Product documentation

THETA+

Realization
NORM, UNIT, RS und RFF
Software-Version 3.0

Table of content:

1 Software version

Please use this documentation in conjunction with software version **V 3.0** of your controller. The version will be displayed for about 10 s when the controller is connected to the mains. If you are using an older version, please contact your heating specialist.

2 Safety

2.1 General Information

Any person charged with working on the device or system, must have read and understood this manual, especially the chapter on “Safety”.

Instruction may be necessary, depending on the professional qualifications of the persons in question.

The relevant accident prevention regulations and other generally accepted safety regulations must be complied with.

2.2 Structure of the warning instructions

Explanation of the warning instructions in this manual:

DANGER	Brief description of the hazard The signal word DANGER indicates a directly threatening hazard. Non-observation leads to severe injuries or death.
WARNING	Brief description of the hazard The signal word **WARNING** indicates a possible hazard. Non-observation may result in severe injuries or death.
CAUTION	Brief description of the hazard The signal word **CAUTION** indicates a possible hazard. Non-observation can result in slight or moderate injuries.
ATTENTION	Brief description The signal word **Attention** indicates possible property damage. Non-observation can lead to damage to the device or plant.
Note	The signal word **NOTE** indicates further information about the device or its use.

2.3 Intended use

The THETA controller range is intended exclusively for the regulation and control of DHW and heating systems, including DHW heating systems, which do not exceed a maximum flow temperature of 120 °C.

Any use beyond this is considered improper. The manufacturer accepts no liability for any resulting damage. The risk for this lies solely with the user/operator.

Proper use also includes observing all instructions in the operating manual.

The system may pose a hazard if it is not used as intended.

2.4 Personnel qualifications

The electrical installation, initial operation and servicing of the device may only be performed by qualified electrical technicians who have been authorized by the operator.

The technicians must have read and understood these operating instructions and follow their procedures.

Requirements to be met by a qualified electrical technician:

- Knowledge of general and special safety and accident prevention regulations.
- Knowledge of the relevant electrical regulations (e.g. DIN VDE 0100 Part 600, DIN VDE 0100-722) plus the relevant national regulations.
- Ability to identify risks and avoid possible hazards.

2.5 Safety instructions for operating

2.5.1 Hazards due to water temperatures > 60 °C

ATTENTION

During operation, there is a risk of scalding at all hot water taps in the heating system due to hot water temperatures exceeding 60 °C in the following cases:

- Automatic anti-Legionella function

When the automatic anti-Legionella function is activated, the DHW is automatically heated to the anti-Legionella temperature (factory setting 65 °C) on the selected day and at the selected time to kill any Legionella bacteria in the DHW tank.

- Manual mode/emission measurement

In manual mode/emission measurement, the DHW can be heated up to the maximum possible boiler temperature, as the burner and all pumps are switched on and the mixer is fully opened.

The heating and DHW systems operate in unregulated continuous mode. This operating mode is used specifically by chimney sweeps for emission measurement or in the event that the Controller is faulty.

However, high DHW temperatures can be avoided by setting the boiler thermostat to a maximum boiler temperature of approx. 60 °C.

Please note the following points to avoid scalding:

- Inform all users of the danger.
- Mix in sufficient cold water or switch off the hot water circulation pump (using the switch on the pump, if available).

2.6 Warranty conditions

Improper use, non-observation of these instructions, use of inadequately qualified personnel and independent changes exclude any liability on the part of the manufacturer for the resulting damage. The manufacturer's warranty becomes void.

ATTENTION

Impairment of device function if incorrect spare parts are used!

If unauthorized parts are used correct functioning is not assured. Use spare parts authorized by customer service.

2.7 Use

The THETA controller family is designed exclusively for controlling and regulating hot water and heating systems, including hot water preparation, that do not exceed a maximum flow temperature of 120 °C.

2.8 Connection requirements

ATTENTION

The heating system must be completed and filled with water so that the pumps do not run dry and the boiler is not damaged.

ATTENTION

Switch off plant completely before opening boiler control panel! Do not plug or unplug electrical connectors under voltage. This may damage the controller or cause dangerous electrical shock.

The controller must be installed according to the installation instructions.

All electrical connections and safety measures have to be carried out by a specialist according to the valid norms and VDE guidelines as well as the local instructions.

The electrical connection must be a fixed connection according to VDE 0100.

The electrical connection has to be done according to the wiring diagram of the respective boiler control panel.

If a floor heating system is connected, a limiting thermostat must switch off the pump if the flow temperatures are too high.

The heating specialist must check all the above-mentioned requirements before switching on the controller.

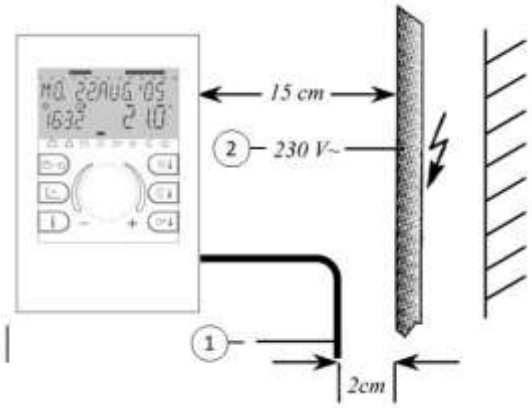
The current time and date are already set by the factory and backed up by a battery.

The timer has a basic time program already activated and the control functions for standard heating systems with low temperature boilers are pre-adjusted.

During longer periods of absence, the heating system should not be removed from operation using the heating emergency switch, but the operating modes STANDBY or HOLIDAY TIL on the controller should be used instead, as the battery for backing up all individual pieces of data will otherwise be used. In addition, the controller's frost protection function is out of operation.

2.9 Safety measures for EMC - conform installation

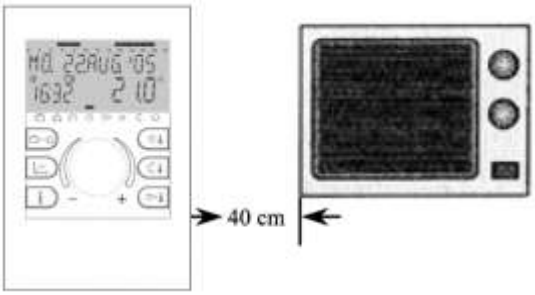
Cables with mains voltage must generally be installed separately from sensor and data bus cables. In this case a minimum distance of 2 cm between the cables must be observed. Crossing of lines is permitted.



1 Data bus line 12V
2 Mains

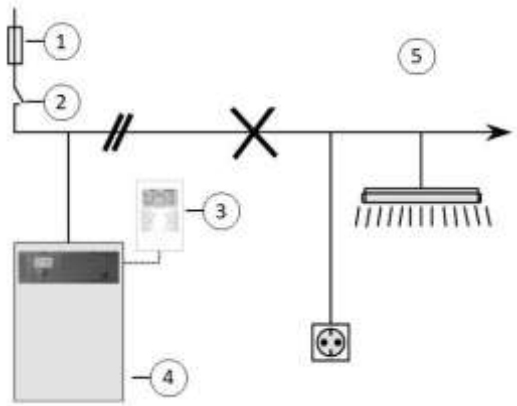
Controls with own mains connections require separate installation of mains and sensor or data bus cable. When using cable ducts, types with internal separators are recommended.

When installing control or remote units close to other components with electromagnetic emission such as solid-state relays, motors, transformers, dimmers, microwave ovens, TV-sets, loudspeakers, computers, radio telephones etc. a minimum distance of 40 cm must be observed.



Between remote units and central units, a minimum distance of 40 cm has to be observed. Several central units in a data bus connection may be installed side by side.

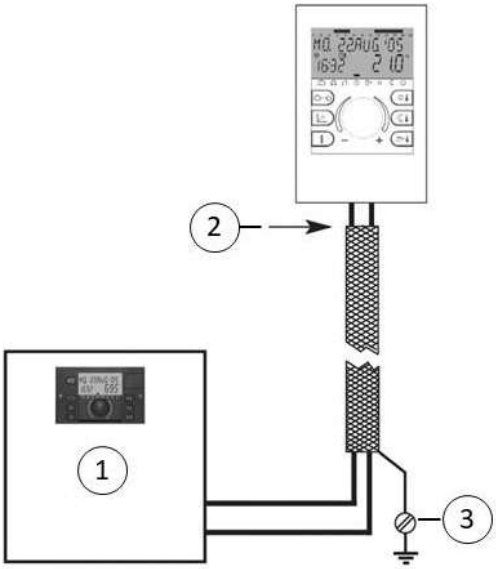
The mains connection of the heating plant (central unit or boiler control panel) must be carried out as an independent electric circuit. It is not permitted to install fluorescent tubes or other machines that could produce interferences to the same electrical circuit.



1 Fuse 16A
2 Emergency-switch
3 Room units
4 Heat generator
5 Connect boiler room lighting and sockets only to a separate circuit!

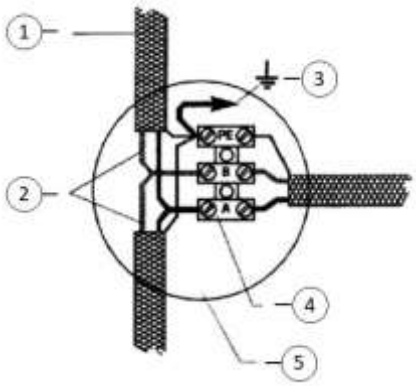
All data bus cables must be carried out in shielded version. Suggested version, see technical specifications on page 15-1

The shielding of the cable has to be connected with earth potential, i.e. boiler covering, connecting terminals for earth potential etc. Multiple grounding is not permitted (humming loop).



1 1 Heat generator
2 Do not ground here!
3 PE

In star shaped networks it is not permitted to ground cables on both sides. They should be grounded in the centre.



1 Shielding
2 2-wire data bus line
3 PE
4 Distribution terminal
5 Distribution box

The outside sensor may not be installed close to transmitter- or receiver-equipment (on garage walls close to receivers for radio-controlled garage door openers, ham operator antennas, radio-controlled alert systems or close to big radio transmission plants).

2.10 Cable dimensions and maximum cable length

For all 230V~ cables such as power supply, burner, pumps, actuators: 1.5 mm2
Maximum cable length: Unlimited cable length within house installation.

Data bus connections: 0.6 mm2
Recommended cables:
J-Y(St)Y 2 x 0.6 mm2
Maximum cable length: 100 m
Longer distances should be avoided to decrease the risk of interferences.

For all low voltage cables such as sensors, external selectors, bus and analogue in- and outputs, heat requiring by means of external contact, modem connection cables, etc.: 0.5 mm2
Maximum cable length: 100 m
Longer distances should be avoided to decrease the risk of interferences.

2.11 Maximum cable lengths

Sensor, selector and analogue inputs
A maximum cable length of 100 m is recommended. Longer cables are possible but increase the risk of interferences.

Relay outputs
Unlimited cable length.

Bus lines
Maximum length 50 m

2.12 Grounding and neutralizing

Always observe local guidelines when installing the devices!

2.13 Connecting accessories

WARNING

According to VDE 0730 the power supply for the controller must have a separate main switch for life and neutral. Please observe local guidelines for grounding and neutralizing!

As soon as there is power supply at the terminals 21, 22, 2, 6, 12 and 18 al-so the terminal rows X3 and X4 will carry 230 V connections!

If a manual switch function is desired for pumps, even though the DHW charging pump does not have on/off switches, external switches must be installed. All accessories (sensors, selectors, etc.) must be connected according to the attached wiring diagram.

2.14 Service and cleaning

The controller is service free. The unit can be cleaned on the outside with a moist (not dripping) cloth.

3 Overview

If the described function is practicable in combination with the controller type, can be seen in the type key. The description refers to this key. Example: In the description, it says: "(Type ..VV..)". This means that this function is implemented in controller types that have the designation "VV" in the type key. The following types can be selected:

Type	2. Burner stage	1. Burner stage	Direct circuit	Mixed circuit 1	Mixed circuit 2	DHW charging pump	Variable outputs 1+2	H-GEN-BUS RS 485	H -GEN-bus RS 485	Variable input 1	Variable inputs 2+3	Inputs for Solar
2B		X	X			X				X		
23B		X	X	X		X				X		
233B		X	X	X	X	X				X		
2233BVV	X	X	X	X	X	X	X			X	X	X
2233BVVC	X	X	X	X	X	X	X	X		X	X	X
23BVVC-OT		X	X	X		X	X		X	X	X	X
2233BVVC-OT	X	X	X	X	X	X	X		X	X	X	X

4 List of abbreviations

EN	DE	Description
A10V	A10VP	Output 10V / PWM
ARS	ARS	Relay normally open contact
ARSP	ARSP	Relay normally open contact, potential-free
BCP	KKP	Boiler circuit pump
BCS	FA	Burner control system
BDP	PEP	Buffer discharge pump
BDV	PEV	Buffer discharge valve
BRZ	BLZ	Burner runtime counter
BS	KF	Boiler sensor
BS	WF	H-GEN sensor
BS2	PF2	Buffer sensor 2
BU	PF	Buffer sensor
BUDS	ELF	Heating buffer discharge valve sensor
BULP	PLP	Buffer charging pump
BURN1	BR1	Burner stage 1
BURN2	BR2	Burner stage 2
BURNL	BRSP	Burner lock
BUS	BUS	System data bus
BUSF	FPF	Buffer sensor solid fuel
CEST	MESZ	Central European Summer Time
CIR.	ZKP	DHW Circulation Pump
CIRPS	ZKPF	Circulation pump sensor
CP	CP	Condenser pump/ main pump heat pump
CU	ZG	central unit
DB	GB	Device bus
DC	DKP	Direct circuit
DHCP	DHCP	Dynamik Host Configuration Protocol
DHW	WW	Domestic hot water
DHWE	EHWW	Electric heating element for DHW
DHW-P	SLP	DHW charging pump
DHWS	SF	DHW sensor
DIFF	DIFF	Differential control
ECO	ECO	Eco mode
EFI	EFI	Input sensor/pulse
EHE	ELH	Electric heating element
EI	EI	Input pulse
EO	EO	Input Octocopter
FD	ZAF	Forced draining

EN	DE	Description
FGS	AGF	Flue gas sensor
FP	ZUP	Feed pump
FS	VF (VLF)	Flow sensor
FSI	SME	Fault signal input
FSO	SMA	Fault signal output
h2B	h2B	heatcon! 2-wire bus
HB	HP	Heating Buffer
HBD	HPE	Hydraulic buffer discharge
HBP	HPP	Heating buffer pump
HC	HK	Heating circuit
HC1 CLOSE	HK1 ZU	Heating circuit 1 valve close
HC1 OFF	HK1 AUF	Heating circuit 1 valve open
HC1P	HK1 P	Heating circuit 1 pump
HC-P	DKP	Heating circuit pump
H-GEN	EEZ	Heat generator
H-GEN	WEZ	Heat generator
HQ	WMZ	Heat quantity
I/O	E/A	Input/Output
KTA	KTR	Boiler temperature controller
KTY	KTY	Temperature sensor
LAN	LAN	Lokal Area Network
MC	MK	Mixed circuit
MOD	MOD	Modulation
OHC	BZ	Operating hours counter
OS	AF	Outdoor sensor
OS2	AF2	Outdoor sensor 2
OT	AT	Outside temperature
P	P	Pump
PI Controller	PI Regler	Proportional-integral Controller
PIN	IMF	Pulse input sensor
PP	PP	Primary pump
PWF	PWF	Parallel (H-GEN) GEN approval
RED	ABS	Reduced
RFH	RLH	Return flow hold-up / boost
RFL	RLB	Return flow limitation
RFS	RLF	Return flow sensor
RS	RF	Room sensor
RS	RS	Room Station
S	F	Sensor

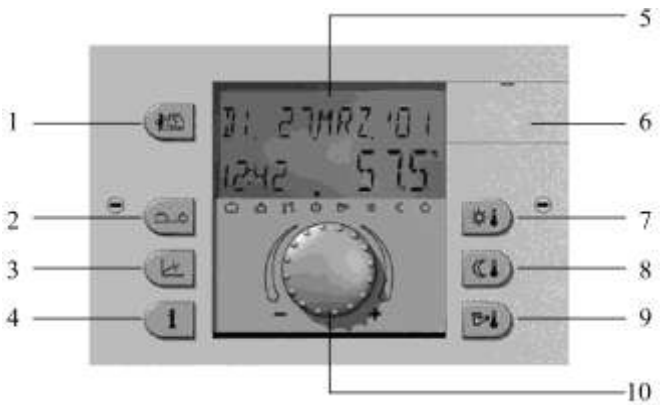
EN	DE	Description
SFBS	FKF	Solid fuel boiler sensor
SFP	FSP	Solid fuel pump
SLT	STB	Safety temperature limiter
SLV	SLV	Solar loading valve
SLVS	SLVF	Solar loading valve sensor
SOL-P	SOP	Solar pump
SPBU	KSPF	Solar buffer sensor
SPFS	KVLF	Solar panel flow sensor
TF	SVL	Total flow
TFS	SVLF	Total flow sensor

EN	DE	Description
UHK	UHK	Diverter valve HC (heating/cooling
UKW	UKW	Diverter valve cooling
ULV	ULV	Diverter valve
UPE	UPE	Diverter valve Buffer - H-GEN
UWW	UWW	Diverter valve DHW
VI	VE	Variable input

5 Operation

5.1 User Interface

Display and operating instruments



1 – Key for emission measurement and manual mode (different key labelling for ..HC..)

2 – "Operating mode" key for all heating and set back modes

3 – "Heating curve" key

4 – "Information" key for the display of temperatures and operating modes

5 – Multi-functional Display

6 – Cover clip for the service jack with labelling

7 – Daytime Room Temperature

8 – Night-time Room Temperature

9 – DHW daytime temperature setpoint

10 – Rotary push button (push - turn)

5.2 Basic display

1 Date
2 Time
3 Active operating mode
4 Operating mode symbols
5 Heat generator temperature

The display illumination is activated by any key or the rotary push button and switches off after a longer period of inactivity (2 min.).

When the plant is started or after a power cut, a segment test + fault diagnosis is carried out. After this test, the software version and the device type are displayed briefly.

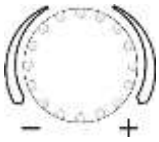
In the **automatic mode** the basic display shows the weekday, the date, the time and the heat generator temperature.

Depending on the set operating mode (automatic, party etc.), other information will be displayed in the basic display.

In the operation mode "Holiday", the note HOLIDAY TIL is displayed instead of the date, and the return date is displayed instead of the temperature. Active summer switch-offs will be shown by the "sunshade" icon R, frost protection by the "ice crystal" icon ❄.

5.2.1 Operation elements

5.2.1.1 Rotary Push button (Press/Turn)

	By pressing the rotary push button once, you can: • Confirm inputs/values By pressing the rotary push button longer (approx. 3 s), you can: • Go to menu selection level • Go one menu level higher By turning the rotary push button, you can: • Change values (clockwise increases values, counterclockwise decreases values) • Browse through menus

5.2.1.2 "Daytime Room Temperature" Key

This key sets the room temperature setpoint in the *AUTOMATIC MODE* during the heating cycles as well as during the *PARTY* and *HEATING* operating modes.
In control mode 1 the set point is identical for all the heating circuits.
In control mode 2 the setpoint is individual for the circuits concerned.

Note:

These setpoints are the starting values for the individual temperature settings during the heating cycles (= cycle temperatures) in the "time programs" menu. If these values differ from the starting value, they are corrected with the requisite amount of the adjustment if a
subsequent adjustment of the setpoint is made.

Setting:

- ➔ Press the key
- ➔ Set the flashing specified room temperature by turning the rotary push button to the desired value.
- ➔ Confirm the set value by pressing either the key or the rotary push button
- ➔ Alternatively: Automatic assumption of the value as per the set automatic exit time (system parameter 11)

Factory setting 20 °C
Setting range 5 ... 30 °C

5.2.1.3 "Night-time Room Temperature" Key

This key sets the reduced room temperature setpoint in the *AUTOMATIC MODE* between the heating cycles as well as during the *ABSENT* and *RED.HEATING* operating modes.
In control mode 1 the set point is identical for all the heating circuits.
In control mode 2 the setpoint is individual for the circuits concerned.

Note:

The set temperature is the starting value for the individually adjustable temperature parameters during the heating cycles (= cycle temperatures) in the "time programs" menu. If these values differ from the starting value, they are corrected with the requisite amount of the adjustment if a subsequent adjustment of the setpoint is made.

Setting:

- ➔ Press the key
- ➔ Set the flashing specified room temperature by turning the rotary push button to the desired value.
- ➔ Confirm the set value by pressing either the key or the rotary push button
- ➔ Alternatively: Automatic assumption of the value as per the set automatic exit time (system parameter 11)

Factory setting 16 °C
Setting range 5 ... 30 °C

5.2.1.4 "Daytime DHW Temperature" Key

This key sets the daytime DHW temperature in the *AUTOMATIC MODE* as well as during the *PARTY* and *HEATING* operating modes. This setting value also applies to domestic hot water only mode (manual summer mode).

Note:

This setpoint is the starting value for the individual temperature setting during the DHW cycles (= cycle temperatures) in the "time programs" menu.
If these values differ from the starting value, they are corrected with the requisite amount of the adjustment if a subsequent adjustment of the setpoint is made.

Setting:

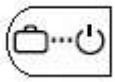
- ➔ Press the key
- ➔ Set the flashing specified DHW temperature by turning the rotary push button to the desired value.
- ➔ Confirm the set value by pressing either the key or the rotary push button
- ➔ Alternatively: Automatic assumption of the value as per the set automatic exit time (system parameter 11)

Factory setting 50°C
Setting range 5 ... water heater maximum temperature limit (service setting)

Single DHW Charging Function

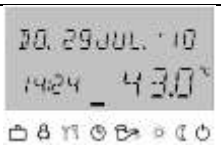
Pushing the key for approx. 3 s will lead to the charging function, in which the charging time is set in min. If a charging time of 0 min is set, the charging function is started and the DHW-tank is charged up to the DHW setpoint. The time interval for the overlapping DHW charging mode can be adjusted between 0 and 240 min. The current weekly program is overlapped.

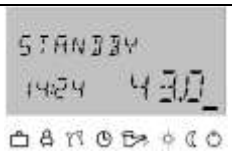
5.2.1.5 "Operating Mode" Key (Basic Display)



Sets the operating mode and jumps back to the basic display from any control level.
The operating mode appears in plain text, while at the same time a cursor at the bottom of the display indicates the relevant operating mode symbol. In control mode 1 the setpoint is identical for all the heating circuits. In control mode 2 the setpoint is individual for the circuits concerned.

The following operating modes can be selected:

Overview of the Operating Modes			
Arrow on the Symbol	**Operating mode**	**Basic display**	**Individual setting**
	Holiday		Return date
	Absent		P1(2,3) Return time
	Party		P1(2,3) Party-End
	Automatic		P1(2,3)
	Summer		P1(2,3)
	Heating		
	Red. heating		

⏻	Standby		

Setting:

- ➔ Press the key
- ➔ Set the flashing operating mode by turning the rotary push button (the bar points simultaneously to the according operating mode symbol)
- ➔ Confirm the set value by pressing either the key or the rotary push button .
- ➔ In case of short-term operating modes (Holiday, Absent, Party) set the desired
- ➔ target value by turning the rotary push button and confirming with the key or the rotary push button .
- ➔ Alternatively: Automatic assumption of the value as per the set automatic exit time (system parameter 11)

Back to Basic display Return to the basic display from any control level by pressing the key.

5.2.1.5.1 Holiday mode (short-term program)

In holiday mode the heating circuits can be switched off with frost protection for the duration of the holiday, depending on presetting (heating circuit parameter 25), or operated using the settings for RED.HEATING operating mode. Warm water is switched off with frost protection.

Application Long absence during the heating season

Control during the holiday time When the outdoor temperature falls below the frost protection limit (see menu “System Parameters - Parameter 5 = System Frost Protection”) the heating circuits are

- without room controller (RS/RFF) according to the weather-compensated frost protection limit (according to system parameter 05) of +3°C.
- with room controller (RS/RFF) according to the room frost protection limit of the respective heating circuit (see menu “Direct or mixed heating circuit - parameter 8 = room frost protection limit”) of 10 °C.
-

Earlier termination An active holiday mode can be terminated after an early return. To do so, press the "Operating mode" key and switch to automatic mode by turning the rotary knob or pressing and holding the "Operating mode" key for 3 seconds until the text "Automatic" appears.

Setting range

Factory setting	Current date
Setting range	Current date... Current date + 250 days

Display An active holiday program appears on the basic display with the indication of the return date.

5.2.1.5.2 Absent mode (short-term program)

The operating mode *ABSENT* causes the heating operation to be switched off temporarily with frost protection. During the absence, all heating circuits are controlled according to the set reduced room temperature. After the set time period, the heating circuits automatically switch back to the operating mode which was active before the absence. Short-term programs such as *PARTY* or *HOLIDAY* are skipped.

Application

Short absence during the heating season

Control during the holiday time

When the outdoor temperature falls below the frost protection limit (see menu “System Parameters - Parameter 5 = System Frost Protection”) the heating circuits are

- without room controller (RS/RFF) according to the weather-compensated frost protection limit (according to system parameter 05) of +3°C.
- with room controller (RS/RFF) according to the room frost protection limit of the respective heating circuit (see menu “Direct or mixed heating circuit - parameter 8 = room frost protection limit”) of 10 °C.
-

Earlier termination

An active absent mode can be terminated after an early return. To do so, press the "Operating mode" key and switch to automatic mode by turning the rotary knob or pressing and holding the "Operating mode" key for 3 seconds until the text "Automatic" appears.

Setting range

Factory setting P1 after activation

Setting range P1(P2, P3) / 0.5 ... 24 h from the current time

P1 (P2, P3)

Program-controlled restart of the heating operation. After activating the absent mode the heating mode is interrupted until the next switch-on time of the current automatic program P1 (as well as P2 or P3 if enabled).

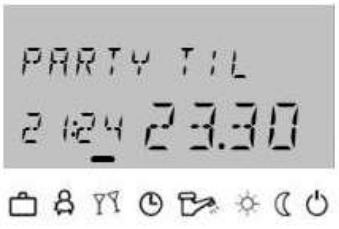
0.5 ... 24 h

The set value is added to the current time and represents the return time. When activating the absent mode again, the ast set value (in relation to current time) is saved and set as the new default value.

Display

An active absent mode appears on the basic display with the indication of the return time.

5.2.1.5.3 Party mode (short-term program)



The party mode causes a temporary heating operation up to the specified time and partially or completely bypasses an upcoming or already active set-back cycle. After the set time has elapsed, the heating circuits automatically return to the operating mode that was active before the party program. Short-term programs such as ABSENT or HOLIDAY are skipped.

Application

One-time unscheduled extension of the heating or intermediate heating during reduced mode

Earlier termination

An active party mode can be terminated prematurely. To do so, press the "Operating mode" key and switch to automatic mode by turning the input knob or pressing and holding the "Operating mode" key for 3 seconds until the text "Automatic" appears.

Setting range

Factory setting P1 after activation

Setting range P1 (P2, P3) / 0.5 ... 24 h from the current time

P1 (P2, P3)

Program-controlled restart of the heating operation. After activating the party mode the heating mode is continued until the next switch-on time of the current automatic program P1 (as well as P2 or P3 if enabled).

0.5 ... 24 h

The set value is added to the current time and represents the end of the party time. When activating the party mode again, the last set value (in relation to current time) is saved and set as the new default value.

Display

An active party mode appears on the basic display with the indication of the duration of the party.

5.2.1.5.4 Automatic mode

In automatic mode, a maximum of 3 automatic time programs with various heating times are available. The standard time programs P1, P2 or P3 set at the factory can be overwritten, if necessary, with one's own switching times in the time program level (see menu "Time programs").

All standard programs have up to three heating cycles per circuit for each weekday with their own switch-on time, switch-off time and cycle temperature. For heating circuits, the latter refers to the room temperature, for domestic hot water circuits, it refers to the water heater temperature. Standard programs are preset at the factory with one or two heating cycles, corresponding to the programs P1, P2 or P3.

Note

The automatic programs P2 or P3 can be selected only if they were enabled in the "System Parameter Menu - Time Program = P1-P3". If they are not enabled, only Program P1 is active.

Application

Municipal buildings (schools, offices etc.), heating and domestic hot water frost protected in weekends, program changes in case of shift operation.

Disable/Enable Standard Programs P2-P3

Disable

"System Parameter menu- Time Program = P1"

All the heating circuits as well as the hot water circuit work exclusively according to the standard or personalized programmed switching times in time program P1. The P1 program does not appear on the display in this operating mode.

Enable

"System Parameter menu": Time Program = P1 - P3.

Display

An active automatic program appears on the standard display with the current time and date.

If automatic programs P2 and P3 are enabled, the relevant symbol ⏲I, ⏲II or ⏲III is displayed. The symbols are only displayed if time program P1 - P3 is displayed.

5.2.1.5.5 Manual Summer Mode (only DHW mode)

In this program only the domestic hot water circuit remains active, and the DHW temperature is controlled according to the DHW setpoint and the DHW time program. The heating operation is interrupted and frost protected.

Application

Operation in the summer months when heating operation is not required for heating circuits, but hot water operation should continue in automatic mode.

Note

The 'SUMMER' operating mode is only available in common operating mode (system parameter 'Operating mode' = 1).

If a THETA-RFF room unit is used in the system, it is not possible to set the 'SUMMER' operating mode.

Display

The manual summer mode appears on the standard display: SUMMER. If standard programs P2 and P3 are enabled, the relevant symbol ⏲I, ⏲II, or ⏲III is displayed. The symbols are only displayed if timer program P1 - P3 is displayed.

5.2.1.5.6 Permanent heating operation

The operating mode HEATING provides for uninterrupted heating according to the specified daytime room temperature. The DHW heating works continuously according to the specified DHW setpoint.

Note

The operating mode HEATING is maintained until another operating mode is activated.

Display

The heating mode appears on the standard display: HEATING.

5.2.1.5.7 Permanent reduced mode

The operating mode *RED.HEATING* provides for a constant reduced heating mode according to the specified reduced room temperature corresponding to the ECO (frost protected switch off
mode) or ABS (reduced mode) reduced operating mode set at a heating circuit level in compliance with the minimum temperature limit of the relevant heating circuit.
See the parameter menu direct circuit or mixed circuit-1 or mixed circuit-2 - Parameter 1 = Reduced mode and - Parameter 12 = minimum temperature limit.

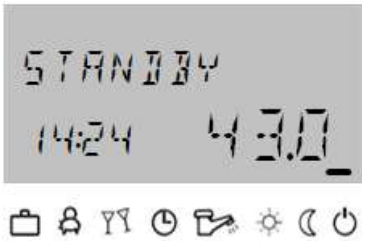
Note

The operating mode *RED.HEATING* is maintained until another operating mode is activated.

Display

The reduced mode appears on the standard display: *RED.HEATING*.

5.2.1.5.8 Standby mode



In *STANDBY* mode, the entire system is switched off and provided with frost protection (all frost protection functions are active).
The DHW heating is blocked and has frost protection. At tank temperatures below 5 °C the water is reheated to 8 °C.

Application

Complete switch-off of the heating and hot water including complete building frost protection.

Note

The heat generator and hot water heating remain active upon external request or upon the request of other heating circuits connected via bus. The heating circuit pumps are switched on briefly every day (pump anti-blocking protection).

Display

The standby mode is maintained until another operating mode is activated.
The standby mode appears on the standard display: *STANDBY*.

5.2.1.6 „Heating curve“ key

Determines the heating curve for the heating circuits (diagram, see detailed description in chapter "Controller functions")
The slope of the heating characteristic describes the relation between the change in the flow temperature and the change in the outside temperature. In case of large heating surfaces (and therefore, low flow temperatures) like floor heating systems, the heating characteristics
curve is less steep compared to smaller heating surfaces (e. g. radiators).
The setting value refers to the lowest outside temperature used for heat request calculation.

ATTENTION

This parameter is to be set by the heating technician and should not be altered afterwards.

Setting:

- ➔ Press the key
- ➔ Turn the rotary push button to set the heating curve type and push the rotary push button to confirm
- ➔ Turn the rotary push button to set the flashing curve value and push the rotary push button to confirm
- ➔ Alternatively: Automatic assumption of the value as per the set automatic exit time (system parameter 11)
- ➔ Push to return to the standard display.

Setting range

Factory settings

Direct circuit (HC):= 1.50

Mixed circuit 1 (MC1):= 1.00

Mixed circuit 2 (MC2):= 1.00

Setting range

OFF, 0.05 ... 3.50

5.2.1.7 „Plant information" key

After entering the information level by means of the information key , a query of all available plant and system temperatures can be made using the rotary push button.
The first data item to appear is always the outside temperature. By turning the rotary push button clockwise the system temperatures and the counter and consumption statuses appear; by turning the rotary push button counterclockwise the operating statuses of the connected system components appear.
Provided that a nominal value is listed in the following table under the column *Nominal Value*, it will appear when pressing the rotary push-button.

Manual exit

The information key allows the user to return to the standard display at any time .

5.2.1.7.1 Temperature display

The following information appears only under the indicated display conditions. Some displays are not available and are skipped according to the respective type of control.

INFORMATION	Display value	Remarks	APPLICATION
Outdoor temp. (1)	Average value / current value	Outside sensor connected	
Outdoor temp. (1)	min.-max. value (0.00 bis 24.00 h)	Outside sensor connected	

INFORMATION	Display value	Remarks	APPLICATION
Outdoor temp. 2	Average value / current value	Outdoor sensor 2 at variable input	
Outdoor temp. 2	min.-max. value (0.00 bis 24.00 h)	Outdoor sensor 2 at variable input	
EM-SET (Energy management-setpoint)	Maximum warm water and maximum heating circuit setpoint value in the system	Installer level	
Heat generator (1)	Setpoint / current value	Only if heat generator is defined	(..2..)
Heat generator 2	Setpoint / current value	Sensor BS 2 at variable input	(..2..)
Return flow (b. contr.)	Current value	Return flow sensor connected at boiler control	(..C..)
Flue gas (b. contr.)	Current value	Flue gas sensor connected at boiler control	(..C..)
Return flow	Setpoint / current value	Return flow sensor at var. input and return temp. increasing activated	
External blocking	Block mode ON/OFF	Ext. blocking at variable input	
Flue gas	Limit value/ current value	Flue gas sensor at variable input	(..2..)
Domestic water heater (1)	Setpoint / current value	If Domestic water heater available	(..B..)
Domestic water heater 2	Setpoint / current value	DHW sensor 2 at var. input	
DHW-Thermostat	Charging status ON/OFF	Mechanical thermostat instead of electronic DHW sensor	
Request via contact (VT-1)	Request ON / OFF	Switching contact at variable input	
Request via contact (VT-2)	Request ON / OFF	Switching contact at variable input	(..VV..)
Request via contact (VT-3)	Request ON / OFF	Switching contact at variable input	(..VV..)
Flow Mixing circuit 1	Setpoint / current value	Flow sensor mix. heating circuit 1 connected	(..3..)
Flow Mixing circuit 1	Setpoint / current value	Flow sensor mix. heating circuit 2 connected	(..33..)
Room temperature Direct circuit	Setpoint / current value	Room unit connected and room sensor activated	(..2..)
Room temperature Mixing circuit 1	Setpoint / current value	Room unit connected and room sensor activated	(..3..)
Room temperature Mixing circuit 2	Setpoint / current value	Room unit connected and room sensor activated	(..33..)
Thermostat function Direct circuit	THERMOSTAT HC ON / OFF	Room thermostat function activated OFF = no room temperature limit	(..2..)
Thermostat function Mixing circuit 1	THERMOSTAT MC-1 ON / OFF	Room thermostat function activated	(..3..)
Thermostat function	THERMOSTAT MC-2	OFF = no room temperature limit	(..33..)

INFORMATION	Display value	Remarks	APPLICATION
Mixing circuit 2	ON / OFF		
Solid fuel boiler temperature	Current value	Solid fuel charging pump at variable output	(..VV..)
Solid fuel buffer temperature	Current value	Solid fuel pump at variable output, depending on configuration collector tank sensor or solid fuel buffer sensor	(..VV..)
Upper buffer sensor	Setpoint / current value	Buffer charging pump at variable output	(..VV..)
Lower buffer sensor	Setpoint / current value	Buffer charging pump at variable output	(..VV..)
Solar flow sensor	Current value	Solar pump at variable output	(..VV..)
Solar buffer sensor	Current value	Solar pump at variable output	(..VV..)
Solar return flow sensor	Current value	Solar pump at variable output Solar return flow sensor at variable Input	(..VV..)
Solar buffer Changeover	Current value	Solar valve activated	(..VV..)

5.2.1.7.2 Operting states

After entering of the information level by means of the information key , a query of all available operating statuses such as counter numbers, capacities etc. can be made by turning the rotary push button anticlockwise.

.

INFORMATION	Display (Example)	Function	APPLICATION
Status Direct circuit	AUTO-P1 ECO HC ON	Operating mode program mode Status of heating circuit pump	(..2..)
Status Mixing circuit 1	AUTO-P1 ECO MC-1 ON	Operating mode program mode Status Mixing circuit pump 1	(..3..)
Status actuator Mixing valve 1	MIX.VALVE-1 OPEN	Display of direction OPEN-STOP-CLOSE	(..3..)
Status Mixing circuit 2	AUTO-P1 ECO MC-2 ON	Operating mode program mode Status Mixing circuit pumpe2	(..33..)
Status actuator Mixing valve 2	MIX.VALVE -2 OPEN	Display of direction OPEN-STOP-CLOSE	(..33..)
Status heat generator stage 1	HEAT GENER. ON	Switching state of heat generator Single stage or stage 1 (2-stage)	(..2..)
Status heat generator stage 2	HEAT GENER. ST-2 OFF	Switching state of heat generator Stage 2	(..22..)
Status modulating heat generator	Modulation 57% 60%	Modulating single stage heat generator, Setpoint- and Current value-display	(..VV..)
Status Hot water circuit	AUTO-P1 ECO DHW ON	Operating mode program mode status of DHW charging pump	(..B..)

INFORMATION	Display (Example)	Function	APPLICATION
Function & status Direct circuit pump	OUTPUT HC EO ON	Information about the assigned function and switching state of pump	
Function and status variable output 1	OUTPUT VO-1 SOP ON	Information about the assigned function and switching state of variable output 1	(..VV..)
Function and status variable output 2	OUTPUT VO-2 SFP ON	Information about the assigned function and switching state of variable output 1	(..VV..)
Starts heat generator (1)	STARTS 1234 (ST-1)	Accumulated number of starts Single stage or stage 1 (2-stage)	(..2..,..22..)
Operating hours heat generator (1)	OPER.HOURS. 246 h	Accumulated operating hours Single stage or stage 1 (2-stage)	(..2..,..22..)
Starts heat generator (2)	STARTS 234 (ST-2)	Accumulated number of starts Stage 2	(..22..)
Operating hours heat generator 2	OPER.HOURS 46 h	Accumulated operating hours Stage 2	(..22..)
Info temperature for measuring purposes	INFO-TEMP. VI-1 50°C	External test sensor for testing purposes at variable input 1	
Info temperature for measuring purposes	INFO-TEMP. VI-2 45°C	External test sensor for testing purposes at variable input 2	(..VV..)
Info temperature for measuring purposes	INFO-TEMP. VI-3 45°C	External test sensor for testing purposes at variable input 3	(..VV..)
Operating mode external switching modem	Modem AUTO	Actual operating mode of external modem at variable Input	(..VV..)
Solar- heating power	HEAT POWER 43 KW SOL	Current heating power of solar plant in KW	(..VV..)
Solar- energy balance	HEAT CONS. 2468 KWh SOL	Current heating power of solar plant in KW	(..VV..)
Starts Solar pump	NO. OF STARTS 246 SOL	Accumulated number of solar pump starts	(..VV..)
Operating hours Solar pump	STARTS 234 h SOL	Info on accumulated operating hours of solar pump	(..VV..)

5.2.1.7.3 Automatic display return

If the "information key" (i) is pressed for approx. 3 s upon accessing the information level, the *INFO TIME* parameter appears.
This parameter determines the time for the automatic return from the info display to the standard display.

Factory setting	OFF
Setting range	OFF, 1 … 10 min
OFF	No exit, the last information displayed remains

until the next setting on the display.

1...10 min. Automatic exit from the information level after the specified time, settable in 0.5-minute steps.

5.2.1.8 "Emission Measurement / Manual Mode" Key

5.2.1.8.1 Emission Measurement (may only be carried out by the heating specialist).

Attention **Emission Measurement has to be carried out by a technician.**

By pressing this key, the heat generator runs for 20 minutes at the set maximum temperature limit. The remaining time is displayed as it passes.
Both stages of two-stage heat generators are in operation (measurement with nominal capacity).

Attention **Danger of scalding because the DHW temperature may exceed the defined DHW setpoint.**

Function The heat generator is adjusted to the maximum H -GEN temperature. All heating circuits and DHW heating adjusts their nominal value to the corresponding maximum temperature.

Application Emission measurement by the technician

Termination: The emission measurement can be terminated prematurely at any moment using the key.

5.2.1.8.2 Manual mode

Function	If the key is pressed for more than 5 s while the standard display is on, the controller is switched to manual mode. In this operating mode the heat generator temperature is set manually with the rotary push button according to the desired setpoint (does not have any effect if operated as extension of heating circuits). All the pumps are active, while the available mixing valves are de-energized and can be actuated by hand if required for the heat request. The heat generator setpoint can be set from heat generator minimum - … heat generator maximum temperature and flashes on the left side; the current heat generator temperature is statically displayed on the right side. The switching differential corresponds to the set differential for automatic control and is symmetrical to the setpoint.
Note	The heat generator high limit prevails over the heat generator switching differential and deactivates the heat generator in case it is exceeded. In controllers that operate purely as an extension of the heating circuits, setting the temperature has no effect. The last value appears as a suggested value after the controller has adjusted to the heat generator temperature.
Application	Controller malfunctions (emergency mode) Malfunctions
Termination:	The return to the previously selected operating mode is carried out by pressing key .

5.3 CODE-Input

5.3.1 Installer code and OEM Code

After entering the specialist code, the parameters which are certain for the heating specialist are released and can be processed according to the heating plant design.

To enter the specialist code the buttons and have to be pressed simultaneously for approx. 3 seconds until the request to enter the code is displayed.

Every flashing digit can be modified with the rotary knob according to the code number and confirmed by pressing the knob once. The further digits are treated in same way.

After entering all digits correctly and confirming the last digit, the specialist code is accepted: *INSTALLER OK*, with wrong entry the message *CODE ERROR* will appear.

The installer code is	…. …. …. ….
The OEM Code is	…. …. …. ….
Note	Enabled specialist parameters are blocked again if no further operation is carried out for a period of ten minutes. in this case, the specialist code must be entered again.
Change code	The OEM can change the specialist code. After entering the OEM code, parameter 15, which contains the specialist code, is enabled in the SYSTEM menu.
Factory setting	1234

Setting range

OFF: The access protection is switched off, the installer parameters are always accessible

0001 … 9999: The Factory setting access code is exchanged for a value between 1 and 9999.

Operation

Note on operation	Key/ parameter tree	Parameter
Locking code for heating specialist	SYSTEM	Parameter 15

5.3.2 Operation lock – User code

By entering a separate code, the operation of the controller can be blocked completely against unauthorized access. Operation is only possible after entering this code.
This function can be activated in the SYSTEM parameter.

Setting range

OFF, 0000 … 999

Factory setting

OFF

Operation

Note on operation	Key/ parameter tree	Parameter
Locking code for user level	SYSTEM	Parameter 23

5.3.3 Automatic exit time

After working on the control unit, the display automatically returns to the basic display after a preset time of 2 minutes.
The timeout can be adjusted in the SYSTEM parameter selection.

Setting range

OFF, 0,5 … 5,0

Factory setting

2 min.

OFF No return from the last selected display.

0,5 … 5,0 min. Return to basic display after the set time has elapsed.

Operation

Note on operation	Key/ parameter tree	Parameter
Automatic exit time	SYSTEM	Parameter 11

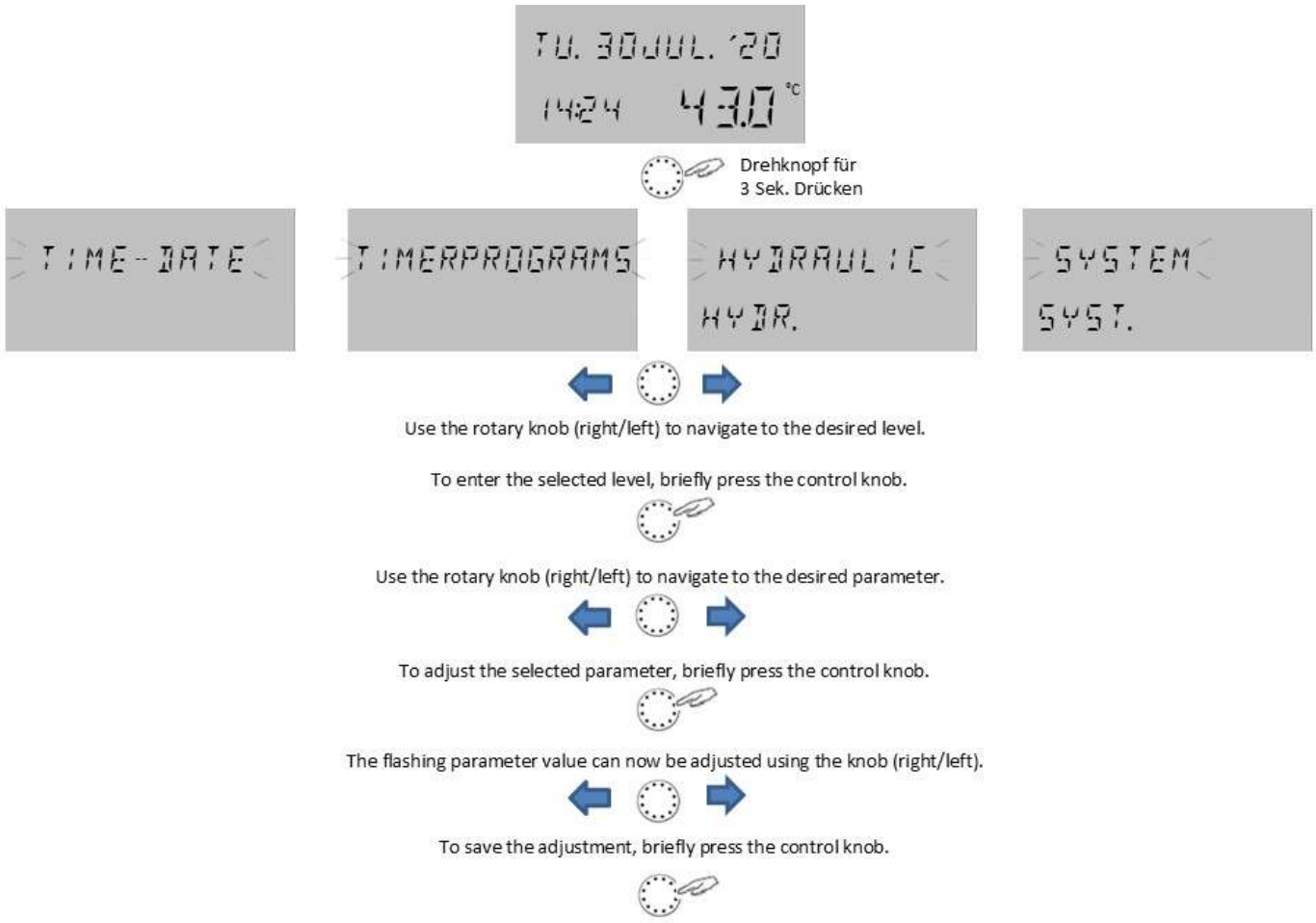
5.4 Menu selection level

The controller has a parameter menu which varies according to the different controller types.

