

## Service manual

# Lambdatronic H 3200 for wood chip boiler

Core module version 50.04 - Build 05.20 | Touch control version 60.01 - Build 01.38



Translation of the original German installation instructions for technicians

Read and follow the instructions and safety information!

Technical changes, typographical errors and omissions reserved!

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## 1 General

### 1.1 About these instructions

Please read and follow the operating instructions, in particular the safety information contained therein. Keep them available next to the boiler.

These operating instructions include important information about operation, electrical connection and troubleshooting. The parameters shown depend on the set boiler type and the system configuration!

The constant further development of our products means that there may be minor differences from the pictures and content. If you discover any errors, please let us know: [doku@froeling.com](mailto:doku@froeling.com).

### 1.2 Safety information

#### DANGER

When working on electrical components:

*Risk of electrocution!*

When work is carried out on electrical components:

- Always have work carried out by a qualified electrician
- Observe the applicable standards and regulations
- ➔ Work must not be carried out on electrical components by unauthorised persons



#### WARNING

When touching hot surfaces:

*Severe burns are possible on hot surfaces and the flue gas pipe!*

When work is carried out on the boiler:

- Shut down the boiler according to procedure ("Boiler off" operating status) and allow it to cool down
- Protective gloves must usually be worn for work on the boiler, and it should only be operated using the handles provided
- Insulate the flue gas pipes and do not touch them during operation



The information on safety, standards and guidelines in the assembly and operating instructions for the boiler should also be observed!



Connection / Name		Note	
KM-05	COM 1	Null modem cable 9-pin SUB-D; Service interface for software update and connection to visualisation software	
KM-06	Broadband probe	Connection cable <sup>1)</sup> 5 x 0.75 mm <sup>2</sup> Connection of a Bosch (item number 69001A) or NTK (item number 69003) broadband Lambda probe	
KM-07	Primary air	T4 90-150 TX TI	Connection cable <sup>1)</sup> 5 x 0.75 mm <sup>2</sup>
KM-08	Air flap	T4 24-75 T4e 20-250	Connection cable <sup>1)</sup> 5 x 0.75mm <sup>2</sup> ; Combined air damper for primary and secondary air
	Secondary air	T4 90-150 TX TI	Connection cable <sup>1)</sup> 5 x 0.75 mm <sup>2</sup> ;
	FGR flap	T4e	
KM-09	Lock		Connection cable <sup>1)</sup> 2 x 0.75 mm <sup>2</sup>
KM-10	High-limit thermostat		
KM-11	EMERGENCY STOP		Caution! Do not connect the emergency stop/shutdown switch to the boiler power supply line. The switch must be a N/C switch and it must be linked to the 24V safety chain of the STL at this terminal.
KM-12	Flowmeter		Connection cable <sup>1)</sup> 2 x 0.75 mm <sup>2</sup>
KM-13	Lambda probe		Connection cable <sup>1)</sup> 4 x 0.75 mm <sup>2</sup> Connection of a Bosch switching-type sensor (type LSM11) or NTK switching-type sensor (type OZA685, item number: 69400)
KM-14	Boiler release		Connection cable <sup>1)</sup> 2 x 0.75 mm <sup>2</sup> Caution! The connection must be a floating connection. ⇒ See "Boiler enable contact" [page 11]
KM-15	Flue gas temperature sensor		Only use connection cable of the component
KM-16	Door switch for ash box		Connection cable <sup>1)</sup> 2 x 0.75 mm <sup>2</sup>
KM-17	Sensor 2	T4 T4e TI TX	Connection cable <sup>1)</sup> 2 x 0.75 mm <sup>2</sup>
	Stoker sensor	PT4e	
KM-18	Sensor 1	T4 T4e 20 – 60 TI TX	Connection cable <sup>1)</sup> 2 x 0.75 mm <sup>2</sup> , sensor 1 in the STL housing
	Boiler sensor 2	T4e 80 - 350	
KM-19	Outside temperature sensor		Connection cable <sup>1)</sup> 2 x 0.75 mm <sup>2</sup> , shielded from 25 m cable length
KM-20	Room temperature sensor heating circuit 2		
KM-21	Room temperature sensor heating circuit 1		
KM-22	Flow temperature sensor heating circuit 2		
KM-23	Flow temperature sensor heating circuit 1		

Connection / Name		Note
KM-24	Return feed sensor	Connection cable <sup>1)</sup> 2 x 0.75 mm <sup>2</sup>
KM-25	Boiler sensor	
KM-26	PDM / 0-10V pump 1	
KM-27	Induced draught fan	Connection cable <sup>1)</sup> 3 x 1.5 mm <sup>2</sup> for power supply, Connection cable <sup>1)</sup> 3 x 0.75 mm <sup>2</sup> for analysis of current speed
KM-28	Pump 1	Connection cable <sup>1)</sup> 3 x 1.5 mm <sup>2</sup> , max. 1.5A / 280W / 230V
KM-29	Mains connection	Connection cable <sup>1)</sup> 3 x 1.5 mm <sup>2</sup> , fuse provided by customer: C16A
KM-30	Mixing valve heating circuit 2	Connection cable <sup>1)</sup> 4 x 0.75 mm <sup>2</sup> , max. 0.15A / 230V
KM-31	Mixing valve heating circuit 1	
KM-32	Heating circuit pump 2	Connection cable <sup>1)</sup> 3 x 1.5 mm <sup>2</sup> , max. 2.5A
KM-33	Heating circuit pump 1	
KM-34	Heating circuit pump 0 or burner relay	Connection cable <sup>1)</sup> 3 x 1.5 mm <sup>2</sup> , max. 2A
KM-35	Operating signal	Connection cable <sup>1)</sup> 2 x 0.75 mm <sup>2</sup> ⇒ See "Operating signal" [page 14]
KM-36	Optional module	

1. YMM as per ÖVE-K41-5 or H05VV-F as per DIN VDE 0881-5

### Fuses

F2	6.3 AT	Pump 1, induced draught fan
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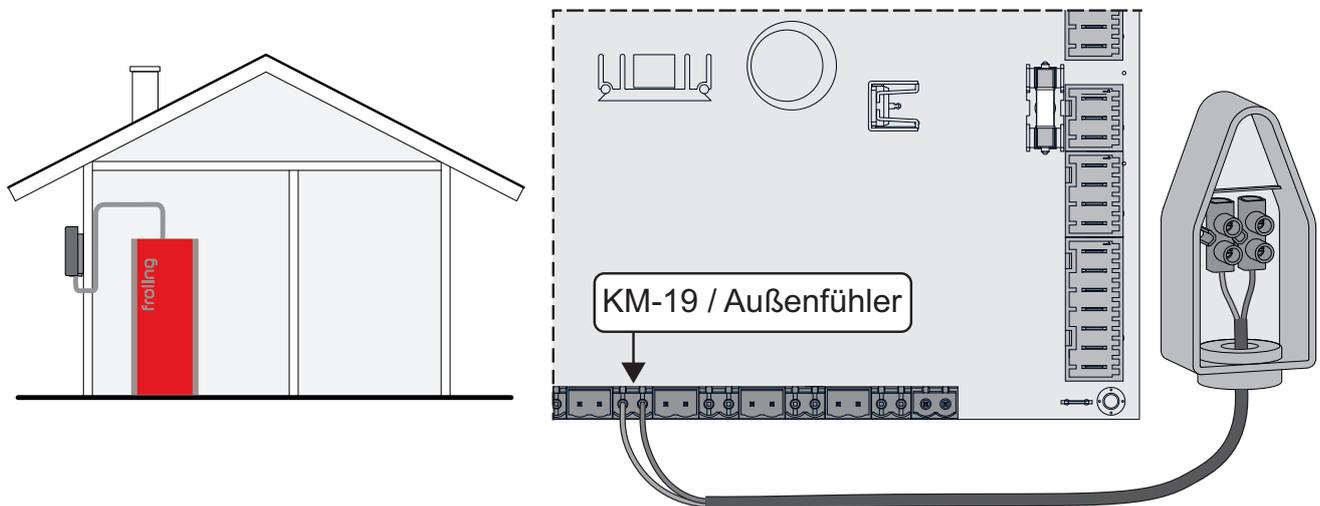
### 2.1.2 Mains connection

Connect the power supply at the "mains connection" plug

- Flexible sheathed cable must be used for the wiring; this must be of the correct size to comply with applicable regional standards and regulations.

#### 2.1.3 Connecting the outside temperature sensor

The outside temperature sensor is included with the materials supplied for the boiler and is usually mounted on an outer wall that is not directly exposed to the sun. It continuously measures the ambient temperature and forms part of the weather-compensated heating circuit control.

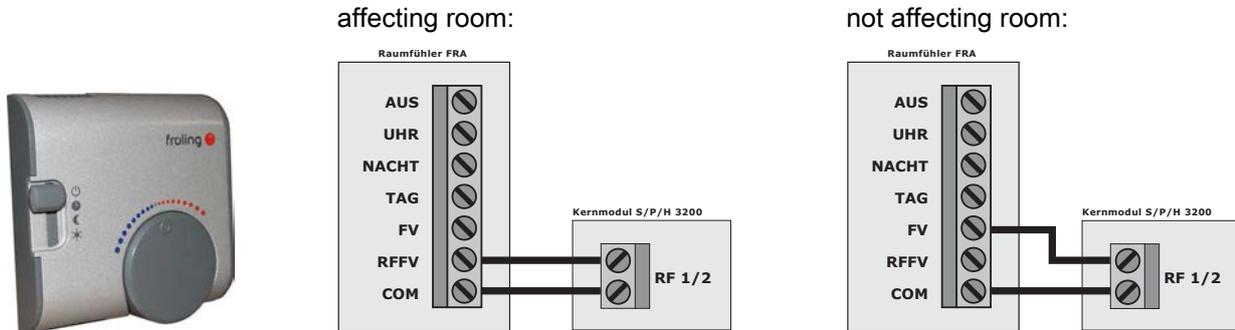


In the delivered state, the outside temperature sensor is read in by the core module ("KM-19 / outside temperature sensor" connection). Alternatively, the outside temperature sensor can be connected to an additional heating circuit module.

⇒ See "Heating circuit module" [page 15]

## 2.1.4 FRA room temperature sensor

In addition to recording the current room temperature, the Froling FRA room temperature sensor also has a handwheel to adjust the required room temperature and a slide switch to set the mode for the heating circuit.



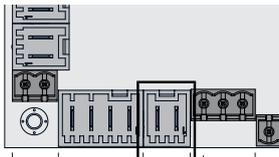
Possible positions of the mode switch:

	<b>Boiler off</b>	Heating circuit deactivated, only frost protection!
	<b>Automatic mode</b>	Heating and setback phases according to the set times
	<b>Setback mode</b>	Ignores the heating phases and continuously controls the room temperature to the temperature set in setback mode
	<b>Party switch</b>	Ignores the setback phases and continuously controls the room temperature to the temperature set in heating mode
Handwheel...	Allows you to adjust the temperature by +/- 3°C	

**IMPORTANT!** Refer to the supplied assembly instructions for more detailed explanations on connecting and operating the FRA room temperature sensor.

### 2.1.5 Boiler enable contact

When commissioning the boiler using the settings wizard, the boiler release contact function (“How is the boiler release contact on the core module being used?”) is called up to enable the optional analysis of an external floating release or start contact. The following functions are possible depending on the setting and electrical connection:

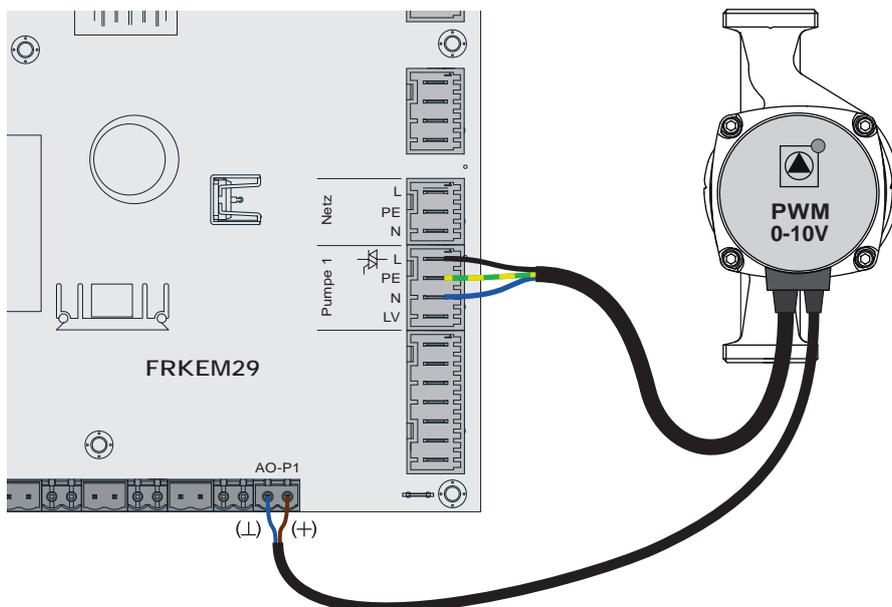
Connection position	Setting	Description
 KM-12 (Durchflussmesser) KM-13 (Lambdasonde) KM-14 (Kesselfreigabe) KM-15 (Abgasfühler) KM-16 (Türkontaktshalter)	not in use	No effect on boiler operation (contact must not be clamped/ bridged).
	Release/disable boiler	As long as the boiler release contact is closed, the boiler controller operates according to the specified parameters (mode, time window, etc.). If the boiler release contact is opened, the boiler is no longer released and follows the shutdown procedure. As long as the boiler release contact is open, heating requirements are ignored. (e.g. flue gas thermostat of a supply boiler, house distribution box).
	Extra heating	As long as the boiler release contact is open, the boiler controller operates according to the specified parameters. If the boiler release contact is closed, the boiler starts in continuous load operation (e.g. heat requirements of a heating fan).

### 2.1.6 Connecting a circulating pump to the core module

Different types of wiring must be implemented depending on the type of pump:

#### High efficiency pump with control line (PWM / 0-10V)

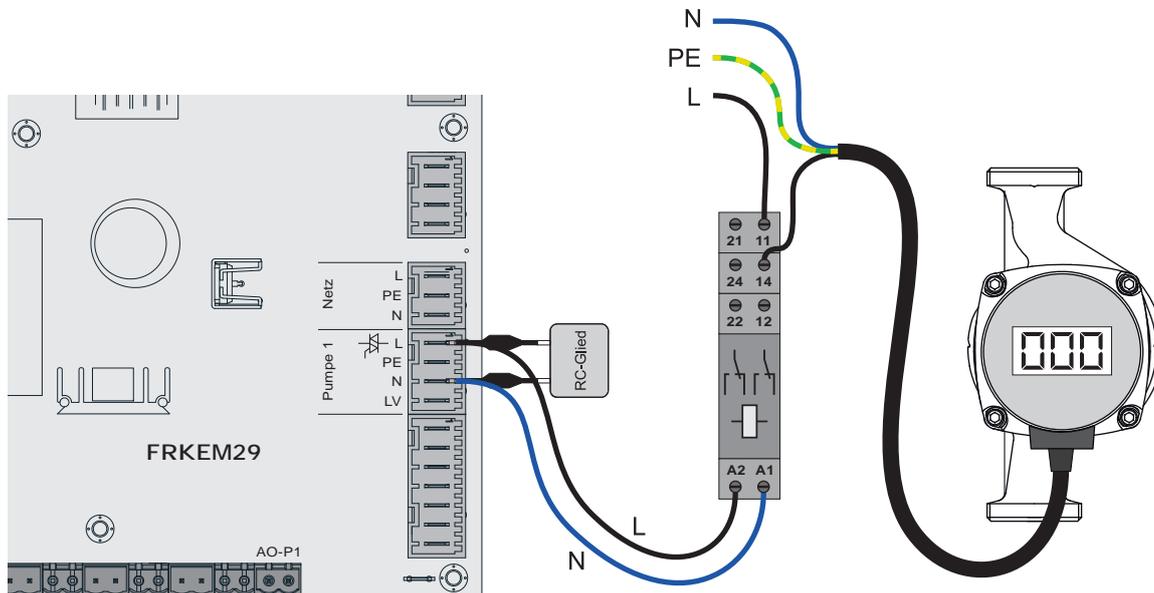
On high efficiency pumps with an additional wired control line, the speed control is implemented via the additional connection for the PWM or 0-10V signal.



- Connect the power supply for the high efficiency pump to output “Pump 1” of the core module
- Connect the PWM cable of the high efficiency pump to the corresponding “PWM / 0-10V” port
  - Make sure that the cables are configured correctly (polarity) in accordance with the connection diagram of the pump!
- Set control of the pump in the relevant menu to “Field pump / PWM” or “Field pump / 0-10V”

**High efficiency pump without control signal**

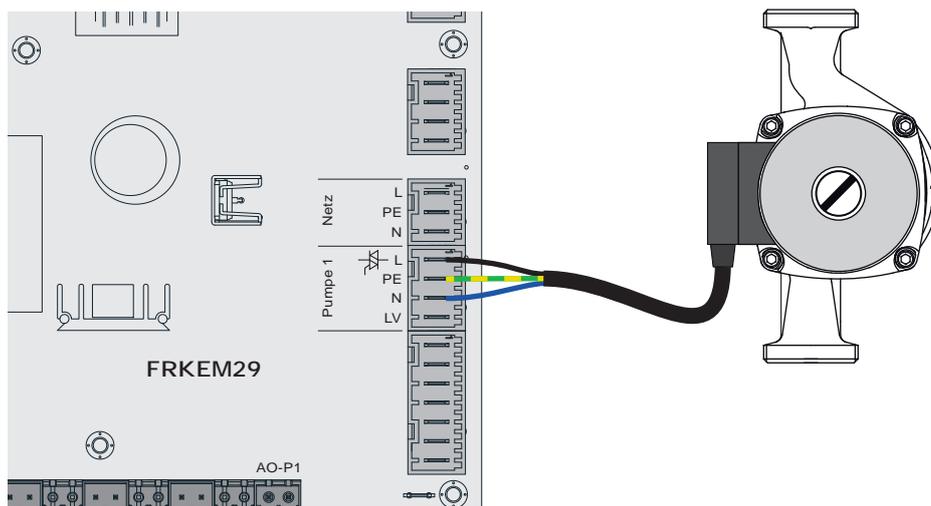
It is not possible to control the speed when using this type of pump. The use of a line regulating valve (e.g.: Setter balancing valve) is recommended.



- Connect pump with relay and RC element isolated from the output
- In the relevant menu, set the pump control to "HE pump without control signal"

**AC pump without control signal (pulse package control)**

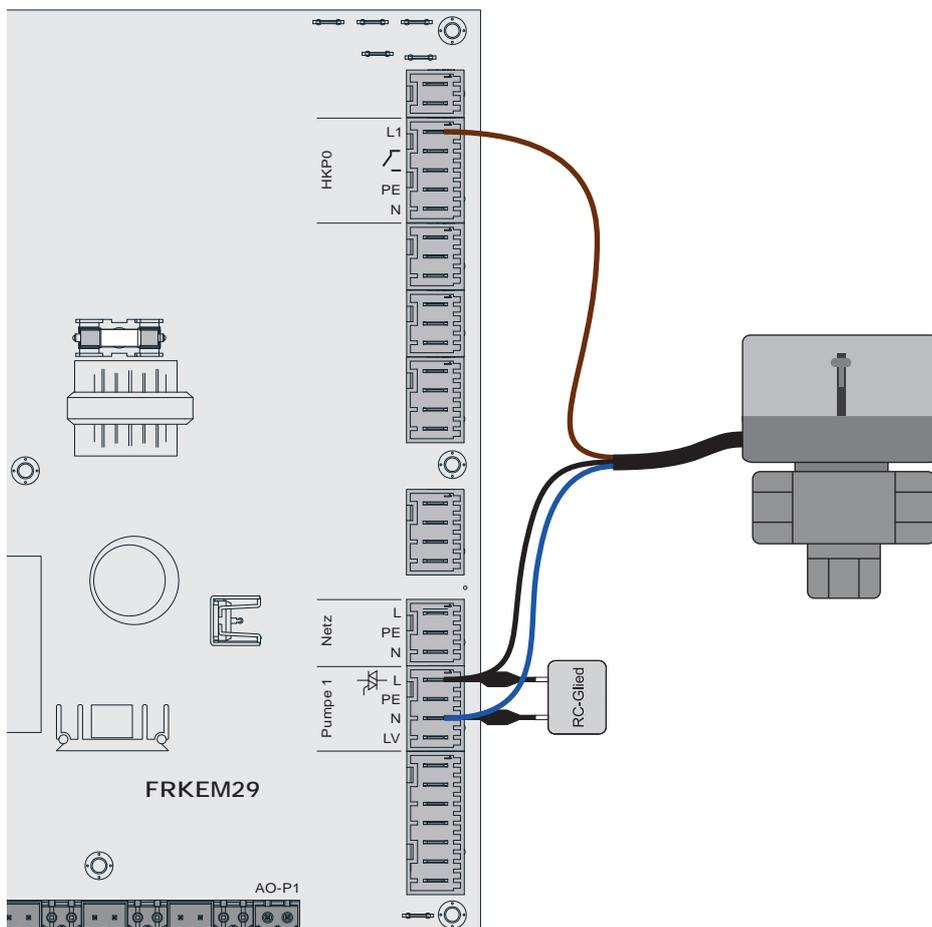
On older pumps without a control signal that are not highly efficient, the speed control is implemented via a pulse package control. Please note that the minimum speed may need to be adjusted on some pumps (default setting: 30%).



- Connect pump to output "Pump 1" of the core module
- In the relevant menu, set the pump control to "Pump without control signal"

### 2.1.7 Connecting an isolating valve to the core module

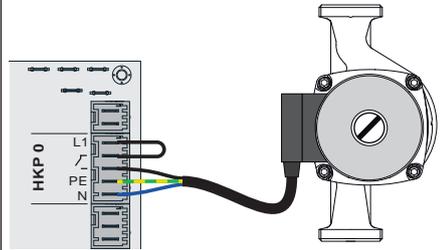
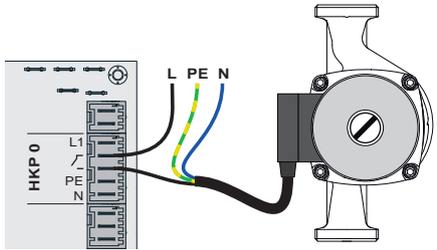
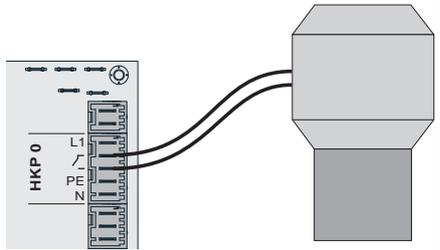
If an isolating valve is connected to the speed-controlled pump outlet, an RC element must be used.



- Phase (L) for switching the valve and connecting neutral conductor (N) to output “Pump 1” with the RC element
- Phase (L) for continuous supply (switches the valve back to the initial position) at output “HCP0” – connect terminal “L1”

### 2.1.8 Heating circuit pump 0 / burner relay

Depending on the system setting, the connection "Heating circuit pump 0" can be used for heating circuit pump 0 or as a burner relay. The following connection instructions must be observed:

Heating circuit pump 0	Heating circuit pump 0	Burner relay
		
<p>The pump can be supplied with up to a max. 2 Ampere directly via the output. During this process, phase (L1) of the output is connected to the switch contact.</p>	<p>The pump must be supplied externally with 2 Ampere. Up to max. 5 Ampere, the floating contact can be used to switch the phase. At above 5 Ampere, the pump must be isolated with a relay.</p>	<p>Wire the floating output contact as an enabling signal to control the standby boiler.</p>

### 2.1.9 Operating signal

On the core module (connection position KM-35), it is possible to issue a floating operating signal. The status is displayed under the "Standby relay" output in the "Manual" -> "Digital outputs" menu.

Operating status	Relay status
Boiler off, standby, fault	0
All other operating statuses (e.g. preparation, heating up, pre-heating, ignition, heating, slumber, cleaning, shutdown wait 1, shutdown wait 2, etc.)	1

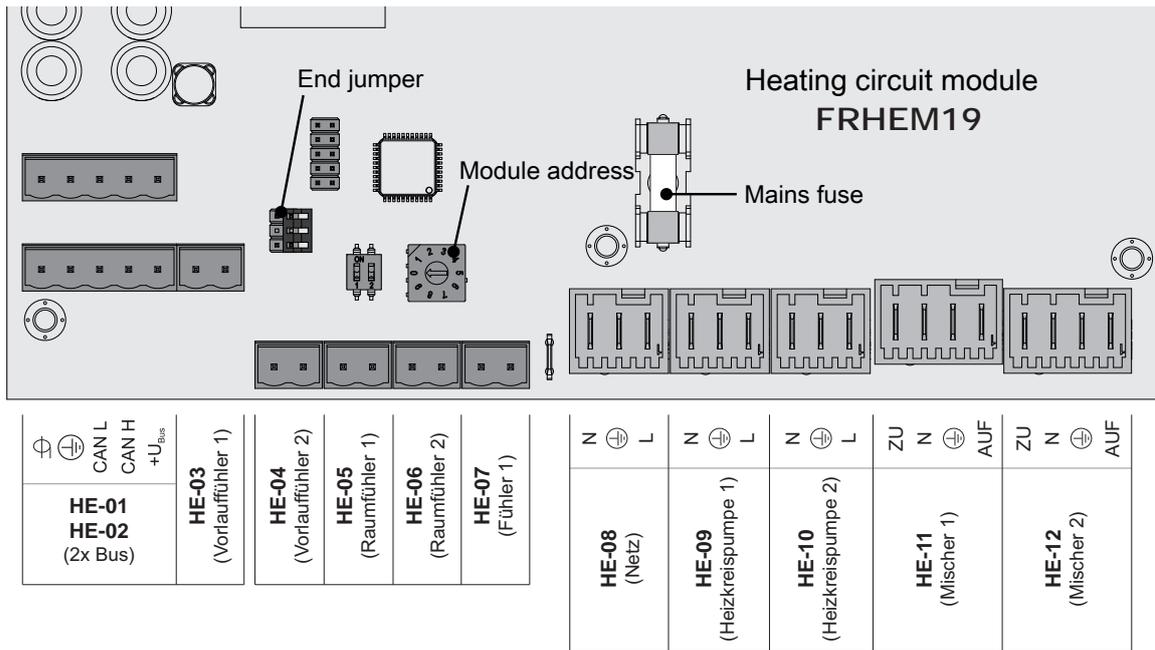
## 2.2 Expansion modules

### 2.2.1 Heating circuit module

Two heating circuits can be controlled as standard with the core module.

To add further heating circuits, the heating circuit module boards must be expanded. Expansion can include up to eight heating circuit modules (address 0 to 7). A total of up to 18 heating circuits can be controlled. It is important to ensure that the module address is set correctly.

⇒ See "Setting the module address" [page 36]



Connection / Name		Note
HE-01	BUS	Connection with cable – LIYCY paired 2x2x0.5; ⇒ See "Connecting the bus cable" [page 35] Caution! CAN L and CAN H must not be connected to +U <sub>BUS</sub> !
HE-02	BUS	
HE-03	Flow temperature sensor 1	Connection cable <sup>1)</sup> 2 x 0.75 mm <sup>2</sup> ;
HE-04	Flow temperature sensor 2	
HE-05	Room temperature sensor 1	Connection cable <sup>1)</sup> 2 x 0.75 mm <sup>2</sup> ; shielded from 25 m cable length
HE-06	Room temperature sensor 2	
HE-07	Sensor 1	Connection cable <sup>1)</sup> 2 x 0.75 mm <sup>2</sup> ; Connection of the outside temperature sensor if this is not to be connected to the core module. The address of the heating circuit module to which the outside temperature sensor is connected must be set in the "Heating – General settings" menu.
HE-08	Mains	Connection cable <sup>1)</sup> 3 x 1.5 mm <sup>2</sup> , fuse 10A
HE-09	Heating circuit pump 1	Connection cable <sup>1)</sup> 3 x 1.5 mm <sup>2</sup> , max. 2.5A / 230V / 500W
HE-10	Heating circuit pump 2	
HE-11	Mixing valve 1	Connection cable <sup>1)</sup> 4 x 0.75 mm <sup>2</sup> , max. 0.15A / 230V
HE-12	Mixing valve 2	

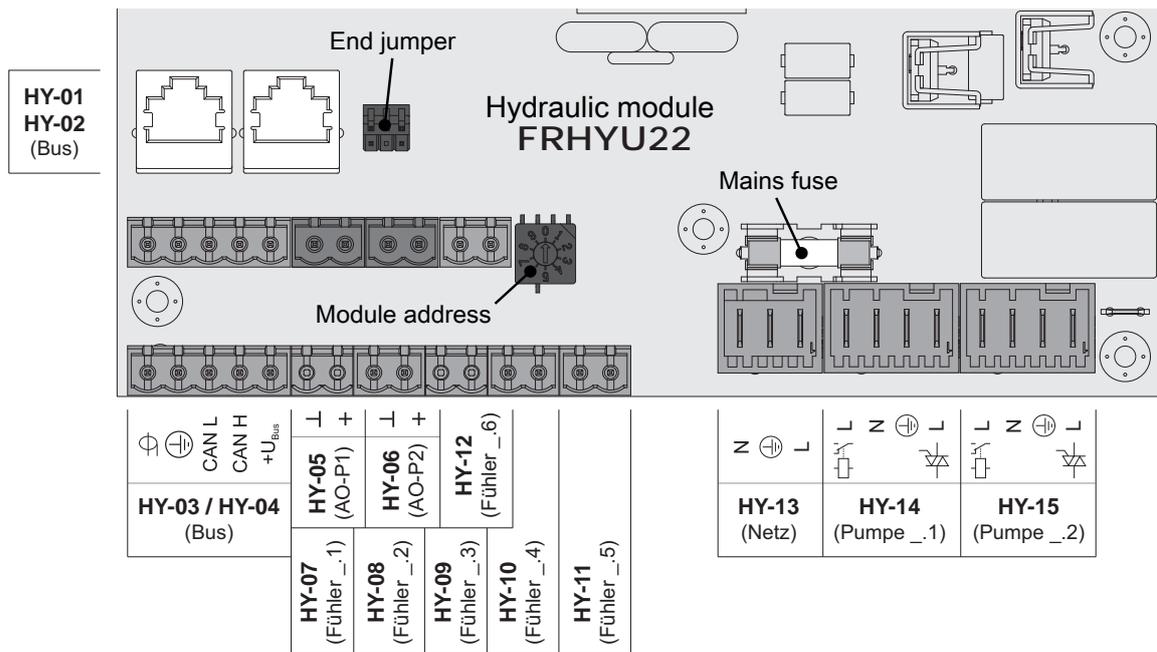
1. YMM as per ÖVE-K41-5 or H05VV-F as per DIN VDE 0881-5



Connection / Name		Note
HY-14	Pump _1	Connection cable <sup>1)</sup> 3 x 1.5 mm <sup>2</sup> , max. 1.5A / 230V / 280W
HY-15	Pump _2	Pump outlets on board. The correct pump designation is determined by the set module address (0-7). Example: module address "2" = pump 2.1 and pump 2.2

1. YMM as per ÖVE-K41-5 or H05VV-F as per DIN VDE 0881-5

**Hydraulic module starting with version FRHYU22**



Connection / Name		Note
HY-01	BUS	Patch cable CAT 5 RJ45 SFTP 1:1 configuration;
HY-02	BUS	
HY-03	BUS	
HY-04	BUS	
HY-05	AO-P1	Connection cable <sup>1)</sup> 2 x 0.75 mm <sup>2</sup>
HY-06	AO-P2	Connection of control signal for relevant pump
HY-07 : : HY-12	Sensor _1 : : Sensor _6	Connection cable <sup>1)</sup> 2 x 0.75 mm <sup>2</sup> , shielded from 25 m cable length Sensor inputs on the board. The correct sensor designation is determined by the set module address (0-7). Example: Module address "2" = sensor 2.1 to sensor 2.6
HY-13	Mains	Connection cable <sup>1)</sup> 3 x 1.5 mm <sup>2</sup> , fuse 10A
HY-14	Pump _1	Connection cable <sup>1)</sup> 3 x 1.5 mm <sup>2</sup> , max. 1.5A / 230V / 280W
HY-15	Pump _2	Pump outlets on board. The correct pump designation is determined by the set module address (0-7). Example: module address "2" = pump 2.1 and pump 2.2 Depending on the type of pump, the phase (L) is either connected to the relay output or triac output. ⇒ See "Connecting a circulating pump to the hydraulic module" [page 18]

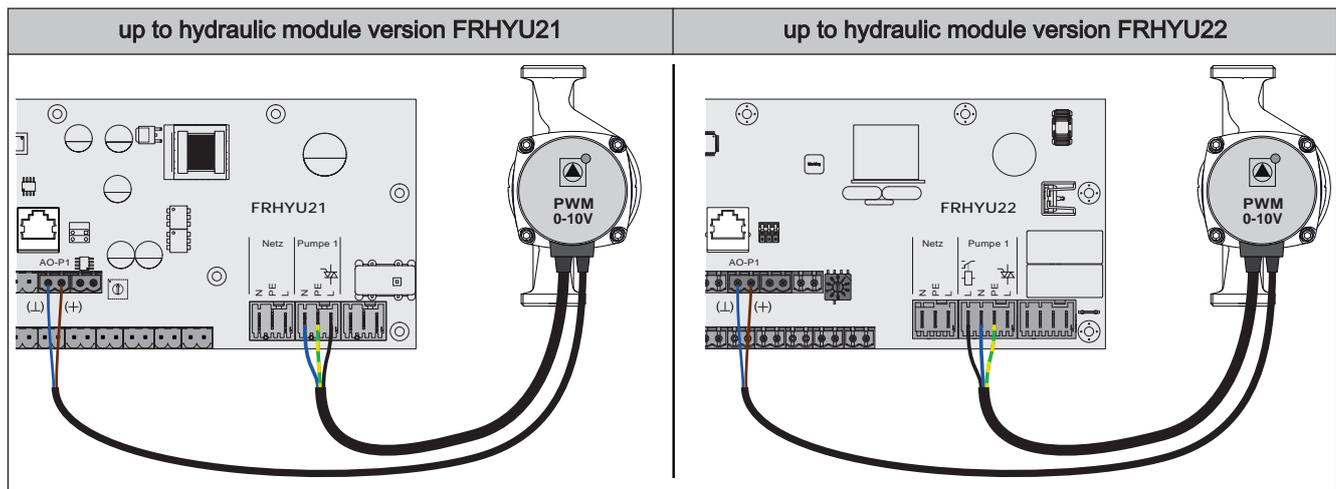
1. YMM as per ÖVE-K41-5 or H05VV-F as per DIN VDE 0881-5

### Connecting a circulating pump to the hydraulic module

**CAUTION!** As of module version FRHYU22, one relay output is available at each of the pump outlets in addition to the triac output. Observe the following connection diagrams to correctly implement the wiring of the circulating pump.

#### High efficiency pump with control line (PDM / 0-10V)

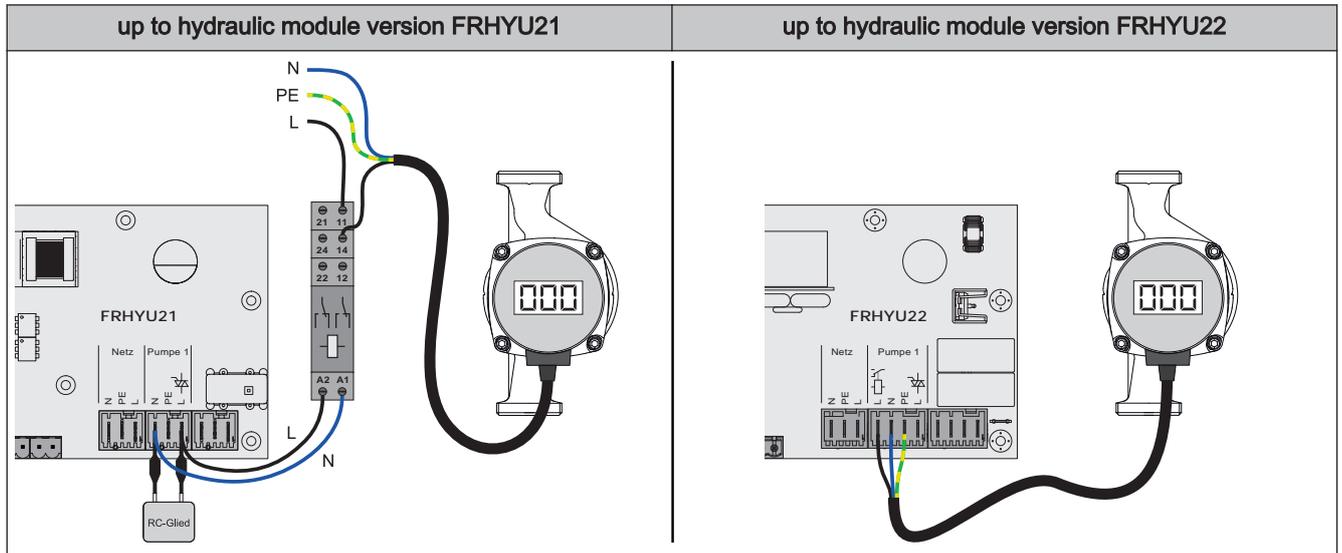
On high efficiency pumps with an additional wired control line, the speed control is implemented via the additional connection for the PDM or 0-10V signal.



- Hydraulic module FRHYU21:** Connect the power supply for the high efficiency pump to output "Pump 1" or "Pump 2"
- Hydraulic module FRHYU22:** Connect the power supply for the high efficiency pump to output "Pump 1" or "Pump 2" and use the relay output for phase (L)
- Connect the PDM cable of the high efficiency pump to the corresponding port "AO-P1" or "AO-P2"
  - Make sure that the cables are configured correctly (polarity) in accordance with the connection diagram of the pump!
- Set control of the pump in the relevant menu to "Field pump / PDM" or "Field pump / 0-10V"

### High efficiency pump without control signal

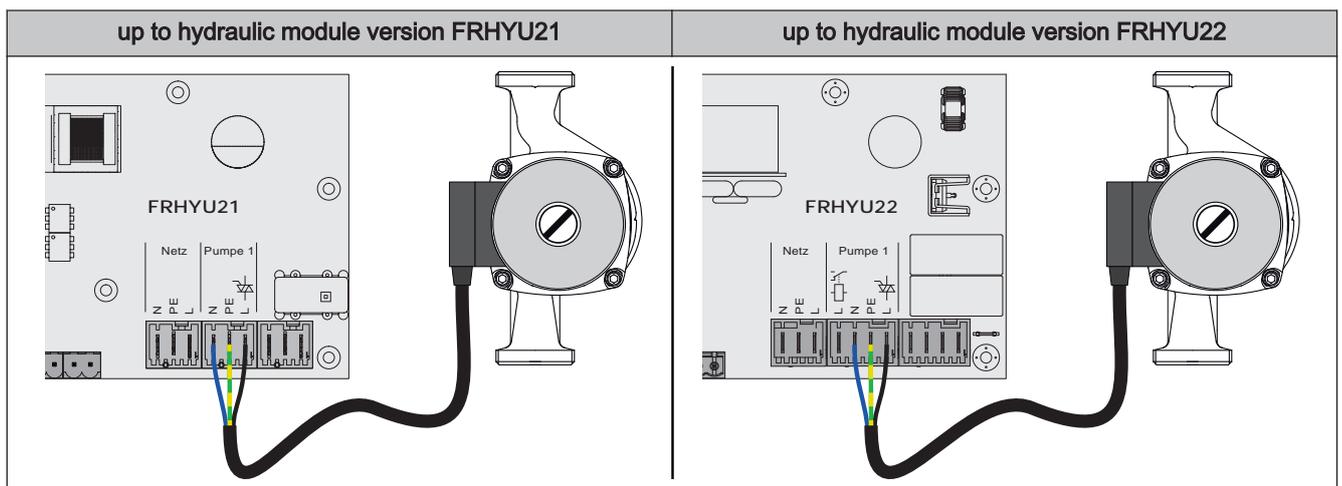
It is possible to control the speed when using this type of pump. The use of a line regulating valve (e.g.: Setter balancing valve) is recommended.



- Hydraulic module FRHYU21:** Connect pump with relay and RC element isolated from the output
- Hydraulic module FRHYU22:** Connect the power supply for the high efficiency pump to output "Pump 1" or "Pump 2" and use the relay output for phase (L)
- In the relevant menu, set the pump to "HE pump without control signal"

### AC pump without control signal (pulse package control)

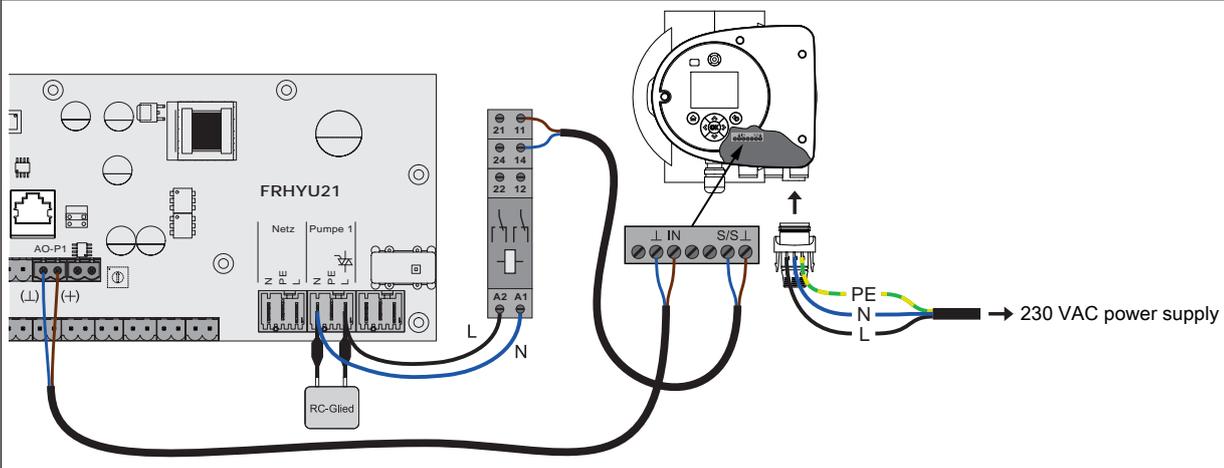
On older pumps without a control signal that are not highly efficient, the speed control is implemented via a pulse package control. Please note that the minimum speed may need to be adjusted on some pumps (default setting: 30%).



