash emptied	Resets the ash filling level after the ash container has been emptied out.
Start filling	Starts the daily bin filling cycle.
Start component test	Runs the automatic unit test

5.3.2.3 System info

Displays important boiler information, including the type designation, serial number and various version numbers.
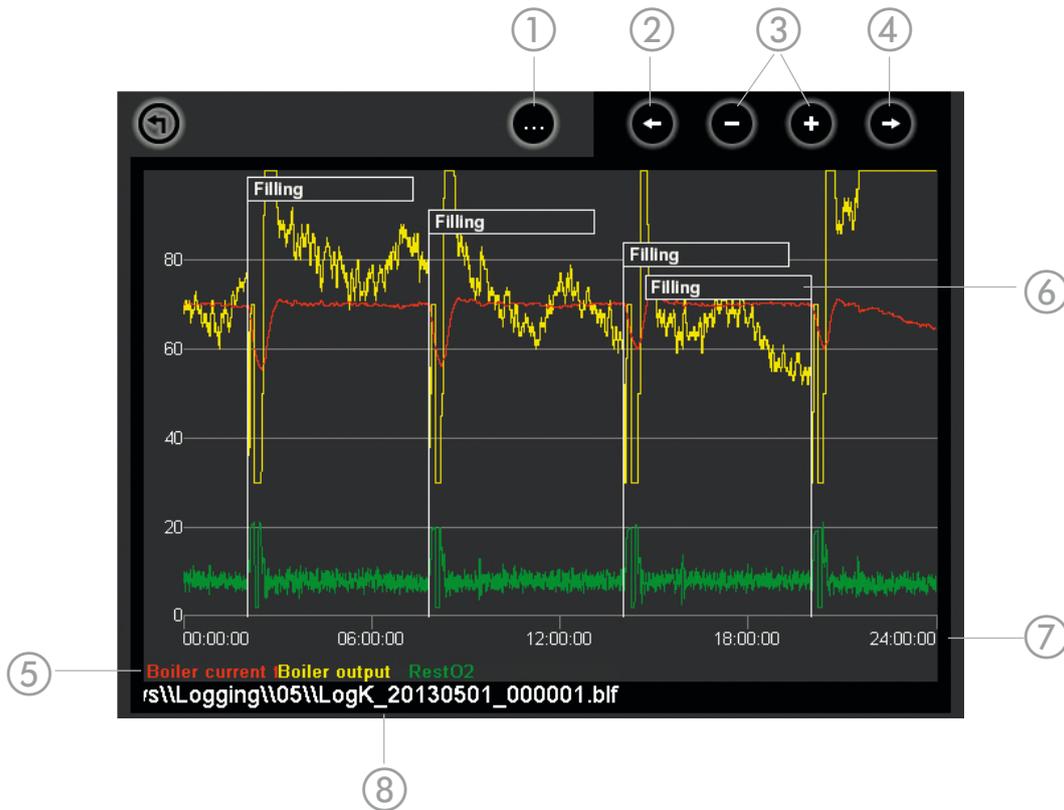
5.3.2.4 Hours of operation

1	Performance	Lists the hours of operation in the various power ranges and the grand total (at the bottom).
2	Components	Displays the hours of operation of each unit including the number of starts (right).

The controller saves the most important heating system operating values every day. In order to analyse this data / optimise operation of the system, these records can be displayed on the controller.

1	More...	Calls up the controls for configuring the display

	Data selection	Opens the value selection page
	Current log	Displays the records for the current day
	Older logs	Selects older records (ordered by month)
	Display end reason	Displays the reason for termination of the heating cycle in text

2	left	Shifts the displayed time period back in time (only when zoomed in)
3	greater/smaller	Changes the displayed time period (max. 00:00-24:00). This can also be done by pressing the area of the display you wish to display in greater detail.
4	right	Shifts the displayed time period forwards in time (only when zoomed in)
5	Keys	The names of the selected values in their assigned colours
6	Reason for termination	When this option is enabled (see 1), the reason why and when heating was switched off is displayed.
7	Time axis	No more than a single day can be displayed
8	Designation	Contains the date and time of occurrence of the displayed record Format: ..._YYYYMMDD_HHMMSS

Select data
Up to six parameters can be displayed at a time. If you press a selected (coloured) text, the value is removed from the curve – its name is shown in white. When six values have already been selected and you wish to display another, you must first deselect one value in this way.

5.3.2.6 Energy log

See Boiler log, page 22
Shows the heat distribution records.

5.3.2.7 Components

When the boiler is running, you can select components (boiler, buffer, heating circuit, etc.) to display the status of their units and the values of the corresponding sensors.
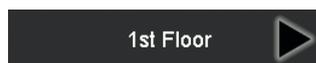If the boiler is off and in standby (heating operation must have shut down in an orderly manner), all outputs can be turned on/off

---

i   If a unit is to be automatically turned on/off while its page is open, its status does not change. Only when you quit the unit page does the change take effect. This can happen for example with the buffer charging pump in after-run mode.

⦿   The active/on status of an input is indicated with a yellow circle

⦿   Inactive/off with a grey circle.

5.3.2.8 Settings

If multiple versions of a given type of component are present (e.g. heating circuits), their names and are shown at the top right, with arrows for selecting them.