Entry into the Parameter Menu Level

To enter the menu, the rotary push button is to be pressed for approx. 3 s. The parameter menu always starts with the time programs menu all the other available menus can be selected using the rotary push button. Press the rotary push button to enter the selected menu.

The availability of the individual levels and the parameters they contain depends on the authorization code (no code, FA code, *OEM code*).



5.4.1 Level and Parameter overview

	Programming		Configuration		parameterization (heating circuits, controlled systems)				
Parameter No.	Time/date	Time programs	Hydraulic	System	Domestic hot water	Direct circuit	Mixer 1 (..3..)	Mixer 2 (..33..)	Heat generator
01	Time (h/min)	Lock time programs programming		Language	DHW Eco Temperature	Reduced mode	Reduced mode	Reduced mode	GEN-Type
02	Year		Output Storage charging pump	Time programs	Legion. protection (week-day)	Heat. System	Heat. System	Heat. System	Start protection
03	Day-Month		Output MC-1	Control mode	Legion. protection (Time)	Room sensor	Room sensor	Room sensor	min. temp. Limit. GEN
04	Summer/winter automatic changeover		Output MC-2	Summer switch-off	Legion. protection (Temp.)	Room impact factor	Room impact factor	Room impact factor	Max. Temp. Limit. GEN
05			Output HC	System frost protection	Sensor selection	Adaptation Heating curve	Adaptation Heating curve	Adaptation Heating curve	min. limit Mode
06			Output VO-1	Request contact VI-1	DHW-Maximum limit	Switch on optimation	Switch on optimation	Switch on optimation	Sensor - Operation mode
07			Output VO-2	Request contact VI-2	DHW mode	Heat limit	Heat limit	Heat limit	min. runtime
08			Input VI-1	Request contact VI-3	Storage discharge protection	Room antifreeze temp.	Room antifreeze temp.	Room antifreeze temp.	Switching difference 1
09			Input VI-2	Climate zone	Charging temp. Increase	Room thermostat function	Room thermostat function	Room thermostat function	Switching difference 2
10			Input VI-3	Building type	DHW Switching difference	Outdoor sensor assignment	Outdoor sensor assignment	Outdoor sensor assignment	Time lock Level II
11			Indirect return flow rise	Autom. timeout	Overrun time Storage charging pump	Constant temperature (Setpoint)	Constant temperature (Setpoint)	Constant temperature (Setpoint)	Release Mode Level 2
12				Anti-lock system	Time program circulation pump	min. Limit Heating circuit	min. Limit Heating circuit	min. Limit Heating circuit	DHW-Loading Level 2
13				Logical fault messages	Eco interval circulation pump (break)	Max. Limit Heating circuit	Max. Limit Heating circuit	Max. Limit Heating circuit	Lead time boiler pump
14				Automatic Set Function	Eco interval circulation pump (Cycle)	Increase GEN	Increase GEN	Increase GEN	Overrun time boiler pump
15				Heating specialist (HF) access code.		Overrun time Direct circuit pump (HC)	Overrun time Direct circuit pump (HC)	Overrun time Direct circuit pump (HC)	Overrun time Feed pump
16				Type code		Screed function (drying of mould)	Screed function (drying of mould)	Screed function (drying of mould)	Exhaust temperature gas control
17					Performance GEN overrun		Return Max. limit	Return Max. limit	Exhaust temperature gas limit
18				Release cycle temperature			Gain K	Gain K	

	Programming		Configuration		parameterization (heating circuits, controlled systems)				
Parameter No.	Time/date	Time programs	Hydraulic	System	Domestic hot water	Direct circuit	Mixer 1 (..3..)	Mixer 2 (..33..)	Heat generator
19				Frost protection cycle mode			Scan time	Scan time	Modulation K
20							Adjust time	Adjust time	Modulation Ta
21				RTC adjustment			Runtime valve	Runtime valve	Modulation Tn
22							Stop position - control	Stop position - control	Modulation runtime
23				Locking code Operating level		Room control P-area	Room control P-area	Room control P-area	Modulation start time
24				Fahrenheit-Scaling		Room control Adjust time	Room control Adjust time	Room control Adjust time	Modulation start output
25						Operating mode vacation	Operating mode vacation	Operating mode vacation	Outdoor temperature lock GEN
26									Base load exaggeration
27				fault message machine					min. heating circuit temperature limit
28				fault message 2					Switching differential heating circuit minimum limit
29				Emergency mode without outdoor sensor					Forced draining GEN
30									OEM-Maximum limitation
31									Full load control
34									Output limit HZG
35									Output limit DHW
37									Operation hours counter
						HC-Name	HC-Name	HC-Name	Reset level I
				Reset (Factory value)					Reset level II

	parameterization					Communication	Service			
Parameter No.	Return flow rise	Solar (..VV..)	Solid fuel (..VV..)	Buffer (..VV..)	Cascading	Data bus	Relay test	Alarm	Alarm 2	Sensor adjust
01	Return flow setpoint	Switching difference (SD) On Collector /Buffer	min. limit	min. limit	Switching difference (SD)	Central unit address	Heat generator	01	01	Outside (OS)
02	Switch-off difference	Switching difference (SD) Off Collector /Buffer	Max. limit	Max. limit	Switch-on delay	Bus rights room station (RS) direct circuit (HC)	Output Direct circuit pump (HCP)	02	02	Heat generator (Boiler sensor)
03	Overrun time Return pump	Minimum runtime Solar pump (SOP)	Switching difference (SD) On Boiler /Buffer	Increase GEN	Switch-off delay	Bus rights room station (RS) mixed circuit (MC)-1	Output Mixed circuit pump MCP-1	03	03	Domestic hot water (Boiler sensor)
04		Max. collector limit	Switching differential Off Boiler/buffer	Switching differential	Switching output Stage sequence	Bus rights room station (RS) mixed circuit (MC)--2	Actuator Mixer 1	04	04	Flow MC-1 (VF-1)
05		Max. limit Solar buffer	Time lock GEN	Forced draining	Reversing		Output Mixed circuit pump MCP -2	05	05	Flow MC-1 (VF-1)
06		Solar- Operating mode		Overrun time SD (Switching differential) On	Leadership level		Actuator Mixer 2	06	06	Solar flow (KVLF)
07		Time lock GEN		Overrun time SD (Switching differential) Off	Peak load boiler		Output Storage pump	07	07	Buffer down (KSPF)
08		Solar priority/ parallel operation		Buffer- Start protection	Group-Reversing		Output VO-1	08	08	Variable-1 (VI-1)
09		Heat balance		Buffer- discharge protection	DHW Quick connection		Output VO-2	09	09	Variable-2 (VI-2)
10		Reset Heat balance		Buffer- Operation mode				10	10	Variable-3 (VI-3)
11		Volume flow Solar fluid		Ext. run time BULP				11	11	
12		Fluid density						12	12	
13		Fluid heat capacity						13	13	
14		Finally switch-off temperature						14	14	
15		Test cycle solar load sw.						15	15	
16		Change over temperature						16	16	
17								17	17	

	parameterization					Communication	Service			
Parameter No.	Return flow rise	Solar (..VV..)	Solid fuel (..VV..)	Buffer (..VV..)	Cascading	Data bus	Relay test	Alarm	Alarm 2	Sensor adjust
18								18	18	
19								19	19	
20								20	20	
								Reset fault message		

5.4.2 „Time – Date" Menu

The following current daytime values can be set in this menu:

- Time
- Year
- Date
- Daylight-savings time (summer-winter time)

All the listed values are preset at the factory and do not usually need to be updated. If corrections are necessary in exceptional cases, the values can be adjusted to the current conditions.

The internal pre-programmed calendar provides for an automatic time change at the annually occurring change of daylight saving time. If required, the automatic change of daylight-saving time can be disabled.

The current weekday from Mon. to Sun. is determined from the calendar data and does not require setting.

Entry See menu selection level

Change A flashing day value in the display can be set by pushing the rotary push button and can also be corrected by using the rotary push button. After saving by pushing the rotary push button again, the other current day values can be selected and corrected if necessary.

Exit Push the key to return to the standard display or wait until the automatic exit occurs

5.4.3 „Time program" menu

In this menu the time programs can be set individually for the heating and DHW modes.

The P1 standard program set at the factory (also P2 and P3, if enabled) for each heating or DHW circuit can be overwritten with individual switching times and temperature values. This is particularly useful if specific personalized heating programs are to be created in case of periodically recurring events with varying times (e.g. work shifts, etc.).

For the programming of time programs, a maximum of three heating cycles with a switch-on and switch-off time each is available for each weekday. Each heating cycle can also be combined with a freely selectable temperature setpoint.

Note

The standard programs are not lost if they are overwritten with personalized programs. Personalized programs will be deleted if the standard program is reloaded and hence need to be created again. For this reason, the personalized switch-on and switch-off times as well as the temperature values should be entered in the tables envisaged for this purpose.

Entry

See menu selection level

5.4.3.1 Control Circuit selection

After accessing the time program menu, the desired control circuits can be selected using the rotary push button in the following sequence

- Direct circuit (HC)
- Mixed circuit 1 (MC-1) –
- Mixed circuit 2 (MC-2) –
- Domestic hot water circuit (DHW)

Access to the selected circuit is carried out by pressing the rotary push button.

5.4.3.2 Program selection

If time programs P2 and P3 are enabled (see "System parameter menu time program = P1– P3"), the program selection appears.

If time programs P2 and P3 are disabled ("System parameter menu time program = P1"), the program selection is skipped automatically.

5.4.3.3 Weekday and cycle selection

After selecting the program, the first cycle of the first weekday (MO-1) appears as well as the relevant section flashing in the upper time bar. The other cycles are set by turning the rotary push button clockwise in crescent order according to the cycles and weekday (e.g. MO-1, MO-2, MO-3, TU-1, TU-2, TU-3, etc.), while after setting these are to be selected by turning the

rotary push button counterclockwise and confirmed by pressing the rotary push button. The third programmed time (e.g. MO-3) is only displayed if the second programmed time (e.g. MO-2) is in use.

5.4.3.4 Programming time programs and cycle temperature

5.4.3.4.1 Switch-on time

The switch-on time defines the start of heating, or the occupancy start time if the optimization is enabled.

After selecting the weekday and the corresponding cycle the relevant switch-on time starts to flash on the display and can be set with the rotary push button. The time bar in the upper part of the display provides an overview of all the programmed cycles between 00:00 and 24:00 of the selected weekday.

Note

The switch-on time cannot be set earlier than the switch-off timer of a previous cycle and not earlier than 0:00 of the selected weekday.

When the switch-on time is changed, the relevant time bar display on the left is adjusted.

If the switch-on time coincides with the switch-off time, the relevant cycle is deleted. The following cycle automatically replaces the deleted cycle when confirmed.

When subsequently adding an earlier cycle, the relevant weekday needs to be reprogrammed.

A flashing switch-on time is acquired by pressing the rotary push button.

5.4.3.4.2 Switch-off time

The switch-off time determines the end of heating.

After confirming the switch-on time the relevant switch-off time starts to flash on the display and can be set using the rotary push button . The time bar in the upper part of the display provides an overview of all the programmed cycles between 00:00 and 24:00 of the selected weekday.

Note

The switch-off time cannot be later than the switch-on time of a following cycle.

When the switch-on time is changed, the relevant time bar display on the right is adjusted.

If the switch-off time coincides with the switch-on time, the relevant cycle is deleted. A following cycle automatically replaces the deleted cycle when confirmed.

When subsequently adding an earlier cycle, the relevant weekday needs to be reprogrammed.

A flashing switch-off time is confirmed by pressing the rotary push button.

5.4.3.4.3 Cycle temperature

After confirming the switch-off time the relevant cycle temperature starts to flash on the display and can be set using the rotary push button. In the case of heating circuits, the displayed cycle temperature always refers to the desired room temperature, while in the case of the DHW circuit it refers to the desired water heater normal temperature in the selected cycle.

A flashing cycle temperature is confirmed by pressing the rotary push button.

At the same time the last cycle call starts to flash on the display so that it can be checked. Further cycles can be selected directly and processed in the following order: SWITCH-ON TIME – SWITCH-OFF TIME – CYCLE TEMPERATURE.

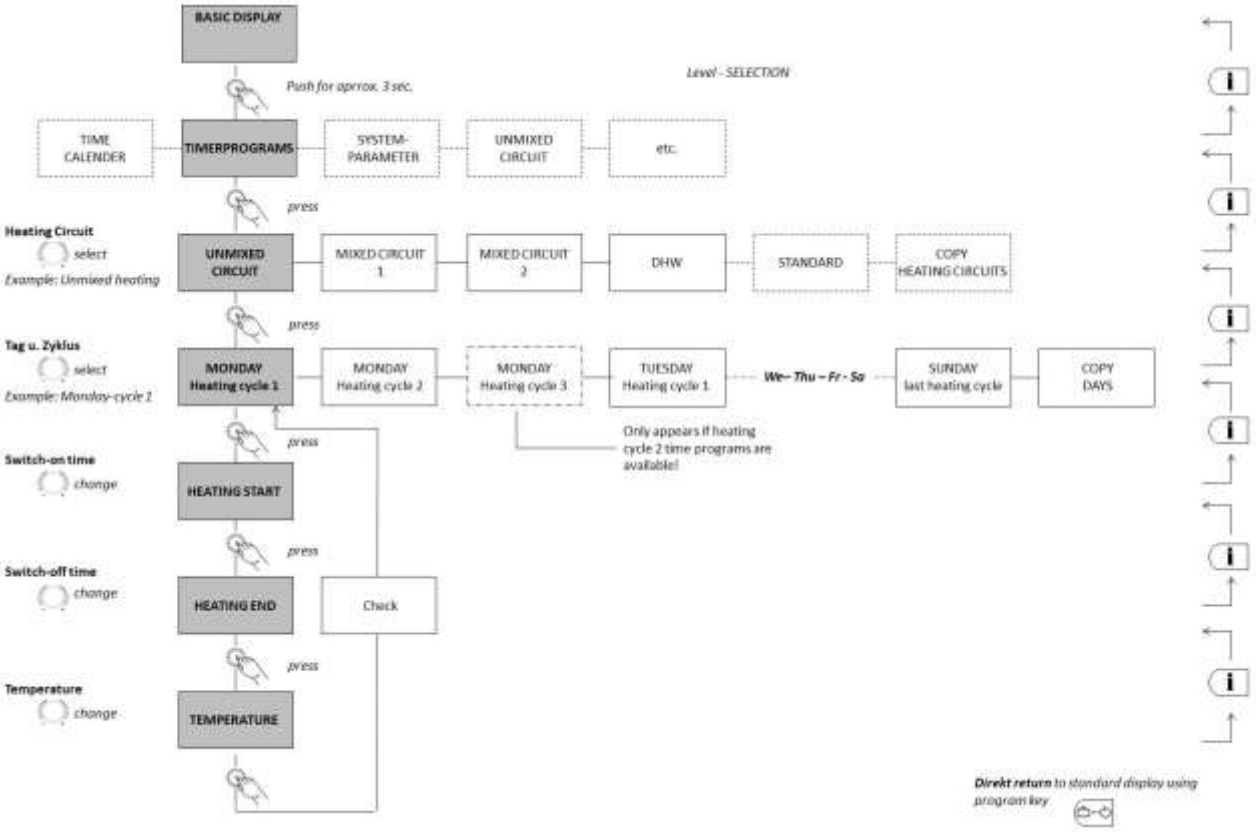
The cycle temperature setting can be deactivated in the System menu

Operating note	Button / parameter tree	Parameter
Variable setpoint	SYSTEM	Parameter 18

5.4.3.4.4 Time program programming (Program P2 and P3 disabled)

When accessing the level selection, the switching time programming always appears first. Programmes P2 and P3 are activated in level - SYSTEM.

Operating note	Button / parameter tree	Parameter
Time program	SYSTEM	Time program

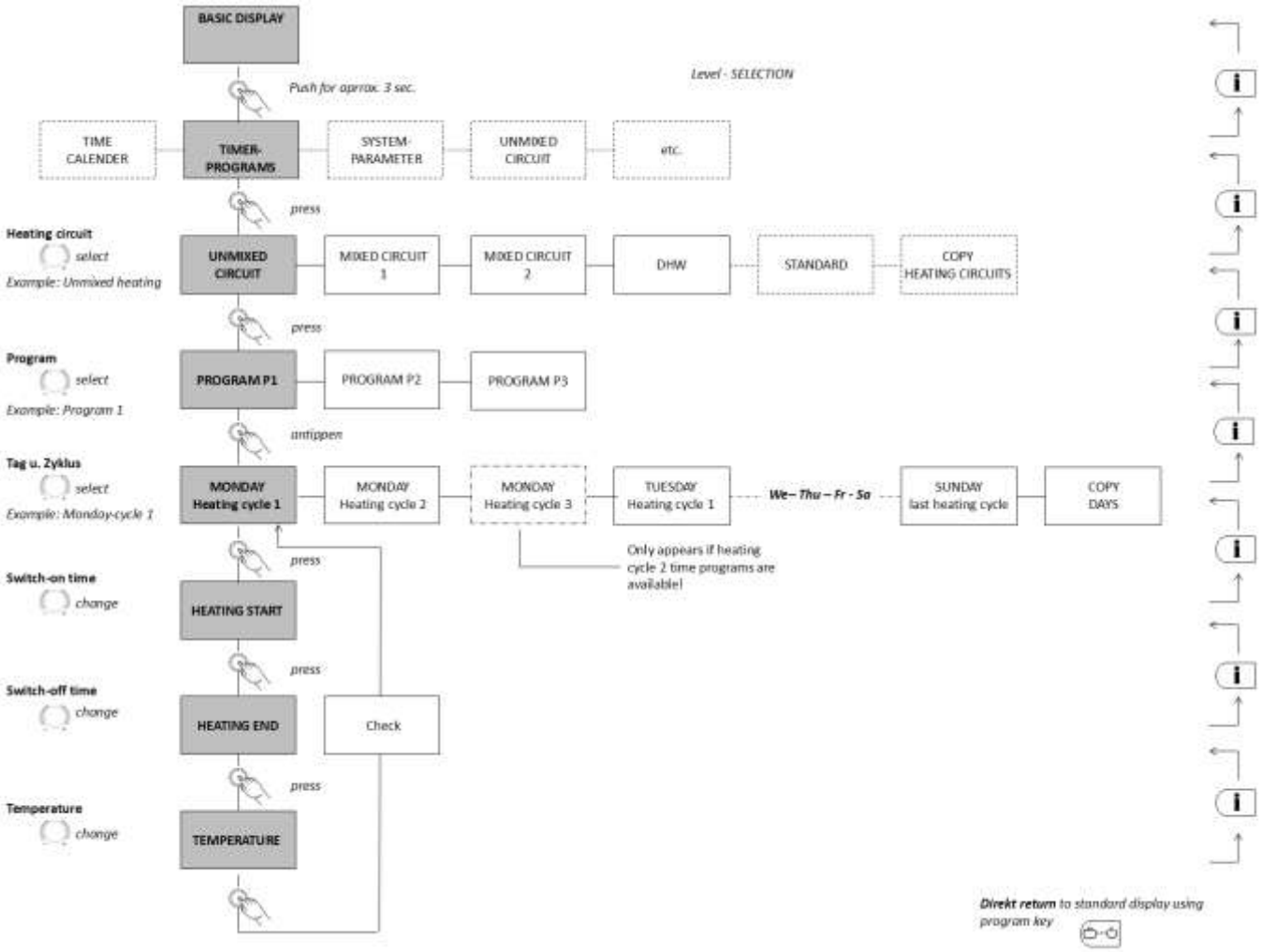


Standard time program (P1) for heating and DHW:

Standard program P1		
Heating circuit	Day	Heating operation from to
Direct circuit	Mo - Su	06:00 – 22:00
DHW-circuit	Mo - Su	05:00 – 22:00
Mixed circuit 1	Mo - Su	06:00 – 22:00
Mixed circuit 2	Mo - Su	06:00 – 22:00

5.4.3.4.5 Time program programming (Program P2 and P3 enabled)

After entry into the level selection, the time program is always displayed first. Enabling programs P2 and P3 in level - *SYSTEM*



Standard program P1		
Heating circuit	Day	**Heating operation from to**
Direct circuit	Mo – Su	06:00 – 22:00
DHW-circuit	Mo – Su	05:00 – 22:00
Mixed circuit 1	Mo – Su	06:00 – 22:00
Mixed circuit 2	Mo – Su	06:00 – 22:00

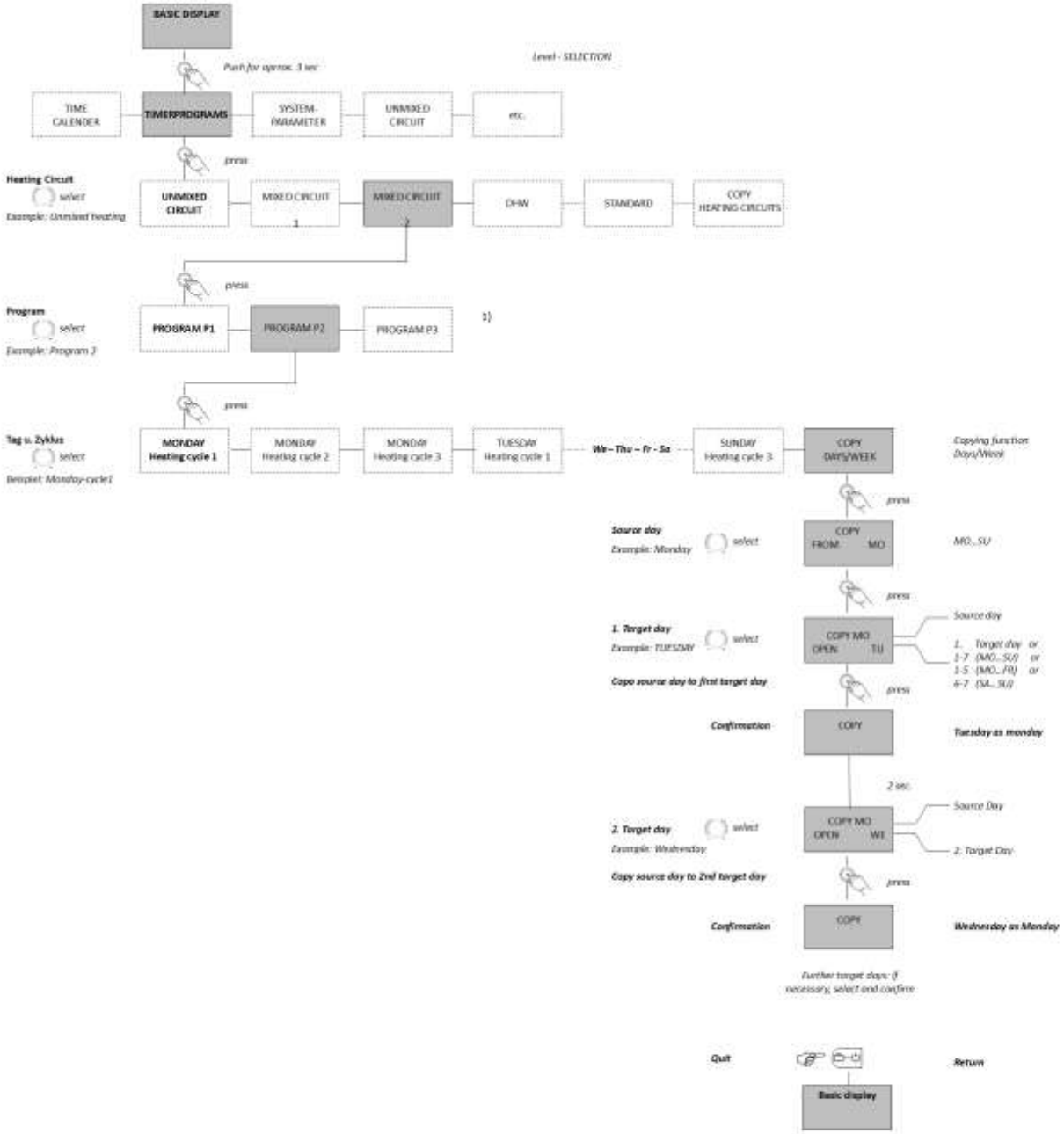
Standard program P2		
Heating circuit	**Day**	**Heating operation from to from to**
Direct circuit	Mo – Thu Fr Sa - Su	06:00 – 08:00 16:00 – 22:00 06:00 – 08:00 13:00 – 22:00 07:00 – 23:00
DHW- circuit	Mo – Thu Fr Sa - Su	05:00 – 08:00 15:30 – 22:00 05:00 – 08:00 12:30 – 22:00 06:00 – 23:00

Mixed circuit 1	Mo – Thu Fr Sa - Su	06:00 – 08:00 16:00 – 22:00 06:00 – 08:00 13:00 – 22:00 07:00 – 23:00
Mixed circuit 2	Mo – Thu Fr Sa – Su-	06:00 – 08:00 16:00 – 22:00 06:00 – 08:00 13:00 – 22:00 07:00 – 23:00

Standard program P3		
Heating circuit	**Day**	**Heating operation from to**
Direct circuit	Mo – Fr Sa – Su	07:00 – 18:00 reduced
DHW- circuit	Mo – Fr Sa – Su	06:00 – 18:00 reduced
Mixed circuit 1	Mo – Fr Sa – Su	07:00 – 18:00 reduced
Mixed circuit 2	Mo – Fr Sa – Su	07:00 – 18:00 reduced

5.4.3.4.6 Block-programming

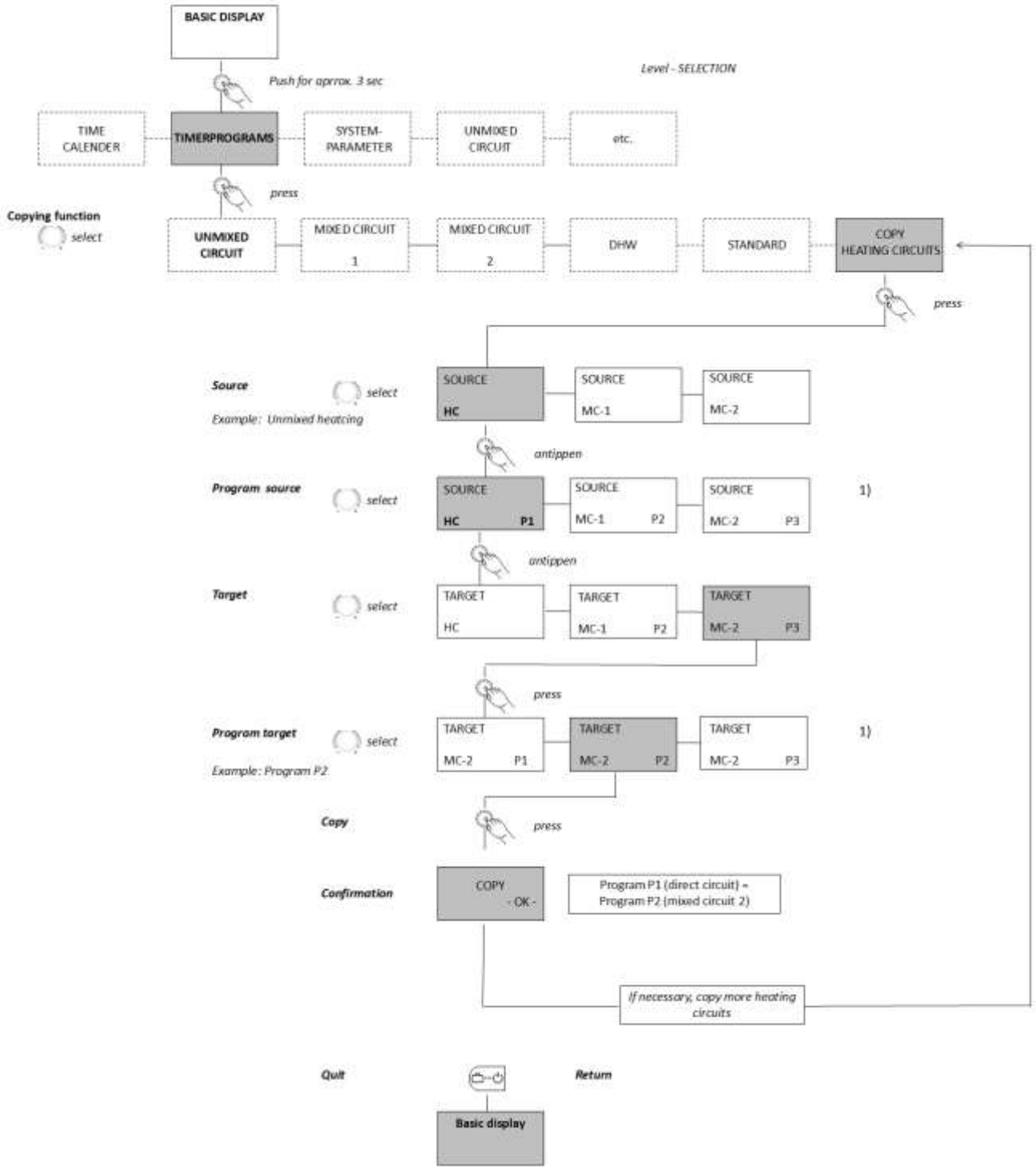
The copy function makes it possible to copy a source day to the desired target day or to all weekdays (week programming). All the cycles of the source day are copied. Single heating cycles cannot be copied.



1) The program selection is skipped if programs P2 and P3 were disabled in the *System Parameter* menu.

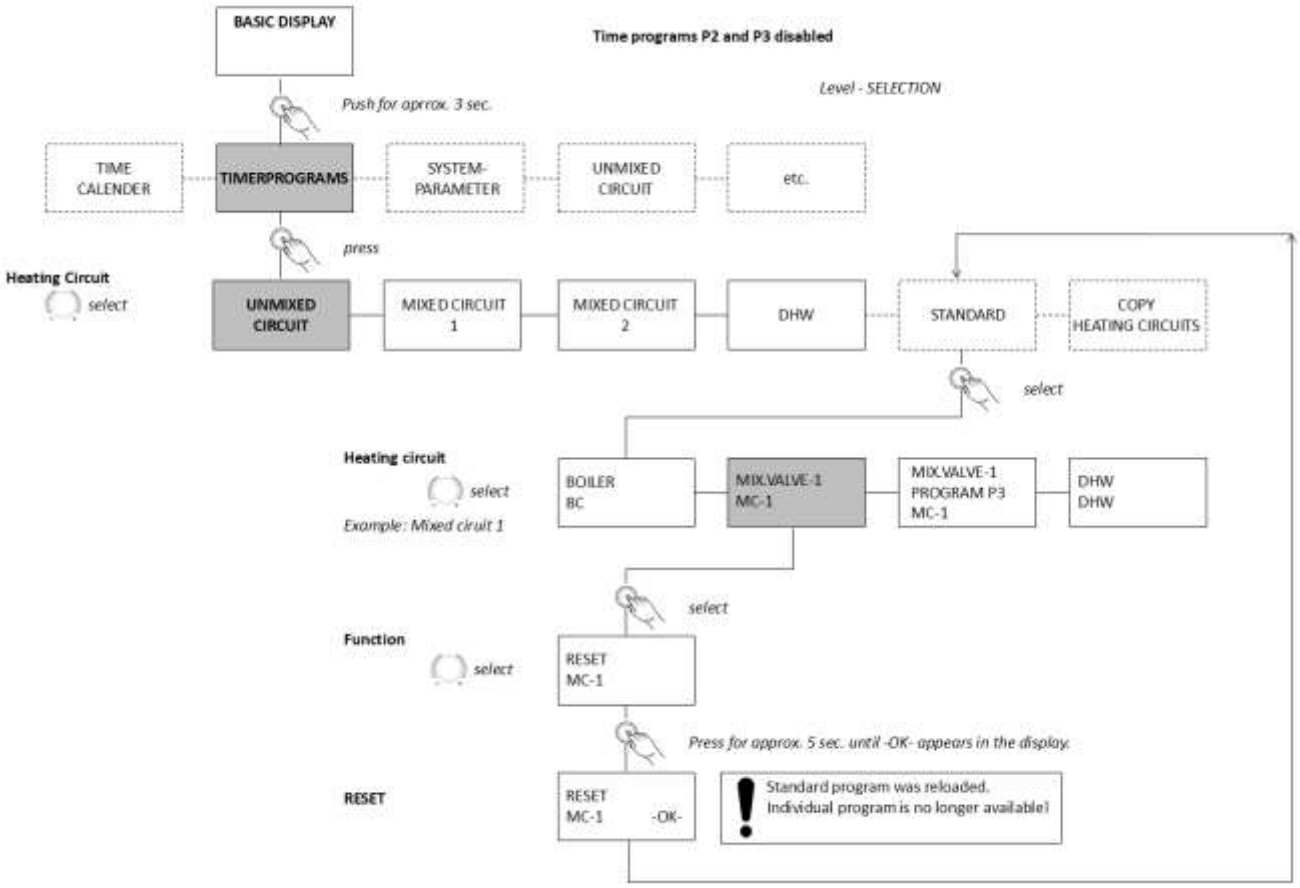
5.4.3.4.7 Copying complete programs

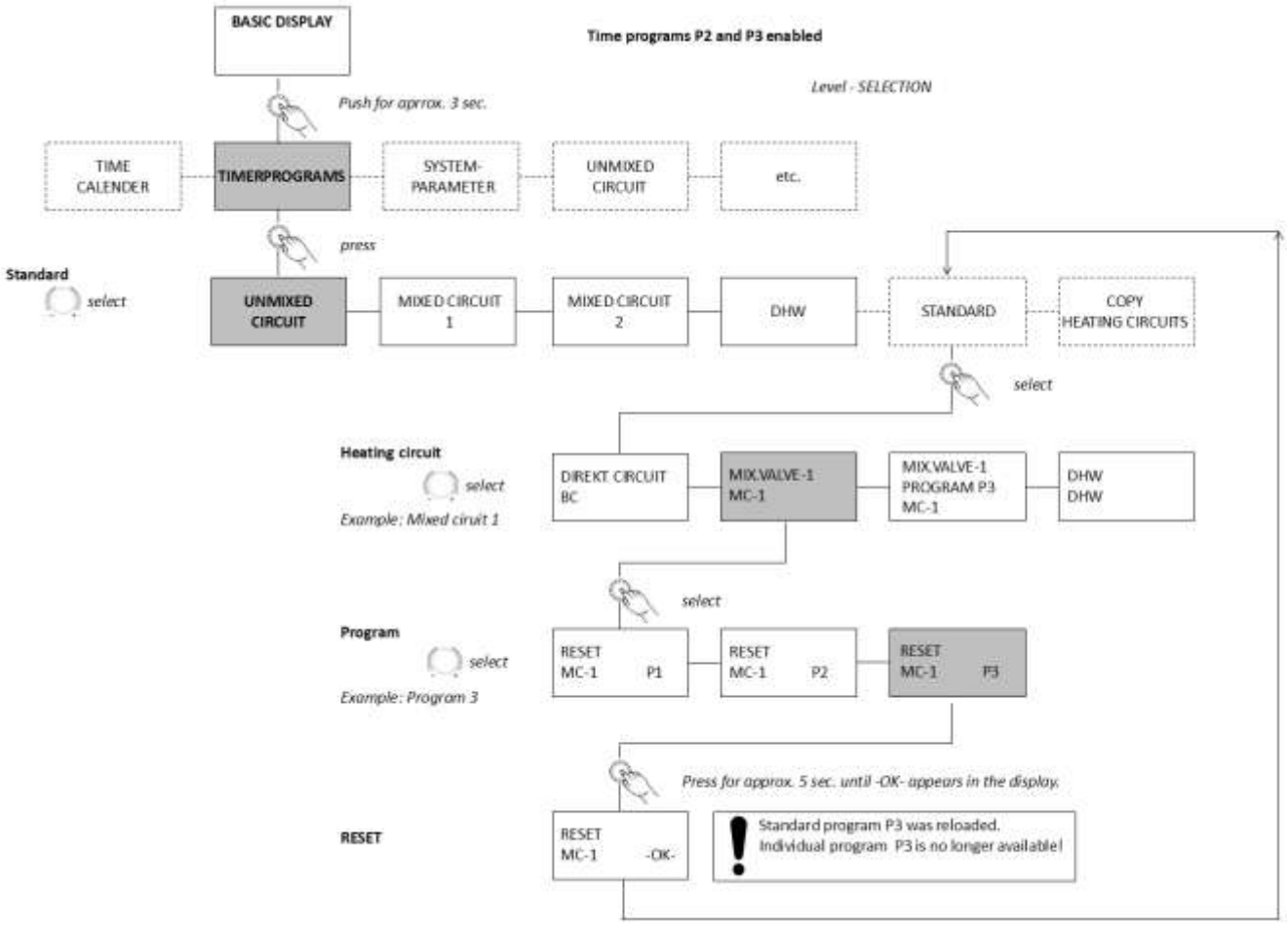
Note Heating circuits cannot be copied to DHW circuits, as these have different cycle temperatures: if a heating circuit is selected as a source circuit, the DHW circuit can no longer be used as a target circuit.



1. The program selection for source and target circuits is skipped if programs P2 and P3 were disabled in the System Parameter menu.

5.4.3.4.8 Reloading Standard Programs





5.4.4 SYSTEM level (Parameter)

The parameters in this level refer to general default values and limit parameters within the heating system connected to the application.

5.4.4.1 Language

On the day of initial operation, the language selection is made during the start-up phase of the control, but the language can also be changed at a later time in the SYSTEM menu.

Factory setting	German
Setting range	DE (German), GB (English), FR (French), IT: Italian, NL: Dutch, ES (Spanish), PT (Portuguese), HU (Hungarian), CZ (Czech), PL (Polish), RO (Romanian), RU (Russian), TR (Turkish), SE (Swedish), NE (Norwegian), BG (Bulgarian)
Function	Several languages can be chosen for all the information appearing on the display.

5.4.4.2 Time programs

Factory setting	P1
Setting range	P1: Program 1 enabled, Programs 2 and 3 = disabled P1-P3: All three programs enabled
Function	This parameter determines the release of the switching time programmes for program selection and for individual switching time programming. In the delivery state, only one switching time program (P1) is enabled. This simplifies operation in most applications where only one switching time program is used.
Effects	Besides the settings described above, the enabling of programs P1 to P3 enables for the following settings:

5.4.4.2.1 Operating mode adjustment

The time programs P1, P2 or P3 can be selected in automatic operating modes and summer.

5.4.4.2.2 Time programming

When programming the time programs, the three time programmes P1 - P3 can be selected for each heating circuit and for the hot water circuit.

5.4.4.3 Control mode

Factory setting	1
Setting range	1, 2
Function	This parameter determines the control mode and has effects on the: • Operating mode selected with the operating mode key  • Daytime temperature selected with the "daytime temperature" key  • Nighttime temperature selected with the "night-time temperature" key  concerning the effect on the different heating circuits. Setting 1: The selected setting (operating mode, daytime temperature, night-time temperature) applies for all the heating circuits Setting 2: Each heating circuit can be assigned its own setting (operating mode, daytime temperature, night-time temperature).
Note:	Once a room device is connected and registered on the basic unit via the data bus, the basic unit automatically switches to separate operating mode (2) and system parameter 3 (operating mode) is faded out!

If you switch to common operating mode using the RS, the bus rights for the respective circuit have to be set to owner status in the data bus menu. System parameter 3 is then available again.

System parameter 3 is generally not available when using RFF!

5.4.4.3.1 Separate control mode Daytime Temperature

Function:

In this operating mode, the relevant setpoint applies only to the selected HC (= direct circuit), MC 1 (= mixed circuit 1) or MC 2 (= mixed circuit 2)

Setting:

- Press key
- Select the desired heating circuit, HC, MC-1 or MC-2, using the rotary push button
- Confirm the selected circuit by pressing the rotary push button
- Set the flashing room temperature value by turning the rotary push button to the desired value.
- Confirm set value by pressing or pressing the rotary push button.
- Pressing the button again exits the basic display

• Alternatively, the value can be confirmed by automatic exit after the set time.

5.4.4.3.2 Separate Control Mode Nighttime Temperature

Function:

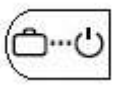
In this operating mode, the relevant setpoint applies only to the selected HC (= direct circuit), MC 1 (= mixed circuit 1) or MC 2 (= mixed circuit 2)

Setting:

- Press key
- Select the desired heating circuit, HC, MC-1 or MC-2, using the rotary push button
- Confirm the selected circuit by pressing the rotary push button
- Set the flashing room temperature value by turning the rotary push button to the desired value.
- Confirm set value by pressing or pressing the rotary push button.
- Pressing the button again exits the basic display

• Alternatively, the value can be confirmed by automatic exit after the set time.

5.4.4.3.3 Separate Control Mode Operating Mode

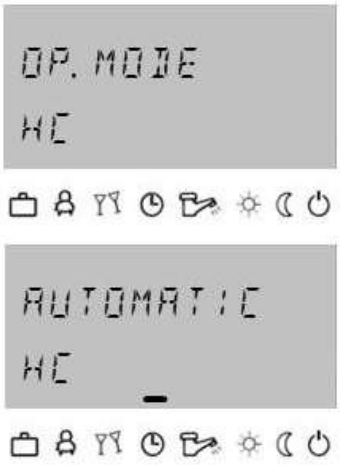


Function:

In separate operating mode, the selected program only applies to the previously specified heating circuit.

Hence each heating circuit can be assigned to its own operating mode.

Note The active operating mode is not displayed in the basic display of the control.



Setting:

- Press key
- Select the desired heating circuit, HC, MC-1 or MC-2, using the rotary push button
- Confirm the selected circuit by pressing the rotary push button
- Set the flashing room temperature value by turning the rotary push button to the desired value.
- Confirm set value by pressing or pressing the rotary push button.
- Pressing the button again exits the basic display
- Alternatively, the value can be confirmed by automatic exit after the set time.

5.4.4.4 Summer switch-off

Factory setting	20° C
Setting range	OFF, system frost protection ...30°C
Note	This function is only effective in operating mode automatic.
Function	This parameter determines the end of the heating season based on the outside temperature. When the summer switch-off mode is active, it is indicated on the basic display by a sunshade symbol.

5.4.4.5 Reset Parameter

The RESET parameter allows you to reset any accidental adjustments made in the parameter levels to the factory settings. Individually set switching times are not reset to the factory settings.

A reset is performed in accordance with the previously activated release authorization

- Without code (reset of operator level parameters)
- HF code (reset of operator and specialist level parameters)

OEM code (reset of operator, specialist and OEM level parameters)

Note	A reset should only be performed if all individually entered parameter values are to be replaced by the factory default values!
Reset	With the reset indicator flashing (RESET) the reset-ready indicator (SET) will flash when the rotary-push button is pressed briefly. A reset will be performed when the rotary-push button is pressed for approx. 5 seconds. After resetting the parameter values, the control system restarts.

5.4.5 DHW level

This level comprises all parameters which are necessary to program the DHW circuit with the exception of the operating time programs.

Note

This level can only be accessed if in the level **Hydraulic** the Parameter 2 (DHW charging pump) was set to OFF by the heating specialist.

5.4.5.1 DHW economy temperature

Factory setting

40°C

Setting range

5°C … DHW maximum temperature

Function

This parameter determines the temperature in the DHW storage tank between the operating standby times in automatic mode and during REDUCED mode.

Note

If a DHW thermostat is used to determine the water heater temperature, this parameter is skipped.

5.4.5.2 Legionella protection day

Factory setting

OFF

Setting range

OFF, MO … SU, ALL

Function

OFF: The legionella protection function is not active.

MO...SU: The legionella protection is activated on the selected weekday at the legionella protection time set by the heating specialist with a different parameter.

ALL: The legionella protection function is activated every day at Legionella protection time.

This parameter serves to prevent a Legionella outbreak in the hot water tank and is activated on the selected weekday or every day at 02:00 hrs. (time can be set using DHW parameter 03). If the DHW temperature is below 65°C, the hot water tank is reloaded. The legionella protection function is activated for 1 hour.

Note

If a DHW thermostat is used to determine the water heater temperature, this parameter is skipped.

5.4.6 Direct circuit / Mixed Circuit 1 / Mixed Circuit 2 Menu

This level comprises all parameters which are necessary to program the heating circuits with the exception of the time programs. A maximum of 1 direct circuit and 2 mixed circuits (mixed circuit 1 and mixed circuit 2) are available per controller as heating circuits.

The heating circuit parameters described below are available for each heating circuit and are to be set separately.

5.4.6.1 Reduced mode

During reduced operation, you can select between two operating modes:

Factory setting

ECO

Setting range

ECO, RED

Function

ECO switch-off mode

During reduced mode the direct heating circuit is completely switched off if the outside temperature exceeds the set frost protection limit. The heat generator minimum temperature limit is deactivated. The heating circuit pump is switched off with a short delay in order to avoid a safety switch-off owing to the post heating of the heat generator (extended pump running time).

If the outside temperature falls below the specified frost protection limit, the controller switches from switch-off mode (ECO) to reduced mode (RED) and the heating circuit temperature is adjusted according to the set reduced setpoint considering the low limit of the heat generator.

Application

Buildings with high insulation values.

Function

RED reduced mode

The direct heating circuit's heating circuit pump remains active during reduced mode (see Switching Time Program). The flow temperature is determined by the relevant reduced heating characteristics according to the decreased room setpoint. The set minimum temperature will be maintained.

Application

Buildings with low insulation values and high heat losses.

Note

As the direct circuit pump remains in operation during reduction mode, the rooms may overheat due to the minimum boiler temperature, as the minimum boiler temperature is transferred 1:1 to the heating system.

The mode set here also applies to the short operating modes ***ABSENCE*** and ***RED.HEATING***

5.4.6.2 Heating system

Factory setting

1.30 (Radiator systems) for direct circuit

1.10 (Floor heating systems) for mixed circuits

Setting range

1.00...10.00

Function

This parameter refers to the type of heating system (floor, radiator, convector heating) and can be compared to the exponent of the relevant heat exchanger. The setting determines the curvature of the heating characteristics of the direct heating circuit and compensates for the performance losses at low temperatures by means of its progressive characteristic.

