SIEMENS

ALBATROS

RVA47.320
Cascade Controller for modulating gas-fired Boilers
Basic Documentation

Ausgabe 2.2
Controller series B
CE1P2379E
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Siemens Building Technologies
HVAC Products

Contents

1 Summary

1.1 Brief description

ALBATROS™- RVA47.320 (B-series) is designed for use as a single-boiler controller or cascade controller with up to 12 heat sources.
It is designed for integration in heat generating equipment / plants with

- a modulating gas burner
- a Boiler Management Unit (BMU)
- d.h.w. heating with charging pump (via RVA47) or changeover valve (via BMU)
- a primary or heating circuit pump

Heating circuit control uses weather compensation while d.h.w. heating operates depending on the storage tank temperature and the time program.

When employed in an interconnected system along with the ALBATROS™ controller RVA43.222 (C-series), it is possible to operate mixed cascades (modulating / multi-stage) with up to 15 heat sources.

➔Important

When used in connection with gas-fired heating boilers, the availability of a BMU is mandatory. Siemens offers different types of BMUs:

- Boiler Mangement Unit LMU5/6x

It is also possible to use BMUs of other manufacture if appropriately equipped. If you intend to use a non-Siemens burner control in connection with the RVA47.230, please contact your nearest Siemens representative.

Use in extensive systems

The range of products comprises several units that complement one another in terms of application and scope of functions. The controllers have communication capability and can be combined to form heating systems that include up to 40 controllers.
For more detailed information about the generation of LPB systems, refer to "Local Process Bus (LPB), Basic Documentation, System Engineering", document no. CE1P2370E.

1.2 Features

Heating circuit

- Heating circuit control with a pump heating circuit
- Remote operation via digital room unit
- Quick setback and boost heating
- Automatic 24-hour heating limit
- Automatic summer / winter changeover
- The building's thermal dynamics are taken into consideration
- Automatic adjustment of the heating curve to the type of building construction and the heat demand (provided a room unit is connected)
- Overload detection (shifting priority)
- Manual operation

Heat generation

- Cascading with up to 12 modulating heat sources controlled by one controller in combination with BMUs via LPB
- Cascading with up to 15 modulating heat sources and additional RVA47.320 (from B-series) via PPS
- Control of mixed cascades (modulating or multistage) with up to 12 heat sources in combination with RVA43.222 (from C-series) with BMUs via LPB
- Selectable boiler sequence and boiler strategy
- Weather-compensated heating circuit control with or without room influence
- Cascade flow temperature control depending on the heat demand signal from the heating circuits connected to the system or from controllers outside the system (via input H1)
- Cascade flow temperature control depending on the temperature demand signal (DC 0…10 V, input H1)
- Adjustable maximum limitation of temperature demand signals delivered to the heating boiler
- Performance-related switching on / off of boilers, very accurate flow temperatures
- Supervision of operating conditions at the pressureless header, low return temperatures

Protection for the plant

- Protection against boiler overtemperatures (pump overrun)
- Protective boiler startup (acting on the mixing valve)
- Minimum limitation of the boiler return temperature (acting on the mixing valve)
- Adjustable minimum and maximum limitation of boiler temperature (boiler flow temperature)
- Frost protection for the building, the plant and the boiler
- Frost protection for the d.h.w. storage tank connected directly to the controller
- Pump protection through periodic pump kick
- Overtemperature protection for the pump heating circuit

Operation

- Temperature adjustment with the setpoint knob
- 7-day or 24-hour program for the heating circuit and d.h.w. heating
- Automatic button for efficient operation throughout the year
- D.h.w. button
- Manual operation at the touch of a button
- Output and input tests to aid commissioning and functional checks
- Straightforward selection of operating mode via buttons
- Change of operating mode via a remote switch (via contact H1)
- Heat generation lock or minimum demand for heat with the remote switch (via contact H1)
- Service connection facility for local parameter settings and data logging

D.h.w.

- D.h.w. heating with charging pump or via BMU with diverting valve
- D.h.w. control with temperature sensor or control thermostat
- Selectable priority for d.h.w. heating
- Selectable d.h.w. heating program
- Adjustable boost of the d.h.w. charging temperature
- Reduced setpoint of the d.h.w. temperature
- Protection against discharging of d.h.w.
- Automatic d.h.w. push
- Legionella function

Use in extensive systems

- Communication via the Local Process Bus (LPB)
- Communicating via point-to-point interface (PPS)
- Controllers of other manufacture can deliver their heat demand signal by closing potential-free contact H1
- Controllers of other manufacture can deliver their analog heat demand by using DC 0...10 V signals
- Input for cascade flow temperature sensor
- Input for cascade return temperature sensor
- Integrity of system architecture with all RVA... controllers
- Can be extended to include 40 heating circuits (with central bus power supply)
- Optional remote supervision
- Error messages (own faults, faults of LPB devices, faults of PPS devices)

Logging

- Logging the individual BMU operating hours
- Logging the number of device operating hours

1.3 Range of products

The following units and accessories are designed for use with the ALBATROS range:

	Type of unit	*Description*	*Documentation no.*
Controllers	RVA47.320	Cascade controller for modulating gas-fired heating boilers	CE1P2379E
	RVA43.222	Boiler and heating circuit controller (from C-series)	CE1P2390E
	RVA46.531	Heating circuit controller	CE1P2372E
	RVA66.540	Heating circuit or primary controller	CE1P2378E*
Burner controls	LMU5/6x	Siemens BMUs for heating circuit and d.h.w. control	
	.....	Different types of non-Siemens burner controls for d.h.w. control (e.g. MCBA)	
	OCI42	Communication interface RVA-LMU5/6x	
	RMCI	Communication interface RVA-MCBA	
Room units	QAA10	Digital room sensor	
	QAA70	Digital, multifunctional room unit	
	QAA50	Digital room unit	
Sensor	QAC31	Outside sensor NTC 600	
	QAC21	Outside sensor LG-Ni 1000	
	QAZ21	Immersion sensor LG-Ni 1000 complete with cable	
	QAD21	Strap-on sensor LG-Ni 1000	

Screw type terminal strips (Rast 5)	AGP2S.02M	LPB (2 poles)	violet
	AGP2S.02G	Room unit (2 poles)	blue
	AGP2S.06A	Sensor (6 poles)	white
	AGP3S.02D	Mains (2 poles)	black
	AGP3S.03B	Pumps (3 poles)	brown

1.4 Field of use

Target market	• OEMs • Manufacturers of modulating gas-fired appliances with BMUs
Types of buildings	• Residential and non-residential buildings with own heating and d.h.w. heating facility • Residential and non-residential buildings with a central heat generating plant
Types of heating systems	• Standard heating systems, such as: Standard heating systems, such as radiator, convector, underfloor and ceiling heating systems, and radiant panels • With or without d.h.w. heating
Heat generating equipment	• Gas-fired heating boilers with modulating burners. • Parallel cascading with lead / lag boiler changeover or fixed priority for up to 4 modulating gas-fired boilers (of identical or different capacities) with only one controller • Parallel cascading with up to 16 modulating gas-fired boilers (of identical or different capacities) with additional RVA47.320 (from B-series) • Mixed cascades with up to 16 modulating and multistage heat sources with additional RVA47.320 (from B-series) and RVA43.222 (from C-series)

1.5 Product liability

- The products may only be used in building services plant and applications as described above
- When using the products, all requirements specified in chapters "Handling" and "Technical data" must be satisfied
- When using the products in a system, all requirements contained in the documentation ”Local Process Bus (LPB), Basic Documentation, System Engineering” (document no. CE1P2370E) must be satisfied
- The local regulations for installation must be complied with

2 Handling

2.1 Installation

2.1.1 Mounting location

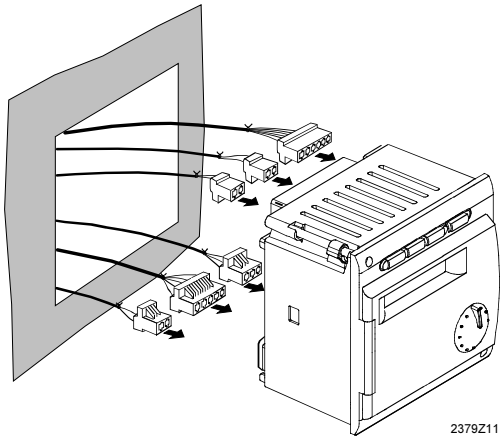
- Boiler control panel
- In the control panel front

2.1.2 Regulations for installation

- A clearance of at least 10 mm must be provided on all sides of the controller, enabling the unit to emit the amount of heat produced during its operation. The space should not be accessible and no objects should be placed there.
- The controller is designed for mounting in a boiler control panel. Power to the controller may be supplied only after it is completely fitted in the cutout. If this is not observed, there is a risk of electric shock near the terminals and through the cooling slots.
- If the controller shall be mounted directly on the wall, a housing must be used to provide protection against electric shock hazard. The housing must have a sufficient number of cooling slots at the bottom and the top, allowing the controller to emit the heat it produces.
- The controller has been designed based on the guidelines of safety class 2 and must therefore be mounted in compliance with these regulations.
- The controller may not be exposed to dripping water.
- Permissible ambient temperature: 0...50 °C

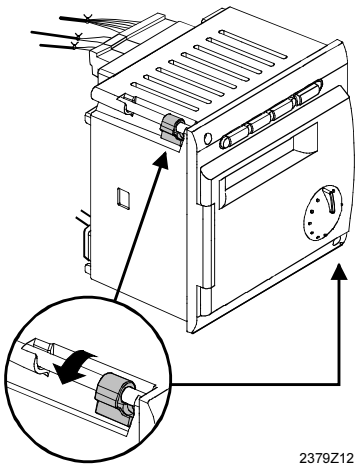
2.1.3 Mounting procedure

1. step

Description	*Diagram*
• Turn off power supply • Pull the prefabricated cables through the cut-out • Plug the connectors into the respective sockets at the rear of the controller ➔ *Note:* *The connectors are coded to make certain they cannot be mixed up.*	 2379Z11

2. step

- Check to ensure the fixing levers are turned inward
- Check to make certain there is sufficient space between the front panel and the fixing levers

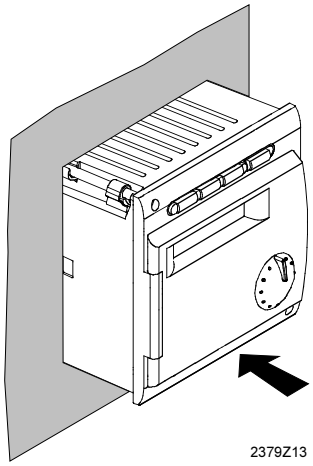


3. step

- Slide the unit into the panel cut-out without applying any force

➔ *Note:*

Do not use any tools when inserting the unit into the cut-out. If it does not fit, check the size of the cut-out and the housing.

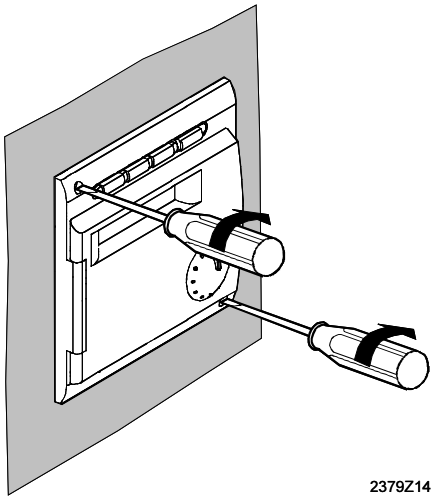


4. step

- Secure the fixing levers by tightening the two screws on the front of the controller.

➔ *Note:*

Tighten the screws only slightly . When tightening the screws, the fixing levers automatically assume their correct positions.

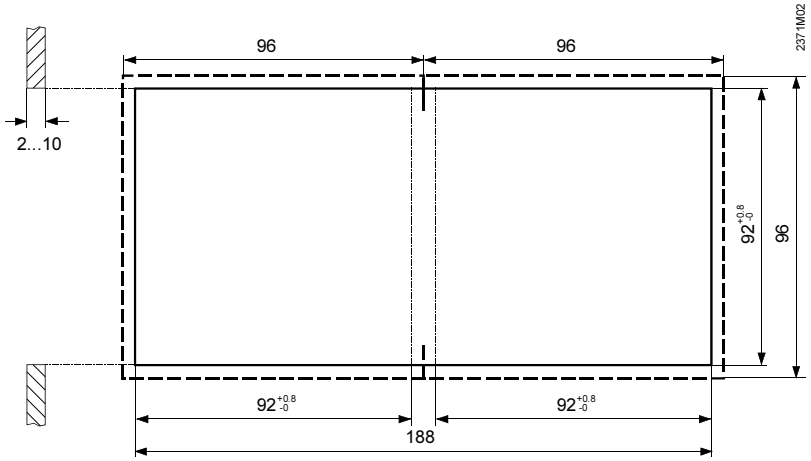


2.1.4 Required cut-out

Dimensions of cut-out

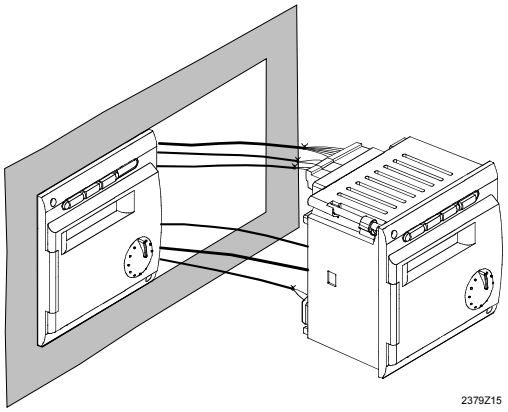
The controller's mounting dimensions are 91 x 91 mm.

Due to the dimensions of the front, however, the standard spacing is 96 mm.
The mechanical mounting facility allows the controller to be fitted in front panels having a thickness of 2 to 10 mm.



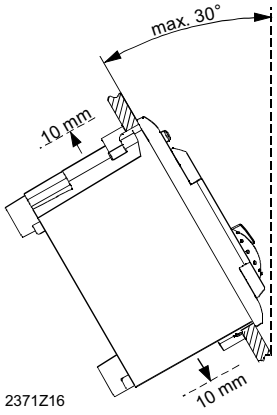
Use of several controllers

The mechanical mounting facility makes it possible to arrange several controllers in a row in one cut-out. In that case, it is merely necessary to have a wider panel cutout.



2.1.5 Orientation

To avoid overtemperatures inside the controller, the inclination may be no more than 30° and there must be a clearance of at least 10 mm on all sides of the unit.
This allows the controller to emit the heat generated during operation.