1st Floor ▶	◀ 2nd Floor

Boiler

> Settings > Boiler

1	Minimal demand temperature	This sets the lower limit value for the target temperature.	60° C
2	Start difference to target temperature	If the boiler temperature drops below the target temperature + this value, the boiler starts. E.g.: 70° C target temperature for buffer charging + (- 5° C) offset = boiler starts at 65° C	5° C
3	Max. boiler temperature	The heating phase stops when the boiler temperature exceeds this value.	80° C
4	External demand temperature	If no heating distribution is configured on the controller and the boiler is controlled by an external controller or is to be kept at a constant temperature, the desired target temperature must be set here. If a buffer, hot water tank or heating circuit are configured, this value must be set to 0.	0° C
5	Minimal output	Sets the lower limit for the power modulation range. Essentially, this value may not be set lower than 30 %.	30 %
6	Maximal output	Sets the upper limit for the power modulation range.	100 %
7	Daily bin capacity	This value is essential for calculating the filling level and hence the filling process (if the fuel's dust content is very high, it may need to be reduced).	[1]
8	Burner auger extraction rate	This value is essential for calculating the filling level of the container and hence the filling process	[1]
9	Switching function external input	Adaptation to the switching cycle of an external controller	Opener
10	Frost protection	If an outdoor temperature sensor is present and its value is lower than this setting, the frost protection cycle starts. If no outdoor temperature sensor is present, the frost protection cycle starts when the boiler temperature falls below 15° C (not adjustable). If the temperature rises at least 1° C over the frost protection threshold, the frost protection cycle is stopped (in both the above cases). -99° C completely disables the frost protection function.	-99° C
11	Grate running time	The duration of the burner grate drive's stroke from closed to fully open	[1]
12	Grate lag time	The period between grate sensor activation and fully closed. The half of this value is used for the grate movements in heating mode, hence this value may not exceed the actual run time (from sensor activation to mechanical stop) by more than 20%	[1]
13	Ignition lag time	After ignition has been detected, the ignition unit continues running for this time.	[1]
14	Max. ignition time	If ignition is not detected in this time, the igniter is switched off and a fault is reported.	10 min
15	Burning time	Duration of period between ignition detection and the heating phase	[1]
16	Burning out phase	Duration of the shutdown process	[1]
17	Heat exchanger cleaning time	Duration of the automatic heat exchanger cleaning cycle	[1]
18	Maximum heat duration	After this time expires, the cleaning heating phase terminates.	[1]
19	Integral time output controller	This setting adapts the boiler power regulation to the response speed of the users. 0...proportional control: e.g. 50 % boiler power, when the boiler temperature is 5° C less than the target value	20 min
20	Max. flue gas temperature	The boiler power setting is reduced when the flue gas temperature exceeds this value.	[1]
21	Numbers of feeding systems	Number of suction turbines	[1]
22	Suction fan type	Affects fan control.	[1]
23	Primary fan type	Affects fan control.	[1]
23	Secondary fan type	Affects fan control.	[1]

[1] Depends on the type of boiler

Feeding system

> Settings > Feeding system

1	Feeding time	Room discharge run time Total run time of suction turbine = suction process + conveyor run + suction after-run	25 s
2	Drive cycle duration	For intermittent room discharge duration of phase during which "Drive pulse duration" is activate during discharge.	6 s
3	Drive pulse duration	For intermittent room discharge: see "Drive cycle duration" E.g. the drive pauses for 2 seconds every 8 seconds -> Drive periodic time = 10 s, pulse drive run time = 8 s If room discharge is intended to be on for the the entire conveyor run time, "Drive cycle duration" and "Drive pulse duration" must have the same value (e.g. 6 s).	6 s
4	Suction pre-running time	Time span between flap closing and start of feeding system	2 s
5	Suction post-running time	At the end of "Feeding time" (feeding system stops) the suction turbine carries	5 s

Heating circuit

> Settings > Heating circuit

1	Mode	See page 17	
2	Day temperature	See page 17	22° C
3	Reduced temperature	See page 17	20° C
4	Flow temperature at -20° C	Leftmost end of heating circuit characteristic curve (for 21° C room temperature)	60° C
5	Flow temperature at +20° C	Rightmost end of heating circuit characteristic curve (for 21° C room temperature)	28° C
6	Minimum flow temperature	If the calculated flow target temperature falls below this value, the heating circuit switches to summer mode.	25° C
7	Maximal temperature	If the flow temperature rises above this setting, the mixer approaches.	55° C
8	Fixed flow temperature	If the operating mode is Fixed, the flow is regulated to this temperature.	32° C
9	Summer temperature	If the outdoor temperature is higher than this value, the heating circuit switches to summer mode (this value may not be lower than the winter temperature).	20° C
10	Winter temperature	If the outdoor temperature is lower than this value, the heating circuit terminates the summer mode (this value may not be higher than the summer temperature).	18° C
11	Switching delay	This is the time for which the outdoor temperature must be higher than the summer temperature/lower than the winter temperature, before the mode switches.	30 min
12	Room influence	The ratio between room and flow temperature (important e.g. when changing the day temperature and operation with the room controller). E.g. In order to increase the room temperature by 1° C, the flow temperature must be increased by 2° C.	2.0
13	Room stat influence active	When a room controller is connected and this value is set to ON, the flow target temperature is corrected by the difference between the actual room temperature and the target temperature.	Off
14	Mixing valve running time	In order for the mixer controller to operate correctly, the mixer run time must be set here (usually specified on the mixer drive).	140 s
15	Proportional factor	Mixer controller parameter	10,000
16	Integral time	Mixer controller parameter	0 ms
17	Derivative time	Mixer controller parameter	0 ms
18	Sample rate	Mixer controller parameter	30 s