Depending on the type of heating system the following settings are recommended:

1.10 Slightly progressive heating characteristic for floor or other panel heating systems.

1.30 Progressive standard characteristics for all radiator heating systems with m-values comprised between 1.25 and 1.35.

2.00 Progressive heating characteristics for convector and baseboard heating systems

>3.00 Very progressive heating characteristic

5.4.6.3 Heating circuit name

Factory setting

empty

Setting range

00000 … ZZZZZ

Function

The maximum of three heating circuits available on a controller are given the standard abbreviations HC (heating circuit), MC1 (mixed heating circuit 1) and MC2 (mixed heating circuit 2). Thus, the heating circuits are clearly named.

In order to enable the end customer to assign the heating circuits easily in the domestic environment, each of these three heating circuits can be given an individual 5-digit short designation.

Operation

By using the setting "empty", no individual name is assigned. The default abbreviated name appears.

- Every flashing digit can be modified with the rotary knob according to the code number and confirmed by pressing the knob once. The further digits are treated in same way.
- The individual heating circuit name display appears
    - in the menu
    - in the parameter tree
    - in the info level

5.5 Malfunction messages

The controller is equipped with an extensive built-in alarm reporting logic, which displays the type of alarm according to its priority.
The alarm messages alternate with the standard display as they appear. Several alarms occurring at the same time will appear one after the other in the temporal order in which they occur.

The heating technician is to be informed of any alarm message.

5.6 Parameter settings

5.6.1 HYDRAULIC level

Parameter	Designation	Setting range / Setting values	Factory settings	Settings
02	Function assignment of the DHW charging pump output	OFF No function 1 DHW charging pump 4 DHW circulation pump 5 DHW electrical heating element	1	
03	Mixing circuit 1 (MC1) output	OFF No function 2 Direct circuit (outdoor temp. contr.) 3 Mixed circuit (outdoor temp. contr.) 6 Constant temp. contr. 7 Fixed value contr. 8 Raising return temp.	3	
04	Mixing circuit 2 (MC1) output	Setting range and assignment see parameter 03	3	
05	Direct circuit 1 (HC) output	OFF No function 2 Direct circuit pump 4 DHW circulation pump 5 DHW electrical heating element 6 Constant control 10 Feed pump 11 Boiler circuit pump 1 12 Boiler circuit pump 2 13 Alarm output 14 Timer 15 Solar charging pump (..VV..) 21 Parall. H-GEN enable 27 Hydraulic buffer release	2	
06	Function assignment of variable outputs 1	OFF No function 4 DHW circulation pump 5 DHW electrical heating element 9 Feed pump 10 Feed pump 11 Boiler circuit pump 1 12 Boiler circuit pump 2 13 Alarm output 14 Timer 15 Solar charging pump 16 Buffer charging pump 17 Solid fuel boiler pump 19 Solar changeover charging valve 20 Solar forced heat removal 21 Parall. H-GEN enable	OFF	

Parameter	Designation	Setting range / Setting values	Factory settings	Settings
		26 Priority pump 27 Hydraulic buffer release		
07	Function assignment of variable outputs 2	Setting range and assignment see parameter 06	OFF	
08	Function assignment of variable inputs 1	OFF No function 1 Outdoor sensor 2 2 Heat generator sensor 2 3 DHW tank sensor 2 4 Buffer sensor 2 5 Demand contact 6 External alarm input 9 Return flow sensor 10 External blocking (heat generator) 11 External switching modem 12 External information 13 Common flow sensor 14 Solar panel return sensor 16 Flue gas sensor 18 Solid fuel buffer sensor 19 Buffer sensor 1	OFF	
09	Function assignment of variable inputs 2	Setting range and assignment see parameter 08 without parameter 16 (flue gas sensor)	OFF	
10	Function assignment of variable inputs 3	Setting range and assignment see parameter 08 without parameter 16 (flue gas sensor)	OFF	
11	Indirect raising of return temperature via mixing valve	OFF, ON (only Type ..3.., ..33..)	OFF	

5.6.2 System level

Parameter	Designation	Setting range / Setting values	Factory settings	Settings
LANGUAGE	Language selection	DE, GB, FR, IT, NL, ES, PT, HU, CZ, PL, RO, RU, TR, SE, NO, BG	DE	
TIME PROGRAM	Number of enabled time programs	P1 Only one time program enabled P1-P3 Three-time programs enabled	P1	
CONTROL MODE	Enabling separate control mode setting (room temp. specific. and operat. modes)	1 Common setting for all Heating circuits 2 Separate setting for every individual heating circuit	1	
SUMMER	Limit temperature for summer switch-off	OFF No function System frost protection...30°C Switch-off at set value	20°C	
05	System frost protection	OFF No function -20...Summer switch-off Frost protection at set value	3°C	
06	Heat requiring contact at VE 1	1 Direct circuit 2 Mixed circuit 1 3 Mixed circuit 2 4 DHW ALLE All circuits	1	
07	Heat requiring contact at VE-2 (Type .. VV..)		1	
08	Heat requiring contact at VE-3 (Type .. VV..)		1	
09	Climate zone	-20 ... 0°C	-12°C	
10	Building type	1 light construction 2 medium construction 3 heavy construction	2	
11	Time for automatic exit	OFF No automatic exit 0,5 ... 5 min. Automatic return to standard after set time	2 min.	
12	Pump and mix valve forced operation Antiblocking protection)	ON active OFF not active	ON	
13	Logical malfunction messages	OFF no display ON Display active	OFF	
14	Automatic Set-Function	OFF automat. sensor recognition deactivated ON automat. sensor recognition activated	OFF	
15*	Locking code for heating specialist	0000 (OFF) no lock 0001 … 9999 All parameters locked from heating specialist upwards	1234	
16*	Type code	Controller type according to type code table	(Type)	
18	Release cycle temperature	OFF cycle temperatures blocked ON cycle temperatures enabled	ON	
19	Frost protection mode	OFF Permanent frost protection in accordance with system frost protection 0.5...60 min Cycle operation	OFF	
21*	RTC adjustment	-10 ... -1, 0, 1 ... 10 Sec.	0	

Parameter	Designation	Setting range / Setting values	Factory settings	Settings
23	Anti-blocking for protection	OFF (0000) no lock ON (0001...9999) locked	OFF	
24	Temperature display in °Fahrenheit	OFF display in °C and K ON display in °F (Fahrenheit)	OFF	
27**	System handling alarm messages boiler control	1 Shown on display only 2 Message from interlocks into the system 3 Message from interlocks and blockages into the system 4 Message from interlocks, blockages and warnings into the system	2	
28	Malfunction message memory 2	OFF, ON	OFF	
29*	Curve for emergency mode without OS	-50 … +30°C	0°C	
RESET	Reset to factory preset	OFF, SET		

* only OEM

** Function dependent on support from automatic burner control

5.6.3 Domestic hot water (DHW) level

Parameter	Designation	Setting range / Setting values	Factory settings	Settings
DHW NIGHT	DHW- economy temperature	5 °C ... DHW- maximum temperature	40°C	
LEGION. DAY	DHW- Day for legionella protection	OFF No legionella protection Mo...Su Legionella protection on the specified weekday ALL daily legionella protection	OFF	
03	DHW- Time for legionella protection	00:00 … 23:00	02:00	
04	DHW- Temperature for legionella protection	10 … DHW- maximum temperature	65°C	
05	Type of DHW temperature measurement	1 DHW temperature sensor 2 DHW temperature controller (thermostat)	1	
06	DHW- temperature limit	20 °C ... Maximum boiler temperature	65°C	
07	DHW- operating mode	1 Parallel mode 2 Priority mode 3 Conditional priority 4 Weather responsive parallel mode 5 Priority mode with intermediate heating 6 Priority-separation circuit 7 External operation	2	
08	DHW- tank discharge protection	OFF No discharge protection ON Discharge protection activated	ON	

Parameter	Designation	Setting range / Setting values	Factory settings	Settings
09	DHW- Charging temperature increase	0 ... 50 K Difference between DHW charging temperature and DHW setpoint	15K	
10	DHW- switching differential	2 ... 20 K Amount of DHW switching differential, symmetrical to the DHW setpoint	5K	
11	DHW- charging pump extended running time	0 … 60 min.	5 min.	
12	Time program circulation pump	AUTO - Active DHW time program 1 P1, direct circuit 2 P2, direct circuit 3 P3, direct circuit 4 P1, mixed circuit 1 5 P2, mixed circuit 1 6 P3, mixed circuit 1 7 P1, mixed circuit 2 8 P2, mixed circuit 2 9 P3, mixed circuit 2 10 P1, DHW circuit 11 P2, DHW circuit 12 P3, DHW circuit	AUTO	
13	Economy interval - cir. pump (no pulse period)	0 min ... Setting parameter 14; time of circulation pump stop)	5 min.	
14	Economy interval - cir. Pump (Period duration)	1... 60 min Duration = shutdown time + operating time	20 min.	
17	Behavior of heat generator during extended run time	AUTO Setpoint value to H-GEN as required OFF H-GEN off	AUTO	

5.6.4 Selection level direct circuit / Mixed circuit 1 / Mixed circuit 2

Parameter	Designation	Setting range / Setting values	Factory settings	Settings
RED. HEATING	Type of reduced mode	ECO Switch-off mode (frost protection) ABS Reduced mode	ECO	
HEAT. SYSTEM	Heating system (Exponent)	1,00 … 10,00	HC = 1,30 MC = 1,10	
03	Room influence (with room unit)	OFF Room sensor deactivated 1 Room sensor enabled 2 Room sensor enabled, operation for remote unit disabled 3 only display mode (room temp.)	OFF	
04	Room factor	OFF, 10 ... 500 %, RC (only room control)	OFF	
05	Adaptation of heating curve	OFF, ON	OFF	

Parameter	Designation	Setting range / Setting values	Factory settings	Settings
06	Switch-ON optimization	OFF, 1 ... 16 h	OFF	
07	Heating limit	OFF, 0.5...40 K	OFF	
08	Room frost protection limit	5 ... 30 °C	10°C	
09	Room thermostat function	OFF, 0.5 ... 5 K	OFF	
10	Outdoor sensor assignment (only if VI n = OS 2)	0 Control to mean value of OS 1 + OS 2 1 Control to OS 1 2 Control to OS 2	1	
11	Constant temperature setpoint	10... 95 °C (Only if output has been set to constant (CC) or fixed value controller (FC)	20°C	
12	Minimum temperature limit	10 °C ... Maximum temperature limit (Parameter 13)	20°C	
13	Maximum temperature limit	Minimum temperature limit (Parameter 12) ... Setting value maximum temperature limit heat generator	75°C	
14	Temperature increase heat generator/heating circuits	-5 ... 20 K	HC = 0 K MC = 4 K	
15	Extended pump running time	0 ... 60 min.	5 min.	
16	Screed function (profile drying) (With direct HC only if the relevant circuit is enabled exclusively)	OFF Function switched off 1 Function heating 2 Occupation suitable heating 3 Function and occupation suitable heating	OFF	
17	Maximum return limit (MC and VI-n = 7 or 8 only)	OFF, 10 … 90°C	90°C	
18*	P-band Xp	1 ... 50 %/K	2,0%	
19*	Sampling time Ta	1 ... 600.sec.	20	
20*	I-band Tn	1 ... 600 sec.	270	
21	Actuator running time	10 ... 600 sec.	120	
22	v	1 Continuous actuator signal at limit stop 2 Actuator signal suppressed at limit stop (Actuator de-energized)	1	
23**	P-band room control (only in RS-L available)	1...100 %/K	8%	
24**	I-band Tn room control (only in RS-L available)	5...240 min.	35 min.	
HC-NAME	Heating circuit name			

* only OEM

** only if remote unit is room controller (PARAMETER 04 = RC)

5.6.5 Heat generator level

Parameter	Designation	Setting range / Setting values	Factory settings	Settings
01	Heat generator type (H-GEN)	OFF without heat generator 1 Oil/Gas 1 stage (..2..) 2 Oil/Gas 2 stage (..22..) 3 Oil/Gas 2 x 1 stage (..22..) 4 variable burner 5 Boiler control units (..C../..OT..)	1	
02**	Start-up protection H-GEN	OFF no start-up protection 1 Start-up protection on minimum limit 2 Start-up protection on outdoor reference 3 Separate start-up protection	1	
03**	Minimum temperature limit H-GEN	5 °C ... Maximum temperature limit	38°C	
04**	Maximum temperature limit H-GEN	Minimum limit H-GEN ... OEM maximum limit	80°C	
05**	H-GEN minimum temperature limiting mode	1 Minimum temperature limit at heat demand 2 Restricted minimum temp. limit 3 Unrestricted minimum temp. limit	1	
06**	Sensor mode H-GEN	1 Burner switch off in case of defect 2 External burner switch off 3 Burner enabling in case of defect !!!Consider warnings!!!	1	
07**	Minimum burner run time	0 ... 20 min.	2 min.	
08**	Burner switching differential SD I	1-stage: 2 ... 30 K 2-stage: 2 ... (SDII - 0,5K)	6 K	
09**	Burner switching differential SD II	(SD I + 0,5 K) ... 30 K	8 K	
10**	Time delay stage II (Type .. 22 ..)	0 ... 60 min (0 = 10 sec.)	0	
11**	Enabling mode stage II (Type .. 22 ..)	1 Unlimited enabling during start-up release 2 Delay during start-up release	2	
12**	DHW charging mode 1- or 2-stage (Type.. 22 ..)	1 2-stage DHW charging with time delay, full load stage 2 unlimited DHW charging stage 2 3 1-stage DHW charging (only partial load stage)	1	
13**	Flow time boiler circuit pump/ parall. heat generator release	0 ... 10 min.	0 min.	
14**	Extended run time boiler circuit pump	0 … 60 min.	2 min.	
15**	Extended run time feed pump or primary pump	0 … 60 min.	2 min.	

Parameter	Designation	Setting range / Setting values	Factory settings	Settings
16**	Flue gas temperature monitoring	OFF only displays flue gas temperature 0...60 min Heat generator locking in case of exceeding limit for the set time SLT Heat generator locking in case of exceeding limit	OFF	
17**	Flue gas temperature limit	50 ... 500 °C	200°C	
19*	Modulation P-band Xp	0,1…50 %/K	5 %/K	
20*	Modulation sample time Ta	1…600 sec.	20 sec.	
21*	Modulation adjust time Tn	1...600 sec./°C	180 sec./°C	
22*	Modulation running time	5...600 Sek	12 sec.	
23*	Modulation starting time	0...900 Sek	60 sec.	
24*	Modulation starting load	0...100 %	70%	
25	Outdoor temp. locking	OFF, -20...+ 30°C	OFF	
26	Basic load exaggeration (only when used in cascade mode)	0...60 K	10 K	
27**	Heat circuits minimum temperature limit	5 °C ... BT min (only if start up release is separated – Parameter 02 = 3)	36°C	
28**	Switching difference minimum temperature limit heating circuits	2 K ... 20 K (only if start-up release is separated – Parameter 02 = 3)	4 K	
29	H-GEN forced discharge	Off no function 1 Into DHW tank 2 Into heating circuits 3 Discharge in buffer tank	OFF	
30*	OEM maximum temperature limit	Minimum temperature limit ... 110 °C	95°C	
31*	Minimal load control (only with OT-Devices)	OFF, 0,5 ... 10 min.	OFF	
34**	Heating power limiting	50 … 100%	100%	
35**	Load limit DHW	50 … 100%	100%	
37	Operating hours counter	OFF AUTO 1 feedback only 2 free counter	AUTO	
RESET ST-1	Reset oper. hours / starts stage 1	SET		
RESET ST-2	Reset oper. hours / starts stage 2	SET		

* only OEM

** Settings available depend up the type of intelligent boiler control or are preset according to the limit values of the boiler control system.

5.6.6 Raising Return Temperature Level

Parameter	Designation	Setting range / Setting values	Factory settings	Settings
01	Minimum return flow limitation / return flow setpoint	10 ... 95 °C	20°C	
02	Switch-off differential pump	1 ... 20 K (only if return pump in operation)	2 K	
03	Extended pump run time	0 ... 60 min. (only if RP in operation)	1 min.	

5.6.7 Solar level (Type.. VV ..)

Parameter	Designation	Setting range / Setting values	Factory settings	Settings
01	Switch-on difference	(Switch-off difference + 3 K) ... 30 K	10 K	
02	Switch-off difference	2 K ... (Switch-on difference - 3 K)	5 K	
03	Minimum run time SOP	0 ... 60 min.	3 min.	
04	Maximum temperature limit of solar panel	70 ... 210 °C	120°C	
05	Solar tank maximum limit	20 ... 110 °C	75°C	
06	Solar operating mode	1 Priority mode 2 Parallel mode 3 Priority mode DHW (setpoint control) 4 Priority mode buffer (setpoint control)	2	
07	Time lock heat generator	OFF, 0.5 ... 24 h (Only in priority mode - Parameter 6 = 1, 3, 4)	OFF	
08	Sol. Prior./parallel mode	OFF, 1 ... 30 K only in priority mode and act. time lock)	OFF	
09	Solar energy balance	OFF no heat balance 1 Balance via flow calculation 2 Balance via pulse processing	OFF	
RESET SOLAR	Reset solar energy balance	SET by pushing the rotary push-button (only if solar heat balance is enabled)		
11	Volume flow	0.0 ... 30 l/min or l/impulse (only if solar heat balance is enabled)	0,0 l/min. 0,0 l/Impulse	
12	Fluid density	0.8 ... 1.2 kg/l (only if solar heat balance is enabled)	1,05	
13	Fluid heat capacity	2,0 ... 5,0 KJ/kg K (only bei aktivierter Solar Wärmebilanz)	3,6	
14	Finally switch-off temperature	OFF, 90 ... 210°C	150°C	
15	Test cycle solar load switch	1 … 60 min.	10 min.	
16	Switch-over temperature	20 ... 110°C	75°C	

5.6.8 Solid Fuel level (Type.. VV ..)

Parameter	Designation	Setting range / Setting values	Factory settings	Settings
01	Minimum temperature	20 ... 80 °C	60°C	
02	Maximum temperature	30 ... 100 °C	90°C	
03	Switch-on difference	(Switch-off difference + 3K) ... 20 K	10 K	
04	Switch-off difference	2 K ... (Switch-on difference - 3K)	5 K	
05	Time lock heat generator	OFF, 2 ... 180 min.	OFF	

5.6.9 Buffer level

Parameter	Designation	Setting range / Setting values	Factory settings	Settings
01	Minimum temperature buffer	5 °C ... Maximum temperature buffer	20°C	
02	Maximum temperature buffer	Minimum temperature buffer... 95 °C	80°C	
03	Temperature increase H-GEN	-10 … 80 K	8 K	
04	Switching differential	1 ... 70 K	2 K	
05	Forced discharge	OFF 1 Into DHW tank 2 Into heating circuits	OFF	
06	Drain function switch-on differential	(Switch-off difference + 2 K) ... 30 K	10 K	
07	Drain function switch-off differential	OFF (Switch-off difference + 2 K) ... 50 K	5 K	
08	Buffer start-up protection	OFF no start-up protection ON Start-up protection active	ON	
09	Buffer discharge protection	OFF no discharge protection ON Discharge protection enabled	ON	
10	Buffer operating mode	1 Charging control for HC and DHW 2 Charging control for HC without DHW 3 Discharging control for HC and DHW 4 Discharging control HC without DHW 5 Charging control (change over to DHW) 6 Discharging control (to heat generator)	1	
11	Buffer loading pump extended run time	0 … 60 min.	3 min.	

5.6.10 Summation flow control level

Parameter	Designation	Setting range / Setting values	Factory settings	Settings
01	P-band Xp SFS control	0,0 … 50,0 %/K	5 %/K	
02	Sample time Ta SFS control	1 … 600 sec.	20 sec.	
03	I-band Tn SFS control	1 … 600 sec.	180 sec.	

5.6.11 Cascade level

Parameter	Designation	Setting range / Setting values	Factory settings	Settings
01	Switching differential	0,5 ... 30.0 K	8 K	
02	Switch-on delay	0 ... 200 min.	0 min.	
03	Switch-off delay	0 ... 60 min.	0 min.	
04	Switch-over power stage sequence	10 … 100%	65%	
05	Reversing	OFF, 1 ... 250 h	OFF	
06	Leading stage	1 ... n (switchable stages))	1	
07	Peak load boiler from address...	OFF, 2 ... (max. stages) all heat generators in cascade numbered	OFF	
08	Changeover basis power at group formation	OFF no changeover ON changeover	OFF	
09	DHW quick activation	OFF 1 ... maximum number of stages	OFF	

5.6.12 Bus level

Parameter	Designation	Setting range / Setting values	Factory settings	Settings
01	Bus address basic unit	10, 20, 30, 40, 50	10	
02	Bus access room unit HC	1 Advanced access (owner status) 2 Simple access (Tenant status)	2	
03	Bus access room unit MC1	1 Advanced access (owner status) 2 Simple access (Tenant status)	2	
04	Bus access room unit MC2	1 Advanced access (owner status) 2 Simple access (Tenant status)	2	

5.6.13 Relay test level

Parameter	Designation	Setting range / Setting values	Factory settings	Settings
01	Heat generator test	Different relay sequence according to type of boiler (1- or 2-stage)		
02	Direct heating circuit pump test	OFF – ON – OFF - ...		
03	Mixing circuit pump 1 test	OFF – ON – OFF - ...		
04	Mixer actuator 1 test	STOP – OPEN – STOP – CLOSED – STOP - ...		
05	Mixing circuit pump 2 test	OFF – ON – OFF - ...		
06	Mixer actuator 2 test	STOP – OPEN – STOP – CLOSED – STOP - ...		
07	DHW charging pump test	OFF – ON – OFF - ...		
08	Variable output 1 test	OFF – ON – OFF - ...		
09	Variable output 2 test	OFF – ON – OFF - ...		

5.6.14 Alarm level

Parameter	Designation	Setting range / Setting values	Factory settings	Settings
01	Alarm message 1	Last alarm message		
02	Alarm message 2	Next to last alarm message		
	…	…		
20	Alarm message 20	First alarm message		
PARA RESET*	Resets the error message memory			

* only OEM

5.6.15 Alarm level 2 (Type..C..)**

Parameter	Designation	Setting range / Setting values	Factory settings	Settings
01	Alarm message 1	Last alarm message		
02	Alarm message 2	Next to last alarm message		
	…	…		
20	Alarm message 20	First alarm message		
PARA RESET*	Resets the error message memory			

* only OEM

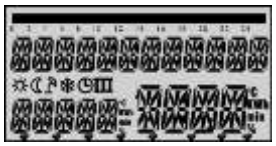
**only in connection with H-GEN interface and SYSTEM parameter 28=ON

5.6.16 Sensor calibration level

Parameter	Designation	Setting range / Setting values	Factory settings	Settings
01	Calibration outdoor sensor	- 5 K ... + 5 K		
02	Calibration H-GEN	- 5 K ... + 5 K		
03	Calibration DHW-Sensor	- 5 K ... + 5 K		
04	Calibration flow sensor 1	- 5 K ... + 5 K		
05	Calibration flow sensor 2	- 5 K ... + 5 K		
06	Calibration solar-panel sensor	- 5 K ... + 5 K		
07	Calibration solar-buffer sensor	- 5 K ... + 5 K		
08	Calibration variable input 1	- 5 K ... + 5 K		
09	Calibration variable input 1	- 5 K ... + 5 K		
10	Calibration variable input 3	- 5 K ... + 5 K		

6 General functions

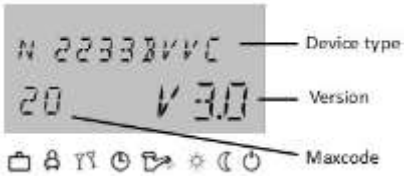
6.1 Starting up



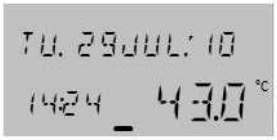
During the first switch-on of the control unit or at return of voltage after power failure all available display segments will appear for 3 seconds.

Next, the desired language (DE, GB, FR, IT, NL, ES, PT, HU, CZ, PL, RO, RU, TR, SE, NE, BG) can be selected.

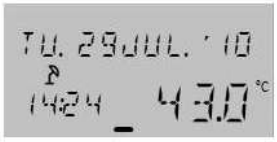
The display appears in the start-up phase only on the day of initial operation or after the controller settings have been reset.



The device model with the current software version number will then appear.



Provided that there is not any error message, the basic display with date, time and current boiler temperature will appear in the display.



An active summer switch-off is represented by a sunshade symbol .

With acting frost protection function an ice crystal symbol appears in the display .

6.2 Controller configuration

6.2.1 Complete reset

To reset all settings, the device can be reset completely.

Press the key , , and together until the controller boots again.

Reset is performed according to the previously activated release authorization

- Without code (reset of operator level parameters)
- HF code (reset of operator and expert level parameters)
- OEM code (reset of operator, expert and OEM level parameters)

6.2.2 Basic settings and parameter preselection

ATTENTION The setting options described below affect the operation. After the adaptation, the end user must be informed about the changed operation.

6.2.2.1 Switching Time Program Enabling

Description

This controller family has three separate switching time programs for each heating circuit. When supplied, only one switching time program is enabled. The use of only a single switching time program for a wide range of applications makes it possible to simplify operating.

Operation

Note on operation	Menu / Parameter tree	Parameter
Time programming	TIMERPROGRAMS	
Enabling separate programs	SYSTEM	PROGRAM

6.2.2.2 Suppressing the cycle temperature on Time program level

When programming switching times, the specialist can set a system parameter to suppress the cycle temperature.

Function

If the setting is "ON", the operation is not changed. If the setting is "OFF", the following reaction occurs:

- All cycle temperatures are suppressed during switching time programming
- Any offset will not affect the set temperature to be corrected
- All connected room devices react identically to parameter changes in the central device

Operation

Note on operation	Menu / Parameter tree	Parameter
Time program cycle temperature	SYSTEM	Parameter 18

6.2.2.3 Enabling separate operating modes and temperature changes

Description

In order to make the operation as easy as possible for most of the applications, a common control mode is set for all heating circuits when supplied. For those rare cases in which separate control modes are necessary (e.g. in case of separate control mode selection for tenants and landlords) it must be enabled by means of the "Control Mode" parameter in the "System" menu.

Function

The operating mode parameter affects the

- **Operating mode selected with the operating mode key**
- **Daytime temperature selected with the temperature selection key**
- **Night-time temperature selected with the temperature selection key**

concerning the effect on the different heating circuits.

Operation

Note on operation	Key/ Parameter tree	Parameter
Effect on operating mode selection		
Effect on daytime temperature selection		
Effect on night-time temperature selection		
Enabling separate settings	SYSTEM	CONTROL MODE

6.2.2.4 Variable adaptation of hydraulic parameters (variable inputs and outputs)

The hydraulic settings preselected via the parameter hydraulic selection for the variable inputs and outputs can be adapted individually. To this end, the preselected hydraulic parameters can be changed individually.

ATTENTION

The plant is defined by the hydraulic parameter. Change can have profound effects on the operation of the controller. Preselected parameter settings can be lost at other locations.

Therefore, individual adaptations must be carried out carefully!

Description

Only the inputs and outputs that are actually available on the controller are available for settings in the Hydraulics level.

The function of the corresponding output is determined by the settings of the hydraulic parameter.

A function can only be operated if the corresponding function is also available hydraulically.

Example

PARAMETER 05 determines the output for the direct circuit pump. The factory presetting for this output is HC.

If this output is assigned to the function "circulation pump", the function HC is no longer available.

The **operation of a function** is only possible, if the corresponding function is also available hydraulically.

Example

The parameters for the circulation pump function settings are only accessible after, for example, the ‘Circulation pump’ function has been assigned to output HC or VO-1 or VO-2. If a variable function requires an input value (sensor), this sensor must be assigned to the corresponding variable input (VO-1 to VI-1 or VO-2 to VI-2). This input is then no longer available for adjustment.

However, if individual settings have been made for the associated input beforehand, a setting that requires an input value (sensor) cannot be selected on VO-1 or VO-2.

Example

An outdoor sensor 2 has been assigned to variable input 1. The function 'Buffer charging pump' is now to be assigned to variable output 1. However, this is not possible; the corresponding settings are skipped. The variable output can only be assigned functions that do not require an input value (sensor) (e.g. ZKP, ZUP, KP, SMA, PWF, PP).

To avoid this conflict, the OS-2 should be registered on the VI-3.

Connections and settings table:

No.	Function	Adjustable at Output	Inputs		Notes
			Assigned permanently	Optional (VI1,2,3)	
1	DHW charging	DHW-P	DHWS	---	Fixed sensor input
2	Direct circuit, weather controlled	HC-P, MC1, MC2	---	---	
3	Mixed circuit, weather controlled	MC1, MC2	VF1, VF2	---	Fixed sensor input for corresponding mixed circuit
4	DHW circulation pump	DHW-P HC-P, VO1, VO2	---	---	
5	DHW electrical heating element	DHW-P, HC-P, VO1, VO2	---	---	
6	Constant control	HC-P, MC1, MC2	VF1, VF2	---	Sensor at connection to MC
7	Fixed value control	MC1, MC2	VF1, VF2	---	Sensor at connection to MC
8	Raising return temp.	MC1, MC2	VF1, VF2	---	
9	Return pump (Type..VV..)	VO1, VO2	RS	---	
10	Feed pump	HC-P, VO1, VO2	---	---	
11	Boiler circuit pump 1	HC-P, VO1, VO2	---	---	
12	Boiler circuit pump 2	HC-P, VO1, VO2	---	---	
13	Alarm output	HC-P, VO1, VO2	---	---	
14	Timer	HC-P	---	---	
15	Solar charging pump (Type..VV..)	HC-P, VO1, VO2	SPFS, SPBU	SPRS (14)	Return flow sensor option
16	Buffer charging pump (Type..VV..)	VO1, VO2	BU	BU1	If BULP is set, BU is assigned to VI permanently. Otherwise, BU1 can be set at a free VI (activation of buffer management)
17	Solid fuel boiler pump (Type..VV..)	VO1, VO2	BOSF	BUSF	BOSF fixed on corresponding VI, standard buffer sensor is SBUS, own solid fuel buffer sensor BUSF can be configured (option)
19	Solar charge valve (Type..VV..)	VO1, VO2	SSLS	---	SSLS in DHW tank, SBUS in buffer. Only when solar is activated.
20	Solar forced heat removal (Type..VV..)	VO1, VO2	---	---	Only when solar is activated.

No.	Function	Adjustable at Output	Inputs		Notes
			Assigned permanently	Optional (VI1,2,3)	
21	Parallel H-GEN release	HC-P, VO1, VO2	---	---	
26	Primary pump	VO1, VO2	---	---	
27	Hydraulic buffer release	HC-P, VO1, VO2	---	---	

Operation

Note on operation	Menu / Parameter tree	Parameter
Function of DHW charging pump	HYDRAULIC	PARAMETER 02
Function Mixed circuit 1	HYDRAULIC	PARAMETER 03
Function Mixed circuit 2	HYDRAULIC	PARAMETER 04
Function Direct circuit pump	HYDRAULIC	PARAMETER 05
Function variable Output 1	HYDRAULIC	PARAMETER 06
Function variable Output 2	HYDRAULIC	PARAMETER 07
Function variable Input 1	HYDRAULIC	PARAMETER 08
Function variable Input 2	HYDRAULIC	PARAMETER 09
Function variable Input 3	HYDRAULIC	PARAMETER 10

6.2.2.5 Temperature display in Fahrenheit

Apart from the °C (Celsius) temperature scale, the °F (Fahrenheit) scale is common in the UK and North America. The conversion formula is:

T [°F] = (T [°C] * 9 / 5) +32

Every device in the control system can be switched separately to temperature display in °F.
The control system as such continues to operate in °C. The conversion to °F only acts on the displayed temperatures.
The temperature display is in full degrees only (no decimals).

Operation

Note on operation	Menu / Parameter tree	Parameter
Activate Fahrenheit display	SYSTEM	PARAMETER 18

6.2.2.6 Controller type code (OEM)

Function

The controller series THETA offers the option of reducing the scope of service of the supplied device. The scope of service set in the factory is based on the controller type (see overview on page 1).

The setting options in the following table are accessible via a parameter. After the functionality is reduced, the controller functions according to the set controller type designation.

After the type code is changed, the central unit is reset automatically. Subsequently, the device functions according to the changed type code.

Example

Controller THETA NORM 2233BVVC-OT

The controller has outputs and inputs for a two-stage or a condensing boiler with OpenTherm interface (..22.. and ..C..), two mixing circuits (..33..), hot water heating circuit (..B..) and inputs and outputs for variable functions (..VV..).

The following type codes can be set on the basis of this "hardware":

1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22

Operation

Note on operation	Menu / Parameter tree	Parameter
Type code	SYSTEM	Parameter 16

	Meaning	C/C-OT	VI1	VI2	VI3	H-GEN ST-2	H-GEN ST-1	HC-P	MC1	MC2	DHW-P	VO1	VO2
Typ Code	Device Type												
1	2B		X				X	X			X		
2	23B		X				X	X	X		X		
3	233B		X				X	X	X	X	X		
4	223B		X			X	X	X	X		X		
5	2233B		X			X	X	X	X	X	X		
6	2BC/C-OT	X	X				X	X			X		
7	23BC/C-OT	X	X				X	X	X		X		
8	233BC/C-OT	X	X				X	X	X	X	X		
9	223BC/C-OT	X	X			X	X	X	X		X		
10	2233BC/C-OT	X	X			X	X	X	X	X	X		
11	2BVV		X	X	X		X	X			X	X	X
12	23BVV		X	X	X		X	X	X		X	X	X
13	233BVV		X	X	X		X	X	X	X	X	X	X
14	223BVV		X	X	X	X	X	X	X		X	X	X
15	2233BVV		X	X	X	X	X	X	X	X	X	X	X
16	2BVVC/C-OT	X	X	X	X		X	X			X	X	X
17	23BVVC/C-OT	X	X	X	X		X	X	X		X	X	X
18	233BVVC/C-OT	X	X	X	X		X	X	X	X	X	X	X
19	223BVVC/C-OT	X	X	X	X	X	X	X	X		X	X	X

	Meaning	C/C-OT	VI1	VI2	VI3	H-GEN ST-2	H-GEN ST-1	HC-P	MC1	MC2	DHW-P	VO1	VO2
20	2233BVVC/C-OT	X	X	X	X	X	X	X	X	X	X	X	X
21	3		X						X				
22	33		x						X	X			

7 General controller functions

7.1 Outside Temperature Measurement

7.1.1 Determination of long-time value and mean value

Function

Three values are used to calculate the effect of the outside temperature on the heating behavior of the plant.

Current outside temperature:

Value of sensor at time of measurement

Long-time value outside temperature:

- It is required for summer switch-off and for mean value
- Is the mean value of the outside temperature during the time period set for the building type
- Every 20 minutes, a new, current value is entered into the mean value calculation

Mean value outside temperature:

- Is required for the calculation of the required flow temperature of the heating circuits
- Is the mathematical mean value of the current outside temperature and the long-time value

7.1.2 Building type

Function

This parameter considers the building type by adapting the calculation of the outside temperature mean value according to the setting.

Light construction

The mean value is obtained over a period of 6 hours.

Application: *wooden houses, lightweight brick buildings*

Medium construction

The mean value is obtained over a period of 24 hours.

Application: *medium-weight masonry with hollow blocks or bricks*

Heavy construction

The mean value is obtained over a period of 72 hours.

Application: *heavy masonry in tuff or natural stone*

Operation

Note on operation	Menu / Parameter tree	Parameter
Setting building type	SYSTEM	Parameter 10

7.1.3 Outdoor temperature assignment heating circuit / outdoor sensor 2

Function

If a second outdoor sensor (OS2) is connected to a vari-able input in the central unit, the heating circuit can be assigned either to external sensor 1, 2 or to the mean value of both sensors.

The following applies to each external sensor:

In case of a defect of one of the sensors, there is an automatic switchover to the remaining outdoor sensor and a simultaneous malfunction message. In case of a defect affecting both sensors, the heating circuit is regulated on the basis of a set heating curve and heating program corresponding to a fictitious external temperature of 0 °C with regard to the set minimum temperature.

Operation

Note on operation	Menu / Parameter tree	Parameter
Set to AF 2	HYDRAULIC	PARAMETER 08 or PARAMETER 09 or PARAMETER 10
Assignment direct circuit	HYDRAULIC	PARAMETER 10
Assignment mixed circuit 1	HYDRAULIC	PARAMETER 10
Assignment mixed circuit 2	HYDRAULIC	PARAMETER 10

7.1.4 Alternative connection of the outdoor sensor to the boiler control (..C..) / (..C-OT..)

Function

Condensing boilers with boiler controls have a connection for an outdoor sensor. For more information, see "Features of fuel value heat generator via data bus (..C..)".

7.2 Climate zone

Function

The climate zone is the coldest outside temperature value to be expected.

For the heat demand coverage, this value is used as the basis for the design of the heating system.

This parameter defines the corresponding steepness value of the heating curve of the heating circuit with regard to the set climate zone.

Operation

Note on operation	Menu / Parameter tree	Parameter
Set climate zone	SYSTEM	PARAMETER 09

7.3 Summer switch-off

Note

This function is only effective in operating mode Automatic.

Function

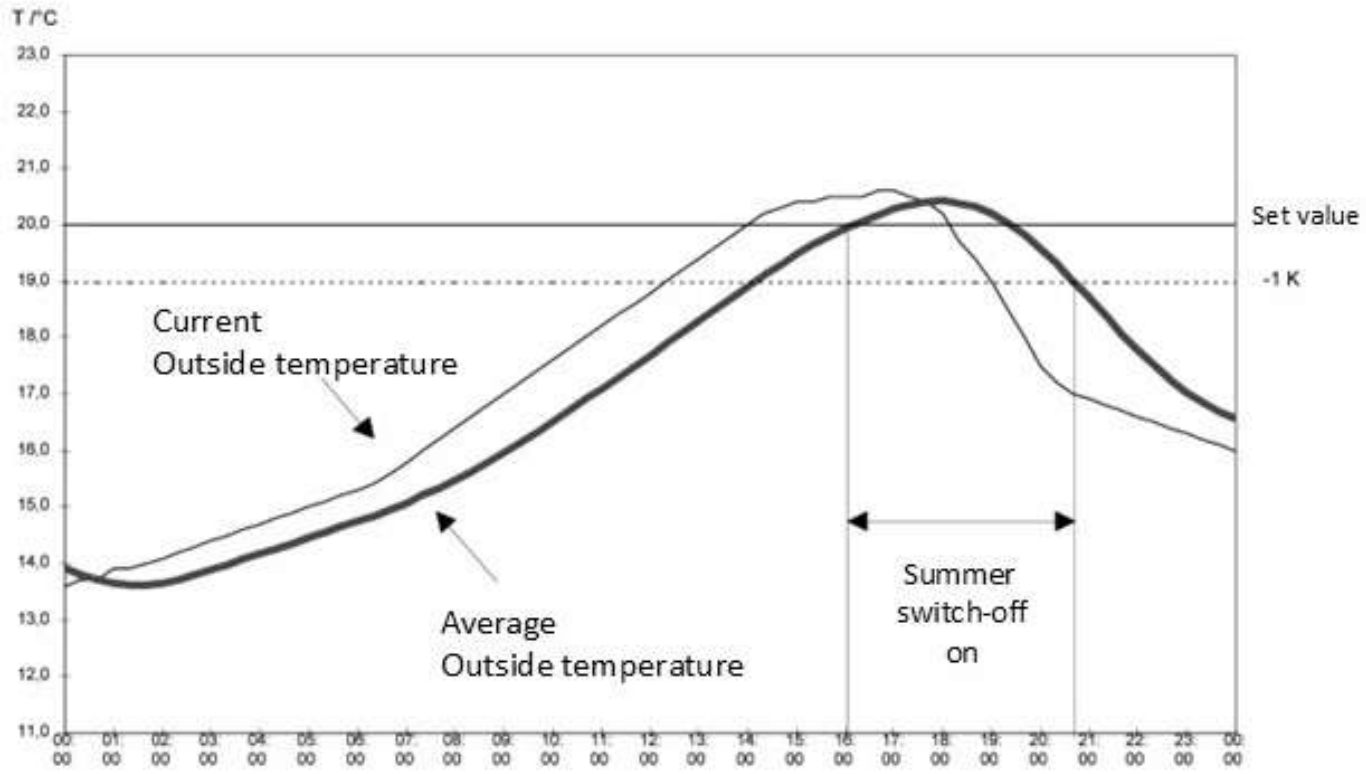
Switches off the heating operation at outside temperatures above the set outside temperature.

Switch-off

- if the long-term outdoor temperature value (made up of the current OT+ mean OT and building type) exceeds the setting value.

Deactivating the switch-off

- if the long-term outdoor temperature value (made up of the current OT+ mean OT and building type) exceeds the setting value by 1K.
- in case of an outdoor sensor fault
- when frost protection is active



Note

The HEATING LIMIT parameter can be used to assist the summer switch-off function during the transitional seasons (see selection levels direct circuit, mixed circuit 1 or mixed circuit 2 - Parameter 7). This function allows setting non-heating periods on warm days during the transitional seasons for each individual heating circuit.

Note

In conjunction with a 2nd outdoor sensor, in accordance with the outdoor sensor assignment, the following summer switch-off is in place:

HC parameter 10 = 0

- Switch-off is performed when on both OS the long-term outdoor temperature exceeds the setting value.
- Switch-off is deactivated when the long-term outdoor temperature value on both OS drops below the setting value by 1 K.

HC parameter 10 = 1

- Switch-off is performed when on OS1 the long-term outdoor temperature value exceeds the setting value.
- The switch-off is deactivated when the long-term outdoor temperature value on OS1 drops below the setting value by 1 K.

HC parameter 10 = 2

- Switch-off is performed when on OS2 the long-term outdoor temperature value exceeds the setting value.
- The switch-off is deactivated when the long-term outdoor temperature value on **OS2** drops below the setting value by 1 K.

When the summer switch-off mode is active, it is indicated on the basic display by a sunshade symbol. If two outdoor sensors are connected and these are assigned to different heating circuits, the symbol is only displayed if both sensors fulfil the conditions for summer switch-off.

Operation

Note on operation	Menu / Parameter tree	Parameter
Setting limit temperature	SYSTEM	SUMMER

7.4 System Frost Protection

Function

To keep the heating system from freezing in switch-off mode, the controller is equipped with electronic frost protection.

Operation without Room Temperature Measurement

If the outside temperature (current value) drops below the set limit, the heat-ing is turned on again. The heating is interrupted if the outside temperature exceeds the set limit by 1 K.

Operation with Room Temperature Measurement

If the room temperature is above the room setpoint, the heating circuit pumps activate at outside temperatures below the set freezing limit. In operating modes STANDBY and HOLIDAY, the mixed circuits regulate the respective minimum heating circuit temperature.

In all other operating modes, regulation is performed in line with OS and room temperature.

When operating using an active RS, room frost protection is also active.

Frost protection function in the event of a heat generator malfunction

In the event of a system-related fault message 30-3 or 31-3 (e.g. burner(s) not switching on due to lack of fuel or a faulty burner), priority pump shut-off functions such as boiler start-up protection, hot water priority, etc. are disabled when frost protection is active. The heating water circulating in the heating circuits assumes the average of all room temperatures and reduces or delays freezing.

Note

If not, every heating circuit is operated with room temperature measurement, different frost protection functions can be assigned to the individual heating circuits. If, for example, a mixed circuit is operated with room temperature measurement and the boiler heating circuit is not, the latter's heating curve and room temperature setpoint are to be set as low as possible.
In connection with a 2nd outdoor sensor, the frost protection function is activated, as soon as one of the two outside temperatures drops below the frost protection limit.
In case of a faulty outdoor sensor, the frost protection is constantly activated.

Note

In conjunction with a room sensor, the thermostat function is not active when frost protection is active.

7.4.1 Cycle Operation

Function

The frost protection function is activated as soon as the temperature drops below the set frost protection limit (SYSTEM-PARAMETER 5), in the same way as before. The frost protection function becomes effective when frost protection is active and there is no request from the heating circuit.

In contrast to continuous operation, however, the frost protection setting "Cycle operation" does not place a continuous demand on the heat generator.

With active system frost protection, the heating circuit pumps are switched on and the mixer valves closed.

As long as the measured flow temperature of the mixed circuits or the heat generator temperature in the direct heating circuit, respectively, does not drop below the current set room temperature (RTFrost or RTNight), no demand value is sent to the heat generator.

When the flow temperature drops below the set value, heating is activated.

Once the set flow temperature has reached the set room temperature and the set time (SYSTEM-PARAMETER 19) has expired, the demand value to the heat generator is retracted and the mixer valves closes while the pumps continue operation.

If no measurements are detected from the outdoor sensor (e.g. because the sensor is defective), only the pumps are switched on while heating is disabled.

The set minimum and maximum limits are taken into account in heating operation.

When the heat generator is activated, the set start-up protection conditions of the heat generator are applied. This means that the heating circuit pumps may be switched off temporarily.

Operation

Note on operation	Menu / Parameter tree	Parameter
System frost protection	SYSTEM	PARAMETER 05
Frost protection cycle operation	SYSTEM	PARAMETER 19

7.5 Pump and mix valve forced operation (Anti-blocking protection)

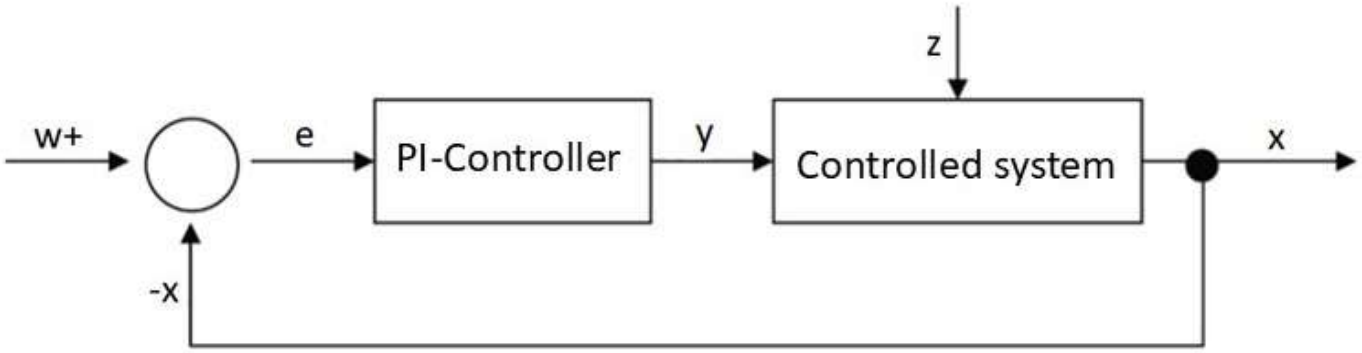
Function

With this function activated all the pumps are switched on every day for approx. 20 seconds to protect against blocking owing to corrosion in case of long switch-off periods (> 24h) and the mixers are opened temporarily during this period. This is the case during summer switch off, for example. The pump and mix valve forced operation is performed 24h after the last deactivation.