2.2 Electrical installation

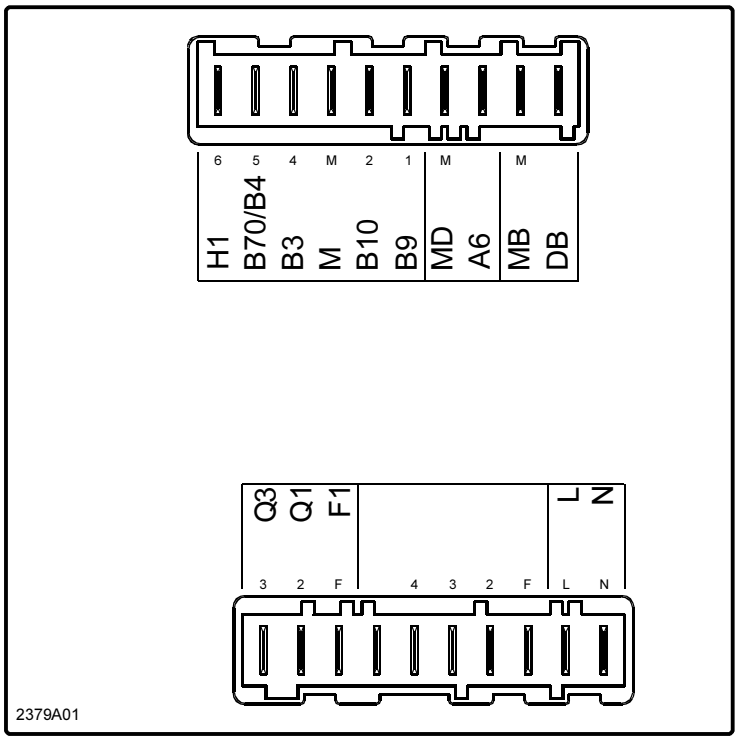
2.2.1 Regulations for installation

- The connections for mains and low voltage are separated
- The wiring must be made in compliance with the requirements of safety class II. This means that sensor and mains cables may not be run in the same duct

2.2.2 Wiring

When using prefabricated cables with connectors, the electrical installation is very straightforward, owing to the coding.

Connection terminals



Rear of controller

Low voltage side

Terminal	*Terminals*	*Connector*
H1	input H1	AGP2S.06A (white)
B70/B4	Cascade return temperature sensor B70 or buffer storage tank temperature sensor B4	
B3	D.h.w. temperature sensor or thermostat	
M	Ground sensors	
B10	Cascade flow temperature sensor (common flow temperature sensor)	
B9	Outside sensor	
MD	Ground PPS (room unit, BMU)	AGP2S.02G (blue)
A6	PPS (room unit, BMU)	
MB	Ground bus (LPB)	AGP2S.02M (violet)
DB	Data bus (LPB)	

Mains voltage side

Terminal	*Terminals*	*Connector*
Q3	D.h.w. charging pump	AGP3S.03B (brown)
Q1	Heating circuit or system pump:	
F1	Phase Q1 / Q3	
-	Not used	-
-	Not used	
-	Not used	
-	Not used	
-	Not used	
L	Live AC 230 V (mains connection)	AGP3S.02D (black)
N	Neutral conductor (mains connection)	

2.3 Commissioning

Prerequisites

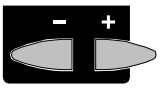
To commission the controller:

1. Make certain that mounting and electrical installation are in compliance with the relevant requirements.
2. Make all plant-specific settings as described in section "Parameter settings".
3. Reset the attenuated outside temperature (operating line 19).
4. Make the functional checks.

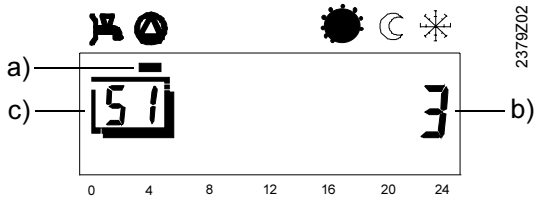
2.3.1 Functional checks

To facilitate commissioning and fault tracing, the controller allows output and input tests to be made. With these tests, the controller's inputs and outputs can be checked.

Output test (relays)

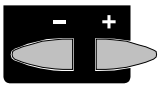
	Buttons	*Explanation*	*Line*
1		Press one of the line selection buttons. *This will take you to the programming level "Enduser".*	
2		Press both line selection buttons for at least 3 seconds. This will take you to the programming level "Heating engineer" and, at the same time, to the relay test (output test).	
3		Press the + or - button repeatedly, which will take you one test step further: Test step 0 — All outputs are switched according to actual control operation Test step 1 — All outputs are deactivated Test step 2 — D.h.w. charging pump (Q3) is activated Test step 3 — Heating circuit or system pump activated (Q1).	
4	 	You leave the programming line "Output test" by pressing either one of the line selection buttons, or one of the operating mode buttons ➔ Note: *If no button is pressed for about 8 minutes, the controller will automatically return to the operating mode selected last.*	contin. display

Display



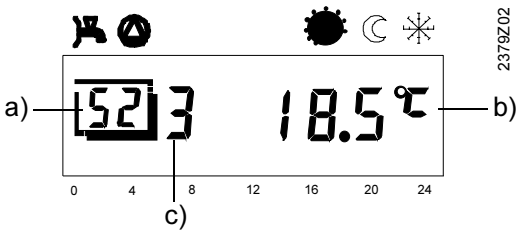
a) The pointer below the symbol indicates the output activated
b) The number indicates the current test step
c) The framed number indicates the selected setting line

Input test (sensors)

	Buttons	*Explanation*	*Line*
1		Press one of the line selection buttons. *This will take you to the programming level "Enduser".*	
2		Press both line selection buttons for at least 3 seconds. *This will take you to the programming level "Heating engineer".*	
3		Press line selection button "Up" until you reach line 52. This will take you to the input test.	
4		Press the + or - button repeatedly, which will take you one test step further: Test step 0 — Display of the function selected on line 97 (B70/B4) [°C]. Test step 1 — Display of d.h.w. temperature (B3). Test step 2 — Display of the cascade flow temperature (B10). Test step 3 — Display of the actual outside temperature (B9) Test step 4 — Display of room temperature acquired with room unit connected to A6 Test step 5 — Display of input H1 according to the function selected on operating line 170 [°C, - - - , o o o].	
5	 	You leave the programming line "Input test" by pressing either one of the line selection buttons, or one of the operating mode or function buttons ➔ Note: *If no button is pressed for about 8 minutes, the controller will automatically return to the operating mode selected last.*	Contin. display

The selected sensor values are updated within a maximum of 5 seconds. If no sensor is present, the connecting line interrupted, or the contact open, the display shows "---"; in the event of a short-circuit, or if the contact is closed, the LCD displays "ooo".

Display



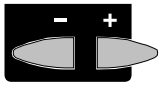
a) The framed number indicates the selected setting line
b) Displayed value of the temperature measured
c) The number indicates the selected test step

2.4 Parameter settings for the enduser

Description

The following settings can be made to meet the individual needs of the enduser.

Setting

	Buttons	*Explanation*	*Line*
1		Press one of the line selection buttons. *This will take you directly to the programming level "Enduser".*	
2		Press the line selection buttons to select the required line. *The parameter list on the next pages contains all available lines.*	
3		Press the + or - button to set the required value. The setting will be stored as soon as you leave the programming mode or change to another line. *The parameter list on the next 2 pages contains all settings that can be made.*	
4		By pressing any of the operating mode buttons, you leave the programming level "Enduser". ➔ Note: *If no button is pressed for about 8 minutes, the controller will automatically return to the operating mode selected last.*	Contin. display

2.4.1 Overview of enduser parameters

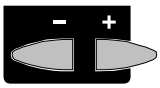
Line	*Function*	*Range*	*Unit*	*Resolution*	*Factory setting*
Setting the clock					
1	Time of day	0...23:59	h / min	1 min	-
2	weekday	1...7	Weekday	1 day	-
3	Date (day, month)	01.01...31.12	dd.MM	1	-
4	Year	1999...2099	jjjj	1	-
Time switch program for heating circuit					
5	Weekday-preselection heating circuit 1-7 7-day block 1...7 Individual days	1-7 / 1...7	Weekday	1 day	-
6	Switch-on time 1. 3rd period heating circuit	00:00...23:59	h / min	10 min	06:00
7	Switch-off time 1. 3rd period heating circuit	00:00...23:59	h / min	10 min	22:00
8	Switch-on time 2. 3rd period heating circuit	00:00...23:59	h / min	10 min	- -:- -
9	Switch-off time 2. 3rd period heating circuit	00:00...23:59	h / min	10 min	- -:- -
10	Switch-on time 3. 3rd period heating circuit	00:00...23:59	h / min	10 min	- -:- -
11	Switch-off time 3. 3rd period heating circuit	00:00...23:59	h / min	10 min	- -:- -
D.h.w. values					
13	Nominal setpoint of the d.h.w. temperature (TBWw) TBWR Line 120 TBWmax Line 40 (OEM)	TBWR...TBWmax	°C	1	55
Heating circuit values					
14	Reduced room temperature setpoint (TRRw) TRF Line 15 TRN Setpoint knob	TRF...TRN	°C	0,5	16
15	Frost protection setpoint of the room temperature (TRFw) TRR Line 14	4...TRR	°C	0,5	10
16	summer / winter changeover temperature	8...30	°C	0,5	17
17	heating curve slope -:- - Inactive 2,5...40 Active	-:- - / 2,5...40	-	0,5	15
Actual values					
18	Actual value of the room temperature (TRx)	0...50	°C	0,5	-
19	Actual value of the outside temperature (TAx) To set the attenuated outside temperature to Tax, press the + / - buttons simultaneously for 3 seconds.	-50...+50	°C	0,5	-
Maintenance					
23	Standard time program for heating circuit and d.h.w. To activate, press the + and - buttons simultaneously for 3 seconds	0/1	-	1	0
Time switch program for d.h.w. heating					
29	preselection of weekday 1-7 7-day block 1...7 Individual days	1-7 / 1...7	Weekday	1 day	-
30	Switch-on time 1. 3rd period d.h.w.	00:00...23:59	h / min	10 min	06:00
31	Switch-off time 1. 3rd period d.h.w.	00:00...23:59	h / min	10 min	22:00
32	Switch-on time 2. 3rd period d.h.w.	00:00...23:59	h / min	10 min	- -:- -
33	Switch-off time 2. 3rd period d.h.w.	00:00...23:59	h / min	10 min	- -:- -
34	Switch-on time 3. 3rd period d.h.w.	00:00...23:59	h / min	10 min	- -:- -
35	Switch-off time 3. 3rd period d.h.w.	00:00...23:59	h / min	10 min	- -:- -
Service					
49	Indication of BMU error code 1...4 = BMU number, 1...255 = error code	1...4 / 0...255	-	1	-
50	indication of faults	0..255 / 00.01–14.16	-	1	-

2.5 Parameter settings for the heating engineer

Description

Configuration and parameter settings to be made by the heating engineer.

Setting

	Buttons	*Explanation*	*Line*
1		Press one of the line selection buttons. *This will take you first to the programming level "Enduser".*	
2		Press both line selection buttons for at least 3 seconds. This will take you to the programming level "Heating engineer".	
3		Press the line selection buttons to select the required line. *The parameter list on the next 2 pages contains all available lines.*	
4		Press the + or - button to set the required value. The setting will be stored as soon as you leave the programming mode or change to another line. *The parameter list on the next 2 pages contains all settings that can be made.*	
5		You leave the programming level "Heating engineer" by pressing one of the operating mode buttons. ➔ Note: *If no button is pressed for about 8 minutes, the controller will automatically return to the operating mode selected last.*	Contin. display

2.5.1 Overview of heating engineer parameters

Line	*Function*	*Range*	*Unit*	*Resolution*	*Factory setting*
Service values					
51	Output test (relay test) 0 Control mode according to the operational status 1 All outputs are deactivated 2 D.h.w. charging pump ON Q3 3 Heating circuit / system pump ON Q1	0...3	-	1	0
52	Input test (sensor test) 0 Cascade return temperature sensor or buffer storage tank temperature sensor B70/B4 1 D.h.w. temperature sensor B3 2 Cascade flow temperature sensor B10 3 outside temperature sensor B9 4 Room temperature sensor (room unit) A6 5 input H1 H1	0...5	-	1	0
53	Display of plant type	27...36 / 65...67	-	1	-
54	displaying the PPS communication - - - No communication 1...12 PPS device address 0...255 identification code	--- / 1..12 / 0..255	-	1	-
Actual values					
55	Actual value of boiler temperature of BMUs (TKx) [1)] 1...4 = BMU number, 0...140 = actual value of boiler temperature (interrogate with + / - buttons)	1...4 / 0...140	°C	1	-
56	Actual value of cascade flow temperature Input B10	0...140	°C	1	-
57	Actual value of cascade return temperature Input B70	0...140	°C	1	-
58	actual value of buffer storage tank temperature Input B4	0...140	°C	1	-
59	Actual value of the d.h.w. temperature (TBWx) [1)] (Input B3 or value from BMU)	0...140	°C	1	-
60	Attenuated outside temperature (Taxged)	-50.0...+50.0	°C	0.5	-
61	Composite outside temperature (TAxgem)	-50.0...+50.0	°C	0.5	-
62	outside temperature source --.-- No signal 00.01 Segment / device address	--.-- / 00.01...14.16	-	-	-
Setpoints					
65	Setpoint of the boiler temperature of BMUs (TKx) [1)] 1...4 = BMU number, 0...140 = actual value of boiler temperature (interrogate with + / - buttons)	1...4 / 0...140	°C	1	-
66	Setpoint of the cascade flow temperature	0...140	°C	1	-
69	Setpoint of d.h.w. temperature (TBWw)	0...140	°C	1	-
70	Nominal room temperature setpoint Nominal setpoint plus readjustment made on the room unit	0.0...35.0	°C	0,5	-
71	Setpoint of room temperature (TRRw)	0.0...35.0	°C	0,5	-
72	Flow temperature setpoint (TVw)	0...140	°C	1	-
Heat generation values					
75	Display of the available cascade boilers (--- = none)	--- / 00.1...16.3	-	01.1	-
76	display lead boiler	--- / 00.1...16.3	-	01.1	-
77	Remaining number of operating hours for changeover of boiler sequence Only if a value is selected on line 130, otherwise the LCD displays - - -	0...990	h	1	-

Line	*Function*	*Range*	*Unit*	*Resolution*	*Factory setting*
80	Burner hours run BMU 1 [1)]	0...65535	h	1	0
81	Burner hours run BMU 2 [1)]	0...65535	h	1	0
82	Burner hours run BMU 3 [1)]	0...65535	h	1	0
83	Burner hours run BMU 4 [1)]	0...65535	h	1	0
90	Minimum limitation of the boiler temperature (TKmin) [1)]	$TKmin_{OEM}$...TKmax (max 95°C)	°C	1	8
91	Nominal output BMU 1 [1)]	0...255	kW	1	20
92	Nominal output BMU 2 [1)]	0...255	kW	1	20
93	Nominal output BMU 3 [1)]	0...255	kW	1	20
94	Nominal output BMU 4 [1)]	0...255	kW	1	20
Configuration of plant					
95	pump function output Q1 1 Heating circuit pump or no pump 2 System pump for heating circuits only 3 System pump for heating circuits and d.h.w. storage tank 4 d.h.w. circulating pump 5 Pump H1	1...5	-		1
97	use sensor input B70/B4 1 Cascade return temperature (B70) 2 Buffer storage tank temperature sensor (B4)	1...2	-	1	1
Space heating					
100	parallel displacement of the heating curve	-4.5...+4.5	K (°C)	0,5	0,0
101	room influence 0 Inactive 1 Active	0 / 1	-	1	1
102	Switching differential of the room temperature (SDR) - - . - Inactive 0,5...4,0 Active	- - . - / 0.5...4.0	K (°C)	0,5	- - . -
103	Minimum limitation of the flow temperature setpoint (TVmin) TVmax Line 104	8...Tvmax	°C	1	8
104	Maximum limitation of the flow temperature setpoint (TVmax) Tvmin Line 103	TVmin...95	°C	1	80
105	type of building construction 0 Heavy 1 Light	0 / 1	-	1	1
106	adaption of the heating curve 0 Inactive 1 Active	0 / 1	-	1	1
107	Maximum forward shift of optimum start control 0 No forward shift	00:00...06:00	hh:mm	10 min	00:00
108	Maximum forward shift of optimum stop control 0 No forward shift	00:00...06:00	hh:mm	10 min	00:00
D.h.w.					
120	Reduced setpoint of d.h.w. temperature (TBWR) TBWw Line 13	8...TBWw	°C	1	40
121	release of d.h.w. heating 0 24 h/day 1 According to the heating circuit time switch program)s) with forward shift 2 According to d.h.w. time switch program (lines 29...35)	0...2	-	1	1
122	switching program circulating pump 0 According to heating circuit time switch program 1 According to release of d.h.w. heating	0...1	-	1	1
123	Assignment of d.h.w. heating 0 For local consumer only 1 For all consumers in the same segment 2 For all consumers in the system	0...2	-	1	2