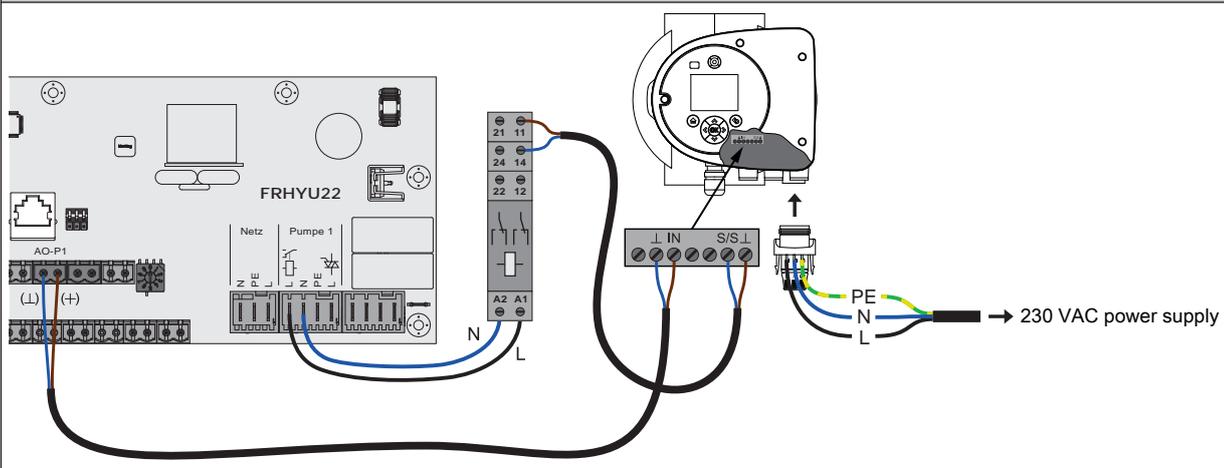
- Hydraulic module FRHYU21:** Connect the power supply for the pump to output "Pump 1" or "Pump 2"
- Hydraulic module FRHYU22:** Connect the power supply for the pump to output "Pump 1" or "Pump 2" and use the triac output for phase (L)
- In the relevant menu, set the pump to "Pump without control signal"

**High efficiency pump with control signal and release contact**

When using a high efficiency pump that requires a release contact in addition to the control signal (e.g. Grundfos Magna 3), the pump outlet of the hydraulic module is used to switch the release.

**up to hydraulic module version FRHYU21**

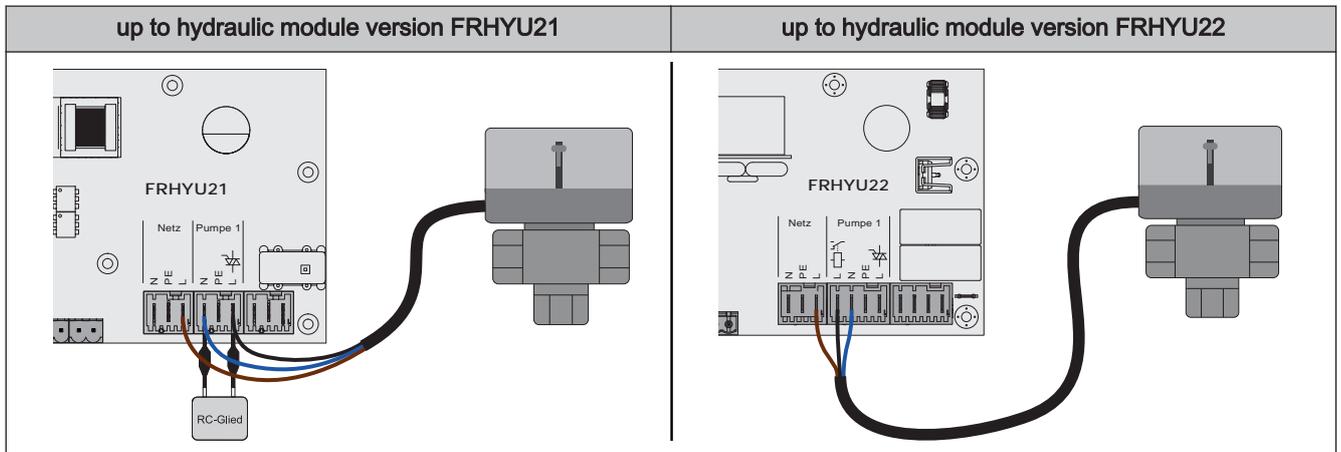
- Hydraulic module FRHYU21:** Connect the relay to output “Pump 1” or “Pump 2” with RC element isolated from the output

**up to hydraulic module version FRHYU22**

- Hydraulic module FRHYU22:** Connect the pump relay to output “Pump 1” or “Pump 2” and use the relay output for phase (L)
- Install and connect two-pole cable (2 x 0.75 mm<sup>2</sup>) from connection “AO-P1” or “AO-P2” to the pump and connect terminal “+” with terminal “IN” of the pump
- Install and connect two-pole cable (2 x 0.75 mm<sup>2</sup>) from NOC on the relay to the pump using terminal “S/S” as the release contact
- Connect power supply at pump connector
- In relevant menu, set pump to “Field pump PDM + valve” or “Field pump 0-10V + valve”

**Connecting an isolating valve to the hydraulic module**

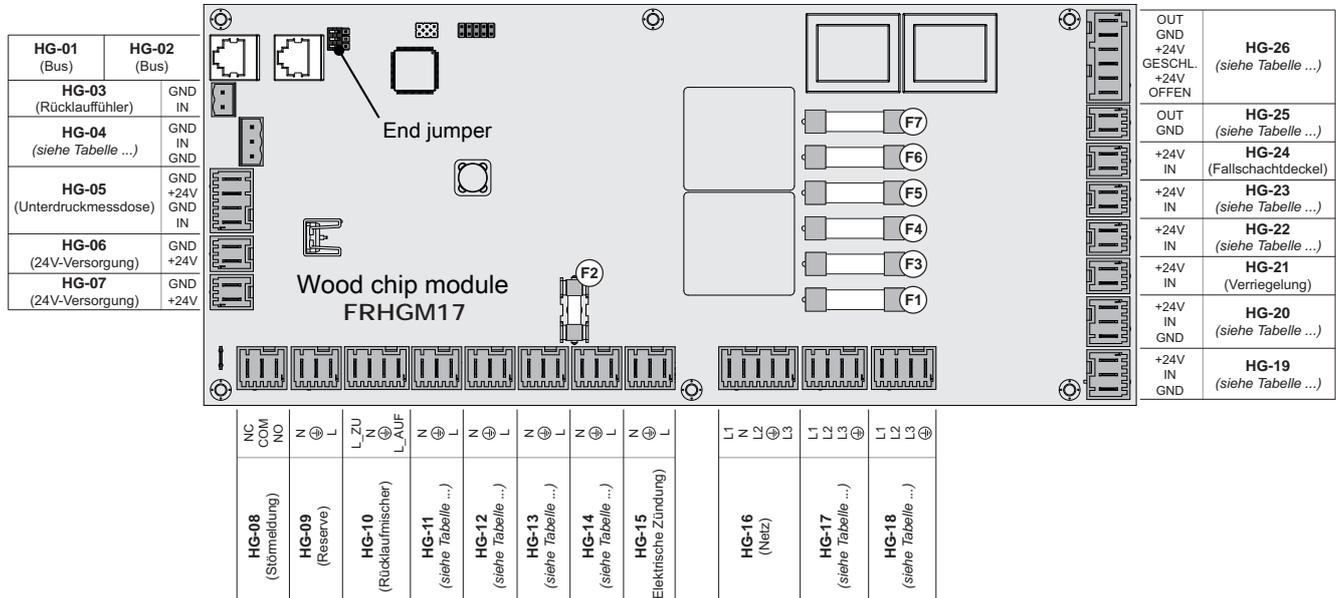
**CAUTION!** As of module version FRHYU22, one relay output is available at each of the pump outlets in addition to the triac output. Observe the following connection diagrams for the correct wiring.



- Hydraulic module FRHYU21:** Phase (L) for switching the valve and connecting neutral conductor (N) to output "Pump 1" or "Pump 2" with the RC element
- Hydraulic module FRHYU22:** Phase (L) for switching the valve and connecting neutral conductor (N) to output "Pump 1" or "Pump 2" using the relay output for phase (L)
- Connect the phase (L) for continuous supply (switches the valve back to the initial position) to the power supply at terminal "L"

## 2.2.3 Wood chip module

The wood chip module is included in standard delivery and has the connections of the hardware components for the wood chip boiler:



Connection / Name		Note	
HG-01	BUS	Patch cable CAT 5 RJ45 SFTP 1:1 configuration	
HG-02	BUS		
HG-03	Return feed sensor	Connection cable <sup>1)</sup> 2 x 0.75 mm <sup>2</sup>	
HG-04	Combustion chamber sensor	TX TI T4e 300 - 350	Use connection cable of the component
HG-05	Underpressure transmitter		
HG-06	24 V power supply	Connection cable <sup>1)</sup> 2 x 0.75 mm <sup>2</sup>	
HG-07			
HG-08	Fault message	Connection cable <sup>1)</sup> 3 x 1.5 mm <sup>2</sup> ; floating changeover contact, max. 2A / 24V, 1A / 230V	
HG-09	-		
HG-10	Return mixer	Connection cable <sup>1)</sup> 4 x 1.5 mm <sup>2</sup> ; max. 0.15A / 230V	
HG-11	Ash screw	T4 TX	Connection cable <sup>1)</sup> 3 x 1.5 mm <sup>2</sup>
	Combi drive	T4e 20 - 180	
HG-12	Ash screw	T4 TX	Connection cable <sup>1)</sup> 3 x 1.5 mm <sup>2</sup>
	External ash removal	T4e	
HG-13	Solenoid valve condenser	T4 24-50	Connection cable <sup>1)</sup> 3 x 1.5 mm <sup>2</sup>
HG-14	WOS drive	T4 TX TI	Connection cable <sup>1)</sup> 3 x 1.5 mm <sup>2</sup>
	HV cleaning	T4e	

Connection / Name		Note
HG-15	Electric ignition	Use connection cable of the component
HG-16	Mains connection	Connection cable <sup>1)</sup> 5 x 2.5 mm <sup>2</sup> ; 400 VAC
HG-17	Feed screw	T4 T4e 20-180
	Combi drive	T4e 200-350
HG-18	Stoker screw	T4 T4e 20-250 TX TI
HG-19	Light barrier gravity shaft	T4 T4e
HG-20	Ash screw monitoring	T4
	Monitoring combi drive	T4e
	Monitoring tipping grate	TX TI
HG-21	Lock	Connection cable <sup>1)</sup> 2 x 0.75 mm <sup>2</sup> ; 24V looping through
HG-22	Overpressure monitor	TX
	Cyclone	T4e
HG-23	Safety switch ash container	TX
	Ash screw cyclone monitoring	T4e
HG-24	Gravity shaft cover	Connection cable <sup>1)</sup> 2 x 0.75 mm <sup>2</sup> ; normally open contact
HG-25	Tilt motor grate 1	T4e
	Tilt motor	TX
HG-26	Tilt motor	T4
	Tilt motor grate 1	T4e
	Burn back flap	TX
	Activation flap flue gas recirculation	TI

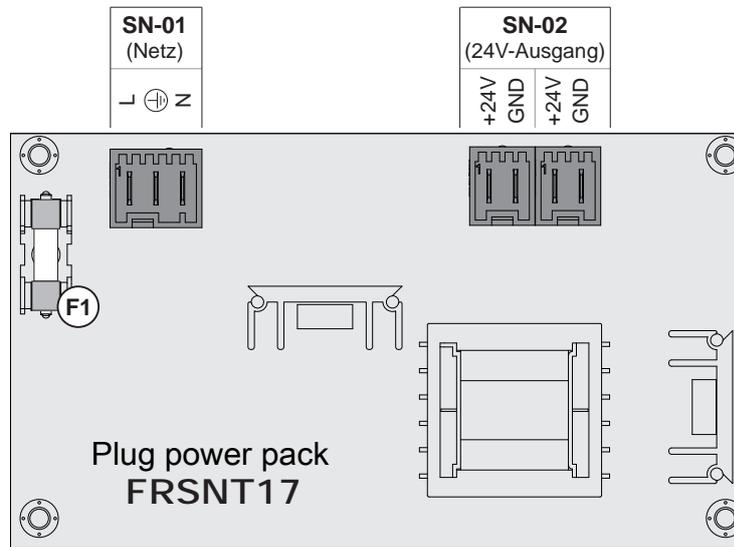
1. YMM as per ÖVE-K41-5 or H05VV-F as per DIN VDE 0881-5

### Fuses

F1, F3, F6	2.5 AT	Stoker screw
F2	6.3 AT	Return mixer, vibrator, combustion air housing
F4, F5, F7	2.5 AT	Feed screw

## 2.2.4 Plug power pack FRSNT17

The plug power pack is designed to supply all of the system consumers with 24 VDC:



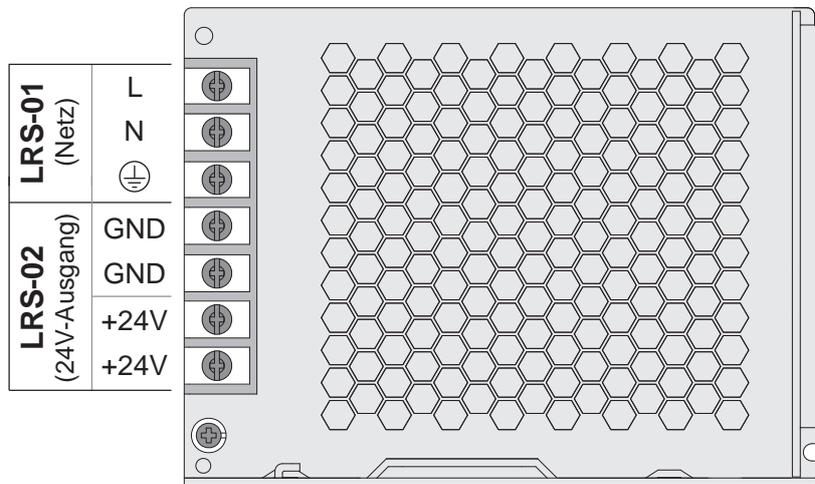
Connection / Name		Note
SN-01	Mains	Connection cable <sup>1)</sup> 3 x 1.5 mm <sup>2</sup>
SN-02	24 V power supply	Connection cable <sup>1)</sup> 2 x 1.0 mm <sup>2</sup> , max. 2A

1. YMM as per ÖVE-K41-5 or H05VV-F as per DIN VDE 0881-5

### Fuses

F1	2 AT	Fuses for 24V outputs
----	------	-----------------------

2.2.5 Plug power pack Meanwell LRS-100-24



Connection / Name		Note
LRS-01	Mains	Connection cable <sup>1)</sup> 3 x 1.5 mm <sup>2</sup>
LRS-02	24 V power supply	2 outputs, max. 4.5A Connection cable <sup>1)</sup> 2 x 1.0 mm <sup>2</sup>

1. YMM as per ÖVE-K41-5 or H05VV-F as per DIN VDE 0881-5



Input		Designation
	T4e	Target voltage HV module 1
2	T4e	Target current HV module 1
3	T4e	Target voltage HV module 2
4	T4e	Actual current HV module 2
5	T4e 300/350	5 V primary air flap

#### Standard configuration – Analogue module with address 1

Thermocouple		Designation
TI 350		Temperature sensor under the moving grate
Input		Designation
1	TI 350	Primary air flap FGR
2	TI 350	Secondary air flap FGR
3	TI 350	Pressure control flap FGR
4	TI 350	Pressure sensor above moving grate
5	TI 350	Pressure sensor in the FGR duct
:		
8	TI 350	External power specification (0-10V) If the power specification is used, the input set in the "Boiler - General settings" menu must be adjusted accordingly.
Output		Designation
1	TI 350	Induced draught control
:		
4	TI	Pump slide-on duct cooling control

#### External power demand

The type of power demand can be set using the "Source for ext. power demand (0 - off, 1 - 0-10 V, 2 - modbus)" parameter. The percentages are transferred directly if the power demand is made via modbus. If 0-10 V is selected as the source, the boiler release/boiler output can be controlled via an adjustable input at the analogue module using a voltage signal.

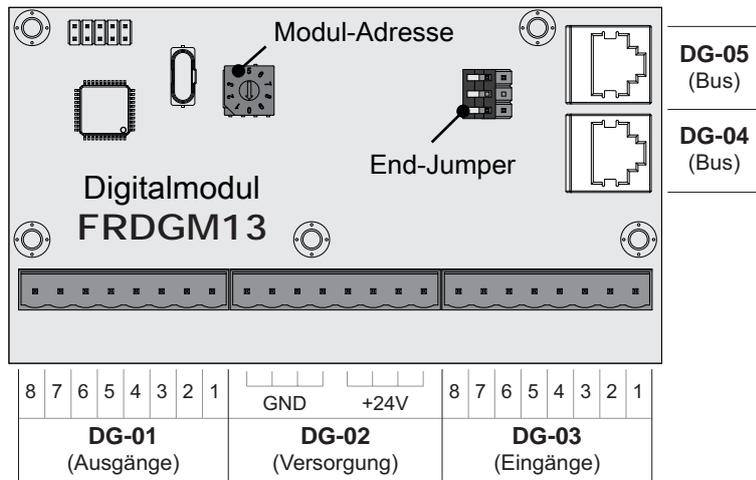
If the signal at the input is above 35%, the boiler starts in continuous load mode; if the signal drops below 30%, the boiler shuts down.

By default 0V = 0% and 10V = 100%. This can be changed using the "Invert ext. power demand via analogue input" parameter.

To initiate start-up via the power demand, "Automatic" mode must be selected and the contact must be closed if a release contact is used ("Boiler release input available" parameter = YES).

Necessary parameters for setting the power demand can be found in the "Boiler – General settings" menu.

## 2.2.7 Digital module



Connection / Name		Note
DG-01	Outputs 1...8	Connection cable <sup>1)</sup> 1 x 0.75 mm <sup>2</sup>
DG-02	Power supply	24 V power supply of the module, connection cable <sup>1)</sup> 1 x 1.0 mm <sup>2</sup> - Pellet boiler and dual fuel boiler: Pellet module, "Sensor level MIN" (PM-12) terminal - wood chip boiler: Supply via 24 V power supply unit
DG-03	Inputs 1...8	Connection cable <sup>1)</sup> 1 x 0.75 mm <sup>2</sup>
DG-04	Bus	CAT 5 patch cable grey RJ45 SFTP 1:1 configuration
DG-05	Bus	

1. YMM as per ÖVE-K41-5 or H05VV-F as per DIN VDE 0881-5

**Standard configuration – Digital module with address 0**

Input		Designation
1	Discharge expansion cabinet at T4 24-110 and TX 150	Light barrier discharge screw
2		Gravity shaft cover
3		Rotary valve overcurrent active
4		Rotary valve motor protection switch
5		Discharge screw motor protection switch
6		Intermediate screw motor protection switch
7		Overfilling safety device
8		Intermediate screw light barrier

Output		Designation
1	Discharge expansion cabinet at T4 24-110 and TX 150	Discharge screw forward
2		Discharge screw back
3		Rotary valve forward
4		Rotary valve back
5		Intermediate screw forward
6		Intermediate screw back

**Standard configuration – Digital module with address 1**

Input		Designation
1	TX 250	Boiler loading pump motor protection switch
	TI 350	Grate motor protection switch
	T4e 300 - 350	SSM pumps
2	TX 250	Combustion air fan motor protection switch
	TI 350	Pump slide-on duct cooling fault
3	TX 250	Induced draught fan motor protection switch
	TI 350	Combustion chamber ash container limit switch
4	TX 250	Automatic/manual induced draught fan selector switch
	TI 350	Ash container heat exchanger limit switch
5	TX 250	Feed screw motor protection switch
	TI 350	Ash screw heat exchanger motor protection switch
	T4e	Tilt motor 3 open
6	TX 250	Frequency converter induced draught fan fault
	TI 350	Frequency converter induced draught fan operating signal
	T4e	Tilt motor 3 closed
7	TX 250	Feed screw overcurrent
	TI 350	Ash screw combustion chamber motor protection switch
	T4 / T4e	Tilt motor 2 open
8	TX 250	Klixon induced draught fan
	TI 350	Induced draught fan thermal contact
	T4 / T4e	Tilt motor 2 closed
Output		Designation
1	TX 250	Induced draught fan release
	TI 350	Frequency converter induced draught fan activation
	T4 / T4e	Open tilt motor 2
2	TX 250	Feed screw forward
	TI 350	Frequency converter induced draught fan release
	T4 / T4e	Close tilt motor 2
3	TX 250	Feed screw backwards
	TI 350	Heat exchanger ash screw
	T4e	Open tilt motor 3
4	TX 250	Discharge screw forward
	TI 350	Ash screw combustion chamber forward
	T4e	Close tilt motor 3
5	TX 250	Discharge screw back
	TI 350	Ash screw combustion chamber back
	T4e	Primary air flap open
6	TX 250	Activate combustion air fan
	TI 350	Worm-drive grate motor

Input		Designation
	T4e	Primary air flap closed
7	TI 350	Pressure control flap FGR open
8	TI 350	Pressure control flap FGR closed

### Standard configuration – Digital module with address 2

Input		Designation
1	TI 350	Feed screw motor protection switch
2	TX 250	Intermediate screw light barrier
	TI 350	Feed screw overcurrent
3	TX 250	Feed screw light barrier
4	TX 250	Light barrier discharge screw
5	TX 250	Discharge screw motor protection switch
6	TX 250	Discharge screw overcurrent
7	TX 250	Intermediate screw motor protection switch
8	TX 250	Intermediate screw overcurrent

Output		Designation
1	TX 250	Intermediate screw forward
	TI 350	Boiler loading pump
2	TX 250	Intermediate screw back
	TI 350	Slide-on duct cooling
3	TX 250	Feed screw forward
4	TX 250	Feed screw backwards
5	TI 350	FGR primary air open
6	TI 350	FGR primary air closed
7	TI 350	FGR secondary air open
8	TI 350	FGR secondary air closed

### Standard configuration – Digital module with address 3

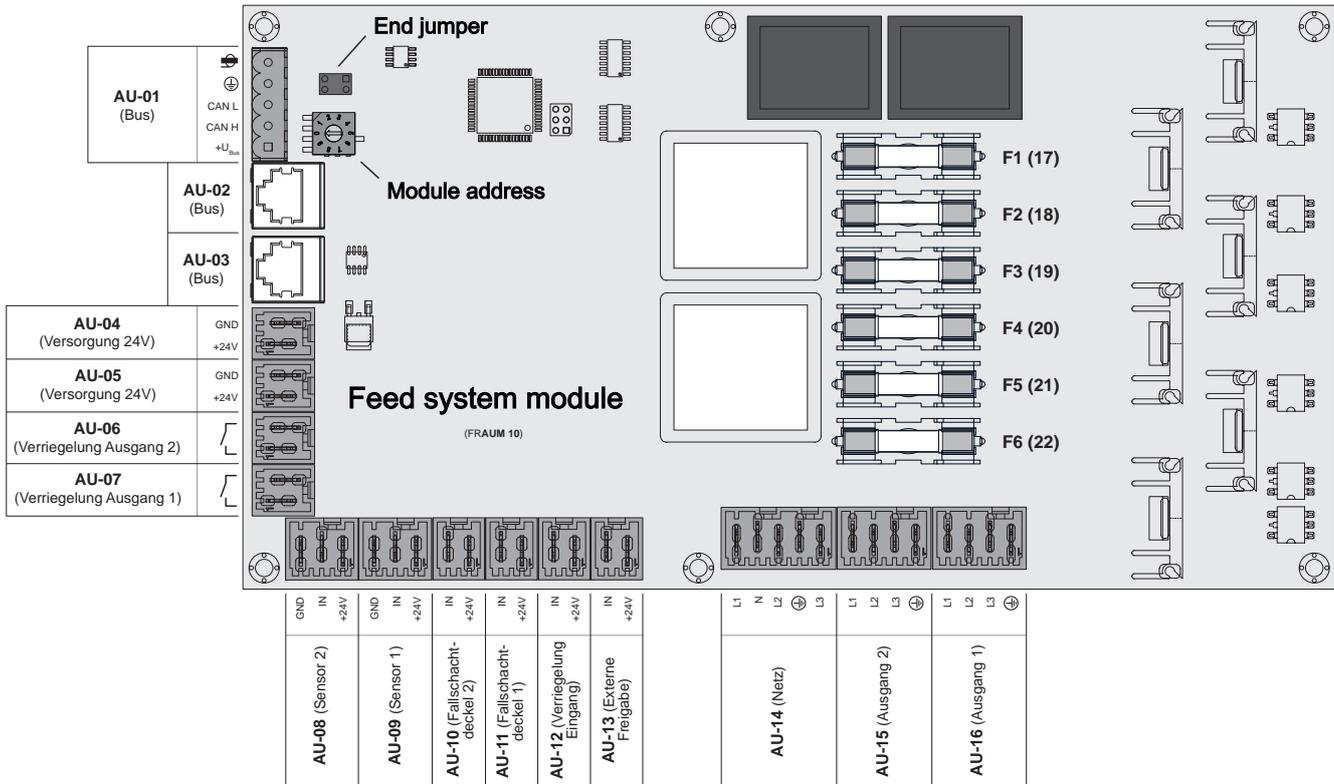
Input		Designation
1	Sliding floor discharge unit	Hydraulic pump motor protection switch
	PT4e suction system	MIN level sensor
2	Sliding floor discharge unit	Hydraulic oil level sensor
	PT4e suction system	MAX level sensor
3	Sliding floor discharge unit	Hydraulic oil temperature
4	Sliding floor discharge unit	Hydraulic chamber key switch
5	Sliding floor discharge unit	Safety limit switch

Input		Designation
	PT4e suction system	Safety relay suction turbine
6	Sliding floor discharge unit	Light scanner 1
8	Sliding floor discharge unit	Light scanner 2
Output		Designation
1	Sliding floor discharge unit	Sliding floor on
	PT4e suction system	Suction turbine on
2	Sliding floor discharge unit	Star-delta start-up 1
	PT4e suction system	Start Pellet mole / vibrator
3	Sliding floor discharge unit	Star-delta start-up 2
	PT4e suction system	1-2-3 suction module – relay 1
4	PT4e suction system	1-2-3 suction module – relay 2
5	PT4e suction system	Induced draught fan safety relay
6	PT4e suction system	1-2-3 suction module – motor 1
7	PT4e suction system	1-2-3 suction module – motor 2
8	PT4e suction system	1-2-3 suction module – motor 3

### *Standard configuration – Digital module with freely selectable address (discharge configurator)*

Input		Designation
1	T4e stoker and feed screws	Overcurrent screw 1
2		Light barrier 1
3		Motor protection switch screw 1
4		Overcurrent screw 2
5		Light barrier 2
6		Motor protection switch screw 2
7		Gravity shaft (coupled)
Output		Designation
1	T4e stoker and feed screws	Screw 1 forward
2		Screw 1 backwards
:		
4		Screw 2 forward
5		Screw 2 backwards

## 2.2.8 Feed system module



Connection / Name		Note
AU-01	Bus	Port with cable – LICY paired 2x2x0.5; ⇨ See "Connecting the bus cable" [page 35] <input type="checkbox"/> Caution! CAN L and CAN H must not be connected to +U <sub>BUS</sub> !
AU-02	Bus	Patch cable CAT 5 RJ45 SFTP 1:1 configuration
AU-03		
AU-04	24V power supply	Connection cable <sup>1)</sup> 2 x 0.75 mm <sup>2</sup>
AU-05		
AU-06	Output 2 latch	
AU-07	Lock output 1	
AU-08	Sensor 2	Connection cable <sup>1)</sup> 3 x 0.75 mm <sup>2</sup> , N/O switch contact 254V (e.g. connecting a light barrier)
AU-09	Sensor 1	
AU-10	Gravity shaft cover 2	Connection cable <sup>1)</sup> 2 x 0.76mm <sup>2</sup>
	Gravity shaft cover	
AU-11	Gravity shaft cover 1	
AU-12	Input latch	
AU-13	External release	
AU-14	Mains	
AU-15	Output 2	Connection cable <sup>1)</sup> 4 x 1.5 mm <sup>2</sup> , max. 0.75kW -7 400V (e.g. connecting a feed screw)

Connection / Name			Note
	Feed screw	T4e 200-350	
AU-16	Output 1		
AU-17 : AU-22	F1 : F6		
			T3, 3.15 A, 15 A fuses
1. YMM as per ÖVE-K41-5 or H05VV-F as per DIN VDE 0881-5			

### *Fuses*

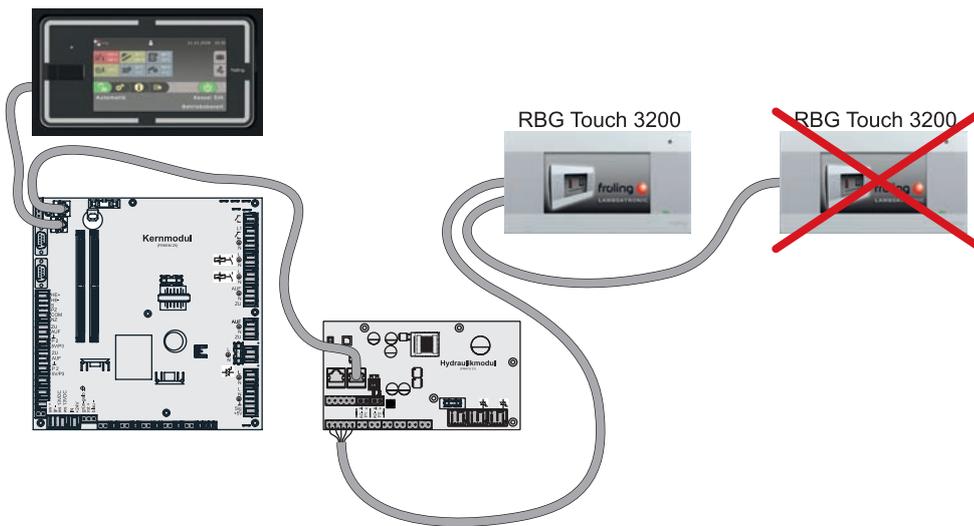
<b>F1, F2, F5</b>	3.15 AT	Screw 1
<b>F3, F4, F6</b>	3.15 AT	Screw 2

## 2.3 BUS connection

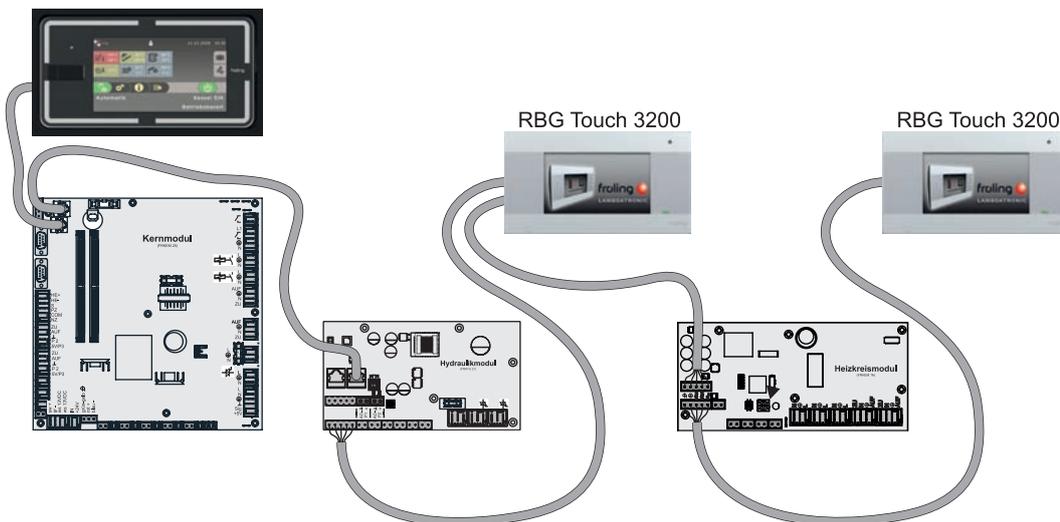
All of the bus models are connected with a bus line. The specification of the cable that is used must adhere to the LIYCY 2x2x0.5 type. A maximum cable length of 200 m must be observed. The cable length can be extended using the Fröling bus repeater.

The bus modules must be connected in series; although no specific sequence of the module types and addresses is specified. A star/stub cable is not permitted.

As the control units are supplied with voltage in addition to transferring data, problems caused by voltage drops can occur depending on the number of modules and existing cable lengths.

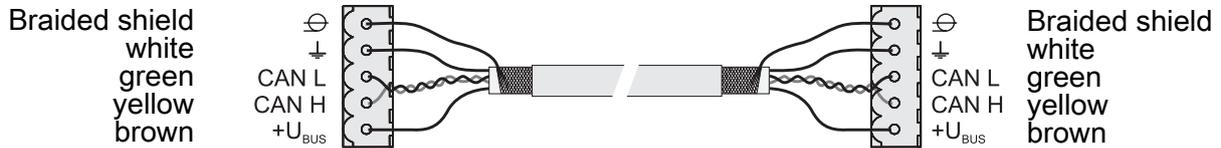


A voltage supply unit must be used for every touch room console (heating circuit module, hydraulic module).



### 2.3.1 Connecting the bus cable

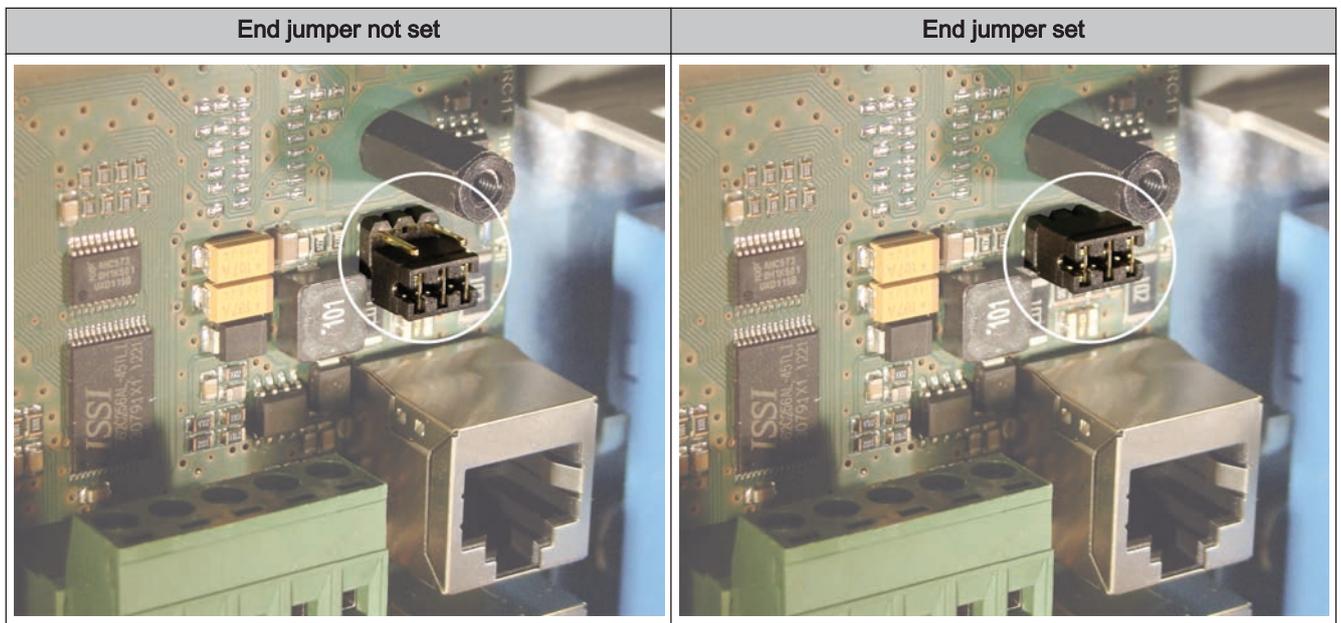
For the bus connections between the individual modules, cable type **LIYCY paired 2x2x0.5** should be used. The connection to the 5-pin plugs should be carried out according to the following diagram:



### 2.3.2 Setting end jumpers

**NOTICE!** To ensure smooth running of the bus system, the jumper must be set on the first and last module.

When using a bus repeater, the two galvanically separated sub-networks must be considered separately. The jumpers for each network must be set on the first and last module.

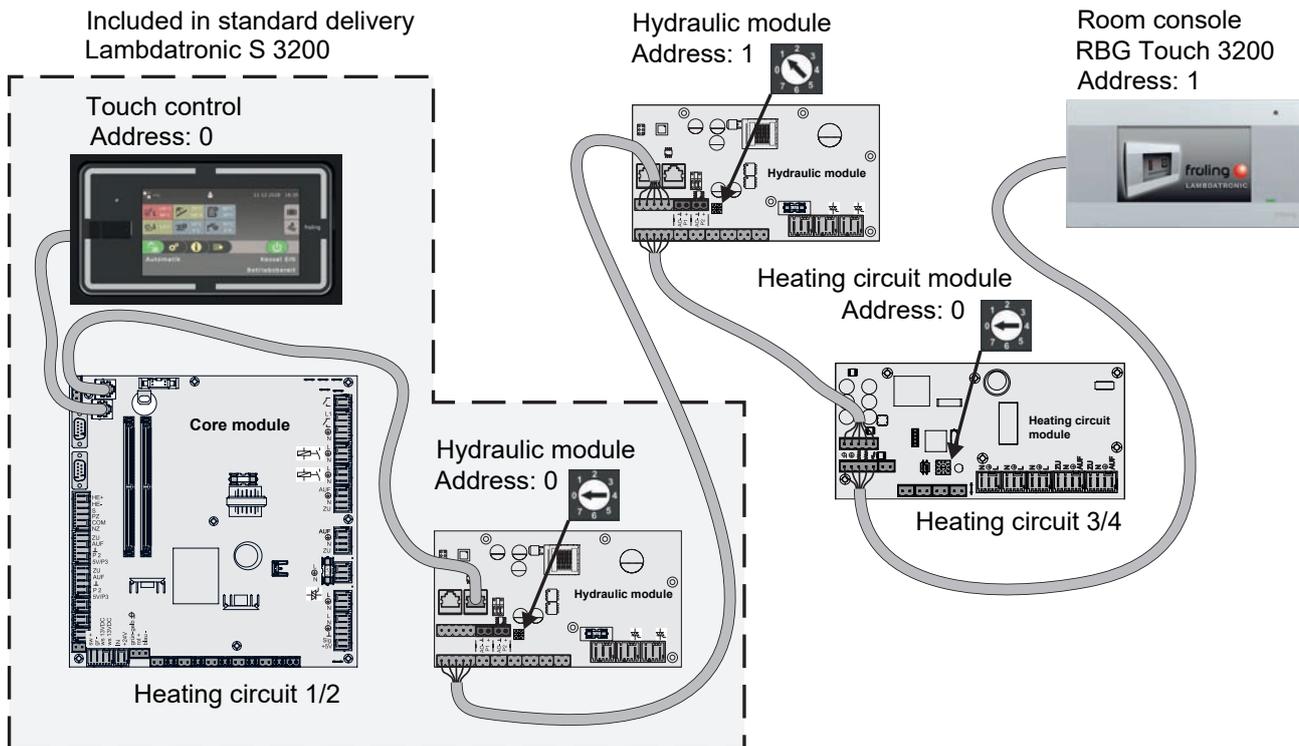


If the contacts at the base of the end jumper are not bridged (image left), it is referred to as "not set". In this case there is no bus termination. If the contacts are closed (image right), the end jumper is set and the bus connection is terminated.

### 2.3.3 Setting the module address

The necessary order for hydraulic modules and heating circuit modules is set with the module addresses. The first board of a module type should always have the address 0, so that the standard hydraulic systems set do not have to be subsequently configured. For further module types rising module addresses (address 1 - 7) are set.

**Important! Only set the module address when the device is disconnected from the power supply!**

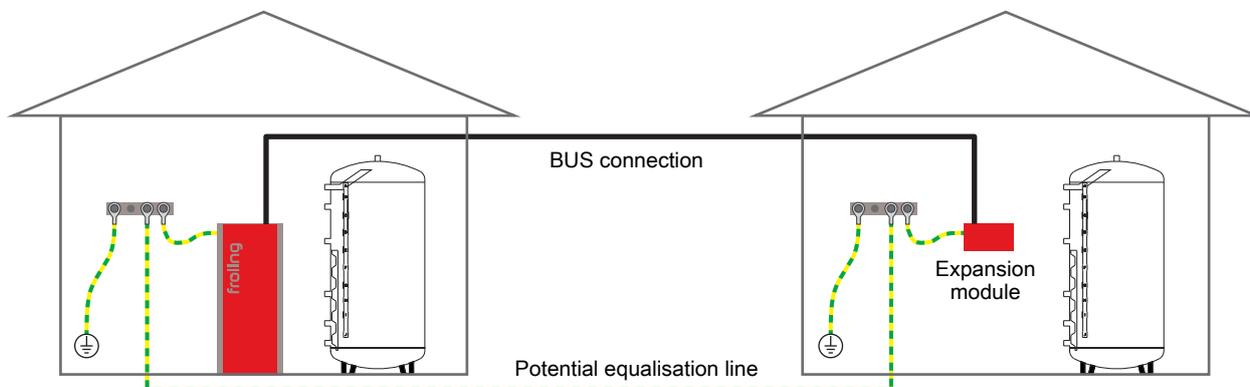


Module address set	Heating circuit module	Hydraulic module	
	Heating circuit	Sensors	Pump
0	03 – 04	0.1 – 0.6	0.1 – 0.2
1	05 – 06	1.1 – 1.6	1.1 – 1.2
2	07 – 08	2.1 – 2.6	2.1 – 2.2
3	09 – 10	3.1 – 3.6	3.1 – 3.2
4	11 – 12	4.1 – 4.6	4.1 – 4.2
5	13 – 14	5.1 – 5.6	5.1 – 5.2
6	15 – 16	6.1 – 6.6	6.1 – 6.2
7	17 – 18	7.1 – 7.6	7.1 – 7.2

**2.3.4 Potential equalisation / potential separation**

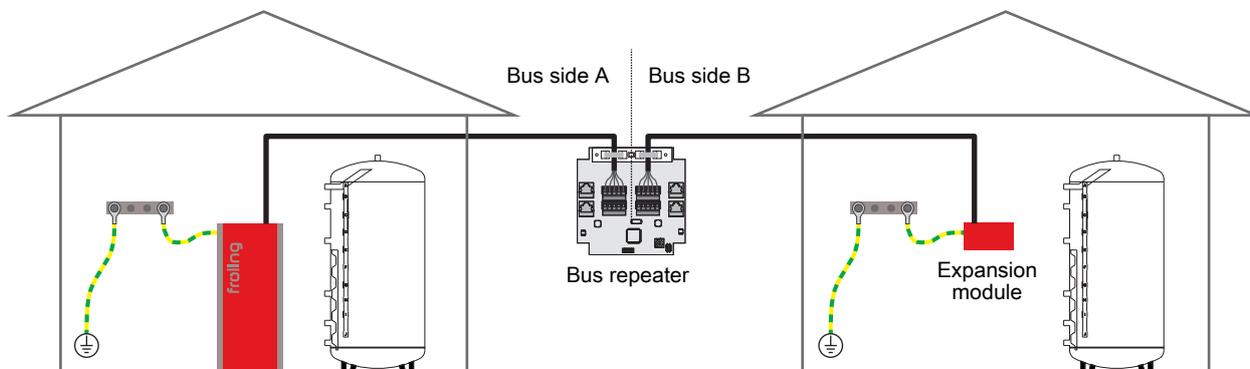
There can be potential shifts between buildings. In this case, equalising currents flow via the bus connection shield which can damage the modules.