Operation

Note on operation	Menu / Parameter tree	Parameter
Activation forced pump operation	SYSTEM	PARAMETER 12

7.6 PI control algorithm



Function	**PI controller:**	Is the section of the control circuit which performs the corrective measures for regulating, taking into account the dynamic properties of the controlled system from the deviation.
	Setpoint w:	Preset value at which the control variable is to be held by the controller. It is an external variable which cannot be influenced by the controller.
	Actual value x:	Is the output variable from the controlled system, which is recorded for regulating and fed back for comparison.
	Control deviation e:	Difference between setpoint variable and actual variable e = w-x, forms the actual input variable for the controller.
	Control variable y:	Output variable of the controller and also the input variable of the controlled system. It transfers the controlling effect of the controller to the system.
	Disturbance variable z:	An external variable which causes the actual value of the control variable to change and triggers a control procedure.

The controller is a combination of a P controller and an I controller. The P band (proportional band Xp) has an immediate reaction to an abrupt changed to the difference between the setpoint value and the actual value. The I band is for exact regulation of the setpoint value and actual value.

Parameterisation:

There are three influential parameters for the PI controller:

- Xp = proportional band of the controller
- Ta = sample time of the controller
- Tn = adjustment time of the controller

The proportional band of the PI control algorithm is set directly by the Xp.

The integral band is a result of the ratio Ki=Xp *Ta/Tn (Ki = Integral band).

8 Hydraulic components and their functions

8.1 Heat Generator: Boiler

8.1.1 Heat Generator Start-up Protection (..2.., ..22.., ..C.., ..C-OT..)

Start-up protection prevents the deposit of condensate during heating up.

Function

There are three different modes of start-up protection that can be set:

Start-protection to K min. **Unlimited start-up protection**

When the temperature in the heat generator drops to 2 K below the set minimum limit, all heating circuits are separated, at the water side, from the heat generator (pumps off, mixing valves closed) to pass through the dew point as quickly as possible. The heating circuits are enabled as soon as the temperature in the heat generator has reached the minimum limit plus half of the burner switching differential 1.

Start-protection to HC setpoint **Weather-dependent start-up protection**

The heating-up characteristic is the same as for unlimited start-up protection, meaning the heat generator remains in operation until the set minimum temperature plus half of burner switching differential is crossed. Below the minimum temperature the pumps remain switched off and the mixing valves closed.

Once the heat generator has been switched off, the start-up protection becomes active again only when the boiler temperature drops below the weather-responsive demand value (acc. to heating curve setting).

The subsequent heating-up follows the same scheme as for unlimited start-up protection.

Separate start-up protection for H-GEN and heating circuits

This function separates the temperatures for switching on the burner and switching off the heating circuits when the boiler minimum temperature limit is reached.

After parameterization, two additional parameters are available in the H-GEN menu for setting the HC start-up protection temperature and SD.

Operation

Note on operation	Menu / Parameter tree	Parameter
Activation of start-up protection	HEAT GENER	PARAMETER 02
Start-protection HC deactivation	HEAT GENER	PARAMETER 27
Start-Protection HC SD	HEAT GENER	PARAMETER 28a

8.1.2 Heat Generator Minimum Temperature Limit (..2.., ..22.., ..C.., ..C-OT..)

Function

In order to protect the heat generator against aggressive condensate the minimum temperature limit documented by the manufacturer of the heat generator is to be set.

The heat generator switches on when the temperature falls below the set value, while it switches off when the set value plus the burner switching differential is exceeded. During heating the limit temperature will be maintained.

This setting is used only for the reaction of the heat generator (burner) to reaching the set minimum temperature (*BTmin H-GEN*). The function for the H-GEN remains unchanged.

The mode of operation of the set limit is defined via the heat generator parameter "H-GEN start-up protection".

There are three different modes of operation for the minimum temperature limit:

Minimum temperature limit at heat requirement (Settings = 1):

If there is no demand from the heating or DHW, the boiler will be switched off. The minimum limit is deactivated. If the temperature in the heat generator drops below the heat generator frost protection temperature of +5°C, the burner will be switched on and the heat generator is heated to the minimum temperature limit.

Conditional minimum limit (Settings = 2):

The boiler minimum temperature serves as the lower limit value and is also maintained without demand. The boiler is only switched off when summer switch-off is activated.

Permanent minimum limit (Settings = 3):

The boiler temperature is limited according to the set minimum temperature regardless of the demand or the switched off operating mode.

Operation

Note on operation	Menu / Parameter tree	Parameter
Setting minimum temperature	HEAT GENER.	PARAMETER 03
Function minimum temperature limit	HEAT GENER.	PARAMETER 05

8.1.3 Heat circuits minimum temperature limit

If the boiler temperature *BTact* <= parameter 27 (*BTmin HC*) the heating circuit pumps (HC-P, DHW-P, MC-P) are switched off. The mixer valves are closed.

If *BTact* > *BT*min-*HC* + SDmin-*HC* (H-GEN parameter 28) the heating circuit pumps and mixer valves are enabled again.

8.1.4 Heat Generator Maximum Temperature Limit (..2.., ..22.., ..C.., ..C-OT..)

Function

In order to protect the heat generator against overheating, the controller is equipped with an electronic maximum temperature limit. It shuts off the burner if the temperature in the heat generator exceeds the limit value.

The burner is switched on again if the temperature in the heat generator falls below the limit value by half of the burner switching differential 1 plus a reserve of 2 K below the set limit value.

The setting range, which can be set by the installer, can be limited by an extra parameter (maximum top limit).

Operation

Note on operation	Menu / Parameter tree	Parameter
Setting maximum temperature	HEAT GENER.	PARAMETER 04
Maximum temperature limit	HEAT GENER.	PARAMETER 30

8.1.5 Heat Generator Sensor Mode (..2.., ..22..)

Function

There are various ways in which the heat generator can react to a malfunction of the H-GEN sensor:

Burner switch-off in case of a faulty H-GEN sensor (Settings = 1)

A message appears in case of a short circuit or the break of the sensor; the burner will be switched off.

External Burner switch off (Settings = 2)

In case of the interruption of the sensor the burner is switched off without a malfunction message. Application for example as external burner switch-off or enabling in case of the interruption of the H-GEN sensor.

Note

Only Ag (hard silver), Au (gold) or Ni (nickel) are to be used for the contacts.
In case of a sensor short circuit a relevant malfunction message appears and the burner is blocked.

Function

Burner enabling in case of a faulty H-GEN sensor (Settings = 3)
A message appears in case of a short circuit or the break of the sensor and the burner is enabled without limitations.
The control of the heat generator is carried out only manually by means of the mechanical boiler temperature controller (boiler thermostat) on the boiler panel according to the set value.

ATTENTION

Activating this setting is only permitted if an electromechanics boiler temperature controller is in series with the burner phase and the boiler temperature is limited by this BTC. Otherwise, there is the danger of boiler overheating.

Operation

Note on operation	Menu / Parameter tree	Parameter
Select sensor mode	HEAT GENER.	PARAMETER 06

8.1.6 Minimum Burner Run Time (..2.., ..22..)

Function

This function extends the burner run times and reduces the standby losses. After starting the burner, at least the set time must lapse before the burner is deactivated again.

Note

If the temperature in the heat generator exceeds the set H-GEN maximum temperature limit, the minimum burner run time is stopped and the burner is switched off in advance.

Operation

Note on operation	Menu / Parameter tree	Parameter
Setting minimum burner run time	HEAT GENER.	PARAMETER 07

8.1.7 Multi-stage Heat Generators / Switching Differential (..2.., ..22..)

Function

The controller is provided with two separately settable switching differentials related to the same setpoint.

Switching Differential I

Switching differential, I controls the required heat generator temperature according to the demand by switching on and off the required stage for the current heat demand within the set value. The switch-on and switch-off is carried out symmetrically to the setpoint with half the value of the switching differential.

Switching differential II

Switching differential II determines how many stages are necessary to cover the current demand (partial load - stage I, full load - stage II). This switching differential is superimposed symmetrically to switching differential I and must always be set at a higher value.

Note

This setting is overlapped by the cascade setting during cascade mode and is not available.

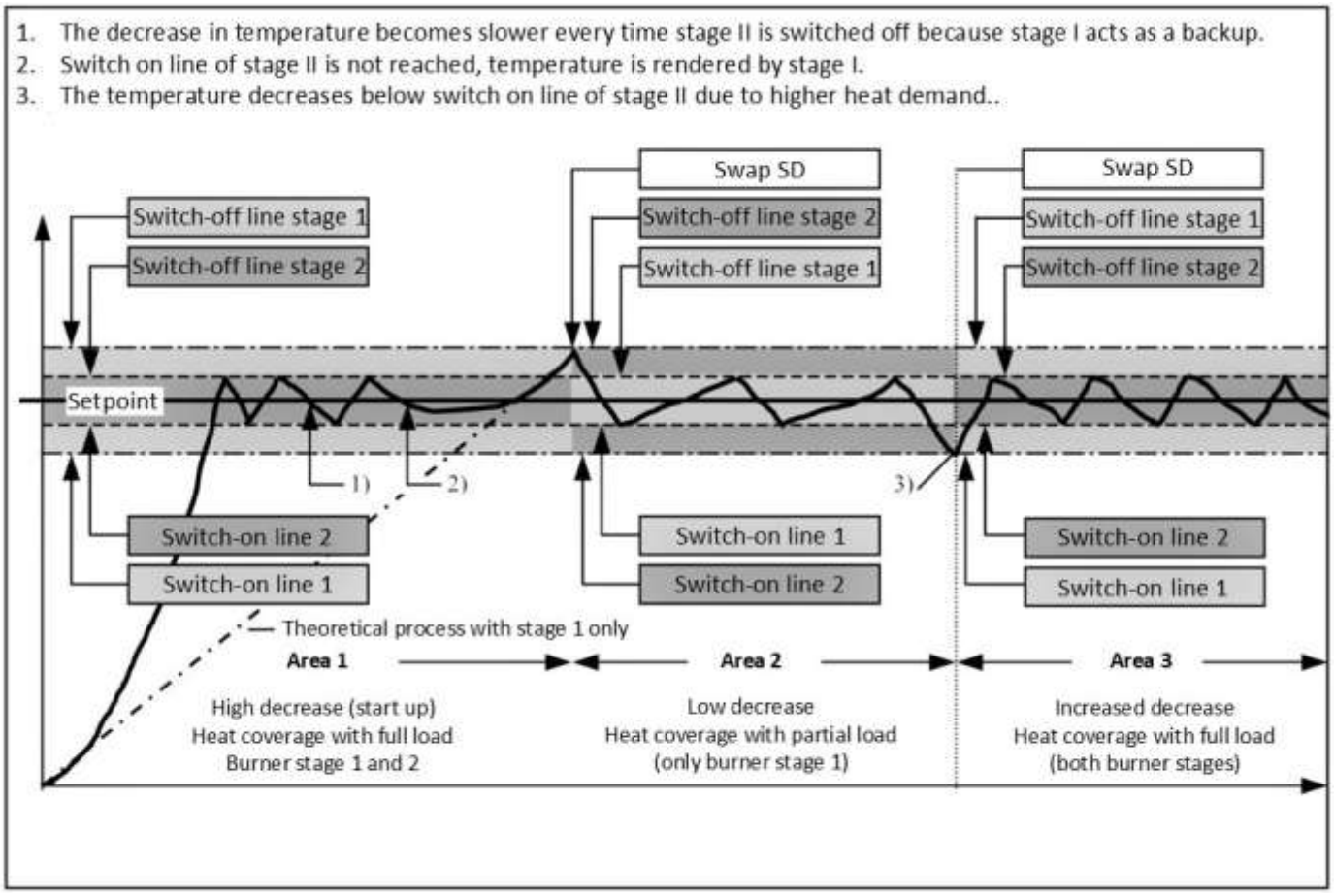
Function switching differential II

- If the H-GEN temperature is lower than switching differential II, stage I is switched on immediately. The enabling of stage II occurs after the time delay stage II.
- If the heat generator temperature reaches the required set point plus half the value of switching differential I, stage II is switched off.
- If the heat generator temperature is lower than the required set point minus half the value of switching differential I, stage II is switched on again.
- If the heat generator temperature exceeds the required set point plus half the value of switching differential I, stage II is switched off.

Cooperation in 2-stage heat generators:

As long as one stage can cover the heat demand (stage II is off), stage I is switched according to switching differential I.

As soon as the second stage is needed for covering the heat demand, switching differential I switches stage II on and off and switching differential II switches stage I on and off.



Time delay stage 2 *(..22..)*

The enabling of stage II (full load stage) is determined not only by the switching differentials, but also by a time delay. This measure blocks the second stage within the set time and hence provides for a longer stage I run time. This function is active only during the start-up phase (i.e. during simultaneous request of both stages). If stage I is in basic load mode and stage II is in the control phase (residual heat coverage), the latter is switched on immediately for each request.

Note

This setting is overlapped by the cascade setting during cascade mode and is not available.

Enabling mode stage 2 *(..22..)*

The effect of a set stage II time delay can be modified during the start-up phase **below** the heat generator minimum temperature limit with the parameter "Enabling mode stage II.

Unlimited enabling during start-up release

During the start-up phase both stages operate without limitations.

Time out during start-up release

Stage II is switched on according to the set time delay.

Note

This setting is overlapped by the cascade setting during cascade mode and is not available.

WW Loading Mode stage 2 *(..22..)*

By means of the "1 or 2-stage Domestic Hot Water Loading Mode" the loading mode for the hot water heater can be determined for 2 one stage or two-stage heat generators.

The following options are available:

- 2-stage DHW loading with delayed enabling of stage II according to the stage II time delay.
- Unlimited two-stage DHW loading

- DHW loading with only stage I, stage II blocked

Note This setting is overlapped by the cascade setting during cascade mode and is not available.

Outside temperature block: If the current outdoor temperature exceeds the set temperature limit, all demands of one device to the heat generator are blocked. The heating circuits continue operation, but the heat generator will not be switched on. Preset minimum burner run times are fulfilled. Only when the outside temperature drops to the AT-disable level minus 2K, is the heat generator enabled again. If several heat generators are controlled though one device (condensing burners, 2-stage burners), all stages of the device will be disabled.

Note If a fault occurs on a heat generator, all outside temperature blocks in the system are removed.

Basic load offset: This setting becomes effective only if several heat generators are operated in cascade mode.

Burner stages operating as basic load are given a higher setpoint than the modulating stage, which is switched on last. This higher value is composed of the setpoint plus the set basic load offset. If several condensing boilers are switched through one control, the setting applies to every heat generator.

Heat generator reset: With 2-stage heat generators, the counters for operating hours and burner starts can be reset separately for stage 1 (ST-1) and stage 2 (ST-2).

Reset: With the reset indicator flashing (R ESET) the reset-ready indicator (SET) will flash when the rotary-push button is pressed briefly. A reset will be performed when the rotary-push button is pressed for approx. 5 seconds.

Operation

Note on operation	**Menu / Parameter tree**	**Parameter**
..2.., ..22.., ..C.., ..C-OT..		
Selection of heat generator type (depends on controller type)	HEAT GENER.	PARAMETER 01
Select sensor mode	HEAT GENER.	PARAMETER 06
Switching differential I (not at H-GEN setting 5)	HEAT GENER.	PARAMETER 08
Outdoor temp. locking	HEAT GENER.	PARAMETER 25
Basic load offset	HEAT GENER.	PARAMETER 26
Reset stage 1	HEAT GENER.	RESET ST-1
Reset stage 2	HEAT GENER.	RESET ST-2
Note on operation	**Menu / Parameter tree**	**Parameter**
..22..		
Switching differential II (only for 2-stage H-GEN)	HEAT GENER.	PARAMETER 09
Time delay stage II (only for 2-stage H-GEN)	HEAT GENER.	PARAMETER 10
Enabling mode stage II (only for 2-stage H-GEN)	HEAT GENER.	PARAMETER 11
DHW charging mode stage II (only for 2-stage H-GEN)	HEAT GENER.	PARAMETER 12
Reset stage 2	HEAT GENER.	RESET ST-2

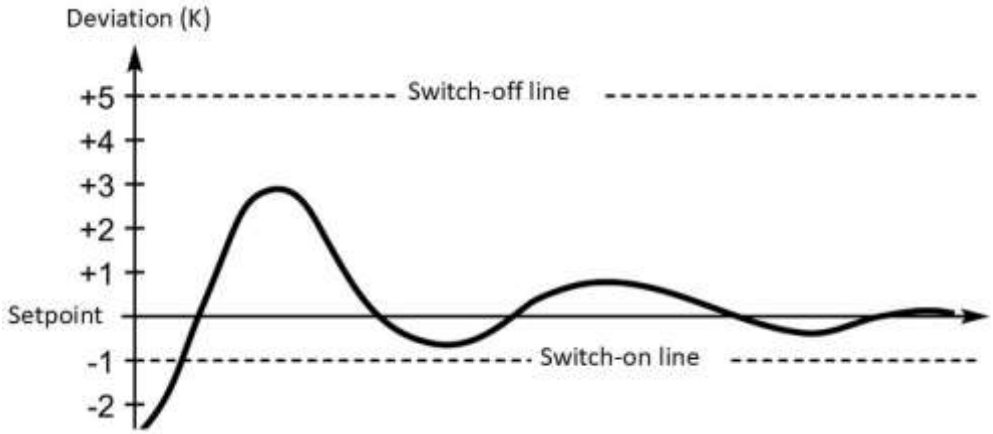
8.1.8 Switching for modulating burners

Function

In modulating burners, control is similar to that of a mixing valve via a PI control algorithm, as an actuator built into the burner regulates the ratio of air and fuel depending on the thermal output. However, the following criteria apply to the control of modulating burners, which differ from the control of conventional burners:

Switching differential

In contrast to conventional ON/OFF burner control systems with their switching differentials symmetrical around the respective setpoint, the switching differential for modulating burners is an asymmetric interval where the switch-on value is always 1K below the setpoint. This offers the advantage that, in case of a possible overshoot through the P-band, the burner is not switched off, because the switch-off point lies ***above*** the setpoint by a wider margin than the switch-on point is ***below*** the setpoint (overshoot reserve). Also, when the heat demand is low (especially in the low-load range) the temperature will drop only slightly because the burner is switched on again as soon as there is a deviation of more than 1 K.



Example:

Current setpoint = 50 K

Switching differential = 6 KSwitch-on at (50°C - 1K) = 49 °C

Switch-off at (49°C +6K) = 55°C

Activation of modulation

The modulating burner stage is activated when the heat generator temperature has dropped below the setpoint by more than 1K. The burner is enabled through the burner relay. As soon as the heat generator temperature exceeds the switch-off line, the burner is deactivated. In contrast to the mixer parameters.

Regulation

The setpoint is controlled via the conventional 2-point output (activation of the burner) and an additional 3-point output for modulating the actuator in the burner. The control algorithm described above is used for the total flow control.
Control variables for this application:

- **Controlled system:** The burner controlled by a 3-point output
- **Setpoint w:** Heat generator setpoint for the boiler
- **Actual value x:** Boiler temperature on the boiler H-GEN/BS
- **Controlled variable:** Action time OPEN or action time CLOSED for the 3-way actuator

In contrast to mixer control, no end position function is assigned to this actuator. The control mechanism is running continuously.

Minimum burner run time

Independent of temperature-related switch-off conditions, the burner is kept running for the duration of the set minimum burner run time.

Minimum and maximum temperature limits

The same functions as for conventional heat generators apply when the heat generator maximum temperature is exceeded or the heat generator minimum temperature is not reached.

8.1.8.1 Modulation running time

Function

This function allows adjusting the actuator, with regard to its finite running time, to the control characteristics, meaning that actuators with different running times react to the same deviation by readjusting by the same amount through adapting the action times. The integral action time Tn remains unchanged in this. However, care must be taken that the latter must always exceed the running time of the respective actuator.

8.1.8.2 Modulation starting time

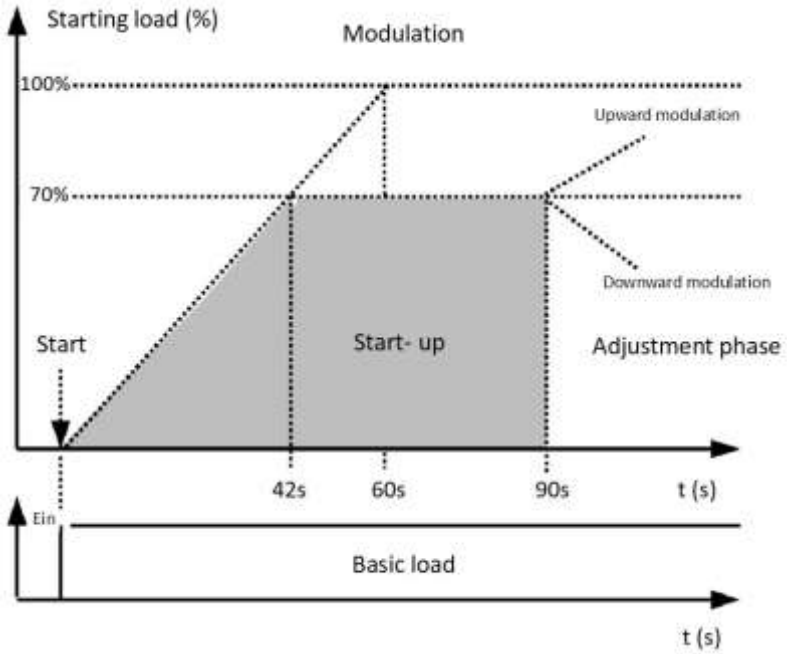
Function

The starting time parameter determines the length of the start-up phase in modulation mode so that a stable startup is ensured. As soon as the set starting time has expired, the modulation switches to its normal control characteristics defined by the modulation parameters.

8.1.8.3 Modulation starting load

Function

The starting load parameter determines a percentage setting for a fraction of the modulation running time during the start-up phase. At a setting of 0%, the actuator valve remains closed continually during the start-up. As soon as the set starting time has expired, the modulation switches to its normal control characteristics defined by the modulation parameters.



Operation

Note on operation	Menu / Parameter tree	Parameter
Modulation P-band Xp (%/K)	HEAT GENER.	PARAMETER 19
Modulation sample time Ta	HEAT GENER.	PARAMETER 20
Modulation I-band Tn (Reset time)	HEAT GENER.	PARAMETER 21
Modulation running time actuator	HEAT GENER.	PARAMETER 22
Modulation starting time	HEAT GENER.	PARAMETER 23
Modulation starting load	HEAT GENER.	PARAMETER 24

8.1.8.4 Connection

Connection for THETA NORM:

When using the THETA NORM design, the connection is made as follows:

- Connect burner ON to burner connection 1 (X3 - 1 and 2)
- Connect modulation ON to burner connection 2 (X4 - 17 and 18)
- Connect modulation OFF to VO1 connection (X4 - 10 and 12)
  VO1 must be switched to a potential-free connection!

Connecting THETA UNIT

If installing the THETA UNIT type, connect as follows:

- Connection burner ON to T2 of burner 1
- Connection modulation OPEN to T8 of burner 2
- Connection modulation CLOSE to T7 of burner 2

8.1.9 Control of communicating heat generators (H-GEN type 5)

Function

When operating communicating heat generators of heat generator type 5 in conjunction with a total flow sensor, the setpoint to be controlled for the heat generator is determined from the control deviation at the total flow sensor using a PI algorithm.

If a total flow sensor has been parameterized, a total flow menu is enabled in which the PI control can be parameterized.

Operation

Note on operation	Menu / Parameter tree	Parameter
Activation of total flow sensor	HYDRAULIC	PARAMETER 08 PARAMETER 09 PARAMETER 10
Modulation P-band Xp (%/K)	MAIN SUPPLY	PARAMETER 01
Modulation sample time Ta	MAIN SUPPLY	PARAMETER 02
Modulation I-band Tn	MAIN SUPPLY	PARAMETER 03

8.1.10 Flue Gas Temperature Monitoring

Note

A flue gas sensor can only be connected to the variable sensor input VI 1. Due to the high temperatures, a PT 1000-sensor is used. The evaluation of the deviating sensors compared to the standard sensors is carried out automatically by the controller.

Function

This function regulates the necessary measures when the permitted flue gas temperature is exceeded.

Displays only flue gas temperature

No function for control; the current flue gas temperature appears on the information display.

Heat generator locking in case of exceeding limit for the set time (Settings = 0 ... 60 min.)

If the limit value is exceeded, the heat generator is blocked for the set time and a malfunction message is triggered.

Heat generator blockage in case of exceeding limit (Settings = STB)
If the limit value is exceeded, the burner is blocked. The block can be deactivated by switching the controller off and on.

Note

If a sensor defect is detected in an activated exhaust gas sensor and a blockage for a limited time or a lockout has been set for the flue gas monitoring (safety functions), the heat generator is switched off in addition to the error message.

Flue gas temperature limit:

With the corresponding parameter the permitted limit for the flue gas temperature can be entered according to the default values of the heat generator manufacturer and serves as the reference value for the sequential functions described above.
Recommended Setting:
Nominal flue gas temperature as per manufacturer plus 10 ... 20 K.

Operation

Note on operation	Menu / Parameter tree	Parameter
Activation of the function	HYDRAULIC	PARAMETER 08
Effect of flue gas temperature monitoring	HEAT GENER.	PARAMETER 16
Setting temperature flue gas temperature limit	HEAT GENER.	PARAMETER 17

8.1.11 Charging pump (CHP)

Note

Function active only if the function "charging pump" was assigned in the "Hydraulic" menu to one of the outputs "Direct circuit pump", "Variable output 1" or "Variable output 2".

Function

A charging pump for supplying remote system components is active whenever there is a heating and DHW request to the heat generator.

Bus system

A charging pump with bus address 10 connected to the central unit runs as soon as there is demand for the data bus (all heating and DHW circuits included).
A charging pump connected to an add-on controller (address 20, 30,...) only runs on demand by the heating circuits of the corresponding controller.

CHP extended running time

If there is no longer a demand to the heat generator the charging pump switches off with time delay in order to avoid a safety switch-off of the heat generator at high temperatures.

Operation

Note on operation	Menu / Parameter tree	Parameter
Activation of the function	HYDRAULIC	PARAMETER 05 PARAMETER 06 PARAMETER 07
Setting extended run time	HEAT GENER.	PARAMETER 15

8.1.12 Primary pump (PP)

Function

The primary pump is the functional equivalent of a CHP, with the following exceptions:

- Activation via V01 or 2 only
- DHW demand does not go to PP (charging pump only for heating circuits)

- The extended run time is the same as for CHP (same parameters)
- The PP must be connected to the central unit with address 10 so that all heating circuit demands (even for multiple controllers) are detected.
- If connected to a subsequent controller, only demands by heating circuits of the corresponding controller are effective (see CHP).
- The PP operates in parallel mode in every DHW mode (no priority switch-off).
- The PP is only switched off if there is no demand by heating circuits.

Operation

Note on operation	Menu / Parameter tree	Parameter
Activation PP	HYDRAULIC	PARAMETER 05 or PARAMETER 06

8.1.13 Boiler circuit pump

Note

Function active only if the function "Boiler circuit pump" was assigned in the "Hydraulic" menu to one of the outputs "Direct circuit pump", "Variable output 1" or "Variable output 2".

Function

This function is used primarily in multiple boiler plants with thermohydraulic distributors and serves as a waterside barrier for heat generators which are not in operation. The variable output controls a boiler circuit pump with spring non-return valve or an engine driven butterfly valve. The function is activated directly when there is a demand for the heat generator. The heat generator is only enabled after the set flow time. After the heat generator is turned off, the variable output is still active for the period of the set extended run time.

BCP2

Two boiler circuit pumps can be connected to plants with two single boilers or a double boiler. The second output controls the boiler circuit pump of the sequential boiler.

BCP flow time

The setting of a flow time is only relevant if a shut-off device (e.g. motorized valve) is used at a variable output instead of a boiler circuit pump. By setting the flow time, the run time of the used shut-off device (motorized valve) is considered. The switch-on delay of the heat generator will ensure proper circulation inside the heat generator when the burner is switched on.
Actuators with a reversible motor must be operated by means of a slave relay with double throw contact (separated control phases L open/Closed).

BCP extended running time

If there is no longer a demand to the heat generator the boiler circuit pump switches off with time delay in order to avoid a safety switch-off of the heat generator at high temperatures.
The extended run time depends on the type of heat generator and must be set accordingly.

Operation

Note on operation	Menu / Parameter tree	Parameter
Activation of the function	HYDRAULIC	PARAMETER 05 PARAMETER 06 PARAMETER 07
Flow time boiler circuit pump	HEAT GENER.	PARAMETER 05
Extended run time boiler circuit pump	HEAT GENER.	PARAMETER 05
Activation second boiler circuit pump	HYDRAULIC	PARAMETER 05 PARAMETER 06 PARAMETER 07
Assignment of second boiler sensor	HYDRAULIC	PARAMETER 08 PARAMETER 09 PARAMETER 10

Note

An external heat generator block influences the BCP output.

8.1.14 Parallel heat generator release (PHR)

Note

Function active only if the function "Parallel heat generator release" was assigned in the "Hydraulic" menu to one of the outputs "Direct circuit pump", "Variable output 1" or "Variable output 2".

Function

Regardless of a request to the heat generator, the output programmed accordingly (HC, VO-1, VO-2) is activated immediately when the burner relay is activated (no flow time). When the burner relay is deactivated, the programmed output is switched off after a delay time. The switch-off duration depends on the setting of parameter 14 (extended run time) in the Heat generator menu.

Note

A parallel setting of boiler circuit pump and parallel heat generator release is allowed.
The temporary interruption (Solar/Solid fuel) and the external heat generator block influence the PHR output.

Operation

Note on operation	Menu / Parameter tree	Parameter
Activation of the function	HYDRAULIC	PARAMETER 05 PARAMETER 06 PARAMETER 07
Extended run time PHR	HEAT GENER.	PARAMETER 14

8.1.15 Return control

General

In order to prevent the temperature falling below the minimum return temperature specified for heat generators, the control system has various options for raising the return temperature. After activating one of these return temperature increases, a parameter tree is enabled in which the corresponding settings can be made.

The 'Minimum return limit' parameter specifies the lowest permissible return temperature for systems with direct or indirect return boost. If the return temperature of the heat generator falls below the set value, the respective return boost is activated and raises the return temperature until the set value is reached or exceeded.

8.1.15.1 Bypass pump (return pump) (..VV..)

Function

The return control with a bypass pump (RP) represents a simple method for a return temperature control. If the return temperature of the heat generator falls below the set return low limit the bypass pump, which is installed parallel to the heat generator, is switched on for flow temperature addition. If the return temperature increases above the setpoint plus switching differential, the bypass pump will be switched off after the time delay (extended run time) has elapsed. Because the mixing is not controlled, the diameters of the bypasses should be considered during construction.

Note

In order to avoid frequent switching of the bypass pump, the sensor should be mounted on the consumer side of the mixing point.

Operation

Note on operation	Menu / Parameter tree	Parameter
Setting bypass pump	HYDRAULIC	PARAMETER 06 PARAMETER 07
Return flow minimum limit	RETURN CONTR	PARAMETER 01
Switch-off difference	RETURN CONTR	PARAMETER 02
Extended pump run time	RETURN CONTR	PARAMETER 03

Note

With activation of the bypass pump (RP) to the VO, the return sensor is automatically assigned to the respective VI (e.g. VO1 = RP → = VI1 = RS)

8.1.15.2 Return control through controlled flow mixing (..3..)

Function

If the control unit is equipped with a mixer output, this output can be programmed for controlled flow mixing. In this mode of return control the programmed mixing circuit adjusts the return temperature to the return temperature setpoint. The return sensor for this function is connected at the sensor input of the respective mixing circuit (e.g. VF 1 for mixed circuit 1).

The mixing circuit operates like a boiler circuit pump without boiler start-up protection for this purpose.

Operation

Note on operation	Menu / Parameter tree	Parameter
Setting controlled flow mixing	HYDRAULIC	PARAMETER 03 PARAMETER 04
Return flow minimum limit	RETURN CONTR	PARAMETER 01

8.1.15.3 Indirect return control

Function

Indirect return control is realized by means of the mixer valves in the heating circuits. It only works for heating systems without a bypass pump and without controlled flow mixing.

When this function is active, two values are calculated independently for regulating each mixing circuit. The first value is the control variable for the flow setpoint of the heating circuit; the second is the control variable for the return setpoint.

The control variable used for mixer control (mixer control variable) results from the superimposition of both values. In this the adjustment of the return temperature is treated with priority.

Indirect return control is only active with mixing circuits that are in heating operation as well. It does not affect a heating circuit in reduced operation.

To avoid excessive pulsing, we recommend enabling the connected consumers (heating and DHW circuits) with delayed switch-on times.

This function does not affect direct circuits.

Note

Even if no return flow sensor is connected, a parameterized return flow temperature is transferred to the heat generator as a demand.

Operation

Note on operation	Menu / Parameter tree	Parameter
Setting of indirect return control	HYDRAULIC	PARAMETER 03 PARAMETER 04
Return flow minimum limit	RETURN CONTR	PARAMETER 01
Switch-off difference	RETURN CONTR	PARAMETER 02
Extended pump run time	RETURN CONTR	PARAMETER 03

8.1.16 Return flow limit

Function

The return flow limiter closes the mixing valve when the measured return flow temperature exceeds the adjustable return flow setpoint (maximum return flow limit). This only works when using a 3-way mixing valve!

Before the mixing valve is controlled, the system checks which control variable is required to regulate the flow temperature and which control variable is required to regulate the return flow limiter.

If the return flow limiter is exceeded, the control variables are superimposed. Priority is given to regulating the return temperature.

The function works in the same way as indirect return boost, whereby a 4-point valve must be used instead of a 3-point valve to ensure circulation to the heat generator. The functionality of the control is identical.

The difference to indirect return flow increase is that each individual heating circuit can optionally be equipped with return flow monitoring. This requires separate parameterization for the VI inputs.

Operation

Note on operation	Menu / Parameter tree	Parameter
Activation of a return sensor (RL-1 /RL-2) for mixing heating circuit 1/2	HYDRAULIC	PARAMETER 08 PARAMETER 09 PARAMETER 10
Return maximum limit	MIX. VALVE	PARAMETER 17

8.1.17 Using the heat generator sensor 2

Function

A second heat generator can be connected to a variable input (VI1-VI3) optionally. This is necessary:

- **Using *two single stage heat generators***
  The second heat generator is required for monitoring the temperature in the second heat generator with two boilers or in two single stage heat generators (see heat generator parameters "Heat generator type").
- **Using *two measuring points in the combustion chamber***
  In order to reduce standby losses by increasing the burner running times. The measured value of the warmer sensor (BS-1 or BS-2) is used as the trigger for switching on the heat generator. Charging stops according to the measured value of the colder sensor. The set heat generator parameters are still active.

Operation

Note on operation	Menu / Parameter tree	Parameter
Activation heat generator 2	HYDRAULIC	PARAMETER 08 PARAMETER 09 PARAMETER 10

8.1.18 External heat generator block

Function

If the corresponding variable input has a short circuit because of a switching contact, the heat generator is switched off after all demands are blocked. The logical error monitoring is switched off. After the short circuit is repaired, the heat generator is enabled directly.

The H-GEN is not disabled if the H-GEN is currently running and has not reached the minimum temperature (+ ½ SD). The block is not applied until this value has been exceeded.

ATTENTION

This function is meant exclusively for external override signals and not for safety switch off of the heat generator!

Operation

Note on operation	Menu / Parameter tree	Parameter
Activation of external boiler block	HYDRAULIC	PARAMETER 08 PARAMETER 09 PARAMETER 10

8.1.19 Adjustment of the heat generator according to the common flow temperature

Function

Common flow sensor:

The sensor connected to the variable input VI-1 (2,3) registers the total flow temperature in thermohydraulic distributors or in the common flow.

The adjustment of the boiler temperature is no longer dependent on the measured boiler temperature, but on the common flow sensor. The boiler sensor keeps monitoring the minimum and maximum boiler temperature of the heat generator.

The reaction of the heat generator(s) to a deviation of the common flow setpoint temperature from the total flow actual temperature can be influenced by using a PI control algorithm.

The control algorithm described in chapter 7.6 is used for the common flow control.

Control variables for this application

- **Controlled system:** The heat generators in the cascade for generating the required temperature.
- **Setpoint w:** Common flow setpoint value of cascade
- **Actual value x:** Common flow actual value on Sensor SFS
- **Correcting variable y:** Change of the heat generator setpoint value of the regulating stage

Operation

Note on operation	Menu / Parameter tree	Parameter
Activation common flow sensor	HYDRAULIC	PARAMETER 08 PARAMETER 09 PARAMETER 10
Modulation P-band Xp (%/K)	COMMUN FLOW	PARAMETER 01
Modulation sample time Ta	COMMUN FLOW	PARAMETER 02
Modulation I-band Tn	COMMUN FLOW	PARAMETER 03

8.1.20 Features of fuel value heat generator via data bus (..C..)

Function

Automatic with RS 485 interface:

Up to 8 condensing boilers with automatic burners can be controlled from a central device (..C..) via the GEN RS485 bus. The condensing boilers are differentiated by different addressing at the interface of the automatic burner.

8.1.20.1 DHW charging in boiler control

Function

Due to the possibility of separate switching hysteresis settings for DHW on automatic boiler controls and the THETA, it is possible that the DHW charging mode will not end (remains stuck in DHW charging mode). When operating using automatic boiler controls, the switching differential is no longer adjustable; DHW charging is performed in accordance with the parameterization of the automatic boiler control.

.

8.1.20.2 DHW operation in combined devices

If a combined device with a communicating automatic boiler control is connected to a controller (RSC, N/U), the display and operation of the DHW temperatures in the switching times is blocked because the setpoint cannot be set on the controller.

Note

A special feature is the operation of the control unit in conjunction with a condensing boiler control. The condensing boiler control has its own control system that automatically regulates the heat generator setpoint. This means that it is not necessary to regulate the heat generator temperature via a higher-level control unit. The digital version of the automatic firing controllers enables communication with the control unit via an interface. The interface connection is located on the rear of the controller and is labeled “WE BUS A/B.”

Effective parameters heat generator

PARAMETER	Designation
01	Heat generator type
03	Heat generator minimum temperature limit
04	Maximum temperature limit H-GEN
05	Heat generator minimum temperature limiting mode
25	Outdoor temp. locking
26	Basic load offset
29	H-GEN forced discharge
30	OEM maximum temperature limit
	Reset statistics 1

Effective parameters via boiler control for direct circuit

PARAMETER	Designation
RED. HEATING	Type of reduced mode
HEAT. SYSTEM	Heating system (exponent)
03	Room influence (with room unit)
04	Room factor
06	Switch-ON optimization
08	Room frost protection limit
09	Room thermostat function
10	Outdoor sensor assignment
11	Constant temperature setpoint
12	Minimum temperature limit
13	Maximum temperature limit
14	Temperature increase in heating circuit
15	Heating circuit parallel shift
17	Return flow maximum temperature limit (not for direct circuit)

Effective parameters via boiler control for hot water operation

PARAMETER	Designation
DHW NIGHT	DHW-economy temperature
LEGION.PROT. DAY	DHW-Day for legionella-protection
03	DHW-Time for legionella protection
04	DHW-Temperature for legionella protection
06	DHW-maximum temperature limit

All other necessary settings are done at the boiler control. A boiler frost protection function is not activated by the controller. This is done independently by the boiler control.

Sensor connection

Condensing boilers with communicating boiler controls have a connection for an outdoor and hot water tank sensor by Honeywell. In combination with the controller series THETA, the outdoor and hot water sensors of the central unit as well as the Honeywell sensors can be used. It is important to make sure that the controller sensors are connected to the central unit and the Honeywell sensors are connected to the boiler control.

The following applies to both the outdoor as well as the tank sensors:

- If a sensor is connected to the central unit, this sensor value is used for control.

- If no sensor is connected to the central unit, a check takes place, if the Honeywell sensor is connected to the boiler control. If so, then this sensor value is automatically used for control.
- If a sensor is neither connected to the central unit nor to the boiler control, an error message is sent.

8.1.21 Heat generator forced discharge

Function

If the maximum H-GEN temperature is exceeded, forced discharge into the downstream heating circuits takes place (necessary because, for example, a pellet boiler is controlled like a single-stage GEN).

- If the current temperature of the heat generator exceeds the heat generator maximum temperature limit, forced discharge according to the setting of this parameter will take place in the DHW circuit or the heating circuits or a buffer tank
- The heating circuits adjust to their maximum temperature.
- If the temperature in the heat generator decreases to 2 K under the heat generator maximum temperature limit, forced discharge is stopped.
- Forced discharge is effective for multiple controllers (BUS system).

Operation

Note on operation	Menu / Parameter tree	Parameter
H-GEN forced discharge	HEAT GENER.	PARAMETER 29

8.1.22 Operating hours counter

Function

The system has two operating hours and burner start-up counters (each for the first and second stage). The display is in the INFO-level of the controller.

The function of the operating hours counter can be set using a parameter.

AUTO

If an operating hours counter is connected to the corresponding inputs of the controller (OHC inputs), this value is used for calculation. Otherwise, theoretical values are determined and registered (time programs and switching frequency of outputs).
If a signal is recognized at a OHC input and the OHC signal does not arrive after demand by the burner, an error message is sent.
(30-3 burner does not switch ON for stage 1 and 31-3 for stage 2)

Feedback only

Same function as AUTO but no theoretical value is determined. Only signals from the burner via BZ1/BZ2 are processed.

Free counter

The operating-hour counter input can be used as a free counting input. No error message is issued if there is no signal. A 230V signal applied to BZ1/BZ2 is processed.

Note

Since the counter values can only be stored once per day (at midnight) in the fixed data memory, it is possible that counter values from the current day may be lost in the event of a power failure. The values are only saved beforehand if the settings have been saved.

Reset

The operating hours and starts of stage 1 and 2 can be reset separately using two parameters in the HEAT GENER. Menu

Operation

Note on operation	Menu / Parameter tree	Parameter
Operating hours counter	HEAT GENER.	PARAMETER 37
Reset stage 1	HEAT GENER.	Reset ST-1
Reset stage 2	HEAT GENER.	Reset ST-2

8.2 Heating circuit

8.2.1 Weather controlled heating operation

8.2.1.1 Heating Characteristic Curve

Function

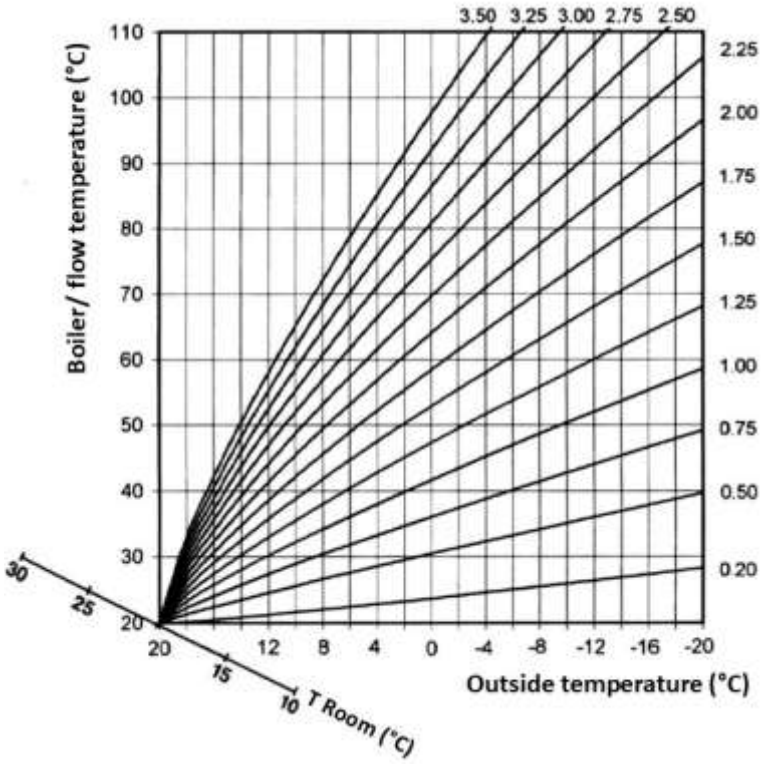
To maintain a constant room temperature, the heating curve for the respective heating circuit must be set precisely and the heating system must be correctly designed by a heating engineer in accordance with the heat requirement calculation.

If adjustment is necessary, this should be done in small steps at intervals of a few hours to ensure that a steady state has been reached.

There may be deviations between the measured room temperature in the occupied area and the desired room temperature, which can be compensated for by installing a room control unit (see accessories on request).

The heating characteristic curve generally describes the ratio of the change in flow temperature to the change in outside temperature. With large heating surfaces, such as underfloor heating, the heating characteristic curve has a lower slope than with smaller heating surfaces (e.g. radiators).

The setting value refers to the lowest outside temperature used in the heat requirement calculation.



Note

In order to measure the room temperature the heating circuit of the most occupied room is to be used.
Radiator thermostats are used together with correctly designed radiators to control the external heat gain and should hence be almost completely open. During the adjustment phase additional external heat sources like fireplaces, majolica stoves, etc. should not be used. Furthermore, during the measurement period excessive ventilation is to be avoided.
The measurement period covers basically the heating phases. If the heating characteristic is correctly set, the room temperature remains constant according to the set daytime setpoint regardless of the changes in the outside temperature.

Note

The heating characteristics are limited by the minimum and maximum temperature limits. With activated limits the relevant flow temperature is controlled exclusively according to the set limit values.

Operation

Note on operation	Menu / Parameter tree	Parameter
Setting Heating curve		

8.2.1.2 Heating circuit reduced mode

Function

For reduced operation, you can select between two operating modes:

RED

Reduced mode
The direct heating circuit's heating circuit pump remains active during reduced mode (see Switching Time Program). The flow temperature is determined by the relevant reduced heating characteristics according to the decreased room setpoint. The set minimum temperature will be maintained.

Application

Buildings with low insulation values and high heat losses.

ECO

Switch-off mode:

During reduced mode the direct heating circuit is completely switched off if the outside temperature exceeds the set frost protection limit. The heat generator minimum temperature limit is deactivated. The heating circuit pump is switched off with a short delay in order to avoid a safety switch-off owing to the post heating of the heat generator (extended pump running time).

If the outside temperature falls below the specified frost protection limit, the controller switches from switch-off mode (ECO) to reduced mode (RED) and the heating circuit temperature is adjusted according to the set reduced characteristic considering the set heat generator minimum temperature settings.

Application

Buildings with high insulation values (full thermal insulation).

The set mode also applies to selecting the operating mode: ABSENT TIL and RED. HEATING.