Line	*Function*	*Range*	*Unit*	*Resolution*	*Factory setting*
124	D.h.w. charging 0 Once per day (forward shift 2.5 h) 1 Several times per day (forward shift 1h)	0 / 1	-	1	1
125	Type of d.h.w. demand 0 Sensor 1 Control thermostat	0 / 1	-	1	0
126	Flow temperature boost for d.h.w.	0...30	K	1	16
127	d.h.w. priority 0 MK + PK absolute 1 MK + PK shifting 2 None (parallel) 3 MK shifting, PK absolute	0...3	1	1	1
129	demand for heat with reduced d.h.w. setpoint 0 No (application with buffer storage tank) 1 Yes	0 / 1	-	1	1
Boiler cascade					
130	changeover of boiler sequence in cascades --- No automatic changeover (fixed boiler sequence) 10...990 Changeover according to the selected number of hours	--- / 10...990	- / hours	10	500
131	Exclusion with autom. changeover of boiler sequence 0 None 1 First boiler 2 Last boiler 3 First and last boiler	0...3	-	1	0
132	Lead boiler with the fixed sequence	00.1...16.3	-	01.1	-
133	Switch-on delay lag boilers	2...120	min	1	5
134	Restart lock of BMUs	0...1800	s	10	300
LPB / system					
140	LPB device address 0 Standalone 1...16 Device number	0...16	-	1	1
141	LPB segment address 0 Central segment (heat generation) 1...14 Segment (heat consumers)	0...14	-	1	0
142	LPB power supply 0 Off (central bus power supply) 1 AUTOMATIC (controller - bus power supply)	0 / 1	-	1	1
143	Displaying the LPB power supply	ON / OFF	-	-	-
144	displaying the LPB communication	ON / OFF	-	-	-
145	Range of action of central changeover 0 In the segment 1 In the system (if segment address = 0)	0 / 1	-	1	1
146	Automatic summer / winter changeover 0 Effect on local heating circuit only 1 Central changeover of all heating circuits	0 / 1	-	1	0
147	Central standby switch 0 OFF (Inactive) 1 ON (all units on standby)	0 / 1	-	1	0
148	clock mode 0 Autonomous clock 1 System time without remote adjustment 2 system time with remote adjustment 3 System clock (master)	0...3	-	1	3
149	Winter- / summertime changeover	01.01...31.12	tt.MM	1	25.03
150	Summer- / wintertime changeover	01.01...31.12	tt.MM	1	25.10
input H1					
170	input H1 0 Changeover of operating mode (HC standby / d.h.w. off) 1 Changeover of operating mode (HC standby) 2 Minimum setpoint of flow temperature (setting on line 171) 3 Heat generation lock 4 Heat demand DC 0...10 V	0...4	-	1	0

Line	*Function*	*Range*	*Unit*	*Resolution*	*Factory setting*
171	minimum setpoint of flow temperature contact H1 If activated at input H1 (setting 2)	8...TKmax	°C	1	70
172	Maximum value of heat demand If activated at input H1 (setting 4)	5...130	°C	1	100
173	operating action of the contact H1 0 N.C. contact 1 N.O.	0 / 1	-	1	1

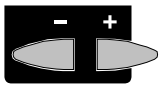
[1)] If a BMU is connected via LPB, this setting will not be active. The respective setting must be made directly on the BMU.

2.6 Parameter settings for the OEM

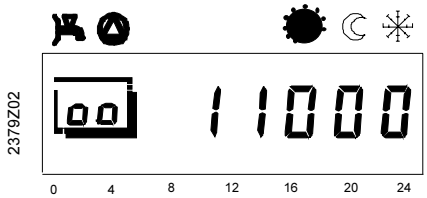
Description

Boiler-specific settings and protective functions for the boiler manufacturer.

Setting

	Buttons	*Explanation*	*Line*
1		Press one of the line selection buttons. *This will take you first to the programming level "Enduser".*	
2	 9 s	Press both line selection buttons for at least 9 seconds. A special display for entering the code will appear.	
3	**CODE**	Press buttons  and  to enter the required combination of the access code. *If the combination of buttons is correct, you reach the programming mode "OEM".* ➔ Wrong code: If the code has been entered incorrectly, the display will change to the "Parameter settings for the heating engineer".	
4		Press the line selection buttons to select the required line. *The parameter list on the next 2 pages contains all available lines.*	
5		Press the + or - button to set the required value. The setting will be stored as soon as you leave the programming mode or change to another line. *The following parameter list contains all available lines.*	
6		You leave the programming level "OEM" by pressing any of the operating mode buttons. ➔ Note: *If no button is pressed for about 8 minutes, the controller will automatically return to the operating mode selected last.*	Contin. display

Example



Whether correct or incorrect, each push of a button represents irrevocably a digit of the code.
As a confirmation, the respective digit changes to 1.

2.6.1 Overview of OEM parameters

Line	*Function*	*Range*	*Unit*	*Resolution*	*Factory setting*
Heat source OEM					
1	Minimum limitation of the boiler temperature:OEM [1)] (TKminOEM)	8...95	°C	1	8
2	Maximum limitation of the boiler temperature (TKmax)	8...120	°C	1	80
8	Pump overrun time (after burner OFF)	0...20	min	1	5
22	Minimum limitation of boiler return temperature	8...95	°C	1	8
25	Calibration of actual output value BMU 1 [1)]	-100...100	-	1	0
26	Calibration of actual output value BMU 2 [1)]	-100...100	-	1	0
27	Calibration of actual output value BMU 3 [1)]	-100...100	-	1	0
28	Calibration of actual output value BMU 4 [1)]	-100...100	-	1	0
Space heating OEM					
30	Gain factor of room influence (KORR)	0...20	-	1	4
31	Constant for quick setback (KON) (without room sensor)	0...20	-	1	2
32	Boost of room temperature setpoint (with boost heating)	0...20	K (°C)	1	5
33	Frost protection for the plant 0 Inactive 1 Active	0 / 1	-	1	1
34	overtemperature protection for the pump heating circuit 0 Inactive 1 Active	0 / 1	-	1	1
35	Heat gains (Tf)	-2...+4	°C	0,1	0
36	adaption sensitivity 1	1...15	-	1	15
37	adaption sensitivity 2	1...15	-	1	15
D.h.w. OEM					
40	Maximum nominal setpoint of the d.h.w. temperature (TBWmax)	8...80	°C	1	60
41	Switching differential of the d.h.w. temperature	0...20	K (°C)	1	5
42	Legionella function 0 = OFF 1 = ON	0 / 1	-	1	1
43	setpoint of the legionella function	8...95	°C	1	65
44	Protection against discharging during d.h.w. heating 0 = no protection against discharging 1 = always protection against discharging 2 = protection against discharging only when heat generation is locked	0...2	-	1	2
Cascade settings OEM					
50	cascade management strategy 1 autonomous 1 2 autonomous 2 3 autonomous 3 4 linked 1 5 linked 2 6 linked 3	1...6	-	1	2
51	Lower limit of output range (Pmin)	0...Pmax	%	1	40
52	Upper limit of output range (Pmax)	Pmin...100	%	1	90
56	Mandatory time on basic stage when boilers are added	10...1200	s	10	60
60	Minimum temperature differential at the pressureless header	0...20	K (°C)	1	4

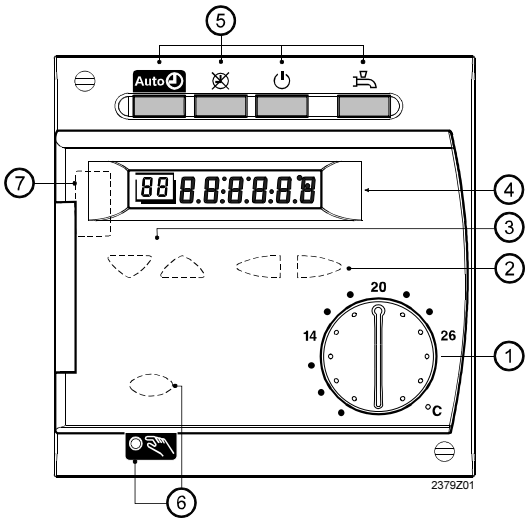
Line	*Function*	*Range*	*Unit*	*Resolution*	*Factory setting*
Configuration of plant					
90	continuous display 0 Weekday / time of day 1 Actual value of cascade flow temperature	0 / 1	-	1	0
Service values OEM					
91	software version	00.0...99.9	-	1	-
92	device operating hours	0...500000	h	1	-

1) If a BMU is connected via LPB, this setting will not be active.
The respective setting is to be made directly on the BMU.

2.7 Operation

Introduction

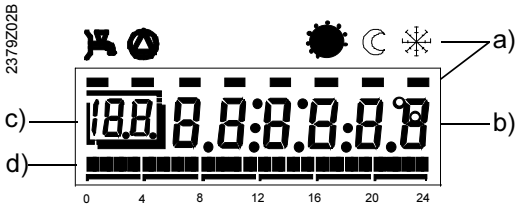
Operating instructions are inserted at the rear of the unit's front cover.



2.7.1 Operating elements

	Operating element	*Function*
1	Room temperature setpoint knob	Adjustment of room temperature setpoint
2	Setting buttons	Parameter settings
3	Line selection buttons	Selection of parameters / switching of lines
4	Display	Readout of actual values and settings
5	Operating mode buttons	Operating mode changes to: Auto Automatic operation continuous operation Standby D.h.w. heating ON / OFF
6	Function button with LED for manual operation	Manual operation ON / OFF
7	Connection facility for PC tool	Diagnostics and service

Display



a) Symbols for indicating the operational status with the black bars (level pointers)
When the ECO function is active, the current level pointer flashes.
b) Display during normal control mode or when making settings
c) Programming line when making settings.
d) Time bar for normal control mode or when making settings.

2.8 Operational faults

2.8.1 No display on the controller:

- Is the heating plant's main switch turned on?
- Are the fuses in order?
- Check the wiring

2.8.2 Controller displays the wrong time of day:

- Set the correct time of day on the controller (operating line 1).
- Set the correct time of day on the clock master (if present).

2.8.3 One of the BMUs does not switch on

- Does the BMU really have to operate? (Check cascade lead strategy, delayed switching on?)
- Press BMU's lockout reset button.
- Check the electromechanical control thermostat (TR) and the manual reset safety limit thermostat (STB)
- Check wiring and fuse of the BMU.
- Check communication link to the BMU (operating line 54)
- Check wiring of the cascade temperature sensors (sensor test, operating line 52).

2.8.4 One of the pumps does not run

- Is the right type of plant displayed (operating line 53)?
- Is the pump correctly defined? (Operating line 95)
- Check wiring and fuse of the pump (relay test, operating line 51)
- Check wiring of the sensors (sensor test, operating line 52)

2.8.5 D.h.w. is not being heated:

- Has the button for d.h.w. heating been pressed?
- Check setpoint of the d.h.w. temperature
- Check if d.h.w. heating is released
- Check wiring and fuse of the charging pump (relay test, operating line 51)
- Check wiring of the d.h.w. temperature sensor (sensor test, operating line 52)
- Check setting of the electromechanical control thermostat (TR) installed on the boiler. It must be above the TKmax setting

2.8.6 The room temperature does not agree with the required temperature level:

- Does the room temperature setpoint agree with the required temperature level? (Knob on the controller or on the room unit)
- Is the required operating mode indicated?
- Are weekday, time of day and the displayed heating program correct? (Operating lines 1...11)
- Has the heating curve slope been correctly set? (Operating line 17)
- Check wiring of outside sensor (operating line 52)
- Has the ”Setting knob for the nominal room temperature setpoint” with the ”Parallel displacement of the heating curve” (operating line 100) been calibrated based on the effective room temperature?

2.8.7 Error message; display shows "ER"

- Select operating line 50 which gives you the error code and error address. There, you see the error code and the address of the error. Refer to section "Indication of errors" for a list of the possible error codes and their descriptions.

3 Description of the enduser settings

User interface

3.1 Heating circuit operating modes

Benefit

- Straightforward selection of heating circuit operating modes

Description

The control provides 3 different heating circuit operating modes that can be directly selected as required.

Setting

Select the required operating mode by pressing the respective operating mode button. It is located on the controller front for direct access by the user.

Operating mode	*Designation*	*Effect of selected operating mode*
	Automatic operation	• Heating according to the time program (operating lines 5 to 11) • Temperature setpoints according to the heating program • Protective functions active • Changeover on the room unit active • Automatic summer / winter changeover and automatic 24-hour heating limit active (ECO functions)
	continuous operation	• Heating mode with no time program • Temperature adjustment with the setpoint knob • Protective functions active • Changeover on room unit **in**active • Automatic summer / winter changeover and automatic 24-hour heating limit **in**active (ECO functions)
	Standby	• Heating OFF • Temperature according to frost protection • Protective functions active • Changeover on room unit **in**active

Illuminated buttons

The selected operating mode is indicated by illuminated buttons. A number of functions can cause the displayed selection to change. The following table shows the possible statuses. The following table shows the possible statuses:

Settings on the controller

Function	*Effect on button and meaning*
Heat generation lock Line 170 = 3	• Selected **HC operating mode button flashes** when contact H1 is closed • **D.h.w. operating mode button flashes** when switched on
Changeover of operating mode Line 170 = 0	• Selected **HC operating mode button** ⏻ **flashes** when contact H1 is closed • **D.h.w. operating mode button flashes** when switched on
Changeover of operating mode Line 170 = 1	• **HC operating mode** ⏻ **flashes** • **D.h.w. operating mode button** will not be affected
Minimum setpoint of flow temperature Line 170 = 2	• Selected **HC operating mode button flashes** when contact H1 is closed. • **D.h.w. operating mode button** will not be affected
Central standby switch Line 147 = 1	• **HC operating mode** ⏻ **flashes** • **D.h.w. operating mode button** will not be affected

Settings on the room unit

Function	*Effect on button and meaning*
Occupancy button	• **HC operating mode** Auto **flashes** when occupancy button is active. • **D.h.w. operating mode button** will not be affected
Holiday function	• **HC operating mode** Auto **flashes** when holiday function is active • **D.h.w. operating mode button flashes** when switched on

Effect of room unit

Changeover of the operating mode on the room unit is active only if the controller is in automatic mode Auto.
The room temperature is transmitted to the controller via PPS, independent of the selected operating mode.