To prevent this, buildings must be connected using a potential equalisation conductor.



**NOTICE!** The dimensions of the equalization line must be installed by a specialist in accordance with regional regulations.

Instead of the potential equalisation, a Fröling bus repeater can be used in the bus connection line to the next building. The potential separation (galvanic isolation) allows the bus network to be split into two separate sub-networks.



## 2.4 Connection information according to pump types

Either a 2-pin, 3-pin, or 4-pin control cable is used for the connection depending on the pump type. Please follow the connection instructions below for the wiring depending on the pump type used:

### Pump type with 2-pin control cable

Power supply	2-pin control cable
(brown) L  (blue) N  (yellow/green) PE 	(blue) ⊥  (brown) + 
Wire the power supply to the pump outlet on the board	Connect the control cable to the PDM output on the board, making sure that the polarity is correct: - blue wire to earth - brown wire to plus

### Pump type with 3-pin control cable

Power supply	3-pin control cable
(brown) L  (blue) N  (yellow/green) PE 	<div style="display: flex; align-items: center;"> <div style="background-color: black; color: white; padding: 5px; margin-right: 10px;">PWM</div> <div style="margin-right: 10px;">(blue) ⊥</div>  </div> <div style="display: flex; align-items: center; border-top: 1px dashed black; margin-top: 5px;"> <div style="background-color: black; color: white; padding: 5px; margin-right: 10px;">not used</div> <div style="margin-right: 10px;">(brown) +</div>  </div> <div style="display: flex; align-items: center; margin-top: 5px;"> <div style="margin-right: 10px;">(black)</div>  </div>
Wire the power supply to the pump outlet on the board	Connect the control cable to the PDM output on the board, making sure that the polarity is correct: - blue wire to earth - brown wire to plus Do not use the black wire and insulate if necessary

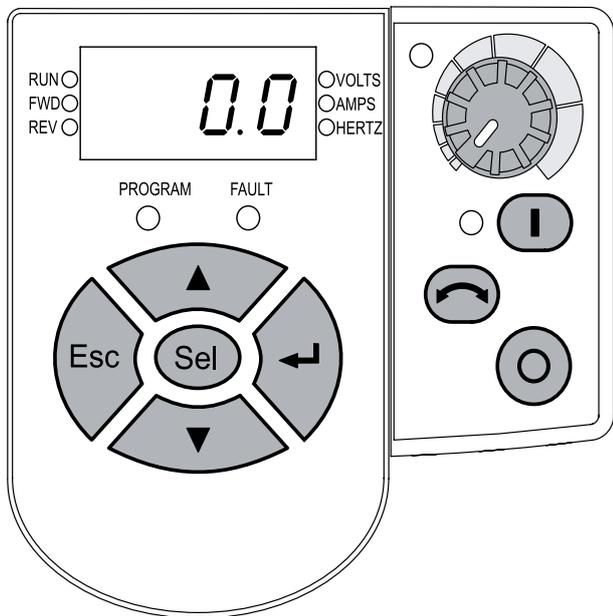
### Pump type with 4-pin control cable

Power supply	4-pin control cable
(brown) L  (blue) N  (yellow/green) PE 	<div style="display: flex; align-items: center;"> <div style="background-color: black; color: white; padding: 5px; margin-right: 10px;">PWM</div> <div style="margin-right: 10px;">(brown) ⊥</div>  </div> <div style="display: flex; align-items: center; margin-top: 5px;"> <div style="margin-right: 10px;">(white) +</div>  </div> <div style="display: flex; align-items: center; border-top: 1px dashed black; margin-top: 5px;"> <div style="background-color: black; color: white; padding: 5px; margin-right: 10px;">not used</div> <div style="margin-right: 10px;">(blue)</div>  </div> <div style="display: flex; align-items: center; margin-top: 5px;"> <div style="margin-right: 10px;">(black)</div>  </div>
Wire the power supply to the pump outlet on the board	Connect the control cable to the PDM output on the board, making sure that the polarity is correct: - brown wire to earth - white wire to plus Do not use the other two wires (blue, black) and insulate

## 2.5 Frequency converter

Below is a description of how the input elements of the frequency converter basically work.

### 2.5.1 Operating elements



Key	Name	Description
	Escape	Go back one step in the program menu. Cancel changes to a parameter value and exit program mode
	Select button	Go forward one step in the program menu. Select a digit when a parameter value is displayed
	Up arrow	Scroll down through groups and parameters. Increase/reduce the value of a flashing digit
	Down arrow	
	Enter	Go forward one step in the program menu. Save a change to a parameter value

## 2.5.2 Changing parameters

Step	Key	Description
1		Connecting the power supply
2		3x escape until "0.0" appears in the display
3		The group menu letter flashes when you press the Enter button
4	 or 	Press the arrow buttons to select the relevant group menu (d,P,t,C,A)
5		Enter the previously selected group menu. The digit on the right flashes and can be changed
6		Pressing the Sel button allows you to change the second digit from the right
7		Press the Enter button to see the value of the parameter, or press it again to change the value
8	 or 	Reduce/increase the value. <b>TIP:</b> Pressing the Sel button allows you to change the tens column, pressing it again allows you to change the hundreds column
9		Confirm the set value by pressing Enter
10		Press Escape several times to exit the program menu

#### *Completing the parameter settings*

After setting the parameters, you must restart the frequency converter to apply the new settings.

### NOTICE

#### **Malfunctions after setting parameters!**

*If the frequency converter becomes inoperable after setting the required parameters:*

- Perform a factory reset
- Set the parameters again
  - The “Start”, “Back” and “Stop” buttons and the “potentiometer” usually have no function after the frequency converter has been programmed.

You can restore the factory settings by setting parameter P 112 to 1. The parameter then automatically returns to the value 0 and the frequency converter displays the message "F048".

## 3 Initial start-up with settings wizards

### 3.1 Before switching on for the first time

#### NOTICE

You should have the initial startup carried out by the authorised heating engineer from Froling customer services.

#### 3.1.1 Controller check

- Check boards for foreign bodies (pieces of wire, washers, screws ...)
- Carry out a wiring check:  
Check for loose, uninsulated wires, which could cause a short-circuit
- Check plug configuration of pumps, mixing valves and other units, which have NOT been prepared by Froling
- Check the connection of the BUS cable for short-circuits
- Check the specified addresses and terminal jumpers on the individual modules (heating circuit modules, hydraulic modules, displays...)

#### 3.1.2 Check on the connected units

- Check that all units that are used are connected correctly
- Carry out wiring check:  
Check for loose or uninsulated wires in the terminal boxes of the pumps, mixing valve and switch valve, which could cause a short-circuit

#### 3.1.3 System check

- Check that the main fuse for the boiler has a sufficient rated amperage

⇒ See "Mains connection" [page 8]

## 3.2 General information about the settings wizard

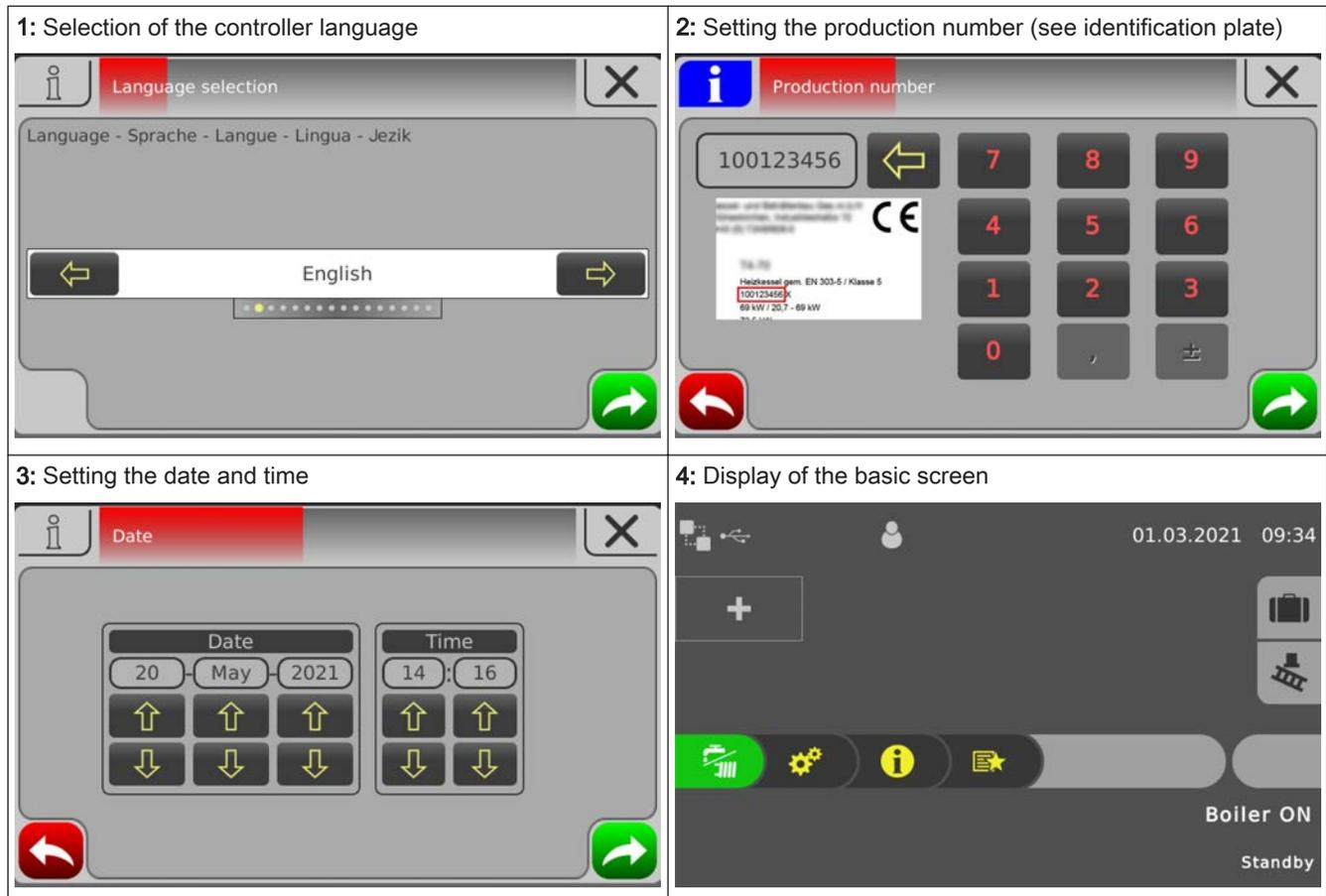
A wide variety of setting wizards are available to start-up the boiler system. A small selection of these can be found on the “Customer” operating level in the “Quick menu”; the rest are only on the “Service” operating level. The settings wizards can be used to set various sections of the boiler system (boiler, lambda probe, hydraulic system, etc.) with guided queries of the controller.

The following settings wizards are available for specific systems. Because they are interdependent, the sequence is automatically determined by the controller.

Icon	Designation
	<b>Switching on for the first time</b> Queries are made regarding language, facility number, date and time
	<b>Boiler</b> Setting for boiler type, boiler output, fuel, return temperature control and boiler-specific options (ignition, filter, etc.)
	<b>Lambda probe</b> Selection and calibration of the type of sensor used
	<b>Feed system</b> Selection of the existing discharge system (only for boilers with automatic loading)
	<b>Hydraulic system</b> Selection of the hydraulic system (hydraulic system 1, 2, 3, etc.)
	<b>Additional components</b> Selection and activation of the existing load and control components (heating circuits, DHW tank, solar, difference controller, etc.)
	<b>Heating up</b> Initial filling of the pellet container for pellet and dual fuel boilers; filling of the discharge screw and defining the loading times for the start process for wood chip boilers
	<b>Connect</b> Setting parameters required for the boiler to use the “froeling-connect.com” online control (IP address, display password, etc.)
	<b>Heating up program</b> Activation and selection of a heating up program.

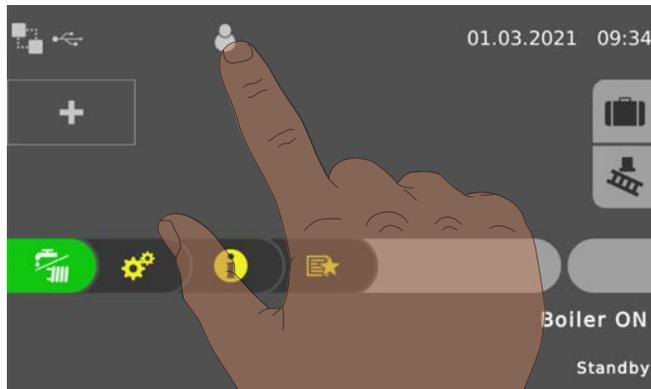
### 3.3 Switching on for the first time

Once you have connected the device to the power supply and switched on the main switch, the display begins with a query regarding the basic settings of the system (language, production number of the boiler system, date, and time). Then the basic screen of the touch display is shown.

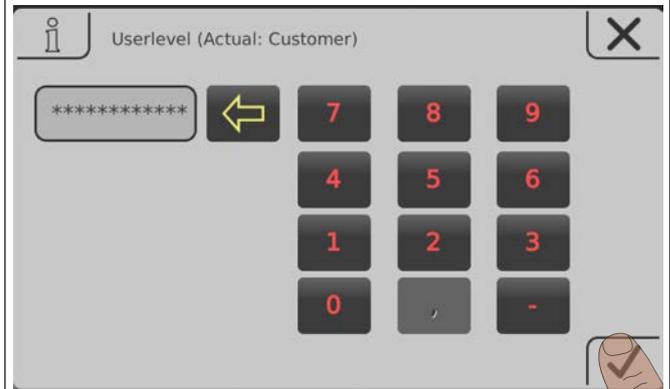


### 3.4 Starting the setting wizard

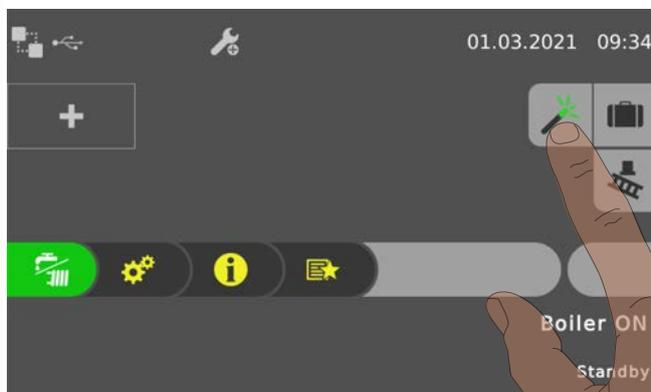
1: Tap the icon to change the user level



2: Type in the service code and confirm



3: Tap the icon of the settings wizard



4: Tap the "Boiler" setting wizard



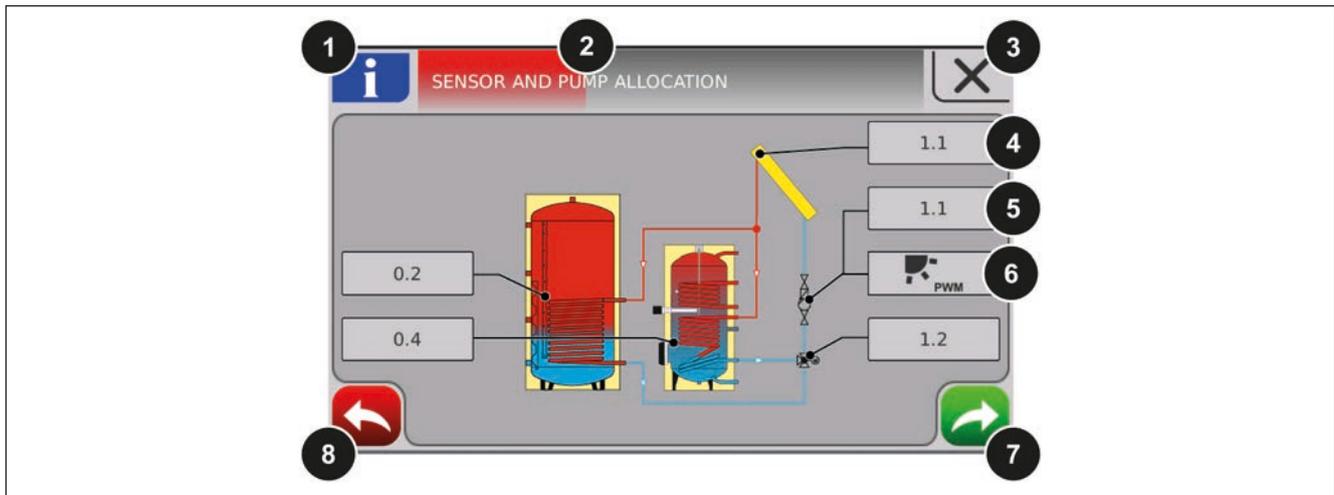
5: The settings wizard loads



6: Read the information text and continue with "YES" to start



## Navigation as well as sensor and pump settings

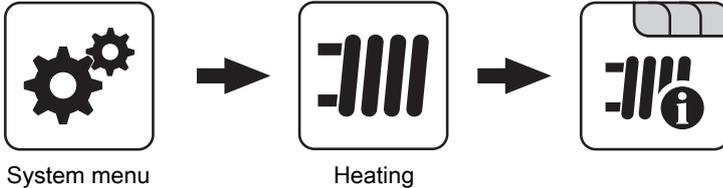


Number	Description
1	If the Info button has a blue background, more information is available for this overview page.
2	Progress bar for the respective settings wizards
3	Cancel setting wizard
4	Setting the address to which the respective sensor was connected
5	Setting the address to which the respective pump was connected
6	Defining the control signal of the respective pump. The following options are available depending on the selected menu:
	 Pump without control line
	 HE pump without control line
	 Field pump / PDM
	 Solar pump / PDM
	 Field pump PDM + valve
	 Solar pump PDM + valve
	 Field pump / 0 - 10 V
	 Solar pump / 0 - 10 V
	 Field pump 0-10 V + valve
	 Solar pump 0-10 V + valve
	 Switch valve
	⇒ See "Activation options of pump outlets" [page 126]
7	Continue to the next step
8	Go back one step

## 4 Parameters overview

### 4.1 Heating

#### 4.1.1 Heating - Status



##### *Heating circuit mode*

Display and setting the heating circuit mode:

-  **Auto:**  
Automatic: heating phases according to the set heating times
-  **Extra heating:**  
The heating circuit is regulated to the set room temperature with no time limitation. To cancel this function, activate another mode/function
-  **Setback:**  
Setback mode; the current or next heating phase is ignored
-  **Continuous setback mode:**  
Heating circuit remains in setback mode until another mode is activated
-  **Party:**  
Party mode; the current or next setback phase is ignored
-  **OFF:**  
Switched off; heating circuit deactivated, only frost protection!

##### *Actual flow temperature*

Display of the current flow temperature.

##### *Flow temperature setpoint*

Display of the calculated flow temperature setpoint.

##### *Room temperature*

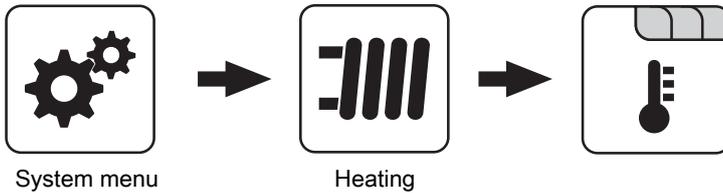
**Prerequisite:** Heating circuit used in conjunction with remote control

Display of the current room temperature.

##### *Outside air temperature*

Display of the current outside air temperature.

## 4.1.2 Heating – Temperatures



### *Desired room temperature during heating mode*

**Prerequisite:** Heating circuit used in conjunction with remote control

Room temperature which is regulated during the set heating times.

### *Desired room temperature during setback mode*

**Prerequisite:** Heating circuit used in conjunction with remote control

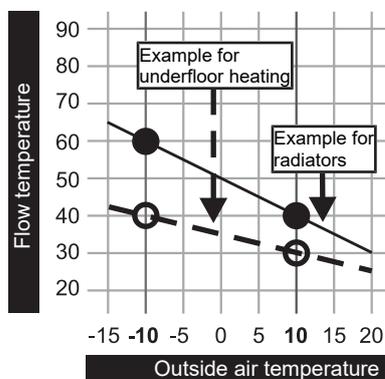
Room temperature which is regulated outside of the set heating times.

### *Flow temperature SP at outside air temperature of +10°C*

First setting point for definition of heating curve.

### *Flow temperature SP at outside air temperature of -10°C*

Second setting point for definition of heating curve.



### *Controller gain room temperature $K_p-R_m$*

**Prerequisite:** Heating circuit used in conjunction with remote control

Influencing factor of room temperature on the flow temperature of the heating circuit. If there is a deviation in the room temperature of +/- 1°C, the set value of the flow temperature is corrected by this value. (Only in conjunction with remote control)

Recommended values:

- underfloor heating: 2-3
- Radiators (new build): 4-5
- Radiators (old build): 6-7

**NOTICE!** Observe external influences on the remote control!

### *Reduction of flow temperature in setback mode*

The flow temperature is reduced by this value during setback mode.

### *External temperature, at which heating circuit pump switches off in heating mode*

If the outside air temperature exceeds this value during heating, the heating circuit pumps and mixing valve are deactivated.

### *External temperature, at which heating circuit pump switches off in setback mode*

If the outside air temperature falls below this value in setback mode, the heating circuit pumps and mixing valve are activated.

### *Maximum heating circuit flow temp.*

Maximum temperature for limiting outfeed temperature at which the heating circuit is supplied.

### *Maximum DHW tank flow temp.*

If DHW tank 1 is supplied directly from heating circuit 1, you can limit the maximum flow temperature for the duration of DHW tank loading.

### *Frost protection temperature*

If the room temperature or the flow temperature is lower than the set value, the heating circuit pump will be switched on and the heating circuit mixer keeps to the maximum heating circuit flow temperature that is set.

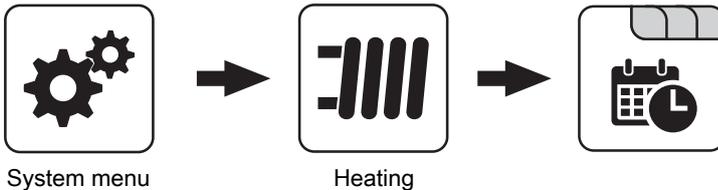
### *From which temperature at storage tank top should the overheating protection be activated?*

If the temperature at top storage tank exceeds the set value, the heating circuit is activated regardless of mode (boiler, remote control) and set heating times. The flow temperature is controlled to the value set in the parameter "Flow temperature SP at outside air temperature of -10°C". The function will remain active until the value falls below 2°C.

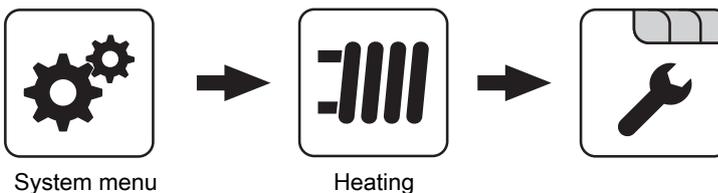
**Recommendation:** The overheating protection should be assigned to a high temperature heating circuit (e.g. radiators).

**Deviation of room temperature sensor**

If a deviation of the room temperature is determined from the evaluated value to the displayed value, the evaluation of the room temperature sensor can be adjusted with this parameter. The temperature measured by the sensor is increased (positive value) or reduced (negative value) by the pre-set value.

**4.1.3 Heating - Times**

⇒ See "Setting times" [page 137]

**4.1.4 Heating - Service****Heating circuit pump**

Used for testing the pump output:

- **A 0:** Automatic, Off; **A 1:** Automatic, On
- **1:** Manual, On
- **0:** Manual, Off

**Heating circuit mixer OPEN**

Used for testing the mixing valve output:

- **A 0:** Automatic, Off; **A 1:** Automatic, On
- **1:** Manual, On
- **0:** Manual, Off

**Heating circuit mixer CLOSED**

Used for testing the mixing valve output:

- **A 0:** Automatic, Off; **A 1:** Automatic, On
- **1:** Manual, On
- **0:** Manual, Off

**Mixer runtime**

Here you can set the mixer runtime of the mixer in use.

**NOTICE!** To avoid mixer vibration, do not set value < 150s!

**Switch off heating circuit pump when outfeed setpoint is lower than**

**Prerequisite:** Heating circuit is operated without remote control

If a flow temperature setpoint is calculated below the value set, the heating circuit pump switches off and the mixing valve closes.

**Should this heating circuit heat when there is DHW tank priority?**

- **NO:** During DHW tank loading this heating circuit is deactivated.
- **YES:** Despite active DHW tank priority, this heating circuit is supplied with heat during DHW tank loading.

**From which buffer tank or distributor is the heating circuit supplied (0 = boiler)**

**Prerequisite:** Parameter can only be used in conjunction with multiple house systems (variants)

This parameter defines the allocation of the heat source for this heating circuit.

- **0** = boiler
- **1** = buffer tank 01, ...

**High temperature requirement because of DHW tank loading**

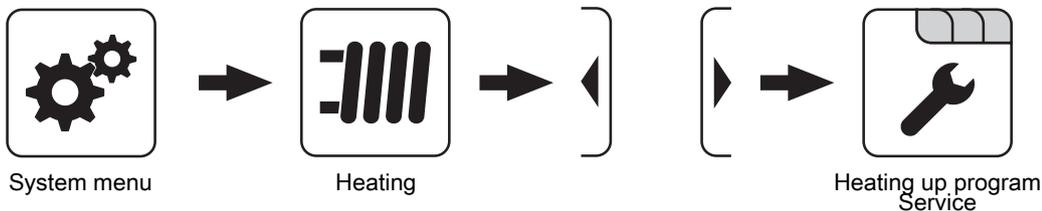
**IMPORTANT! Parameter only available for heating circuit 1 and 2!**

**Set Pellet as the unit model for "DHW tank 1" in the case of pellet boiler PE1!**

- **No DHW tank:** the heating circuit is operated according to the selected heating curve
- **DHW tank 1:** only DHW tank 1 is supplied via the heating circuit
- **DHW tanks 2-8:** all DHW tanks apart from DHW tank 1 are supplied via the heating circuit
- **All DHW tanks:** all DHW tanks are supplied via the heating circuit

**High temperature requirement because of DHW tank loading**

The DHW tank can be loaded via the heating circuit. If there is a requirement from the DHW tank and the criteria for DHW tank loading have been met, the switch valve immediately clears the way for DHW tank loading. The heating circuit pump starts running as soon as the "Load if temperature difference between boiler and DHW tank is" criterion is reached. Once DHW tank loading is complete, the heating circuit pump will stop, the switch valve will remain active for a specified period of time and the heating circuit mixer will close. If time has run out, the heating circuit will go back to being supplied on a weather-compensated basis.

**4.1.5 Heating - Heating up program****Heating up program active**

- **NO:** Heating up program deactivated, all heating circuits are operated according to the selected heating times.
  - **YES:** The 30-day heating up program that has been set starts. After the 30 days, the heating circuit that has been selected operates based on the set heating times again.
- The heating times of the selected heating circuit, as well as the boiler/buffer tank loading times are automatically set to 0:00-24:00 and the outside air temperature heating limit is ignored.
- When using a firewood boiler, a corresponding heat supply must be ensured.
- If the actual flow temperature setpoint required cannot be reached or maintained (e.g. boiler output, ...), then no warning is displayed!
- In the event of a power failure, the program continues from the point at which it was interrupted.

If the current room temperature falls below the set frost protection temperature setpoint, this influences the set flow temperature setpoint of the heating up program.

**NOTE:** Only in conjunction with remote control!

**Current day of the heating up program**

Shows the current day of the heating up program that is running. By adjusting this parameter, you can jump forward or return to a specific day of the program.

**Which heating up program is used**

There are set options for the progression of the flow temperature in heating up programs 1 – 6. With heating up program 7 the flow temperature can be selected freely over the entire 30 days.

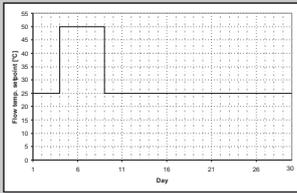
Heating up program 8 allows you to pre-define the progression of the flow temperature for each individual day.

**Outfeed setpoint for all days in program 7**

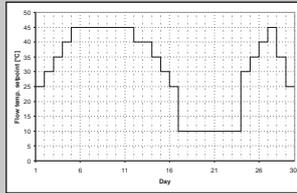
If heating up program 7 is active, the selected heating circuit is adjusted to the specified flow temperature.

**Heating up programs**

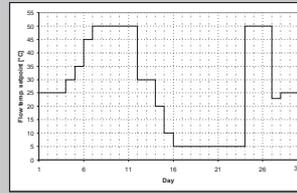
Heating up program 1:



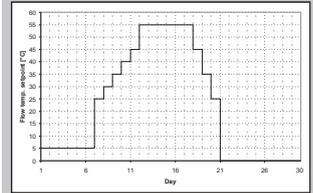
Heating up program 2:



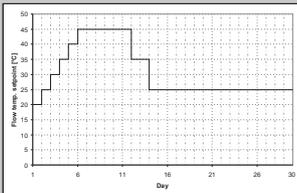
Heating up program 5:



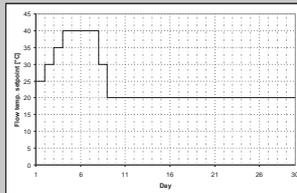
Heating up program 6:



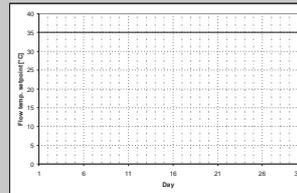
Heating up program 3:



Heating up program 4:



Heating up program 7:



The heating up programs listed are non-binding recommendations. If the heating up program is to be used for floor screed drying, you must consult the manufacturer of the floor finish and/or the installer!

**Configure program 8**

Configure program 8

Heating up program  
Service

**Outfeed temperature setpoint on day 1 ... 30**

If "heating up program 8" is selected, the flow temperature setpoint can be preset for each day using this setting.

**Heating circuits used**

Heating circuits used

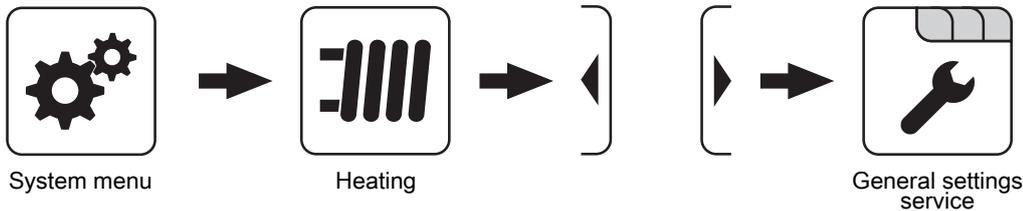
Heating up program  
Service

**Using heating circuit 01 ... 18**

The number of heating circuits used depends on the system configuration. If only 2 heating circuits are installed, then only 2 heating circuits will be available for selection.

The heating up program selected will be used for all heating circuits!

### 4.1.6 Heating - General settings



#### *Correction value for external sensor*

If a deviation of the outside temperature is determined from the evaluated value to the displayed value, the evaluation of the outside temperature sensor can be adjusted with this parameter. The temperature measured by the sensor is increased (positive value) or reduced (negative value) by the pre-set value.

#### *Heating circuit module to which the external sensor is connected (0 = core module)*

If the outside temperature sensor is not connected to the core module, the address of the relevant heating circuit module +1 must be set here (sensor 1 on relevant module).

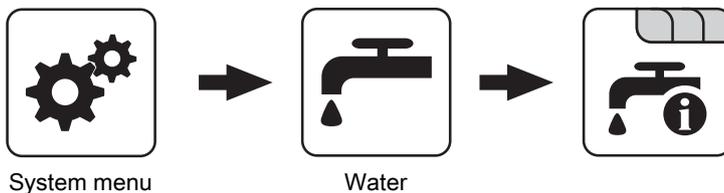
#### *Using room sensor inputs for room thermostat*

**NOTICE! This parameter influences all sensor connections to which an analogue room temperature sensor can be connected!**

- **NO:** At the sensor connector of the room sensor, a room sensor must be connected to control the room temperature.
  - **YES:** At the sensor connector of the room sensor, room thermostats can be connected to control the room temperature.
- Contact of room thermostat open: Heating circuit pump deactivated, mixing valve is closed
  - Contact of room thermostat closed: Heating circuit pump and mixer control active

## 4.2 Water

### 4.2.1 Water - Status



#### *DHW tank top temperature*

Current temperature of the DHW tank. If the time window for DHW tank loading is reached and the temperature falls below the value set under parameter "Reload if DHW tank temperature is below", the DHW tank will be loaded. The DHW tank is loaded either until the time window has elapsed or the temperature set under "Desired DHW tank temperature" has been reached.

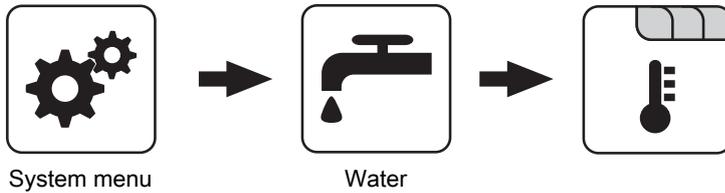
#### *DHW tank bottom temperature*

**Prerequisite:** Solar panel system is regulated by Froling!  
Current temperature in the area of the reference sensor of the solar panel system.

#### *DHW tank pump control*

Specifies the speed of the DHW tank pump as a percentage of maximum speed.

### 4.2.2 Water - Temperatures



#### ***Set DHW temperature***

When this DHW temperature is reached, DHW tank loading is stopped.

#### ***Reload if DHW tank temperature is below***

If the DHW tank temperature falls below the value set here, the time window is active and the loading source (boiler or buffer tank) indicates the set loading increase, and the DHW tank loading is started.

#### ***Load if temperature difference between storage tank and DHW tank is***

If the top storage tank temperature is above the current DHW tank temperature by this value and the time window is active, DHW tank loading starts (only for systems with a storage tank).

#### ***Load if temperature difference between boiler and DHW tank is***

If the boiler temperature is above the current DHW tank temperature by this value and the time window is active, DHW tank loading starts (only for systems without a storage tank).

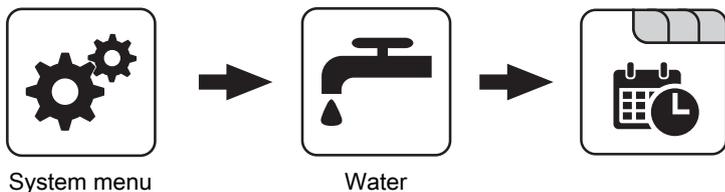
#### ***Setpoint for temperature difference between boiler and DHW tank***

Adjust the boiler temperature setpoint to reach the desired DHW tank temperature.

Boiler temperature setpoint = Set DHW temperature + difference

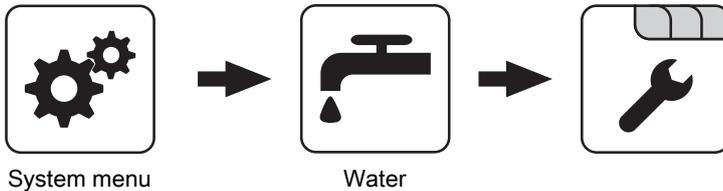
If the current boiler temperature setpoint calculated is higher than the result from the above calculation, the boiler temperature setpoint is maintained (only for systems without storage tank).

### 4.2.3 Water - Times



⇒ See "Setting times" [page 137]

## 4.2.4 Water - Service



### *Residual heat use*

**Prerequisite:** Hydraulic system 0 and return temperature control with mixing valve

- **YES:** Diverts the residual heat to the DHW tank. The "Minimum boiler temperature to release all pumps" parameter is ignored. The pump is set to minimum speed until the boiler temperature is lower than the DHW tank temperature + 3°C.

### *Only load DHW tank once a day*

- **NO:** A DHW loading takes place always when the DHW tank temperature falls below the value, which is set under "Reload if DHW tank temperature is below", and the time window is active and the heat source (boiler or buffer tank) indicates sufficient temperature.
- **YES:** If the DHW tank has already been loaded once on the current day, a further DHW tank loading is prevented.

### *Legionella heating activated*

- **NO:** A legionella heating of the DHW tank is not carried out.
- **YES:** Once a week the DHW tank is heated to the temperature set under the parameter "DHW tank temp. setpoint for legionella heating (same for all DHW tanks)".

### *When should the legionella heating be carried out?*

Determines the day of the week on which the legionella heating of the domestic hot water is carried out.

### *DHW tank temp. setpoint for legionella heating (same for all DHW tanks)*

If the parameter "Legionella heating activated" is set to "YES", the DHW tank is heated to the set temperature on the specified day of the week.

### *Which buffer tank or heat distributor supplies the heat to this DHW tank (0 = boiler)*

**Prerequisite:** Parameter can only be used in conjunction with multiple house systems (variants)

This parameter defines the allocation of the heat source for this DHW tank.

- 0 = boiler
- 1 = buffer tank 01, ...

### *DHW tank pumps run-on ⇒ (this setting applies for all DHW tanks)*

When DHW tank loading has finished, the DHW tank loading pumps continue to run for the time set here.

### *Sensor input of DHW tank 01 top sensor*

Sensor input to which the DHW tank sensor is connected.

### *Sensor input of DHW tank 01 solar reference sensor*

Sensor input to which the sensor for the DHW tank solar reference is connected.

### *Pump output of DHW tank 01 pump*

Pump outlet to which the boiler loading pump is connected.

### *Control of DHW tank pump*

Definition of control signal for pump type used.

⇒ See "Activation options of pump outlets" [page 126]

### *Minimum DHW tank speed*

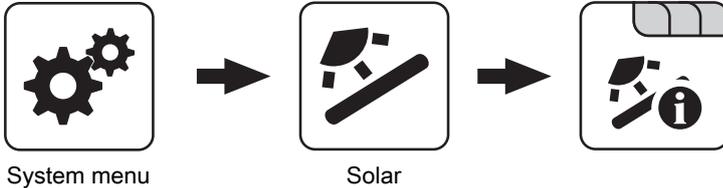
Adjustment of the minimum speed to the pump type (set mode of pump in accordance with pump manufacturer).

### *Maximum DHW tank pump speed*

If you need to limit the maximum speed of the boiler loading pump for systemic reasons, you can do so by adjusting this parameter.

## 4.3 Solar

### 4.3.1 Solar - Status



#### **Collector temperature**

Display of the current temperature at the solar collector.

#### **Top storage tank solar sensor**

Display of the current temperature at the solar reference sensor in the top part of the buffer tank.

#### **Solar temperature buffer tank bottom**

Display of the current temperature at the solar reference sensor in the lower part of the buffer tank.

#### **Collector return temperature**

**Prerequisite:** Hydraulic system 12 or 13

Display of the current temperature at the collector return.

#### **Actual power from solar heat meter [kW]**

Display of the current output which is generated by the solar collector. The calculation of the output is only performed either when a per litre output of the collector pump has been set or an external volume pulse transmitter is used. In order to perform the calculation more precisely, the use of a collector return sensor is recommended.

#### **Flow through [l/h]**

**Prerequisite:** External volume pulse transmitter installed

Display of the water quantity currently being pumped through the solar collector.

#### **Today's yield [kWh]**

Display of the heat quantity that has been supplied by the solar panel system today.

#### **Daily yield 1 ... 6 days ago [kWh]**

Shows the historical progression of the solar panel system. The yields of the last 6 days are available.

#### **Total yield [kWh]**

Display of the heat quantity which has been supplied by the solar panel system since activation of the heat meter.

#### **DHW tank bottom temperature**

Current temperature in the area of the reference sensor of the solar panel system.

#### **Heat exchanger sec. return temperature (line to buffer tank)**

**Prerequisite:** Hydraulic system 12 or 13

Current temperature at heat exchanger flow on the secondary side.

#### **Collector pump runtime**

Display of the total runtime of the collector pump.

#### **Collector pump control**

Display of the current speed of the collector pump as a percentage of maximum speed.

#### **Pump between heat exchanger and buffer tank**

**Prerequisite:** Hydraulic system 12 or 13

Display of the current speed of the pump between heat exchanger and buffer tank.

#### **Pump between heat exchanger and DHW tank**

**Prerequisite:** Hydraulic system 12

Display of the current speed of the pump between heat exchanger and DHW tank.

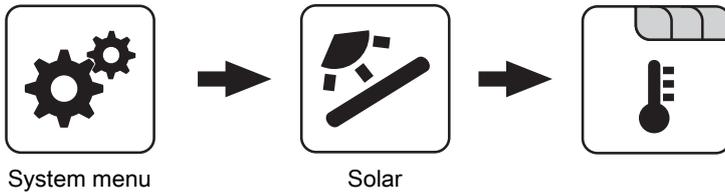
#### **Diverter valve for top/bottom coils**

**Prerequisite:** Hydraulic system 12 or 13

Current control of the isolating valve on the solar side.