Operation

Note on operation	Menu / Parameter tree	Parameter
Setting reduced mode	DIRECT CIRCUIT or MIX . VALVE-1 or MIX . VALVE-2	RED. HEATING

8.2.1.3 Heating system (exponent)

Function

This parameter refers to the type of heating system (floor, radiator, convector heating) and can be compared to the exponent of the relevant heat exchanger. The setting determines the curvature of the heating characteristics of the heating circuit and compensates the performance losses at low temperatures by means of its progressive characteristic.

Depending on the type of heating system the following settings are recommended:

1.10 Slightly progressive heating characteristic for floor or other panel heating systems.

1.30 Progressive standard characteristics for all radiator heating systems with m-values comprised between 1.25 and 1.35.

2.00 Progressive heating characteristics for convector and baseboard heating systems

3.00 - 5.00 Very progressive heating characteristic curves for general ventilator application with high start temperatures.

Operation

Note on operation	Menu / Parameter tree	Parameter
Setting reduced mode	DIRECT CIRCUIT or MIX . VALVE-1 or MIX . VALVE-2	HEATING SYSTEM

8.2.1.4 Heating circuit temperature limitation

Note

The minimum and maximum temperature limit function is not active if the heating circuit control is used as constant control (KR) or fixed value control.

Function

This function limits the flow temperature of a heating circuit. The minimum and maximum temperatures set in the relevant parameters of a heating circuit must not exceed or fall below the setpoints.

Minimum temperature limitation is not active:

- in case of switch-off in standby mode above the frost protection limit
- in case of switch-off in reduced automatic mode with the activated ECO function above
- the frost protection limit
- in case of switch-off in constant reduced mode with activated ECO function
- in case of automatic summer switch-off

Application

- Floor minimum limitation
- Ventilation pre-adjustment (warm air curtain)
- Convector heating
-

ATTENTION

To protect floor heating systems against excessive heating (malfunction – manual operation), a controller-independent maximum temperature limiter (STL) must be installed in all cases.

We recommend using a contact thermostat for this purpose, whose switch contact loops the control phase of the respective heating circuit pump. The thermostat must be set to the maximum permissible system temperature.

Operation

Note on operation	Menu / Parameter tree	Parameter
Minimum temperature limit	DIRECT CIRCUIT or MIX . VALVE-1 or MIX . VALVE-2	PARAMETER 12
Maximum temperature limit	DIRECT CIRCUIT or MIX . VALVE-1 or MIX . VALVE-2	PARAMETER 13

8.2.1.5 Temperature increase heating circuit

Function

This function offers the option of applying a constant overshoot value to the heating curve of the heating circuit for special applications. The demand value is transmitted to the heat generator plus the overshoot value.

The heating characteristic curve is shifted parallel to the flow temperature.

Application

Foot point adjustment of the heating characteristic curve to adapt to the desired room temperature without changing the room setpoint.

Note

Operation

Note on operation	Menu / Parameter tree	Parameter
Temperature increase settings	DIRECT CIRCUIT or MIX . VALVE-1 or MIX . VALVE-2	PARAMETER 14

8.2.1.6 Heating circuit pump extended running time

Function

If there is no heat demand from the heating circuit, the heating circuit pump is switched off after the time set in the relevant heating circuit menu to avoid a safety switch-off of the heat generators at high temperatures.

During an active extended pump running time on a mixed circuit pump (MC1 and MC2 only), the mixed circuit continues to regulate its setpoint value without transmitting the requested value to the heat generator.

Operation

Note on operation	Menu / Parameter tree	Parameter
Setting pump extended running time	DIRECT CIRCUIT or MIX . VALVE-1 or MIX . VALVE-2	PARAMETER 15

8.2.1.7 Screed function

Note

This function is not active if the heating circuit control is used as constant control (CC) or fixed value control (FC).

Before activating the screed function, ensure that the respective screed has dried sufficiently.

Cement screed	21 days
Calcium sulphate (anhydride) screed	7 days

Note

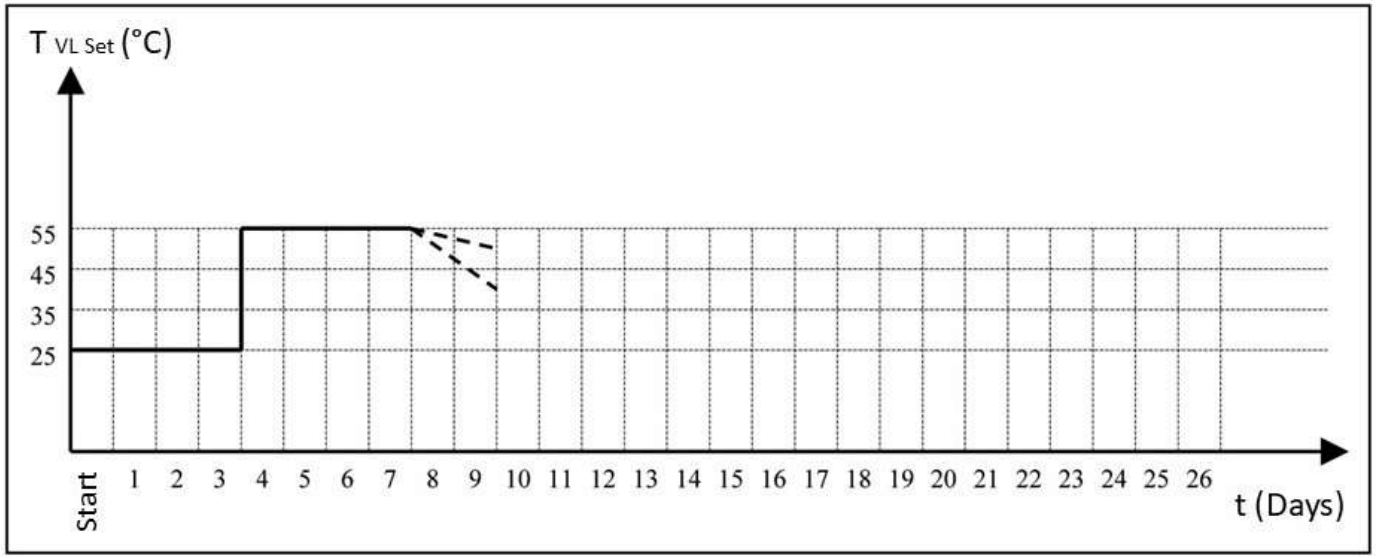
The screed function is only for drying new screed on underfloor heating systems. It's based on the recommendation from the German Federal Association for Surface Heating for heating to readiness for covering (heating according to the required temperature profile).
It's a special function and can't be stopped by any other operating mode (not even manual mode or emission measurement)!

The screed function can be activated for mixer circuits and, in special cases (e.g. in conjunction with condensing boilers), also for a direct heating circuit.
After activating the screed function, all weather-compensated control functions of the corresponding heating circuit are switched off. The corresponding heating circuit operates as a constant temperature controller regardless of the operating mode (cycle times).
An already activated screed function can be deactivated at any time (parameter setting Screed function = OFF).
After the screed function has ended, the heating circuit operates again according to the currently set operating mode.
The screed function consists of two steps:

Step 1: Function heating acc. to DIN 4725 Part 4 (setting 1)

- Constant heating at 25 °C on the start day and for the following three days.
- Heating at set maximum flow temperature, limited to 55 °C.

On the start day, the temperature is heated to 25 °C until midnight. At midnight on the following day, the first day of functional heating begins.



Time profile of the screed function for function heating

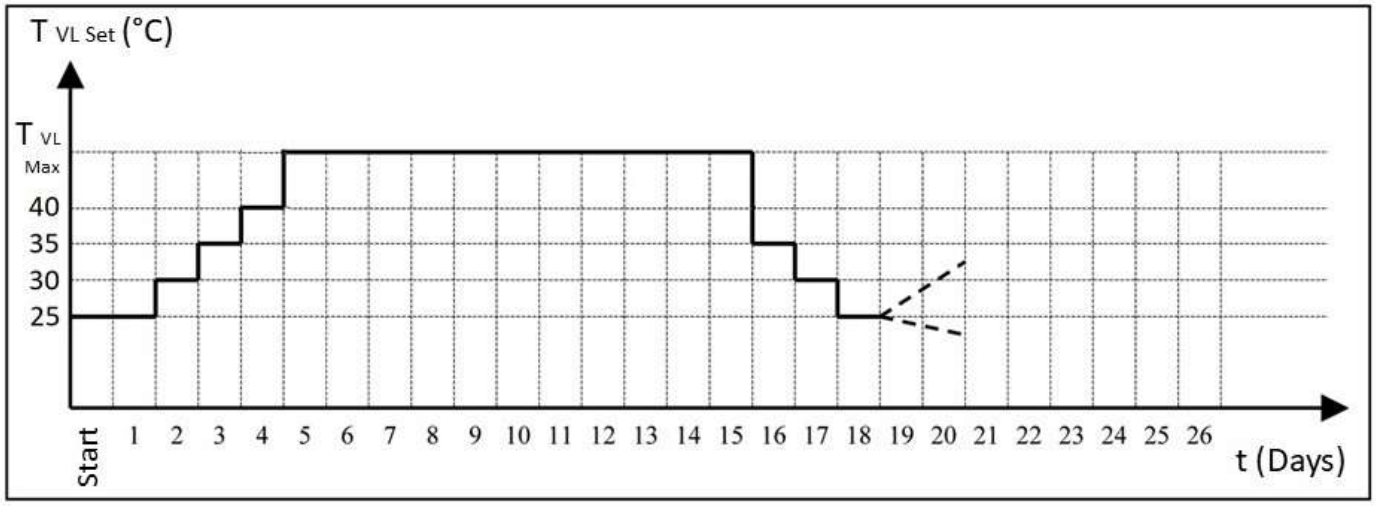
Step 2: Heating function for floor covering (setting 2)
The heating of the floor covering follows a preset temperature profile.

During the heating for drying out, the heating circuit is regulated one day after a constant temperature of 25°C has been reached. On the following three days, the constant temperature increased by a further 5K per day. At the end of the fourth day, the flow temperature of the mixing circuit is regulated to the maximum flow temperature (set to 55°C when the screed function is active) for the following eleven days. After this time, the flow temperature is regulated to 35°C on day 16. Over the next two days, the flow setpoint temperature is reduced by a further 5K per day so that on the final day it is regulated to a constant temperature of 25 °C. At the end of the last day, the screed function is automatically switched off and the heating circuit operates again in weather-compensated mode according to the set cycle time. The maximum flow temperature is not reset to the previous value.

Example

Maximum temperature setting for the heating circuit = 40 °C

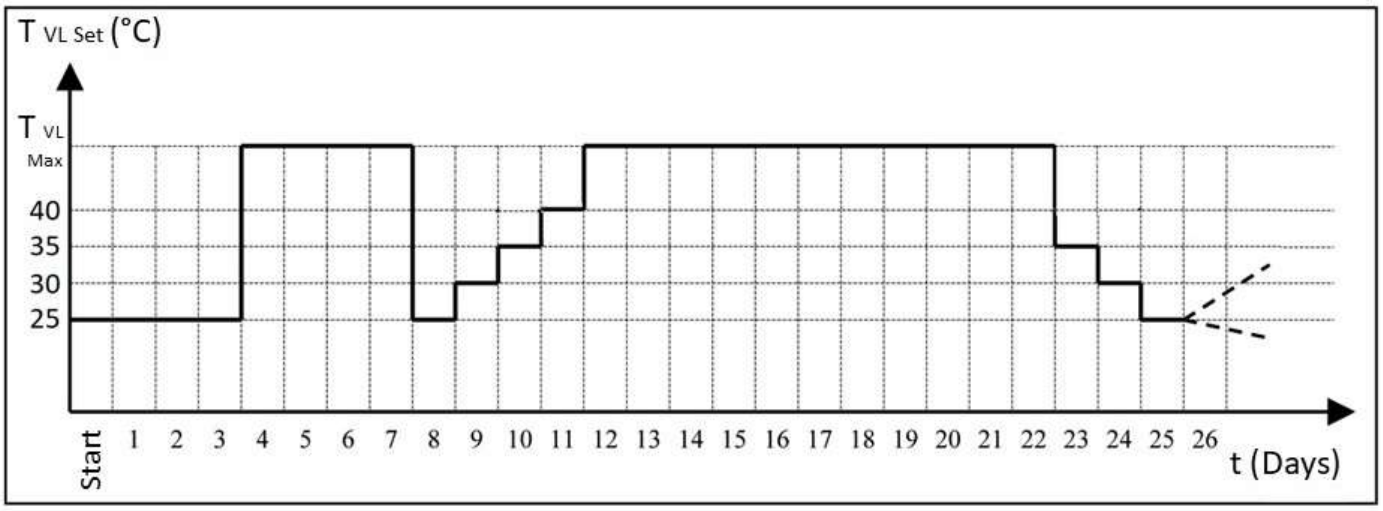
1. Day: constant heating at 25 °C
2. Day: constant heating at 30 °C
3. Day: constant heating at 35 °C
4. Day: constant heating at 40 °C
5.-15. Day: constant heating at maximum flow temperature
16. Day: reduced heating at 35 °C
17. Day: reduced heating at 30 °C
18. Day: reduced heating at 25 °C



Time profile of the screed function for floor cover heating

Step 1+2: Function heating with subsequent floor cover heating (setting 3)

Both steps are carried out subsequently.



Time profile of the screed function for function heating and heating for floor covering

Note

The maximum profile temperature is determined by the respective maximum flow temperature limit. In the event of a brief power failure or restart, a previously activated screed function will continue from the point at which it was interrupted. Once the screed function has expired, the parameter is automatically set to OFF. If necessary, the screed function can be reactivated.

Note

If the screed function is active for a direct heating circuit, only the requests from this heating circuit are transmitted to the heat generator. Requirements of other heating circuits are suppressed.

All other heating circuits except for the direct heating circuit at address 10 are blocked. During this time, no frost protection monitoring takes place for these heating circuits, for example.

The screed function for an unmixed heating circuit can only be activated on the direct heating circuit of the central unit with address 10 (ZG1 - HC) and only if no other central units are present in the bus network.

If another controller (Addr. 20...50) is connected during a screed function on HC, the screed function for the HC is automatically terminated.

Operation

Note on operation	Menu / Parameter tree	Parameter
Setting screed function	DIRECT CIRCUIT or MIX . VALVE-1 or MIX . VALVE-2	PARAMETER 16

8.2.2 Assessment of the Room Temperature / Room factor (Room influence)

8.2.2.1 Heating circuit with room influence

Function

This function activates the room sensor of a room device (RS or RFF) which is assigned to the corresponding heating circuit via the data bus address. The corresponding room parameters are enabled for operation.

No room sensor

(Setting = OFF) in the following situations:

- No room sensor influences when mounting the room units outside the occupied area (e.g. in unheated rooms like cellars, etc.).
- No room sensor influences in multifamily buildings which have different room temperatures.

- No display of the current room temperature is provided in the system information if the room influence is off.
- The feed temperature is corrected purely by atmospheric conditions.

Room sensor enabled **room influence with outside sensor (Setting = 1)**

- When the room sensor is switched on, the heating circuit is controlled according to the weather, taking into account the deviation of the room temperature according to the setting in the room factor parameter.
- When THETA RS room devices are connected, the actual room temperature appears in the basic display instead of the heat generator temperature.

Room sensor enabled **operation blocked (Setting 2)**

- With this setting, the functions influenced by the room temperature are enabled, however, operation via the remote unit is blocked.

Application Public buildings (administrative offices, schools, public institutions, etc.) where only room temperature monitoring is required.

Room sensor off **Operation active (Setting = 3)**

- If these settings are active, the room sensor only has a display character and does not influence the functions.
- Operation of the room device is possible.

Applicatopm All plant types that do not allow for room influence but (in contrast to the setting OFF) display of the current room temperature is desired.

Operation

Note on operation	Menu / Parameter tree	Parameter
Room influence (with room unit)	DIRECT CIRCUIT or MIX . VALVE-1 or MIX . VALVE-2	PARAMETER 03

8.2.2.2 Room factor heating circuit

Function This function determines how strongly a deviation of the room temperature from the specified setpoint influences the control of the boiler flow temperature.

If there is no difference between the desired (SET) and actual (IS) room temperature, the flow temperature of the respective heating circuit is controlled according to the set heating characteristic.

If the room temperature deviates from the setpoint, the heating characteristic is adjusted on the room temperature axis in such a way that the control deviation is compensated. The amount of the shift depends on the room factor setting.

The following relation applies:

$$\text{Corrected room setpoint} = \text{adjusted room setpoint} - \frac{(\text{Deviation} \times \text{Room Factor})}{100}$$

Example

Adjusted room setpoint = 21°C

Current room temperature = 20°C

Deviation = -1K

For a room influence of 100%:

Corrected room setpoint = $21°C - \frac{(-1K \cdot 100)}{} = 22°C$.

The boiler temperature is controlled according to a heating characteristic which corresponds to a room temperature setpoint of 22 °C.

High settings lead to a quicker adjustment of the control deviation, while they reduce the stability of the control circuit and can lead with excessively high setpoints to the oscillating of the control value (= room temperature).

8.2.2.3 Room controller heating circuit (RC - Room Control)

Function

With the setting Room factor = RC (Room Control), the corresponding heating circuit can be controlled via a room controller. This requires a THETA RS or THETA RFF room controller with room control function. The room controller directly determines the required flow setpoint and transmits it to the central unit.

With these settings, the control for the corresponding heating circuit only works in room control mode. Weather compensation is no longer active. However, it is still possible to parameterize weather compensation (heating characteristic curve settings).

8.2.2.4 Heating curve adaptation heating circuit

Function

Adaptation means the automatic adjustment of the heating curve slope to the building characteristics under continuous measurement of outside, flow and room temperatures. The determination of the optimum heating curve requires prolonged heating periods so that a balance between heat supply and heat reduction is ensured. The adaptation causes a targeted readjustment of the heating curve, depending on the control deviation.

The value found through adaptation is not stored. The larger the deviations, the larger the correction steps; the smaller the deviations, the smaller the corrections. The heating curve is newly adapted whenever the heating curve slope parameter setting is changed at a later stage.

An active adaptation is indicated by a flashing symbol in the user menu.

Adaptation is a useful tool for determining the correct building characteristic curve. We recommend switching off this parameter once the adaptation is complete, and to set manually, in the user menu, the slope value found though adaptation.

Note

An adaptation is allowed under the following conditions:

- Room sensor switched on (Room influence = ON)
- Heating curve adaptation switched on
- Heating operating under any automatic program
- Continuous heating
- Mean outside temperatures below 16°C
- Room temperature deviations from present setpoint > ±1K.

The adaptation will not be initiated:

- if the heating circuit is switched off
- during the optimization phases
- if heating curve adaptation is switched off
- if the room sensor is disabled (Room influence = OFF)
- if the outdoors sensor is defective or disconnected

- during reduced operation under any automatic program
- during permanently reduced operation
- when the boiler maximum temperature is reached

8.2.2.5 Room frost protection limit for heating circuit

Function

This function determines the room setpoint temperature of the corresponding heating circuit during shutdown mode with frost protection activated.

- during HOLIDAY operating mode
- during STANDBY operating mode
- during SUMMER operating mode

In connection with a room unit the heating circuit is controlled according to the room frost protection temperature.

Without a room unit the setting serves a default value for the reduced room temperature and is controlled on the basis of the latter.

Note

With lasting frost protection mode and sensitive objects in the house like antiques, plants, etc. the setting value is to be duly adjusted.

8.2.2.6 Room thermostat function (Room temperature maximum limit)

Function

This function determines a room temperature-related limit with adjustable switching differential. If the room temperature of the relevant heating circuit exceeds the current daytime or reduced room setpoint by the set switching differential, the heating mode is temporarily stopped (heating circuit pump switched off).

The heating mode is resumed if the room temperature of the relevant heating circuit drops below the current room setpoint – 0.5K.

Example

Day room setpoint	= 22 °C setting thermostat function = 2K
Interruption of heating operation: TRoom	> (22°C + 2K) > 24.0°C
Restart of heating operation: TRoom	< (24°C - 0.5K) < 23,5°C

With setting OFF summer thermostat function is not in effect.

Note

The thermostat function is operative both in heating and reduced mode.

With active frost protection the thermostat function is not operative.

Operation

Note on operation	Menu / Parameter tree	Parameter
Activation room function	DIRECT CIRCUIT (HC) or MIX . VALVE-1 (MC-1) or MIX . VALVE-2 (MC-2)	PARAMETER 03
Setting room factor	HC, MC-1, MC-2	PARAMETER 04
Activation room controller	HC, MC-1, MC-2	PARAMETER 04
Setting room frost protection limit	HC, MC-1, MC-2	PARAMETER 08
Setting room thermostat function	HC, MC-1, MC-2	PARAMETER 09

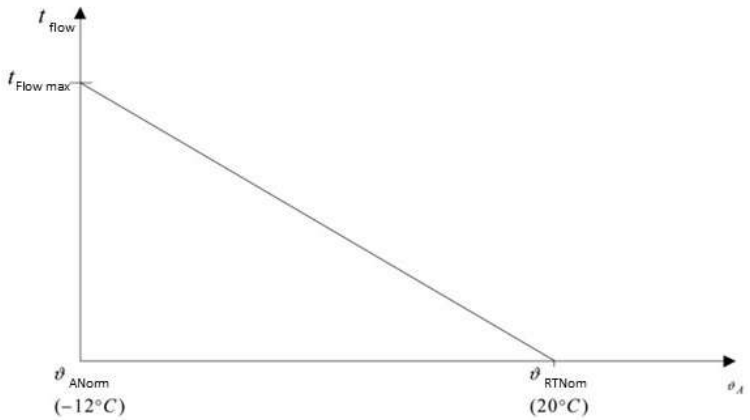
8.2.2.7 Heating circuit switch-on optimization

Function

This function calculates the latest heating start time within the specified setting value and taking into account the outside temperature (heat loss) in order to ensure the desired room temperature at the specified occupancy start time.

The switch-on times stored in the cycle time programmes for the corresponding heating circuit no longer refer to the start of heating, but to the start of occupancy (i.e. the time at which the desired room temperature should be reached)

Calculation of the advanced switch-on time



ϑ RTNom	room setpoint at the start time (adjusted switch on time)
t flow max	max. optimization time (setting parameter)
ϑ ANorm	Standard interpretation temperature (climate zone)
t flow	current optimization time
ϑ A	outside temperature

This function can be complemented by an activation of the room influence if a room device is connected (see description of room influence).

Operation

Note on operation	Menu / Parameter tree	Parameter
Maximum advance time	DIRECT CIRCUIT (HC) or MIX . VALVE-1 (MC-1) or MIX . VALVE-2 (MC-2)	PARAMETER 06
Room Influence	DIRECT CIRCUIT (HC) or MIX . VALVE-1 (MC-1) or MIX . VALVE-2 (MC-2)	PARAMETER 04

8.2.2.8 Switch-on optimization for room controller (RC)

General

The advance time is determined adaptively by the room controller. To this end, the room station THETA RS must be connected and parameterized as a room controller in the corresponding heating circuit level (parameter 4 = RC).

This function is not available in the room device THETA RFF.

Function

In the transfer from reduced mode to heating operation, if the optimization is switched off, a certain period of time elapses before the room temperature reaches the day setpoint.

An advance factor is determined by measuring this time. This determines, how much time is necessary for heating per Kelvin temperature rise. It is calculated with the measured time of the last x heating cycles, whereby x is used as a buffer number in the calculation.

The maximum advance time is calculated with the parameter setting for the optimization (direct circuit or MIX. VALVE-1 or 2 - Parameter 06).

A setpoint adjustment from the advance time is not carried out because the complete control algorithm is based on erratic setpoint changes.

Note

Switch-on optimization only takes place if:

- the controller is in automatic mode.
- the controller is in reduced mode, which means no advance takes place between 2 consecutive heating cycles with different room setpoints.
- the new room setpoint temperature is higher than the setback temperature.

8.2.3 Mixer control

The control algorithm described un chapter 7.6 is used.

Control variables for this application:

- **Controlled system:** The mixing valve installed in a mixed heating circuit
- **Setpoint w:** Flow setpoint
- **Actual value x:** Flow actual value on flow sensor FS
- **Correcting variable y:** Run time OFF or CLOSED for mixing valve outputs

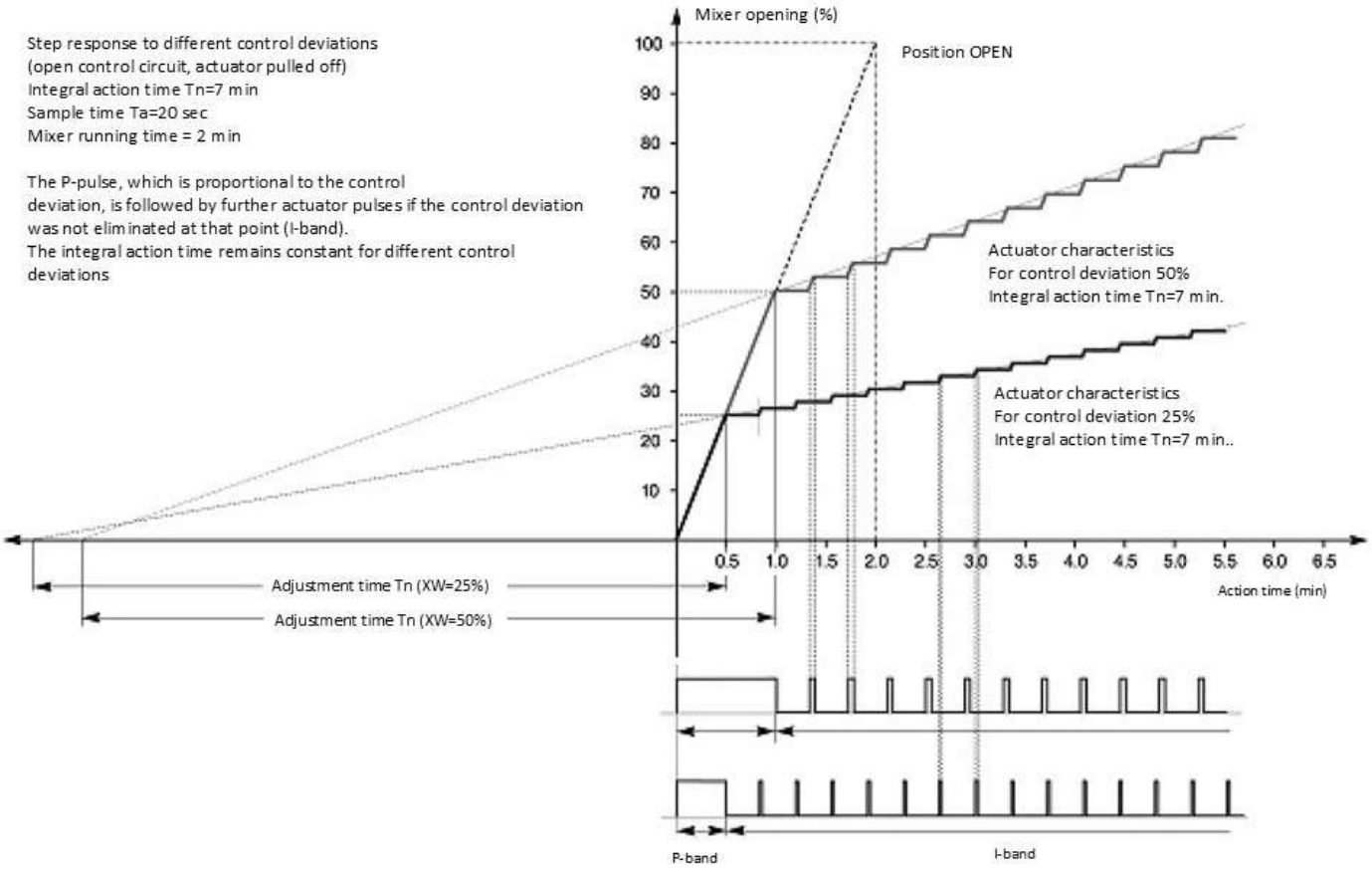
The influential variables described in the following are also included in regulations.

8.2.3.1 Actuator run time

Function

This function allows adjusting the actuator, with regard to its finite run time, to the control characteristics, meaning that actuators with different running times (e.g. 1 min, 2 min, 4 min) react to the same deviation by readjusting by the same amount through adapting the action times.

The integral action time Tn remains unchanged in this. However, care must be taken that the latter must always exceed the running time of the respective actuator. If necessary, actuators with other running times should be used.



8.2.3.1.1 End position function actuator

Function

This function determines the type of control signal in the end positions OPEN and CLOS of each actuator.

1 = Continuous voltage signal at connector OPEN or CLOS at the respective end position

2 = De-energized in end position OPEN or CLOS respectively

When the limit stop of the actuator is reached (0 / 100 %), the actuator is in idle state (STOP). To balance the running time tolerances, a drain function of 100 % of the set mixer running time takes place after reaching the limit stop.

Operation

Note on operation	Menu / Parameter tree	Parameter
Proportional band Xp (gain)	MIXV. ALVE-1 / 2	PARAMETER 18
Sampling time Ta	MIXV. ALVE-1 / 2	PARAMETER 19
Integral action time Tn (Adjustment time)	MIXV. ALVE-1 / 2	PARAMETER 20
Actuator run time	MIXV. ALVE-1 / 2	PARAMETER 21
End position function actuator	MIXV. ALVE-1 / 2	PARAMETER 22

8.2.4 Function heating limit

General

This parameter supplements the summer switch-off function. It deactivates the respective heating circuit as soon as the computed flow temperature setpoint approaches the present room temperature setpoint.

The parameter heating limit can be activated separately for each heating circuit.

Function

Switch-off: Flow-set < (room-set + heating limit setting)

Switch-on: Flow-set > (room-set + heating limit setting + 2K)

Example

Room setpoint = 22 °C, heating limit setting = 2 K

Switch-off at flow setpoint 24 °C (22°C + 2K)

Switch-on at flow setpoint 26°C (22°C + 2K + 2K)

Note

The SUMMER SWITCH-OFF function (menu SYSTEM - parameter 04) has priority over the HEATING LIMIT function.

The FROST PROTECTION function (menu SYSTEM - parameter 05) has priority over the HEATING LIMIT function.

Operation

Note on operation	Menu / Parameter tree	Parameter
Offset heating limit	DIRECT CIRCUIT (HC) or MIX . VALVE-1 (MC-1) or MIX . VALVE-2 (MC-2)	PARAMETER 07

8.3 Domestic hot water control (..B..)

8.3.1 DHW Tank Loading (DHW-P)

Function

The output controls at request a DHW loading pump during the relevant operating times.

DHW Day

The DHW (Domestic Hot Water-) daytime temperature is set with a key on the user interface.

The DHW daytime temperature provides for the desired hot water temperature during DHW operating times in the AUTOMATIC and SUMMER and during the PARTY and HEATING operating modes.

This setting is the initial value for the nominal temperatures that can be set for each heating cycle in the switching-time programs. The temperature settings in the switching time programs are automatically adjusted when the DHW daytime temperature is changed.

Example

Before: Temperature setting hot water daytime temperature: 50 °C

Temperatures in switching-time program:

5:00 - 8:00 60 °C

08:00 - 16:00 50 °C

16:00 - 22:00 60 °C

After: Temperature setting hot water daytime temperature: 52 °C

Temperatures in switching-time program:

05:00 - 08:00 62 °C

8:00 - 16:00 52 °C

16:00 - 22:00 62 °C

Changed settings are stored when DHW button or the rotary knob briefly pressed again or after automatic return at a preset time. Once the settings are stored, the unit automatically switches to basic display.

Operation

Note on operation	Menu / Parameter tree	Parameter
Setting DHW day temperature	TIMER PROGRAMM	
Setting DHW day temperature	Button DH (Offset/basic 50 °C)	

DHW night temperature

Hot water economy temperature (Eco) is the setpoint for the DHW tank between the active operating mode times in automatic mode.

If a DHW thermostat is used to determine the water heater temperature, the parameter for the setting of the economy temperature is skipped.

Operation

Note on operation	Menu / Parameter tree	Parameter
Setting DHW night temperature	DHW	DHW night

Legionella protection

A legionella protection function can be activated to eliminate the legionella germs in the tank.

In order to completely kill all germs, the Legionella protection temperature should be set at least at 60-65°C.

The setting is carried out with two parameters. The weekday for Legionella protection can be selected by the end user with a freely accessible parameter. With additional parameters the time and temperature can be set by the heating technician. The legionella protection function is activated for 1 hour.

Operation

Note on operation	Menu / Parameter tree	Parameter
Setting weekday for legionella protection / activating function	DHW	LEGION . PROT. DAY
Setting the time (only if function is active)	DHW	PARAMETER 03
Setting the temperature (only if function is active)	DHW	PARAMETER 04

Temperature assessment:

Mode of temperature assessment

This function determines the type of temperature assessment in the DHW tank.

Usually an electronic temperature probe (immersion sensor in the hot water tank) is used for this purpose. The temperature-dependent electric resistance of the probe is utilized.

Alternatively, hot water provision can also be controlled by a mechanical temperature controller (Thermostat switching contact). A hot-water thermostat is connected to tank sensor input DHWS and set to the required nominal temperature. When the thermostat request energy via the tank sensor input (contact closed), the tank is loaded with hot water at the set hot water maximum temperature until the contact opens again.

Note

In case of DHW control via thermostat the current water heater temperature can no longer be detected and hence does not appear in the system information. Only the status of the thermostats is displayed. The desired water heater daytime temperature is not callable at the user level.

Operation

Note on operation	Menu / Parameter tree	Parameter
Mode of temperature assessment	DHW	PARAMETER 05

Maximum Temperature

Domestic Hot Water-maximum temperature:

This function limits the temperature in the DHW tank according to the aforementioned set value. The desired water heater daytime temperature to be set at the user level is limited by this parameter.

ATTENTION

Hot water maximum temperature limitation is function protecting the tank and terminates hot water loading into the tank. The tank loading pump is switched off immediately when the maximum temperature is exceeded. In this case it cannot be ensured that the set extended running time is adhered to.

Note

If a DHW thermostat is used to determine the water heater temperature, this function is not active.

Operation

Note on operation	Menu / Parameter tree	Parameter
Setting DHW Maximum temperature	DHW	PARAMETER 06

Operating Mode

With this function it is set how the heating system reacts to a heat demand from the DHW tank. There are 7 different settings.

Parallel mode (setting = 1):

During tank loading the heating circuits remain operative

Note

Parallel tank operation should only be used with mixer-controlled heating circuits, as unmixed heating circuits can cause rooms to overheat or even pose a scalding hazard from the radiators.

Priority mode (setting = 2):

During tank loading the heating circuits are put out of function. They are restarted as soon as the DHW loading pump extended running time is over.

If the DHW setpoint is not reached after 4 hours, an alarm is indicated on the display.

Conditional priority (setting = 3):

The heating circuits are enabled when the temperature in the heat generator exceeds the current DHW target value. The heating circuits will be enabled according to the following criteria:

Enabling the heating circuits:

H-GEN actual temperature > DHW setpoint + DHW switching differential/2 + 10 K

Disabling the heating circuits:

H-GEN actual temperature < DHW setpoint + DHW switching differential/2 + 5 K

Unmixed heating circuits (HC) remain in priority mode

Note

In this operating mode the loading temperature increase for the tank is to be selected so that the heat generator does not switch off before the heating circuits are enabled. A parallel shift of at least 10K should be set so that this function can operate correctly.

Weather-guided parallel mode (setting = 4):

Above the set outside frost protection limit DHW heating is carried out in priority mode; in case of active frost protection there is a switchover to parallel mode.

Priority mode with intermediate heating (setting = 5):

With this setting DHW loading is limited to a maximum of 20 minutes in order to provide for a 10-minute-long intermediate heating. The loading procedure is continued at the end of the intermediate heating. DHW loading and intermediate heating are carried out in an alternating order until DHW tank loading is finished.

Note

This operating mode is recommended for unmixed heating circuits if the heating circuits are not operated due to long-lasting hot water charges and the rooms therefore cool down. For heating circuits controlled by mixers, the intermediate heating time is not sufficient for regulation.

Priority separation circuit / diverting valve (setting = 6):

Tank loading is carried by means of a three-way changeover valve; the heating circuit pump is also the DHW loading pump. At the end of the DHW loading and at the expiry of the extended time the three-way valve is changed back to heating mode.

The heating circuit pump is connected at output HC-P and the three-way valve to output DHW in this case.

Note

If there is no request (HC/DHW) (standby mode), the valve is switched to the hot water tank (relay output closed).

External operation (Setting = 7):

In external operation hot-water loading is switched only according to the set switching differentials.

- There is no heat request to the heat generator.
- There is no storage priority operation for the heating circuits.
- The parameters boiler parallel shift, storage discharge protection, pump run-on time and boiler start-up protection no longer affect the hot water charging pump.

The settings for the DHW setpoint are not restricted by the setting limits of the heat generator. The setting range for DHW parameters extends from 20°C to 90°C (fixed).

The DHW day temperature can be set up to 90°C in the switching time level but is limited by the DHW maximum setting value.

The legionella protection function operates in accordance with its settings.

Operation

Note on operation	Menu / Parameter tree	Parameter
Setting DHW Operation mode	DHW	PARAMETER 07

Discharge Protection:

With discharge protection activated and a DHW request present, the DHW loading pump enabled only when the temperature in the heat generator rises by more than 5 K above the actual temperature in the hot water tank.

This measure prevents any rear tank discharge through the heat generator. The DHW loading pump is disabled again as soon as the temperature difference between the heat generator and the DHW tank has dropped to less than 2 K.

Note

The heat generator minimum temperature limit operates continuously to protect the heat generator and blocks the DHW loading pump in case of temperatures below the set value.

ATTENTION

In case of DHW temperature settings above 60°C this function should not be activated to avoid safety switch-off (in particular for heat generators with a low water capacity).

Operation

Note on operation	Menu / Parameter tree	Parameter
Activation tank discharge protection	DHW	PARAMETER 08

Boiler Temperature parallel shift

This function determines the default setting for the tank loading temperature through the HGEN, compared to the set DHW setpoint.

In case of several controllers connected via bus and several DHW circuits the tank loading temperature depends on the highest setpoint if several tanks are loaded simultaneously.

Operation

Note on operation	Menu / Parameter tree	Parameter
Setting boiler temperature parallel shift	DHW	PARAMETER 09

Switching differential

This function determines the size of the DHW switching differential. The switching differential affects the relevant DHW setpoint symmetrically.

- **Loading enabling:** The current DHW temperature is lower than the DHW setpoint by half the amount of the DHW switching differential.
- **Loading abort:** The current DHW temperature exceeds the DHW setpoint by half the amount of the DHW switching differential.

Operation

Note on operation	Menu / Parameter tree	Parameter
Setting switching difference	DHW	PARAMETER 10

Extended Pump running time:

After switching off the heat generator the tank loading pump is stopped only after a time delay to prevent a safety switch-off in case of high temperatures. The setting can be adjusted to the capacity of the DHW tank.

Note

Excessively long overtravel times interrupt unnecessarily the heating mode and increase the temperature in the hot water tank.

Depending on the parameter setting, an existing setpoint value in the system is either transmitted to the heat generator during the extended run time, or not.

The boiler continues to operate according to the following rules during a extended tank pump run time:

DHW-Parameter 17	DHW- Parallel mode	DHW- Priority mode	Conditional DHW priority mode	
	HC setpoint	HC setpoint	HC setpoint	MC- setpoint
AUTO	Active	OFF	OFF	Active
OFF	OFF	OFF	OFF	OFF

Operation

Note on operation	Menu / Parameter tree	Parameter
Setting loading pump extended running time	DHW	PARAMETER 11
Behavior of heat generator during extended run time	DHW	PARAMETER 17

Tank sensor 2

For complete loading of a hot-water tank by means of automatic measuring point changeover between tank sensors 1 and 2 (layer loading). The measured value of the hotter sensor (DHWS1 or DHWS2) is evaluated for the activation of the loading pump. Termination of the loading is carried out on the basis of the measured value of the colder sensor. The set values for the hot-water setpoint temperature and the specified hot-water switching difference continue to apply.

Oeration

Note on operation	Menu / Parameter tree	Parameter
Activation tank sensor 2	HYDRAULIC	PARAMETER 08 or PARAMETER 09 or PARAMETER 10

8.3.2 DHW reloading

Function

The reload function is activated by pressing and holding (3 seconds) the DHW button. The reload time can be changed by turning the rotary knob.

Note

In DHW thermostat mode, briefly pressing the DHW button is sufficient.

An activate reload remains active at the hot water DAY value (basic value) for the preset reloading time.

A current request from the time programmes is overlapped by reloading. The reloading temperature has priority over the time programmes temperature. If the reloading time is 0 min, reloading is started once and remains active until the setpoint value has been reached.

If the operating mode for the DHW circuit is set using the modem function, a DHW reload is not performed as the modem function has priority 1.

8.3.3 Circulation pump (CIR.)

Note This function is callable only if a variable output is defined for a circulation pump.

Function The output controls a hot water circulation pump.

Economic interval (pause) The use of the economy interval minimizes the usual circulation losses owing to adjustable switch-on intervals during operating and determines the run time of the DHW circulation pump within an adjustable period (economy interval).

Economy interval (cycle duration) The cycle duration determines the length of the cycle and thus the duration of the circulation pump pulse operating mode minus the set economy interval pause time.

Economy interval pulse = economy interval cycle duration - economy interval pause

Example If the economy interval cycle time is 20 minutes and the economy interval pause time is 5 minutes, the subsequent economy interval pulse is 15 minutes.

Operation

Period duration / economy interval (cycle)	
economy interval	Economy interval (cycle) – Economy interval (pause) = Economy interval (running time)

Timer program By default, the circulation pump is linked to the switching time program of the hot water circuit. However, the switching time program for the circulation pump can also be linked to an existing automatic program of another control circuit with regard to the switch-on and switch-off times. The DHW circulation pump is in operation during the heating or DHW cycles of the selected circuit and program.

Note If operation of the time programs P2 and P3 were not enabled (see parameter PROGRAM on parameter level SYSTEM) and the circulation pump is assigned to one of these programs, the pump will operate according to the stored standard times. The same applies if a switching-time program was selected that does not exist for the controller in use (e.g. an MC 2 for THETA 23B).

Operation

Note on operation	**Menu / Parameter tree**	**Parameter**
Activation circulation pump	HYDRAULIC	PARAMETER 02 or PARAMETER 05 or PARAMETER 06 or PARAMETER 07
Assignment time program	DHW	PARAMETER 12
Econ. interval running time	DHW	PARAMETER 13
Econ. interval period duration	DHW	PARAMETER 14

8.3.4 Electrical Heating Element (ELH)

Function

The function controls indirectly (via circuit breaker) an electrical water heater if the automatic summer switch-off is active.

An external DHW thermostat including the necessary safety installation will take care of the switch off function.

Operation

Note on operation	Menu / Parameter tree	Parameter
Activation electrical heating element	HYDRAULIC	PARAMETER 02 or PARAMETER 05 or PARAMETER 06 or PARAMETER 07

8.4 Solar function (..VV..)

Note

This function can only be accessed if a variable output is assigned to a solar loading pump.

Two separate sensor inputs are available for this function:

- SPFS for the solar panel flow temperature and
- SPBU for the solar buffer tank

For heat metering a variable input (VI1..VI3) can be assigned for the solar panel return sensor SPRS.

If the solar panel flow sensor is defect, the loading pump will be switched off.

Function

The solar function makes it possible to combine solar panels with heating and DHW systems in order to support the economy of the system. The Solar loading pump can be controlled according to various conditions.

Operation

Note on operation	Menu / Parameter tree	Parameter
Activation solar charging pump	HYDRAULIC	PARAMETER 05 or PARAMETER 06 or PARAMETER 07
Solar panel return sensor	HYDRAULIC	PARAMETER 08 or PARAMETER 09 or PARAMETER 10

Switch-on differential

With sufficient solar heat energy the temperature difference between panel flow and solar buffer tank will become bigger than the adjusted value and the solar panel pump is switched on to load the buffer tank. The minimum value is 3K above the switch off differential.

Switch-off differential

If the temperature difference between panel flow and buffer tank falls below this adjusted differential, the pump will be switched off and the loading terminated. The maximum value is always 3K below the switch on differential.

Minimum running time

To prevent the solar charge pump from cycling, it remains in operation for at least the set **minimum running time of the solar pump**. The minimum running time takes priority over shutdown via the switch-off difference SD OFF. Shutting down the solar charge pump via the final switch-off temperature or when the maximum buffer temperature is reached takes priority over the minimum running time.

Solar panel max

The **collector maximum temperature limit** provides thermal protection for the collector and causes the solar charge pump to switch on automatically when the set value is exceeded.

If the temperature falls below the set value -5K, all solar functions become active again according to their settings. Switching off the solar charge pump via the final switch-off temperature or when the buffer maximum temperature is reached takes priority over the forced activation.

Tank max

If the temperature in the solar storage tank (hot water storage tank or buffer storage tank) exceeds the set **solar storage maximum temperature limit**, the active forced activation of the solar charging pump (see description for collector maximum temperature limit) is interrupted. The forced activation is enabled again when the temperature in the solar storage tank falls below the set value by more than 10 K.

Solar operating mode

This function defines the loading mode.

- **Solar priority mode**
  During solar loading the heat demand is not sent to the heat generator when it is not active. An active heat generator stays in operation until the next switch off cycle.
- **Solar parallel mode**
  During solar loading the demand to the heat generator is permitted.
- **Solar priority mode DHW (setpoint control)**
  During solar charging, a request from the hot water control to the heat generator is suppressed.
- **Solar priority mode buffer (setpoint control)**
  During solar charging, a request from the buffer control to the heat generator is suppressed.

Inhibition H-GEN

Inhibition heat generator (only during solar operating mode = priority mode)

The temporary interruption serves to prevent frequent switching between solar loading and loading by the heat generator. After a solar pump switch-off the set time has to pass before the solar buffer tank can be loaded again by the heat generator (boiler).

Changeover parallel

Solar priority / parallel switchover (only with solar operating mode = 1, 3, 4)

- **Priority mode**
  When the temperature in the solar tank drops below the nominal value by this temperature setting during priority solar loading, the system is automatically switched to parallel operation (temporary interruption disabled, heat generator enabled). Priority mode is activated again as soon as the tank temperature rises above the actual setpoint plus the DHW switching differential.
- **Priority mode DHW**
  If the temperature in the DHW tank (DHWS) sinks under the nominal DHW-value by the set value during priority solar loading, the solar priority mode is switched off until the nominal DHW-value is reached.
  Example:
  DHW setpoint 50°C
  Set value changeover: 10K
  => The heat generator is only required when the actual DHW temperature drops below 40°C.

- **Priority mode buffer**
  If the temperature in the buffer tank (BU) sinks under the nominal buffer value by the set value during priority solar loading, the solar priority mode is switched off until the nominal buffer value is reached.
  Example:
  Nominal value to buffer of HCs: 45°C
  Buffer parallel shift: 10K
  Set value changeover: 20K
  => The heat generator is only required when the buffer temperature drops below 35°C.