3.2 Operating mode of d.h.w. heating

Benefit

- Selection of d.h.w. heating mode independent of heating operation
- Selection is made directly on the user interface

Description

D.h.w. heating can be switched on and off independent of the other operating modes.

Setting

D.h.w. heating is selected by pressing the respective button on the controller's user interface.

Effect

By pressing the respective button, d.h.w. heating is switched on or off.

- D.h.w. heating **OFF** - button dark.
  D.h.w. is not being heated. Frost protection remains active, however, and prevents the storage tank temperature from falling below a certain level
- D.h.w. heating **ON** - button illuminated.
  The d.h.w. is heated according to the settings made

Important settings

The following settings affect d.h.w. heating:

- Time switch program d.h.w. heating (lines 29...35)
- Nominal d.h.w. temperature setpoint (line 13)
- Reduced d.h.w. temperature setpoint (line 120)
- Release of d.h.w. heating at the nominal setpoint (line 121)
- Assignment of d.h.w. heating (line 123)
- D.h.w. heating (line 124)
- Type of d.h.w. demand (line 125)

➔ Note

The d.h.w. values that can be adjusted on the controller apply to both d.h.w. heating by the controller and d.h.w. heating by a BMU supplied by Landis & Staefa. Some BMUs of other manufacture also support this function.

3.3 Nominal room temperature setpoint

Benefit

- Straightforward setting of the required nominal room temperature setpoint

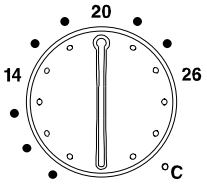
Description

The heating system uses 3 different setpoints that can be adjusted:

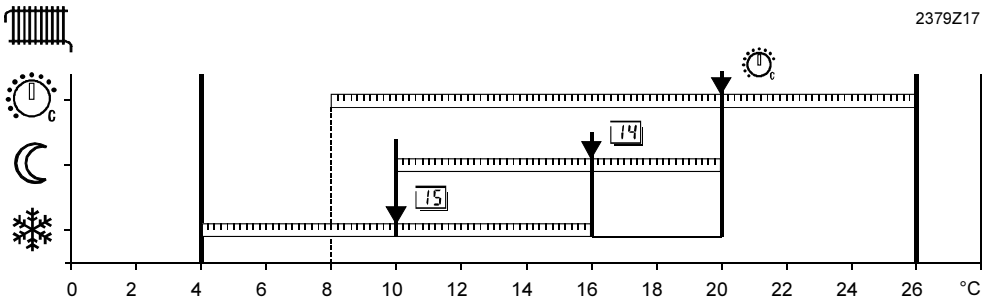
- The nominal room temperature setpoint described here
- The reduced room temperature setpoint (setting on line 14)
- The frost protection setpoint of the room temperature (setting on operating line 15)

Setting

The nominal room temperature setpoint is preadjusted with the setpoint knob. It is located on the controller front for direct access by the user.



Setting range	*Unit*	*Factory setting*
8...26	°C	20



Room temperature setpoint setting ranges

14 Setting "Reduced room temperature setpoint"
15 Setting "Frost protection setpoint of the room temperature"

Effect of temperature setting

When the nominal room temperature setpoint is active, the rooms will be heated according to the adjustment made with the setpoint knob.
Effect in the various operating modes:

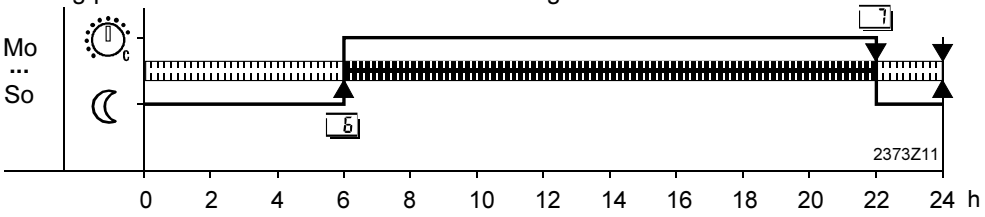
Operating mode	*Effect of knob adjustment*
Auto	Adjustment acts on the heating periods
	Adjustment acts continuously
	Adjustment has no effect

Note

The adjustment made with the setpoint knob has priority over the reduced room temperature setpoint entered (line 14). Especially in a situation when the adjustment made with the knob is lower.

Example

During the heating periods, the nominal room temperature setpoint is maintained. The heating periods are in accordance with the settings made on lines 6 to 11.



Room unit

When using a room unit without setpoint readjustment (QAA50), the setpoint knob on the controller acts as described above.
When using a room unit featuring setpoint readjustment (QAA70), the setpoint knob on the controller is inactive. In that case, the nominal setpoint adjusted on the room unit applies.
A connected room unit is active only when operating mode Auto is selected on the controller.

3.4 Manual operation

Benefit

- Partly manual heating operation

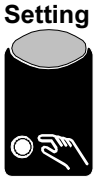
Description

In operating mode “Manual operation”, the plant components on the consumer side must be manually adjusted and monitored. The control functions of the unit are only used for controlling the BMUs.

Common flow temperature

The BMUs are released and use their boiler temperature sensor to control the temperature at the level of the maximum limitation of the BMU setpoint (TKmax.) Factory setting 80 °C. The actual boiler temperatures are displayed on setting line 55.

Setting



Activation: Manual operation is activated by pressing this button. It is accessible only when the cover of the controller is open

Deactivation:
- By pressing one of the operating mode buttons
- By pressing again the manual operation button

➔ Note

When deactivating the function, the controller will automatically return to the operating mode previously selected.

Effect

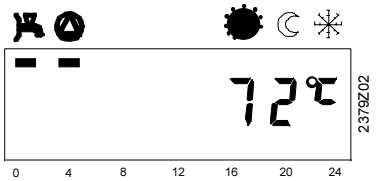
As soon as manual operation is selected, all relays will switch to the following statuses:

Output	*Terminals*	*Status*
BMU	PPS	All boilers released, fixed heat demand at TKmax
Heating circuit or system pump:	Q1	ON (uncontrolled)
D.h.w. charging pump	Q3	ON (uncontrolled)

TKmax = maximum limitation of BMU setpoint (operating line 2_{OEM})

Display

Common flow temperature (cascade flow temperature):



Setting the clock

Benefit

- Straightforward changeover from summer- to wintertime, and vice versa
- Fast and easy-to-understand time settings

Description

To ensure proper operation of the heating program, the 24-hour time switch with the time of day and weekday must be correctly set.

System time

The time of day can be set from a remote location via the bus system, provided clock operation is appropriately set. Also refer to clock operation on operating line 148.

3.5 Time of day

Setting

1. Press the operating line selection buttons to select line 1.
2. Press the + / - buttons to set the time of day.

Setting range	*Unit*
00:00...23:59	Hour : Minute

Effect

The controller's clock time is set in agreement with the correct time. This setting is important to make certain the controller's heating program will operate correctly.

➔ Notes

- During the setting procedure, the clock continues to run
- Each time the + or - button is pressed, the seconds are reset to zero

3.6 Weekday

Setting

1. Press the operating line selection buttons to select line 2.
2. Press the + / - buttons to select the weekday.

Setting range	*Unit*
1...7	Weekday

Effect

The time of day will be set to the selected weekday. This setting is important to make certain the controller's heating program will operate correctly.

Weekday table

1	=	Monday	5	=	Friday
2	=	Tuesday	6	=	Saturday
3	=	Wednesday	7	=	Sunday
4	=	Thursday			

3.7 Date (day, month)

Setting

Setting range	*Unit*
01:01...31:12	Day month

Effect

Day and month of the controller will be based on this setting. This setting of date is important to make certain the controller's holiday program and summer- / wintertime changeover will operate correctly.

3.8 Year

Setting

Setting range	*Unit*
1999...2099	Year

Effect

The year of the controller will be based on this setting. This setting of year is important to make certain the controller's holiday program and summer- / wintertime changeover will operate correctly.

Benefit

- The heating system operates only if there is demand for heat.
- The user can set the heating periods to suit his lifestyle.
- Energy can be saved by making adequate use of the heating program.

Description

The time switch program for space heating consists of the switching times that can be entered for the weekdays or the 7-day block.
The time switch program for space heating and the time switch program for d.h.w. heating operate independently of one another.

3.9 Preselecting the weekday

Description

With this setting, you select the weekdays or the 7-day block for which the switching times of the time switch program apply.

The heating program thus set becomes active when selecting automatic mode Auto.

Setting

1. Press the operating line selection buttons to select line 5.
2. Press the + / - buttons to preselect the 7-day block or the individual day.

Setting range	*Unit*
1-7	7-day block
1...7	Individual days

Important

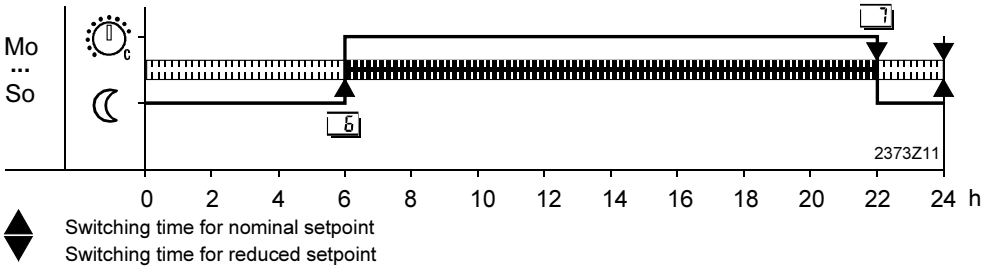
- This setting must be made before the switching times are entered!
- For every day on which other switching times shall apply, the preselection of the individual day with subsequent entry of the switching times must be repeated

Effect
Entry of **1-7**

This setting is used to select either the whole week (1-7) or individual days (1...7).
7-day block

Entry of the switching times from operating line 6 to 11 is identical for every day from Monday through Sunday.

Example:



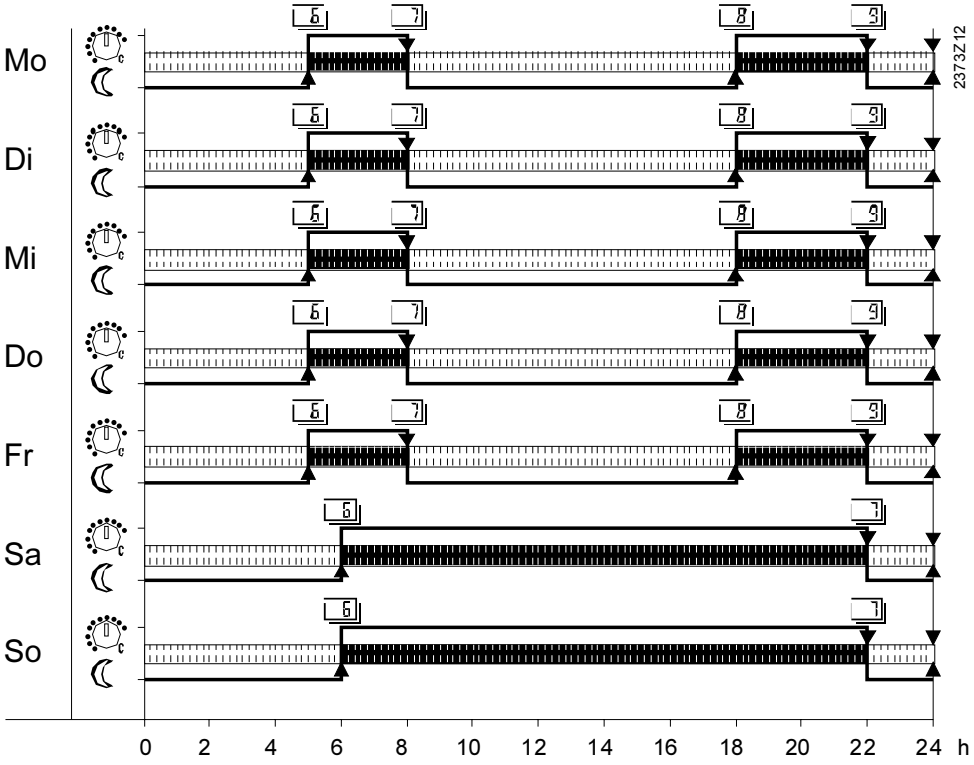
Entry of **1...7**

Individual days

The setting of the switching times from operating line 6 through 11 is entered **only** for the individual day selected here.

➔ *Tip*
First, choose the 7-day block (1-7) to enter the switching times that apply to the majority of days; then, select the individual days (1...7) to make the required adjustments.

Example:



3.10 Switching times

Description

With this setting, you determine the switching times for space heating. At these switching times, the temperature setpoints of the heating circuit change.
The heating program thus set becomes active when selecting automatic mode Auto.

Setting

1. Press the line selection buttons to select line 6 to 11.
2. Press the + / – buttons to set the switching time on each line.

6 ... 11

Setting range	*Unit*	*Factory setting*
- -:- -...24:00	h : min	See "Program overview" below

! Important

First, select the weekday (operating line 5) for which the switching times shall be entered!

➔ Note

The controller then makes a check to ensure the entries have been made in the correct order.

Effect

At the times entered, the program will switch to the respective temperature setpoints. The table below shows at what times the setpoints will be activated.

Entry:

– – : – – Switching point inactive

00:00...24:00 At the time entered, heating to the respective temperature is ensured.

Program overview

Line	*Switching point*	*Temperature setpoint*	*Standard*
6	Switch-on time period 1	Setpoint of knob	06:00
7	Switch-off time period 1	Reduced setpoint	22:00
8	Switch-on time period 2	Setpoint of knob	– – : – –
9	Switch-off time period 2	Reduced setpoint	– – : – –
10	Switch-on time period 3	Setpoint of knob	– – : – –
11	Switch-off time period 3	Reduced setpoint	– – : – –

Effect of room unit

When using a QAA70 room unit, the heating program will be acted upon. However, this works only if operating mode “AUTO” is selected on the controller.

3.11 Nominal d.h.w. temperature setpoint

Benefit

- D.h.w. heating only if there is a demand for it
- Possibility of using 2 different d.h.w. temperature setpoints

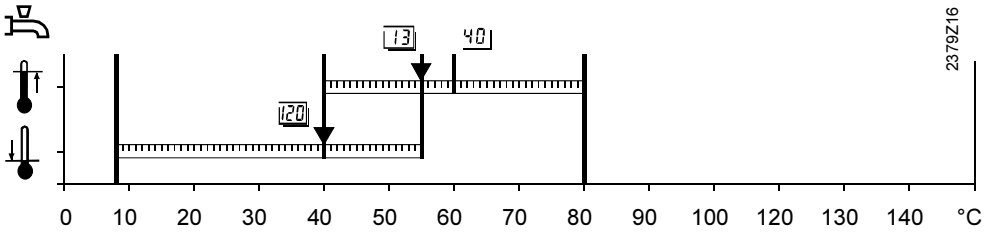
Setting

1. Press the operating line selection buttons to select line 13.
2. Press the + / – buttons to adjust the nominal setpoint of the d.h.w. temperature.