- 0% ... bottom buffer tank
- 100% ... top buffer tank

### 4.3.2 Solar - Temperatures



#### ***Boiler target temperature during solar charging***

Up to this temperature the DHW tank is heated by the solar system. If the solar panel system is equipped with an isolating valve for switching between DHW tank and buffer solar coil, then this parameter is responsible for switching between both of these solar coils.

#### ***Temp differential to start collector pump***

The collector pump activates when the collector temperature exceeds the reference temperature in the DHW tank or buffer tank by this value.

#### ***Temp difference to stop collector pump***

The collector pump switches off when the difference between the collector temperature and reference temperature in the DHW tank or buffer tank is lower than this value.

#### ***Maximum buffer tank bottom temperature during solar charging***

**Prerequisite:** Hydraulic system 12 or 13

If the sensor for the solar reference temperature in the buffer tank exceeds the specified value, the collector pump is switched off.

#### ***Minimum collector temperature***

Minimum temperature at collector which must be reached in order for the solar control to start.

#### ***Collector/pump protection from a collector temp.***

If the measured value of the solar collector sensor exceeds the set value, the solar collector must cool down by 20°C within 15 minutes, otherwise the solar collector pump stops in order to protect the pump.

#### ***Heat exchanger - buffer tank pump start delay***

**Prerequisite:** Hydraulic system 12 or 13

Delay for switching on the pump between heat exchanger and buffer tank.

#### ***Heat exchanger – buffer tank pump stop delay***

**Prerequisite:** Hydraulic system 12 or 13

Delay for switching off the pump between heat exchanger and buffer tank.

#### ***Buffer tank top solar setpoint (fast loading until this temperature)***

**Prerequisite:** Hydraulic system 12 or 13

When the upper sensor in the buffer tank reaches the specified value, the solar isolating valve switches to the lower area of the buffer tank.

#### ***Collector - buffer tank top differential***

**Prerequisite:** Hydraulic system 12 or 13

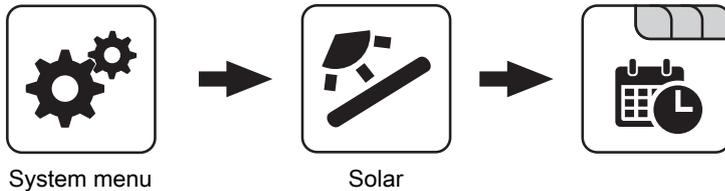
This is the overcharge for the collector pump controller for the top or bottom temperature in the buffer tank.

#### ***Top storage tank – secondary HE flow difference***

**Prerequisite:** Hydraulic system 12 or 13

This parameter indicates how much lower the temperature at the heat exchanger secondary outfeed is than the collector temperature should be. If the difference is less than the set value, the speed of the pump between heat exchanger, DHW tank and storage tank is reduced.

### 4.3.3 Solar - Times



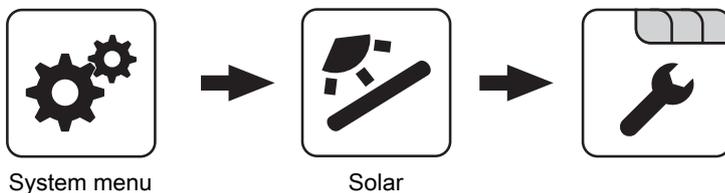
#### *The solar panel system pump is allowed to start from*

If the criteria for starting the collector pump have been reached from the set time, the collector pump starts.

#### *The solar panel system pump is allowed to run until*

Also when the criteria for starting the collector pump have been reached, the collector pump is only active up to the set time.

### 4.3.4 Solar - Service



#### *Solar system*

- 1: The solar panel system supplies only the DHW tank
- 2: The solar panel system supplies only the buffer tank
- 3: The solar panel system is expanded with a switch valve and is used to supply two different heat sinks. For example: Switch from domestic hot water tank to buffer tank, or between top and bottom solar coils with the hygienic solar layered tank or modular solar layered tank with 2 solar coils)

**NOTICE!** This parameter is not displayed when hydraulic system 12 or 13 is set.

#### *Pump output of collector pump*

Pump outlet to which the collector pump is connected.

#### *Control of collector pump*

Definition of control signal for pump type used.

⇒ See "Activation options of pump outlets" [page 126]

#### *Minimum collector pump speed*

Adjustment of the minimum speed to the pump type (set mode of pump in accordance with pump manufacturer).

#### *Maximum collector pump speed*

If you need to limit the maximum speed of the collector pump for systemic reasons, you can do so by adjusting this parameter.

#### *Collector monitoring*

- **YES:** The collector pump is switched on at regular intervals for 10 seconds. The time can be defined using the following parameter. If the collector sensor detects an increase in temperature, the pump is kept on. This function is active from 8:00 am - 7:00 pm and the threshold value of the collector temperature, from which this function is active, is dynamically adjusted.
- **NO:** The collector pump only starts when the criteria which is defined under parameter "Temp differential to start collector pump" is reached.

#### *Collector monitoring every*

If the collector pump is not active within the time window between 8:00 am – 7:00 pm, the pump is activated for 10 seconds at the end of the specified time set. If the collector sensor detects an increase in temperature, the pump is kept on. If no temperature increase on the collector sensor is detected, the collector pump switches off and the time starts to run afresh.

**For solar to store and DHW tank, the DHW tank has priority**

- **YES:** The DHW tank is loaded until the temperature set under "Set DHW temperature during solar charging" is reached. Only then does it switch to the storage tank by means of the switch valve.
- **NO:** The DHW tank is charged until the temperature difference between the sensor on the solar collector and the solar reference sensor in DHW tank is no longer sufficient. The switch valve then switches to the storage tank and supplies it for 20 minutes. Afterwards the collector pump is stopped for 20 minutes and a check is carried out to see if the temperature difference is now sufficient for DHW tank charging.

**Solar charging to which storage tank**

This parameter defines the storage tank to which the solar charging takes place.

**Solar charging to which DHW tank**

This parameter defines the DHW tank to which the solar charging takes place.

**Sensor input of solar collector sensor**

Sensor input to which the collector sensor is connected.

**Sensor input of solar reference storage tank top sensor**

**Prerequisite:** Hydraulic system 12 or 13

Sensor input to which the solar reference sensor in the top part of the buffer tank is connected.

**Sensor input of solar reference storage tank bottom sensor**

Sensor input to which the solar reference sensor in the lower part of the buffer tank is connected.

**Sensor input of secondary HE Sensor flow**

**Prerequisite:** Hydraulic system 12 or 13

Sensor input to which the sensor at heat exchanger flow on the secondary side is connected.

**Sensor input of collector return sensor**

Sensor input to which the sensor for the collector return is connected.

**Pump output of solar isolating valve**

Pump outlet to which the solar isolating valve is connected.

**Pump output of storage tank – heat exchanger pump**

**Prerequisite:** Hydraulic system 12 or 13

Pump outlet to which the pump between the solar heat exchanger and buffer tank is connected.

**Control of storage tank – heat exchanger pump**

**Prerequisite:** Hydraulic system 12 or 13

Definition of control signal for pump type used.

⇒ See "Activation options of pump outlets" [page 126]

**Pump outlet of DHW tank – heat exchanger pump**

**Prerequisite:** Hydraulic system 12

Pump outlet to which the pump between the solar heat exchanger and DHW tank is connected.

**Control of DHW tank – heat exchanger pump**

**Prerequisite:** Hydraulic system 12

Definition of control signal for pump type used.

⇒ See "Activation options of pump outlets" [page 126]

**Invert switch valve output**

**Prerequisite:** Solar system 3, hydraulic system 12 or 13

- **NO:** The pump outlet, to which the solar switch valve is connected, is supplied with 230V if the solar panel system is supplying energy to the DHW tank solar element or the top part of the storage tank. If there is not 230V at this output, the valve clears the way to the storage tank solar element or the lower area of the storage tank.
- **YES:** If the solar switch valve switches incorrectly, the way it is controlled can be adjusted using this parameter.

**Is a PT1000 sensor used as a solar sensor?**

- **NO:** A KTY81 sensor is used as a collector sensor
- **YES:** A PT1000 sensor is used as a collector sensor

**Collector pump control Kp value**

Control parameter for the speed control of the collector pump.

**Collector pump control Tn value**

Control parameter for the speed control of the collector pump.

**Secondary HE pumps control Kp value**

**Prerequisite:** Hydraulic system 12 or 13

Control parameter for the speed control of the pump between the solar heat exchanger and buffer tank, as well as for the pump between the solar heat exchanger and DHW tank (if installed).

**Secondary HE pumps control Tn value**

**Prerequisite:** Hydraulic system 12 or 13

Control parameter for the speed control of the pump between the solar heat exchanger and buffer tank, as well as for the pump between the solar heat exchanger and DHW tank (if installed).

**Minimum pump speed secondary HE**

**Prerequisite:** Hydraulic system 12 or 13

Adjustment of the minimum speed to the pump type (set mode of pump in accordance with pump manufacturer).

**Minimum pump speed secondary HE**

This parameter applies for the pump between the solar heat exchanger and storage tank, as well as for the pump between the solar heat exchanger and DHW tank (if installed).

**4.3.5 Solar - Heat meter**

System menu



Solar

**Collector temperature**

Display of the current temperature at the solar collector.

**Collector return temperature**

**Prerequisite:** Hydraulic system 12 or 13

Display of the current temperature at the collector return.

**Actual power from solar heat meter [kW]**

Display of the current output which is generated by the solar collector. The calculation of the output is only performed either when a per litre output of the collector pump has been set or an external volume pulse transmitter is used. In order to perform the calculation more precisely, the use of a collector return sensor is recommended.

**Flow through [l/h]**

**Prerequisite:** External volume pulse transmitter installed

Display of the water quantity currently being pumped through the solar collector.

**Today's yield [kWh]**

Display of the heat quantity that has been supplied by the solar panel system today.

**Daily yield 1 ... 6 days ago [kWh]**

Shows the historical progression of the solar panel system. The yields of the last 6 days are available.

**Total yield [kWh]**

Display of the heat quantity which has been supplied by the solar panel system since activation of the heat meter.

**Nominal flow of collector pump for heat meter [L/h]**

If no external volume pulse transmitter is used, the pump of the heat meter can be activated by entering the per litre output. The flow rate at 100% collector pump speed must be entered here.

**NOTICE! This parameter can be ignored if using an external volume pulse transmitter.**

**Litres per pulse of flow sensor**

If an external volume pulse transmitter is used, adjust this value according to the volume pulse transmitter used [0.5 – 5 pulses/L].

**Sensor input of collector return sensor**

Sensor input to which the sensor for the collector return is connected.

**Sensor input of heat meter flow temperature sensor**

Sensor input to which the sensor for the heat meter flow temperature is connected.

**Is an external flow through counter used**

- **YES:** An external volume pulse transmitter is in use.

## 4.4 Buffer tank

### 4.4.1 Buffer tank - Status



System menu



Buffer tank



#### *Buffer tank top temperature*

Display of the current temperature in the top part of the buffer tank.

#### *Storage tank temperature sensor 2 ... 7*

**Prerequisite:** Multi-sensor management with 3 – 8 sensors  
Displays the current temperature at the respective sensor position at the storage tank. All of the configured sensors are used to calculate the storage tank charge status.

#### *Buffer tank bottom temperature*

Display of the current temperature in the lower part of the buffer tank.

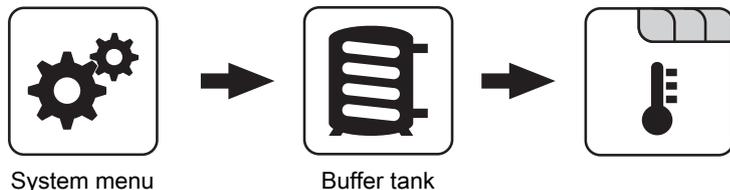
#### *Buffer tank pump control*

Display of the current speed of the buffer loading pump.

#### *Storage tank charge*

Display of the current storage tank charge.

## 4.4.2 Buffer tank - Temperatures

***Heating circuit release from following buffer tank temperature***

Temperature value which must be reached to release the heating circuit pumps in the top part of the buffer tank.

**NOTICE!** This parameter applies for all available heating circuits!

***Boiler start if difference between boiler setpoint and top buffer is larger***

If the difference between the upper buffer tank temperature and the boiler temperature setpoint is greater than the specified value, the boiler starts.

***Start of buffer tank charging from charge***

**Prerequisite:** Master boiler in the cascade or hydraulic system 4

If the buffer tank charge is below the specified value, the boiler starts.

***100% boiler control output when buffer charge is lower than***

**Prerequisite:** Master boiler in the cascade or hydraulic system 4

If the buffer tank charge is below the specified value, the boiler system runs at nominal load.

***0% boiler output if buffer charge is over***

**Prerequisite:** Master boiler in the cascade or hydraulic system 4

If the buffer tank charge is greater than the specified value, the boiler system follows the shutdown procedure.

***Storage tank charge is 100% at boiler setpoint parameter***

**Prerequisite:** Master boiler in the cascade or hydraulic system 4

The storage tank charge is 100% if the average temperature of the storage tank is below the specified boiler temperature setpoint by the specified value. This parameter defines the end point of the charging curve of the storage tank.

***Buffer tank charge is 0% at the following temperature (absolute value)***

**Prerequisite:** Master boiler in the cascade or hydraulic system 4

The buffer tank charge is 0% if the average temperature of the buffer tank reaches the specified value. This parameter defines the base point of the charging curve of the buffer tank.

***Buffer tank fully loaded if temperature difference between boiler and bottom buffer tank***

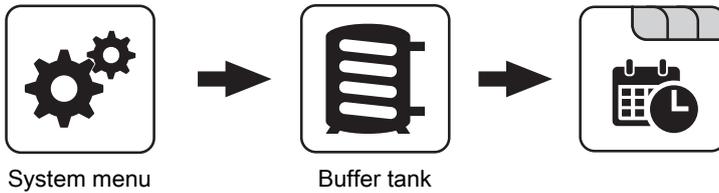
From this difference between the boiler temperature setpoint that has been set and the current temperature in the lower part of the buffer tank, buffer tank loading is stopped.

***Storage tank – storage tank difference***

**Prerequisite:** Variant 3

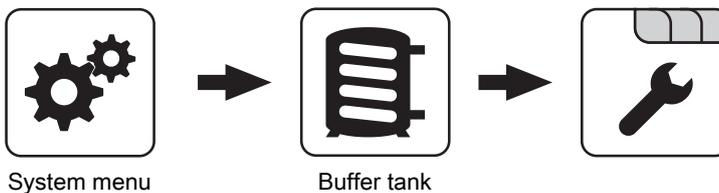
Difference, which must be given for loading a storage tank e.g. in an adjacent building. If this difference is not reached, the storage tank loading stops.

### 4.4.3 Buffer tank - Times



⇒ See "Setting times" [page 137]

### 4.4.4 Buffer tank - Service



#### *Enable heating circuit pump 0 according to top buffer temp.*

- **NO:** Release of heating circuit pump 0 according to the boiler temperature parameter "Minimum boiler temperature to release all pumps"
- **YES:** Release of heating circuit pump 0 according to the temperature in the top part of the buffer tank parameter "Heating circuit release from following buffer tank temperature"

#### *Control buffer tank requests according to system environment*

- **NO:** The start criterion of the boiler is defined via the parameter "Boiler start if difference between boiler setpoint and top buffer is larger".
- **YES:** All heating circuits and DHW tanks that are connected to the boiler system and activated report requirements back to the controller on the basis of temperature specifications or according to the outside air temperature. These requirements are compared with the current temperature in the top buffer tank and if this temperature is too low the boiler is started. If there is no requirement from the system or if the loading criterion is fulfilled, the boiler switches off.

#### *According to system environment, buffer tank request shutdown delay of*

If there is no requirement from the heating circuit and DHW tank, the boiler system stops at the end of the specified time.

**NOTICE!** Parameter only if "Control buffer tank requests according to system environment" parameter is relevant.

#### *Sensor input of storage tank top sensor*

Sensor input to which the sensor in the top part of the buffer tank is connected.

#### *Sensor input of storage tank sensor 2-7*

The number of sensors displayed depends on the configuration. All of the configured sensors are used to calculate the storage tank charge status.

#### *Sensor input of storage tank middle sensor*

Sensor input to which the sensor in the mid area of the buffer tank is connected.

#### *Sensor input of storage tank bottom sensor*

Sensor input to which the sensor in the bottom part of the buffer tank is connected.

#### *Pump output of storage tank pump*

Pump outlet to which the buffer loading pump is connected.

#### *Control of storage tank pump*

Definition of control signal for pump type used.

⇒ See "Activation options of pump outlets" [page 126]

#### *Minimum storage tank pump speed*

Adjustment of the minimum speed to the pump type (set mode of pump in accordance with pump manufacturer).

#### *Maximum buffer tank pump speed*

If you need to limit the maximum speed of the store loading pump for systemic reasons, you can do so by adjusting this parameter.

#### *Minimum value for the reload quantity*

If the calculated reload quantity is less than the minimum value setting, an instruction is displayed to the user that he need not heat up/reload.

#### *If the boiler is active then charge all storage tanks*

**Prerequisite:** Variant 3 or variant 4

- **YES:** Starting the boiler due to a heating requirement by the storage tank in the boiler system not only loads this storage tank, but all of the storage tanks in sub-stations. This increases the runtime related to a boiler system start.

#### *Pump outlet for storage tank relief valve*

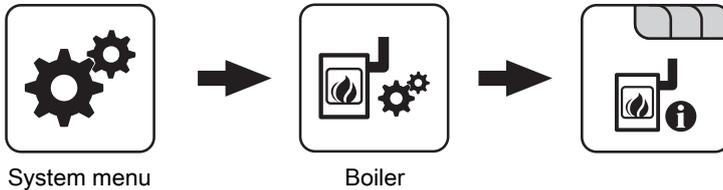
The switch valve switches off part of the layered tank until an adjustable temperature has been reached in the top of the layered tank so that the boiler reaches the temperature more quickly. Once this temperature has been reached, the switch valve switches back and the entire volume of the layered tank is available to the boiler.

#### *Invert pump outlet for buffer relief valve*

- **YES:** If the valve switches incorrectly, the way it is controlled can be changed using this parameter.

## 4.5 Boiler

### 4.5.1 Boiler - Status



#### **Boiler temperature**

Display of the current boiler temperature.

#### **Flue gas temperature**

Display of the current flue gas temperature. If a flue gas temperature sensor is not connected, the board temperature of the core modules is displayed.

#### **Flue gas setpoint**

Display of the calculated flue gas setpoint.

#### **Boiler control variable**

Display of the signal for the combustion controller.

#### **ID fan control**

Display of the current ID fan control.

#### **ID fan speed**

Display of the current ID fan speed.

#### **Air flap control**

Display of the current position which the air flap should move to.

#### **Position of the air flap**

Display of the current position of the air flap.

#### **Primary air**

Display of the current value of the primary air flap according to controller.

#### **Position of primary air flap**

Display of the current position of the primary air flap (adjusted for the air settings).

#### **Residual oxygen content**

Display of the current residual oxygen content.

#### **Oxygen control**

Display of control of primary and secondary air flap.

#### **Calculated boiler setpoint**

Display of the current boiler temperature setpoint depending on the specified hydraulic system.

#### **Return setpoint calculated**

**Prerequisite:** Maintaining outfeed through return feed mixer

#### **Sensor 1**

Display of the current temperature at sensor 1.

#### **Return sensor**

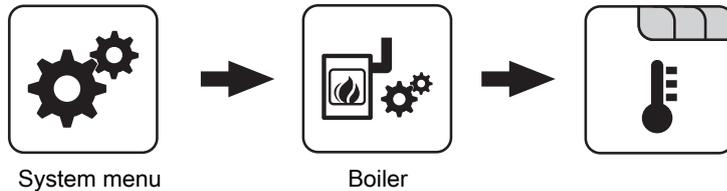
**Prerequisite:** Return temperature control with mixing valve or bypass pump

Display of the current temperature at the boiler return.

#### **Stoker temperature**

Display of the current temperature at the stoker sensor.

## 4.5.2 Boiler - Temperatures

**Boiler temperature setpoint**

The boiler temperature is regulated to this temperature.

Setting range T4: 60 – 90 °C

Setting range TX / T1 / T4e: 70 – 90 °C

**Shutdown if current boiler temperature is higher than boiler setpoint +**

If the boiler temperature setpoint is exceeded by this value, the boiler follows the shutdown procedure. The boiler starts up again below the boiler temperature setpoint.

**Always shutdown when boiler maximum setpoint is exceeded by +**

If the maximum boiler temperature setpoint is exceeded by this value, the available heating circuit pumps and DHW tank loading pumps are also activated for cooling the boiler. If the current boiler temperature falls below the boiler temperature setpoint, the boiler starts up again.

**Minimum boiler temperature to release all pumps**

When the current boiler temperature reaches this value, the storage tank loading pump starts (hysteresis: 2°C).

**Minimum return temperature**

**Prerequisite:** Return temperature control with mixing valve  
Minimum temperature of return to boiler.

**Enable return mixer only with active storage tank pump**

**Prerequisite:** "Variant 2 and 5" or "Variant 3"

Return mixer is controlled only when the store loading pump is active. If the pump stops, the mixer closes the total return / opens the bypass.

**Target temperature difference, flow/return temp.**

Defines the desired difference between flow and return temperature in boiler heating mode.

**Return setpoint delay**

**Prerequisite:** Maintaining outfeed through return feed mixer

Waiting time for calculating the return temperature setpoint adjustment. Once the specified time has passed, the heating system temperatures are evaluated.

**Return setpoint boost (power influence)**

**Prerequisite:** Maintaining outfeed through return feed mixer

This parameter determines how heavily the deviation of the actual boiler temperature from the boiler temperature setpoint is weighted.

**Return feed lift at min. dif. at min. output**

**Prerequisite:** Maintaining outfeed through return feed mixer

Minimum difference between boiler temperature setpoint and return temperature setpoint. The temperature difference between the boiler outfeed temperature and boiler return temperature should not be below this value. This parameter applies to partial load of the boiler.

**Return feed lift min. dif. at 100% output**

**Prerequisite:** Maintaining outfeed through return feed mixer

Minimum difference between boiler temperature setpoint and return temperature setpoint. The temperature difference between the boiler outfeed temperature and boiler return temperature should not be below this value. This parameter applies to nominal load of the boiler.

An interpolation is made between the two parameters between partial load and nominal load.

**Heating circuit overheat invariable mode**

**Prerequisite:** Variable mode activated or boiler system in the cascade

The boiler setpoint temperature in heating mode is increased by this value compared to the required flow temperature.

**Use quick throttle function at RL temperature increase**

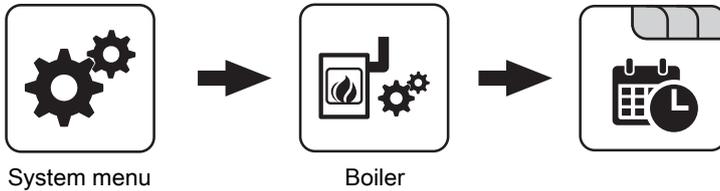
- **YES:** Response to fast load change. If quick regulation is switched on, the return temperature is permanently monitored and if it increases unusually quickly (e.g. because a major consumer has dropped out), the feed is immediately reduced to the minimum setting so that the boiler does not overheat.

**Temperature rise in return feed for quick regulation**

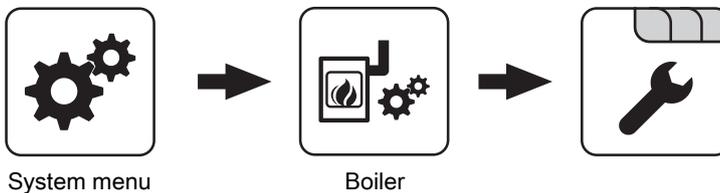
The quick regulation responds to this temperature increase within the set monitoring time.

**Monitoring time of temperature rise in return**

Monitoring time of temperature rise in return (for start of quick regulation).

**4.5.3 Boiler - Times**

⇒ See "Setting times" [page 137]

**4.5.4 Boiler - Service****Variable mode activated**

- **NO:** The boiler temperature is regulated to the boiler temperature setpoint that is set. When used in conjunction with a storage tank, this parameter should be set to "NO".
- **YES:** The boiler temperature is regulated according to the calculated flow value for the heating circuit/DHW tank.

**Mixer runtime**

**Prerequisite:** Return temperature control with mixing valve  
Setting the runtime of the mixer used for the return temperature control.

**Recommendation:** To reduce mixer vibration, do not set value below 150s!

**Control boiler loading pump using pump 1**

**Prerequisite:** System 0, system 3 or variant 4

- **NO:** Connection of boiler loading pump at output "HKP0" on core module
- **YES:** Connection of boiler loading pump at output "Pump 1 on core module"

**Control of boiler loading pump**

**Prerequisite:** System 0, system 3 or variant 4

- Definition of control signal for pump type used.

⇒ See "Activation options of pump outlets" [page 126]

**Control of boiler loading pump in operation****Prerequisite: Variant 4**

Variant 4 has no speed control of the boiler loading pump. If you need to limit the speed of the boiler loading pump for systemic reasons, you can do so by adjusting this parameter.

**Function of boiler pump collective fault sig.**

Defines whether and how the input of the boiler pump's collective fault message is to be interpreted.

**Input for boiler pump collective fault signal**

Preferred digital module address of boiler pump collective fault input

**Boiler pump collect. fault sig.**

Current input signal.

## 4.5.5 Boiler - General settings



System menu

Boiler

**Modem installed**

- **NO:** The boiler does not have a modem for data transfer installed.
- **YES:** The boiler has a modem for data transfer installed.

**Memory cycle of data logger**

If the boiler is equipped with a data logger the most important boiler data is stored on a SD card. This parameter specifies at what intervals the recording should be started.

**Output warnings through fault message relays**

- **NO:** When there is an "error" or "alarm" the common fault relay closes.
- **YES:** In addition to an "error" or "alarm", the common fault relay closes when a "warning" is present on the boiler.

**Which temperature scale should be used**

- **Celsius (°C):** Displayed temperature values and settings are shown in °C.
- **Fahrenheit (°F):** Displayed temperature values and settings are shown in °F.

**Always log data in °C**

- **YES:** In conjunction with a data logger, all temperature values are saved in °C.
- **NO:** In conjunction with a data logger, all temperature values are saved in °F.

**Send a line break when ASCII data output on COM2**

- **NO:** When a new data set is issued it will be added to the previous one.
- **YES:** A line break for better visualisation is sent between the individual data sets.

**Reset counter since last maintenance**

- **NO:** The service hours counter since last maintenance continues to run.
- **YES:** The service hours counter since last maintenance is set to "0".

**Source for ext. power demand (0 - off, 1 - 0-10V, 2 - Modbus)**

Defines whether the boiler is controlled via an external power demand. If "1 - 0-10V" or "2 - Modbus" is selected as the source, the boiler release and output can be controlled via an adjustable input at the analogue module (0-10V) or via the modbus.

⇒ See "External power demand" [page 27]

**Invert ext. power demand via analogue input**

Designed to invert the input signal (0V = 0% ⇒ 0V = 100%).

**Input external power demand**

Current input value for the external power demand.

**Current external power demand**

Current effective specified value for the boiler taking the minimum times into consideration.

**Adopt specified material values**

**YES:** The preset boiler parameters for the chosen fuel selection are adopted. When the process is completed the parameter changes back to "NO".

**Adopt specified boiler values**

**YES:** The preset boiler parameters for the selected boiler type are adopted. When the process is completed the parameter changes back to "NO".

**Adopt standard settings (all values are reset)**

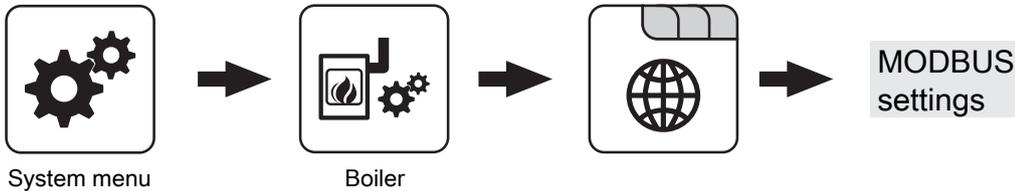
- **YES:** Adopting standard factory settings. This resets all parameters! Once the settings have been applied, the parameter automatically switches to "NO" and the boiler must be reset, otherwise, boiler function is no longer guaranteed.

**EEPROM reset**

- **YES:** All boiler settings and system configurations are deleted. The boiler is only functional again once it has been recommissioned by Froling customer services or authorized installer.

**Analogue module input for external power demand**

Defines the input for the external power demand with a specified power of "0-10V" (address of analogue module and input terminal, e.g. 0.3).

**Boiler - General settings - MODBUS settings****COM 2 is used as a MODBUS interface**

- **NO:** The COM 2 interface sends the most important boiler values every second.
- **YES:** The COM 2 interface can be used to connect a MODBUS (RTU/ASCII).

**MODBUS address**

Defines the address of the boiler in the Modbus network.

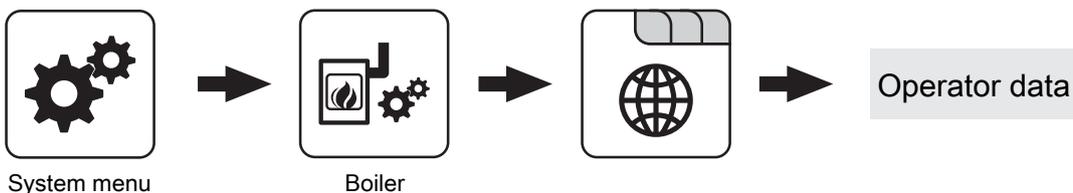
**MODBUS protocol (1 – RTU / 2 – ASCII)**

Indicates which Modbus protocol is to be used for the transfer. Which protocol must be used can be found in the documentation of the Modbus system used on site.

**Use MODBUS protocol 2014?**

Indicates whether the Modbus protocol 2014 is to be used for communication. In this version, parameters can be written at the customer level. In addition to the previous version, the element addresses are newly grouped thematically.

If the parameter is set to "NO", the functionality and the element addresses remain the same as in the previous version to ensure compatibility with existing systems in the event of software updates.

**Boiler - General settings - Operator data****Production number**

For unique identification of the boiler on the froeling-connect server, the facility number listed on the identification plate must be set here.

**Customer number**

By setting the customer number, this is automatically transferred into the commissioning report when it is saved.

**Boiler number**

By setting the boiler number, this is automatically transferred into the commissioning report when it is saved.

## 4.6 Boiler 2

### 4.6.1 Boiler 2 - Status



#### *Temperature of secondary boiler*

Display of the current boiler temperature of the secondary boiler.

#### *Burner relay status*

Shows the current status of the burner relay:

- 0: Secondary boiler not active
- 1: Secondary boiler active

#### *Standby boiler pump*

**Prerequisite:** "Switch valve installed" parameter set to "NO"

Display of the current pump control for the standby boiler.

#### *Standby boiler switch valve*

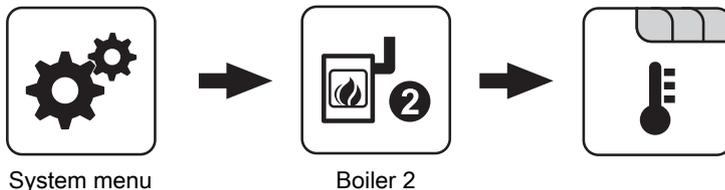
**Prerequisite:** "Switch valve installed" parameter set to "YES"

Display of the current switch valve control of the standby boiler.

#### *Manual start of secondary boiler (only when ID fan is switched off)*

- **OFF:** Secondary boiler is controlled according to the program that is set
  - **ON:** Secondary boiler is activated immediately
- NOTICE! Burner blockage noted.**

### 4.6.2 Boiler 2 - Temperatures



#### *Secondary boiler start delay*

If there is a requirement from the heating circuit or DHW tank and the buffer tank or boiler has insufficient temperature, the secondary boiler starts after the specified delay time set here.

#### *Disable startup delay in case of fault?*

Indicates whether the startup delay is ignored in the event of a boiler fault and whether the standby boiler is activated immediately on request.

#### *Deactivate startup delay when boiler is switched off?*

Indicates whether the startup delay is ignored when the boiler is switched off and whether the standby boiler is activated immediately on request.

#### *Secondary boiler start, if buffer tank top temperature is below*

If the temperature in the top part of the buffer tank falls below the specified value, the secondary boiler is started once the set duration has elapsed.

#### *Start standby boiler only after storage tank top*

Standby boiler enabled after temperature decreases below minimum temperature on top storage tank. No consumers are taken into consideration.

#### *Secondary boiler minimum runtime*

If the secondary boiler is started, it will run for at least the length of time set here.

**No heat pump operation when outside air temperature less than**

**Prerequisite:** Heat pump as standby boiler

The heat pump stops working below the set temperature. This avoids operation with high energy consumption when the temperature outside is cold.

**Maximum outfeed temperature for heat pump operation**

**Prerequisite:** Heat pump as standby boiler

If a flow temperature higher than the set value is required, the main boiler takes over.

**Main boiler minimum runtime**

**Prerequisite:** Heat pump as standby boiler

If the main boiler is in operation, it only shuts down after the minimum runtime of the main boiler if the criteria for heat pump operation are fulfilled. This should prevent excessively short runtimes of the main boiler.

**Minimum temperature of secondary boiler**

When the secondary boiler reaches the specified temperature, the loading pump is started and switches the isolating valve.

**Temperature difference between secondary boiler and buffer tank**

Temperature difference between secondary boiler and upper temperature in layered tank to activate the loading pump of the secondary boiler.

**Oil valve shut delay**

If the current boiler temperature of the secondary boiler falls below the value that is set under "Minimum temperature of secondary boiler", the isolating valve only switches once the set duration has elapsed.

**4.6.3 Boiler 2 - Service**

System menu



Boiler 2

**Control secondary boiler variably to the target value**

- **NO:** The secondary boiler is operated with the boiler temperature that is set on the secondary boiler thermostat.
- **YES:** The boiler temperature of the secondary boiler is regulated to the target temperature specified from the heating circuit or DHW tank.

**Sensor input of backup boiler sensor**

Sensor input to which the sensor for the secondary boiler is connected.

**Pump output of secondary boiler unloading**

Pump outlet to which the loading pump of the secondary boiler or the secondary boiler switch valve is connected.

**Control of boiler 2 pump**

Definition of control signal for pump type used.

⇒ See "Activation options of pump outlets" [page 126]

**Maximum speed of boiler 2 pump**

If you need to limit the maximum speed of the loading pump of the secondary boiler for systemic reasons, you can do so by adjusting this parameter.

**Invert secondary boiler isolating valve**

**YES:** If the valve switches incorrectly, the way it is controlled can be adjusted using this parameter.

**Burner relay**

- **A:** Standby boiler is controlled according to the program that is set.
- **1:** Standby boiler was started manually.
- **0:** Standby boiler was stopped manually.

## 4.7 Fuel

### 4.7.1 Fuel - Service



#### *Fuel selection*

- Dry chip
- Wet chip
- Pellets

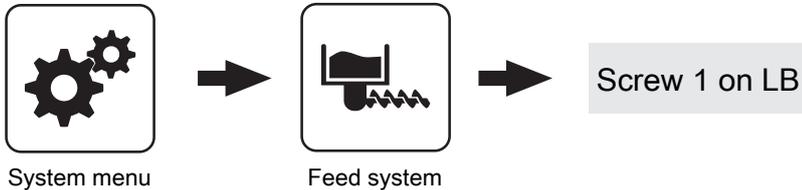
After setting the fuel a prompt appears to adopt the specified material values. This must be confirmed with "YES".

#### *Adopt specified material values*

- **YES:** The preset boiler parameters for the chosen fuel selection are adopted. When the process is completed the parameter changes back to "NO".

## 4.8 Feed system

### 4.8.1 Feed system - Screw 1 on LB



#### *Screw active*

- **NO:** Screw 1 on feed system module is not used.
  - **YES:** Screw 1 on feed system module is used.
- “Screw 1” output  
 – “Drop box cover 1” input  
 – “Light barrier 1” connection

#### *Nominal current for screw 1*

Nominal current for the motor of “screw 1” motor according to the identification plate on the motor.

#### *During troubleshooting of feed screw, it turns backwards for*

Duration, how long should the feed screw turn backwards during troubleshooting.

#### *During troubleshooting of feed screw, it turns forwards for*

Duration, how long should the feed screw turn forwards during troubleshooting.

#### *Switch-on delay feed screw light barrier*

Feed screw startup delay. If no fuel is detected in the gravity shaft over the set time, the feed screw will start.

#### *Switch-off delay feed screw light barrier*

Feed screw switch-off delay. If no fuel is detected in the gravity shaft during the set time, the feed screw will stop.

#### *Maximum idle time of screw*

Time delay until an error in the material recognition is tripped.

#### *Forced infeed after*

The forced infeed happens after the runtime of the follow-up screws. The screw is activated after a certain period of time, even though the light barrier can currently still see material.

#### *Forced infeed maximum runtime*

Maximum duration of forced infeed. The screw then pauses.

#### *Forced infeed attempts*

If the light barrier still does not come down after the set number of forced infeeds, an error message will be issued.

#### *Screw at address*

Address at which the screw has been connected.

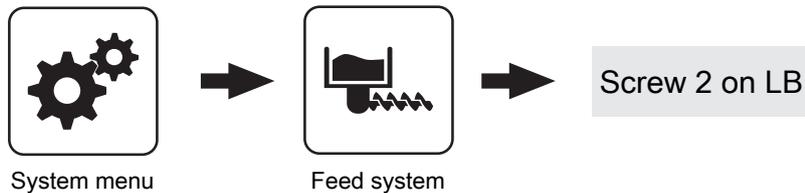
#### *Minimum current monitoring active*

Indicates whether the minimum current is being monitored during operation.

#### *Operating hours of screw on LB*

Operating hours of screw on light barrier.

## 4.8.2 Feed system - Screw 2 on LB

**Screw active**

- **NO:** Screw 2 on feed system module is not used.
- **YES:** Screw 2 on feed system module is used.
- “Screw 2” output
- “Gravity shaft cover 2” input
- “Light barrier 2” connection

**Nominal current for screw 2**

Nominal current for the motor of “screw 2” motor according to the identification plate on the motor.

**During troubleshooting of feed screw, it turns backwards for**

Duration, how long should the feed screw turn backwards during troubleshooting.

**During troubleshooting of feed screw, it turns forwards for**

Duration, how long should the feed screw turn forwards during troubleshooting.

**Switch-on delay feed screw light barrier**

Feed screw startup delay. If no fuel is detected in the gravity shaft over the set time, the feed screw will start.

**Switch-off delay feed screw light barrier**

Feed screw switch-off delay. If no fuel is detected in the gravity shaft during the set time, the feed screw will stop.

**Maximum idle time of screw**

Time delay until an error in the material recognition is tripped.

**Forced infeed after**

The forced infeed happens after the runtime of the follow-up screws. The screw is activated after a certain period of time, even though the light barrier can currently still see material.

**Forced infeed maximum runtime**

Maximum duration of forced infeed. The screw then pauses.

**Forced infeed attempts**

If the light barrier still does not come down after the set number of forced infeeds, an error message will be issued.

**Minimum current monitoring active**

Indicates whether the minimum current is being monitored during operation.

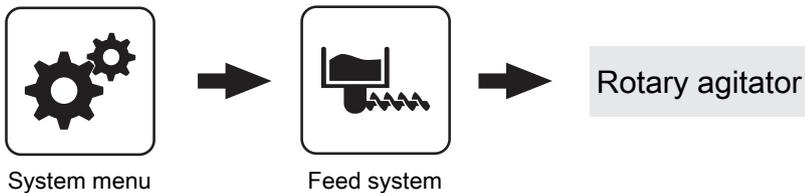
**Operating hours of screw on LB**

Operating hours of screw on light barrier.

**Screw at address**

Address at which the screw has been connected.

### 4.8.3 Feed system - Rotary agitator



#### Mode

- **OFF:** Rotary agitator with separate drive system is deactivated
- **Auto FULL / EMPTY:** The boiler controller makes the decision whether the bunker is full or empty based on the measured current of the motor of the separate rotary agitator drive, which gives the runtime of the rotary agitator with separate drive.
- **Bunker FULL:** The runtime of the rotary agitator with separate drive system is defined via the parameter "Weighting of screw runtime when bunker is FULL", regardless of whether the bunker is full or empty.
- **Bunker EMPTY:** The runtime of the rotary agitator with separate drive system is defined via the parameter "Weighting of screw runtime when bunker is EMPTY", regardless of whether the bunker is full or empty.

#### Nominal current for rotary agitator

Setting the nominal current of the rotary agitator with separate drive according to the identification plate on the motor.

#### Bunker FULL at % of nominal current

Threshold value in % of motor nominal current from the rotary agitator with separate drive above which a full bunker is assumed.

- If the actual power consumption exceeds the set percentage value of the motor nominal current, the boiler controller evaluates this as a full bunker and the control of the rotary agitator with separate drive is defined via the "Weighting of screw runtime when bunker is FULL" parameter.
- If the actual power consumption falls below the set percentage value of the motor nominal current, the boiler controller evaluates this as an empty bunker and the control of the rotary agitator with separate drive is defined via the "Weighting of screw runtime when bunker is EMPTY" parameter.

#### Cycle time:

Cycle time for calculating the runtime of the rotary agitator with separate drive system.

#### Weighting of screw runtime when bunker is FULL

The total runtime of all screws is added up within the cycle time. This parameter defines the runtime of the rotary agitator with separate drive when bunker is full in the next cycle.

#### Weighting of screw runtime when bunker is EMPTY

The total runtime of all screws is added up within the cycle time. This parameter defines the runtime of the rotary agitator with separate drive when the bunker is empty in the next cycle.

#### Rotary agitator at address

Indicates the output at which the rotary agitator drive is controlled.

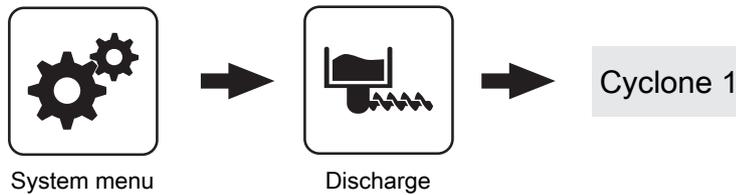
#### Minimum current monitoring active

- **YES:** A failure of measured phase is detected.

#### Service hours of rotary agitator

Operating hours of rotary agitator if rotary agitator has its own drive.

## 4.8.4 Discharge - Cyclone 1 (feed system-configuration 8)

**Cyclone active**

- **NO:** Cyclone on the vacuum discharge system is not in use.
- **YES:** Cyclone on the vacuum discharge system is in use.