Buffer

> Settings > Buffer

1	Mode	See page 15	
2	Switch on temperature	See page 15	55 °C
3	Switch off temperature	See page 15	55 °C
4	Superelevation	Charging process: Boiler target temperature = buffer deactivation temperature + overshoot Changing the overshoot affects the duration of buffer charging.	5 °C
5	Maximum lag time	In order to exploit the residual energy in the boiler, the storage tank pump runs after charging has finished fro at most the after-run time, so long as the boiler temperature is higher than the upper buffer temperature (hysteresis: On +3 / Off +1 °C). During the after-run time, the pump may be turned on again, even if the boiler is switched off.	30 min
6	Number of integrated hot water tank	Important for combined tanks (see page 28)	0

Hot water

> Settings > Hot water

1	Mode	See page 16	
2	Switch on temperature	See page 16	45 °C
3	Switch off temperature	See page 16	55 °C
4	Superelevation	If the hot water tank is subordinated to the boiler, then during charging: Boiler target temperature = hot water tank switch off temperature + superelevation Changing the superelevation affects the duration of hot water tank charging.	10 °C
5	Maximum lag time	If the hot water tank is attached to the boiler, the description of the buffer applies. If the hot water tank is connected to buffer, then this parameter must be set to 0.	30 min

Solar

> Settings > Solar

1	Mode	See page 19	
2	Target temperature buffer 1	See page 19	45 °C
3	Maximum temperature buffer 1	See page 19	55 °C
4	Collector minimum temperature	The collector must reach at least this temperature before the solar pump runs.	40 °C
5	Hysteresis pump on	The solar pump can only be activated when the collector temperature is greater than the tank temperature by at least this amount.	10 °C
6	Hysteresis pump off	The solar pump is switched off when the collector temperature and tank temperature fall below this value.	5 °C
7	Collector sensor type	Changes to the sensor type setting only take effect when the controller is rebooted (shut off power for at least 5 seconds).	Pt1000

Module configuration

> Settings > Module configuration

Overview

Represents all components of the system with their designations in hierarchical order. Subordinate components are thus set back (e.g. the "1st Floor" heating circuit is attached to the buffer). The component designation can be edited by pressing on the list entry itself. The service technician can also edit the hydraulic assignment (to the boiler or buffer) on this page.

The three buttons (top) are used for switching between pages.

Configuration

This page is protected by the Service Code password.

Press on a numerical field to enter the desired amount. "Internal" and "External" refer to the type of expansion module – built into the boiler or installed outside the boiler in a separate housing.

Press the "Accept" button to accept the changes (the controller must be switched off).

---

i   If a solar component is added or removed, the controller must be rebooted after the change has been confirmed (shut off power for at least 5 seconds). The reason for this is the switch type of the collector temperature input.

---

i   If a hot water and circulation component are internally configured, the hot water component is NOT associated with the HZS532. Hot water and circulation are then on an HZS533. The index depends on the other components and is shown on the Modules page.

Maximum component numbers

Buffer	5
Hot water tank	3
Circulation	3
Heating circuit	10
Solar	3
Feeding system	2

Combined tank

If a combination tank is present, both a buffer and a hot water tank must be configured.
The charging pump is connected to the buffer pump output, while the hot water temperature sensor is connected to the hot water temperature input.
The "Number of integrated hot water tank" must be set (normally 1) in the buffer settings.
If buffer mode is "Automatic", the buffer will no longer be fully charged during the summer (all connected heating circuits off or in summer mode). Hot water is still generated using the hot water temperature sensor and buffer charging pump.

Modules

Lists all necessary (expansion) modules with their assigned functions.

| 1 | Green square | Communications with module OK |
| 2 | Grey square | Module not detected/communications not OK |

Assignment of the modules in the following sequence:
1. Buffer
The first internal buffer is assigne always on the main mother board 524, additional buffers on intern expansion module 533.
2. Hot water tank
The first intern assigned hot water tank is always on the intern expansion module 532, except if in connection with a circulation (in this case the intern expansion module 533 is needed).
3. Heating circuit
The first intern asssigned heating circuit is always on the intern expansion module 532, additional ones on intern expansion module 533
4. Feeding
One intern assigned feeding system is always on the intern expansion module 532
Two feeding systems can be connected to the extern expansion module 541
5. Solar
If both internal and external expansion modules are used, assign first the internal modules
I.e. Assign 6 internal modules and 4 external heating circuits as follows:
Heating circuit 1: Internal expansion module 532
Heating circuit 2−6: Internal expansion module 533 No. 1−5
Heating circuit 7−10: External expansion module 541 No. 1−4

---

i   Move additional components (i.e. Hotwater tank) under the module assignement of existing elements (i.e. heating circuits). When using an external expansion module, change only the Dip switch so that no changes on the wiring is necessary.

Enter the 14-digit serial number (5-digit prefix, 2-digit language ID and 7-digit boiler number) and confirm with the "Accept" button.

2.4 Remote access

> Settings > Network

The ReFlex controller can be operated directly with a PC/laptop (with Ethernet connection), or remotely via a LAN or the internet (with a router). The user interface is identical with that on the boiler itself.
The network cable must be connected to the "X4 Ethernet" socket on the back of the touchscreen controller. In order to integrate the heating system controller into the network, a free "IP-Address" must be assigned to it. Enter the values of the network in the "Network mask". The "Gateway" is the IP address of the router.

i   Changes to the network settings only take effect after the page has been closed (e.g. with the Back button) and the controller itself is rebooted (shut off power for at least 5 seconds).

If you wish to be able to connect to the controller from outside the LAN (i.e. via internet), you must establish a connection to a router capable of forwarding multiple ports to the controller (so-called "port forwarding", see below).
If the router does not have a fixed IP address (dependent on the internet access/provider), it must be assigned a DNS name with a DNS service.
Depending on the device used to access it, you can choose between "WEB Server" and "VNC Server".