Setting range	*Unit*	*Factory setting*
TBWR...TBWmax	°C	55

TBWR Reduced setpoint of d.h.w. temperature (setting on operating line 120)
TBWmax Maximum nominal setpoint of d.h.w. temperature (setting on line 40_{OEM})

Effect



The temperature setpoint during normal d.h.w. operation will be changed.

13 Setting "Nominal setpoint of the d.h.w. temperature"
120 Setting "Reduced setpoint of the d.h.w. temperature"
40_{OEM} Setting "Maximum nominal setpoint of the d.h.w. temperature"

D.h.w. temperature setpoints

D.h.w. heating has 2 different setpoints that can be used:

- Nominal d.h.w. temperature setpoint: It ensures the d.h.w. temperature required during main occupancy times
- Reduced d.h.w. temperature setpoint (setting on operating line 120): it ensures the d.h.w. temperature required during the main occupancy times.

D.h.w. charging

The criteria required for releasing d.h.w. heating are defined by the settings made on lines 121 and 123 and 124.

➔ Note

In the event of a sensor with a short-circuit (display ”- - -” in input test, test step 1) the d.h.w. will not be heated (protection against scalding).

3.12 Reduced room temperature setpoint

Benefit

- Lower room temperatures during non-occupancy times, e.g. during the night
- Energy savings

Description

The heating system has 3 different setpoints that can be adjusted:

- The reduced room temperature setpoint described here.
- The nominal room temperature setpoint (to be adjusted with the setpoint knob).
- The frost protection setpoint of the room temperature (setting on operating line 15)

Setting

1. Press the operating line selection buttons to select line 14.
2. Press the + / – buttons to adjust the reduced room temperature setpoint.

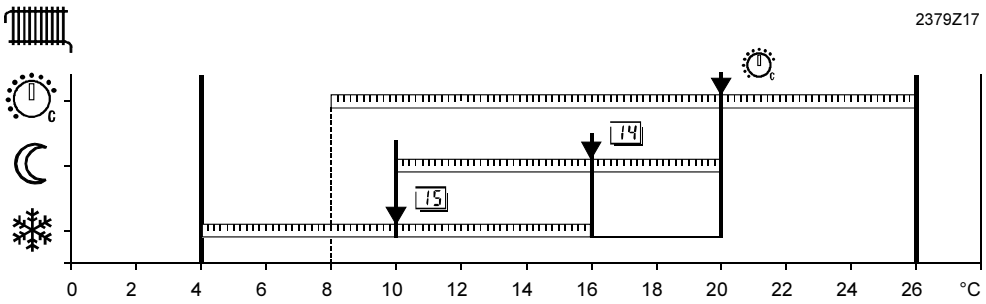
Setting range	*Unit*	*Factory setting*
TRF...TRN	°C	16

TRF Frost protection setpoint of the room temperature (setting on line 15)

TRN Nominal room temperature setpoint (to be adjusted with the setpoint knob)

➔ Note

If the required temperature level cannot be set, the adjustment made with the setpoint knob may be too low. It is not possible to set a value above the adjustment made with the setpoint knob.



Room temperature setpoint setting ranges

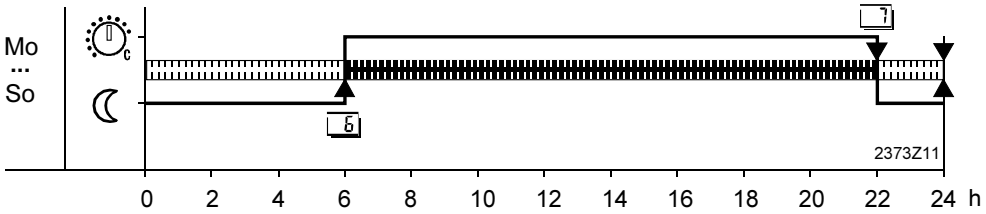
14 Setting "Reduced room temperature setpoint "

15 Setting "Frost protection setpoint of the room temperature"

Effect

With this setting, the reduced room temperature setpoint will change to the level called for by reduced operation ☾ in the living rooms.

Example



The heating periods are in accordance with the settings made on lines 6 to 11.

3.13 Frost protection setpoint of the room temperature

Benefit

- Protects the building against frost

⚠ Caution

This function is ensured only when the heating plant operates properly!

Description

This function prevents the room temperature from falling below the adjusted frost protection setpoint.

Setting

1. Press the operating line selection buttons to select line 15.
2. Press the + / – buttons to adjust the frost protection setpoint of the room temperature.

Setting range	*Unit*	*Factory setting*
4...TRRw	°C	10

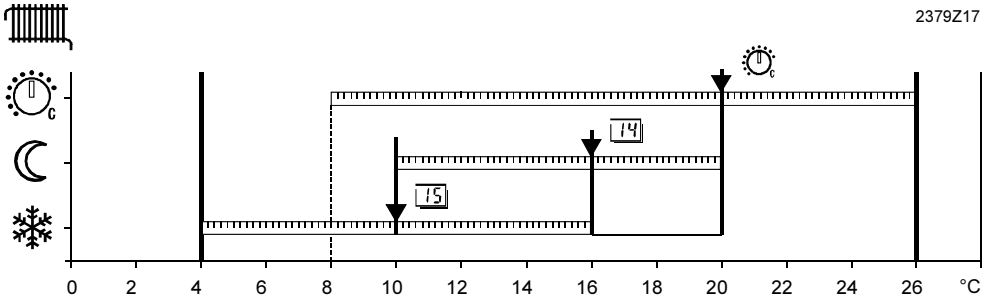
TRRw Reduced room temperature setpoint (setting on operating line 14)

Effect

This setting will change the frost protection setpoint of the room temperature.

Frost protection for the building

In operating mode ⏻, the room temperature is prevented from falling below a certain level. This means that the frost protection setpoint of the room temperature ❄ will be maintained.



Room temperature setpoint setting ranges

14 Setting "Reduced room temperature setpoint"
15 Setting "Frost protection setpoint of the room temperature"

3.14 Summer / winter changeover temperature of the heating circuit

Benefit

- Fully automatic operation throughout the year
- The heating will not be switched on when the outside temperature drops for short periods of time
- Additional savings function

Description

The summer / winter changeover temperature is the criterion for automatic summer / winter changeover of the heating plant.

Setting

1. Press the operating line selection buttons to select line 16.
2. Press the + / – buttons to select the summer / winter changeover temperature.

16

Setting range	*Unit*	*Factory setting*
8...30.0	°C	17

Effect

By changing the setting, the respective periods of time will be shortened or extended. The change will only affect the heating circuit.
Entry:

Increase: Winter operation will start *earlier*
Summer operation will start *later* .

Decrease: Winter operation will start *later*
Summer operation will start *earlier*

➔ Notes

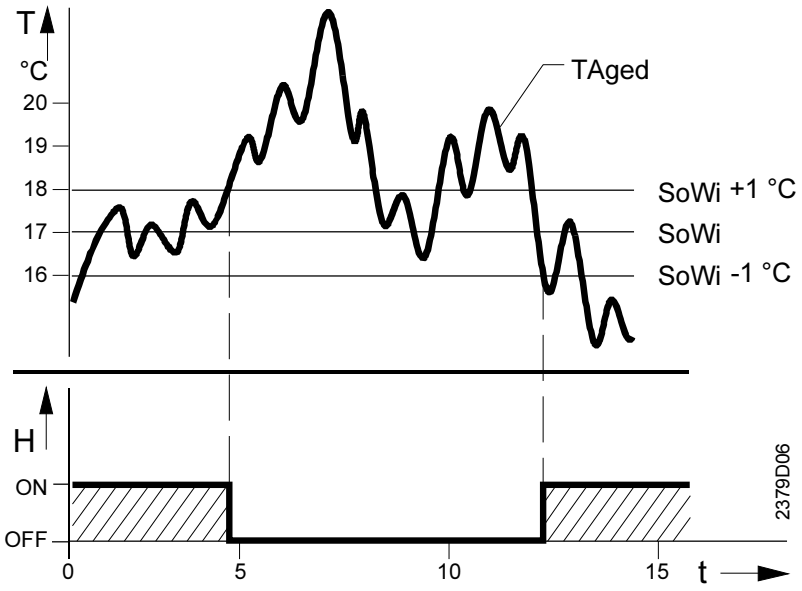
The summer / winter changeover temperature can act either locally or on other devices in the system (also refer to section "Effect of summer / winter changeover temperature") (Also refer to "Effect of automatic summer / winter changeover" on operating line 91).

- This function only acts in automatic mode Auto and standby mode ⏻.
- Level cursor flashes during summer operation.

Changeover

To determine changeover, the setting of the summer / winter changeover temperature (± a fixed switching differential) is compared with the attenuated outside temperature. Also refer to page 64.

Heating **OFF** (from winter to summer)	TAged > SoWi + 1°C
Heating **ON** (from summer to winter)	TAged < SoWi - 1°C



Changeover between summer and winter operation:

TAged Attenuated outside temperature
SoWi Summer / winter changeover temperature
T Temperature
t Time in days
H Heating

3.15 Heating curve slope

Benefit

- Constant room temperature in spite of outside temperature variations
- Generation of a flow temperature with no external demand for heat

Description

The controller generates the flow temperature setpoint as a function of the selected heating curve. For plants where the controllers cannot transmit their demand for heat via LPB or input H1, the controller can generate a weather-compensated flow temperature.

Setting

1. Press the operating line selection buttons to select line 17.
2. Press the + / - buttons to select the heating curve slope or - - . - einstellen.

Setting range	*Unit*	*Factory setting*
- : - - / 2.5...40.0	Increment	15.0

Effect

By changing the setting, the slope of the heating curve will be increased or decreased with the following effects:

Increase: The flow temperature will be **raised** when the outside temperature drops

Decrease: The flow temperature will be **raised less** when the outside temperature drops

The following settings produce the following effects:

2.5...40.0 The controller delivers a weather-compensated flow temperature.

- - : - The controller delivers no weather-compensated flow temperature.
To release heat generation, an external heat demand signal is required.
Frost protection for the plant is active, but not frost protection for the building. The settings and the display on the room unit are also deactivated.

➔ Notes

The setting of the heating curve slope (value from 2.5 to 40 or inactive - - -) affects the automatic generation of plant type (operating line 53).

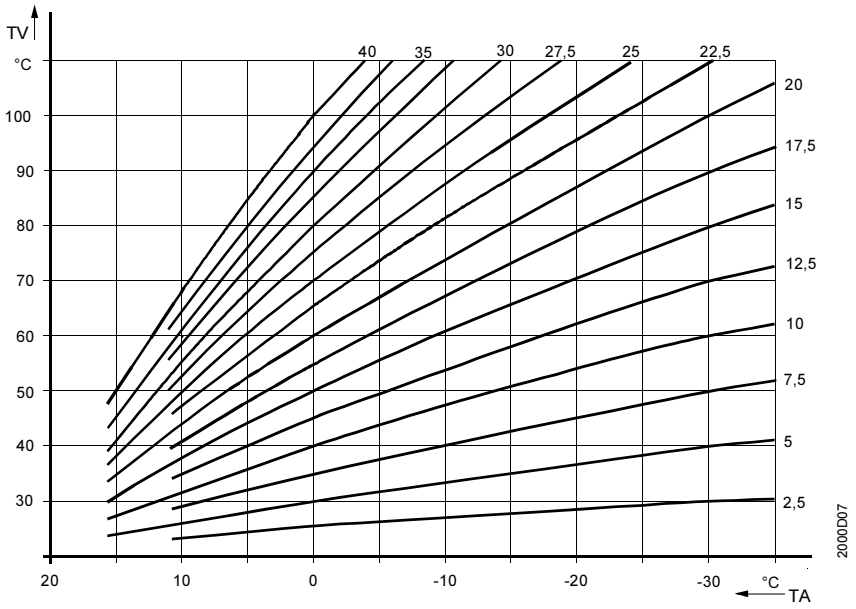
An external demand for heat can be delivered to the controller via LPB (LPB-compatible controllers) or input H1 (controllers of other manufacture). If several signals are present, the controller will use the highest of them as the setpoint.

The heating curve

Using the heating curve, the controller generates the flow temperature setpoint, enabling the system to maintain a constant room temperature even without using a room temperature sensor.
The steeper the slope of the heating curve, the higher the flow temperature setpoint at low outside temperatures.

➔ Note

Comfort is considerably enhanced when using a room temperature sensor.



TV Flow temperature
TA Composite outside temperature

Actual values

Benefit

- Display of the actual room temperature
- Display of the actual outside temperature

Note

All displays of actual values require the respective temperature detectors.

3.16 Actual value of the room temperature

Setting

1. Press the operating line selection buttons to select line 18.
2. No setting can be made with the + / - buttons.

Display	*Unit*
0...50 °C	°C

Effect

The temperature measured with the room unit will automatically be displayed on this line.

Special displays

– – –	Sensor with open-circuit or no room sensor connected
0 0 0	Sensor with short-circuit

3.17 Actual value of outside temperature

Setting

1. Press the operating line selection buttons to select line 19.
2. No setting can be made with the + / - buttons.

Display	Unit
- 50... + 50	°C

Effect

The temperature measured with the outside sensor will automatically be displayed on this line.

Special displays

– – –	Sensor with open-circuit or no sensor connected
0 0 0	Sensor with short-circuit

Note

For resetting the attenuated outside temperature to the actual room temperature, refer to page " Attenuated outside temperature".

3.18 Standard time switch program for heating circuit and d.h.w.

Benefit

- Straightforward resetting of all time switch programs to their standard values

Description

The standard time program resets the time settings of all time switch programs. For this purpose, the controller is supplied with non-volatile factory settings.

Setting

1. Press the operating line selection buttons to select line 23.
2. Press the + / - buttons for 3 seconds.
   The standard time program is activated as soon as the display changes to 1.

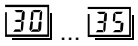
Display	*Unit*
0 / 1	-

! Caution

In that case, the individual settings will be lost!

Effect

The time settings for the time switch programs will be overwritten with standard values. This applies to the following settings:

- Switching times of time switch program "heating circuit" 
- Switching times for d.h.w. program 

Standard values

Switching point	*Setting line*		*Standard time*
	Heating circuit	*D.h.w.*	
Period 1 ON	6	30	06 : 00
Period 1 OFF	7	31	22 : 00
Period 2 ON	8	32	– – : – –
Period 2 OFF	9	33	– – : – –
Period 3 ON	10	34	– – : – –
Period 3 OFF	11	35	– – : – –

Benefit

- D.h.w. is heated only if required.
- The user can set the d.h.w. heating times to suit his lifestyle.
- Energy can be saved by making adequate use of the time switch program

Description

The time switch program for d.h.w. consists of the switching times to be entered for the weekdays or the 7-day block.
The time switch program for d.h.w. and the time switch program for space heating operate independently of one another.

➔ Important

The time switch program is active only when, on operating line 121 (d.h.w. program), setting 2 has been selected.

3.19 Preselecting the weekday

Description

With this setting, you define the weekdays or the 7-day block for which the switching times of the d.h.w. time switch program apply.

The time switch program thus set is activated by pressing the d.h.w. operating mode button.

Setting

1. Press the operating line selection buttons to select line 29.
2. Press the + / - buttons to preselect the 7-day block or the individual day.