Heat balance

Heat balancing is activated through this parameter setting. The user can select between flow calculation via the pump running time and determination of the flow volume via the pulse signal input of the device, if such input is available. Any commercial flow meter can be connected to the pulse input.

Reset heat balance

The Reset heat balance function (only when heat balancing is activated) can be used to reset the heat balance meter when heat balancing is activated.

Volume flow

(only with heat balancing enabled) This setting allows choosing between volume flow computed in

- liters/minute for calculating the flow volume or
- liters / pulse when using the pulse input

corresponding to the respective pumping capacity of the solar loading pump.

Note

If the adjustment is 0, there is no heat balance!

Fluid density

(only if heat balancing is activated) This parameter defines the fluid density according to the manufacturers data.

Fluid heat capacity

(only if heat balancing is activated) This parameter defines the specific heat capacity for the correct calculation of the heat balance. The data is supplied by the fluid manufacturer.

Note

The physical data Volume flow, density and specific heat capacity form the basis for the calculation of the solar energy balance and the solar capacity and are calculated according to the mathematical correlation.

$W = (V / t) \cdot rw \cdot cw \cdot Du \cdot tSOP$

The results can be seen in the information level.

Final switch temperature

The end shut off or maximum limit also works independently of whether the solar bypass valve (SZV) function is activated.

The SOP is activated when the maximum temperature limit is exceeded! The SOP is deactivated when the final switch-off temperature is exceeded! The final switch-off temperature has priority over the maximum temperature limit!

Note

The final switch-off temperature must be set at least 10.5K higher than the maximum solar temperature, otherwise the SOP will not activate.

Anti-blocking protection

This is an automatic function of the controller. If the solar loading pump was switched off for longer than 24 hours, then it will be started for 20 seconds in order to prevent blocking through corrosion.

Operation

Note on operation	Menu / Parameter tree	Parameter
Switch-on difference	SOLAR	PARAMETER 01
Switch-off difference	SOLAR	PARAMETER 02
Minimum run time SOP	SOLAR	PARAMETER 03
Collector's maximum temperature	SOLAR	PARAMETER 04
Tank's maximum temperature	SOLAR	PARAMETER 05
Operating mode	SOLAR	PARAMETER 06
Inhibition H-GEN	SOLAR	PARAMETER 07
Solar priority parallel switchover	SOLAR	PARAMETER 08
Heat balance	SOLAR	PARAMETER 09
Reset sol. energy balance	SOLAR	PARAMETER 10
Volume flow	SOLAR	PARAMETER 11
Density medium	SOLAR	PARAMETER 12
Specific heat capacity medium	SOLAR	PARAMETER 13
Final switch temperature	SOLAR	PARAMETER 14
Switchover time total flow sensor	SOLAR	PARAMETER 15
Switchover temperature total flow sensor	SOLAR	PARAMETER 16

8.4.1 Tank loading changeover (via solar loading valve SLV) (..VV)

General

In systems that have both an external hot water tank and a buffer tank, a diverter valve can be used to switch between loading the hot water tank and loading the buffer tank from solar equipment.

The use of a changeover delay (Parameter 15 solar tree) sometimes causes problems. To ensure that the solar collector in priority operation can be loaded, checks are performed at regular intervals whether a sufficient temperature is reached for charging the tank.

Function

This function allows switching a diverter valve according to the load condition of two heat storage tanks (2-point output).

The solar energy charging of the DHW tank is prioritized according to the settings of the solar control. In this case, the SCVS (solar tank charge valve sensor) is used instead of the SBUS and the changeover temperature is used for charging instead of the solar tank maximum limit.

If the set changeover temperature in the DHW tank is reached or the switching differential between SPFS and SCVS is insufficient for charging the DHW tank, the solar charge control changes over to the buffer tank.

Changeover requirements

If the switchover temperature in the primary storage tank is not reached and solar charging in the secondary storage tank is active, then after a fixed time of 30 minutes, the SOP is switched off for the time set in the parameter (para. 15) and a check is made to see whether the temperature difference between KVLF (collector flow sensor) and SLVF (solar storage charging valve sensor) meets the switch-on condition.

If, in the meantime, the switch-on condition for charging the primary storage tank is met, charging of the primary storage tank starts immediately.

This check must not be carried out

if the actual temperature of the primary storage tank + switch-on difference is > = end switch-off temperature.

Operation

Setting only possible if an SOP is set.

Note on operation	Menu / Parameter tree	Parameter
Solar charge valve	HYDRAULIC	PARAMETER 06 or PARAMETER 07
Solar tank charge valve sensor	HYDRAULIC	Automatic assignment
Switch delay	SOLAR	PARAMETER 15
Switch-over temperature	SOLAR	PARAMETER 16

8.4.1 **Forced heat dissipation valve (Solar forced dissipation valve SFDV)** (.. VV..)

Function

This function allows preventing the degassing of the medium at high solar panel temperatures in solar power systems. Such degassing can occur when the solar heat tank is full (maximum temperature exceeded) and, consequently, forced dissipation into the heat tank is impossible. In this case, the solar pump is switched off and the solar panel temperature rises.

The function of the solar heat dissipation valve (SZV) is to prevent this.

The output as solar heat dissipation is switched under the following conditions:

- The function is enabled if the maximum solar storage temperature has been exceeded.
- If the collector temperature rises above the set maximum collector temperature, the output switches on and the solar charging pump continues to run.
- If the collector temperature rises above the set final switch-off temperature, the SZV output switches off and the solar charging pump switches off.

Operation

This function can be selected only if an SOP has been set.

Note on operation	Menu / Parameter tree	Parameter
Solar forced dissipation valve	HYDRAULIC	PARAMETER 06 or PARAMETER 07

ATTENTION

When this function is active, the solar loading pump continues running even when the solar panel temperature exceeds the set solar panel maximum temperature.

8.5 Buffer tank function heating buffer (..VV..)

Function

Buffer tanks are energy storage used to store energy which is supplied without control from either a solar system or a solid fuel boiler. The energy consumption of heat consumers can be covered by the energy from the buffer tank.

Controlled heat generators (boilers) can be used in a supporting function, which cover the extra energy demand.

The function of the buffer charging pump ensures that a controlled heat generator supplies the buffer or heating or DHW circuits with the necessary extra energy.

If no controlled heat generator is used (e.g. heating by wood boilers only), buffer functions such as forced dissipation into the heating circuits can be used by connecting and activating buffer tank sensor 1 at a variable input.

Note

The function is only activated if a variable output is assigned to a buffer loading pump.

For stratified discharge, an optional second buffer tank sensor (BU 2) can be connected at a variable input (VI1 to VI3).

The temperature of the heat generator is internally supplied.

Operation

Activation of the function and sensor assignment:

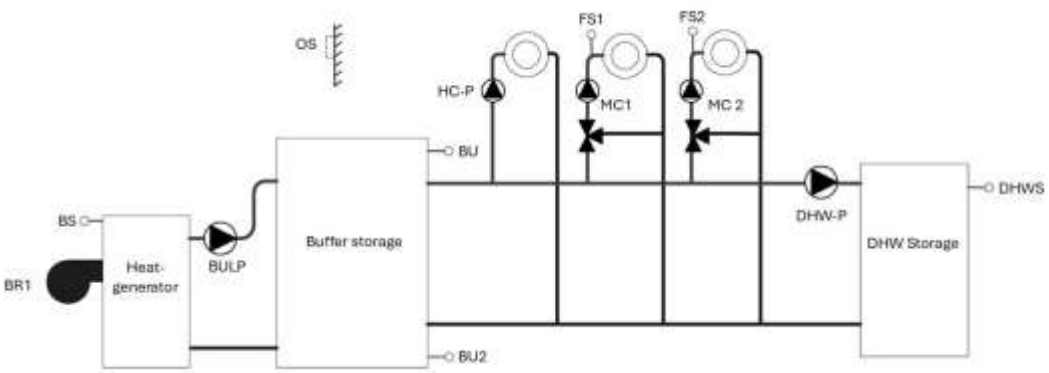
Note on operation	Menu / Parameter tree	Parameter
Activation buffer charging pump	HYDRAULIC	PARAMETER 06 or PARAMETER 07
BU is assigned if BULP is active, otherwise, it can be set	HYDRAULIC	PARAMETER 08 or PARAMETER 09 or PARAMETER 10

Operating modes

To support the full range of available combination options in multivalent heating systems with buffer support, the control system offers the possibility to set various operating modes for buffer operation. The different settings cause different processing sequences of heat requests for heating circuits and hot water. In the following, the different operating modes are illustrated using exemplary hydraulics layouts. The hydraulic examples refer solely to the THETA connection. Safety devices are not taken into account. Building regulations must be observed.

Operating mode 1

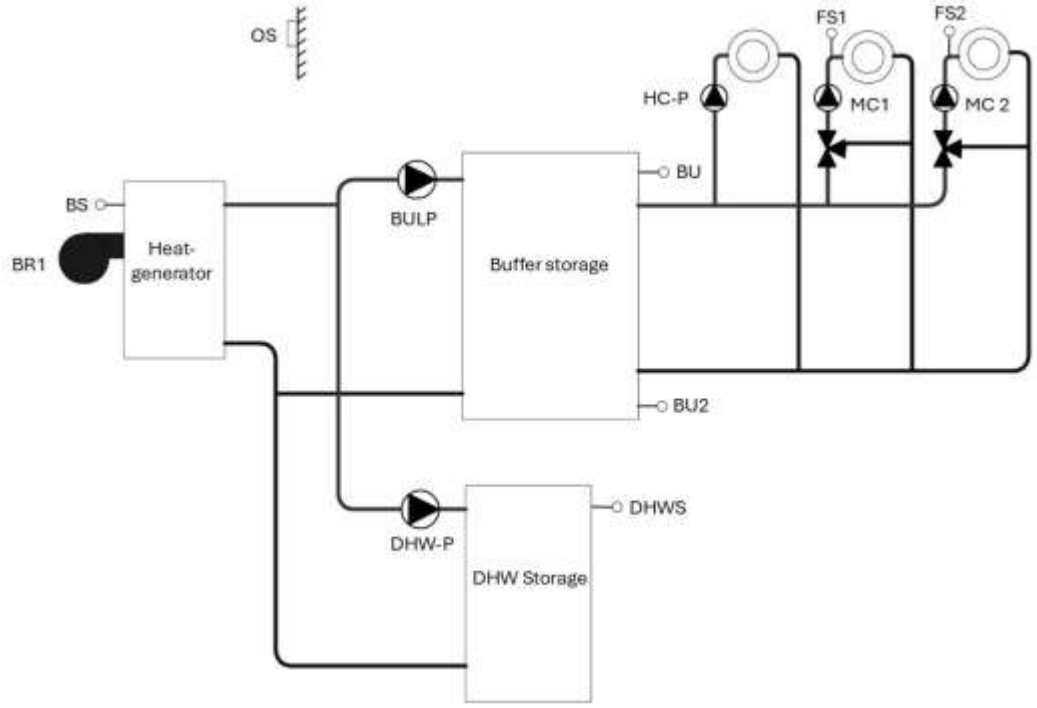
Charging control HC and DHW requests



Heating-circuit and hot-water control send their demand value to buffer control. Buffer control requests additional energy from the heat generator via the buffer loading pump.

See the table below for detailed correlations.

Operating mode 2 **Loading control for HC request without DHW**

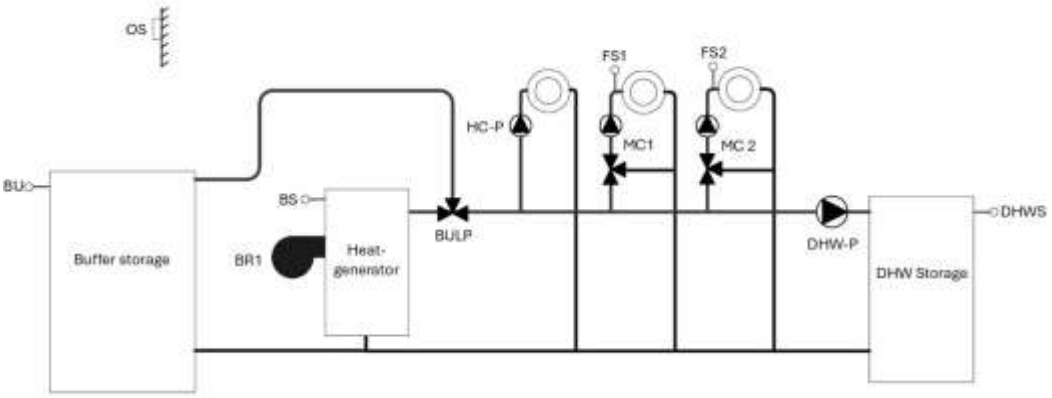


The heating circuit controls send their demand value to buffer control. Hot-water and buffer control request energy from the heat generator when required.

With DHW priority activated, this function acts on the buffer loading pump but not on the heating circuits.

See the table below for detailed correlations.

Operating mode 3 **Discharge control HC and DHW requests**

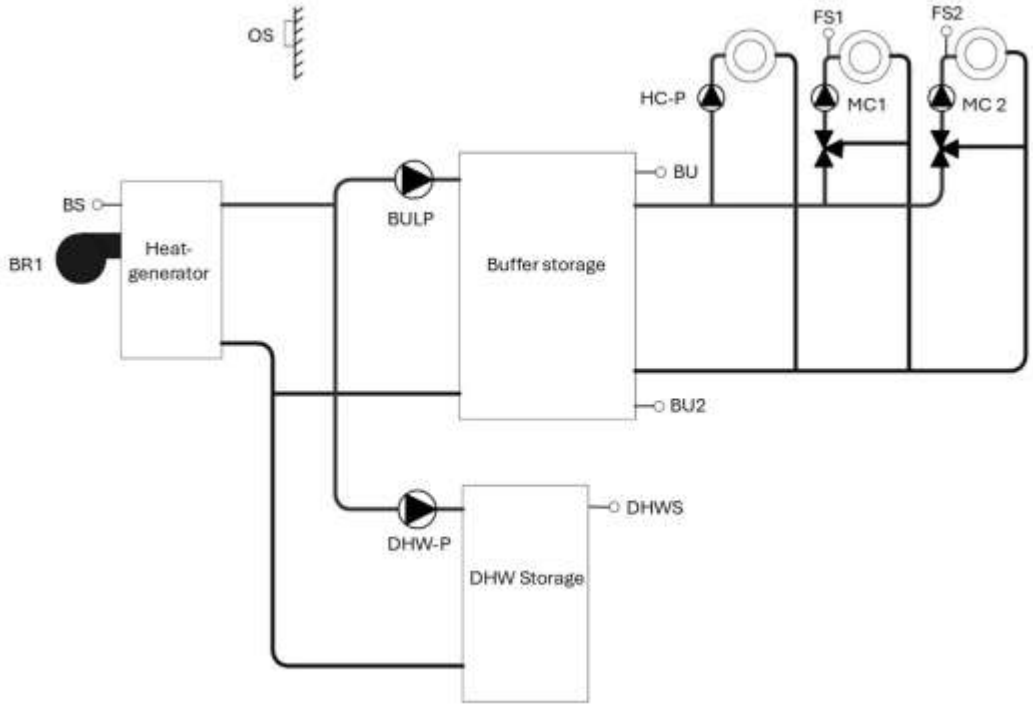


Heating-circuit and DHW control send their demand value to buffer control. The BULP (BULP) input switches ON when the energy demand can be met by the buffer. If the energy in the buffer is insufficient, buffer control requests additional energy from the heat generator and BULP (BULP) switches OFF.

BULP (BULP) is switched off when there is no request from the heating circuits and from DHW loading.

See the table below for detailed correlations.

Operating mode 4 **Discharge control for HC requests without DHW**



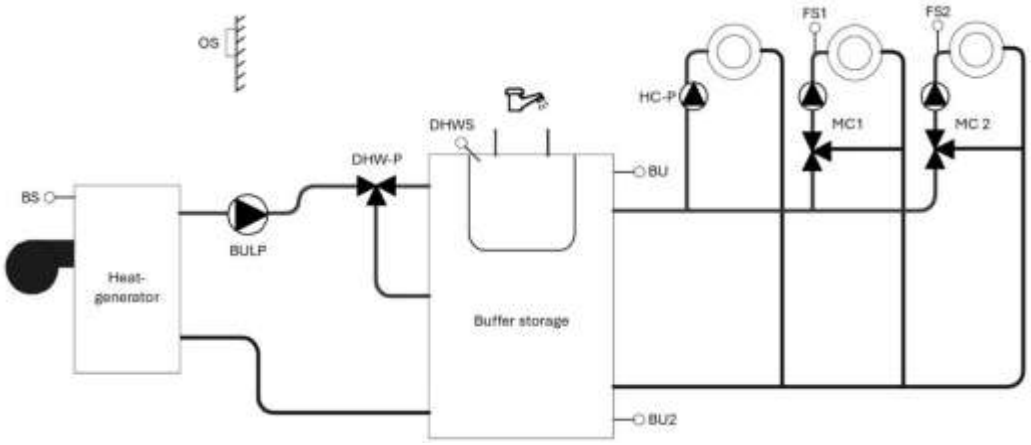
Buffer demand HC

As operating mode 3, except that the requests from DHW control are sent directly to the heat generator.

An active hot-water priority only acts on the heating circuits when there is no buffer discharge in progress.

See the table below for detailed correlations.

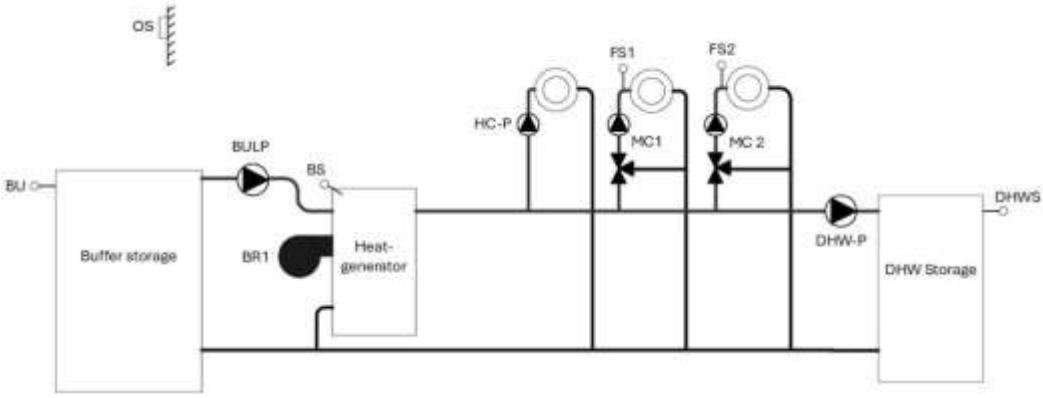
Operating mode 5 **Loading control with DHW switchover**



The heating circuit controls send their setpoint values to the buffer control. The DHW and buffer controls request energy from the heat generator as required. The BULP (BULP) output is ON during a buffer charge and during a hot water charge. If hot water priority is activated, this does not apply here.

The exact dependencies can be found in the table following the hydraulic examples.

Operating mode 6 **Discharge control to heat generator**



This hydraulic system is used when a buffer tank powered by alternative energies is added to existing systems.

Unit boilers are often already in use here, with the hot water tank and DHW charging integrated into the boiler.

Heat requests are sent to the heat generator; if the buffer tank can cover the energy demand, the heat generator setpoint temperature is generated from the buffer via the BULP instead of the burner.

The heat generator thus always operates at its setpoint temperature and cannot be overloaded by excessive buffer temperatures.

The exact dependencies can be found in the table following the hydraulic examples.

Table 1: Correlations between operating mode and buffer functions

	Buffer-operating mode					
	1	2	3	4	5	6
Buffer request from	HC/DHW	HC	HC/DHW	HC	HC	---
H-GEN request from	Buffer	Buffer/DHW	Buffer	Buffer/DHW	Buffer/DHW	HC/DHW
Buffer control type	Charge	Charge	Discharge 1	Discharge 1	Charge	Discharge 2
Buffer-start-up protection acts on	HC/DHW	HC	HC/DHW	HC	HC	---
Buffer-discharge protection	X	X	---	---	X	---
Buffer-frost protection monitoring	X	X	---	---	X	---
Buffer-minimum temperature monitoring	X	X	---	---	X	---
Buffer-maximum temperature monitoring	X	X	X	X	X	X
Buffer-forced dissipation into	HC/DHW	HC	HC/DHW	HC	HC	HC/DHW
Buffer-absorption function	X	X*	---	---	X*	---
Loading temperature control from	HC/DHW	HC	---	---	HC	---
H-GEN start-up protection on BULP	X	X	---	---	X	---
Function BULP without request	OFF	OFF	OFF	OFF	OFF	OFF
Function BULP for manual operation	ON	ON	OFF	OFF	ON	OFF
Function BULP for sensor defect	ON	ON	OFF	OFF	ON	OFF
Function BULP for heat generator disabled	---	---	ON	ON	---	---

	Buffer-operating mode					
	1	2	3	4	5	6
Function BULP if H-GEN not available and buffer start-up protection is active**	---	---	OFF	OFF	---	---
Function BULP if H-GEN available and buffer start-up protection is not active**	---	---	ON	ON	---	---
Effect of H-GEN start-up protection on	BULP	DHW/BULP	HC/DHW	HC/DHW	BULP	HC/DHW
DHW discharge protection / H-GEN in system	BULP	H-GEN	H-GEN	H-GEN	H-GEN	H-GEN
DHW discharge protection / no H-GEN in system	BULP	H-GEN	BULP	H-GEN	H-GEN	H-GEN

* only if hot water loading is not active

** H-GEN is not available if

- An external heat generator block is present on a VI.
- Time lock H-GEN is active via parameterization in the menu 'Solid fuel'
- Time lock H-GEN is active via parameterization in the menu 'Solar'
- There is no H-GEN in the system

Loading control

The supply of energy from a controlled heat generator to the heating circuits is realized through loading the buffer tank. The buffer control ensures that the buffer is supplied with sufficient energy from the heat generator, via the buffer loading pump.

Discharge control 1

The heating circuits are supplied with energy **either** from the buffer **by discharging the buffer** via the BULP, provided that it has sufficient energy, **or by** direct supply from the **heat generator**.

Discharge control 2

The heating circuits are **always supplied with energy by the heat generator**. If the buffer has sufficient energy, the heat generator is heated via the BULP instead of the burner. If the energy in the buffer is insufficient, the burner is started.

Operation

Note on operation	Menu / Parameter tree	Parameter
Buffer operating mode	BUFFER	PARAMETER 10

Setpoint temperature

The buffer set temperature is the temperature which the buffer tank must supply for the connected heating circuits. This is the temperature of the highest demand in the heating system.

Example

• Demand value MC-1 = 45 °C

• Demand value MC-2 = 55 °C

• Demand value DHW = 65 °C

=> Buffer set temperature = 65 °C

A required value for boosting (e.g. DHW charging temperature boost) is already included in the requirement value for the heating circuits.

Minimum temperature limit

If there is a heat request on the buffer storage from heating circuits or DHW, it is maintained at least at the set value of the buffer minimum temperature limit. If this value is not reached, the buffer storage tank is reloaded by the heat generator, taking into account the buffer start-up protection.

Maximum temperature limit

If the temperature in the buffer storage exceeds the set value for the buffer storage maximum temperature limit, the buffer charging pump is switched off automatically. The excess heat is dissipated to the preselected circuits (see forced discharge).

The forced discharge is cancelled, and buffer operation is resumed when the temperature in the buffer storage falls below the set maximum limit value by more than 2 K.

H-GEN Increase of request

In order to ensure sufficient control reserve for all consumers connected to the buffer storage, the demand value transmitted to the heat generator (H-GEN) can also be increased by a temperature increase.

Buffer switching differential

If the buffer tank temperature rises by the set buffer switch difference above the current demand value, the buffer charging pump is switched off. It is switched on again when the buffer tank temperature falls below the current demand value.

Buffer forced dissipation

If the specified maximum buffer storage temperature is exceeded, the excess energy can be dissipated into the heating circuits or the hot water storage tank, provided that the buffer control mode allows this. The heating circuits into which forced dissipation takes place are determined using the corresponding parameter.

Setting options:

- **OFF**
  no heat dissipation
- **1 (DHW)** (only with additional storage tanks)
  The excess heat is dissipated into an existing Domestic water heater.

ATTENTION Thermal mixing valve required at DHW output due to risk of scalding

- 2 **Heating circuits**
  The excess heat is dissipated in the heating circuit(s). The set maximum temperature is not exceeded. The desired room temperature may be exceeded for a short time. If necessary, activate the thermostat function in conjunction with room station(s)!

ATTENTION For floor heating systems, it is essential to use a contact thermostat to shut off the pump.

Buffer Drain function (only with charging control, Buffer operating mode 1, 2, 5)

Outside of a buffer loading by heat generator (buffer setpoint is reached), the temperature difference between the heat generator temperature and the buffer tank temperature (BU) checked, if this has been parameterized. If the temperature difference rises above the set drain function switch-on differential, the buffer charging pump is switched on. If the temperature difference drops to the drain function switch-off differential, the buffer charging pump is switched off immediately.

This drain function ensures that excess energy in the heat generator (e.g. by post heating) is not lost.

Buffer start-up protection (only with charging control, Buffer operating mode 1, 2, 5)

In buffer mode, there is no start-up protection for the heat generator on the heating circuits. This only affects the buffer charging pump. If the buffer minimum temperature is not reached when the buffer start-up protection is switched on, the consumer circuits are disconnected on the water side (pumps switch off), depending on the buffer operating mode. The buffer start-up protection is deactivated (pumps switch back on) when the buffer temperature exceeds

the minimum buffer temperature plus half the buffer switching difference. When the buffer start-up protection is switched off, the consumer circuits remain in operation.

Buffer discharge protection (only with charging control, Buffer operating mode 1, 2, 5)

Buffer discharge protection disables the buffer loading pump until the heat generator temperature has risen to more than 5 K above the buffer nominal temperature.

This measure prevents any rear buffer discharge through the heat generator. The buffer loading pump is disabled again as soon as the temperature difference between the heat generator and the buffer tank has dropped to less than 2 K.

Buffer sensor 2 (BU 2)

The buffer can optionally be equipped with a second buffer sensor (BU2) via the variable inputs, which is used for stratified charging. In this case, the buffer is charged via the active heat generator as soon as the highest temperature (of both sensors) falls below the specified setpoint. Charging via the heat generator is terminated when the lowest temperature (of the two sensors) has reached the setpoint plus the specified buffer switching difference (stratified charging). Buffer sensor 2 (BU2) is used in charging controls (buffer operating modes 1, 2, 5).

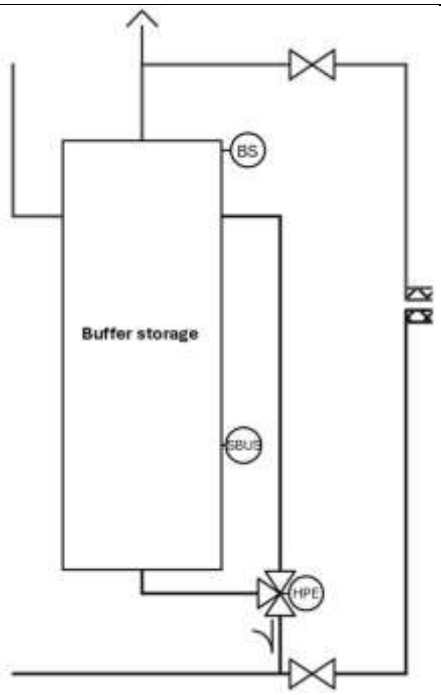
Overrun time BULP

When buffer charging has been completed in a buffer charging system (buffer operating modes 1, 2, 5), an overrun time for the buffer charging pump can be set via the parameter setting.

Operating

Operating note	Menu / Key	Parameter
Buffer sensor 2 (bottom)	Hydraulic	PARAMETER 08 or PARAMETER 09 or PARAMETER 10
Buffer-Minimum temperature	Buffer	PARAMETER 01
Buffer-Maximum temperature	Buffer	PARAMETER 02
Excess temperature H-GENH-GEN	Buffer	PARAMETER 03
Switching differential	Buffer	PARAMETER 04
Forced heat dissipation	Buffer	PARAMETER 05
Drain function switch-on differential	Buffer	PARAMETER 06
Drain function switch-off differential	Buffer	PARAMETER 07
Start-up protection	Buffer	PARAMETER 08
Discharge protection	Buffer	PARAMETER 09
BULP extend. time	Buffer	PARAMETER 11

8.5.1 Hydraulic buffer discharge (HBD) (..VV..)

	
Function	In buffer charging systems (buffer operating modes 1, 2 and 5), the buffer storage is first charged by the H-GEN without buffer discharge before the heating circuits can draw energy. Hydraulic buffer discharge first charges the upper buffer area and switches on the heating circuits. The HPE valve is then switched so that the entire buffer is charged. • When the output is not switched, the buffer is fully charged. • When the output is switched, only part of the buffer is loaded (unloading active). • The switching difference for switching the output is fixed at 5 K. • If actual buffer >= target buffer + 5 K, the output switches off. • If actual buffer <= target buffer, the output switches on. •

8.6 Solid fuel function (SFP) (..VV..)

Function

The solid fuel function enables the addition of a solid fuel boiler to the system in a supporting role (usually in combination with a buffer tank) and to control it according to the following different switching conditions.

Note

This function can only be called up if a programmable switching output has been assigned to a solid loading pump.

The following sensors are required for control:

- BUSF for the solid boiler sensor

The connection is made to VI1 or VI2 depending on the assignment of the output (VO1 or VO2).

Example:

parameterization of the BUSF to hydraulic parameter 06 (VO1) à automatic assignment of the solid fuel boiler sensor to VI1. Hydraulic parameter 08 is no longer available for settings and is hidden.

- BUSF for the solid fuel buffer sensor

Automatic assignment to the KSPF sensor input of the control system takes place. Alternatively, activation and connection to a free variable input on VI1 - VI3 can be carried out.

If the solid fuel boiler sensor is defective, the solid fuel loading pump is switched on automatically.

Operation

Note on operation	Menu / Parameter tree	Parameter
Activation solid fuel charging pump	Hydraulic	PARAMETER 06 or PARAMETER 07
Solid fuel boiler sensor is permanently assigned to corresponding VI1 or VI2	Hydraulic	
Feststoffpufferfühler wird automatisch dem Input KSPF zugeordnet		
Optional buffer sensor (solid fuel)	Hydraulic	PARAMETER 08 or PARAMETER 09 or PARAMETER 10

Minimum temperature limit

Wenn die Temperatur des Festbrennstoffkessels 10 K über dem unteren Grenzwert liegt, wird die Festbrennstoffladepumpe eingeschaltet.

Fällt sie unter den unteren Grenzwert, wird sie ausgeschaltet.

Maximum temperature limit

If the temperature of the solid fuel boiler is higher than the high limit, the solid fuel loading pump will be forced to switch on. The excess heat will then be dissipated into the selected (see menu buffer tank) circuits.

This forced operation will be finished and the temperature difference control enabled when the solid fuel boiler temperature falls more than 10K below the high limit.

Note:

Forced exhaust should be activated in the buffer menu to protect the buffer itself from overheating.

Switch-on differential

If the solid fuel boiler temperature rises above the buffer tank plus the adjusted switch-on temperature difference, the normal buffer tank loading process can start again.

Prerequisite

The temperature of the solid-fuel boiler is at least 10 K over the minimum temperature limit. The **minimum** value is 3K above the switch off differential.

Switch-off differential

If the temperature difference is lower than the switch-off differential, the loading process is terminated, and the pump is switched off. The **maximum** setting value is always 3 K under the selected switch-on differential in order to prevent rear discharge of the buffer tank.

Inhibition H-GEN

The solid fuel inhibition serves to prevent frequent switching between loading through the solid-fuel boiler and loading through a conventional oil/gas heat generator.

After the solid-fuel loading pump has been switched off, the set time must pass before loading of the buffer tank is continued through the conventional heat generator.

Activating the inhibition prevents the oil/gas heat generator from becoming active even though the solid fuel section is active.

Anti-blocking protection

This is an automatic function of the controller. If the solid fuel loading pump was switched off for longer than 24 hours, then it will be started for 20 seconds in order to prevent blocking through corrosion.

Operation

Note on operation	Menu / Parameter tree	Parameter
Solid fuel minimum temperature	Solid fuel	PARAMETER 01
Solid fuel maximum temperature	Solid fuel	PARAMETER 02
Switch-on difference	Solid fuel	PARAMETER 03
Switch-off difference	Solid fuel	PARAMETER 04
Inhibition H-GEN	Solid fuel	PARAMETER 05

8.7 Heating Circuit Constant Temperature Control

Note

This function must be activated in the HYDRAULIC menu for the corresponding heating circuit (Direct circuit, mixed circuit 1, mixed circuit 2).

Function

The control circuit is operated at a constant flow temperature value. The demand value is transmitted to the heat generator. The switching program of the corresponding heating circuit is active.

The constant temperature setting is carried out with the relevant parameter "Constant Temperature Setpoint".

If the function is activated at a mixer output, a flow sensor must be installed to adjust the flow temperature.

If priority DHW charging is active, the heating circuit is switched off.

If the H-GEN start-up protection is active, the heating circuit is switched off.

Operation

Note on operation	Menu / Parameter tree	Parameter
Activation constant temperature control	HYDRAULIC	PARAMETER 03 or PARAMETER 04 or PARAMETER 05
Setting constant temperature	Mixer 1 or Mixer 2 or direct circuit	

8.8 Fixed Value Control

Note

This function must be activated in the HYDRAULIC menu for the corresponding heating circuit (mixed circuit 1, mixed circuit 2).

Function

As in the case of constant control, but the demand value is not transmitted to the heat generator. Switching time program not active.

Operation

Note on operation	Menu / Parameter tree	Parameter
Activation fixed value control	Hydraulic	PARAMETER 03 or PARAMETER 04
Setting fixed value temperature	Mixer-1 or Mixer-2	PARAMETER 11

8.9 Demand contact

Note

This function is available if a heating circuit or hot water circuit is available and a variable input has been defined as a demand contact in the HYDRAULIC menu.

Function

Each of the three variable inputs (VE1-VE3) can be assigned a request contact.

If a variable input has been defined as a request contact, a corresponding parameter appears in the SYSTEM menu for assigning the contact to the respective heating or hot water circuit. Here you can define which heating circuit or hot water circuit the request contact should affect. For the assignment, each control circuit can be selected individually, or all control circuits of the corresponding central unit can be addressed via the 'All' settings.

In the information level, an open request contact is indicated in the status display of the respective heating circuit with *BLOCK*, a closed contact with *REQUEST*.

Contact function: A variable input defined as a request contact performs the following functions on the heating circuit:

- Variable input open: no request

The heating or hot water circuit is switched off without restriction (no frost protection, no standby function). ***Attention! To protect the respective control circuits against frost, etc.***, appropriate protective measures must be taken on site.

- Variable input short-circuited: Request

The heating or hot water circuit is in HEATING mode (continuous heating operation) and operates according to its parameterization.

Note

There is no controller function when multiple central units are connected in a bus network!

- When the request contact is activated, the set operating modes and switching times have no function. The heating circuit responds exclusively to the specifications of the request contact.
- The operating modes Manual, Emission measurement with STB test and Screed function has higher priority.

Operation

Note on operation	Menu / Parameter tree	Parameter
Activation demand contact	Hydraulic	PARAMETER 08 or PARAMETER 09 or PARAMETER 10
Assignment to heating circuits (HC/DHW)	System	PARAMETER 06 or PARAMETER 07 or PARAMETER 08

8.10 Malfunction Message Output

Note

Diese Funktion muss in der Ebene HYDRAULIC für eine variable Ausgabe (VO1 oder VO2) aktiviert werden.

Function

The function is activated during errors and serves as a common global malfunction message output for the connection of optical or acoustic signals.

Operation

Note on operation	Menu / Parameter tree	Parameter
Activation global malfunction message output	Hydraulic	PARAMETER 05 or PARAMETER 06 or PARAMETER 07

8.11 Malfunction Message Input

Note

This function can be activated in the HYDRAULICS level for each variable input (VI1 to VI3), so that up to three different fault messages can be connected via the variable inputs.

Function

When this function is activated, the corresponding input acts as a switching-contact. If the contact is closed (shorted), the global malfunction message input is treated as an extra error in the control circuit. Activated malfunction messages can be transferred to the data bus or can be registered via a global malfunction message output.

Operation

Note on operation	Menu / Parameter tree	Parameter
Activation malfunction message input	Hydraulic	PARAMETER 08 or PARAMETER 09 or PARAMETER 10

8.12 Timer

Note

The 'Timer' (clock) function can be selected in the HYDRAULIC level for the Output Direct circuit (HC).

Function

The function controls a consumer according to the current switching time program of the direct circuit.

8.13 External switching modem

Note

This function is available if a variable input (VI1...VI3) was defined as the switching modem in the *HYDRAULIC* menu.

Function

In this configuration, an external modem can be used in order to switch different operation modes by telephone remotely.

If a variable input (VI) has been defined as an external switching modem, the corresponding parameter for assigning the contact to the respective heating circuit (i.e. the heating circuit on which the request contact is to act) appears in the *SYSTEM* menu.

For the assignment, each control circuit on which the VI has been activated can be selected individually, or all control circuits of the heating system, including Controllers, can be addressed via the 'All' settings.

Contact function

Depending on the value of the input the following modes for the controller are possible:

- Variable input open:
  Controlling according to current operating mode (AUTO, RED. HEATING, HEATING, STANDBY)
- Variable input shorted:
  Controlling in STANDBY mode, heating and DHW frost protected.
- Variable input with resistance of 2.2 kOhm :
  Controlling according to continuous heating
- Variable input with resistance of 3.0 kOhm:
  Controlling according to continuous reduced heating (in RED or ECO mode according to settings).

Switching the operating mode affects all heating circuits simultaneously. Only one modem can be connected to a controller.

Prioritization

In the event of simultaneous access to a heating circuit, the following rules apply:

- If several VEs are parameterized for the same heating circuit, priority is given in the order VI1, VI2, VI3.
- If a VI is assigned to ALL, it has a higher priority than a heating circuit assignment.
- If several VEs are assigned to ALL, priority is again given in the order VI1, VI2, VI3.

Note

Always connect short circuits or resistive terminations to GND!

Operation

Note on operation	Menu / Parameter tree	Parameter
Activation modem function	Hydraulic	PARAMETER 08 or PARAMETER 09 or PARAMETER 10
Assignment to heating circuits (HC/DHW)	System	PARAMETER 06 or PARAMETER 07 or PARAMETER 08

8.14 External Information

Note This function must be activated in the HYDRAULIC level for a variable input (VI1 to VI3).

Function This function displays a temperature value in the information display as an info-value which is registered by a standard sensor (KTY10-6, as used in OS, BS, DHWS or FS). The function is not influenced by a controller and is only for your information.

Operation

Note on operation	Menu / Parameter tree	Parameter
Activation function for external info-value	Hydraulic	PARAMETER 08 or PARAMETER 09 or PARAMETER 10

9 Data bus / Bus communication / Room controllers

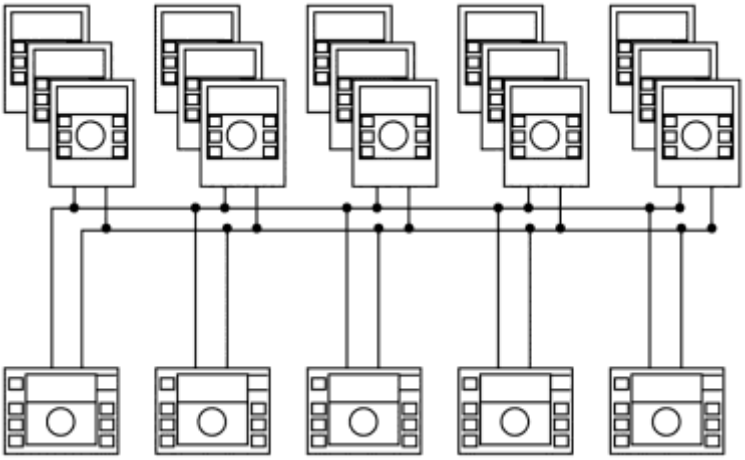
9.1 The data bus system

Function

The THETA control units can be connected via a special data bus designed for the THETA system (T2B = THETA 2-wire bus). This makes it possible to:

- Controlling further heating circuits by adding up to four additional central units
- Connecting room sensors and remote units to the central units and assigning them to heating circuits
- Cascading several heat generators, each with integrated central unit.
- Operation and monitoring of the heating system via app when connected to a heatapp! base T2B.
- Single room control when connected to a heatapp! base T2B with heatapp! gateway.

The maximum possible expansion of the bus system is shown in the following image.



9.1.1 Data bus addresses

Function

The individual devices in the buss system are assigned precise addresses. This is set in the corresponding parameter in the parameter tree " DATA BUS". The assignment occurs according to the following table.

Address	Device type	Assignment
10	Control unit	Central unit 1 as central controller
20, 30, 40, 50	Control unit	Central unit 2 to 5 as add-on controllers for extension of heating circuits or cascade
11, 12, 13	Room controller	Assigned to controller 1
21, 22, 23	Extra units	Assigned to controller 2
31, 32, 33	Extra units	Assigned to controller 3
41, 42, 43	Extra units	Assigned to controller 4
51, 52, 53	Extra units	Assigned to controller 5

Note

Make sure that one controller is assigned to the bus address 10.

Note: Bus addresses may only be assigned once.

Operation

Note on operation	Menu / Parameter tree	Parameter
Setting bus address	DATA BUS	PARAMETER 01

9.1.1 Control and regulation functions via the data bus

9.1.1.1 Boiler corrosion protection

If the heat generator is working with boiler corrosion protection, then this status is sent to all corresponding heating circuits. These will then block the energy supply for the time being (valves closed and pumps off).

9.1.1.2 Indirect return temperature control

The heat generator in the central controller (ADR 10) sends its current boiler data to each mixing circuit in the system which can then activate an indirect return control.

9.1.1.3 Accumulator mode (accumulator priority mode)

Each central unit can perform a storage tank charge, provided that the device design allows this. In priority mode, a started hot water charge blocks all other heating circuits and hot water charges within the bus system. If the storage tank charge is performed in parallel mode, all heating circuits in the system can remain active and another hot water charge can be activated with parallel mode set.

9.1.1.4 Heating circuit demand

Each heating demand in the data bus system will be processed by the central controller (ADR 10). The highest demand is accepted and transferred to the heat generator as a setpoint. Manual operation with manual temperature settings is also regarded as demand.

9.1.1.5 Clock synchronization

The time of the central unit (address 10) will be synchronized in the complete system. There is a system time.

9.1.1.6 Room temperature information

All room controllers and room sensors send the current room temperature to their heating circuits regularly.

9.1.1.7 Alarms / status indications

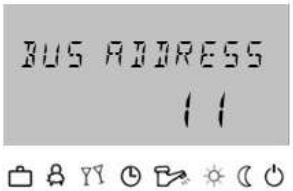
Alarms and status indications will be sent from every central unit to the room controller for display.

9.2 Operation of room controllers

9.2.1 Operation of room controller THETA RS-L

Function

A wall device RS can be connected to the controller.



With a room controller, remote control for a central unit (e.g. from a living room) is possible in addition to the room temperature detection. Settings can be carried out for all the existing heating circuits.

The bus address of the room controller is used to specify upon which heating circuit the ***room sensor*** (room influence) should act.

When a THETA RS-L is connected for the first time to the bus system, the address is selected for the heating circuit to which the RS is to be assigned (bus address).

After the input has been confirmed, feedback is output to which heating circuit (HC, MC1, MC2) and which central unit (CU) the room controller has been assigned

If a heating circuit that is not available was selected during selection, the display remains in the 'DATA BUS' display.

Assignment is carried out on the basis of the following table:

Address	Parameter
11	Direct circuit on central unit 1
12	Mixed circuit 1 on central unit 1
13	Mixed circuit 2 on central unit1
21	Direct circuit on central unit 2
22	Mixed circuit 1 on central unit 2
23	Mixed circuit 2 on central unit2
31	Direct circuit on central unit 3
32	Mixed circuit 1 on central unit 3
33	Mixed circuit 2 on central unit3
41	Direct circuit on central unit 4
42	Mixed circuit 1 on central unit 4
43	Mixed circuit 2 on central unit4
51	Direct circuit on central unit 5
52	Mixed circuit 1 on central unit 5
53	Mixed circuit 2 on central unit5

Note Double assignments of bus addresses are not permitted and will inevitably result in an error message.

Changing a bus address

A bus address can be changed at a later stage by the following procedure:

1. Disconnect wall devices from the data bus line (disconnect plug connection at the bottom of the device)
2. Reconnect the wall device, holding the rotary-push button pressed down until the address setting screen is displayed.
3. Set and confirm the new bus address.

Operation

Note on operation	Menu / Parameter tree	Parameter
Settings for room temperature-related functions	Direct circuit or mixed circuit 1 or mixed circuit 2	PARAMETER 03 PARAMETER 04 PARAMETER 06 PARAMETER 08 PARAMETER 09

The button operation and functions correspond to those of the THETA central unit (see Chapter 5, Operation).

9.2.2 Operation with room sensor THETA-RFF

Function

A room sensor RFF can be connected to the controller.

With a room sensor, it is possible to detect the room temperature, to remotely adjust the room setpoint temperature and to change the operating mode for a heating circuit. The settings only apply for the applicable heating circuit.

The bus address of the room sensor is used to specify on which heating circuit the room sensor and the adjustment of the operating mode are to act.

The connection is carried out via the data bus.

Setting the bus address

The settings for the THETA-RFF address are made using the rotary coding switch inside the room sensor in accordance with the following table:

Address	Assignment
0	undefined
1	Direct circuit on central unit 1
2	Mixed circuit 1 on central unit 1
3	Mixed circuit 2 on central unit1
4	Direct circuit on central unit 2
5	Mixed circuit 1 on central unit 2
6	Mixed circuit 2 on central unit2
7	Direct circuit on central unit 3
8	Mixed circuit 1 on central unit 3
9	Mixed circuit 2 on central unit3

A	Direct circuit on central unit 4
B	Mixed circuit 1 on central unit 4
C	Mixed circuit 2 on central unit4
D	Direct circuit on central unit 5
E	Mixed circuit 1 on central unit 5
F	Mixed circuit 2 on central unit5

Detection of the current room temperature (room sensor)

The integrated room sensor measures the current room temperature for all room temperature specific functions and transfers the measured values to the central unit every 20 s.

Operation

Note on operation	Menu / Parameter tree	Parameter
Setting room temperature specific functions	Direct circuit or mixed circuit 1 or mixed circuit 2	PARAMETER 03 PARAMETER 04 PARAMETER 06 PARAMETER 08 PARAMETER 09

Operating mode adjustment

The desired operating mode is selected with the key (keep pressed approx. 2 - 3 seconds) and indicated by the corresponding LED.