**Active suction system**

**Prerequisite:** 1-2-3 suction module when using up to three identical discharge systems.

Specifies which discharge system is currently being used.

**Active probe**

**Prerequisite:** 1-2-3 suction module in combination with RS4 / RS8 pellet suction system

Probe of the active discharge system, which is used for suction.

**Cyclone status**

Shows the current status of the cyclone.

**Status of the vacuum discharge system**

Shows the current status of the vacuum discharge system that feeds the cyclone.

**Switch-on delay MIN sensor**

Duration after which the suction turbine is activated.

**Suction system 1 ... 3**

**Prerequisite:** 1-2-3 suction module in combination with RS4 / RS8 pellet suction system

Submenu of the respective suction system (RS4 / RS8) to enable/disable the corresponding suction positions.

**Empty the cyclone completely after how many filling operations?**

Specifies after how many fillings the cyclone is to be completely emptied.

**Maximum time until switching of probe**

**Prerequisite:** Feed system 4 probe switch or 8 probe switch

Time period, during which the cyclone must reach a fill level of 100% from a probe. If this time is exceeded, the change-over unit automatically changes to the next probe. If all probes are started and the fill level of 100% in the cyclone is not reached, an error message appears on the display.

**Probe suction reversal for**

**Prerequisite:** RS4 / RS8 pellet suction system

Before switching to the next probe, the probe that was last used is back-flushed for the time set.

**Max. runtime of suction fan**

**Prerequisite:** Feed system bag silo or suction screw

If the 100% fill level in the cyclone has not been reached within the specified runtime, the suction turbine switches off.

**Vacuum + screw filling run-on after reaching the MAX fill level**

Specifies how long the suction screw should deliver material after reaching the maximum fill level in the cyclone. After this runtime, the run-on time of the suction turbine starts (parameter "Suction run-on")

**Suction run-on**

When the fill level sensor detects fuel in the cyclone, the suction turbine remains active for the time set.

**Is position 1 ... 8 of the change-over unit being used?**

To enable/disable the individual suction positions of the RS4 / RS8 suction system.

**Vibration timing**

The default vibration interval timing is 60%:  
Time basis: 100 sec. → 60 sec. on / 40 sec. pause

**Screw cycle**

Discharge screw runtime, minus an adjustable pause time. The pause time is determined by the parameter "Preliminary suction".

**Nominal current for discharge screw**

Nominal current of the suction screw motor according to the identification plate on the motor.

**During troubleshooting of suction screw, this turns backwards for**

Duration, how long should the suction screw turn backwards during troubleshooting.

**During troubleshooting of suction screw, this turns forwards for**

Duration, how long should the suction screw turn forwards during troubleshooting.

**Minimum current monitoring active**

- **YES:** A failure of measured phase is detected.

**Service hours of suction screw**

**Prerequisite:** Large-scale suction system with one cyclone and 2 rotary valves.

operating hours of suction screw discharge on a GASS.

**Suction turbine operating hours**

Counter for the operating hours of the suction turbine.

**Preliminary suction time**

Time before the discharge screw starts.

**Suction zone 1 ... 3 activated**

A suction zone can be activated or deactivated. Deactivated suction zones are skipped when changing the suction zones.

**Screw cycle**

Discharge screw runtime, minus an adjustable pause time.

**Screw at address**

Address at which the screw has been connected.

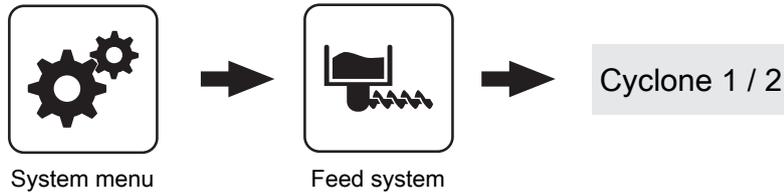
**Pellet mole run-on, applies after the MAX sensor triggered**

The pellet mole remains activated for the set time when the cyclone is full.

**Pellet mole cyc**

Total time of a pellet mole's cycle.

## 4.8.5 Feed system - Cyclone 1 (suction screw)

**Cyclone active**

- **NO:** Cyclone on the vacuum discharge system is not in use.
- **YES:** Cyclone on the vacuum discharge system is in use.

**Preliminary suction time**

**Prerequisite:** Feed system suction screw

After the start of a filling process, the suction screw starts after this period of delay.

**Max. runtime of suction fan**

**Prerequisite:** Feed system bag silo or suction screw

If the 100% fill level in the cyclone has not been reached within the specified runtime, the suction turbine switches off.

**Vacuum + screw filling run-on after reaching the MAX fill level**

Specifies how long the suction screw should deliver material after reaching the maximum fill level in the cyclone. After this runtime, the run-on time of the suction turbine starts (parameter "Suction run-on")

**Suction run-on**

When the fill level sensor detects fuel in the cyclone, the suction turbine remains active for the time set.

**Address at screw**

Address of output at discharge module, to which the suction screw motor is connected.

**Screw cycle**

Discharge screw runtime, minus an adjustable pause time. The pause time is determined by the parameter "Preliminary suction".

**Nominal current for discharge screw**

Nominal current of the suction screw motor according to the identification plate on the motor.

**During troubleshooting of suction screw, this turns backwards for**

Duration, how long should the suction screw turn backwards during troubleshooting.

**During troubleshooting of suction screw, this turns forwards for**

Duration, how long should the suction screw turn forwards during troubleshooting.

**Minimum current monitoring active**

- **YES:** A failure of measured phase is detected.

**Service hours of suction screw**

**Prerequisite:** Large-scale suction system with one cyclone and 2 rotary valves.  
operating hours of suction screw discharge on a GASS.

**Suction turbine operating hours**

Counter for the operating hours of the suction turbine.

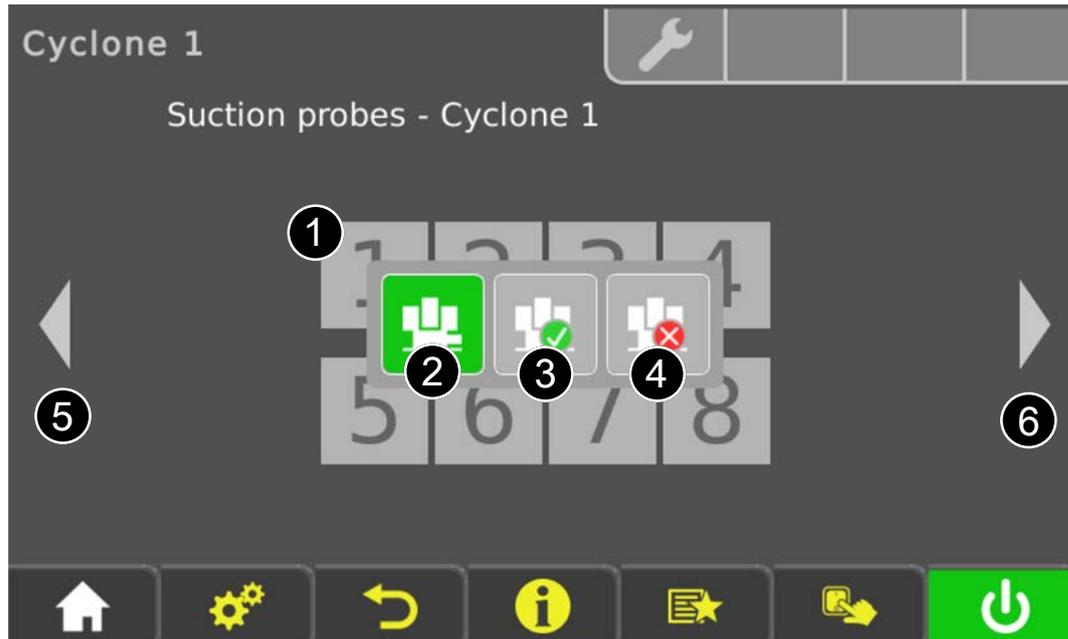
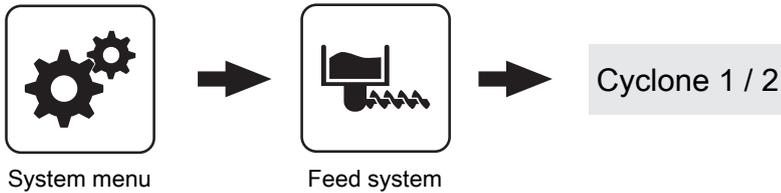
**Pellet mole run-on, applies after the MAX sensor triggered**

The pellet mole remains activated for the set time when the cyclone is full.

**Pellet mole cyc**

Total time of a pellet mole's cycle.

## 4.8.6 Feed system - Cyclone 1 (4/8x toggle)



Number	Description
1	Overview of the maximum available suction probes. If the RS4 suction system is selected, only four positions are shown. Tap the respective suction point to open a window in which various functions can be called up.
2	Selected suction point should be started by the selection unit probes. The area of the suction point flashes alternately grey/green until the desired position is reached.
3	Selected suction point is available.
4	If the selected suction point is generally not in use or should not be used due to a problem (suction hose, blockage by pellets, etc.) the suction point can be locked by tapping on this area.
5, 6	Buttons for switching between cyclone 1 and cyclone 2.

**Cyclone active**

- **NO:** Cyclone on the vacuum discharge system is not in use.
- **YES:** Cyclone on the vacuum discharge system is in use.

**Maximum time until switching of probe**

**Prerequisite:** Feed system 4 probe switch or 8 probe switch

Time period, during which the cyclone must reach a fill level of 100% from a probe. If this time is exceeded, the change-over unit automatically changes to the next probe. If all probes are started and the fill level of 100% in the cyclone is not reached, an error message appears on the display.

**Probe suction reversal for**

**Prerequisite:** RS4 / RS8 pellet suction system

Before switching to the next probe, the probe that was last used is back-flushed for the time set.

**Suction run-on**

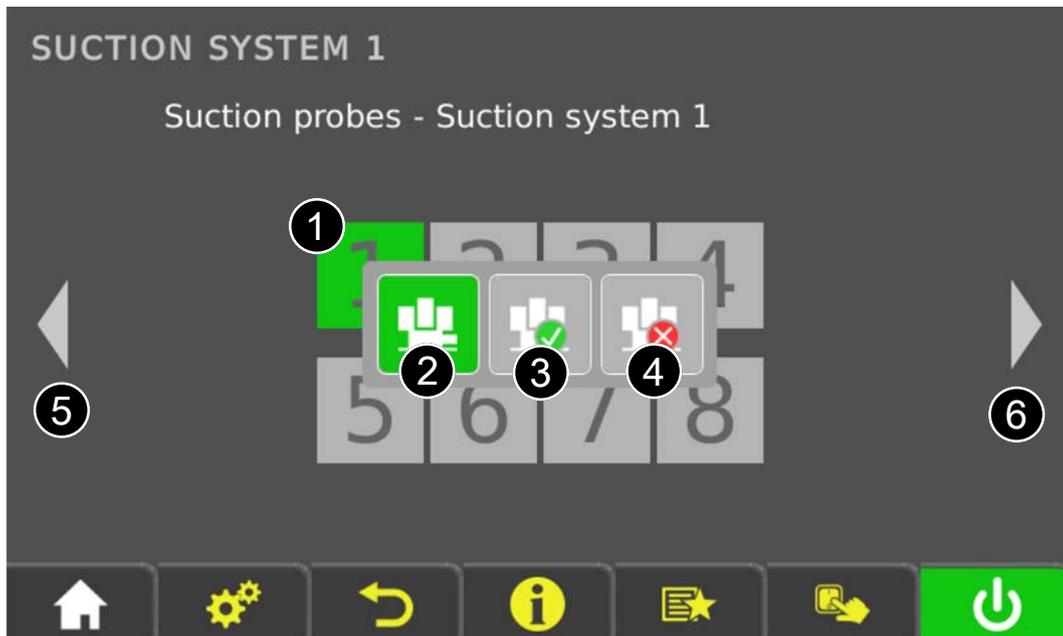
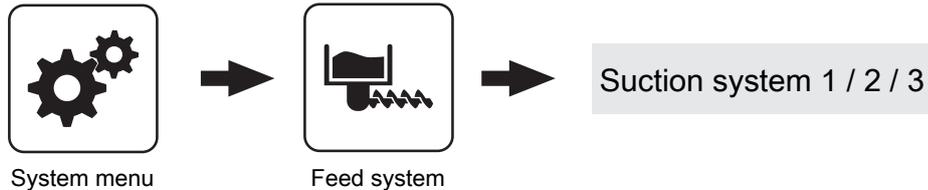
When the fill level sensor detects fuel in the cyclone, the suction turbine remains active for the time set.

**Suction turbine operating hours**

Counter for the operating hours of the suction turbine.

**Is position 1 ... 8 of the change-over unit being used?**

To enable/disable the individual suction positions of the RS4 / RS8 suction system.

**4.8.7 Feed system - Cyclone 1 (1-2-3 suction module)**

Number	Description
1	Overview of the maximum available suction probes. If the RS4 suction system is selected, only four positions are shown. Tap the respective suction point to open a window in which various functions can be called up.
2	Selected suction point should be started by the selection unit probes. The area of the suction point flashes alternately grey/green until the desired position is reached.
3	Selected suction point is available.
4	If the selected suction point is generally not in use or should not be used due to a problem (suction hose, blockage by pellets, etc.) the suction point can be locked by tapping on this area.
5, 6	If a combination of several RS4/RS8 pellet discharge systems is being used, then these buttons can be used to switch to the other suction systems.

**Active suction system**

**Prerequisite:** 1-2-3 suction module when using up to three identical discharge systems.

Specifies which discharge system is currently being used.

**Cyclone active**

- **NO:** Cyclone on the vacuum discharge system is not in use.
- **YES:** Cyclone on the vacuum discharge system is in use.

**Active probe**

**Prerequisite:** 1-2-3 suction module in combination with RS4 / RS8 pellet suction system

Probe of the active discharge system, which is used for suction.

**Cyclone status**

Shows the current status of the cyclone.

**Controlling the suction zones**

A suction zone can be activated or deactivated. Deactivated suction zones are skipped during changeover.

**Status of the vacuum discharge system**

Shows the current status of the vacuum discharge system that feeds the cyclone.

**Inputs**

Displays the current operation of the inputs.

**Outputs**

Displays the current operation of the outputs.

**Empty the cyclone completely after how many filling operations?**

Specifies after how many fillings the cyclone is to be completely emptied.

**Switch-on delay MIN sensor**

Duration after which the suction turbine is activated.

**Maximum time until switching of probe**

**Prerequisite:** Feed system 4 probe switch or 8 probe switch

Time period, during which the cyclone must reach a fill level of 100% from a probe. If this time is exceeded, the change-over unit automatically changes to the next probe. If all probes are started and the fill level of 100% in the cyclone is not reached, an error message appears on the display.

**Suction turbine operating hours**

Counter for the operating hours of the suction turbine.

**Vibration timing**

The default vibration interval timing is 60%:  
Time basis: 100 sec. → 60 sec. on / 40 sec. pause

**Pellet mole run-on, applies after the MAX sensor triggered**

The pellet mole remains activated for the set time when the cyclone is full.

**Pellet mole cyc**

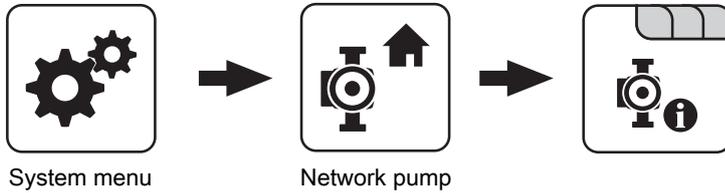
Total time of a pellet mole's cycle.

**Preliminary suction time**

Time before the discharge screw starts.

## 4.9 Network pump

### 4.9.1 Network pump - Status



#### *Network return temperature*

Display of the current return temperature of the remote line.

#### *Network pump speed*

Specifies the current speed of the network pump.

#### *Return temperature distributor 1*

**Prerequisite:** Variant 1 and feeder pump for distributor 1 installed

Display of the current return temperature from distributor 1.

#### *Speed, distributor 1 pump*

**Prerequisite:** Variant 1 and pump for distributor 1 installed

Display of the current speed of distributor 1 pump.

#### *Return temperature distributor 2 ... 4*

**Prerequisite:** Variant 2 or variant 3 and pump for distributor 2 ... 4 installed

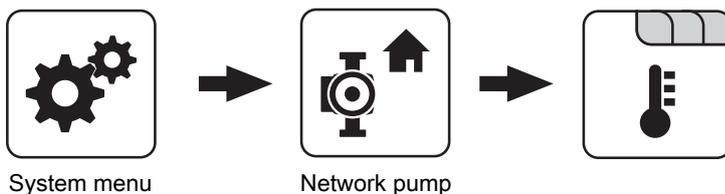
Display of the current return temperature from distributor 2 ... 4.

#### *Speed, distributor 2 ... 4 pump*

**Prerequisite:** Variant 2 or variant 3 and pump for distributor 2 ... 4 installed

Display of the current speed of the distributor 2 ... 4 pump.

### 4.9.2 Network pump - Temperatures



#### *Network return setpoint*

**Prerequisite:** Network pump installed

The network return setpoint is regulated to the value set here. When the network return temperature reaches the specified value, the network pumps starts up at minimum speed.

#### *Return temperature setpoint distributor 1*

**Prerequisite:** Variant 1 and pump for distributor 1 installed

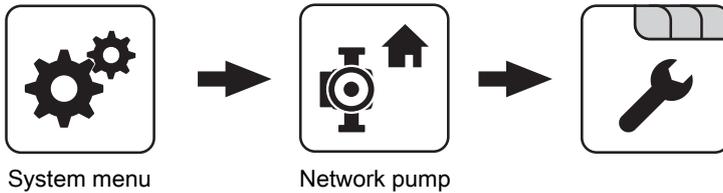
The return temperature from distributor 1 is regulated to the value set here. When the return temperature from distributor 1 reaches the specified value, the pump for distributor 1 starts up at minimum speed.

#### *Return temperature setpoint distributor 2 ... 4*

**Prerequisite:** Variant 2 or variant 3 and pump for distributor 2 ... 4 installed

The return temperature from distributor 2 ... 4 is regulated to the value set here. When the return temperature from distributor 2 reaches the specified value, the pump for distributor 2 ... 4 starts up at minimum speed.

### 4.9.3 Network pump - Service



**Only switch on the network pump when required by the storage tank (variant 3 / 4)**

**Prerequisite:** Variant 3 or variant 4

- **NO:** The network pump is activated as soon as a consumer in the hydraulic system requires heat.
- **YES:** The network pump is only activated when one or more layered tanks require heat.

**NOTICE! Parameter only relevant if a layered tank is installed in all buildings to be supplied!**

#### **Sensor input of network return temperature sensor**

Sensor input to which the sensor for the network return temperature is connected.

#### **Pump output of network pump**

Pump outlet to which the network pump is connected.

#### **Control of network pump**

Definition of control signal for pump type used.

⇒ See "Activation options of pump outlets" [page 126]

#### **Minimum speed of network pump**

Adjustment of the minimum speed to the pump type (set mode of pump in accordance with pump manufacturer).

#### **Maximum speed for network pump**

If you need to limit the maximum speed of the network pump for systemic reasons, you can do so by adjusting this parameter.

#### **Sensor input of distributor 1 return sensor**

**Prerequisite:** Variant 1 and pump for distributor 1 installed  
Sensor input to which the sensor for the return distributor 1 is connected.

#### **Pump output of distributor 1 pump**

**Prerequisite:** Variant 1 and pump for distributor 1 installed  
Pump outlet to which the pump for distributor 1 is connected.

#### **Control of distributor 1 pump**

**Prerequisite:** Variant 1 and pump for distributor 1 installed  
Definition of control signal for pump type used.  
⇒ See "Activation options of pump outlets" [page 126]

#### **Minimum speed for distributor 1 pump**

**Prerequisite:** Variant 1 and pump for distributor 1 installed  
Adjustment of the minimum speed to the pump type (set mode of pump in accordance with pump manufacturer).

#### **Maximum speed for distributor 1 pump**

**Prerequisite:** Variant 1 and pump for distributor 1 installed  
If you need to limit the maximum speed of the distributor 1 pump for systemic reasons, you can do so by adjusting this parameter.

#### **Sensor input of distributor 2 ... 4 return sensor**

**Prerequisite:** Variant 2 or variant 3 and pump for distributor 2 ... 4 installed

Sensor input to which the sensor for the distributor 2 ... 4 return is connected.

#### **Pump outlet of distributor 2 ... 4 pump**

**Prerequisite:** Variant 2 or variant 3 and pump for distributor 2 ... 4 installed

Pump outlet to which the pump for distributor 2 ... 4 is connected.

#### **Activation of distributor 2 ... 4 pump**

**Prerequisite:** Variant 2 or variant 3 and pump for distributor 2 ... 4 installed

Definition of control signal for pump type used.

⇒ See "Activation options of pump outlets" [page 126]

#### **Minimum speed for distributor 2 ... 4 pump**

**Prerequisite:** Variant 2 or variant 3 and pump for distributor 2 ... 4 installed

Adjustment of the minimum speed to the pump type (set mode of pump in accordance with pump manufacturer).

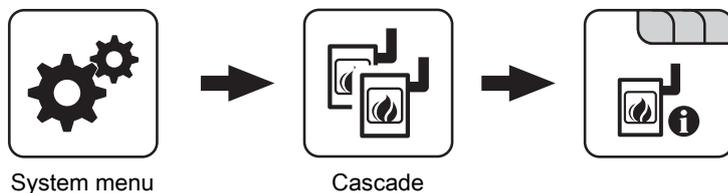
#### **Maximum speed for distributor 2 ... 4 pump**

**Prerequisite:** Variant 2 or variant 3 and pump for distributor 2 ... 4 installed

If you need to limit the maximum speed of distributors 2 ... 4 pump for systemic reasons, you can do so by adjusting this parameter.

## 4.10 Cascade

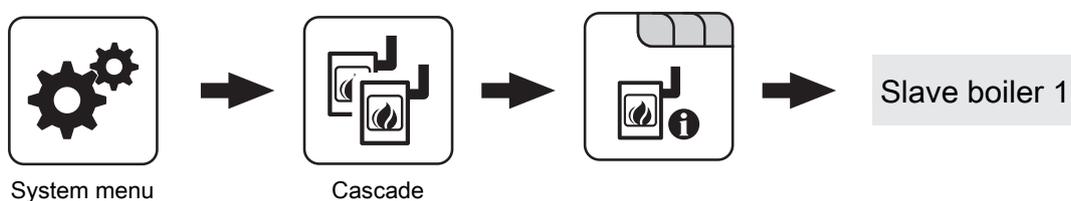
### 4.10.1 Cascade - Status



#### *Buffer tank charge*

Display of the current buffer tank charge.

### 4.10.2 Cascade - Backup boiler



#### *Slave boiler boiler temperature*

Display of the current boiler temperature of the backup boiler.

#### *Slave boiler OK*

Display of whether the backup boiler is ready for operation.

#### *Backup boiler is heating*

Display of whether the backup boiler is in "Heating" operating status.

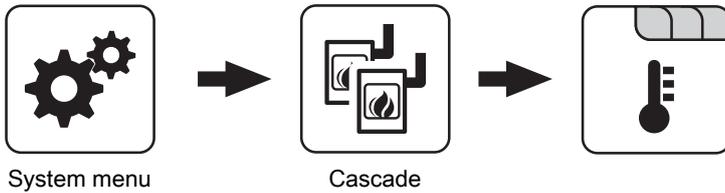
#### *Slave boiler control variable*

Display of the signal for the combustion controller.

#### *Boiler charging pump speed*

Display of the current speed of the boiler loading pump.

## 4.10.3 Cascade - Temperatures

**Buffer tank charge is 100% at boiler setpoint parameter**

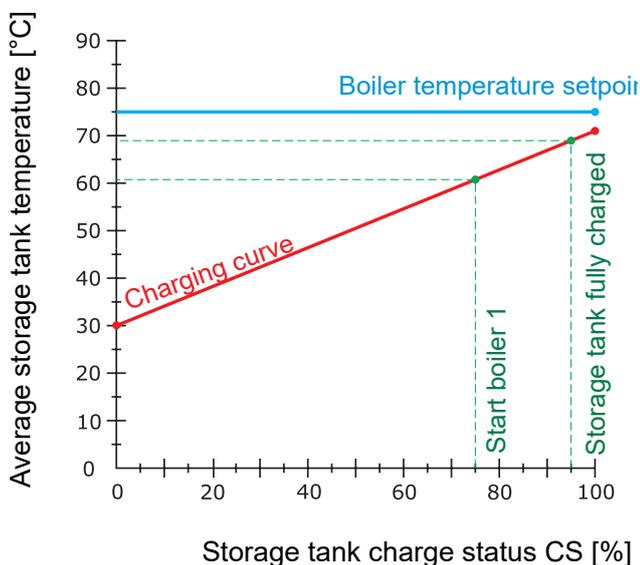
The buffer tank charge is 100% if the average temperature of the buffer tank is below the specified boiler temperature setpoint by the specified value. This parameter defines the end point of the charging curve of the buffer tank.

**Buffer tank charge is 0% at the following temperature (absolute value)**

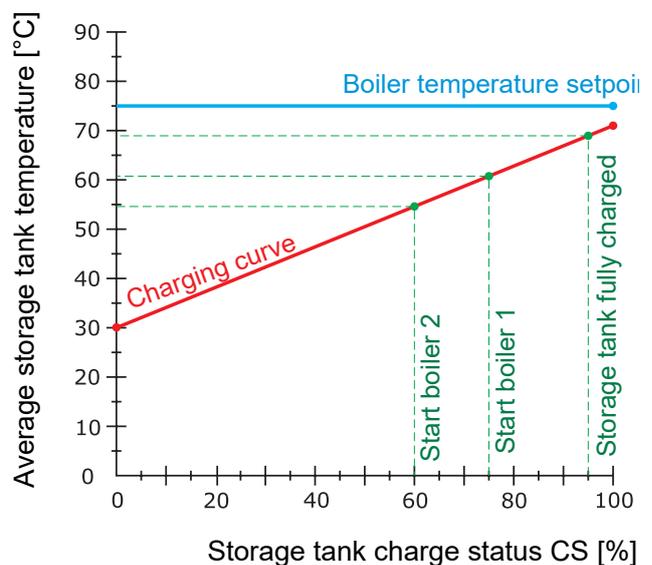
The buffer tank charge is 0% if the average temperature of the buffer tank reaches the specified value. This parameter defines the base point of the charging curve of the buffer tank.

**Start point 1 at storage tank charge**

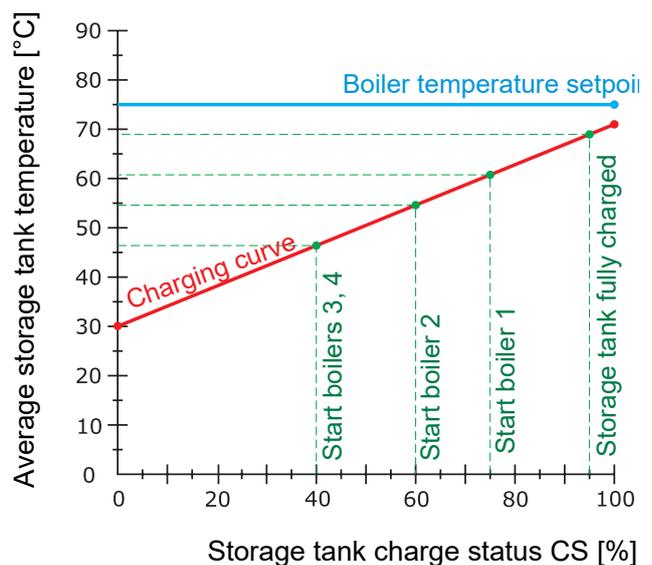
If the storage tank charge is lower than this value, the first boiler is started. This can be the boiler with the highest priority or with the fewest operating hours, and consequently both the master and the slave boiler.

**Start point 2 at storage tank charge**

If the storage tank charge is lower than this value, the second boiler is started.

**Start point 3 at storage tank charge**

If the storage tank charge is lower than this value, slave boilers 3 and 4 are started.



**Quick start if buffer tank discharge is greater than (% / 10min)]**

If the storage tank discharge is greater than the set value within 10 minutes, the boiler with the greatest rated heat output will be started (quick start).

**Reduce the overall output of the cascade before the storage tank is fully charged**

When the storage tank charge exceeds the value which is set under "Start point 1 at storage tank charge", the boiler control variable for the boilers that are still active will be reduced using the boiler loading pump.

**4.10.4 Cascade - Service**

System menu



Cascade



Boiler priorities are used to specify the order in which the boilers start. Where boilers have the same priority, the boiler currently with the fewest operating hours always starts first.

With this setting the master boiler always starts first as it has the **highest priority**; the boilers then start in numerical order.

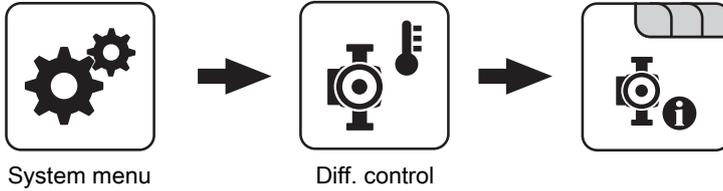
<i>Start priority of the master boiler</i>	<i>1</i>
<i>Start priority of slave boiler 1</i>	<i>2</i>
<i>Start priority of slave boiler 2</i>	<i>3</i>
<i>Start priority of slave boiler 3</i>	<i>4</i>

With this setting the current **number of operating hours** is used as the start criterion as all boilers have equal priority.

<i>Start priority of the master boiler</i>	<i>1</i>
<i>Start priority of slave boiler 1</i>	<i>1</i>
<i>Start priority of slave boiler 2</i>	<i>1</i>
<i>Start priority of slave boiler 3</i>	<i>1</i>

## 4.11 Difference regulator

### 4.11.1 Difference regulator - Status



#### *Heat source temperature*

Display of the current heat source temperature of the differential controller (e.g. tiled stove with water pocket, ...).

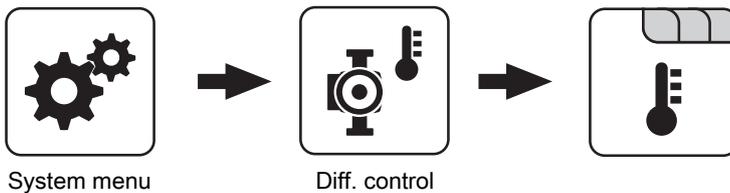
#### *Pump speed*

Specifies the current speed of the differential controller pump.

#### *Heat sink sensor*

Display of the current temperature of the heat sink for the differential controller (e.g. layered tank, etc.).

### 4.11.2 Difference regulator - Temperatures



#### *Startup difference*

Temperature difference between heat source and heat sink which must be reached to activate the pump of the differential controller.

#### *Minimum temperature for heat source*

If the temperature in the heat source falls below this value the differential controller will be deactivated.

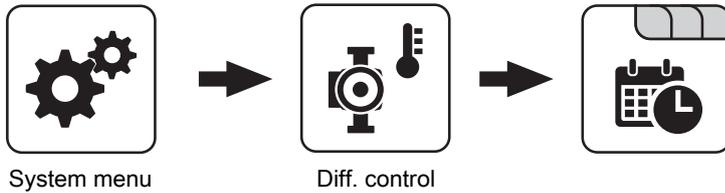
#### *Shutdown difference*

If the temperature difference between the heat source and the heat sink falls below this value, the pump of the differential controller is deactivated.

#### *Maximum temperature for heat sink*

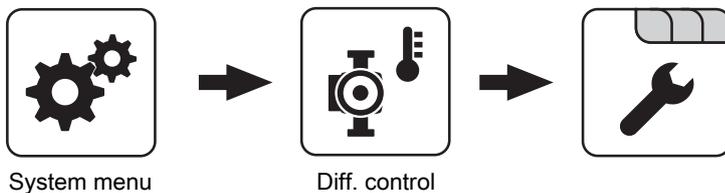
When the heat sink reaches this value, the pump of the differential controller is deactivated.

### 4.11.3 Difference regulator - Times



⇒ See "Setting times" [page 137]

### 4.11.4 Difference regulator - Service



#### ***Pump output of diff. control pump***

Pump outlet to which the pump of the differential controller is connected.

#### ***Control of diff. control pump***

Definition of control signal for pump type used.

⇒ See "Activation options of pump outlets" [page 126]

#### ***Minimum pump speed***

Adjustment of the minimum speed to the pump type (set mode of pump in accordance with pump manufacturer).

#### ***Maximum pump speed***

If you need to limit the maximum speed of the pump of the differential controller for systemic reasons, you can do so by adjusting this parameter.

#### ***Sensor input of heat source sensor***

Sensor input to which the heat source sensor is connected.

#### ***Sensor input of heat sink sensor***

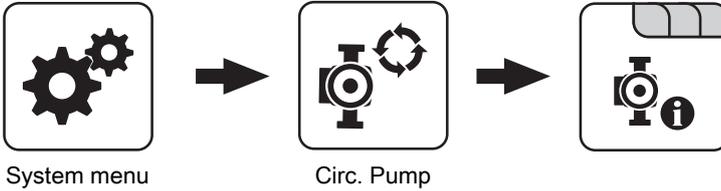
Sensor input to which the heat sink sensor is connected.

#### ***Sensor monitoring***

- **YES:** If temperatures around freezing point occur, an error message appears on the display.
- **NO:** The error messages of the differential controller sensor are suppressed.

## 4.12 Circulation pump

### 4.12.1 Circulation pump - Status



#### *Return temperature in circulation line*

Display of the current temperature at the return feed sensor of the circulation line.

**NOTICE!** If the parameter "Return sensor present" is set to "NO", 0°C is permanently displayed.

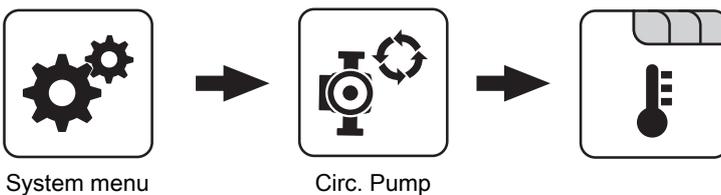
#### *Flow switch on the domestic hot water line*

- 0: Flow switch detects no flow rate.
- 1: Flow switch detects flow rate.

#### *Speed of the circulation pump*

Specifies the current speed of the circulation pump.

### 4.12.2 Circulation pump - Temperatures



#### *Return sensor present*

- **NO:** The circulation pump is controlled according to time program. In conjunction with the use of a flow valve, the circulation pump is also activated at a signal from the flow valve.
- **YES:** The circulation pump is controlled according to time program and temperature at the return circulation line. In conjunction with the use of a flow switch, the circulation pump is also activated at a signal from the flow switch.

**NOTICE!** Connect the flow sensor as the return sensor!

#### *Switch off the pump at what return temperature in the circulation line*

If the set temperature at the return circulation line is reached, the circulation pump will be deactivated.

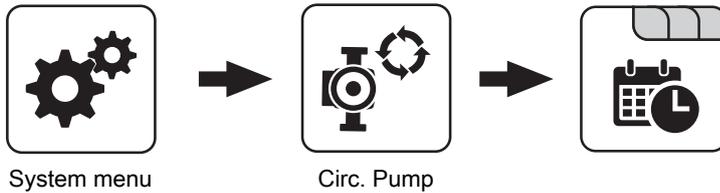
**NOTICE!** Parameter only relevant when using a return feed sensor in the circulation line!

#### *Circulation pump run-on*

If the flow stops at the flow switch, the circulation pump still remains active for the time set.

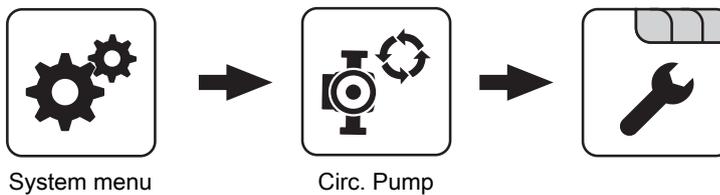
**NOTICE!** Parameter only relevant when using a flow switch!

### 4.12.3 Circulation pump - Times



⇒ See "Setting times" [page 137]

### 4.12.4 Circulation pump - Service



#### **Sensor input of circulation return sensor**

Sensor input to which the sensor at the return line of the circulation is connected.

#### **Which sensor is used for the flow switch**

Sensor input to which the flow switch is connected.

#### **Pump output of circulation pump**

Pump outlet to which the circulation pump is connected.

#### **Control of circulation pump**

Definition of control signal for pump type used.

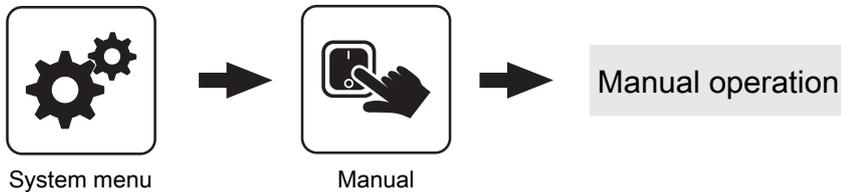
⇒ See "Activation options of pump outlets" [page 126]

#### **Maximum speed of the circulation pump**

If you need to limit the maximum speed of the circulation pump for systemic reasons, you can do so by adjusting this parameter.

## 4.13 Manual

### 4.13.1 Manual - Manual operation



When exiting the “Manual operation” menu, all active parameters are automatically set to “OFF”! The parameters displayed depend on the boiler configuration!

#### **Stoker ON**

- **ON:** The stoker screw drive is activated.

#### **Feed screw ON**

- **ON:** The feed screw drive is activated.

#### **Suction screw of cyclone 1**

- **ON:** The drive of the suction screw at cyclone 1 is activated.

#### **Suction screw of cyclone 2**

- **ON:** The drive of the suction screw at cyclone 2 is activated.

#### **Rotary valve ON**

- **ON:** The drive of the rotary valve is activated.

#### **Screw 1**

- **ON:** The drive of screw 1 on feed system module is activated.

#### **Screw 2**

- **ON:** The drive of screw 2 on feed system module is activated.

#### **Bunker filling rotary agitator**

- **ON:** In the case of rotary agitator with a separate drive system, the head of the rotary agitator is operated separately from the delivery screw.

#### **WOS drive**

- **ON:** The heat exchanger cleaning system is activated.  
**NOTICE! With PE1c Pellet, the WOS is activated via a combined drive with the ash screw!**

#### **Back burn flap drive**

- **ON:** Burn back flap is opened.

#### **Oufeeder - manual**

- **ON:** The stoker and feed screw drive is activated.

#### **Ash screw**

- **ON:** The ash screw drive is activated.

#### **Tilt grate drive**

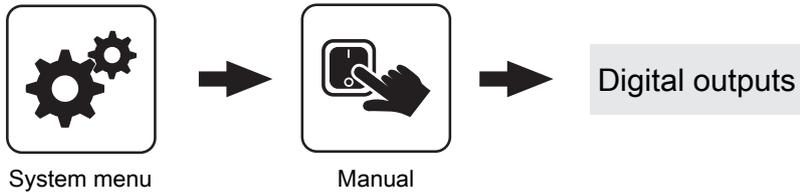
- **ON:** The tipping grate is opened.

#### **Rinse the condenser manually – only possible if boiler off / on standby**

- **ON:** The solenoid opens and the calorific value heat exchanger is cleaned.

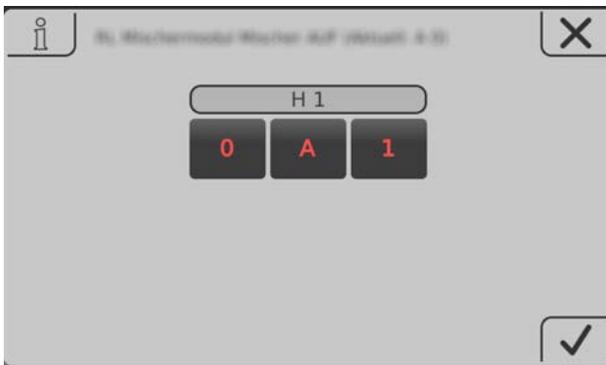
**NOTICE! This parameter can only be activated when the boiler is in “Standby” or “Boiler off” status.**

### 4.13.2 Manual - Digital outputs

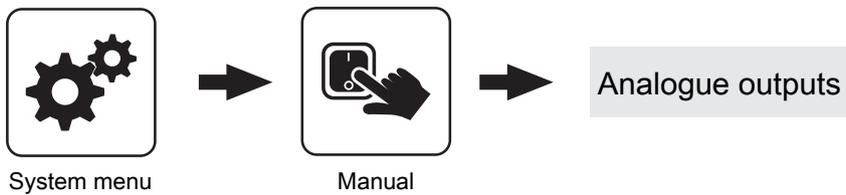


The parameters displayed depend on the boiler configuration!

- **A 0**: Automatic, Off; **A 1**: Automatic, On
- **1**: Manual, On
- **0**: Manual, Off

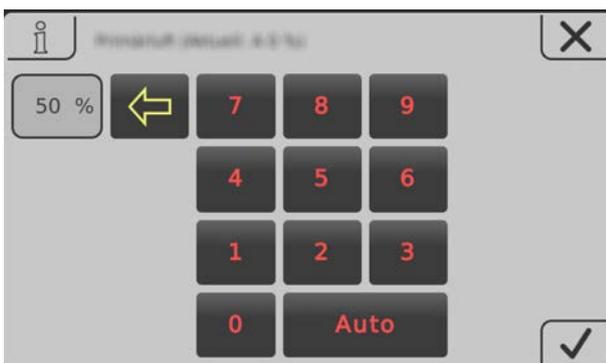


### 4.13.3 Manual - Analogue outputs

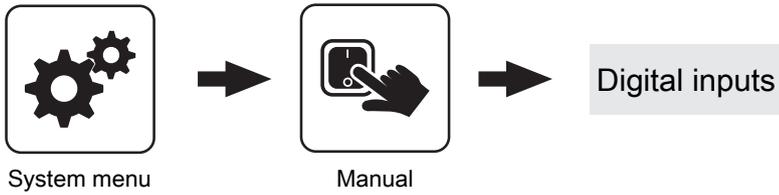


The parameters displayed depend on the boiler configuration!