2.4.1 Web server

Remote control with the Java applet only requires a Java-enabled browser. Normally, PCs or laptops are already equipped to do so with no additional programs.
Enter the controller's IP address (direct Ethernet connection) or router's IP address or DNS name in the browser's address bar to call up the "LRS Application Online Settings" page. Select "Fast Transmission" and click on <Ok>; you are then prompted to enter the password ("LRS Operating System Login" – confirm again with <Ok>).
If the controller page does not display after a few seconds, you have entered the password incorrectly.
Available ports: 80, 1954, 1983

2.4.2 VNC server

In this mode, a VNC Viewer/Client is required on the remote station. Since this is a standard process, such programs are available even for smartphones and tablets.
Available ports: 1954, 5900

2.4.3 Email

Messages (information, warning, fault) can be sent to up to three recipients by email. The following settings are required:

- Data of the outgoing email account
  If a DNS name is given for the SMTP server, a "DNS-Server" must be specified on the "Network" page.
- Up to three recipient-email addresses, which can be set to "only errors" or "all messages".

The email's subject line will contain the text "Pellets-Heizung" (Pellet heating system) followed by the boiler serial number
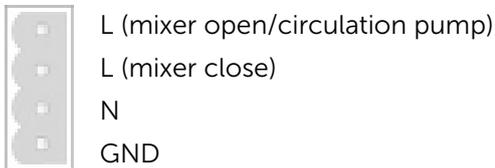
06 Annex

A. Module assignment

		Maximum number
Internal	Main board 524	1
	Internal expansion module 532	1
	Internal expansion module 533	5
External	External expansion module 541	16

PIN CONFIGURATION

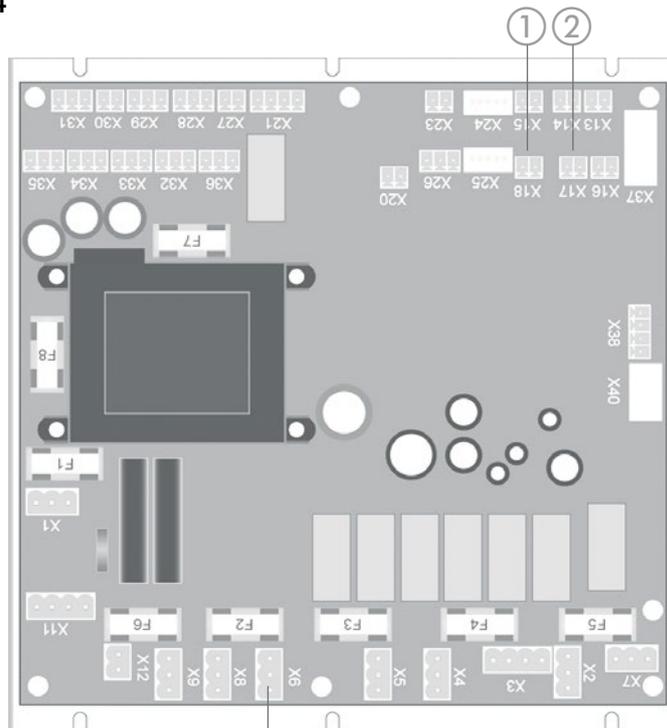230 V AC 3-pole

L
N
GND

Temperature sensor 2-pole

Input
GND

230 V AC mixer 4-pole

L (mixer open/circulation pump)
L (mixer close)
N
GND

Temperature sensor 3-pole

Input
free
GND

Remote room sensor connection "RTF H11" (from 2013)

3
2
1

Plug
Expansion
module
(internal)

Remote
room sensor
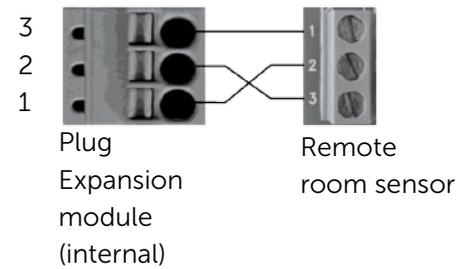
Buffer on motherboard 524

| 1 | X18 | Buffer tank temperature top | 3 | X6 | Buffer pump |
| 2 | X17 | Buffer tank temperature bottom | | | |

Internal expansion module 532
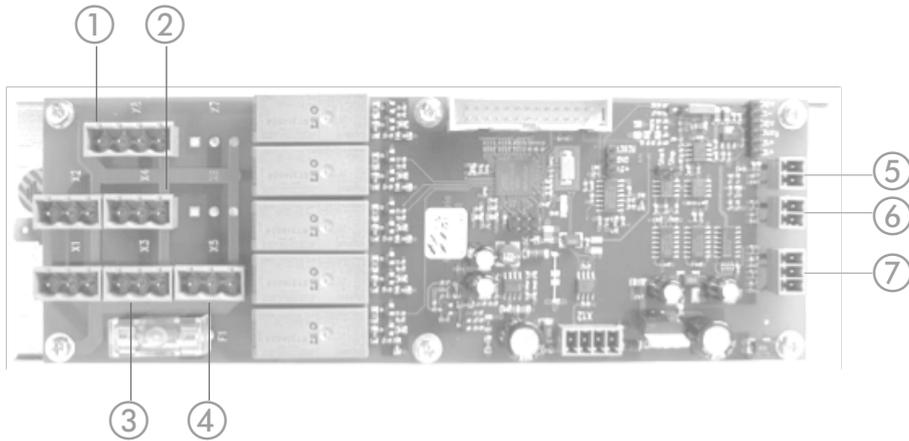
1	X8	Heating circuit mixer	5	X9	Hot water temperature
2	X4	Heating circuit pump	6	X10	Flow temperature
3	X3	Feeding system	7	X11	Room thermostat
4	X5	Hot water pump			