Setting range	*Unit*
1-7	7-day block
1...7	Individual days

Important

- This setting must be made before the switching times are entered!
- For every day on which other switching times shall apply, the preselection of the individual day with subsequent entry of the switching times must be repeated

Effect

This setting is used to select either the whole week (1-7) or individual days (1...7).
Entry:

1-7 7-day block: Entry of the switching times on lines 30 to 35 is identical for every day from Monday through Sunday

1...7 Individual days: Entry of the switching times on lines 30 to 35 is made **only** for the individual day selected here

Example:

The principle is the same as that used with "Time switch program space heating" (refer to the diagrams and tips on page 39).

3.20 Switching times

Description

This is the setting of the switching times for d.h.w. time switch program at which the d.h.w. temperature setpoint will change.
The time switch program thus set is activated by pressing the d.h.w. operating mode button.

Setting

1. Press the line selection buttons to select line 30 to 35.
2. Press the + / – buttons to set the switching time on each line.

Setting range	*Unit*	*Factory setting*
- -:- -...24:00	h : min	See "Program overview" below

! Important — First, select the weekday for which the switching times shall be entered!

➔ Note — The controller then makes a check to ensure the entries have been made in the correct order.

Effect

At the times entered, the program will switch to the respective temperature setpoints. The table below shows at what times the setpoints will be activated.
Entry:

– : – – Switching point inactive

00:00...24:00 At the time entered, the d.h.w. will be heated to the respective temperature.

Program overview

Line	*Switching point*	*D.h.w temperature setpoint*	*Standard*
30	Switch-on time period 1	Nominal setpoint 13	06:00
31	Switch-off time period 1	Reduced setpoint 120	22:00
32	Switch-on time period 2	Nominal setpoint 13	– – : – –
33	Switch-off time period 2	Reduced setpoint 120	– – : – –
34	Switch-on time period 3	Nominal setpoint 13	– – : – –
35	Switch-off time period 3	Reduced setpoint 120	– – : – –

3.21 Displaying the BMU error code

Benefit

- Straightforward checking of plant.
- Fault tracing is made easier.

Description

For each BMU, the RVA47.320 can log and store one fault status signal with the associated BMU number and error code. The faults are indicated on this operating line.

Setting

1. Press the operating line selection buttons to select operating line 49.
2. Press the + / - buttons to interrogate the individual BMUs.

Display	*Unit*
1...4 / 0...255	BMU number / error code

Effect

The number of the lowest connected BMU number containing a fault entry will automatically be displayed on this line.

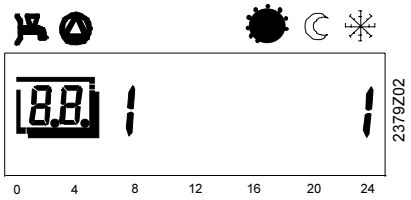
➔ Note

Error messages cannot be acknowledged. They disappear only if the appropriate fault has been rectified.

Display

The display shows the BMU number and the associated error code. When none of the BMUs delivers a fault status signal, or when no BMU is connected, there will be no display.
The meaning of the different error codes depends of the make of BMU used. For this reason, no overview of all the different error codes can be given here. For details, please refer to the technical documentation of the relevant product.

Example:



BMU 1 signals error code 1.

Note

If there is a BMU error code, operating line 50 also displays a general BMU error (error code 150).

3.22 Indication of faults

Benefit

- Straightforward checking of plant
- Fault tracing is made easier

Description

The controller indicates faults that may have occurred in the controller itself or in the system.
The display shows "Er" if an error has occurred.

Setting

1. Press the operating line selection buttons to select line 50.
2. Press the + / - buttons to display the list of faults.

Display	*Unit*
0...255	-

Effect
Note

The first entry in the error list will automatically be displayed on this operating line.
By pressing − + , it is possible to switch between error signals.

Error signals

The controller can store a maximum of 2 error signals. The error signal will be cleared only after the cause of the fault has been removed. If additional errors are present, they will be stored as soon as storage capacity becomes available.

Device errors

Errors that may occur locally on this device:

Display	*Description of error*
Blank	No error
10	outside temperature sensor
26	Cascade flow temperature sensor
46	Cascade return temperature sensor
50	D.h.w. temperature sensor
58	D.h.w. thermostat
61	Fault room unit
70	Buffer storage tank temperature sensor
81	Short-circuit LPB
82	Address collision on LPB (same address several times)
86	Short-circuit PPS
100	2 clock masters present
145	Wrong device connected to PPS
146	Inadmissible plant configuration
147	No BMU connected
150	General BMU fault

➔ Note

In the case of error code 150, operating line 49 also gives the manufacturer-specific error code of the BMU.

Faulty devices

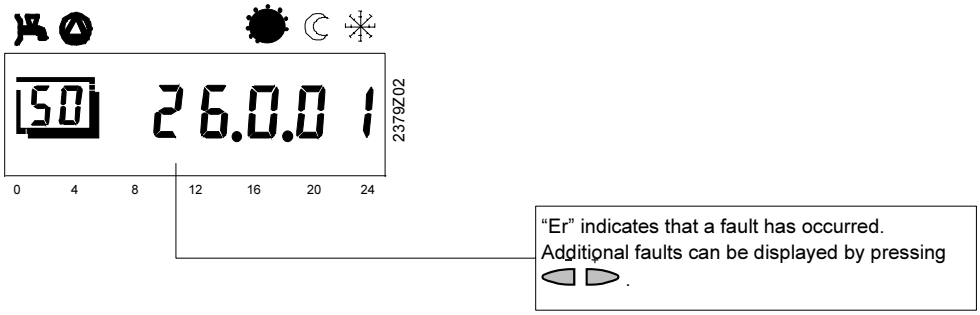
Other devices that are faulty and whose faults are signaled:

Display	*Description of error*
Example:	
26.0.01	Fault with address of the faulty device

- The first digit gives the error code (26).
The second digit indicates the segment address of the faulty device (.01).
(for the segments 10-14, the letters A, b, C, d, and E are used)
The third digit indicates the device address of the faulty device (.01).

Display

Example of a display after an error has occurred:



4 Description of the heating engineer settings

Service values

4.1 Output test

Benefit

- Connections can be checked prior to commissioning
- Faults can be traced much faster

Description

Also termed relay test, which is used to check the wiring and the configuration.

Setting

1. Press the operating line selection buttons to select operating line 51.
2. Press the + / - buttons to run through the output test.

Setting range	*Unit*	*Factory setting*
0...3	Increment	0

Effect

The output test will automatically become available on this operating line.
With each test step, the respective output will be activated so that it can be checked.

Test sequence

The test sequence is arranged in the form of a ring counter. This means it can be run through either forward or backward by pressing the + / - buttons.

Test step 0	All outputs are switched according to actual control operation
Test step 1	All outputs are deactivated
Test step 2	D.h.w. charging pump (Q3) is activated
Test step 3	Heating circuit or system pump (Q1) is activated.

Note

For additional information, refer to section "Commissioning".

4.2 Input test

Benefit

- Commissioning is facilitated
- Faults can be traced much faster

Description

Also termed detector test, which is used to check the wiring and the configuration.

Setting

1. Press the operating line selection buttons to select operating line 52.
2. Press the + / - buttons to run through the input test.

Setting range	*Unit*	*Factory setting*
0...5	Increment	0

Effect

The input test will automatically become available on this operating line.
With each test step, the respective input will be displayed so that it can be checked.

Test sequence

The test sequence is arranged in the form of a ring counter. This means it can be run through either forward or backward by pressing the + / - buttons.

Test step 0	Display of the function (B70/B4) [°C] selected on operating line 97.
Test step 1	Display of the d.h.w. temperature (B3).
Test step 2	Display of the cascade flow temperature (B10).
Test step 3	Display of the actual outside temperature (B9)
Test step 4	Display of room temperature acquired with room unit connected to A6
Test step 5	Display of input H1 according to the function selected on operating line 170 [°C, - - - , o o o].

➔ Note — For additional information, refer to section "Commissioning".

Special displays

– – –	Sensor with open-circuit or no sensor connected
0 0 0	Sensor with short-circuit

4.3 Display of plant type

Benefit

- Plant structure is easy to understand
- Straightforward checking of configuration

Description

Displays the plant type used.

Setting

1. Press the operating line selection buttons to select operating line 53.
2. No setting can be made with the + / - buttons.

Display	*Unit*
0, 27...36, 65...67	-

Effect

The number of the current plant type will automatically be displayed on this line.

0	Invalid configuration of plant
27...36, 65...67	Valid configuration of plant

Plant type

Based on the connected peripheral devices and parameter settings, the controller ascertains the current plant type.
The plant type is displayed in the form of a number which corresponds to the plant diagram.
For the graphic illustration of the various plant types, refer to chapter "Application".

The following factors have an impact on the generation of the type of plant:

- Connection of a d.h.w. temperature sensor:
  The controller identifies a connected d.h.w. temperature sensor and also whether it is connected directly to the controller or to one of the BMUs.
- Setting of operating line "Type of d.h.w. demand" (line 125)
  Based on this setting, the controller knows whether the d.h.w. is heated by means of a temperature sensor or control thermostat.
- Selection of pump connected to output Q1 (operating line 95)
- Adjustment of heating curve (operating line 17)
(- - : - or value between 2.5 and 40)

combinations

The following table contains the setting combinations that lead to the required types of plant:

Plant type-number (operating line 53)	***Slope of heating curve*** (operating line 17)	***Pump function (output Q1)*** (operating line 95)	***Type of d.h.w. demand*** (operating line 125)	***D.h.w. sensor connected to:***	
				BMU	***RVA***
27	---	heating circuit pump	temperature	No	No
27	x	D.h.w. circulating pump	temperature	No	No
28	---	heating circuit pump	temperature	x	Yes
28	---	heating circuit pump	Control	x	No
28	x	D.h.w. circulating pump	temperature	x	Yes
28	x	D.h.w. circulating pump	Control	x	No
29	---	heating circuit pump	temperature	Yes	No
29	x	D.h.w. circulating pump	temperature	Yes	No
30	x	Primary pump for d.h.w. and	temperature	No	No
30	x	Primary pump for HCs only	temperature	No	No
31	x	Primary pump for d.h.w. and	temperature	x	Yes
31	x	Primary pump for d.h.w. and	Control	x	No
32	x	Primary pump for HCs only	temperature	x	Yes
32	x	Primary pump for HCs only	Control	x	No
33	x	Primary pump for d.h.w. and	temperature	Yes	No
33	x	Primary pump for HCs only	temperature	Yes	No
34	2.5...40	heating circuit pump	temperature	No	No
35	2.5...40	heating circuit pump	temperature	x	Yes
35	2.5...40	heating circuit pump	Control	x	No
36	2.5...40	heating circuit pump	temperature	Yes	No
65	x	Pump H1	temperature	No	No
66	x	Pump H1	temperature	x	Yes
66	x	Pump H1	Control	x	No
67	x	Pump H1	temperature	Yes	No

x means that the setting has no influence on the generation of plant type.

➔ Note

If the heating curve is deactivated (setting ---), the controller requires an external heat demand signal to release the generation of heat. An external demand for heat can be transmitted to the controller via LPB (LPB capable controllers) or input H1. If several signals are present, the controller will use the highest of them as the setpoint.

The following settings are invalid, therefore producing fault message 58 (demand from thermostat, but sensor used):

Plant type-number	***Slope of heating curve***	***Pump function (output Q1)***	***Type of d.h.w. demand***	***D.h.w. sensor connected to:***	
				BMU	***RVA***
28	---	heating circuit pump	Control	x	Yes
28	x	D.h.w. circulating pump	Control	x	Yes
31	x	Primary pump for d.h.w. and	Control	x	Yes
32	x	Primary pump for HCs only	Control	x	Yes
35	2.5...40	heating circuit pump	Control	x	Yes
66	x	Pump H1	Control	x	Yes

x means that the setting has no influence on the generation of the type of plant.

4.4 Displaying the PPS communication

Benefit

- Interface for BMUs and digital room unit
- Checking the communication with the peripheral devices (BMUs, room unit)

Description

PPS is a point-to-point interface for communication between controller, BMU and room unit. The display provides information about the communication status and the types of connected peripheral devices.

Setting

1. Press the operating line selection buttons to select operating line 54.
2. Press the + / - buttons to interrogate the various PPS users.

Display	*Unit*
– – –	No communication
1...12 / 0...255	PPS address / identification code
o o o	Short-circuit of communication line

Effect

The status of the PPS communication will automatically be displayed on this line. If communication is error-free, the controller identifies the unit connected by displaying the identification number, in addition to the device address.

Displays

The display is comprised of PPS address and a device identification code.

PPS-address

Within the PPS, a fixed PPS address is assigned to some types of devices:

Room unit	⇨	1
BMU-Nummer 1	⇨	4
BMU-Nummer 2	⇨	5
BMU-Nummer 3	⇨	6
BMU-Nummer 4	⇨	7

Note

These peripheral devices can only be operated under the respective PPS address. If one of these devices is not used, the PPS address can be allocated to some other peripheral device.
Assignment of all the other peripheral devices to the PPS addresses can be made randomly.
Since every controller has a specific and confined PPS address space, the same PPS addresses can be assigned to each device.

Identification code

Only digital peripheral devices can be connected to the controller. Analog devices are not permitted. The digital devices transmit the controller an identification code in agreement with the type of device. The type of device can be identified with the help of the list given below.

82	Room unit QAA 50 (digital)
83	Room unit QAA 70 (digital)
90	Room temperature sensor QAA10 (digital)
102	BMU

➔ Notes

- When the LCD displays a PPS address with an identification code, the communication with the respective device is error-free
- When the LCD displays **no** PPS address and **no** identification code, there is no communication or it is faulty
- Incompatible devices are also displayed, but produce error code 145 (operating line 50)

Benefit

- Overview of the actual temperatures of the sensors used
- Better reproducibility of the control sequences thanks to visualized temperatures

4.5 Actual boiler temperature values of BMUs (TKx)

Setting

1. Press the operating line selection buttons to select operating line 55.
2. Press the + / - buttons to interrogate the individual BMUs.

Display	*Unit*
1...4 / 0...140	BMU number / °C

Effect

The lowest connected BMU number with the associated temperature will automatically be displayed on this line. The temperatures of the other cascaded heating boilers can be interrogated by pressing the + / - buttons. Non-existing BMUs will be skipped.

➔ Note

The cascade boilers displayed are only those connected to this controller. If there are additional cascaded boilers, they will be displayed on the controllers to which they are physically connected.

Special displays:

In place of the temperature, the following displays can appear next to the BMU number:

– – – Sensor with an open-circuit or no sensor connected

0 0 0 Sensor with short-circuit

➔ Note

If the LCD displays – – – without giving an associated BMU number, there is no BMU connected to the controller.

4.6 Actual value of cascade flow temperature

Description

When using several cascaded heat sources, a cascade flow temperature sensor (B10) **must** be installed.
Also termed "Common flow temperature sensor".

Setting

1. Press the operating line selection buttons to select operating line 56.
2. No setting can be made with the + / - buttons.