- **A 0**: Automatic, Off; **A 1-100%**: Automatic, with % value ON
- **1-100%**: Manual, with % value ON
- **0%**: Manual, Off

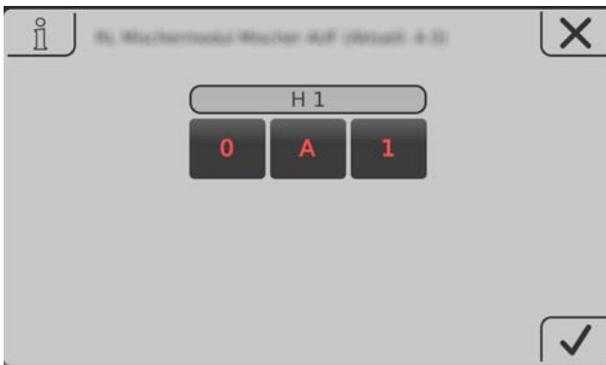


#### 4.13.4 Manual - Digital inputs



The parameters displayed depend on the boiler configuration!

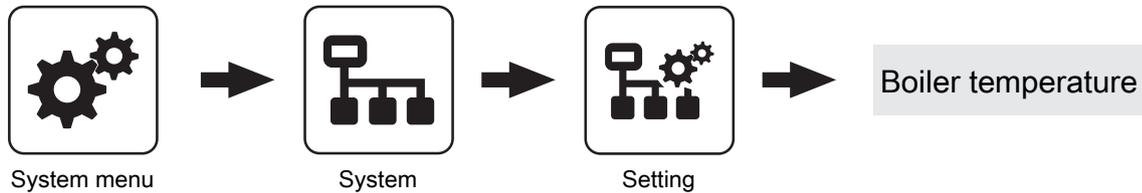
- **A 0**: Automatic, Off; **A 1**: Automatic, On
- **1**: Manual, On
- **0**: Manual, Off



## 4.14 System

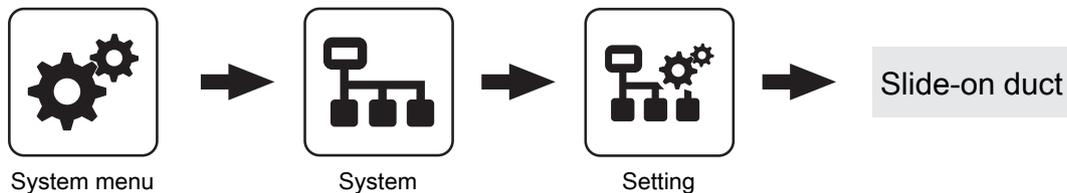
### 4.14.1 System - Settings

#### Setting - Boiler temperature



⇒ See "Boiler - Temperatures" [page 65]

#### Setting - Slide-on duct



#### Slide-on duct temperature

Display of the current reference temperature for the cooling of the slide-on duct and burn through elbow. Start and stop values for the pump control refer to this temperature.

#### SoDC pump control

Display of the current pump control for the slide-on duct cooling.

#### Slide-on duct cooling run-on

Run-on time of the pump control for the slide-on duct cooling.

#### Activate slide-on duct cooling if temperature above

If the actual temperature in the slide-on duct exceeds the set value, the pump starts to run at minimum speed to cool the slide-on duct.

#### Warning if temperature in slide-on duct/burn through elbow above

If the actual temperature in the slide-on duct or burn through elbow exceeds the set value, a warning message appears on the display.

#### Maximum permitted temperature in the slide-on duct/burn through elbow

When the set temperature value is reached, the pump is activated at maximum speed to cool the slide-on duct.

#### Maximum speed SoDC pump

Maximum speed at which the pump is activated to cool the slide-on duct.

#### Minimum speed SoDC pump

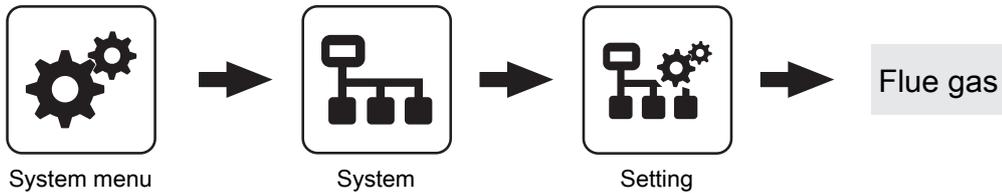
Minimum speed at which the pump is activated to cool the slide-on duct.

#### Gain for SoDC controller Kp

Control parameter for the speed control of the pump to cool the slide-on duct.

#### Reset time for SoDC controller TN

Control parameter for the speed control of the pump to cool the slide-on duct.

**Setting - Flue gas****Minimum flue gas temperature**

Specifies the minimum flue gas temperature setpoint in °C.

**NOTICE!** When using the TI wood chip boiler, the lower range of the output increase is calculated in conjunction with the predefined flue gas control band.

**Maximum flue gas temperature**

Highest operation point of flue gas temperature for continuous operation.

**Maximum flue gas temperature**

Specifies the maximum flue gas temperature setpoint in °C.

**NOTICE!** When using the TI wood chip boiler, the upper range of the output decrease is calculated in conjunction with the predefined flue gas control band.

**Boiler output at flue gas temperature of 20°C**

Lower point of the start ramp of boiler controller at system startup.

**100% boiler output from a flue gas temperature of**

Upper point of the start ramp of boiler controller. If the flue gas temperature reaches the value set here, the fuel output should reach 100%.

**Minimum difference between flue gas temperature and boiler temperature in HEATING**

As a condition for the "Heating" operating status, the difference between the current flue gas temperature and the current boiler temperature must at least exceed the value set here.

**Flue gas - Flue gas difference for start process**

When the boiler controller changes to "Pre-heating" status the current value of the flue gas temperature is stored. When the flue gas temperature rises by the value set here during "Pre-heating" or "Ignition" status, the boiler controller switches to "Heating" status.

**Safety time**

If the condition "Minimum difference between flue gas and boiler temperature in HEATING" is not fulfilled for the set duration, the message "Safety time expired, flue gas temperature too low for too long" appears on the display.

**Flue gas temperature, below which boiler switches to SHUTDOWN status**

If the flue gas temperature is below this value for the duration of the "Safety time", the boiler switches off.

**Boiler flue gas difference for fire out**

If the current boiler temperature plus the set value is greater than the current flue gas temperature, the boiler switches off.

**Control band for flue gas temperature**

Defines the control band in °C before reaching the minimum or maximum flue gas temperature.

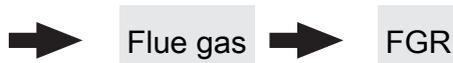
**Ignition power at flue gas temp.**

Specifies the flue gas temperature that must be reached, so that power can be increased. Below this temperature the boiler is limited to the ignition power. Above this temperature the maximum possible power is calculated from the control curve ("ignition power at flue gas temperature" parameter -> "100% boiler power at flue gas temperature of" parameter). This should prevent the cold fire clay from heating up too quickly.

## FGR



Setting

**FGR characteristics**

The FGR characteristics is used to define the progression of the flue gas recirculation section. Depending on the progression selected, the FGR section is determined based on the position of the ash screw using switch points "Temp 1" and "Temp 2".

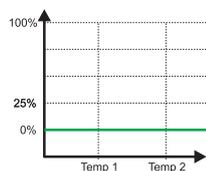
**Temp 1**

Depending on the FGR characteristic selected, the FGR section is modified from this temperature value.

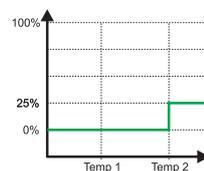
**Temp 2**

Depending on the FGR characteristic selected, the FGR section is modified from this temperature value.

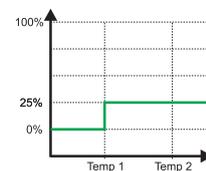
FGR characteristic progression 0:



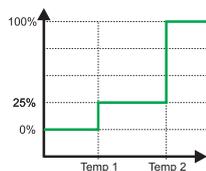
FGR characteristic progression 1:



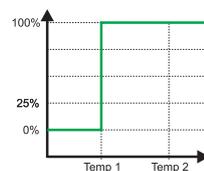
FGR characteristic progression 2:



FGR characteristic progression 3:



FGR characteristic progression 4:

**FGR flap position at partial load**

At "Heating" and "Empty stoker" status, the FGR flap regulates between the setting values of the "FGR flap position at partial load" and "FGR flap position at nominal load" depending on the flue gas temperature.

**FGR flap position at nominal load**

At "Heating" and "Empty stoker" status, the FGR flap regulates between the setting values of the "FGR flap position at partial load" and "FGR flap position at nominal load" depending on the flue gas temperature.

**Reduce underpressure at 100% FGR by**

A certain value is deducted from the underpressure setpoint depending on the FGR flap position.

**Startup criteria for FGR - Flue gas temperature**

The FGR flap is regulated from this flue gas temperature; the flap closes below the set value.

**ID fan control for FGR cleaning**

Desired control of ID fan during boiler status "FGR cleaning".

**Release FGR flue gas temperature**

Flue gas temperature at or above which the flue gas recirculation control system is activated. If the flue gas temperature falls to a level 3 °C below this value, then the FGR will be deactivated.

**Release FGR combustion chamber temperature**

Specifies the value in percent of the combustion chamber signal at or above which the flue gas recirculation is activated. If the combustion chamber temperature falls so low that the CCT signal falls below this value again, the flue gas recirculation will be deactivated again.

**FGR power influence**

Specifies as a percentage the influence that the current infeed level has on the FGR primary air. If this parameter is set to 100%, then the FGR primary air will adjust downwards proportionally to the feed level. If this parameter is set to 0%, then the FGR primary air is adjusted according to the combustion chamber signal and the calculated curve, and ignores the infeed level. At minimum output, this may result in the primary air being adjusted up to the maximum value. If the power influence is set to a negative value, this function is inverted. For negative values the FGR primary air is increased in proportion to the infeed rate.

**Max. reduction of primary air in FGR mode**

Specifies the amount by which the primary air (fresh air) can be reduced at maximum FGR primary air. Please note that the reduction is dependent on the infeed level and that the maximum reduction will not necessarily have been achieved at the point when the parameter "CCT signal for primary FGR stop" is reached. At full FGR primary air (= Maximum FGR Primary) and maximum feed level, the maximum reduction to the primary air will also be active.

***CCT signal for primary FGR stop***

Specifies the stop point for the FGR primary air as a percentage of the combustion chamber control band. The control band is defined by the parameters "0% CCT signal at CCT" and "100% CCT signal at CCT". Because the FGR primary air is also dependent on the instantaneous feed level, it is important that the FGR primary air flap is not yet at its maximum position when this point is reached or exceeded.

***Prim. FGR decrease curve***

Specifies which curve will be used to control the FGR primary air from the stop point until the maximum combustion chamber temperature is reached.

***CCT signal for primary FGR start***

Specifies the start point for the FGR primary air as a percentage of the combustion chamber control band. The control band is defined by the parameters "0% CCT signal at CCT" and "100% CCT signal at CCT".

***Prim. FGR increase curve***

Specifies which curve will be used to control the FGR primary air from the start point ("CCT signal for primary FGR start" parameter) to the stop point ("CCT signal for primary FGR stop" parameter).

***CCT signal for secondary FGR start***

Specifies the start point for the FGR secondary air as a percentage of the combustion chamber control band. The control band is defined by the parameters "0% CCT signal at CCT" and "100% CCT signal at CCT".

***CCT signal for secondary FGR stop***

Specifies the stop point for the FGR secondary air as a percentage of the combustion chamber control band. The control band is defined by the parameters "0% CCT signal at CCT" and "100% CCT signal at CCT". At and above this point, the maximum possible FGR secondary air has been reached.

***Max. reduction of secondary air in FGR mode***

Specifies the maximum reduction to the secondary air when the stop point is reached ("CCT signal for secondary FGR stop" parameter). This ensures that the secondary air (= fresh air) is not closed off too much by the FGR.

***Start of FGR control at FGR***

The FGR is only activated from this set demand. If the flue gas temperature drops by a defined value (FGR hysteresis) after the FGR is activated, the FGR is deactivated again.

***Influence of FGR primary air on FGR control***

This factor increases/decreases the effect of the FGR primary air flap position on the pressure setpoint in the FGR duct. It is important to note that the higher value applies (influence of FGR primary air or influence of FGR secondary air).

***Influence of FGR secondary air on FGR control***

This factor increases/decreases the effect of the FGR secondary air flap position on the pressure setpoint in the FGR duct. It is important to note that the higher value applies (influence of FGR primary air or influence of FGR secondary air).

***FGR primary air opening at 0% control***

Defines the minimum opening of the FGR primary air flap and guarantees a minimum proportion of primary air.

***FGR primary air opening at 100% control***

Defines the maximum opening of the FGR primary air flap and serves to limit the proportion of primary air.

***FGR secondary air opening at 0% control***

Defines the minimum opening of the FGR secondary air flap and guarantees a minimum proportion of secondary air.

***FGR secondary air opening at 100% control***

Defines the maximum opening of the FGR secondary air flap and serves to limit the proportion of secondary air.

***FGR secondary air opening at 0% control***

Defines the position of the FGR flap at minimum control (0% corresponds to a complete opening in the flue gas direction to the chimney)

***FGR flap opening at 100% control***

Defines the position of the FGR flap at maximum control. Please note that the way through the FGR duct flap is limited (rotation angle approx. 51°, corresponds to the default value of 57%).

***Pressure setpoint in FGR duct at 0% FGR control***

Defines the minimum pressure in the FGR duct which must be reached at minimum control.

***Pressure setpoint in FGR duct at 100% FGR control***

Defines the maximum pressure in the FGR duct which may not be exceeded at maximum control.

***FGR flap control delay time***

During pressure changes in the FGR duct, the control of the FGR flap is delayed by the specified time, in order to counteract constant vibrations.

**Maximum permitted pressure deviation**

Defines the tolerance range for the specified pressure setpoint in the FGR duct. If the actual value remains above or below the pressure setpoint for the duration of the delay time (parameter "Delay till warning"), a warning message appears on the screen.

**Delay till warning**

Specifies how long the maximum permitted pressure deviation must be exceeded in order to issue a warning.

**FGR cleaning duration**

Specifies the duration for the automatic cleaning of the FGR duct in seconds.

**FGR cleaning at CCT**

Specifies the combustion chamber temperature, under which the cleaning of the FGR duct is released when the boiler is shut down.

**Condenser**

Setting



Flue gas



Condenser

**Condenser cleaning interval (heating hours)**

Once the boiler has reached the specified operating hours in "Heating" status, the condensing boiler heat exchanger is rinsed.

**On-time of spray valve. Overall cycle 20 sec**

The entire washing process is set with the "Condenser cleaning duration" parameter. The cleaning time is regarded as the time in which the spray valve is active. Pause times (spray valve off) are not included in the cleaning time.

Example:

100% = spray valve active for the specified time

75% = spray valve active for 15 sec and 5 sec pause

**Calorific value heat exchanger cleaning possible from**

Time from which the washing process can be activated.

**Calorific value heat exchanger cleaning possible until**

Time to which the washing process can be activated.

## External elec. sep.



Setting



Flue gas



External elec. sep.

## State

**Separator status**

Displays the current operating status of the electrostatic separator as a numeric code. The following statuses are possible:

- Status "0": Separator deactivated
- Status "1": Separator OFF
- Status "2": Separator ON
- Status "3": Measuring mode
- Status "4": RFI
- Status "5": Wait for bypass flap
- Status "6": Cleaning - Pause
- Status "7": Cleaning - Rinse
- Status "8": Wait for water sensor
- Status "9": Waiting for drying time
- Status "10": Separator error
- Status "11": Quick cleaning
- Status "12": Waiting for drying time
- Status "13": Cleaning – Waiting
- Status "14": Cleaning – Shaking
- Status "15": Cleaning – Waiting

**Elec. separ. return signal**

Shows the separator's status as a numeric code. Following status values are possible:

- Status "0": No error
- Status "1": Power supply fault
- Status "2": RS485 error
- Status "3": Temperature box error
- Status "4": High voltage error
- Status "5": Wait for ready-to-measure state
- Status "6": Values critical
- Status "7": Measure
- Status "8": Measuring mode error

**Water detected**

Shows the status of the water sensor in the ash drawer. If the water sensor detects a water level that is too high, the electrostatic separator is deactivated.

**Time until next cleaning**

Shows the remaining time (in minutes) until the next cleaning process.

**Elec. separ. operating hours**

Shows the operation hours since the electrostatic separator was first activated.

**Number of cleaning processes**

Shows the total number of cleaning processes since the electrostatic separator was first activated.

**Output HV module 1 ... 4**

Displays the current output of the respective HV module as a numeric code. The following displays are possible:

- Output "0": The current output of the HV module is between 0 - 25%
- Output "1": The current output of the HV module is between 25 - 50%
- Output "2": The current output of the HV module is between 50 - 75%
- Output "3": The current output of the HV module is above 75%

*Service****The electrostatic separator function is active***

Used to activate/deactivate the electrostatic separator's function. When the electrostatic separator is deactivated, the bypass flap is open and the flue gas is fed directly into the chimney.

***Time until bypass flap is open***

Specifies the time for opening the bypass flap in seconds. The specified time must correspond at least to the actuating time of the flap drive.

***Close bypass flap when filter switched off***

This parameter is set to "NO" by default and should only be changed after consultation with the manufacturer.

***Cleaning interval***

Specifies after how many operation hours of the electrostatic separator a cleaning cycle must be started. Depending on the raw dust content, this value is set between 4 and 8 hours.

***Duration of cleaning cycle***

Defines the total time for a cleaning process. Via this duration, the spray valve is periodically switched on and off.

***On-time of spray valve. Overall cycle 10 sec***

Defines the cycle of the spray valve, which is repeated until the total time (parameter "Duration of cleaning cycle") has elapsed. The cycle of the spray valve is set in percentages of 10 seconds.

Example: On-time of spray valve: 60%, duration of cleaning cycle: 23s;  
Spray valve is switched on for 6 seconds, waits for 4 seconds. This cycle is repeated until the total time is reached. (6s ON - 4s OFF - 6s ON - 4s OFF - 3s ON)

***Dry time***

Defines the waiting time after a cleaning cycle before the HV electrodes are activated again.

***Is there a siphon fitted?***

By default this parameter is set to "YES" and cleaning of the filter is performed according to the specified interval. In case of problems with the drain system (e.g. blocked duct) this parameter can be set to "NO" in the interim. The cleaning times are then adjusted so that the collection tank is not overfilled.

***Quick/compulsory cleaning active?***

Specifies whether the function of the quick/compulsory cleaning should be active.

Quick/compulsory cleaning: If the output of the HV module is below 25% for a defined period, a quick cleaning is carried out during operation. If the output of the HV module remains below 25%, then a set waiting time is observed until the next quick cleaning.

***Duration of quick cleaning***

Defines the on-time of the spray valve during a quick cleaning.

***Minimum time between quick/compulsory cleaning***

Specifies the waiting time between two quick cleanings in minutes.

***Cleaning possible from***

In conjunction with the "Cleaning possible till" parameter, this defines a time window in which the automatic cleaning of the separator may be activated.

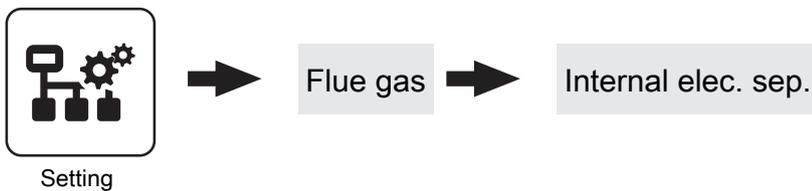
***Cleaning possible until***

In conjunction with the "Cleaning possible as of" parameter, this defines a time window in which the automatic cleaning of the separator may be activated.

*IO allocation*

Setting of the relevant address for the respective component for the inputs and outputs on the digital module.

- Address HV in 1
- Address HV in 2
- Address water sensor 1
- Address water sensor 2
- Safety switch address
- Address HV out 1
- Address HV out 2
- Address bypass flap open
- Address washer valve 1
- Address washer valve 2

**Internal elec. sep.***State***Separator status**

Displays the current operating status of the electrostatic separator as a numeric code. The following statuses are possible:

- Status "0": Separator deactivated
- Status "1": Separator OFF
- Status "2": Separator ON
- Status "3": Measuring mode
- Status "4": RFI
- Status "5": Wait for bypass flap
- Status "6": Cleaning - Pause
- Status "7": Cleaning - Rinse
- Status "8": Wait for water sensor
- Status "9": Waiting for drying time
- Status "10": Separator error
- Status "11": Quick cleaning
- Status "12": Waiting for drying time
- Status "13": Cleaning – Waiting
- Status "14": Cleaning – Shaking
- Status "15": Cleaning – Waiting

**Elec. separ. return signal**

Shows the separator's status as a numeric code. Following status values are possible:

- Status "0": No error
- Status "1": Power supply fault
- Status "2": RS485 error
- Status "3": Temperature box error
- Status "4": High voltage error
- Status "5": Wait for ready-to-measure state
- Status "6": Values critical
- Status "7": Measure
- Status "8": Measuring mode error

**Current response HV module 1**

Actual voltage of the HV modules in kV.

**Power response HV module 1**

Actual current of the HV module in mA.

**Current response HV module 2**

Actual voltage of the HV modules in kV.

**Power response HV module 2**

Actual current of the HV module in mA.

**Time until next cleaning**

Shows the remaining time (in minutes) until the next cleaning process.

**Elec. separ. operating hours**

Shows the operation hours since the electrostatic separator was first activated.

**Number of cleaning processes**

Shows the total number of cleaning processes since the electrostatic separator was first activated.

**Number of flashovers**

Shows the total number of flashovers since the electrostatic separator was first activated.

**Service****Enable elec. separ. function**

Used to activate/deactivate the electrostatic separator's function.

**Number of HV modules**

Specifies the number of HV modules used. One or two modules are used, depending on the output of the boiler.

**Max. output HV modules**

For setting the output power in watts of the HV module used. If two modules are used, the output of one module must be set here. If more than one module is used, HV modules with the same output power should always be used.

**Startup criteria for HV modules - Flue gas temperature**

If the flue gas temperature of the boiler exceeds the set value, the HV modules are switched on. If the flue gas temperature falls below the set value during heating mode, the HV modules remain switched on.

**Start ramp HV controller**

As soon as the start-up criterion (parameter "Start-up criterion for HV modules - Flue gas temperature") is reached, the high voltage is activated with the start value (parameter "Start value HV controller"). Within this set start ramp, the set times of the parameters for standard operation ("Interval voltage increase HV module" and "Interval voltage decrease HV controller") are reduced by a defined factor in order to achieve a rapid increase in the target voltage in the start phase.

**HV cleaning system**

Defines the type of cleaning system for the HV electrode of the e-filter. Cleaning takes place either by means of vibrator or air flush.

**Absorbed energy**

Shows the total amount of absorbed energy since the electrostatic separator was first activated.

**Output HV module 1**

Actual output of the HV module in W.

**Output HV module 2**

Actual output of the HV module in W.

**Number of cleaning cycles per heating hour**

Determines the number of cleaning processes per boiler operating hour in heating mode. Together with the cleaning duration (parameter "Duration of cleaning cycle"), the total cleaning time is calculated.

Example: Number of cleaning cycles per heating hour = 3, duration of cleaning cycle = 3s, heating hours until cleaning = 4 h,

Results in a cleaning time of 36 seconds (4 x 3 x 3)

**Duration of cleaning cycle**

Defines the total time for a cleaning process. During this time the shaker is switched on.

**Cleaning active during heating**

- **YES:** When the time for cleaning is reached (parameter "Cleaning interval") and no blocking window is active (menu System => Set => Cleaning), the HV modules are switched off in heating mode. After a pause of 15 seconds the electrode is cleaned and after a further pause of 15 seconds the HV modules are switched on again.

IMPORTANT: For the cleaning after switching off the boiler, the cleaning in heating mode is taken into account!

Example: Cleaning interval = 5 h; cleaning is carried out after 5 h heating mode. If the boiler switches off in a controlled manner after 7 h, the cleaning time of the electrode is only calculated for the 2 h in heating.

- **NO:** The electrode is cleaned only after the boiler has been switched off.

**Cleaning interval**

Specifies after how many operation hours of the electrostatic separator a cleaning cycle must be started.

**Minimum target control for HV module(s)**

Defines the output of the HV module up to which it can be reduced in the event of flashovers. If the controller detects a defined number of flashovers at the minimum setpoint control, the HV module switches to standby mode for a certain period of time.

**Maximum target control HV module 1**

Determines the maximum output of the HV module up to which the voltage is increased in a defined interval (parameter "Interval voltage increase HV controller").

**Maximum target control HV module 2**

Determines the maximum output of the HV module up to which the voltage is increased in a defined interval (parameter "Interval voltage increase HV controller").

**Interval voltage increase HV controller**

If the controller does not detect a flashover within this set time, the voltage is increased by 1 percent.

**Interval voltage decrease HV controller**

A voltage reduction occurs after a flashover. Within the set interval, the voltage can only be reduced by 1 percent. If at least one flashover occurs again at the next interval, the voltage is reduced again by 1 percent.

**Start value HV controller**

Defines the starting point of the HV controller start ramp (parameter "Start ramp HV controller").

**Max. residual oxygen if elec. separ active**

If the measured residual oxygen exceeds the set value, the electronic separator is switched off (hysteresis 2%).

**Max. number of flashovers in start-up phase**

If the set number of flashovers is detected after activation of the elec. separator, the ramp-up phase with increased control speed is completed and the system is controlled at the set speed.

**Cyclone separator**

Setting



Flue gas



Cyclone separator

**Status****Cyclone separator operating mode**

Displays the current mode of the cyclone separator.

**Cyclone separator ash screw operating mode**

Displays the current mode of the ash screw of the cyclone separator.

**Error status of the cyclone separator**

Displays the current error status of the cyclone separator.

**Under-pressure at cyclone separator infeed**

Displays the current underpressure upstream of cyclone separator.

**Cyclone separator safety switch**

Displays the current status of the safety switch.

**Service****Setpoint under-pressure at cyclone infeed**

The cyclone ID fan regulates to this underpressure during operation.

**Cyclone separator overpressure detected**

Indicates whether an overpressure has been detected upstream of the cyclone separator.

**Due to the cyclone separator, the boiler control variable is limited to**

Indicates how much the boiler control variable is limited by the cyclone separator in percent.

**Cyclone separator ID fan controller**

Indicates the percentage at which the ID fan of the cyclone separator is being controlled.

**Minimum pressure in preparation before the cyclone**

In "Preparation" status, the minimum underpressure specified must be reached.

**Minimum ID fan activation at the cyclone separator**

Minimum value at which the cyclone separator can be activated.

**Runtime of the ash screw per heating hour**

Indicates the length of time during which the ash can be discharged to the ash container. The duration is calculated on the basis of the heating hours of the boiler since the ash screw was last operational.

**Cyclone separator Kp under-pressure monitor**

Proportional value of the PI controller of the cyclone ID fan controller.

**Tn cyclone separator under-pressure monitor**

Reset time of PI controller of cyclone ID fan controller.

**Ratio of boiler induced draught fan to cyclone separator**

Determines the ratio to the boiler's induced draught speed in which the induced draught of the cyclone separator is controlled.

**IO allocation****AO ID fan cyclone separator**

Indicates the analogue module output at which the ID fan of the cyclone separator is connected.

**Max. induced draught fan control of cyclone separator**

Maximum ID fan control in the cyclone separator.

**Speed monitoring of the cyclone separator ash screw active**

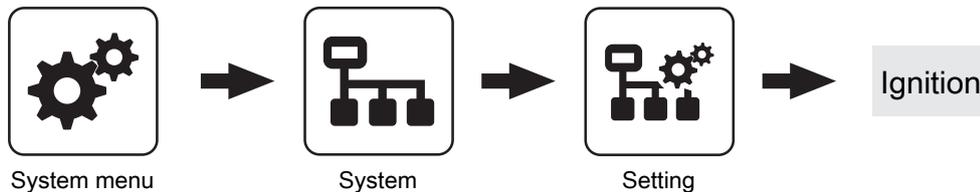
If the speed monitoring function is active, an error message is output if no feedback is detected at the speed sensor despite activation of the cyclone separator's ash screw.

**Target negative pressure in the cyclone during preparation**

During the PREPARATION mode, the negative pressure in the cyclone is controlled to this setpoint.

**AI underpressure transmitter**

Indicates the analogue module input at which the underpressure transmitter of the cyclone separator is connected.

**Setting - Ignition****Feed time until there is a fuel quantity suitable for ignition**

Feed time until a sufficient quantity of fuel is present on the combustion grate to carry out the ignition process.

**Duration of pre-heating**

Time during which only the ignition is activated. The fuel slide-in is not active for this duration.

**Infeed during ignition**

Material feed in "Ignition" status.

**Maximum ignition duration**

Specifies how long the ignition procedure should last. "Heating" status must be reached within this time.

**Ignition switches off above**

Flue gas temperature at which the ignition is deactivated at the latest.

**Switch off ignition when oxygen is reduced by**

If an oxygen reduction of 50% of the set value is detected in the "Pre-heating" operating status, the system switches to the "Ignition" operating status prematurely.

**Infeed time without ignition**

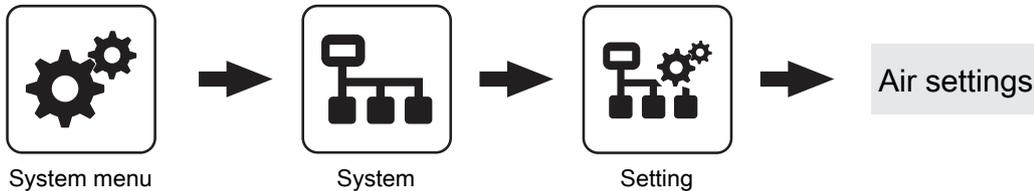
Specifies how long fuel is fed to the combustion grate before "Pre-heating" operating status.

**Infeed during ignition**

Defined fuel feed-in for the "Ignition" status duration.

**CCT rise for heating**

If the combustion chamber temperature rises after pre-heating by this value, the boiler switches to heating operating status.

**Setting - Air settings****Minimum ID fan speed**

Lower operation point of the ID fan characteristic line.

**Minimum ID fan control**

Specifies the control voltage (0-10V) at which 0% ID fan control is emitted.

**Maximum ID fan speed**

Highest operation point of the ID fan characteristic line.

**Maximum ID fan control**

Specifies the control voltage (0-10V) at which 100% ID fan control is emitted.

**Opening of air flap at 0% control**

At 0% control of the air flap, the air flap remains open by the specified value.

**Opening of air flap at 100% control**

At 100% control of the air flap, this will open by the maximum specified value.

**Primary air opening at 0% activation**

At 0% activation of the primary air flap, this will open by the specified value.

**Primary air opening at 100% control**

At 100% activation of the primary air flap, this will open by the specified value at most.

**Opening of primary air when boiler is off**

The primary air flap is set to this value in the "Boiler off", "Standby" and "Fault" operating statuses.

**Primary air opening at minimum feed**

Specifies the primary air flap position in percent at minimum power.

**Minimum opening of air flap at full load**

In full load operation of the boiler, the air flap is opened by at least the set value.

**Primary air opening in pre-heating / ignition**

Opening of the primary air at 100% control output. Adjustment of the controls to fuel and various air flap actuators or mechanical conditions.

**Opening of air flap during pre-heating**

In "Pre-heating" status, the air flap is opened to this value.

**Opening of air flap during ignition**

In "Ignition" status, the air flap is opened to this value.

**Opening of air flap during shutdown**

In "Shutdown" status, the air flap is opened to this value.

**The duration of the preparation is**

Time for the "Preparation" status.

**Secondary air opening at 0% signal**

At 0% control of the secondary air flap, this will open by the specified value.

**Secondary air opening at 100% control**

At 100% control of the secondary air flap, this will open by the maximum specified value.

**Primary air delay**

Time constant for low-pass filtering of the primary air flap control.

**Primary air boost during heating up (absolute)**

The control value of the primary air is increased by this value during heating up. The absolute control refers to the maximum path of the actuator.

***Duration of primary air boost***

Indicates the duration of the primary air boost that starts with "Heating up" status.

***Primary air boost during shutdown (absolute)***

Increase of primary air from "Empty stoker" boiler status. This value also affects the value calculated by the combustion control.

***ID fan startup time***

Corresponds to the minimum time of the boiler in "Preparation" status.

***Primary air when boiler off***

Specifies the primary air flap opening in percent in "Boiler off" status.

***Primary air boost for startup***

Parameter for primary air increase at the start of heating. The primary air boost remains active for the entire heating up process and after changing to "heating" status for the boost duration or until the minimum combustion chamber temperature is reached. After this time the primary air boost is reduced again.

***Start secondary air cooling at CCT signal***

Specifies the start point for secondary air cooling as a percentage of the combustion chamber temperature control band. The control band is defined by the parameters "0% CCT signal at CCT" and "100% CCT signal at CCT". For the start of cooling you should ensure that the secondary air does not begin at 0, but at the current (oxygen managed) secondary air setting.

***End secondary air cooling at CCT signal***

Specifies the end point for secondary air cooling as a percentage of the combustion chamber temperature control band. The control band is defined by the parameters "0% CCT signal at CCT" and "100% CCT signal at CCT". At this value the secondary air flap has reached the maximum permitted opening.

***Start of output reduction at CCT signal***

Description should also be changed in the SPS operating instructions:

Specifies the start point for power reduction as a percentage of the combustion chamber temperature control band. The control band is defined by the parameters "0% CCT signal at CCT" and "100% CCT signal at CCT". If the combustion chamber temperature signal exceeds this value, the fuel feed-in and the primary air are reduced. Both have the minimum value at 100% combustion chamber temperature signal.

***Boiler underpressure setpoint***

Desired underpressure which is to be maintained during the operation of the boiler.

***Minimum underpressure***

If this underpressure is not reached within a defined period of time, a warning is issued.

***Time until error for MIN underpressure in combustion chamber***

If the specified underpressure is not reached after this time, a fault is issued.

***Max. power reduction through under pressure control***

Maximum power reduction when setpoint underpressure not reached.

***Minimum output***

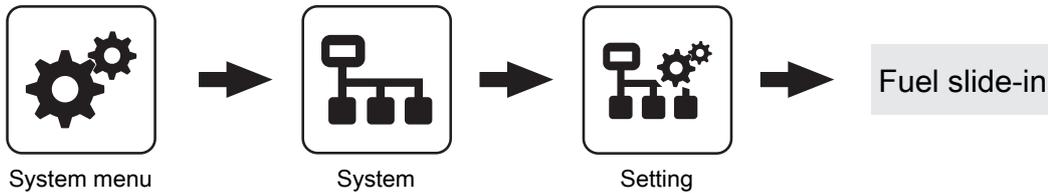
Minimum value of boiler control variable which can be used to operate the boiler.

***Start value of ID fan if door open***

Start value of the ID fan control in the DOOR OPEN state.

***Rising of induced draft fan controller if door is open***

Gradient rate at which the ID fan control is increased in the DOOR OPEN state.

**Setting - Fuel slide-in****Maximum value for automatic max. fuel feed-in**

Upper limit for the automatic fuel feed-in.

**Minimum value for automatic max. fuel feed-in**

Lower limit for the automatic fuel feed-in.

**Minimum power**

Minimum infeed as a percentage of the maximum infeed ("maximum infeed" parameter). Lowest possible power.

**Differential pressure setpoint at minimum power**

Pressure setpoint specification for the differential pressure above the grate at minimum boiler power.

**Differential pressure setpoint at 100% power**

Pressure setpoint specification for the differential pressure above the grate at maximum boiler power.

**Infeed calculation differential pressure Kp**

Proportional value of the PI controller for the infeed calculation.

**Infeed calculation differential pressure Tn**

Reset time of the PI controller for the infeed calculation.

**Start value for slide-in control**

The boiler starts with this value for the maximum fuel feed-in. Caution: The "Monitoring time for start value tracking" parameter and the "Delta +/- for start value tracking" parameter are used to adjust the start value for the slide-in control during operation.

**Slide-in control**

Adjustable parameters for the fuel slide-in controller.

**NOTICE! Factory setting - do not change!**

**Slide-in control start phase**

In the first 30 minutes in the heating status, the stored feed control value is used to limit the nominal load operation. The function is deactivated with setting "0".

**Ratio of heating to ignition feed rate**

In heating status, the feed control value is stored in the nominal load operation. At the next start, the ignition feed rate is calculated and controlled via the ratio setting.

**Infeed during ignition**

Defined fuel feed-in for the "Ignition" status duration.

**Activation delay for slide-in**

Indicates the period during which the boiler approaches the feed rate in a ramp to the feed rate in heating mode when changing from the "ignition" to "heating" status.

**Monitoring time for start value tracking**

The automatic fuel feed-in is checked constantly. If this percentage value changes within the monitoring time to less than the parameter "Delta +/- for start value tracking", the start value is set to the current feed-in.

**Delta +/- for start value tracking**

In conjunction with the parameter "Monitoring time for start value tracking", the start value for the slide-in control is automatically adjusted, as required.

**Maximum infeed**

Maximum loading rate of feed screw.

**Minimum infeed**

Minimum feed rate of feed screw.

**Start value of the feed regulator [T4e]**

The feed controller starts at this value when the boiler starts up.

**Feed time of feed screw is**

The feed time in seconds, during which the feed screw is active after the pre-run time of the stoker screw.

**Stoker pre-run**

Time that the stoker runs before the feed screw is activated.

**The minimum feed time of the feed screw is**

Minimum time that the feed screw is on.

**Delivery time feed screw**

Time for calculation of feed.

***Time feed screw is on until stoker screw***

Runtime ratio between feed screw and stoker screw.

***The time until the stoker is full is***

Total time that the feed screw is on, until the fuel falls onto the grate (= stoker is full).

***The time until the stoker is empty is***

Theoretical runtime of the feed screw until there is no more fuel in the stoker.

***Rotary valve run-on***

**Prerequisite:** Rotary valve with own drive installed  
Duration that the rotary valve continues to run after the feed screw has stopped.

***Switch-on delay feed screw light barrier***

**Prerequisite:** Level sensor installed between feed and stoker augers  
The time for which the light barrier must consistently recognise material to activate material recognition in the drop box.

***Switch-off delay feed screw light barrier***

**Prerequisite:** Level sensor installed between feed and stoker augers  
The time for which the light barrier must consistently recognise no material to deactivate material recognition in the drop box.

***Switch-on delay of delivery screw(s) light barrier(s)***

**Prerequisite:** Delivery screw installed or intermediate screw installed  
The time for which the light barrier must consistently recognise material to activate material recognition in the delivery screw.

***Switch-on delay of delivery screw(s) light barrier(s)***

**Prerequisite:** Delivery screw installed or intermediate screw installed  
The time for which the light barrier must consistently recognise no material to deactivate material recognition in the delivery screw.

***Error of light barrier(s) is delayed for***

**Prerequisite:** Overfilling safety device installed for rotary valve or level sensor installed between feed and stoker augers  
Time delay until an error in the material recognition is tripped.

***Max. Counter limit for troubleshooting of rotary valve overcurrent is***

**Prerequisite:** Rotary valve with own drive installed  
Number of troubleshooting attempts on the rotary valve if the overcurrent sensor of the rotary valve activates.

***During troubleshooting of stoker, it turns forwards for***

Duration, how long should the stoker turn forwards during troubleshooting of stoker.

***During troubleshooting of stoker, it turns backwards for***

Duration, how long should the stoker turn backwards during troubleshooting of stoker.

***During troubleshooting of feed screw, it turns forwards for***

Duration, how long should the feed screw turn forwards during troubleshooting.

***During troubleshooting of feed screw, it turns backwards for***

Duration, how long should the feed screw turn backwards during troubleshooting.

***During troubleshooting of rotary valve, it turns forwards for***

**Prerequisite:** Rotary valve with own drive installed  
Duration, how long should the rotary valve turn forwards during troubleshooting.

***During troubleshooting of rotary valve, it turns backwards for***

**Prerequisite:** Rotary valve with own drive installed  
Duration, how long should the rotary valve turn backwards during troubleshooting.

***A rotary valve motor protection switch error is delayed for***

**Prerequisite:** Rotary valve with own drive installed  
Time delay of an error message for the rotary valve motor protection switch.

***The back-burn flap opens after a maximum of***

**Prerequisite:** Back-burn flap installed  
Maximum time the burn back flap has turned from the closed to the open position.

***The back-burn flap closes after a maximum of***

**Prerequisite:** Back-burn flap installed  
Maximum time the burn back flap must be closed.

***Nominal current for stoker screw (MSS\*2)***

Setting the nominal current of the stoker screw according to the identification plate on the motor.

***Nominal current for rotary valve***

**Prerequisite:** Rotary valve with own drive installed  
Setting the nominal current of the rotary valve according to the identification plate on the motor.

***Nominal current for feed screw***

Setting the nominal current of the feed screw according to the identification plate on the motor.

**Min. current monitoring with stoker**

- **YES:** A failure of measured phase is detected.

**Min. current monitoring with feed screw**

- **YES:** A failure of measured phase is detected.

**Min. current monitoring with rotary valve**

- **YES:** A failure of measured phase is detected.

**Start delay of light barrier at sliding floor**

**Prerequisite:** Feed system, sliding floor available

If the light scanner does not detect any material within this time, the sliding floor is switched on.

**Release delay of light barrier at sliding floor**

**Prerequisite:** Feed system, sliding floor available

If the light scanner detects material within this time, the sliding floor is switched off.

**Cycles of sliding floor after**

**Prerequisite:** Feed system, sliding floor available

If the transverse conveyor screw runs for this time without the sliding floor being requested, the sliding floor is activated for a set time ("Duration of cycles of sliding floor" parameter).

**Duration of cycles of sliding floor after**

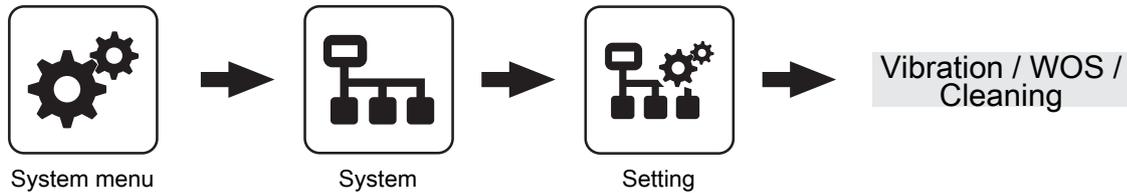
**Prerequisite:** Feed system, sliding floor available

Specifies how long the sliding floor is activated for in override.