Internal expansion module 533

Heating circuit
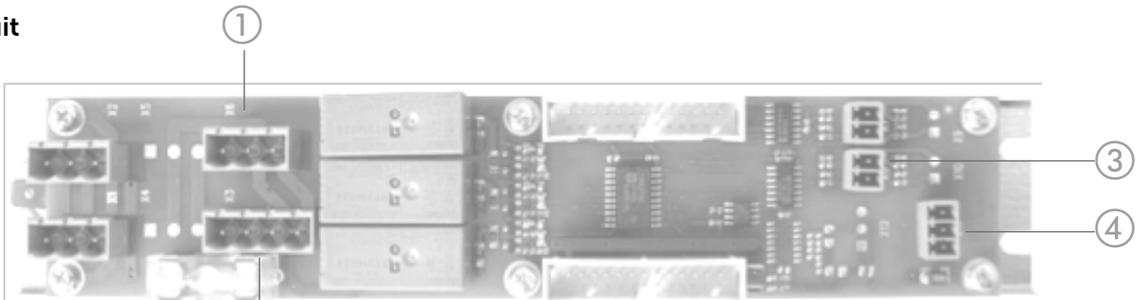
1	X6	Heating circuit pump	3	X8	Flow temperature
2	X3	Heating circuit mixer	4	X11	Room thermostat

Solar
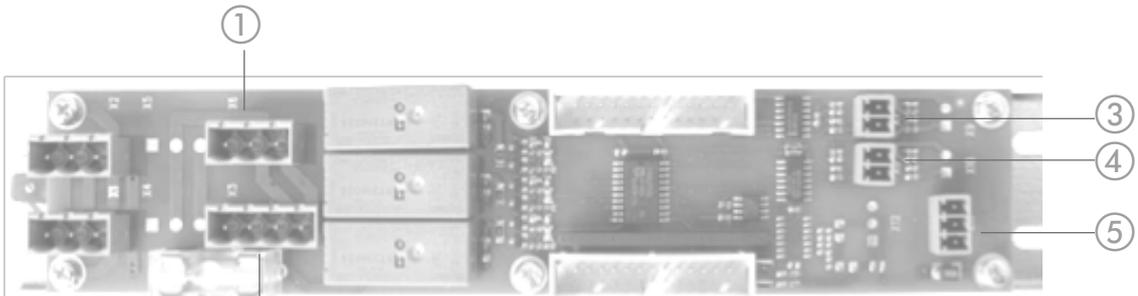
1	X6	Solar pump	3	X7	Collector temperature (Pt 1000)
2	X3	Switching valve	4	X8	Buffer 1 temperature
			5	X11	Buffer 2 temperature

Hot water with circulation
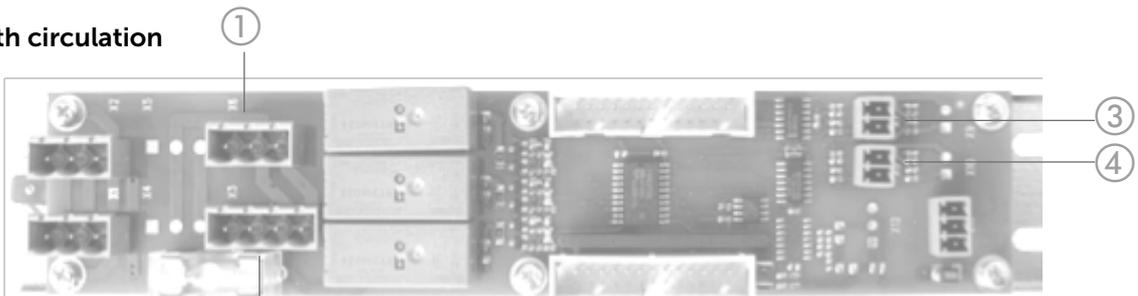
1	X6	Hot water pump	3	X7	Hot water temperature
2	X3	Circulation pump	4	X8	Circulation temperature

External expansion module 541

The CAN-bus wiring should be run using shielded twisted-pair cables (Cat5 or 6 shielded). Please ensure that the shield of the cable is properly earthed to minimise interface along the cable.
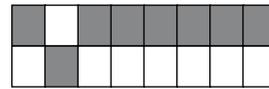
Dip switch:
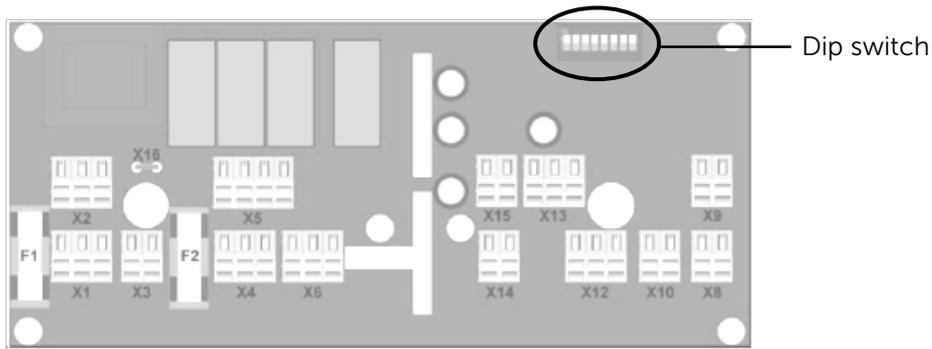
Dip switch