As the key is pressed, the operating mode is adjusted in the following sequence:

AUTOMATIC MODE - HEATING – SET BACK - AUTOMATIC MODE - ...

Once the operating mode has been changed, the new operating mode is transmitted to the central unit.

Only the operating mode of the heating circuit to which the RFF is assigned is changed. A global change of the operating mode is not possible with the THETA-RFF.

Automatic mode

The heating circuit is controlled constantly in accordance with the specification of the automatic program P1 - P3 set in the central unit plus or minus the room setpoint correction at the rotary button.

Heating

The heating circuit is controlled constantly in accordance with the desired daytime room temperature plus or minus the room setpoint correction at the rotary button.

Reduced

The heating circuit is controlled constantly in accordance with the desired reduced room temperature plus or minus the room setpoint correction at the rotary button. The function depends on the setting in the parameter selection for the heating circuit, REDUCED OPERATING MODE parameter.

Correction Room setpoint

The rotary button can be used to modify the room temperature set at the central unit by ± 6 K compared to the central position.

Turn clockwise: Temperature increase

Turn anticlockwise: Temperature decrease

Status indication

The status indication is realized by three LEDs. The possible states are listed in the table below:

Operating mode/Function	Moon LED	Clock LED	Sun LED
Automatic	OFF	ON	OFF
Permanent heating	OFF	OFF	ON
Permanent set back	ON	OFF	OFF
Starting phase	BRIEF FLASHING	BRIEF FLASHING	BRIEF FLASHING
Error address setting	FLASHING	ON	ON
Bus fault as well as indication when parameters are blocked	ON	FLASHING	ON
Party (set via CU)	OFF	OFF	FLASHING
Absent (set via CU)	FLASHING	OFF	OFF
Holiday (set via CU)	OFF	BLITZ	OFF

Definition:

Flashing: 0.8 s on and 0.8 s off

Brief flashing: 0.08 s on and 0.7 s off

Flash: 0.08 s on and 1.4 s off

The status indication is updated immediately after adjustment at the RFF and at the latest after about 20 s after adjustment when adjusted at the central unit.

Note

In all the other operating modes not defined in the table above, all three LEDs are activated.

9.2.3 Bus priority heating circuit

Function

This setting serves to determine the privilege status of a room station connected to a heating circuit. One parameter per available heating circuit is available for this setting.

Possible setting

- Simple access authorization with separate operating mode (tenant status)
  Only cycle times and parameters for ***your own*** heating circuit can be read and changed. When called up, only the information to which the operator is entitled with regard to his own heating circuit appears.
- Extended access authorization (caretaker/owner status)
  This authorization status allows access to ***all the*** heating circuits and the hot water circuit, as well as their parameters and cycle times within the respective central unit.

Note

Once a room device is connected and registered via the data bus to the central unit, the central unit automatically switches to separate operating mode! This is necessary to ensure clear operation of the system with connected room devices.

Operation

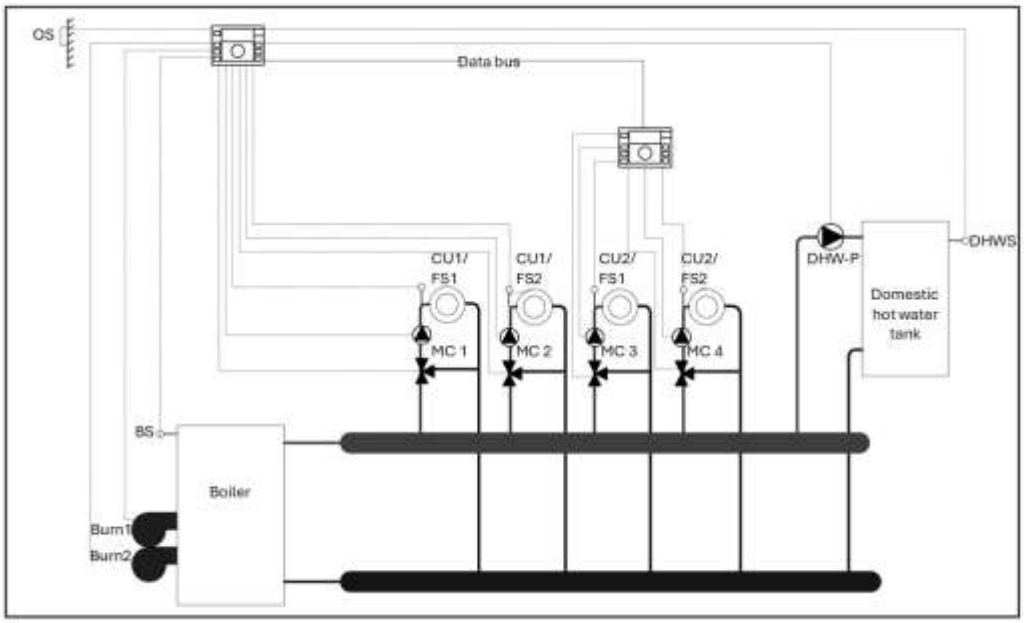
Note on operation	Menu / Parameter tree	Parameter
Setting bus address	DATA BUS	PARAMETER 02 or PARAMETER 03 or PARAMETER 04

9.3 Expanding the system by several central units

9.3.1 Examples with several controllers

Example 1

Heating system with 2 stage heat generator, DHW control, and 4 mixed circuits. The following diagram shows the hydraulic system.



The following components will be connected to the first controller with busaddress 10:

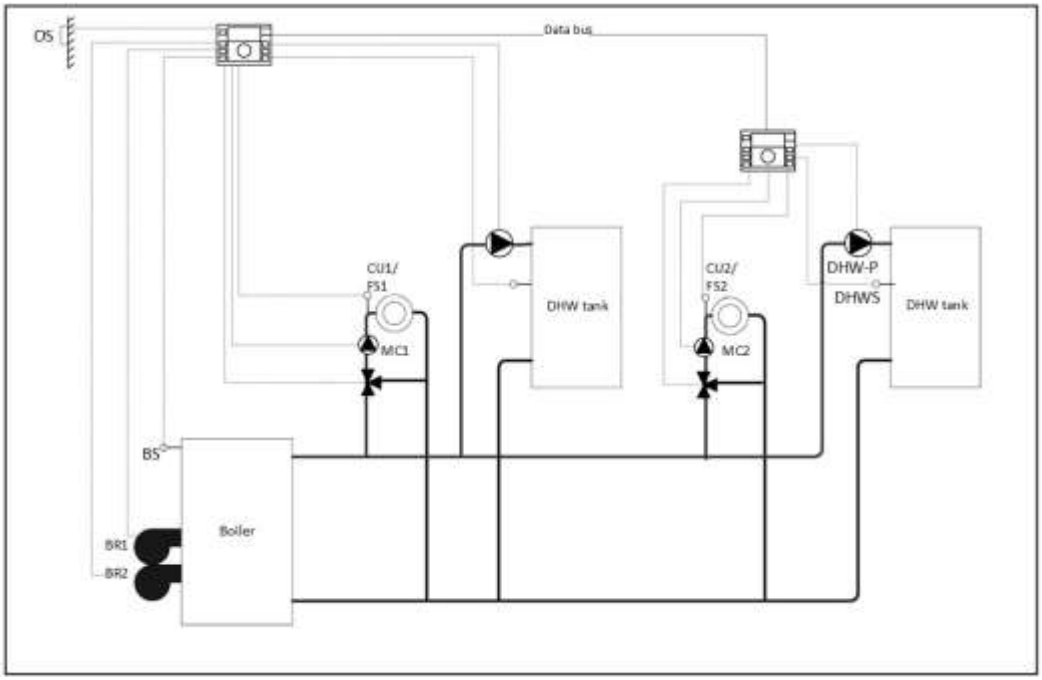
- Outdoor sensor
- Stage 1 and 2 of the burner
- Boiler sensor
- DHW sensor
- DHW charging pump
- Mixer pump, mixer open / closed and flow sensor of heating circuit 1
- Mixer pump, mixer open / closed and flow sensor of heating circuit 2

The following components will be connected to the second controller with busaddress 20:

- Mixer pump, mixer open / closed and flow sensor of heating circuit 3
- Mixer pump, mixer open / closed and flow sensor of heating circuit 4

Example 2

Heating system with 2 stage heat generators, 2 mixed circuits and 2 DHW controls (e.g. for a semidetached house with one boiler only). The following diagram shows the hydraulic system.


OS
Data bus
CU1/
FS1
MC1
DHW tank
CU2/
FS2
MC2
DHW-P
DHWS
DHW tank
BS
Boiler
BR1
BR2

10 Cascading of heat generators in the bus system

10.1 General description of cascading of control devices

In heating applications, a cascade is the hydraulic connection of several heat generators of different types to create a complex of heat generators.

The advantage compared to a single heat generator of the same capacity is that only the necessary number of heat generators supply to the heat demand. Heat generators which are not required are not switched on. This way, losses are minimized and the running time of the individual heat generators is prolonged significantly, which leads to a large increase in efficiency.

This type of plant design is especially suitable for plants of middle and high capacities.

Function

In its standard version, the control system features the possibility to couple and cascade several boilers in a simple way. Also, cascade control is independent of the type of heat generators to be combined. For instance, condensing boilers can be easily combined with atmospheric gas boilers.

The system automatically recognizes a cascade by checking if several central devices have programmed a heat generator, or if more than one condensing boiler is connected to a central device. In cascade operation, an additional cascade selection level is displayed for handling the parameters in the central device assigned to bus address 10.

Note

Cascade operation excludes 2-stage boiler control. All available stages are switched by the cascade management. Consequently, the respective parameters of the heat generator selection level are not available for settings. All controls are governed by cascade control.

10.2 Functions of the cascade parameter

Switching differential

Each heat generator has its own switching differential. The cascade switching differential must be set in such a way that it is always wider than the switching differential of any individual heat generator.

Switch-on delay

The reheating behavior of the boilers used must also be taken into account when dimensioning. The cascade switch-on delay is used to adjust the system to the start-up delays of the individual boilers. When does the switched-on heat generator supply its energy to the system after it has been activated (start-up phase, lead time)? The maximum delay time of the boiler in the system must be set here.

Switch-off delay

To prevent all heat generators from switching off simultaneously when the set cascade switching difference is exceeded, the switch-off delay controls the withdrawal of the heat generators. This must be coordinated with the reheating behavior of the heat generators.

Switch-over power

The switch-over power set in the cascade level is only suitable for operating boiler controls. Until the last burner stage has been started, all active burner stages up to that moment are reduced to the set switch-over power (capacity limitation). When the last burner stage is activated, and after the dynamically calculated activation delay has elapsed again (at least 5 minutes), all further automatic controls are enabled for 100 % power (full load).

If the system is operating at all available stages, no power limitation is active for the automatic firing controllers. If a stage is reduced, the set Switching output for the automatic firing controllers takes effect again.

Reversing

To ensure the balanced utilization of the heat generators within a cascade, a running-time dependent leading stage swap can be activated.

After the set operating time of the presently leading heat generator, the system switches to the heat generator with the next higher bus address.

Stage swaps can be executed between several standard units or if several condensing boilers are switched by a single central unit.

Leading stage

The leading stage can still be set manually to any existing stage even when automatic stage sequence switching is disabled. During parameterization, the existing cascade stages are numbered according to their address in the data bus (example: see below).

Note

Changing the heat generator type within the central device under address 10 leads to an automatic reset of the leading stage setting to the first heat generator.

Peak load from address

The cascading plant can be divided into two groups (basic and peak load).

To do this, parameterization is used to determine the cascade level at which the peak load group begins. During parameterization, the existing cascade levels are numbered consecutively according to their addressing within the data bus.

Example for addresses

Address THETA	H-GEN-Typ	H-GEN-Address	Numbering Groups
10	Automatic boiler	1	1
10	control	2	2
10	Automatic boiler	3	3
20	1-stage	--	4
30	1-stage	--	5

In the example, the three condensing boilers will be used as basic load boilers.

The two atmospheric gas boilers will be used as peak load boilers.

The peak load groups will start at stage 4.

Changeover basic load in group formation

Wenn the group is formed by parameterization and the peak load boiler(s) are activated, the leading groups can be switched via a parameter. If this parameter is on ON, the group of peak load boilers, on demand, takes over the basic load and the basic load boilers take over the correction of the flow temperature. The stage switch-over is still only active for the actual basic load boilers.

Domestic hot water Quick load

This parameter is used to determine how many stages of the cascade are required for hot water loading. A quick activation is also associated with this.

Operation

Note on operation	Menu / Parameter tree	Parameter
Switching differential	CASCADING.	PARAMETER 01
Switch-on delay	CASCADING.	PARAMETER 02
Switch-off delay	CASCADING.	PARAMETER 03
Sequential switch-over power stage sequence	CASCADING.	PARAMETER 04
Reversing	CASCADING.	PARAMETER 05
Leading stage	CASCADING.	PARAMETER 06
Peak load boiler from address	CASCADING.	PARAMETER 07
Changeover basis power at group formation	CASCADING.	PARAMETER 08
DHW quick activation	CASCADING.	PARAMETER 09

10.3 Mode of operation of cascade control

10.3.1 Switch-on characteristics

The switch-on characteristics of the boiler stages is determined by the set switching differential and the dynamic switch-on delay. The stage number is incremented only when the following criteria are fulfilled.

BTACT < BTNOM - SD/2

t >= tswitch-on delay * (100 - (dFT * 100 / FTnom)) / 100

The boiler temperature of the master boiler or the total flow sensor must have fallen below the specified boiler setpoint minus half the switching difference for at least the calculated switch-on delay.

The switch-on delay is reduced if the actual temperature falls significantly below the switching difference. The reduction is proportional to the ratio:

$$\frac{dFT - SDcascade / 2}{FTnom - SDcascade / 2}$$

dFT	=	Difference nominal flow temperature and actual flow temperature
VTSetp.	=	Flow setpoint
SDcascade	=	1/2 cascade switching differential

10.3.2 Switch-off behavior

The number of stages is reduced as soon as the boiler temperature of the leading boiler or the common flow sensor exceeds the current set boiler temperature plus half of the switching differential during the calculated switch-off delay.

The switch-off delay is reduced if the actual temperature is far above the switching differential. The reduction is proportional to the ratio

$$\frac{dFT - SDcascade / 2}{FTnom + SDcascade / 2}$$

dFT	=	Difference nominal flow temperature and actual flow temperature
FTnom	=	nominal flow value
SDcascade	=	1/2 cascade switching differential

10.3.3 Operation with conventional heat generators (2-point)

Function

Only the heat generator that was switched on last operates according to the setpoint (residual heat coverage). All other heat generators are switched on.

Only after the corrected stage has no more demands on the heat generator and the boiler temperature rises above the setpoint plus the set cascade switching differential, the boiler stage can be reduced by one.

Each heat generator displays the current demand value as setpoint.

If a heat generator is not available in the system (error, external blockage or OUT-lock), it is skipped in the stage control and the next available heat generator is controlled.

The minimum boiler temperature of all the burner stages enabled by the cascade management is checked. In such cases the highest minimum temperature of all the heat generators is set as the minimum requirement for the system.

The maximum boiler temperature is only monitored inside the heat generators. There is no limit to the setpoint!

10.3.4 Operation with boiler control (new)

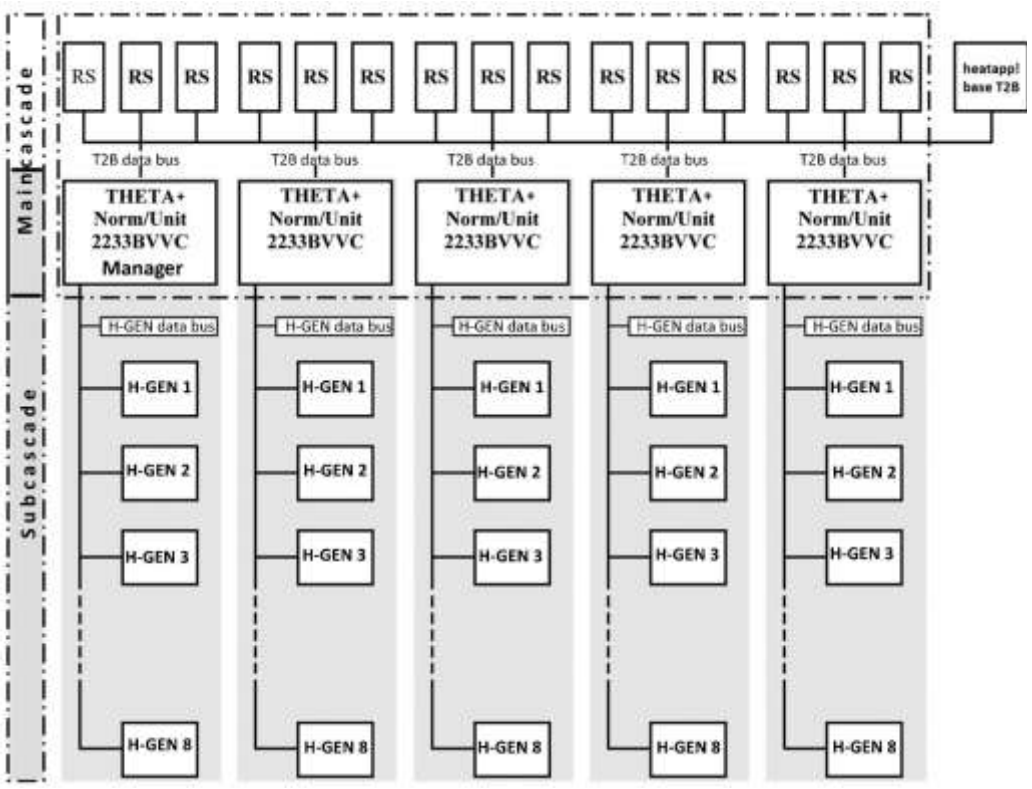
THETA controllers with communicative heat generator interfaces (..C..) enable connecting more than one heat generator per controller. The cascade control in the THETA system comprises a main cascade and, depending on the plant design, one or more sub cascades.

The main cascade is controlled directly by the cascade manager (address 10) via the THETA system bus (T2B). Every participant in this cascade is a THETA controller NORM or UNIT. The

parameterization of the cascade settings is carried out at the cascade manager. Specific settings for the heat generators are carried out at the corresponding standard unit NORM or UNIT.

The sub-cascade is controlled via the H-GEN bus (heat generator bus). Here, several heat generators can usually be addressed either via an interface (as with a combustion controller) or directly and separately. Since only one parameterization for heat generators is possible in THETA, the settings apply equally to all H-GENs in the sub-cascade.

System overviewT2B



Information display

If a sub-cascade is detected, an extended display appears in the information display of the central unit.

Detailed temperature display heat generator

INFORMATION	Display value	Notes
Heat generator-temperature H-GEN address 1	HEAT GENER. ADR-1 actual value	Combined display of heat generator address and actual flow temperature of the boiler control with the address 1
Heat generator-temperature H-GEN address 2	HEAT GENER. ADR-2 actual value	Combined display of heat generator address and actual flow temperature of the boiler control with the address 2
…	…	…
Heat generator-temperature H-GEN address n	HEAT GENER. ADR-N actual value	Combined display of heat generator address and actual flow temperature of the boiler control with the address n

Additional display if the rotary push button is pressed during the heat generator temperature display:

INFORMATION	Display value	Notes
Heat generator-temperature H-GEN address n	HEAT GENER. Setpoint op.cond.	- H-GEN setpoint displayed at bottom left - "%" display, if capacity limitation on, bottom left - Operating conditions displayed at bottom right: - SET (requirement present, no flame present) - ON (requirement present, flame present) - MANU (no requirement present, flame present) - OFF (no requirement present, no flame present)

Status display heat generator

INFORMATION	Display value / examples	Notes
Operating status heat generator	HEAT GENER . ON/OFF	Information on the switching state of the multiple stage heat generator

Additional display if the rotary push button is pressed during the operating status display

INFORMATION	Display value / examples	Notes
Operating status heat generator	HEAT GENER . SG/SE SA/SV	Combined display with information on Cascade stages: SG=required stages SE=recognized stages SA=activated stages SV=available stages

Explanations

- (SG) Required stages
  number of stages calculated by the energy management for controlling
- (SE) Recognized stages
  number of all heat generator stages (main cascade and sub cascade, 2-stage boilers are counted as two stages) recognized via the data bus
- (SA) Activated stages
  number of active heat generator stages in cascade
- (SA) Available stages
- If individual stages are not available, e.g. due to an outdoor temperature lock or an external heat generator block, the number of available stages is different than the number of recognized stages.

Function

The set switch-over power in the CASCADE level and the basic load excess in the HEAT GENER. level are only suitable for operation with a burner control system. Until the last burner stage has been started (basic load mode), all active burner stages up to that moment are reduced to the set switch-over power (ventilator rpm limitation).

Only the stage that was activated last operates according to the current requirement value.

If a flow sensor is installed, the setpoint of the stage that was activated last is calculated using a PI-algorithm.

If all stages are activated (full load mode), the capacity limitation is lifted, and all condensing boilers are enabled 100 %. Then, all stages operate according to the current setpoint.

If a flow sensor is installed, the setpoint is calculated using the PI-algorithm.

The stages operating at basic load mode are also monitored concerning the required value. This may not become smaller than the required value.

If the capacity is reduced by one stage and the last stage is removed from the control network, then the basic load mode is activated. Then the set basic load excess and the capacity limitation of the stages operating at the basic load level are activated.

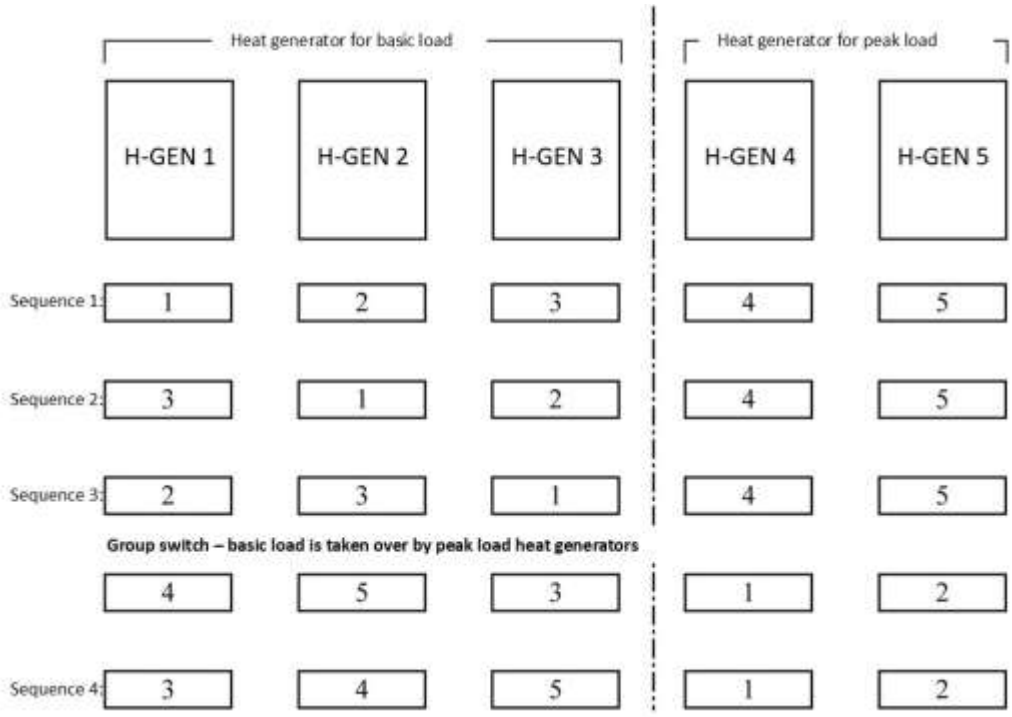
10.3.5 Operation with group reversal

High-end condensing technology is used especially in plants of large and middle capacities when high efficiency is required (municipal plants) , to cover a basic load of an average annual capacity. The peak load is covered by conventional low temperature boilers in the cold months.

In this technique, an activated stage reversal only affects the basic load heat generators, not the peak load heat generators.

The first peak load boiler is switched on after all basic load heat generators are activated and operating at 100 %, at full load.

Example for switching sequence



In some cases, it might be better to have the peak load boilers take over the basic load if they are necessary. This is possible by parameterization.

10.3.6 DHW quick activation in cascade systems

Description

Often, on cascade systems, not all heat generators are required to prepare hot water. The required heat generators must also be activated more quickly than with the heating mode.

Function

When there is a DHW request, a fixed value of 10 seconds is used to activate subsequent stages up to the set maximum number of stages for DHW rapid activation, instead of the general activation delay (PARAMETER 02).

For further stages, activation takes place in accordance with the adjustable activation delay.

During DHW charging without heating operation (storage priority), the number of heat generators is limited by the settings in the DHW rapid activation parameter.

In parallel operation (heating circuit and DHW demand simultaneously), there is no limit on the number of stages.

When DHW charging is active, stages are switched down taking into account the configured switch-off delay.

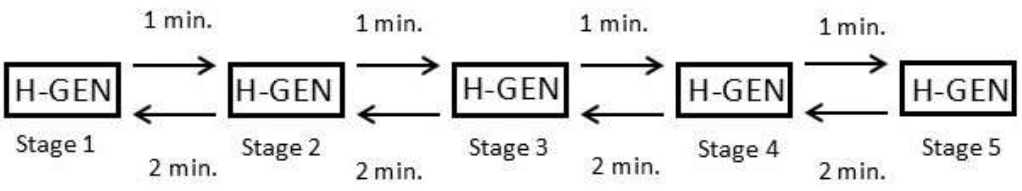
If a heating circuit is operating with more stages than those authorized for DHW operation, and DHW charging then takes place in priority mode, the stages exceeding the number authorized for DHW charging are switched off immediately.

In parallel operation, the activated stages are not downshifted.

A parameterized stage sequence switching output must be taken into account for switching on the next stage.

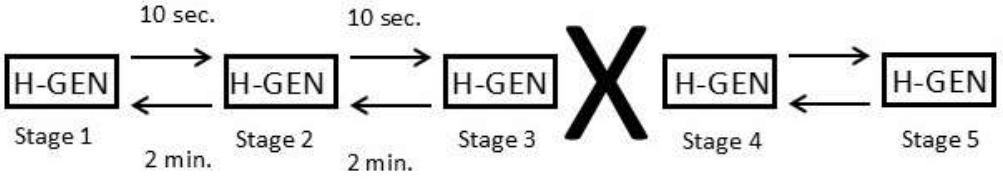
- Cascade system with 5 stages
- PARAMETER 02 = 1 min.
- PARAMETER 03 = 2 min.
- PARAMETER 09 = 3

Heating mode



Activation and deactivation with the parameterized delay from parameter 02 and parameter 03.

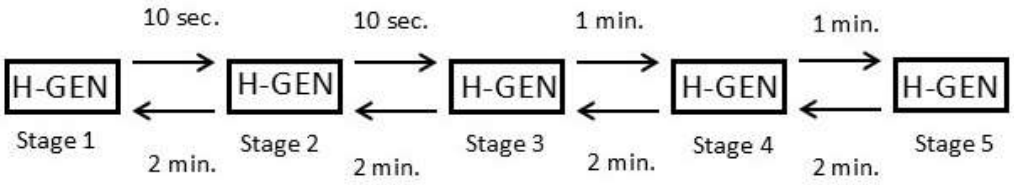
DHW tank priority (no heating request)



- Activation immediate with minimum delay

- Switch back with parameterised delay P03

DHW tank parallel mode (combined hot water loading / heating mode)



- Activation up to stage parameter 09 with minimum delay for H-GEN loading
- In case of further requirement through heating further activation with parameterised delay parameter 02
- Switch back with parameterised delay parameter 03

10.3.7 DHW operation via the burner control system (sub-cascade)

When operating the DHW system in a sub-cascade via the burner control systems, ensure that the DHW function on the burner control system with address “0” is activated.

Activation on a downstream burner control system is not recognized or processed by the THETA system.

The information display shows only the DHW value transmitted by the burner control system with address “0”.

10.3.8 Behavior during heat generator fault

A heat generator that is not available in the system (due to a fault, external lockout or outdoor temperature lockout) is bypassed within the stage control, and the next available heat generator is activated.

10.3.9 Behavior for special functions

Manual operation

The heating circuits of the control device in which manual operation was activated operate according to the MANUAL function. The set request value is forwarded to the energy management module of cascade control and adjusted by the available boiler stages.

Emission measurement

This function works as described under "Emission measurement", with the following extensions:

- The effect on heating circuits is extended to all heating circuits of the system.
- The heat generators (burners) are only enabled on those units on which emissions measurement has also been activated.

Limiter Test

This function works as described under "limiter test", with the following extension:

As soon as an limiter function is detected within the BUS system, all consumers (heating circuits) are inhibited.

Emergency mode

The parameters of cascade control are determined in the central device with the bus address 10. If that controller becomes unavailable due to some defect, the remaining stages continue

operating in an emergency mode. In this mode all heat generators adjust to the same boiler nominal temperature (parallel operation). As soon as the cascade manager comes back into operation, cascade control is reactivated automatically.

Data transmission

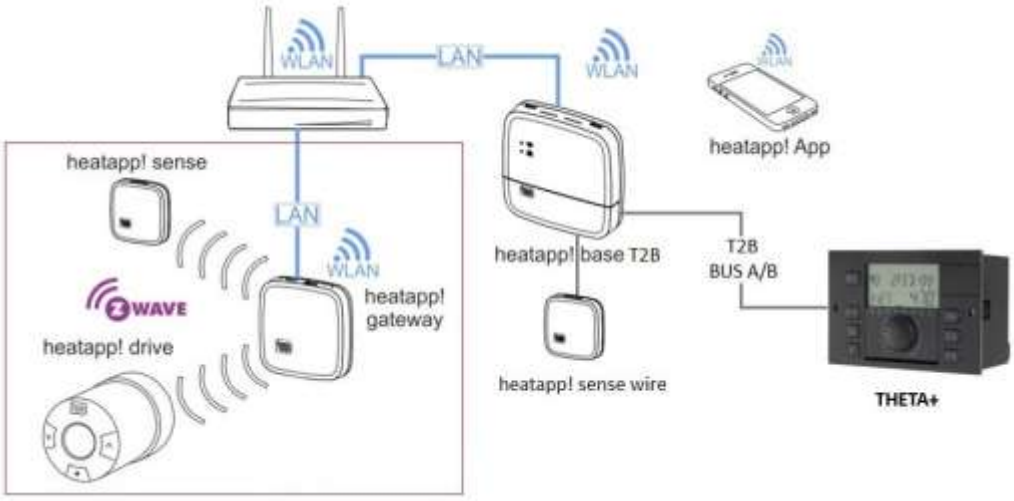
To enable the cascade function to process fast switching events (cascading with communicating boiler controls), the trans-mission of the cascade data was given a higher priority. Consequently, the data transmission from any device to the master device, and of the request values from the master to the slave devices, takes no longer than approx. 3 seconds.

11 heatapp!

Integrating the **heatapp! base t2b** with THETA creates opportunities for enhanced comfort and energy savings.

A **heatapp! base t2b** can be connected directly to THETA via the integrated t2b system bus. In turn, a **heatapp! sense-wire** can be connected to the **heatapp! base t2b** to utilise room conditions for reference room control.

THETA room units THETA RS-L and THETA RFF cannot be used in conjunction with the **heatapp! system**.



11.1 heatapp! Operation for Theta systems

The **heatapp! base t2b** enhances user-friendliness for both users and installers. The system can be operated from anywhere and at any time via the **heatapp! app** (Ethernet and internet).

The parameters in THETA can be accessed and adjusted in the professional section of the **heatapp! base t2b**. Control of the settings is transferred from the controller to the **heatapp! system**.

In the **heatapp! base t2b**, room groups are formed according to the available heating circuits. These represent the hydraulic layout of the heating system in relation to the rooms (e.g. ground floor, upper floor).

When assigning room groups during setup, all configured heating circuits – including those from cascade systems – are immediately visible. However, this requires that all connected THETA RS units have been uninstalled. If a THETA RS remains connected, the heating circuit will not be displayed and will continue to operate independently.

When using the **heatapp! sense-wire**, a reference room is created and assigned to the THETA heating circuit.

The **heatapp! base t2b** automatically checks and corrects the required parameters for the heating circuits and DHW control in the THETA.

The operating modes and cycle times for the heating circuits and DHW are decoupled from THETA and set by the **heatapp! base t2b**. The cycle times can be conveniently set in the app. The settings in the THETA, including the cycle times, are then no longer effective.

The settings for the comfort temperature (daytime temperature), the reduced temperature (night-time temperature) and the desired temperature (temporary temperature) are made in the app.

The calculation of the demand-based flow temperature for the heating circuit is performed in the **heatapp! base t2b**, taking into account the THETA's limit values, and passed on to the THETA as a setpoint.

Control of the heating circuit flow temperature remains active in the THETA.

Additionally, the calculation of the flow temperature for a heating circuit can be influenced by using **heatapp! sense-wire**. To do this, the **heatapp! sense-wire** is connected to the **heatapp! base t2b**.

Fault messages from the **heatapp! system** are automatically sent as push notifications and/or via email.

Fault messages from the THETA are also automatically sent as a global fault message "Interface reports a fault" in the **heatapp! system** as a push notification and via email.

Effects of a connected heatapp! base t2b on THETA:

- The **heatapp! base t2b** calculates heating circuit setpoints.
- The **heatapp! base t2b** calculates the domestic hot water setpoint.
- Cycle times for the heating circuits and DHW are no longer set on the THETA but in the heatapp! app.
- The **heatapp! base t2b** automatically adjusts the following parameters in the THETA:
  - System: Parameter 03 (Operating mode) to value 2 (Operating mode set to all heating circuits separately)
  - Per heating circuit: Slope for HC / MC1 / MC2 to value 1.00
  - Per heating circuit: Parameter 04 (Room factor) set to value RC
  - Per heating circuit: Parameter 07 (Heating limit) set to value OFF
  - Per heating circuit, the operating mode is set to HEAT
  - The DHW operating mode is set to HEAT
  - The DHW day setpoint is overwritten with the DHW day temperature from the **heatapp! base t2b** cycle time
  - The DHW night setpoint is overwritten with the DHW night temperature from the **heatapp! base t2b** cycle time
- The time synchronization of the THETA control is carried out by **heatapp!**

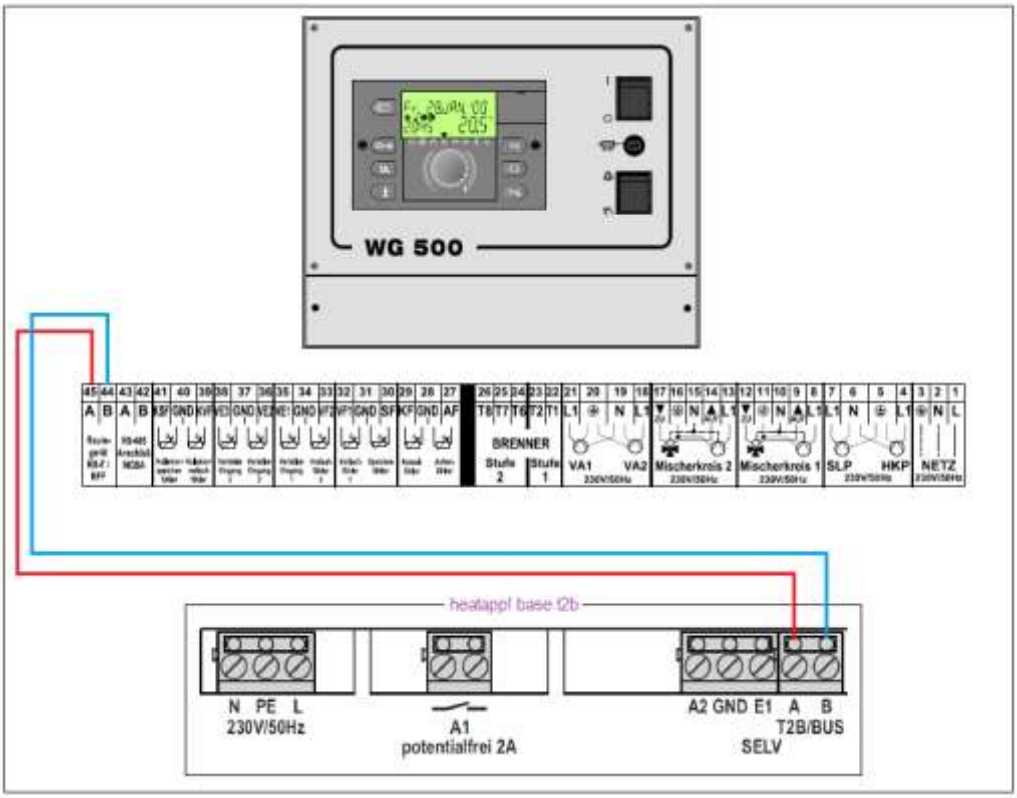
The **heatapp! base t2b** uses the outdoor temperature to calculate the heating circuit flow temperature.

Alternatively, reference room control can be activated for a heating circuit using **heatapp! sense-wire**.

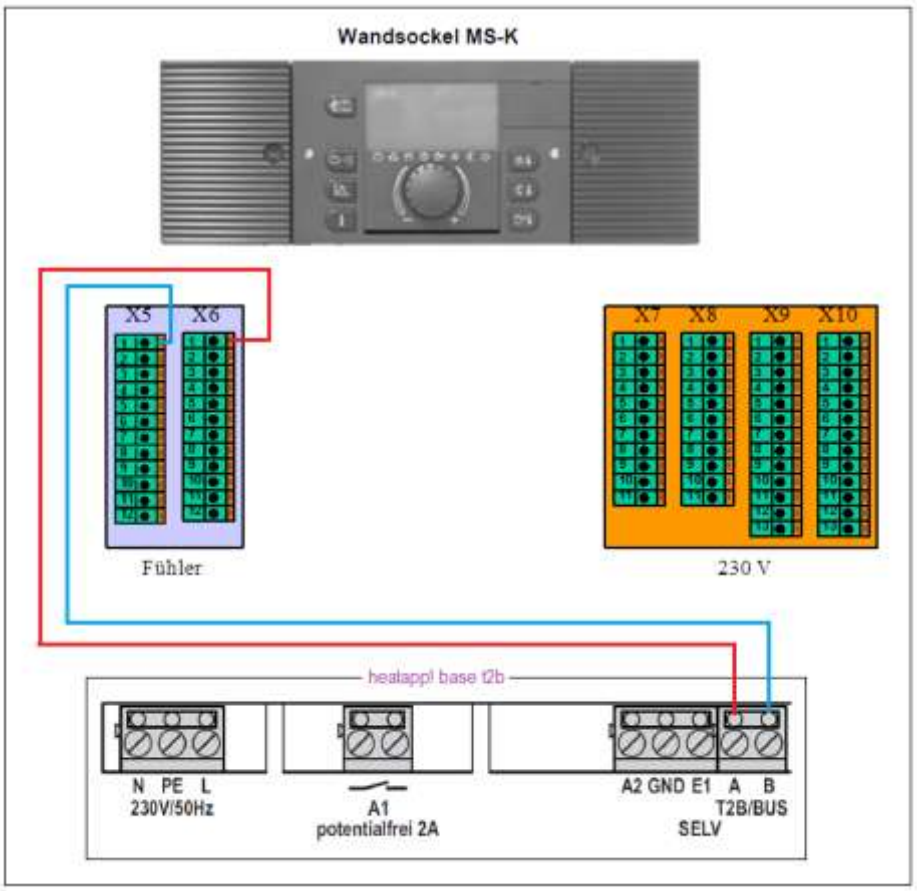
The **heatapp! app** uses the outdoor sensor temperature to display the weather temperature in the app. The **heatapp! app** displays current setpoint and actual temperatures (outdoor, rooms, DHW, energy generators) in the Monitor menu.

11.2 Connecting a heatapp! base t2b to THETA+

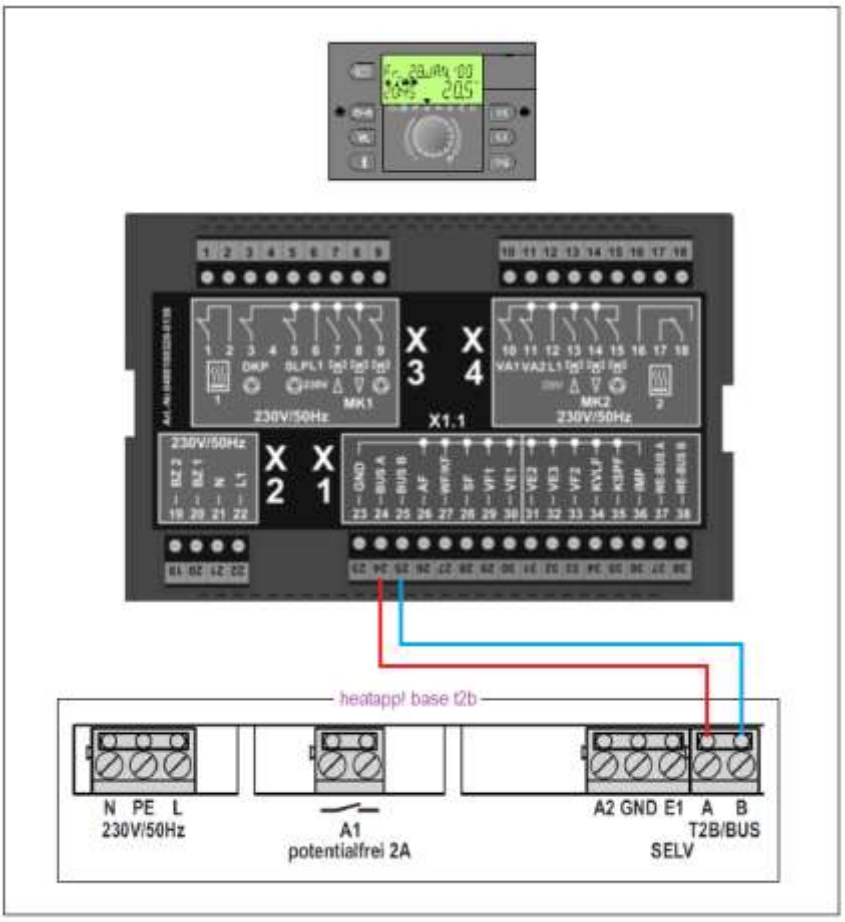
WG 500



THETA-MSK



THETA+ N


X 3
X 4
X1.1
X 2
X 1
heatapp! base t2b
N PE L
230V/50Hz
A1
potentialfrei 2A
A2 GND E1 A B
T2B/BUS
SELV

12 Help for commissioning, maintenance and problem solving

12.1 Automatic Set-Function

Function

This function allows control loops that are not required, or will only be required at a later stage, to be taken out of service.

Control loops are automatically registered when their associated sensors are connected and provide valid measurement values. Control loops without sensor connections are automatically taken out of service without an error message.

The AUTO-SET function becomes active every time the power is switched on.

Automatically activation

As long as system parameter (14) AUTO SET is set to ON and no change of day has been detected during operation, the AUTO SET function is executed every time the Controller starts up. Once a change of day has been detected, system parameter (14) AUTO SET is automatically reset to OFF. The AUTO SET function can be reactivated at any time via the parameter for one day (change of day).

Manual activation

Manual call-up of the AUTO SET function is always possible. It is called up by pressing and holding the rotary push button when switching on (during the segment test) until the AUTO SET display appears. The basic display is activated after the function has been carried out.

The auto set function registers the following sensors

Input		**Is only activated if:**	
Outdoor sensor	OS		
Flow sensor 1	VF1	MC1	OFF / mixed circuit valve 1
Flow sensor 2	VF2	MC2	OFF / mixed circuit valve 2
DHW sensor	DHWS	DHW-P	OFF / DHW charging pump
Boiler sensor	BS	Burn	OFF / single stage

Furthermore, the auto set function is carried out only, if the control circuits which are assigned to the corresponding sensors were parameterized in the respective levels.

DHW sensor

HYDRAULIC Level

Parameter 2 - Function DHW charging pump Setting range OFF or 1 (DHW-P)

Flow sensor 1 (VF1)

HYDRAULIC Level

Parameter 3 - Function mix. heating circuit 1 Setting range OFF or 3 (mix. heating circuit)

Flow sensor 2 (VF2)

HYDRAULIC Level

Parameter 4 - Function mix. heating circuit 2 Setting range OFF or 3 (mix. heating circuit)

Boiler sensor (KF)

Level HEAT GENERATOR

Parameter 1 – Type of heat generator

Set-value OFF or 1 or 2 (single-stage operation or 1x two-stage operation), depending on type code.

With that a programmed parameterization will not be changed again, the current values will be checked before. A modification is carried out only if one of the adjustments listed above is

given. In this way the auto set function, for example never can cancel a return flow increase of mixer heating circuit 2, or can function it to a mixer heating circuit.

Operation

Note on operation	Menu / Parameter tree	Parameter
Activate automatic set function	SYSTEM	PARAMETER 14

12.2 Check safety temperature limiter

Note

This function may only be activated by the heating specialist.

Function

By keeping the rotary push button pressed during an emission measurement the integrated heat generator maximum temperature limit is bypassed, the heat generator remains in function continuously until the triggering of the safety temperature limiter (SLT).

During the SLT check all the loads are separated from the heat generator, i.e. any available mixing valve is closed and all the heating and DHW loading pumps are shut down.

The emission measurement is continued with the remaining time.

Application

SLT test by the heating technician

Termination

Release the rotary push button – the emission measurement still active is stopped with the  key.

12.3 Relay / Function Test

Function

Depending on the controller version various outputs can be tested. This is not only a relay test, but a function test by means of which the hydraulic components are tested. The partially compulsory sequence of the switching procedures is considered.

After selecting the test function the relevant relays can be switched one by one by pressing the rotary push button in the specified switching sequence.

Heat generator

Heat generator test

a. **Single stage** heat generator
(Level ***heat generator*** Parameter 1 = 1)
Switching sequence: OFF, ON, OFF...

b. **2-stage heat generator**
(Level ***heat generator*** Parameter 1 = 2)
Switching sequence: OFF, STAGE 1, STAGE 1+2, STAGE 1, OFF.....

c. **2x1-stage heat generator**

(Level ***heat generator*** Parameter 1 = 3)
Switching sequence: OFF, HG 1, HG 1+2, HG 2, OFF.....

d. **modulating mode**
(Level ***heat generator*** Parameter 1 = 4)
Switching sequence: OFF, ON, OPEN, STOP, CLOSED, OFF...

Pumps / VOs **Test Pumps**

(Unmixed circuit pump, mixed circuit pump, DHW loading pump, variable output 1 and 2)

Switching sequence: OFF, ON, OFF,...

Mimo **Test Actuator Mixed Circuit**

Switching sequence: STOP, OPEN, STOP, CLOSED; STOP....