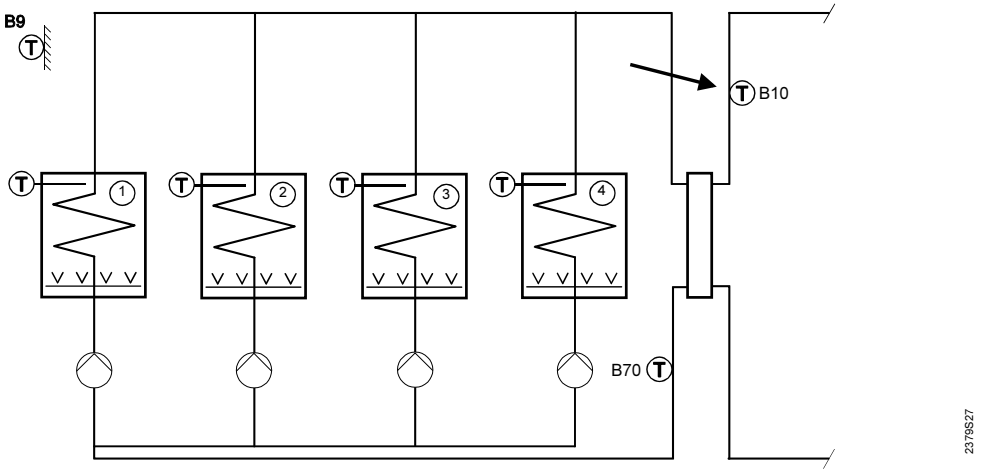
Display	*Unit*
0...140	°C

Effect

The temperature measured with the cascade flow temperature sensor (B10) will automatically be displayed on this line.

Cascade flow temperature sensor

In a cascaded system, a common cascade flow temperature sensor (B10) is used for all heat sources.
The cascade temperature sensor (B10) is connected directly to the RVA47.320.



B10 Cascade flow temperature sensor

Special displays

– – – Sensor with open-circuit, no sensor connected, or sensor incorrectly defined

0 0 0 Sensor with short-circuit

4.7 Actual value of the cascade return temperature

Description

When using several cascaded heat sources, we recommend to use a cascade return temperature sensor (B70).
It is also termed "Common return temperature sensor".

Setting

1. Press the operating line selection buttons to select operating line 57.
2. No setting can be made with the + / - buttons.

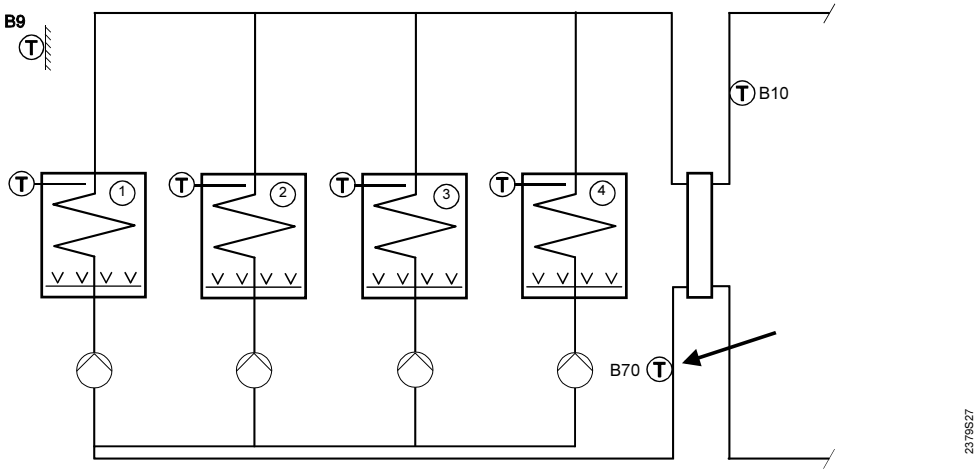
Display	*Unit*
0...140	°C

Effect

The temperature measured with the cascade return temperature sensor (B70) will automatically be displayed on this line.

Cascade return temperature sensor

In a cascaded system, a common cascade return temperature sensor (B70) should be used for all heat sources. The value of this sensor is used for optimizing the controller's functionality. In particular, it permits the detection of wrong mass flows (primary / secondary mass flow).
The cascade return temperature sensor is connected directly to the RVA47.320.



B70 Cascade return temperature sensor

➔ Important

The meaning of the temperature measured at B70/B4 is defined by setting 1 (cascade return temperature sensor) on operating line 97.

Special displays

– – –	Sensor with open-circuit, no sensor connected, or sensor incorrectly defined
0 0 0	Sensor with short-circuit

4.8 Actual value of buffer storage tank temperature

Description

When using alternative heat sources, the buffer storage tank temperature is used as a control criterion for the release of additional heat sources.

Setting

1. Press the operating line selection buttons to select operating line 58.
2. No setting can be made with the + / - buttons.

Display	*Unit*
0...140	°C

Effect

The actual temperature in the buffer storage tank (B4) will automatically be displayed on this line.

Important

To be used as a buffer storage tank temperature sensor, input B70/B4 must be appropriately defined (operating line 97, setting 2)

➔ Note

If input B70/B4 of the first cascade controller is already used by the optional cascade return temperature sensor B70, buffer storage tank temperature sensor B4 can be connected to input B70/B4 of the second controller.

4.9 Actual value of the d.h.w. temperature (TBWx)

Setting

1. Press the operating line selection buttons to select operating line 59.
2. No setting can be made with the + / - buttons.

Display	*Unit*
0...140	°C

Effect

The temperature measured with the d.h.w. temperature sensor (B3) connected to the controller, or the d.h.w. temperature transmitted by the BMU via PPS will automatically be displayed on this line.

➔ Note

With the type of d.h.w. demand ”Thermostat” (line 125), there will be no temperature display of course. The display shows ” --- ”. The input test (line 52, test step 1) provides information about the current switching status of the thermostat.

Special displays

– – –	Sensor with open-circuit or no sensor connected
0 0 0	Sensor with short-circuit

4.10 Attenuated outside temperature

Benefit

- Making use of the building's thermal storage capacity

Description

The attenuated outside temperature is the simulated room temperature of a fictive building that has no internal heat source. This means that it is only the outside temperature that affects the room temperature.

Setting

This operating line automatically displays the actual value [°C] of the attenuated outside temperature. No direct setting can be made.
The generation of the attenuated outside temperature cannot be influenced.

60

Display	*Unit*
-50...50	°C

Resetting

It is possible, however, to reset the attenuated outside temperature:
1. Press the operating line selection buttons to select line 19.
2. Press the + / - buttons for 3 seconds.
   As soon as the display stops flashing, the attenuated outside temperature is reset to the actual outside temperature.

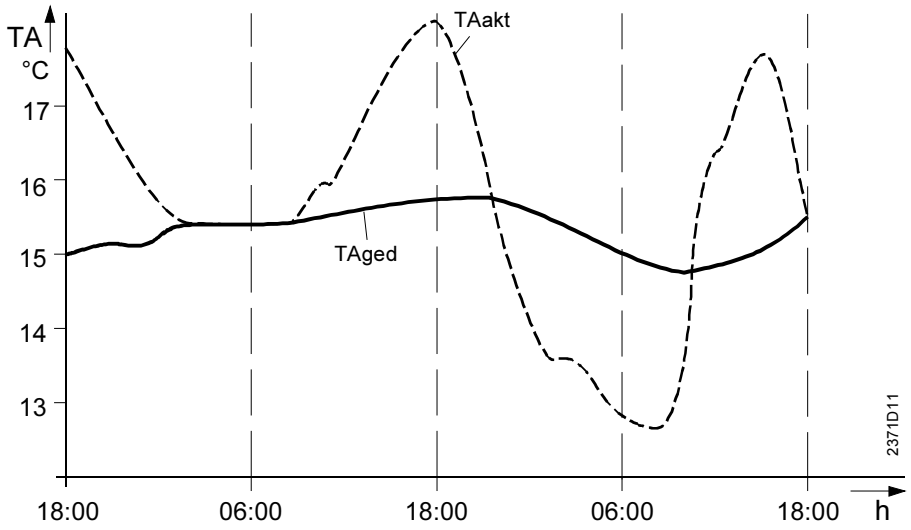
Process

The attenuated outside temperature is generated by the controller. It is continually calculated based on the prevailing outside temperature. The factory setting is 0 °C.

Effect

The attenuated outside temperature affects directly only the summer / winter changeover (setting 16).
The attenuated outside temperature acts indirectly, via the composite outside temperature, on flow temperature control.

Example



TAakt Actual outside temperature
TAged Attenuated outside temperature

4.11 Composite outside temperature

Benefit

- Compensating variable for the flow temperature control

Description

The composite outside temperature is a mixture of the actual outside temperature and the attenuated outside temperature calculated by the controller.

Setting

This operating line automatically displays the actual value [°C] of the composite outside temperature. No direct setting can be made.

Display	*Unit*
-50...50	°C

Process

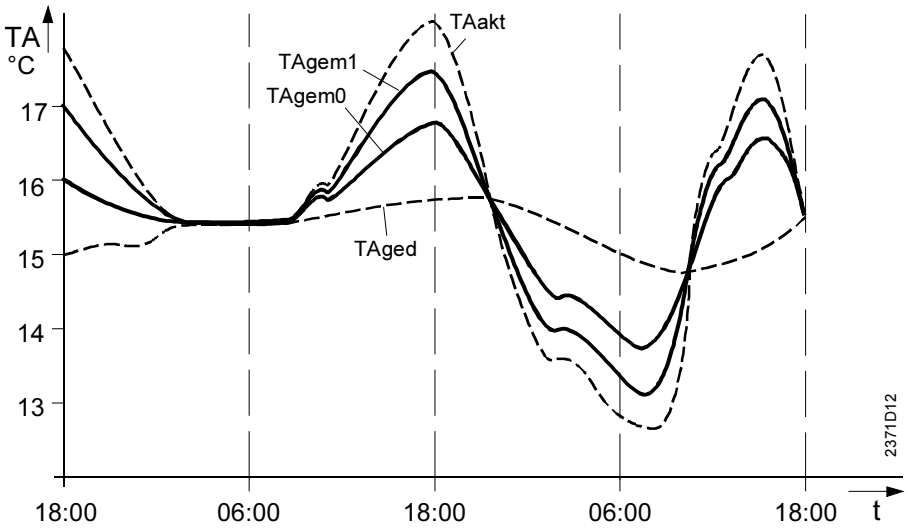
The mixture of actual and attenuated outside temperature is dependent on the type of building construction (setting 105) and is generated as follows:

Selected type of construction	*Composite outside temperature*
Heavy (setting 105 = 0)	Tagem = ½ TAakt + ½ TAged
Light (setting 105 = 1)	Tagem = ¾ TAakt + ¼ TAged

Effect

The composite outside temperature as a compensating variable acts on flow temperature control, that is thus matched to the prevailing weather conditions.
It also acts on the 24-hour heating limit to shut down the heating.

Example



TAakt	Actual outside temperature
TAged	Attenuated outside temperature
TAgem1	Composite outside temperature for light building structures
TAgem0	Composite outside temperature for heavy building structures

4.12 Outside temperature source

Benefit

- Display and location of actual outside temperature measurement

Description

When interconnecting several controllers, only one outside sensor is required. This sensor will be connected to any of the controllers and delivers its signal via LPB.
The controllers to which no sensor is connected adopt the outside temperature signal via the bus system, from a controller to which a sensor is connected.

Setting

1. Press the operating line selection buttons to select operating line 62.
2. No setting can be made with the + / - buttons.

Display	*Unit*
– – . – –	No signal
00.01...14.16	Segment and device address

Effect

The address of the outside detector that currently delivers the outside temperature signal will automatically be displayed on this line.

Display

– – . – –	No outside sensor signal
01.02	Address of outside sensor The first 2 digits represent the segment number (01.) The second digit corresponds to the device number (.02)

➔ Note

If required (e.g. due to different exposure to solar radiation of the various buildings), the different sections of the system can be equipped with their own outside sensors.
For more detailed information, refer to section ”Outside temperature source” of ”Local Process Bus (LPB), Basic Documentation, System Engineering” (document no. CE1P2370E).

4.13 Boiler temperature setpoint of BMUs

Benefit

- Indication of BMU temperature setpoints
- Better overview of the plant’s operational status

Description

The lowest connected BMU number with the associated temperature setpoint will automatically be displayed on this line. The temperature setpoints of the other BMUs used in the cascade can be interrogated by pressing the + / - buttons. Nonexisting BMUs will be skipped.

Setting

1. Press the operating line selection buttons to select line 65.
2. Press the + / - buttons to select the setpoint of the required BMU.

Display	*Unit*
1...4 / 0...140	BMU number / °C

➔ Note

The setpoints can only be displayed but not changed. The function helps better understand the control sequences taking place in the controller.
No setpoint is displayed (---), when

- there is no heat demand from the consumers
- no BMU is connected to the controller

4.14 Setpoint of the cascade flow temperature

Benefit

- Indication of setpoint of the cascade flow temperature
- Better overview of the plant's operating state

Description

The setpoint of the cascade flow temperature will automatically be displayed on this line.

Setting

1. Press the operating line selection buttons to select line 66.
2. No setting can be made with the + / - buttons.

Display	*Unit*
0...140	°C

The setpoint can only be displayed, but not changed. The function helps better understand the control sequences taking place in the controller.

Generation of setpoint

The setpoint displayed is generated based on the different heat demand signals received from the system. These are:

- Demand for heat from the controller's internal heating circuits based on the outside temperature
- Demand for heat from the external heating circuits (system) based on the outside temperature
- Demand for heat for d.h.w. (from inside the controller or externally)
- Demand for heat via contact H1
- Demand for heat resulting from protective functions (e.g. frost protection for the plant)
- Demand for heat by pressing the button for manual operation

The highest of the setpoints received is shown on the display as the setpoint of the cascade flow temperature.

➔ Note

The display shows "---" if one of the following points applies:

- There is no demand for heat
- The controller has been defined as a cascade controller (device address > 1)
- Sensor B10 has not been detected or connected

4.15 D.h.w temperature setpoint

Benefit

- Visualization of the d.h.w. temperature setpoint
- Better overview of the plant's operating state

Description

The current d.h.w. temperature setpoint will automatically be displayed on this line.

Setting

1. Press the operating line selection buttons to select line 69.
2. No setting can be made with the + / - buttons.

Display	*Unit*
0...140	°C

The setpoint can only be displayed, but not changed.

Generation of setpoint

The value displayed depends on the following parameters:

- Current time of day (operating line 1)
- Time switch program d.h.w. heating (lines 29...35)
- Nominal setpoint of the d.h.w. temperature (operating line 13)
- Reduced setpoint of the d.h.w. temperature (operating line 120)
- Release of d.h.w. heating (operating line 121)
- Assignment of d.h.w. (operating line 123)
- d.h.w.frost protection (5°C)
- Number of the d.h.w. heating cycles per day (operating line 124)
- Legionella function ON / OFF (operating line 42_{OEM})
- Legionella setpoint (operating line 43_{OEM})

➔ Note

No value (---) is displayed in the following situations:

- No d.h.w. heating available
- D.h.w. heating is switched off (button for d.h.w. heating OFF)

4.16 Nominal room temperature setpoint

Benefit

- Information about the nominal room temperature setpoint in normal operation

Description

Displays the current nominal room temperature setpoint during the comfort period. The nominal room temperature setpoint is the temperature adjusted on the controller that shall be maintained in the rooms in normal operation (comfort).

Setting

1. Press the operating line selection buttons to select operating line 70.
2. No setting can be made with the + / - buttons.