External modules are numbered in progressively increasing order during configuration (1-16). The dip switches must be set accordingly.
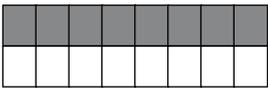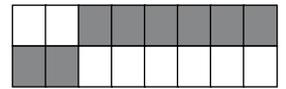

0 - invalid
(Delivery condition)

1

2

3

230 V AC 3-pole
X1 Power supply
X2 Power to next module,
X4, X6

GND
N
L

CAN Bus
X14 Input
X15 Output (if not used:
150Ω termination resistor)

CAN B (High)
CAN A (Low)

230 V AC mixer 4-pole

X5
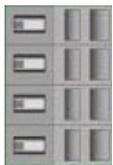
GND
N
L (mixer close)
L (mixer open/
circulation pump)

X12 Remote room sensor
"RTF H11" 3-pole (optional)
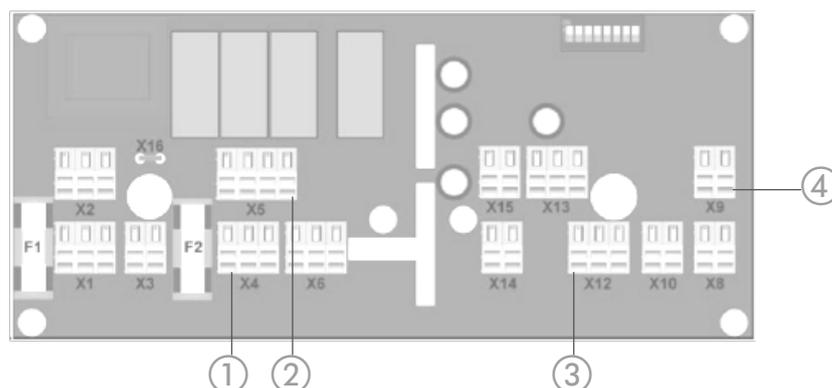

3
2
1
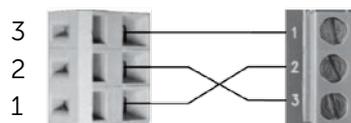
Expansion
module
(external)

Remote
room sensor
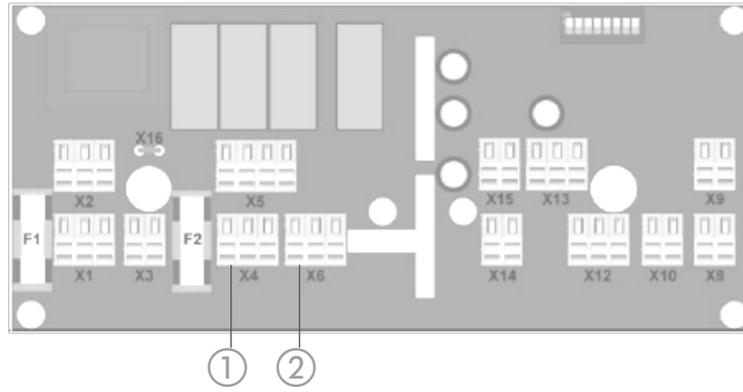
X12 Circulation
temperature

GND
free
Input

Heating circuit

① ②   ③

④

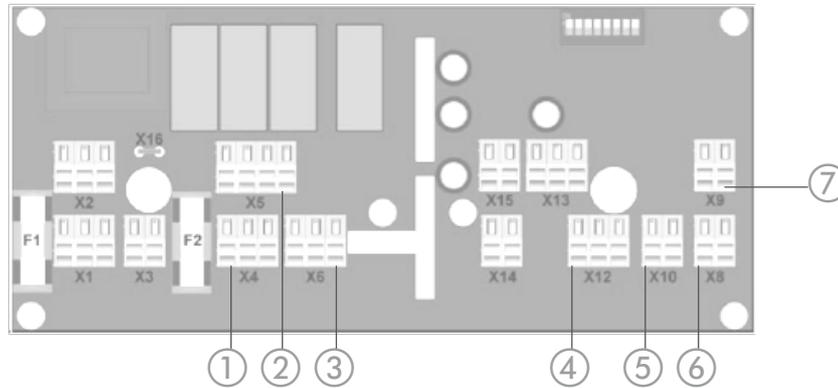1   X4   Heating circuit pump
2   X5   Heating circuit mixer

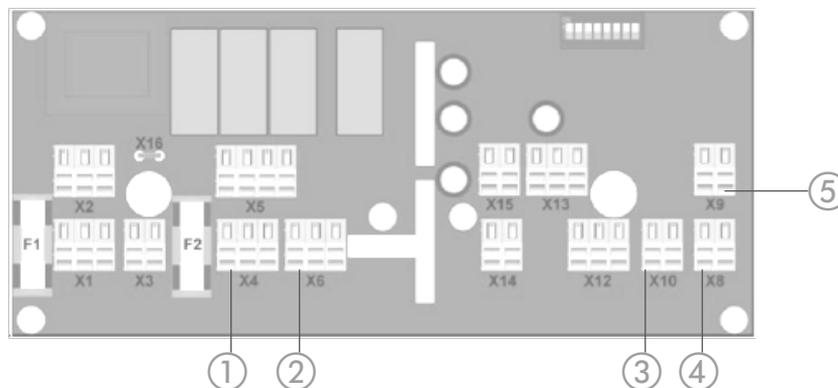3   X12   Room thermostat
4   X9   Flow temperature