Operation

Note on operation	Menu / Parameter tree	Parameter
Relay test heat generator	RELAY TEST	heat generator
RELAY TEST direct circuit pump	RELAY TEST	OUTPUT HC-P
RELAY TEST mixed circuit pump 1	RELAY TEST	OUTPUT MCP 1
RELAY TEST actuator mixing valve 1	RELAY TEST	ACTUATOR MC-1
RELAY TEST mixed circuit pump 2	RELAY TEST	OUTPUT MCP2
RELAY TEST actuator mixing valve 2	RELAY TEST	ACTUATOR MC-2
RELAY TEST DHW charging pump	RELAY TEST	OUTPUT DHW-P
RELAY TEST variable output 1	RELAY TEST	OUTPUT VO-1
RELAY TEST variable output 2	RELAY TEST	OUTPUT VO-2

12.4 Alarm messages

Function

In order to set up a precise diagnosis in the case of malfunction, the control system is equipped with an extensive malfunction message system. An occurring alarm is always announced in the display of the corresponding basic control and stored.

There are five different categories of alarm messages:

- **1 Sensor alarm messages**
  Sensor values which are not in their respective measuring range will either be sensor breaks or sensor short circuits. They appear with an error message according to their use.
- **2 Heat generator alarm messages**
  These messages depend on the actual switching conditions. They appear with the corresponding error message, depending on the version and allocation.
- **3 Logical alarm messages**
  These messages will react on the actual control result. They appear with the corresponding error message, depending on the version and allocation.
- **4 Bus alarm messages**
  These messages display address problems such as double addresses or not recognizing addresses within the data bus system. They appear with the corresponding error message, depending on the version and allocation
- **5 Alarm messages from boiler control (high efficiency condensing boilers)**

These error messages come from the automatic boiler control and are divided up into locks, blocks and warnings.

The displaying characters and further processing of the logical faults from the THETA system can be enabled or suppressed by a corresponding parameterization (see SYSTEM level-parameter 13 (logical error message).

Display and further processing of alarm messages from a connected automatic boiler control can be controlled as follows:

- SYSTEM parameter 27 can be used to determine which of the alarm messages transmitted from an automatic boiler control are forwarded to the THETA system.
- System parameter 28 can be used to determine whether or not alarm messages from an automatic boiler control are written to a separate alarm memory. If parameter is set to ON, another tree appears inside the menu tree, with the designation ALARM 2. This alarm memory is used to store alarm messages from automatic boiler controls only.

Further processing in case of alarm messages:

- Alarms will be indicated in the basic display of the control unit
- System errors appear in the information level besides the corresponding information
- Alarm messages are loaded into a malfunction message log (see description below)
- Alarm messages activate in case of corresponding parameterization an alarm output for optical or audible signalers.
- With the appropriate parameterization, alarms are forwarded to the respective gateways via the data bus.

Table of alarm messages

Error state	Designation	Type of error	Code	Note
System	Outdoor sensor	Break	10-0	
System	Outdoor sensor	Short circuit	10-1	
System	Boiler sensor	Break	11-0	
System	Boiler sensor	Short circuit	11-1	
System	Flow sensor 1	Break	12-0	MiMo MC1 OFF
System	Flow sensor 1	Short circuit	12-1	MiMo MC1 OFF
System	DHW sensor	Break	13-0	
System	DHW sensor	Short circuit	13-1	
System	VI 2	Break	14-0	
System	VI 2	Short circuit	14-1	
System	VI 2	Alarm	14-7	
System	VI 3	Break	15-0	
System	VI 3	Short circuit	15-1	
System	VI 3	Alarm	15-7	
System	VI 1	Break	16-0	
System	VI 1	Short circuit	16-1	
System	VI 1	Alarm	16-7	
System	Solar panel buffer sensor	Break	17-0	
System	Solar panel buffer sensor	Short circuit	17-1	
System	Flow sensor 2	Break	18-0	MiMo MC2 OFF
System	Flow sensor 2	Short circuit	18-1	MiMo MC2 OFF
System	Solar panel -flow sensor	Break	19-0	

System	Solar panel-flow sensor	Short circuit	19-1	
System	Burner 1	Not OFF	30-2	After 10 min.
System	Burner 1	Not ON	30-3	After 10 min.
System	Burner 2	Not OFF	31-2	After 10 min.
System	Burner 2	Not ON	31-3	After 10 min.
System	Heat meter	No impulse	32-3	
System	Flue gas temperature	Exceeding	33-5	
System	Flue gas temperature	STL triggered	33-8	
Logical	Heat generator temperature	Nicht erreicht	50-4	After 90 min.
Logical	DHW temperature	Not reached	51-4	After 4 hrs.
Logical	Flow temperature MC1	Not reached	52-4	After 1 hrs.
Logical	Flow temperature MC2	Not reached	53-4	After 1 hs.
Logical	Room temperature HC	Not reached	54-4	After 3 hrs.
Logical	Room temperature MC 1	Not reached	55-4	After 3 hrs.
Logical	Room temperature MC 2	Not reached	56-4	After 3 hrs.
System	Activity	Case of collision	70-0	
System	Activity	No t2b	70-1	
System	Activity	No i2C	70-3	
System	Activity	No connection H-GEN bus	70-6	After 1 min.
System	Activity	No master	70-8	After 2 minutes, CU1 is missing from the cascade
System	Malfunction impulse input	No signal	90-0	After 5 min.

Alarm message 2

Error state	Designation	Type of error	Code	Note
System	Malfunction	Locking	EnXX	Error FA
System	Malfunction	Blocking	BnXX	Error FA

If an automatic boiler control is connected, helpful warning messages may come from the boiler control which will be displayed as follows:

Error type	Code	Field 1	Field 2	Field 3
Hydrau.press	80-1	HYDRAU . PRESS		HIGH
Hydrau.press	80-6	HYDRAU . PRESS		FILL
Hydrau.press	80-2	HYDRAU . PRESS		MIN
Venting	81-0	VENTING		
Maintena	82-0	MAINTENANCE		
Switch-off	---	HEATS. YSTEM		OFF
Service	240-1	SERVICE		

Warning messages are not saved in the error stack.

Malfunction log

The control unit has two malfunction logs (ERROR MESSAGE for system errors and ERROR 2 for errors from an automatic boiler control) in which a maximum of 20 error messages can be stored. The malfunction messages are displayed with date, time and malfunction type (error number). The query is carried out in the sequence of the entered malfunction messages in the level ALARM.

The last (= most recent) malfunction message is in first position (No. 01); the previous malfunction messages are shifted down by a position upon each new alarm message. The last error message is deleted when a new message appears.

Operation

Note on operation	Menu / Parameter tree	Parameter
Display of logical alarm messages	SYSTEM	PARAMETER 13
Query error memory	ALARM	ERR-1 - ERR-20
Query error memory BCS	ALARM 2	ERR-1 - ERR-20

Note

The outdoor sensor input can be used to shut down the heating system in plants with boiler controls. A sensor short circuit of the outdoor sensor suppresses the error message and shuts down the plant. Instead of the error message, the message “Heat.system off” appears.

Note

If there is a defect in the heat generator (error message 30-1 or 31-3) and the plant frost protection is active, the boiler corrosion protection is switched off and thus the heating circuit pumps are activated to lower the risk of the plant freezing.

Note

The error message register appears as always on a connected RS. The last 5 error messages are displayed. ALARM 2 is not shown in a RS.

12.4.1 OEM- Information for troubleshooting

12.4.1.1 Controller complete reset

A complete reset can be carried out to change the settings of the controller back to the settings at delivery. All parameters, values and counters accessible via the enabled code will be reset and the controller will be restarted.

Values not accessible via the enabled access code will not be affected.

Activation

Press the  ,  ,  und  keys simultaneously.

12.4.1.2 Controller time correction

Function

In special cases, it may be necessary to correct the operating time of the clock in the controller. Parameter 21 can be used for this purpose.

The set value determines the time correction every 24h. It takes place once at 01:01:10 hours.

Negative values stop the clock for that time period.

Positive values set the clock ahead for that time period.

Operation

Note on operation	Menu / Parameter tree	Parameter
Time correction RTC	SYSTEM	PARAMETER 21

12.4.2 Behavior in case of outdoor sensor malfunction

If, during weather-controlled mode, a connected outdoor sensor fails (sensor short-circuit or interruption), emergency mode comes into effect.

The weather control then regulates in accordance with an assumed fixed outdoor temperature which is preset in a parameter.

Operation

Note on operation	Menu / Parameter tree	Parameter
Curve for emergency mode without OS	SYSTEM	PARAMETER 29

12.5 Sensor Calibration

Function

If the measured values of the connected sensors do not match the actual temperatures, calibration of the sensor values is possible with the "Sensor Calibration" parameter menu.

In this level all the sensors connected to the controller can be corrected by ± 5 K compared to the factory calibration value.

The current measured value plus or minus the specified correction as well as the new value appear on the display. The compensation steps amount to 0.5 K.

Attention

The sensor inputs are adjusted at the factory with precise measurement instruments. An adjustment may only take place in exceptional cases and after a careful check of the actual deviation.

The changes are not affected by a parameter reset and are kept until new changes are made.

They do not replace the factory calibration.

Application

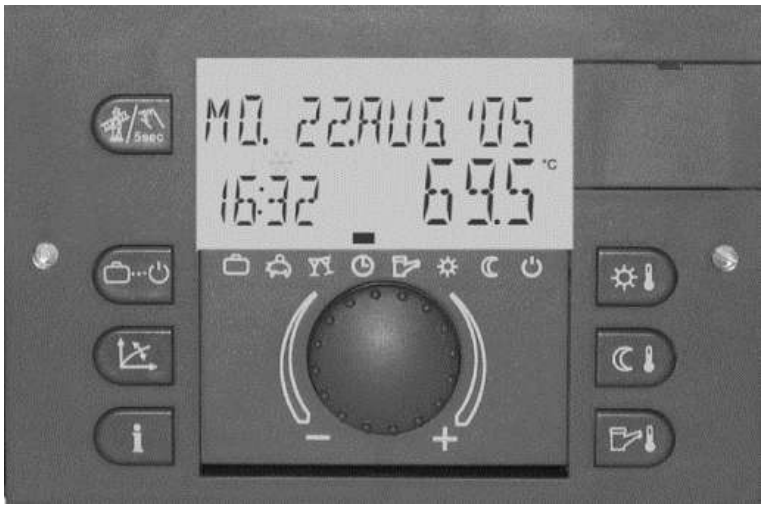
- Compensation for very long sensor lines
- Constant external temperature effect on the sensor

Operation

Note on operation	Menu / Parameter tree	Parameter
Sensor calibration	SENSOR ADJ.	Text display of available and activated sensors

13 Mounting

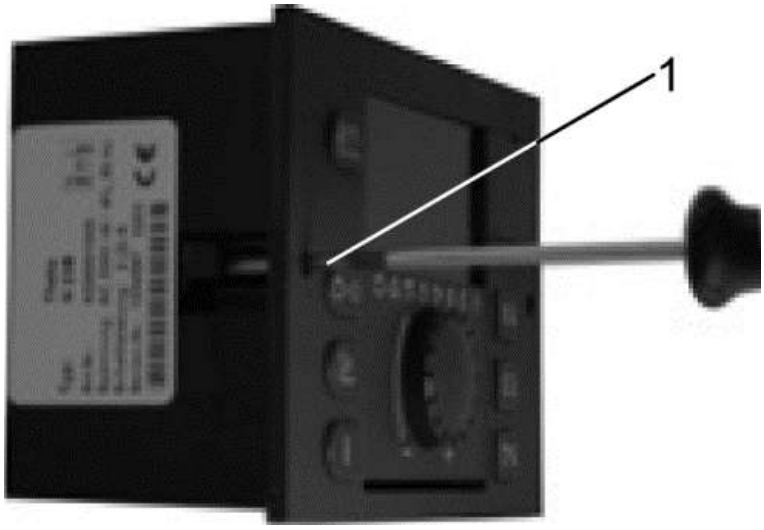
13.1 Mounting instructions for NORM type



All central units are designed exclusively as units for incorporation and will be installed from the front side into the boiler panel after finishing the electrical wiring.

The instrument is fastened by a quarter turn clockwise of the quick clamping devices at the left and right side of the front panel (1).

Removal is done in opposite direction.



13.1.1 Electrical Installation

The electrical installation to the control equipment is done at the back side of the instrument via the four enclosed connecting terminals X1, X2, X3 and X4 corresponding to the identification on the colored-marked connection pads.

ATTENTION

All blue marked connecting terminals (X1) work with safety low voltage and must not get into contact with the mains voltage. At no observance the instrument will definitely be destroyed, and the warranty is no longer valid!

⚠ WARNING!

Red marked connecting terminals (X2...X4) principally may work with mains voltage (230V) according to the current operation conditions.

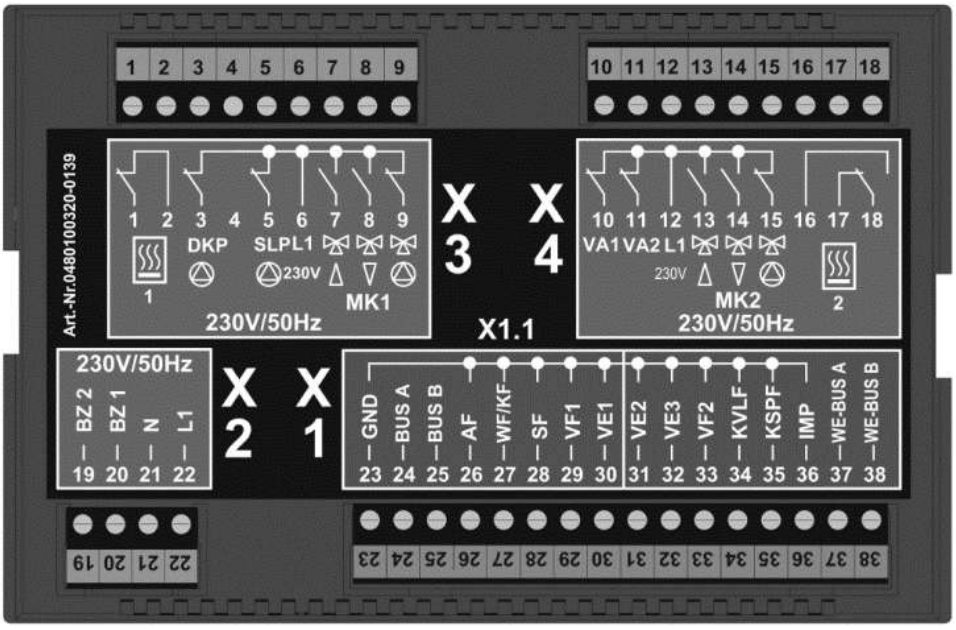
For further information see documentation of the boiler manufacturer.

Note

When wiring the device, it is essential to ensure that sensor and data bus cables are routed **separately** from mains power cables. It is not permitted to route these cables together **within a single cable**.

Sensor and data bus cables must **not be routed together** with mains power cables supplying electrical equipment that **is not** interference-suppressed in accordance with EN 60555-2.

13.1.2 Electrical connection

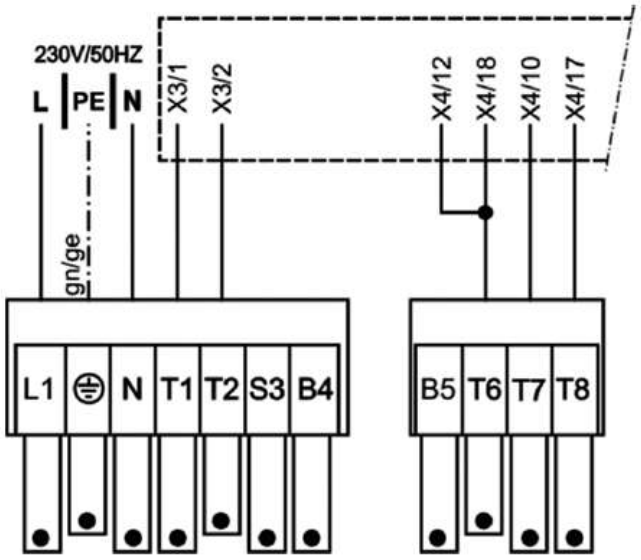


230 V - Connections		Sensor and data bus connections	
1	Floating exit for heat generator, output (stage 1)	23	Ground for data bus and sensors
2	Floating exit for heat generator, input (stage 1)	24	Data bus signal A
3	Direct heating circuit pump	25	Data bus signal B
4	Coded plug	26	Outdoor sensor
5	DHW charging pump	27	Heat generator sensor/boiler sensor
6	L 1 / 230 V	28	DHW sensor
7	Mixing valve 1 OPEN	29	Flow sensor for mixed circuit 1
8	Mixing valve 1 CLOSED	30	Variable input 1
9	Pump for mixed circuit 1	31	Variable input 2
10	Variable output 1	32	Variable input 3
11	Variable output 2	33	Flow sensor for mixed circuit 2
12	L 1 / 230 V	34	Solar panel flow sensor 1)
13	Mixing valve 2 OPEN	35	Solar tank sensor
14	Mixing valve 2 CLOSED	36	Pulse input
15	Pump for mixed circuit 2	37	Heat generator-data bus A
16	-	38	Heat generator-data bus B
17	Floating exit for heat generator, output (stage 2)		
18	Floating exit for heat generator, input (stage 2)		
19	Operat. hours counter burner (stage 2)		
20	Operat. hours counter burner (stage 1)		
21	N / 230 V mains		
22	L 1 / 230 V mains		1) Solar application only

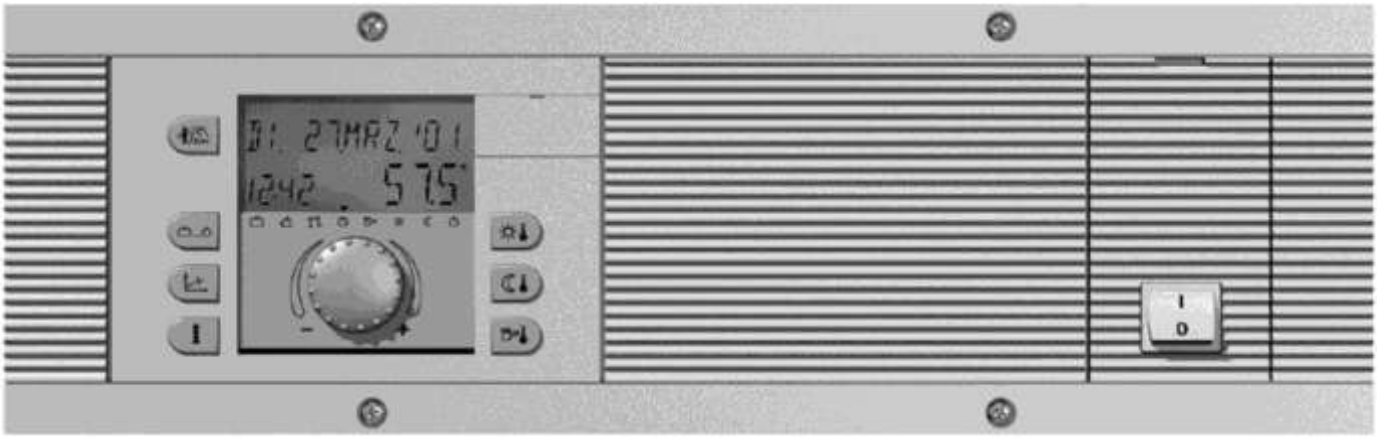
Mounting into boilers See technical documentation of boiler manufacturers.

Wall mounting See technical documentation wall mounting set THETA WG 500

Connecting modulating burners



13.2 Mounting instructions for UNIT type



13.2.1 Mounting UNIT

The boiler control panel is completely prewired and will be mounted from the front side into the panel cut-out of the boiler after finishing the electrical wiring. The panel is fastened with the four enclosed screws.

Removal is done in opposite direction.

The sensor of the safety temperature limiter as well as the boiler sensor will be inserted into the sensor immersion pocket of the boiler.

ATTENTION

- Do not crease or damage the capillary tubing.
- For further information see documentation of the boiler manufacturer.

Accessories on demand

For easier installation, optional swing-out aids can be ordered. These aids will be snapped into both left and right sides of the panel and prevent that the panel falls down when opening.

13.2.2 Electrical Installation

The electrical installation is done at the back side of the boiler control panel via the plugged in connection terminals corresponding to the identification on the colored-marked connection pads.

When carrying out work on the electrical connections, ensure that the circuit is de-energized! This work must only be carried out by trained specialists.

ATTENTION

Low voltage connecting terminals

All blue marked connecting terminals work with safety low voltage and must not get into contact with the mains voltage.

At no observance the instrument will definitely be destroyed, and the warranty is no longer valid!

⚠WARNING!

Mains voltage connecting terminals

Red marked connecting terminals principally may work with mains voltage according to the current operation conditions.

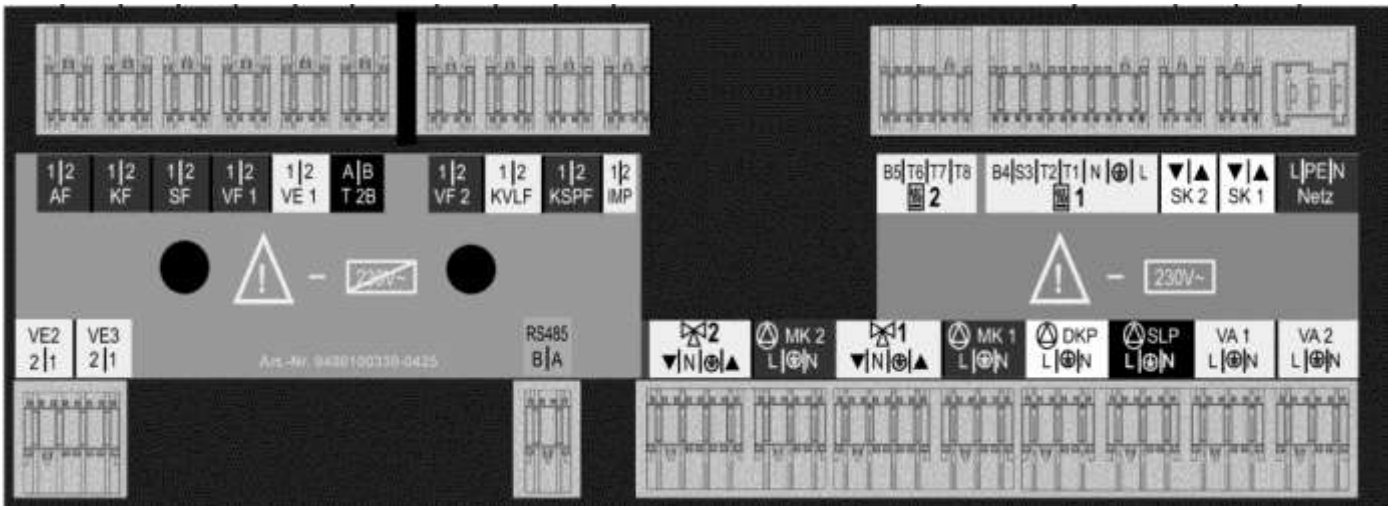
Further information can be found in the documentation provided by the heat generator manufacturer.

Note

When wiring the device, it is essential to ensure that sensor and data bus cables are routed **separately** from mains power cables. It is not permitted to route these cables together **within a single cable**.

Sensor and data bus cables must **not be routed together** with mains power cables supplying electrical equipment that **is not** interference-suppressed in accordance with EN 60555-2.

13.2.3 Terminal assignment



230 V - Connections		Sensor and data bus connections	
01	Mains 230V~ +6/-10%, 50 Hz	14	Outdoor sensor
02	Safety circuit 1 (burner loop)	15	Heat generator sensor/boiler sensor
03	Safety circuit 2 (burner loop)	16	DHW sensor
04	Burner 1 (single step boilers)	17	Flow sensor for mixed circuit 1
05	Burner 2 (double step boilers)	18	Flow sensor for mixed circuit 2

06	Direct circuit pump	19	Variable input 1
07	DHW charging pump	20	Variable input 2
08	Pump for mixed circuit 1	21	Variable input 3
09	Actuator mixing valve 1	22	Solar panel flow sensor 1)
10	Pump for mixed circuit 2	23	Solar tank sensor1)
11	Actuator mixing valve 2	24	Pulse input
12	Variable output 1 depending of programming (see level HYDRAULIC)	25	Data bus T2B
13	Variable output 1 depending of programming (see level HYDRAULIC)	26	Data bus RS 485 2)
			1) Solar application only 2) high efficiency condensing boilers only

13.3 Mounting instructions for mounting with wall socket MS-K

Application The wall socket MS-K is used for wall mounting application of all types of central units.

Performance The wall-mounted connection base is intended for the sole purpose of housing the central unit. After plugging the central unit into the wall socket and after finishing the electrical wiring ready for startup.

13.3.1 Mounting and Electrical Installation

When carrying out work on the electrical connections, ensure that the circuit is de-energised!

This work must only be carried out by trained specialists.

1. Break out the impressed cable inlets due to the required number and seize on top side or lower side of the wall socket according to the position of the cable channel.

Note

Cable strain relief is prescribed if no cable duct is used.

2. Turn locking screws (1) horizontally and pull off terminal covers to the side.
3. Fix wall socket on a flat background using enclosed screws and plugs. Use the enclosed drill pattern.
4. Carry out the electrical wiring in accordance with the system design and wiring diagram.

ATTENTION

The connecting terminals of terminal blocks X5 and X6 at the left side work with safety low voltage and must not get into contact with the mains voltage. At nonobservance the instrument will definitely be destroyed, and the warranty is no longer valid!

⚠WARNING!

The connecting terminals of terminal blocks X7 to X10 may work with mains voltage according to the device type and current operation conditions.

When connecting, press down the operating lever of the screwless terminals before inserting the conductor.

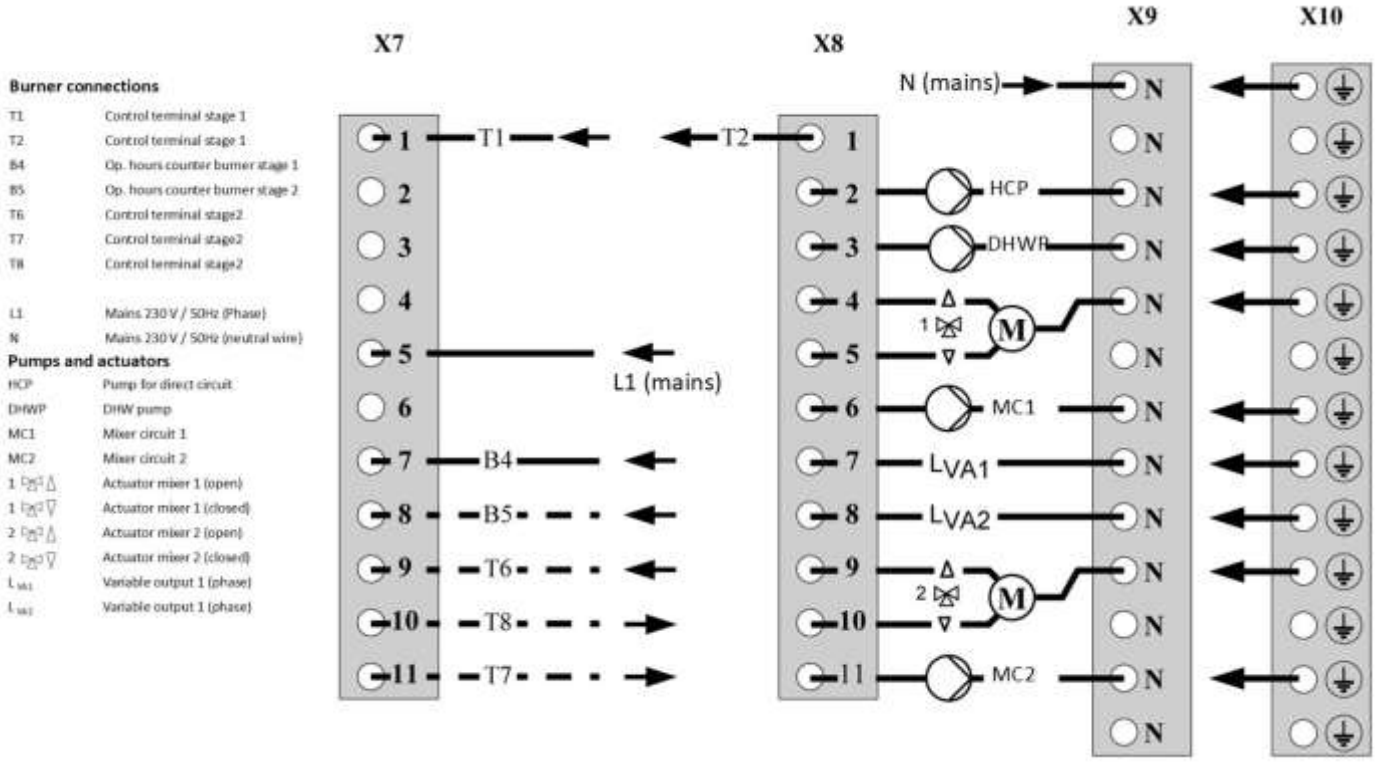
5. Attach and clamp the side terminal-covers.
6. Insert standard unit with evenly distributed pressure. The electrical connection is done by plugging the instrument into the terminals at the socket print. Lock standard unit with both quick clamping devices left and right.

Note

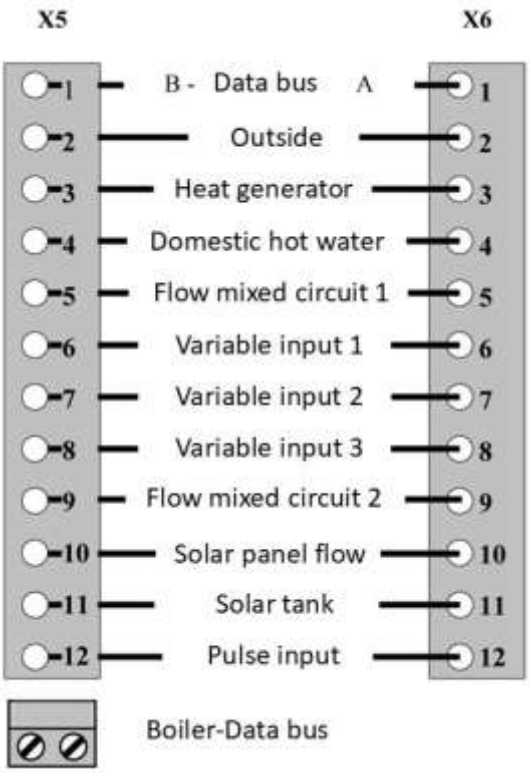
Cables with mains voltage must be installed separate from low voltage cables (data bus, sensors etc.). It is strictly prohibited to use one cable for both voltages. Use cable ducts equipped with separators, if necessary.

13.3.2 Electrical connection in wall socket MS-K

230V - Connections



Sensor and data bus connections



13.4 Mounting instructions Room unit (RS-L)

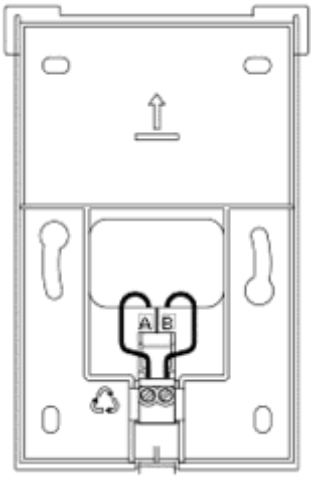
13.4.1 Mounting location

Application without room sensor	Without room sensor function the remote unit may be fixed at any place in the interior range.
Application with room sensor	The room unit should be fixed at a height of approx. 1.20 -1.50 m at a place most representative of all rooms. It is recommended to choose an interior wall of the coolest day room (such as entrance halls). In order to ensure sufficient air circulation at the room station, it must be mounted to the wall with a gap in between.
The room unit must not be mounted	• at locations exposed to direct sunlight (seasonal variations should be taken into account) • close to heat-producing appliances (televisions, refrigerators, wall lamps, radiators etc.) • onto walls heated by under plaster heating pipes or chimneys • onto outside walls • in corners behind curtains or shelves (due to insufficient ventilation) • close to doors of unheated rooms (due to the influence of low temperature) • on unsealed under plaster wiring boxes (influence of external low temperatures due to the chimney effect of • installation tubes) • in rooms with radiators controlled by thermostatic valves (mutual influence).
Mounting	After removing the front panel by pressing the locating lug at the lower side the socket can be mounted at the desired location using the enclosed dowel pins and screws. The cable for the bus connection has to be led through the lower cut-out of the socket.
Note	For new installations use an under-plaster wiring box for perfect wiring.

Locating lug

13.4.2 Electrical connection

The 2-wire data bus cable is connected to terminals A and B on the 2-pole terminal block on the base plate. **The connections are not interchangeable** and must be installed in the socket in accordance with the A/B markings.



Socket (unit removed)

Once the electrical connection has been made, hang the room unit flush with the wall as shown in the illustration above and fold it downwards until it clicks audibly into the wall mounting bracket.

13.4.3 Data bus addressing

Function

To connect one or more room stations to the central unit, use a two-wire data bus. Because this connection is always parallel on the same line, the data transfer must be selected by corresponding assigned bus addresses (lock also chapter 9.1)

The mapping between the bus addresses of the central units and the bus addresses of the room units follows a fixed, factory-set scheme as shown in the table below:

Control unit		Room unit	
Function	**Bus address**	**Heating circuit**	**Bus address RS-L**
Basic unit (Master)	10	Direct circuit Mixed circuit 1 Mixed circuit 2	11 12 13
1. Extension	20	Direct circuit Mixed circuit 1 Mixed circuit 2	21 22 23
2. Extension	30	Direct circuit Mixed circuit 1 Mixed circuit 2	31 32 33
3. Extension	40	Direct circuit Mixed circuit 1 Mixed circuit 2	41 42 43
4. Extension	50	Direct circuit Mixed circuit 1 Mixed circuit 2	51 52 53

Note

Once a room device is connected and registered via the data bus to the standard unit, the standard unit automatically switches to separate operating mode! This is necessary to ensure clear operation of the system with connected room devices. However, it is possible to switch to shared control mode. To do this, set the bus priority to “1” and then set the control mode to “1”

Operation

Note on operation	Menu / Parameter tree	Parameter
Settings bus rights RS (HC)	DATA BUS	Bus rights HC
Settings bus rights RS (MC-1)	DATA BUS	Bus rights MC1
Settings bus rights RS (MC-2)	DATA BUS	Bus rights MC2
Control mode	SYSTEM	Control mode

13.5 Mounting instructions wall device RFF

13.5.1 Mounting location

Application without room sensor

Without room sensor function the remote unit may be fixed at any place in the interior range.

Application with room sensor

The room unit should be fixed at a height of approx. 1.20 -1.50 m at a place most representative of all rooms. It is recommended to chose an interior wall of the coolest day room (such as entrance halls). In order to ensure sufficient air circulation at the room station, it must be mounted to the wall with a gap in between.

The room unit may not be installed

- at locations exposed to direct sunlight (seasonal variations should be taken into account)
- close to heat-producing appliances (televisions, refrigerators, wall lamps, radiators etc.)
- onto walls heated by under plaster heating pipes or chimneys
- onto outside walls
- in corners behind curtains or shelves (due to insufficient ventilation)
- close to doors of unheated rooms (due to the influence of low temperature)
- on unsealed under plaster wiring boxes (influence of external low temperatures due to the chimney effect of
- installation tubes)
- in rooms with radiators controlled by thermostatic valves (mutual influence).

13.5.2 Mounting

After removing the front cover the remote unit is fixed using supplied screws and plugs. The data bus line has to be lead through the lower cut-out.

13.5.3 Electrical connection

The electrical connection takes place at the 2-pole terminal strip.

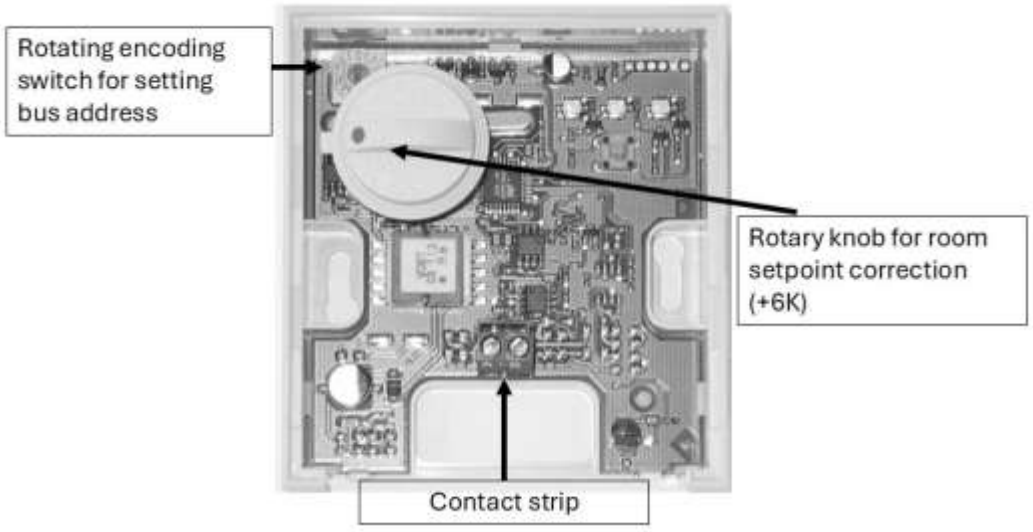
Recommended connecting cable: J-Y(ST)Y 1 x 2 x 0.6 mm2.

ATTENTION Do not change connecting terminals A and B!

After installing the data bus line and setting the data bus address

Control unit		**Room unit**	
Function	**Bus address**	**Heating circuit**	**Bus address RS-L**
Basic unit (Master)	10	Direct circuit Mixed circuit 1 Mixed circuit 2	1 2 3
1. Extension	20	Direct circuit Mixed circuit 1 Mixed circuit 2	4 5 6
2. Extension	30	Direct circuit Mixed circuit 1 Mixed circuit 2	7 8 9
3. Extension	40	Direct circuit Mixed circuit 1 Mixed circuit 2	A B C
4. Extension	50	Direct circuit Mixed circuit 1 Mixed circuit 2	D E F

Remote unit open (front cover removed)



14 Accessories

14.1 Outdoor sensor AF

Outdoor sensor AF

Mounting location

The outdoor sensor should be installed on the coldest side of the building (north or northeast) at approx. one third of the building's height (minimum distance from the ground: 2 m).

Exception

Choose the corresponding side of building due to the direction of the preferential living area.

Never mount sensor onto external heat sources such as chimneys, hot air from air shafts, sunlight or black underground etc. since this will falsify the measured values considerably.

The cable outlet must be directed downwards in order to avoid the intrusion of moisture.

Electrical installation

- Install sensor cable to the sensor location.
- Loosen lid screws and remove top.
- Mount open sensor case with enclosed central fixing screw. Use sealing ring! Cable outlet must be directed downwards!
- Insert sensor cable. The cable insulation must be encircled by the sealing lips of cable entry.
- Set up electrical connection. For the electrical installation, preferably a 2-core cable with at least sectional view of 1 mm2 is recommended. The connection is made at the screw terminal block inside the sensor case and may be changed.
- Put on lid again and screw it firmly with the case. Make sure that the cover is firmly in place.

14.2 Immersion sensor TF A20 (KVT 20)

Immersion sensor TF A20 (KVT 20 ...)

Types	TF A20-20-03 or KVT 20/2/6, cable length 2 m
Application	Boiler sensor, hot water sensor (for boiler integrated hot water tanks), return flow sensor
Types	TF A20-50-03 or KVT 20/5/6, cable length 5 m
Application	Hot water sensor (for add-on tanks, buffer tanks, solar collector return flow sensor etc.)
Mounting location	In the immersion sleeve of the respective application.
Mounting into boilers or other heat sources	Bend clutch spring to sensor top and insert sensor together with the capillary sensors of boiler thermostat, safety temperature limiter (SLT) and boiler thermometer into the immersion sleeve. Use spring clip if necessary.
Mounting into DHW- or buffer tanks	Bend clutch spring to sensor top and insert sensor according to the instructions of the manufacturer into the dry immersion sleeve of the respective hot water tank.
Electric Connection	Connect sensors at the corresponding terminals of the respective control unit (see terminal diagram). The terminals may be changed.

14.3 Flow sensor VF

VF 202 (B) / VF 204 (B)

Types	VF 202	cable length 2 m
	VF 204	cable length 4 m

Application

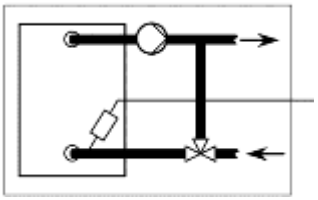
Contact sensor for mixer-controlled heating circuits onto flow- or return pipes

Mounting location

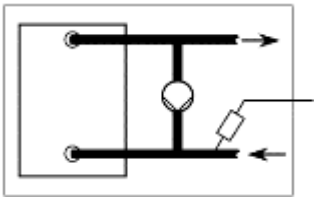
Used as mixer flow sensor:

Behind the mixer circuit pump, in the flow, at minimum distance of 50 cm.

In case of use as return flow sensors:



Controlled flow temperature addition by means of mixing valve



Mounting

1. Clean flow or return pipe thoroughly and apply heat conduction paste.
2. Attach sensor on the contact place in a flush way to the tube surface by means of the enclosed clamping band.
3. Pay attention to firm seat!

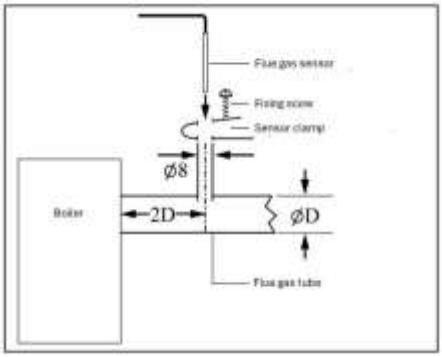
Electric Connection

Connect sensors at the corresponding terminals of the respective control unit (see terminal diagram). The terminals may be changed.

14.4 Flue gas sensor / solar panel flow sensor

PT1000/6 Kabellänge 2,5 m

Type	PT1000/6 cable length 2.5 m
Application	Flue gas temperature Collector flow temperature
Mounting location	1. In the flue gas tube in the minimum distance of the double tube diameter. 2. In the immersion sleeve of the solar collector
Mounting in the flue gas tube	Mount sensors clamp according to illustration below. Determine immersion depth into the core flow of the flue gas and fix sensor.



Electric Connection	Connect sensors at the corresponding terminals of the respective control unit (see terminal diagram). The terminals may be changed.

15 Technical Data

15.1 General

Power supply voltage:	230V +/-10%
Rated frequency:	50...60Hz
Power input:	max. 5,8VA
Recommended pre-fuse:	max. 6,3A slow
Output relay contact load:	2 (2) A
Bus interface:	T2B to connect to external devices (room station, heatapp! Base T2B)) OT OpenTherm (depending on the controller model (C-OT)) RS 485 (depending on the controller model (C))
Power supply via T2B bus:	12V / 150mA
Ambient temperature:	0 ... +60°C
Storage temperature:	-25 ... +60°C
Degree of protection:	IP 30
Protection class according to EN 60730:	II
Protection class according to EN 60529:	III
Software-class:	A
Radio protection:	EN 55014 (1993)
Interference immunity:	EN 55104 (1995)
CE compliance:	89/336/EWG
Casing dimensions:	144 x 96 x 75 mm (B x H x T)
Casing material::	ABS antistatic
Electrical connections:	Plug-in terminal connections

Installation recommendations:

Cables with mains voltage (power supply, burner, pumps, actuators):	
Cross-section:	1,5 mm²
Maximum cable length:	Unlimited cable length within house installation
Low voltage cables (sensors, ext. switches, heat demand by means of contacts, modem connection cables, analogue signal lines etc.)	
Cross-section:	0,5 mm²
Maximum cable length:	100 m (double line); Longer distances should be avoided to decrease the risk of interferences.
Data bus connections	
Cross-section:	0,6 mm²
Maximum cable length:	50 m (double line, longest distance between a standard unit and a device to be supplied); longer distances should be avoided to decrease the risk of interferences.
Recommended cable:	J-Y(St)Y 2 x 0.6 mm²

15.2 Technical data for sensor and digital inputs

15.2.1 Sensor Resistance Values

Resistance value KTY sensor for OS, H-GEN/BS, DHWS, FS1, FS2, VI1 (not FGS setting), VI2, VI3, SPBU							
°C	kOhm	°C	kOhm	°C	kOhm	°C	kOhm
-20	1,386	0	1,630	20	1,922	70	2,786
-18	1,393	2	1,658	25	2,000	75	2,883
-16	1,418	4	1,686	30	2,080	80	2,982
-14	1,444	6	1,714	35	2,161	85	3,082
-12	1,469	8	1,743	40	2,245	90	3,185
-10	1,495	10	1,772	45	2,330	95	3,290
-8	1,522	12	1,802	50	2,418	100	3,396
-6	1,549	14	1,831	55	2,507		
-4	1,576	16	1,862	60	2,598		
-2	1,603	18	1,892	65	2,691		

Resistance values PT 1000-sensor for VI1 (setting FGS), SPFS							
°C	kOhm	°C	kOhm	°C	kOhm	°C	kOhm
0	1000,0	80	1308,93	140	1535,75	280	2048,76
10	1039,02	85	1327,99	150	1573,15	300	2120,19
20	1077,93	90	1347,02	160	1610,43	320	2191,15
25	1093,46	95	1366,03	170	1647,60	340	2261,66
30	1116,72	100	1385,00	180	1684,65	360	2331,69
40	1155,39	105	1403,95	190	1721,58	380	2401,27
50	1193,95	110	1422,86	200	1758,40	400	2470,38
60	1232,39	115	1441,75	220	1831,68	450	2641,12
70	1270,72	120	1460,61	240	1904,51	500	2811,00
75	1289,84	130	1498,24	260	1976,86		

15.2.2 Sensor measuring ranges

Designation	Abbreviation	Sensor type	Measuring range
Outdoor sensor	OS	KTY	-50°C ... 90°C
Boiler sensor	BS	KTY	-50°C ... 120°C
Flow sensor 1	FS1	KTY	-50°C ... 120°C
Flow sensor 2	FS2	KTY	-50°C ... 120°C
DHW sensor	SHWS	KTY	-50°C ... 120°C
Solar panel flow sensor	SPFS	PT 1000	-50°C ... 210°C
Solar panel tank / buffer sensor	SPBU	KTY	-50°C ... 120°C
Variable input VI1 *)	VI1	KTY PT 1000	-50°C ... 120°C -50°C … 500°C
Variable input VI2	VI2	KTY	-50°C ... 120°C
Variable input VI3	VI3	KTY	-50°C ... 120°C

15.2.3 Digital inputs

Designation	Abbreviation	Sensor type	Measuring range
Impulse sensor	PIN	Low voltage	<= 10 Hz
Op. hours counter burner stage 1	OHC 1	230V	OFF, ON
Op. hours counter burner stage 2	OHC2	230V	OFF, ON

*) According to selected function, PT1000 can be used for flue gas sensor connection.