**Maximum numbers of cycle for sliding floor**

**Prerequisite:** Feed system, sliding floor available

Specifies how often the sliding floor can be activated in succession via the override.

**Setting - Vibration / WOS / Cleaning*****Clean after how many hours heating?***

If the boiler has passed the set time in “Heating” status, the boiler shuts down for a cleaning cycle.

***Minimum runtime in heating mode until grate 1 ... 3 are cleaned***

The boiler has to be in “Heating” status for the set time at least before the grate is cleaned. The number of combustion grates depends on the boiler type.

***Tip grate 1 ... 3 how often during cleaning?***

Specifies how often the grate is to be tipped in “Cleaning” status. The number of combustion grates depends on the boiler type.

***During heating-cleaning reduce output for***

In “Heating - Cleaning” status, before the combustion grate is cleaned, the output of the boiler is reduced to minimise the bed of embers.

***During heating-cleaning release output after***

After cleaning the combustion chamber grate, the bed of embers will be formed again in the specified time.

***Tilt the grate how often during heating-cleaning?***

Defines the number of times the combustion chamber grate is tipped during “Heating - Cleaning” status.

***Slide-in during heating-cleaning***

During the “Heating - Cleaning” status, the fuel feed-in is limited to the specified value.

***Primary air during heating-cleaning (absolute)***

During the “Heating - Cleaning” status the primary air flap is opened to the specified value.

***During heating-cleaning, the grate should stay open for***

If the combustion grate is tipped in “Heating - Cleaning” status, it will remain open for the specified time in order to allow the burned fuel to slide down the ash chute.

***Clean after how many shutdowns***

This parameter defines the number of shutdowns after which the cleaning cycle is carried out.

***WOS start time***

Time from which the heat exchanger cleaning system can be activated.

***WOS stop time***

Time to which the heat exchanger cleaning system can be activated.

***WOS runs every***

When the delivery screw runtimes reach the specified value, the WOS drive is activated.

***WOS runtime***

Time which the heat exchanger cleaning system is activated.

***Minimum duration of blower fan run-on I (for residual O2)***

Minimum duration of “FD fan run-on I” status. If the criterion “Current residual oxygen content”  $\geq$  “Residual oxygen content, above which fire is out” has already been fulfilled during this time, the operating status is not cancelled early. The maximum duration of the operating status is 1 hour.

***Minimum duration of blower fan run-on II (for flue gas temperature)***

Minimum duration of “FD fan run-on II” status. If the criterion “Current flue gas temperature”  $<$  “Flue gas temperature, below which boiler switches to OFF status” has already been fulfilled in this time, the operating status is not cancelled early.

***Cycle of ash discharge system***

Interval at which the ash screw is to be operated for the set runtime.

***Ash screw runtime***

Time which the ash screw drive is activated.

***First start of cleaning***

Cleaning starts at this time.

***Second start of cleaning***

Cleaning starts at this time.

**Primary air at the start of heating-cleaning (absolute)**

The primary air is regulated to this value at the start of the boiler status "Heating - Cleaning" and then ramped to the value "Primary air in heating - cleaning (absolute)".

**Tip grate 1 after how many hours heating**

Indicates after how many hours of heating the grate on the feed-in side is tilted.

**Tip grate 1 after how many times cleaning**

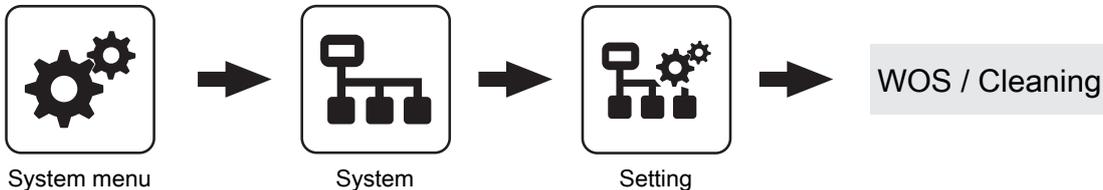
Indicates the number of cleanings after which the grate on the feed-in side is tilted.

**During troubleshooting of ash screw, it turns backwards for**

Specifies how long the ash screw should turn in the opposite direction in the event of a fault.

**Nominal current of the ash screw**

Nominal current of the ash screw drive in accordance with the motor identification plate.

**Setting - WOS / Cleaning****Clean after how many hours heating?**

If the boiler has passed the set time in "Heating" status, the boiler shuts down for a cleaning cycle.

**Tilt the grate how often during cleaning?**

Defines the number of times the combustion chamber grate is tipped during "Cleaning" status.

**Permitted start processes with blocked ash screw**

Defines the number of boiler start processes that can be carried while the ash screw is blocked. Once the specified number has been reached, no further start process is permitted.

**WOS start time**

Time from which the heat exchanger cleaning system can be activated.

**WOS stop time**

Time to which the heat exchanger cleaning system can be activated.

**WOS runs every**

When the delivery screw runtimes reach the specified value, the WOS drive is activated.

**WOS runtime**

Time which the heat exchanger cleaning system is activated.

**Minimum duration shutdown**

Minimum duration of "Awaiting shutdown" status, in which the remaining fuel is burned on the combustion grate.

**Ash screw interval**

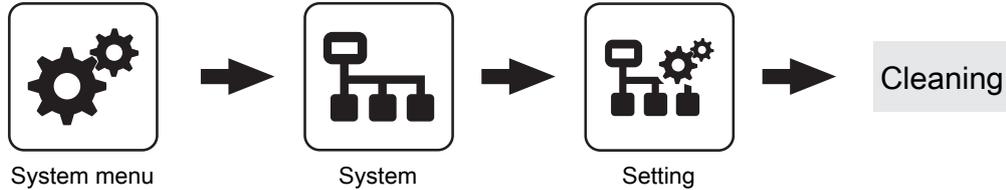
Time until the ash screw is activated.

**Ash screw runtime**

Time which the ash screw drive is activated.

**Cleaning after standby**

- **YES:** When the boiler switches off, the combustion chamber grate is only tipped and cleaned after the next start command. The remaining bed of embers cools down and when fully cooled falls into the ash screw.
- **NO:** In "Cleaning" operating status, the combustion grate is tipped and cleaned.

**Set - Cleaning****Clean after how many hours heating?**

If the boiler has passed the set time in “Heating” status, the boiler shuts down for a cleaning cycle.

**Tip grate 1 how often during cleaning?**

Defines the number of times the first combustion grate is tipped during “Tip grate” status.

**Tip grate 2 how often during cleaning?**

**Prerequisite:** Boiler with separately driven second combustion grate

Defines the number of times the second combustion grate is tipped during “Cleaning” status.

**Tip grate 1 after how many times cleaning**

Indicates the number of cleanings after which the grate on the feed-in side is tilted.

**Tip grate 1 after how many hours heating**

Indicates after how many hours of heating the grate on the feed-in side is tilted.

**Permitted start processes with blocked ash screw**

Defines the number of boiler start processes that can be carried while the ash screw is blocked. Once the specified number has been reached, no further start process is permitted

**The cleaning may start from**

Time from which cleaning is enabled. A time limit for the heat exchanger is not recommended.

**The cleaning may run until**

Time from which cleaning is blocked. A time limit for the heat exchanger function is not recommended.

**Runtime of the cleaning per heating hour**

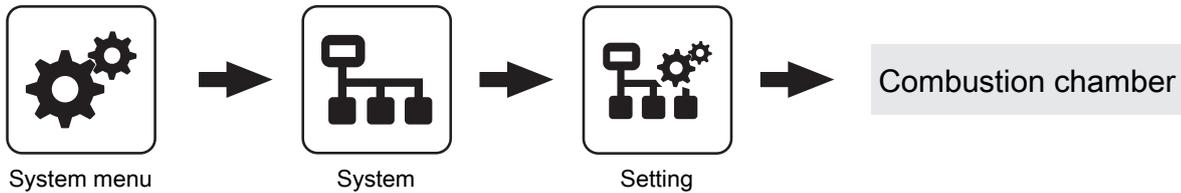
Specifies how long the cleaning per operating hour of the boiler should be in the heating status. If the boiler is switched off after 5 hours of heating operation, cleaning takes five times as long as the time set here.

**Minimum duration shutdown**

Minimum duration of “Awaiting shutdown” status, in which the remaining fuel is burned on the combustion grate.

**Cleaning after standby**

- **YES:** When the boiler switches off, the combustion chamber grate is only tipped and cleaned after the next start command. The remaining bed of embers cools down and when fully cooled falls into the ash screw.
- **NO:** In “Cleaning” operating status, the combustion grate is tipped and cleaned.

**Setting - Combustion chamber*****Under-pressure in the boiler at maximum output***

At maximum boiler output the specified underpressure has to be kept.

***Boiler underpressure setpoint***

Desired underpressure which is to be maintained during the operation of the boiler.

***Underpressure MIN control variable***

Adjustable parameters for the underpressure control.

***Underpressure in the boiler at maximum output during start phase***

Underpressure that must be maintained during the start phase at max. output.

***Under-pressure at minimum output***

At minimum boiler output the specified underpressure must be kept.

***Start infeed reduction from pressure deviation of***

If the differential pressure exceeds the value set here, the feed rate is reduced.

***Control pressure during preparation (seal control)***

In "Preparation" status, the minimum underpressure specified must be reached.

***Control pressure tolerance during preparation (seal control)***

In "Preparation" status, a maximum deviation for the parameter "Control pressure during preparation (seal control)" can be reached.

***The duration of the preparation is***

Duration of the seal check during "Preparation" status.

***Under-pressure during pre-heating***

In "Pre-heating" status, the specified underpressure is required as a minimum.

***Under-pressure during shutdown***

In "Shutdown" status, the specified underpressure is required as a minimum.

***Minimum combustion chamber temperature***

Defines the minimum combustion chamber temperature in heating status. In conjunction with the parameters "Power increase from \_\_ K above minimum CCT" and "Min. power at minimum combustion chamber temperature and flue gas temperature" the range of power increase due to the low combustion chamber temperature is calculated.

***Combustion chamber temperature for Heating***

Combustion chamber temperature which must be reached during the heating process of the boiler to change to "Heating" status.

***Start of combustion chamber temperature control***

Threshold value for activating the combustion chamber temperature regulator.

***Width of the cc temp. control band***

Temperature range within which the combustion chamber temperature is to be regulated.

***Maximum combustion chamber temperature***

Maximum combustion chamber temperature which can be reached in the "Heating" status.

***NO feed if temp over***

If the combustion chamber temperature in "Heating" status exceeds the specified value, the fuel feed-in is stopped.

***Power increase from \_\_ ° above minimum CCT***

In conjunction with the parameter "Minimum combustion chamber temperature", this defines the control band, within which the minimum output of the boiler is increased.

***0% CCT signal at CCT***

This is defined together with the parameter "100% CCT signal at CCT".

***100% CCT signal at CCT***

Together with the parameter "0% CCT signal at CCT", this defines the combustion chamber temperature signal.

**Minimum output**

Minimum value of boiler control variable which can be used to operate the boiler.

**Maximum boost of output to**

Maximum opening of the primary air flap at minimum boiler output.

**Start of combustion chamber cooling at cc temp signal**

When the combustion chamber temperature signal reaches the specified value, the combustion chamber cooling is started.

**End of combustion chamber cooling at cc temp signal**

When the combustion chamber temperature signal reaches the specified value, the combustion chamber cooling stops.

**Start of slide-in reduction from cc temp signal**

When the combustion chamber temperature signal reaches the specified value, the fuel slide-in is reduced.

**Current cc temp. signal**

Display of the current combustion chamber temperature signal.

**CC cooling through secondary air**

Display of the current combustion chamber cooling by the secondary air.

**Slide-in is limited to a maximum of**

Display of the current feed-in limit during combustion chamber cooling.

**Output boost using combustion chamber control**

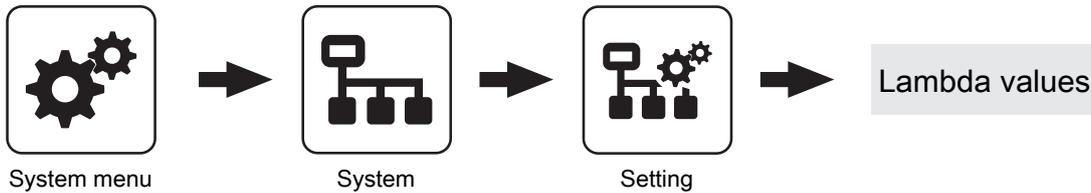
Display of the current power increase rate due to combustion chamber regulation.

**Neg. press. while FGR clean.**

Indicates the negative pressure required during the "Clean FGR" status.

**Neg. press. during Shutdown Wait 2**

Indicates the negative pressure required in the "Shutdown Wait 2" status.

**Setting - Lambda values****Heating up time for lambda probe**

Time for the heating up cycle of the lambda probe.

**Residual oxygen content setpoint**

Residual oxygen content which is regulated during "Heating" status.

**Maximum deviation of residual O2 from setpoint**

Within this tolerance range, with reference to the residual oxygen content setpoint, the residual oxygen controller does not activate.

**O2 setpoint increase for partial load**

In partial load operation of the boiler, the residual oxygen content to be reached is increased by the specified value.

**No feed when residual O2 below**

If the current residual oxygen content falls below the set value, the fuel slide-in stops.

**Maximum feed correction by O2 controller**

Maximum correction factor, by which the residual oxygen controller can change the infeed.

**Residual oxygen content, above which fire is out**

If the current residual oxygen content in "Heating" status exceeds the specified value, the safety time begins to run.

**O2 Controller max**

Adjustable parameters for the residual oxygen controller.

**NOTICE! Factory setting - do not change!**

**Slide-in control**

Adjustable parameters for the fuel slide-in controller.

**NOTICE! Factory setting - do not change!**

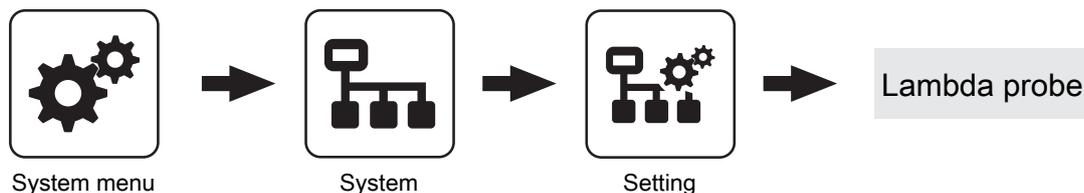
**Start value of the O2 regulator.**

Adjustable parameters for the fuel slide-in controller.

**NOTICE! Factory setting - do not change!**

**Residual oxygen above which the lambda probe is allowed to switch off**

If the boiler switches to "Boiler off" or "Off" mode, the lambda probe heating remains active for at least 1 hour, up to a maximum of 24 hours. If the residual oxygen content exceeds the value set here, the lambda probe heating is switched off.

**Set - Lambda probe****Residual oxygen content**

Display of the current residual oxygen content.

**Lambda probe status**

The following status displays are possible:

- Off
- Pre-heating
- Normal operation
- Cooling
- Reheating
- Error

**Lambda probe type**

Setting the Lambda probe type used:

- Bosch broadband probe  
(item number: 69001A, "broadband probe" socket)
- NTK broadband probe  
(item number: 69003, "broadband probe" socket)
- Bosch switching-type sensor  
(type LSM11, "Lambda probe" socket)
- NTK switching-type sensor  
(type OZA685, item number: 69400, "Lambda probe" socket)

**Lambda probe heating**

- **A 0:** Automatic, Off; **A 1:** Automatic, On
- **1:** Manual, On
- **0:** Manual, Off

**Lambda probe calibration (probe must be at 21% O<sub>2</sub>)**

- **YES:** After activation of the Lambda probe heating, the Lambda probe can be calibrated.
- **NOTICE!** The Lambda probe must be at 21% oxygen (air)!

**Automatic lambda probe calibration active**

- **YES:** If the boiler is in one of these statuses ("Boiler off", "Off", or "Standby") for a minimum period, which can be set ("Minimum time at standstill"), the broadband probe will be calibrated to 21%.

For boilers with automatic loading, calibration is carried out at the next start (status "Preparation").

For boilers with manual loading, the boiler changes to the "sensor check" status after this time has elapsed (additional indication on the display). The ID fan is activated and the secondary air is completely opened. If the insulated door is opened in this status, the process is aborted.

The prerequisite for calibration is that the probe provides a stable measurement for one minute. If the measurement exceeds 21% for more than one minute, the probe is also calibrated, regardless of the standstill times.

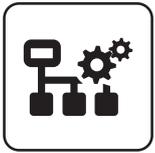
**Minimum time at standstill**

Defines the duration that the boiler must be in "Boiler Off", "Off" or "Standby" mode to start automatic Lambda sensor calibration.

**Residual oxygen above which the lambda probe is allowed to switch off**

If the boiler switches to "Boiler off" or "Off" mode, the lambda probe heating remains active for at least 1 hour, up to a maximum of 24 hours. If the residual oxygen content exceeds the value set here, the lambda probe heating is switched off.

## Switching-type sensor



Setting



Lambda values



Switching-type sensor

***Residual oxygen content***

Display of the current residual oxygen content.

***Lambda probe voltage measured***

Display of the current measured Lambda probe voltage.

***Lambda probes correction value***

Correction value for lambda measurement. If too much is displayed, this value must be set to positive, if too little is displayed, the value must be set to negative.

***Lambda probe voltage corrected***

Display of the measured Lambda probe voltage, at which the "Lambda probe correction value" is taken into account.

## Broadband probe



Setting



Lambda values



Broadband probe

***Residual oxygen content***

Display of the current residual oxygen content.

***Broadband probe heating current***

Display of the measured broadband probe heating current.

***Broadband probe heating voltage***

Display of the measured broadband probe heating voltage.

***Broadband probe Nernst voltage***

Display of the measured Nernst voltage of the broadband probe.

***Broadband probe pump current***

Display of the measured broadband probe pump current.

***Broadband probe internal resistance***

Display of the measured internal resistance of the broadband probe.

**Set - Quantity of heat calculation****Flow temperature sensor correction value**

If, at the same ambient temperature, the flow temperature sensor and return feed sensor display different temperature values, this correction value is used to calibrate the difference between the flow sensor and the return sensor to "0". The corrected value is used only to calculate the quantity of heat does not affect the operation of the boiler. If the boiler temperature is used to calculate the quantity of heat, the correction value is applicable to the boiler sensor.

**Flow temperature sensor input**

Sensors 1/2 on the core module or a sensor on the hydraulic module can be used as flow temperature sensors. If an invalid sensor assignment is made, the value of the boiler sensor is used to calculate the quantity of heat.

**Specific heat capacity**

This parameter indicates the specific heat capacity of the heat carrier. The value for pure water (4180 Ws/kgK) is used as the default value.

**Litres per pulse of flow sensor**

If an external volume pulse transmitter is used, adjust this value accordingly.

**Flow rate at 50% pump rotation speed**

The parameter specifies the volumetric flow rate at 50% pump actuation.

⇒ See "Calculating the feed output of the circulating pump" [page 129]

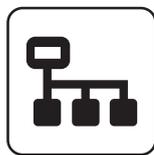
**Flow rate at 100% pump rotation speed**

The parameter specifies the volumetric flow rate at 100% pump actuation.

⇒ See "Calculating the feed output of the circulating pump" [page 129]

**Setting - General settings**

System menu



System



Setting



General settings

⇒ See "Boiler - General settings" [page 67]

**MODBUS settings**

Setting



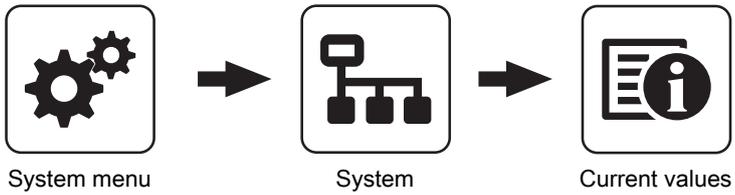
General settings



MODBUS settings

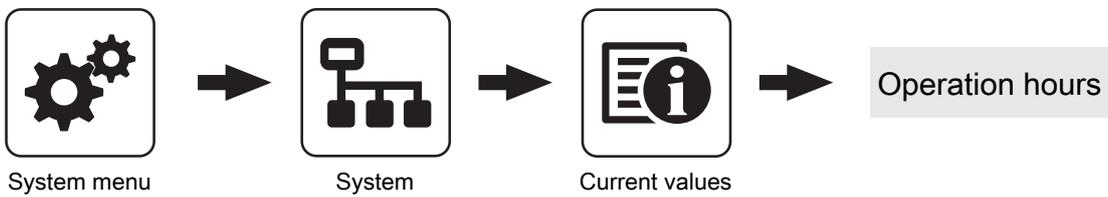
⇒ See "Boiler - General settings - MODBUS settings" [page 68]

#### 4.14.2 System - Current values



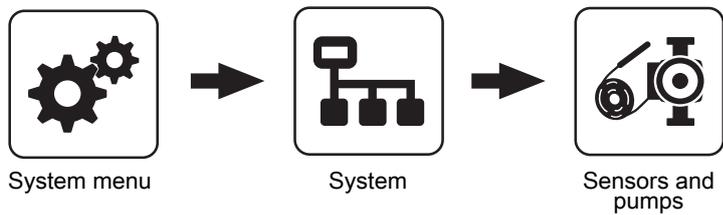
Display of the current value for the relevant parameter. The parameters displayed depend on the boiler configuration!

#### *Operation hours*



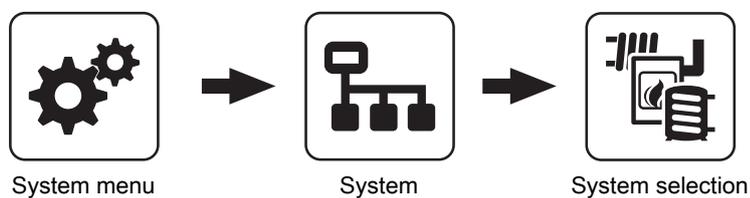
Display of the current number of operation hours of the respective unit and respective components. The parameters displayed depend on the boiler configuration!

#### 4.14.3 System - Sensors and pumps



In the “Sensors and pumps” menu, all sensor inputs and pump outlets available in the hydraulic system can be allocated. The number of parameters depends on the configuration.

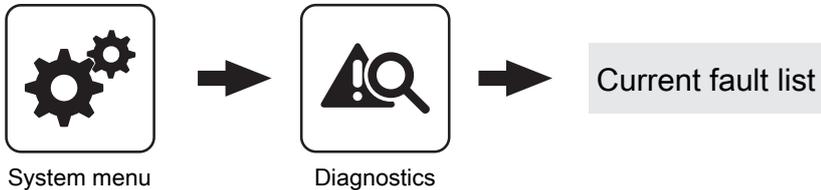
#### 4.14.4 System - System selection



Menu for setting the configuration for systems that have not been configured with the setting wizard.

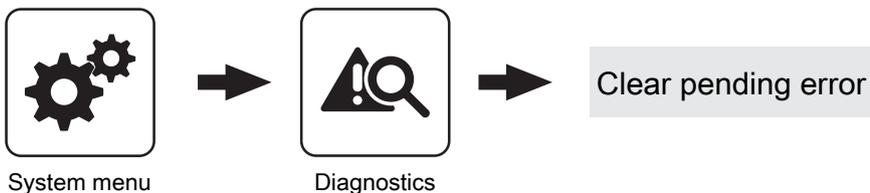
## 4.15 Diagnostics

### 4.15.1 Diagnosis – Current fault list



Display of the current fault messages. In addition, you can also invoke time information here, such as when the fault occurred, when the fault was acknowledged and when the fault was cleared.

### 4.15.2 Diagnosis – Clear pending error



Used to delete current faults in the fault list. Depending on the system configuration, the status LED can flash red even though no fault messages are pending. This function can also be used to delete pending fault messages that are not visible.

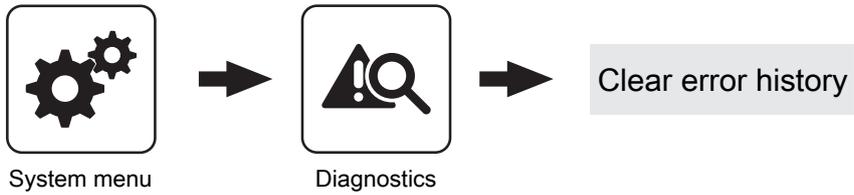
### 4.15.3 Diagnostics - Error history



Up to 50 fault indication entries are stored in the error history. A fault can consist of up to 3 fault indication entries. You can determine what type of fault message it is, when the fault occurred (appeared), when the fault was

acknowledged and when the fault was eliminated (cleared). If all 50 fault indication entries are in use and there is another fault indication entry, the oldest entry will be deleted to make room for the current one.

#### 4.15.4 Diagnostics - Clear error history

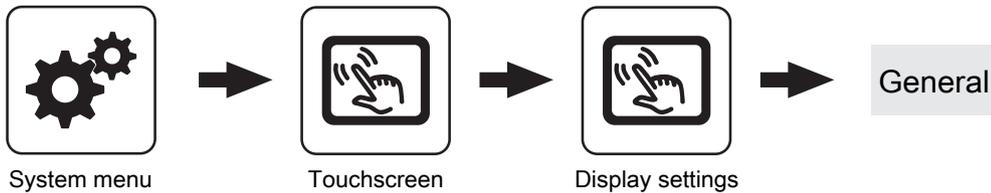


The entire error history can be deleted using this function. From this time on, the error history will be filled again with new fault messages.

## 4.16 Touchscreen

### 4.16.1 Touchscreen - Display settings

#### *Display settings - General*



#### **Brightness**

Display of the light sensor's evaluation of the current brightness in the room for adjusting the backlight.

#### **Maximum backlight**

The brighter it is in the room, the more the background of the touch display is illuminated. This is where you can limit the maximum backlight.

#### **Minimum backlight**

The darker it is in the room, the less the background of the touch display is illuminated. This is where you can set the minimum backlight.

#### **Delay time for screen saver (0 deactivates the screensaver)**

If the touchscreen is not touched within the set time, the screensaver will activate and the screen will go dark. To disable the screensaver, set the delay time to "0".

#### **Module address**

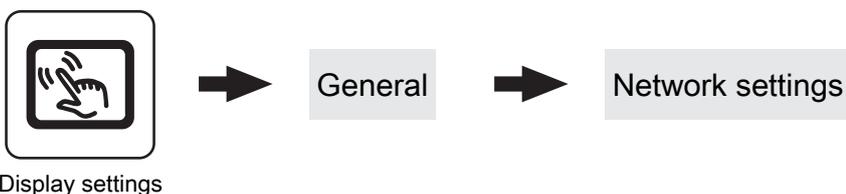
This is where you can change the module address if it is incorrectly set.

Module address 0: Boiler console

Module address 1-7: respective room console 3200 with touchscreen

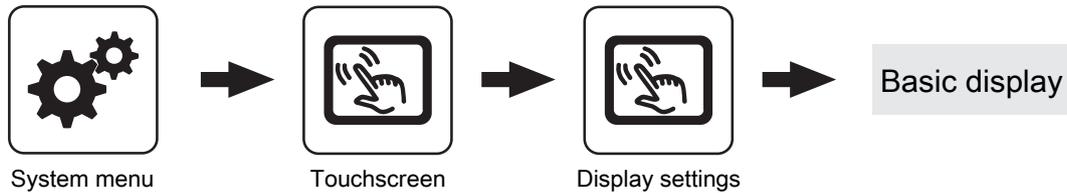
**NOTICE! Once you have changed the module address, you will need to restart the boiler controller (switch main switch on boiler off and on)!**

#### **Network settings**

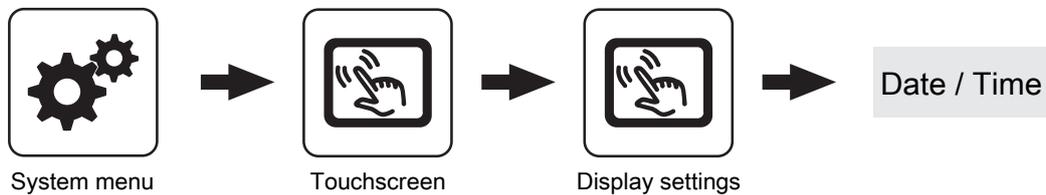


#### **Obtain IP address automatically**

- **On:** The address in the local network (IP address), the subnet mask, default gateway and DNS server are automatically assigned by the router/server.
- **Off:** IP address, subnet mask, default gateway and DNS server can be manually set.

**Display settings - Basic display****Figures 1 ... 6**

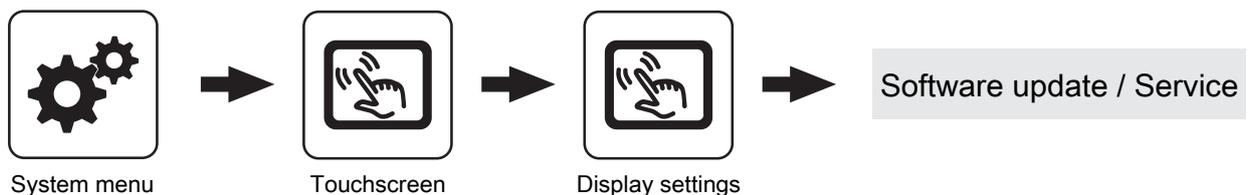
On the basic display, up to six different information displays can be freely selected. The selection depends on the system configuration.

**Display settings - Date / Time****Automatic switching between standard/daylight saving time**

Used to deactivate switch to daylight saving time (factory setting: YES).

**Date / Time**

Display and setting of the date and time.

**Display settings - Software update / Service****Calibrate screen**

⇒ See "Calibrating the touchscreen" [page 139]

**Restart control  
Carry out update**

⇒ See "Software update Lambdatronic 3200" [page 141]

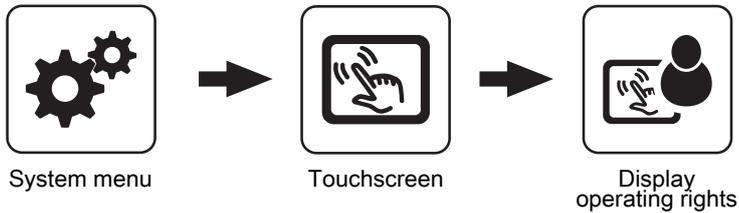
**Restart display**

Touch control unit is restarted and the data is reloaded from the core module.

**Restore control device to factory settings (restart is carried out)**

The touch display is reset to the factory setting. Data stored on the touch display (e.g. setting wizard) is completely deleted. Only perform if the system must be completely reconfigured (e.g. when replacing the core module).

### 4.16.2 Touchscreen - Display operating rights



In this menu the operating rights for the individual room consoles are allocated. If access from a room console to a heating system component is permitted, the corresponding parameter must be set to "YES". The number of menus as well as the parameter entries depend on the system configuration!

**NOTICE!** The operating rights of the room consoles should be allocated from the boiler console, as unrestricted access is only possible here.

#### "Touch display with address 1 – 7" and "Button display with address 1 – 7"

##### Heating circuit system:

###### *Allow access to heating circuit 01 ... 18?*

Specifies whether heating circuit 01 ... 18 can be accessed from touchscreen 1 ... 7.

##### DHW tank system:

###### *Allow access to DHW tank 01 ... 08?*

Specifies whether DHW tank 01 ... 08 can be accessed from touchscreen 1 ... 7.

##### Storage tank system:

###### *Allow access to storage tank 01 ... 04?*

Specifies whether storage tank 01 ... 04 can be accessed from touchscreen 1 ... 7.

##### Solar panel system:

###### *Allow access to solar system 01?*

Specifies whether solar system 01 can be accessed from touchscreen 1 ... 7.

##### Heating system:

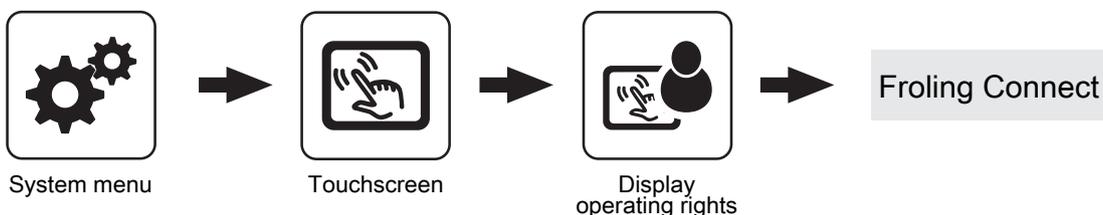
The parameters displayed depend on the configuration.

##### Boiler:

###### *Switch boiler on/off via room console*

If this function is activated, the respective room console is enabled for switching the boiler on and off. In order to be able to operate the boiler, remote switching on the boiler display must also be activated.

#### Froling Connect



For connection via the froeling-connect.com online platform using a touchscreen, the issue of a password is required.

**NOTICE!** The same password can be assigned for each touch display!

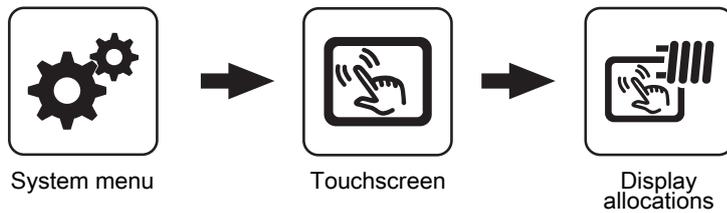
###### *Password for boiler display*

Password for boiler display can be issued.

###### *Password for touchscreen with address 1 ... 7*

Password for the touchscreen with address 1 ... 7 can be issued.

### 4.16.3 Touchscreen - Display allocation



#### Heating circuit system:

***Touch display with address 1 ... 7 is assigned to the following heating circuit:***

To assign a room console to a heating circuit, the respective heating circuit number with its address must be set on the room console. The parameters are set to “none” at the factory!

***Button display with address 1 ... 7 is assigned to the following heating circuit:***

To assign a room console to a heating circuit, the respective heating circuit number with its address must be set on the room console. The parameters are set to “none” at the factory!

#### DHW tank system:

***Touchscreen with address 1 ... 7 is assigned to the following DHW tank:***

To assign a DHW tank to a specific room console, the respective DHW tank number with its address must be set on the room console. The parameters are set to “none” at the factory!

***Button display with address 1 ... 7 is assigned to the following DHW tank:***

To assign a DHW tank to a specific room console, the respective DHW tank number with its address must be set on the room console. The parameters are set to “none” at the factory!

## 5 FAQ

### 5.1 Activation options of pump outlets

#### *Pump 0.1 – 7.2, pump 1*

The following settings are possible at the hydraulic modules as well as at pump 1 on the core module with pump outlets 0.1 – 7.2.

- **Pump without control line)**  
Set when a standard pump is run at the respective output. This is controlled at the 230V output using pulse packets.
- **HE pump without control line**  
Set when a high efficiency pump without control line (e.g. Grundfos Alpha, WILO Yonos Pico, etc.) is run at the respective output.
- **Field pump / PDM**  
There is a permanent power supply of 230V at the output for the high efficiency pump. The pump is controlled using pulse duration modulation at the respective PDM output.
- **Solar pump / PDM**  
Here again, the pump is controlled by means of pulse duration modulation at the respective PDM output. In this case, however, the characteristic line is inverted and can only be used for specially marked high efficiency solar pumps.
- **Field pump PDM +valve**  
The signal for the field pump is emitted at the PDM output. If the signal exceeds 2%, the 230V output is switched on. If the signal is below 2% for more than 4 minutes, the output is switched off again.
- **PDM sol.pump +valve**  
The signal for specially marked high efficiency solar pumps is emitted at the PDM output. If the signal exceeds 2%, the 230V output is switched on. If the signal is below 2% for more than 4 minutes, the output is switched off again.
- **Field pump / 0–10V**
- **Solar pump / 0–10V**
- **Field pump 0–10 +valve**
- **Sol. pump 0–10V +valve**  
The same functions that apply with PDM apply to the parameter values with 0-10V. The only difference is that instead of pulse duration modulation, a 0-10V signal is used to control the pump.
- **Switch valve**  
When set to “Isolating valve” the output is activated either with 0% or 100%. This setting value is only available in the “Water” or “Boiler 2” menu.

#### *HKP0*

The following applies to pump outlet HKP0 at the core module:

- Relay output
- Speed control is not possible

## 5.2 Pump stall protection

After extended standstill times, there is a risk the pump drive may block due to corrosion and deposits. The pump stall protection feature is intended to prevent this.

The control ensures that the circulation pumps are switched on briefly on a regular basis, even outside the season of use.

At that time, the pumps are activated for 15 seconds at 100%.

The following components are affected:

- DHW loading pump
- Buffer pump
- Collector pump (not applicable to system 12 and system 13)
- Difference control pump
- Heating circuits (15 seconds pump run, subsequently the mixer starts up and shuts down again)

### 5.3 Boiler operating statuses

Availability of the listed operating statuses depend on the set boiler type!

<b>Preparation</b>	The boiler is ventilated, the Lambda probe heated and the ash screws are switched on; underpressure test.
<b>Heating up</b>	The stoker is filled with fuel and a quantity of fuel that can be ignited is pushed onto the grate.
<b>Close BBF</b>	The burn back protection system (burn-back flap) closes. (depending on the boiler type).
<b>Pre-heating</b>	The fan-assisted ignition switches on and the fuel is pre-warmed until a flame forms. For this period infeed is deactivated.
<b>Pre-heating – Ignition</b>	
<b>Ignition</b>	The fan-assisted ignition ignites the fuel. The flame is distributed throughout the entire combustion chamber. Control of the induced draught fan and infeed for this operating status are defined in the "Ignition" parameter menu.
<b>Open BBF</b>	The burn back protection system (burn-back flap) opens. (depending on the boiler type).
<b>Heating</b>	The boiler controller controls combustion according to the boiler setpoints.
<b>Heating - Cleaning</b>	The output of the boiler and the infeed unit are reduced and the grate is cleaned. After cleaning the boiler output is increased again.
<b>Empty stoker</b>	The stoker is emptied according to procedure.
<b>Awaiting shutdown</b>	Safety time during which the residual material on the grate is burnt.
<b>Fan run-on 1</b>	1. Safety time during which the residual material on the grate is burnt.
<b>Fan run-on 2</b>	2. Safety time during which the residual material on the grate is burnt.
<b>Stopped</b>	The combustion process has ended.
<b>Tip grate</b>	The grate opens / closes a specified number of times.
<b>Cleaning</b>	The grate is tipped and the boiler is ventilated for 1 minute. The stoker switches on and the ignition opening is cleared by blowing. The ash screw runs and the grate open / close twice the specified number of times during the entire procedure. This operating status can only be opened in "Boiler off" mode. The status that follows is "Boiler off", and the boiler must be activated by pressing the start key.
<b>Standby</b>	The boiler is ready to start and is waiting for a heat requirement (a start command).
<b>Cleaning possible</b>	Operating status for boiler cleaning tasks, which is activated after the service key has been pressed and a cleaning cycle has been carried out. The grate is in open position, the tipping grate and ash screw can be switched off and on manually.
<b>Boiler off</b>	The boiler controller now only controls the connected heating components. All parts of the boiler are deactivated. Lambda probe heating remains active for 1 hour after the operating status has been reached.
<b>Fault</b>	CAUTION - There is a fault!
<b>TS (Troubleshooting)</b>	If a fault occurs during heating (up), the boiler will switch to "Troubleshooting" status. In this status the stoker is emptied at minimum fuel feed-in (Parameter: "The time until the stoker is empty is") whilst the ignition fan is active. The boiler then switches to "Shutdown wait" status and "Tilt grate". It will remain in this status for at least 30 mins depending on the boiler output, the fuel used and the parameters set.

## 5.4 Determination of the quantity of heat

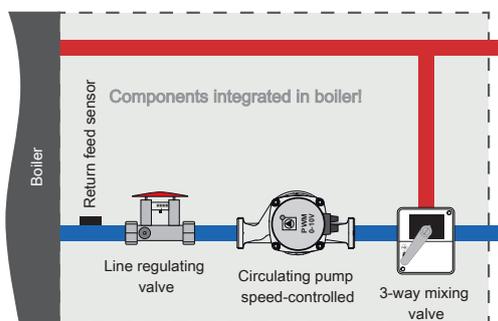
### 5.4.1 Assembly Information

The contact sensor and the line regulating valve must be positioned in the direction of flow downstream of the circulating pump and immediately upstream of the return connection of the boiler. Additional contact sensors and line regulating valves are required for boilers without return temperature control or return temperature control with thermal valve. A return feed sensor is already fitted on the return temperature control with 3-way mixing valve, which means that only the line regulating valve is required additionally.

#### Wood chip and pellet boiler T4e / PT4e

The return temperature control comes fitted with a 3-way mixing valve. The corresponding return feed sensor is already wired to the wood chip module. The position in the boiler is specified for the installation of the line regulating valve. Please refer to the information in the installation instructions for the boiler.

#### Return temperature control with mixing valve (factory fitted)

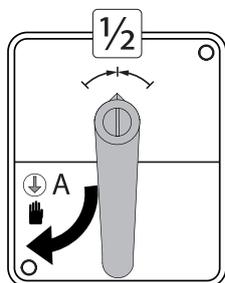


### 5.4.2 Functioning and configuration

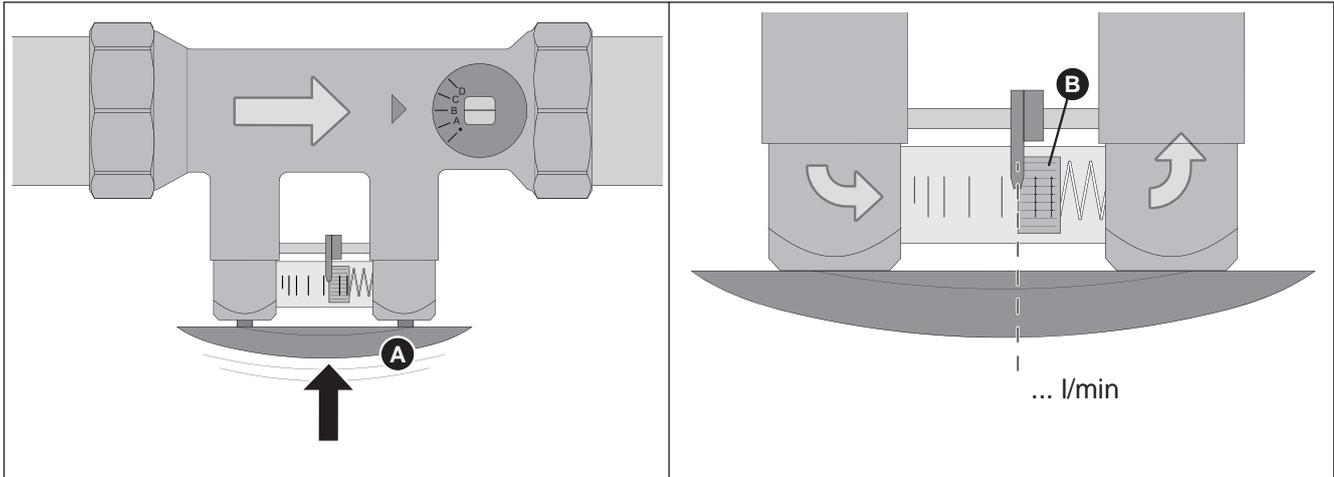
Software version V50.04 – B05.19 at minimum is required for the heat quantity calculation to work. The difference between the boiler temperature and the boiler return temperature as well as the flow of the circulating pump are used to calculate the heat quantity.