Feeding system

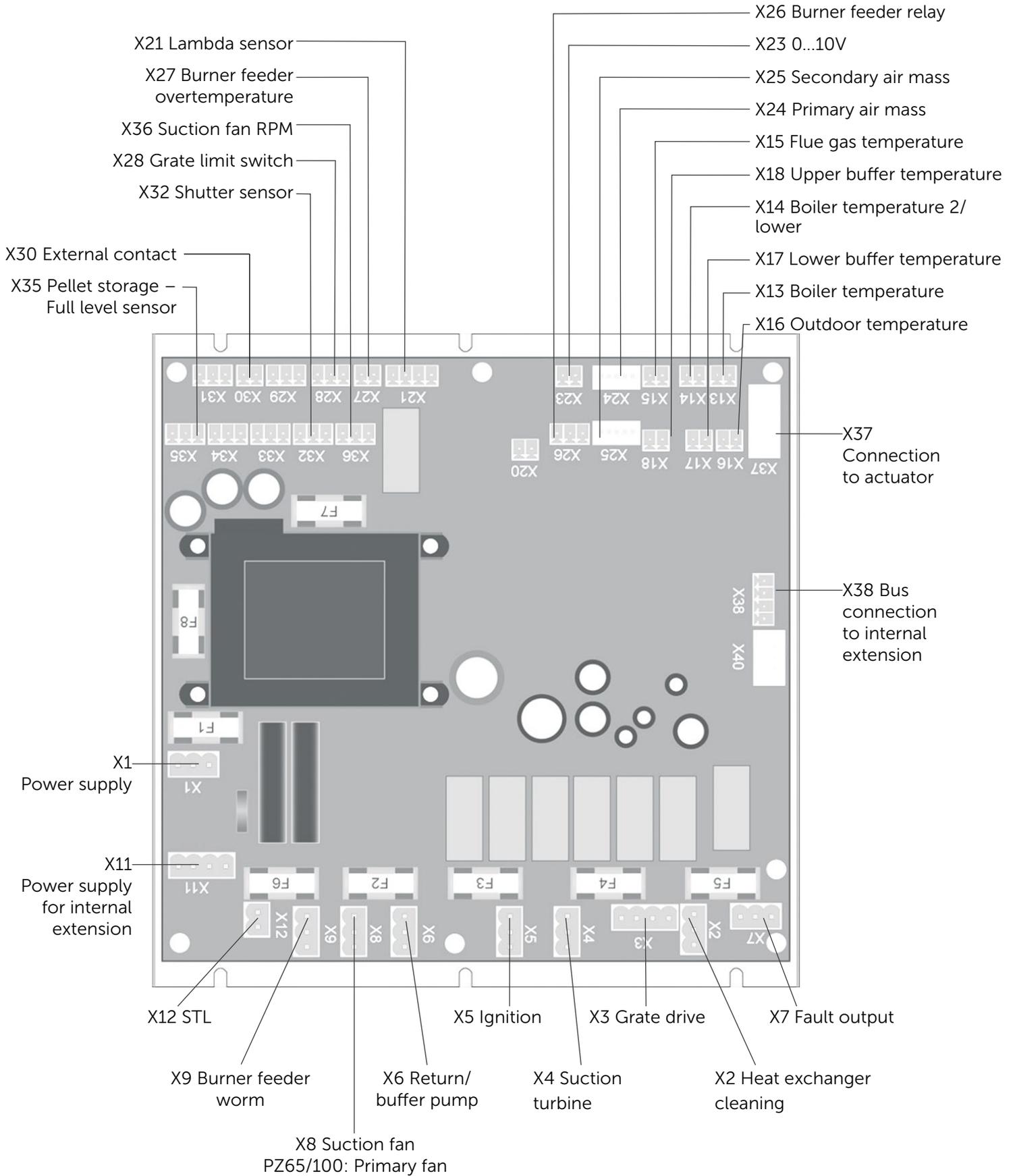|		
1	X4	Feeding system 1
2	X6	Feeding system 2

Buffer & hot water & circulation

1	X4	Buffer pump	4	X12	Circulation temperature
2	X5	Circulation pump	5	X10	Hot water temperature
3	X6	Hot water pump	6	X8	Upper buffer temperature
			7	X9	Lower buffer temperature

Solar

1	X4	Buffer pump	3	X10	Collector temperature
2	X5	Switching valve	4	X8	Buffer 1 – temperature
			5	X9	Buffer 2 – temperature

Main board 524

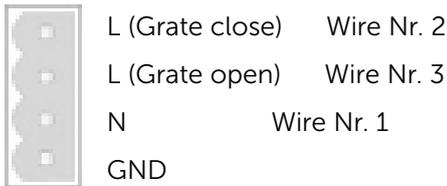X21 Lambda sensor

X27 Burner feeder overtemperature

X36 Suction fan RPM

X28 Grate limit switch

X32 Shutter sensor

X30 External contact

X35 Pellet storage – Full level sensor

X26 Burner feeder relay

X23 0…10V

X25 Secondary air mass

X24 Primary air mass

X15 Flue gas temperature

X18 Upper buffer temperature

X14 Boiler temperature 2/ lower

X17 Lower buffer temperature

X13 Boiler temperature

X16 Outdoor temperature

X37 Connection to actuator

X38 Bus connection to internal extension

X1 Power supply

X11 Power supply for internal extension

X12 STL

X9 Burner feeder worm

X8 Suction fan PZ65/100: Primary fan

X6 Return/ buffer pump

X5 Ignition

X4 Suction turbine

X3 Grate drive

X2 Heat exchanger cleaning

X7 Fault output

Fuses

Designation	Rating [A]	Description
F1	0.25	Transformer main board
F2	5	Suction fan (X8), burner feeder worm (X9)
F3	10	Ignition (X5)
F4	10	Suction turbine (X4)
F5	10	Heat exchanger cleaning (X2), grate unit (X3)
F6	10	Return pump (X6)
F7	2.5	Lambda sensor heating
F8	2.5	24V power unit

Pin configuration
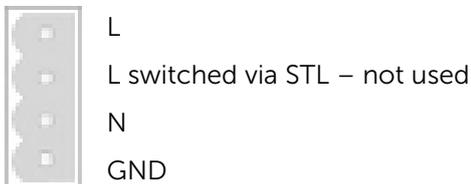
230 V AC 3-pole
X1, X2, X4, X5, X6, X8, X9, X10
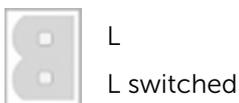
L
N
GND

230 V AC 4-pole
X3 Grate drive

L (Grate close)	Wire Nr. 2
L (Grate open)	Wire Nr. 3
N	Wire Nr. 1
GND	

No-voltage 3-pole
X7 Fault output

normally closed
Root
normally open
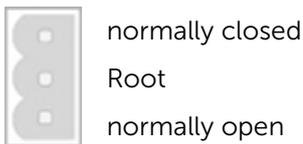
230VAC 4-pole
X11 Power supply for internal extension modules

L
L switched via STL – not used
N
GND

230 V AC 2-pole
X12 STL

L
L switched

Temperature sensor/analogue input 2-pole
X13 – X18, X23

Input
GND

Lambda sensor 4-pole
X21

Input positive
Input negative
Sensor heating
Sensor heating
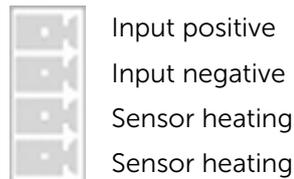
Analogue output 3-pole
X26

24 V
Analogue output
Analogue GND
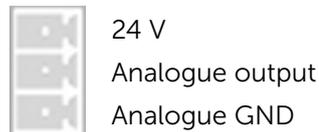
Burner feeder overtemperature/external contact
X27, X30

24 V
Input

Digital input 3-pole
X28, X32, X35, X36

24V	brown
Input	black
GND	blue

CAN Bus 4-pole
X38

24 V
CAN A
CAN B
GND
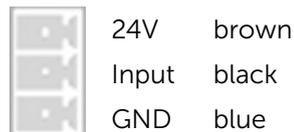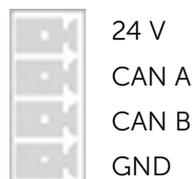
B. Frost protection

Each component has its own frost protection process.

Buffer	If the buffer is off (power manager Off or mode Off), charging is started when indicated by the activation/deactivation temperature, regardless of the time settings.
Hot water	If the hot water tank is off (power manager Off or mode Off), charging is started when indicated by the activation/deactivation temperature, regardless of the time settings.
Heating circuit	If the heating circuit is off (power manager Off or mode Off), the heating circuit is run in reduced mode.

C. Seizing protection

If the pumps have not been run for a week, they are turned on for a minute. The mixer drives are opened and closed again for double the mixer run time (before the heating circuit pump is turned on).

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07   Regular maintenance

In order to keep the system in good working efficiency and order, the boiler must be cleaned at regular intervals.

7.1 Empty out the ash compartment / clean the combustion chamber

Depending on the quality of the pellets, the ash compartment and combustion chamber must be emptied out and cleaned every 6 – 18 weeks. These are located behind the left housing hatch and are closed with the ash compartment / combustion chamber doors (secured with a spoked handle / wingnut respectively).

• **Procedure**

   CAUTION: Never attempt to handle hot ash or glowing embers!

Press the ON/OFF switch to turn the heating off.

CAUTION:

We recommend leaving the system 2 - 3 hours to cool down after switching it off

    Please note that damage caused by failure to observe the maintenance instructions is not covered by the warranty/guarantee.

- Open the lower cleaning hatch.
- Extract the ash container and empty it out.
- Open the upper cleaning hatch and place the ash container beneath it.

- Remove any fly ash which has accumulated on the combustion chamber bulkhead (a scraper for this purpose can be obtained from Biotech or your dealer).
- Use a vacuum cleaner to remove any residual ash so that the combustion chamber is completely clean.
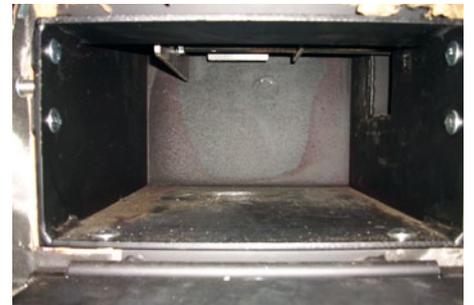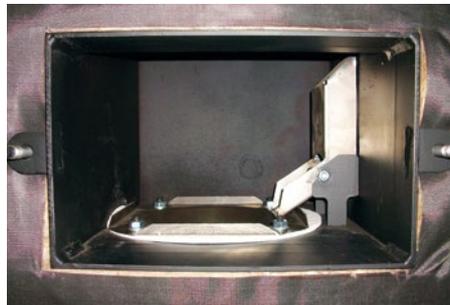
- Use a suitable vacuum cleaner to clean any residual ash out of the ash compartment as well.

- Place the ash container back in its compartment.

- Close the cleaning hatches.

- Press the "Empty ash" button in the "Maintenance" menu to confirm that the system has been cleaned.

- The removed ash can be used as compost or disposed of with biological waste.

- Start the system up again.

⚠️ **This job can also be done by our customer service technician during the yearly overhaul!**

Natural, sustainable heating

with Biotech pellet and chipping heating systems.

Biotech

PELLETS- UND HACKGUTHEIZUNGEN