#### *Calculating the feed output of the circulating pump*

##### Boiler with 3-way mixing valve



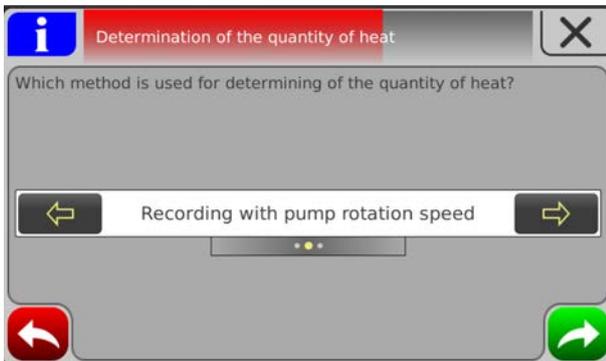
- Set mixing valve to manual operation and turn the lever to the central position
- Activate the circulating pump in manual operation with 100% speed



- Press the handle (A) on the line regulating valve
- Read and record the flow rate in l/min at the underside of the floater (B)
- Activate the circulating pump in manual operation at 50% speed
- Press the push bar on the line regulating valve; make a note of the flow on the scale

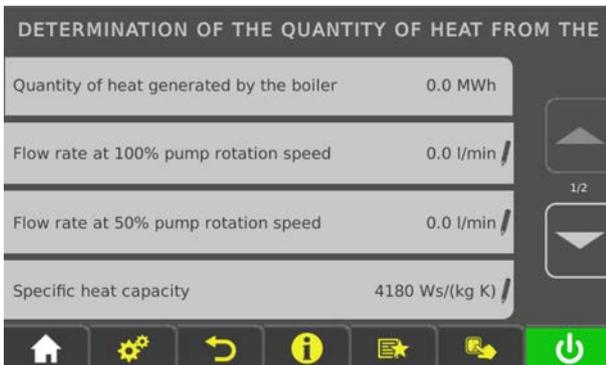
### Setting the type of heat quantity calculation

- In the boiler's setting wizard, select "Record with pump speed"



### Configuring the heat quantity calculation

- Go to the menu "System → Settings → Boiler heat quantity calculation"
- Enter the recorded values for the flow of the circulating pump at the respective parameter



## 5.5 Boiler modes

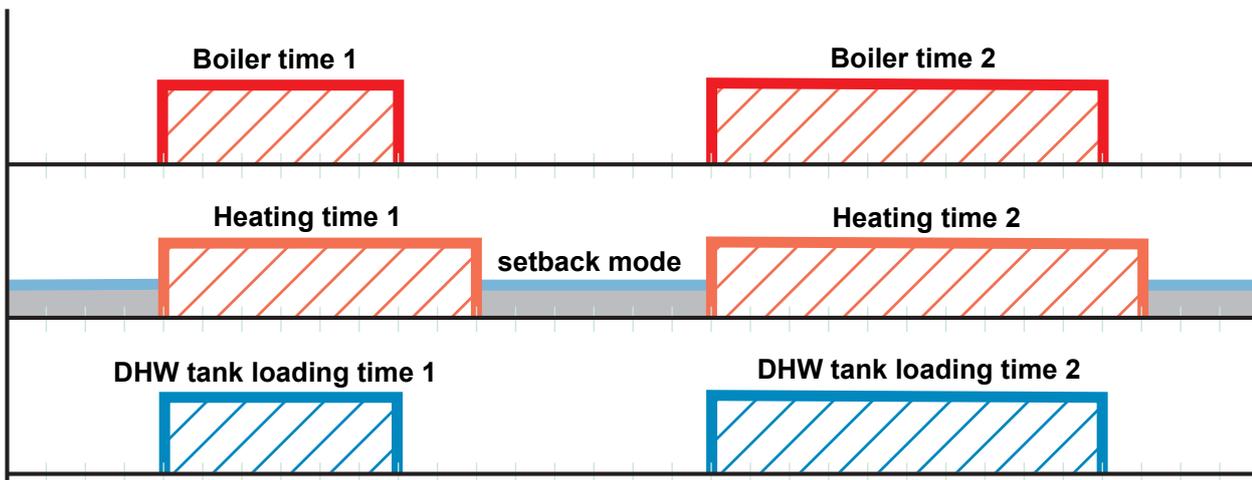
### 5.5.1 "Automatic" mode without storage tank

When "Automatic" is selected without a storage tank, the boiler only produces heat during the specified boiler times. Outside these times the boiler follows the shutdown procedure and switches to "Standby" status. It is, therefore, important to note that in this mode the heating circuits and DHW tank are only supplied with heat during the boiler times.

In Example 1 the boiler times have been set to cover the necessary heat requirement. The heating times and DHW tank loading times have been set within the boiler time range, with the heating time being extended approximately one hour beyond the boiler time. This allows the residual energy in the boiler to be used by the heating circuits after the end of the boiler time.

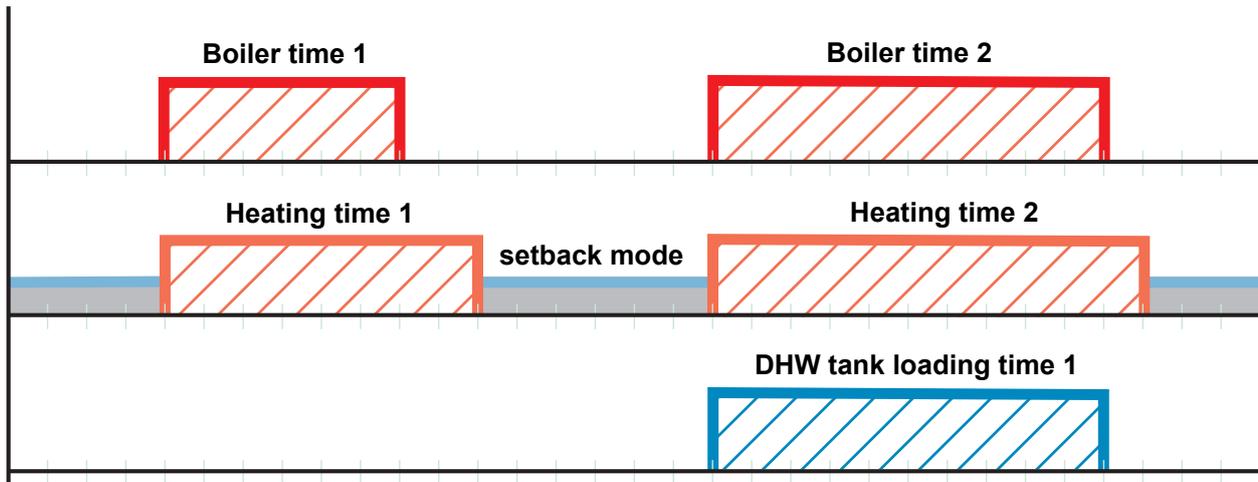
Note that outside the boiler times for setback mode, heat is only available until the boiler temperature falls below the setting value (parameter "Minimum boiler temperature to release all pumps").

*Example 1: "Automatic" mode without storage tank*



**Tip:** In systems with solar panels, choose the DHW tank loading time so that solar energy can be used.

Example 2: "Automatic" mode without storage tank with solar panel system



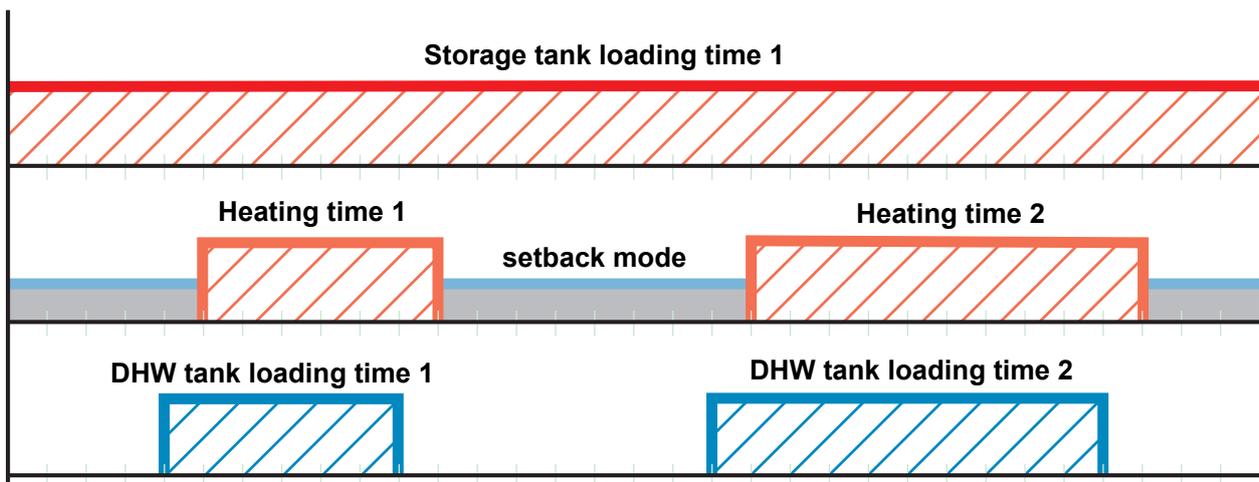
### 5.5.2 "Automatic" mode with storage tank

When "Automatic" is selected with storage tank, the boiler only produces heat if the storage tank actually requests heat within the specified storage tank loading time. Outside these times the boiler is in "Standby" status.

The heating times should be set within the storage tank loading times so that the provision of heat is guaranteed over the entire heating time.

**Note that the heating circuit and DHW tank are only supplied with heat for as long as the storage tank temperature is sufficient for the demand.**

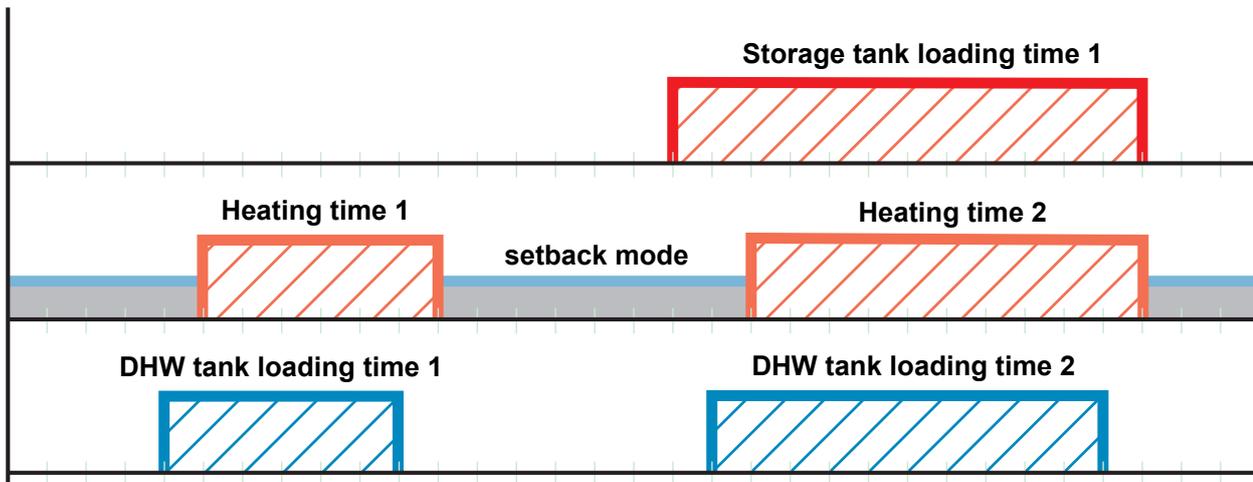
Example 1: "Automatic" mode with storage tank



**Tip:** In systems with a storage tank and solar panels, choose the storage tank loading time so that solar energy can be used.

In order to ensure that there is sufficient heat at the start of the DHW tank loading time and heating time, we recommend setting the storage tank charging time to begin before the start of the DHW tank time or heating time.

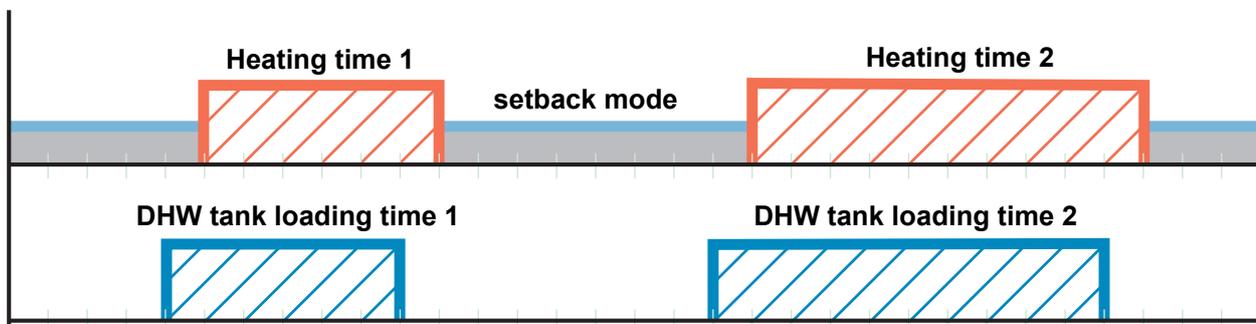
Example 2: "Automatic" mode with storage tank and solar panel system



### 5.5.3 "Continuous load" mode without storage tank

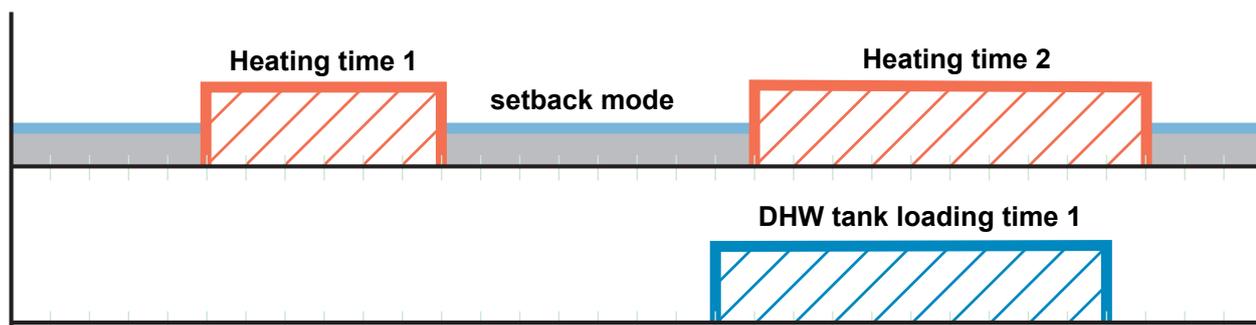
When "Continuous load" is selected, the boiler produces heat around the clock, in other words it tries to maintain its boiler temperature setpoint 24 hours a day. The boiler time settings are ignored in this mode. The heating times and DHW tank loading times can be distributed throughout the day as required.

Example 1: "Continuous load" mode



Tip: In systems with solar panels, choose the DHW tank loading time so that solar energy can be used.

Example 2: "Continuous load" mode with solar panel system



### 5.5.4 “Continuous load” mode with storage tank

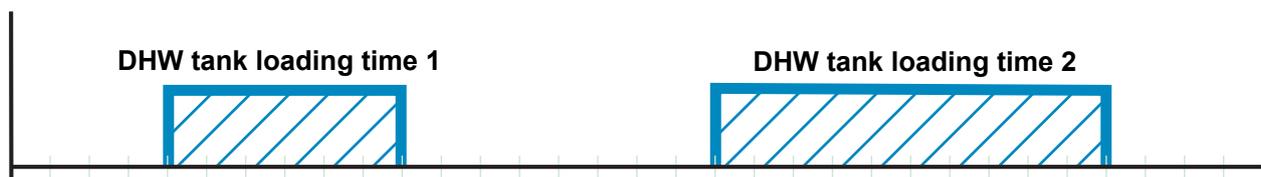
To ensure efficient operation, set systems with a storage tank to “Automatic” mode rather than “Continuous load” mode.

⇒ See “Automatic” mode with storage tank” [page 133]

### 5.5.5 “Domestic hot water” mode without storage tank

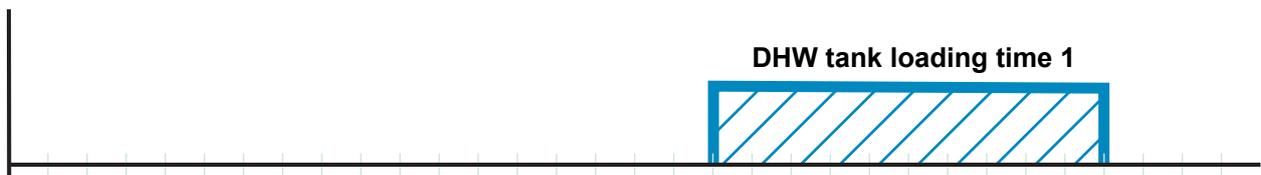
When “Domestic hot water” is selected, the boiler only produces heat if the DHW tank actually requests heat within the specified DHW tank loading time.

*Example 1: “Domestic hot water” mode without storage tank*



**Tip:** In systems with solar panels, choose the DHW tank loading time so that solar energy can be used.

*Example 2: “Domestic hot water” mode without storage tank with solar panel system*

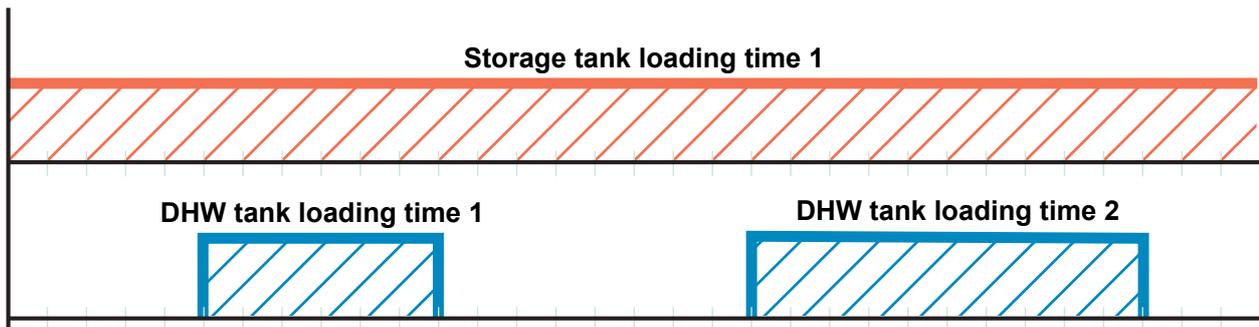


### 5.5.6 “Domestic hot water” mode with storage tank

In systems with a storage tank, note that in “Domestic hot water” mode, the storage tank loading times remain active as the DHW tank is supplied with heat from the storage tank.

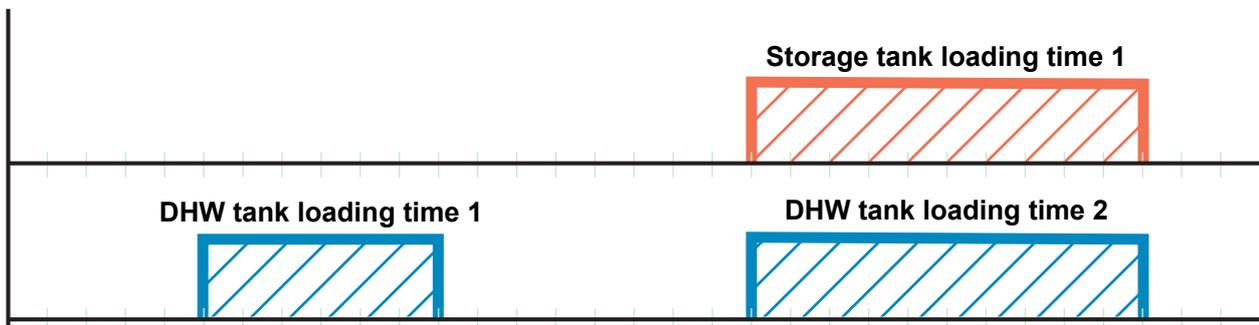
Within the storage tank loading time the boiler only produces heat if the storage tank temperature is below the minimum value and the DHW tank is requesting heat.

*Example 1: “Domestic hot water” mode with storage tank*



**Tip:** In systems with a storage tank and solar panels, choose the storage tank loading time so that solar energy can be used.

*Example 2: “Domestic hot water” mode with storage tank and solar panel system*



## 5.6 Setting times

The desired time window for the component can be set in the "Times" tab in the individual menus of the heating components (heating circuits, DHW tanks etc.). The structure of the time menu and the procedure for changing the times are always the same.

- Use the left or right arrow to navigate to the desired day of the week
- Tap the symbol under the day of the week
  - ↳ The edit window will appear

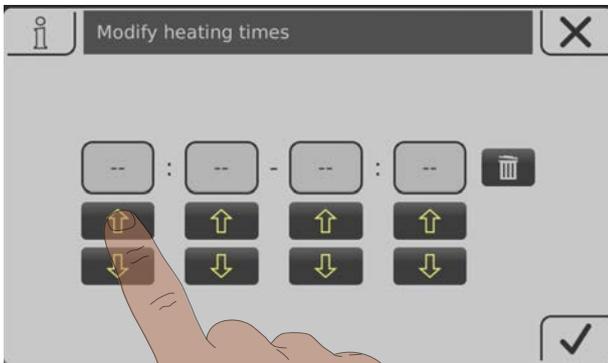


You can specify up to four time windows per component and day.

- Tap the desired time window



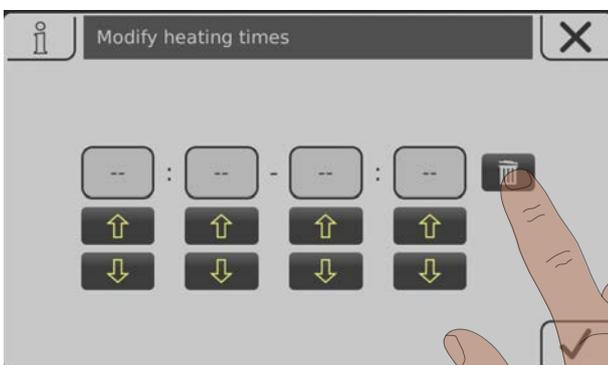
- The time window will open for editing
- Set the start and end time for the time window using the up and down arrows
- Save the time window setting by tapping on the confirm icon



If you want to apply the time window setting to another day in addition, you can do this by activating the relevant day.



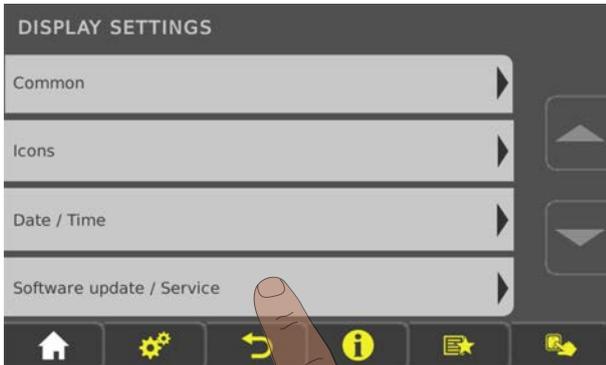
A set time window can be deleted by tapping on the "Recycle bin" symbol.



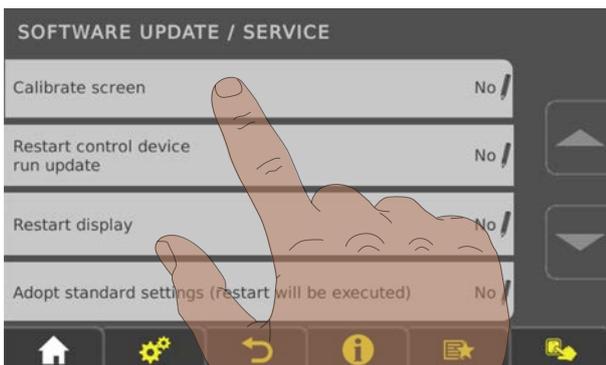
## 5.7 Calibrating the touchscreen

If the touchscreen stops working properly, it will need to be calibrated.

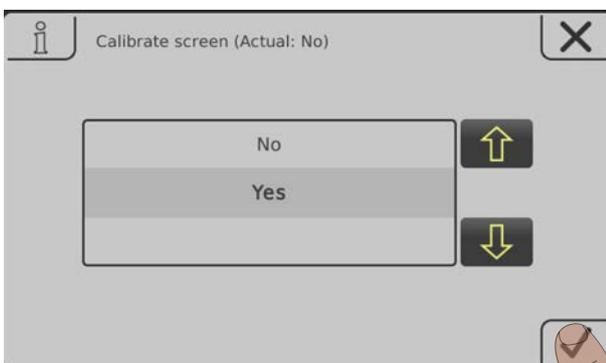
- Go to the “Display settings” menu
- Scroll down until the “Software update / Service” submenu appears and open the submenu



- In the “Software update / Service” menu open the “Recalibrate touch control” parameter



- Set the parameter to “YES” and confirm at the bottom right
  - ↳ The touchscreen will restart and begin calibrating



To calibrate the touchscreen, you must press five points indicated by a crosshair in the order shown. The control will restart after calibration.

## NOTICE

### Inaccurate calibration

*If you do not tap the indicated points accurately, the control may stop working properly and a software update may be required.*

## 5.8 Software update Lambdatronic 3200

The following description shows the software update process for systems with Lambdatronic 3200 and a touch control in the system environment (also applies to systems with button boiler console and touch room console). The Froling Flash Update Wizard (core module) as well as a USB storage device is necessary to perform the software update. The procedure for establishing a connection and any necessary bootloader update is described in the documentation of the Flash Update Wizard.

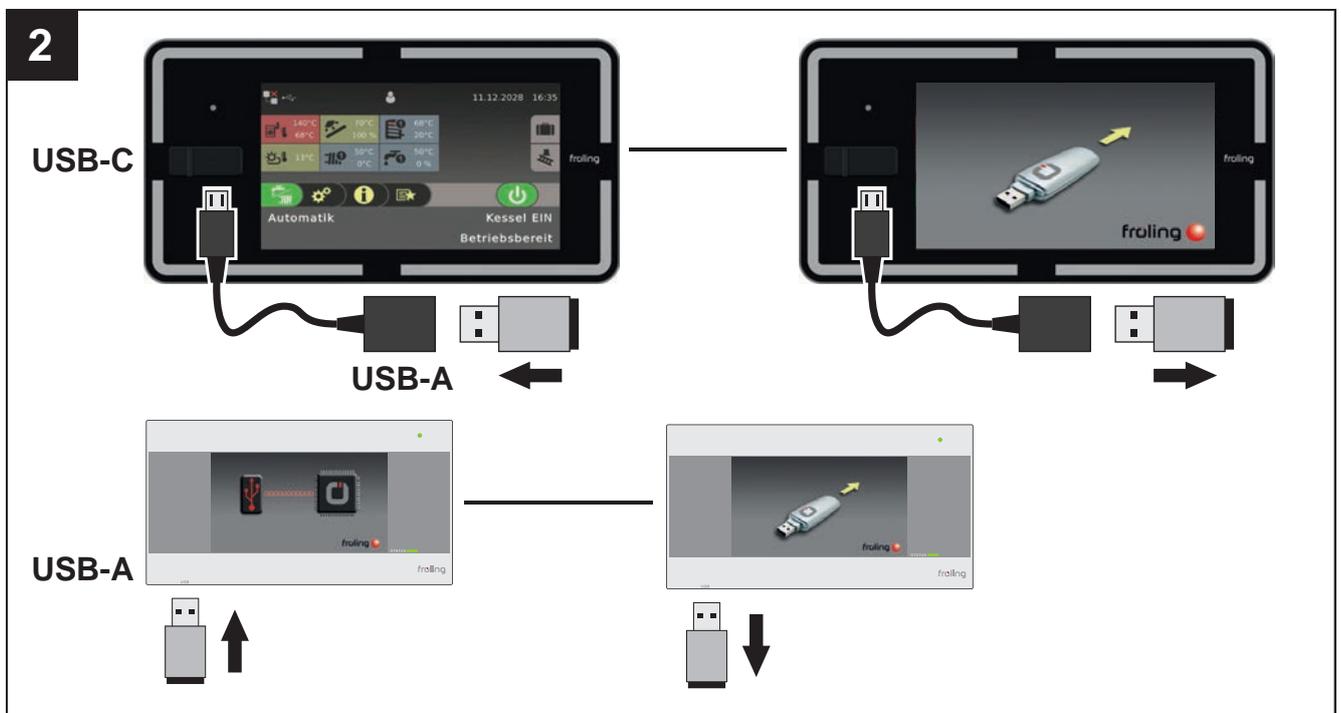
### Overview of main steps during a software update

*Perform flash update - but do not close the Wizard*



⇒ See "Carrying out a software update on the boiler controller" [page 142]

*Perform software update of all touch controls*



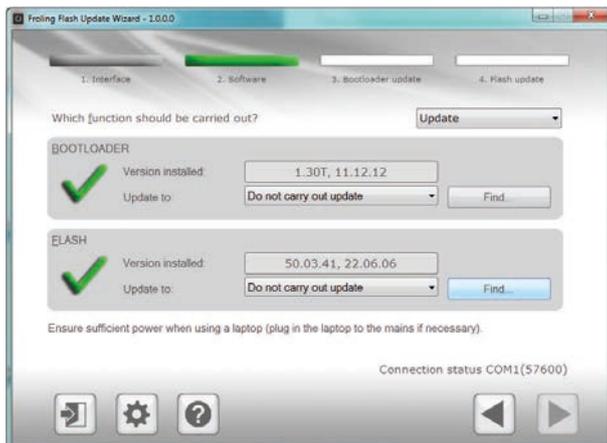
⇒ See "Carrying out a software update on the touch control" [page 144]

**Close Flash Update Wizard - restart controller**

⇒ See "Finishing a software update" [page 145]

**5.8.1 Carrying out a software update on the boiler controller****Selecting a Flash file**

Once the connection has been established, the main window displays the update files which can be installed:



- The "Version installed" field displays the Flash version which is currently installed on the boiler controller
- There is a drop-down list next to the "Update to:" field which shows the Flash files available in the standard folder

**If the Flash file is located in the standard folder:**

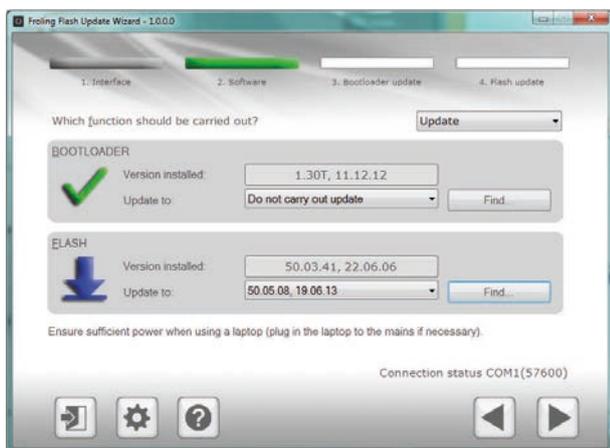
- Select the required Flash file from the drop-down list

**If the Flash file is not located in the standard folder:**

- Click on the "Find" button in the "FLASH" section
  - A window is displayed where you can search for the Flash file
- Navigate to the folder where the file is saved
- Select the Flash (\*.s19) file and click on the "Open" button

### Starting the Flash update

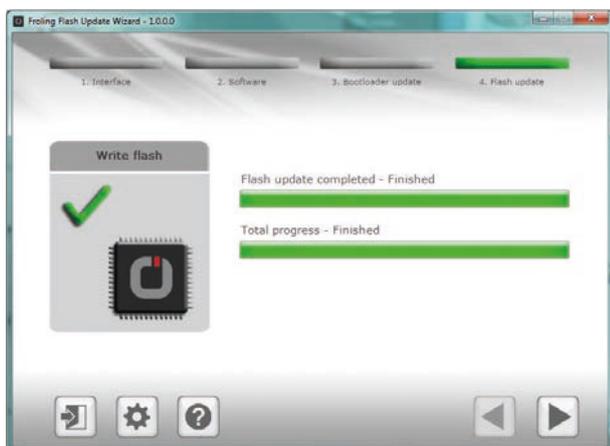
After selected the desired Flash file, it will be displayed next to the "Update to:" field:



Click on the "Next" button

➤ The update process will now start and a progress bar displays the current status

When the flash update is successfully transferred to the boiler controller, the following window appears:

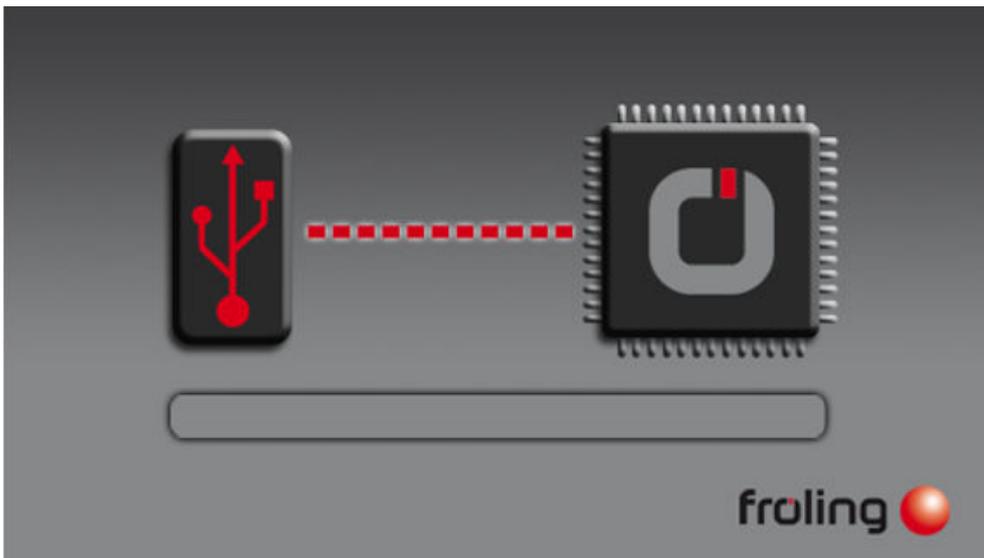


**NOTICE! Do not close the update at this time and do not disconnect the boiler controller!**

### 5.8.2 Carrying out a software update on the touch control

**NOTICE!** If several touch controls are installed, we recommend the use of several USB sticks to perform the updates in parallel!

- Insert the USB stick with the necessary data (linux.bin; rootfs.img; update; froresetdemo.inc or frorestart.inc) into the USB port
  - System message for restart is displayed
- Tap “OK” to carry out a restart of the touch control
  - After the restart, the update process will begin automatically



Once the update is complete, a message will appear that you can remove the stick

- Remove the USB stick
  - The touch control restarts automatically



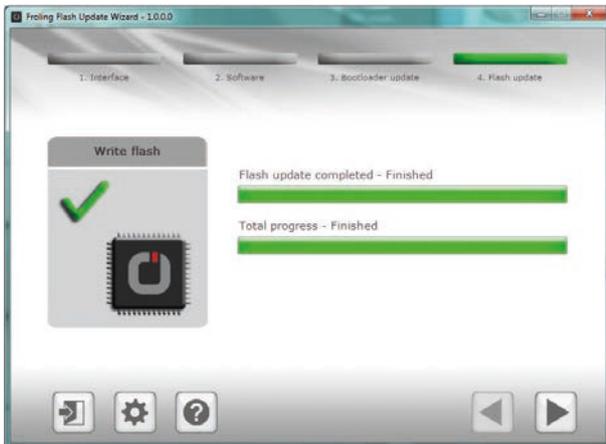
The touch control software is up-to-date following the restart.

- Perform updates to any other touch controls

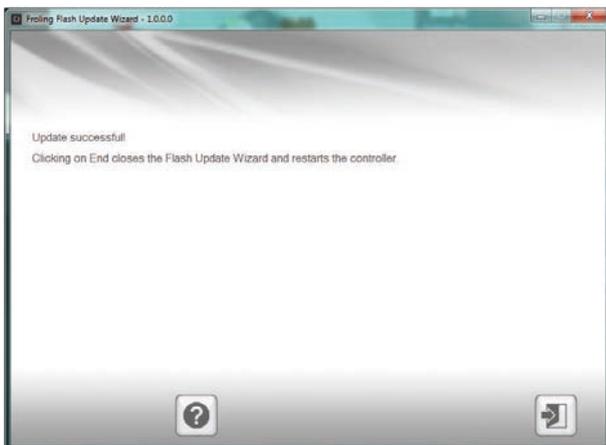
### 5.8.3 Finishing a software update

When the software update has been performed on all touch controls, the Flash Update Wizard must be ended correctly.

#### *End flash update*



- Click on the "Next" button
  - The completion window appears

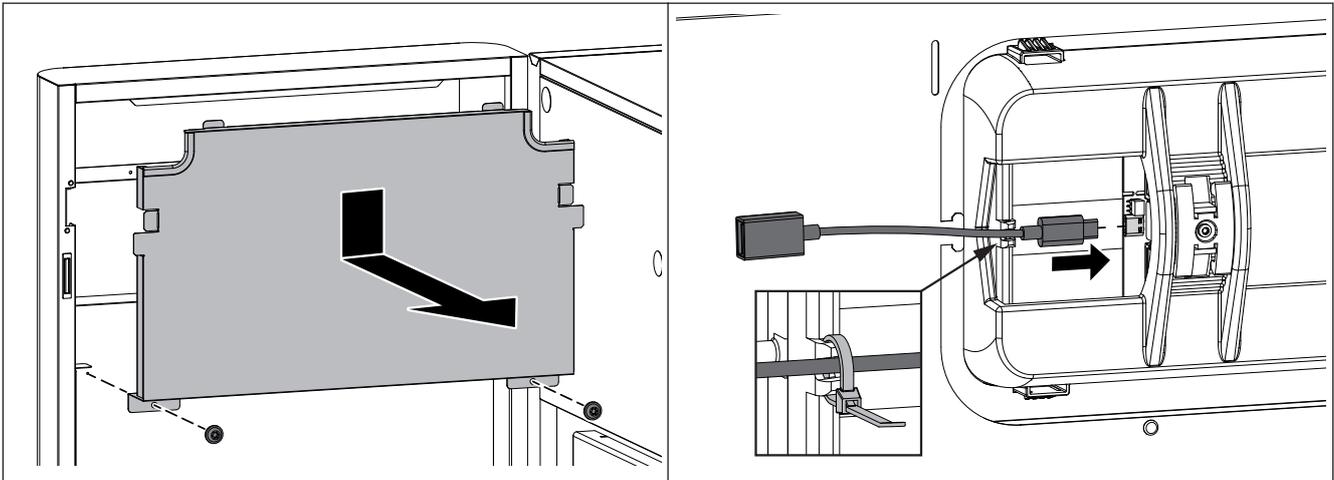


- Clicking on "Close" closes the Flash Update Wizard and restarts the boiler controller
  - After restarting the boiler controller, check whether all touch controls have started up correctly

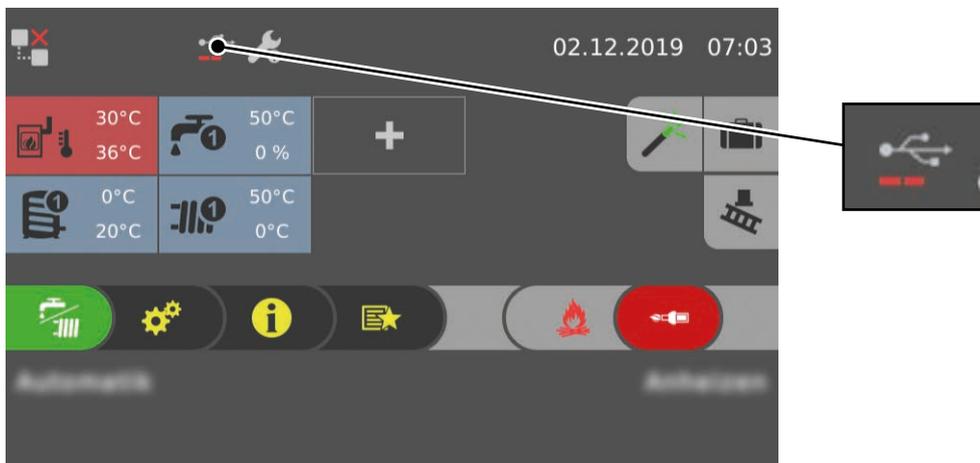
**NOTICE!** If not all touch controls connect to the boiler control, a restart of the entire system (main switch OFF/ ON) is necessary!

## 5.9 USB data recording

- Switch off the boiler using the main switch



- Open the insulated door and disassemble cover plate on inside of the door
- Connect USB C - USB A adapter cable to the display bushing and secure cable on display housing using cable ties
- Turn on the main switch and connect USB to the extension
  - The USB must not contain a software update
  - Recording starts automatically once the touch display has started



Data recording is indicated in the status line by means of the USB symbol with an activity bar.

6 Notes

A large grid of graph paper for taking notes, consisting of 20 columns and 30 rows of small squares.

## 7 Appendix

### 7.1 Addresses

#### 7.1.1 Address of manufacturer

**FRÖLING**  
Heizkessel- und Behälterbau GesmbH

Industriestraße 12  
A-4710 Grieskirchen  
AUSTRIA

TEL 0043 (0)7248 606 0  
FAX 0043 (0)7248 606 600  
EMAIL [info@froeling.com](mailto:info@froeling.com)  
INTERNET [www.froeling.com](http://www.froeling.com)

#### *Customer service*

Austria	0043 (0)7248 606 7000
Germany	0049 (0)89 927 926 400
Worldwide	0043 (0)7248 606 0

#### 7.1.2 Address of the installer

Stamp