Display	*Unit*
0.0...35.0	°C

Effect

The nominal room temperature setpoint will automatically be displayed on this operating line.

Nominal room temperature setpoint

The resulting nominal room temperature setpoint is made up of the adjusted setpoint and a readjustment that may have been made on the room unit:

- Without room unit

	Adjustment made with the controller's setpoint knob
=	controller's nominal room temperature setpoint

- When using a room unit with no programming facility (e.g. QAA50)

	Adjustment made with the controller's setpoint knob
+	readjustment made on the room unit (± 3 °C) [1)]
=	controller's nominal room temperature setpoint

- When using a room unit with a programming facility (e.g. QAA70)

	Setpoint programmed with the room unit [1)]
+	readjustment made on the room unit (± 3 °C) [1)]
=	controller's nominal room temperature setpoint

➔ In that case, the controller's setpoint knob is inactive.

➔ Important

1) Setpoints and readjustments made on room units are considered only in automatic mode Auto .

4.17 Room temperature setpoint

Benefit

- Information about the room temperature setpoint in the various operating modes

Description

Displays the current room temperature setpoint during the respective heating period (normal operation / reduced operation).

Setting

1. Press the operating line selection buttons to select line 71.
2. No setting can be made with the + / - buttons.

Display	*Unit*
0...35	°C

When selecting the operating line, the current room temperature setpoint is displayed, depending on the operating mode and the time switch program, that is, a selection / combination of the following parameters:

- Room temperature setpoint knob
- Reduced setpoint of room temperature (operating line 13)
- Frost protection setpoint of room temperature (operating line 15)
- Readjustments made on the room unit (QAA50 / QAA70)

➔ Note

If there is no heating circuit, the display shows ”---”.

4.18 Flow temperature setpoint

Benefit

- Displays the current flow temperature setpoint of the pump heating circuit

Description

When selecting this operating line, the current flow temperature setpoint of the controller’s internal pump heating circuit is displayed.

Setting

1. Press the operating line selection buttons to select line 72.
2. No setting can be made with the + / - buttons.

Display	*Unit*
0...140	°C

The value displayed corresponds to the flow temperature of the pump heating circuit which is required for reducing the demand for heat.

➔ Note

The display shows ”---” in the following situations:

- No heating circuit available
- ECO function active (summer / winter changeover, automatic 24-hour heating limit)
- Quick setback active
- Room temperature limitation active

4.19 Existing boilers

Benefit

- Overview of the boilers used by the system

Description

The function makes it possible to obtain a quick overview of the boilers used by the system.

Setting

1. Press the operating line selection buttons to select line 75.
2. Press the + / - buttons to scroll through the list of available boilers.

Display	*Unit*
00.1...16.3	-

The numbers have the following meaning:

00.1...16.3 Device address and device subaddress (boiler number in a controller) of the boilers assigned to the system (max. 16).
All boilers must be contained in segment 0 to ensure the demand for heat from all segments will be considered.

➔ Caution!

Do not mix up device / device subaddress and segment / device address!
If the segment address was added, the display would read 0.00.1 ... 0.16.3.

Device address

A controller that uses device address 0 (e.g. **00**.1) operates autonomously (no communication via LPB).
The device address 1 (**01**.1) defines the cascade master (controller).

Device subaddress

Up to four BMUs can be connected to the first RVA47.320 (B-series) of a cascade, and up to three BMUs to each of the additional RVA47.320 (B-series).
The possible device subaddresses are therefore 1.**1** ... 1.**4**, 2.**1** ... 2.**3**, 3.**1** ... 3.3 through 16.3 One cascade can contain a maximum of 16 boilers, however.

For more detailed information, refer to ”Local Process Bus (LPB), Basic Documentation, System Engineering” (document no. CE1P2370E).

4.20 Display lead boiler

Benefit

- Quick overview of current lead boiler

Description

With ”Automatic lead boiler changeover”, this function facilitates quick identification of the current lead boiler.

Display

When selecting this operating line, the current lead boiler is displayed. No settings can be made with the + / – buttons.

Display	*Unit*
00.1...16.3	-

The numbers have the following meaning:

00.1...16.3 Device address and device subaddress (boiler number in a controller) of the boilers assigned to the system (max. 16).
All boilers must be contained in segment 0 to ensure the demand for heat from all segments will be considered.

➔ Caution! Do not mix up device / device subaddress and segment / device address!
If the segment address was added, the display would read 0.00.1 ... 0.16.3.

Device address A controller that uses device address 0 (e.g. **00**.1) operates autonomously (no communication via LPB).
The device address 1 (**01**.1) defines the cascade master (controller).

Device subaddress Up to four BMUs can be connected to the first RVA47.320 (B-series) of a cascade, and up to three BMUs to each of the additional RVA47.320 (B-series).
The possible device subaddresses are therefore 1.**1** ... 1.**4**, 2.**1** ... 2.**3**, 3.**1** ... 3.3 through 16.3 One cascade can contain a maximum of 16 boilers, however.

➔ Note The setting for boiler sequence changeover is made on operating line 130.
For more detailed information, refer to ”Local Process Bus (LPB), Basic Documentation, System Engineering” (document no. CE1P2370E).

4.21 Remaining number of operating hours for changeover of boiler sequence

Benefit

- Indication of the remaining number of operating hours until the next changeover of boiler sequence takes place.

Description Indicates the number of hours the current lead boiler still operates until the next changeover of boiler sequence occurs.

Setting When selecting this operating line, the remaining number of operating hours for changeover of the boiler sequence are displayed.

Display	*Unit*
0...990 / ---	h / -

Display The number displayed represents the number of operating hours until the next changeover of boiler sequence occurs. It is generated by subtracting the current number of operating hours from the setting made on operating line 130 (automatic changeover according to the number of operating hours).

➔ Note The display appears only if, on operating line 130, a setting of 10…990h has been selected (automatic changeover according to the number of operating hours).
Otherwise, the display will show "- - -”.

4.22 Burner operating hours BMU 1 – 4

Benefit

- Overview of the number of burner operating hours of the individual BMUs
- Criterion for service and maintenance work
- Criterion for adjusting the cascade management strategy

Description

The display shows the number of hours the respective BMU has been operating since the controller was first commissioned.

Setting

1. Press the line selection buttons to select lines 80 -83.
2. No setting can be made with the + / - buttons.

Display	*Unit*
0...65535	h

The numbers have the following meaning:

Line 80	Number of burner operating hours of BMU 1
Line 81	Number of burner operating hours of BMU 2
Line 82	Number of burner operating hours of BMU 3
Line 83	Number of burner operating hours of BMU 4

➔ Note

For information about the selection of the cascade management strategy, refer to operating lines 50_{OEM} to 52_{OEM}.

4.23 Minimum limitation of the boiler temperature TKmin

Benefit

- This function prevents the boiler temperature from falling below a predefined minimum temperature.

Description

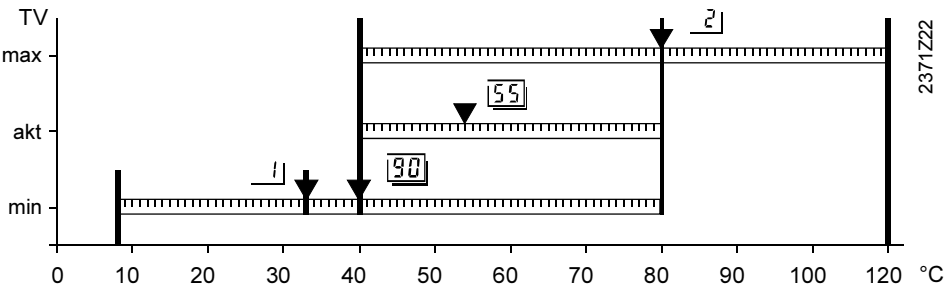
Minimum limitation of the boiler temperature setpoint is a protective function for the boiler. In addition, minimum limitation of the setting range can be provided with the setting 01_{OEM}.

Setting

1. Press the operating line selection buttons to select line 90.
2. Press the + / - buttons to set the minimum limitation of the boiler temperature TKmin.

Setting range	*Unit*	*Factory setting*
$TKmin_{OEM}$...TKmax (max 95°C)	°C	8

$Tkmin_{OEM}$ Minimum limitation of the boiler temperature setpoint (setting on line 01_{OEM})
Tkmax Maximum limitation of the boiler temperature setpoint (setting on line 02_{OEM})



55 Actual value of the boiler temperature
90 Minimum limitation of the boiler temperature setpoint
2_{OEM} Maximum limitation of the boiler temperature setpoint
1_{OEM} Lowest minimum limitation of the boiler temperature setpoint

Effect

If the boiler temperature falls below the set minimum temperature, this setting generates a locking signal which reduces the amount of heat supplied to the consumers.

4.24 Nominal output of BMU 1 - 4

Benefit

- Consideration is given to the different heat source capacities

Description

By setting this paramter, the controller knows the proportion of capacities of the connected boilers and can take this into account with the running time strategy and the linked lead boiler operation (refer to page 114 ff.).

Settings

1. Press the line selection buttons to select lines 91 -94.
2. Press the + / - buttons to set the nominal capacities of BMUs 1 - 4.

Line	*BMU-Nr.*	*Setting range*	*Unit*	*Factory setting*
91	BMU1	0...255	kW	20
92	BMU2	0...255	kW	20
93	BMU3	0...255	kW	20
94	BMU4	0...255	kW	20

➔ Note

The controller only uses the proportions of the numbers entered. When having capacities of 100 / 150 / 70 kW, entry of the proportions of 10 / 15 / 7 or 20 / 30 / 14 will lead to the same result as entry of the absolute figures. Hence, capacities above 255 kW can also be entered by using the respective ratios.

Effect

This setting has an impact on the accuracy of the points in time the individual boilers are switched on and off (refer to boiler management and running time strategy, operating line 50_{OEM}).

Autonomous lead boiler operation:
No effect

Linked lead boiler operation:
The lag boilers follow the lead boiler's output at different speeds, depending on the proportion of capacities of lead boiler and lag boilers.

Running time strategy 1 - 3:
Additional boilers are switched on or off earlier or later, depending on the capcities of the individual boilers in sequence.

4.25 Pump function output Q1

Benefit

- Use of pump for different types of plant

Description

This parameter defines the function provided by the pump connected to terminal Q1.

➔ Note

Setting of this function has an impact on automatic generation of the type of plant. Operating line 53.

Setting

1. Press the operating line selection buttons to select operating line 95.
2. Press the + / - buttons to select the required function of the circulating pump.

Setting range	*Unit*	*Factory setting*
1...5	-	1

Effect

The pump provides one of the following functions, depending on the setting made:

1	Circulating pump operates as a heating circuit pump of the controller-internal pump heating circuit or no pump is available.
2	Circulating pump works as a system pump for the heating circuits only (located after the d.h.w. storage tank).
3	Circulating pump works as a system pump for the heating circuits and for the d.h.w. (located before the d.h.w. storage tank).
4	Circulating pump operates as a d.h.w. circulating pump
5	Circulating pump operates as an H1 pump

Pump overrun is active with all settings, with the exception of setting 4.

4.26 Use sensor input B70/B4

Benefit

- The same sensor input can be used for different functions

Description

This parameter setting defines the function adopted by the temperature sensor connected to terminal B70/B4.

Setting

1. Press the operating line selection buttons to select operating line 97.
2. Press the + / - buttons to select the required function of the input B70/B4.

Setting range	*Unit*	*Factory setting*
1...2	-	1

Effect

Depending on the setting made, the sensor provides the following function:

1	The sensor is used for measuring the return temperature (B70).
2	The sensor is used for measuring the buffer storage tank temperature (B4).

Use in cascades

If, with the first controller, sensor input B70/B4 is defined for use with a return temperature sensor (B70), for instance, it can be defined with another controller of the

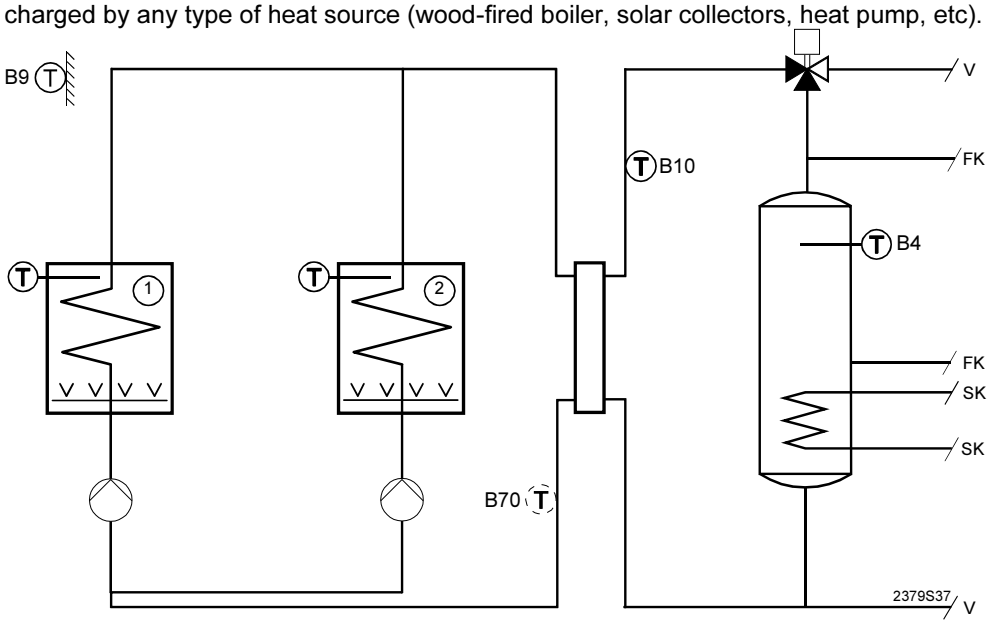
cascade for use with a buffer storage tank temperature sensor (B4). The sensor values are automatically transmitted to the cascade master. Within a cascade, each type of sensor may occur only once (with the exception of the outside sensor).

Use as a buffer storage tank temperature sensor

When using input B70/B4 for a buffer storage tank temperature sensor (B4), the temperature measured at B4 is used to decide whether the consumers receive their heat from the cascade or from the buffer storage tank.
If the temperature measured in the buffer storage tank is higher than the flow temperature called for by the consumers, the cascade will be locked and the consumers receive their heat from the buffer storage tank.
If the temperature measured in the buffer storage tank is lower than the flow temperature called for by the consuemrs, the buffer storage tank will be locked and the consumers receive their heat solely from the cascade.

Example

Example of a hydraulic circuit with a buffer storage tank. The buffer storage tank can be charged by any type of heat source (wood-fired boiler, solar collectors, heat pump, etc).



SK = solar collectors
FK = solid fuel boiler
V = consumer

Connection of diverting valve

The changeover valve must be connected in parallel to the pump of the first BMU. This BMU must be excluded from automatic changeover of the boiler sequence (refer to operating line 131).

4.27 Parallel displacement of the heating curve

Benefit

- Adjustment of controller's temperature scale to the actual plant conditions.

Description

Produces a parallel displacement of the heating curve in order to achieve a better match of room temperature setpoints and actual room temperatures.

Setting

1. Press the operating line selection buttons to select operating line 100.
2. Press the + / – buttons to set the parallel displacement..

Setting range	*Unit*	*Factory setting*
-4.5...+4.5	°C (K)	0.0

Effect

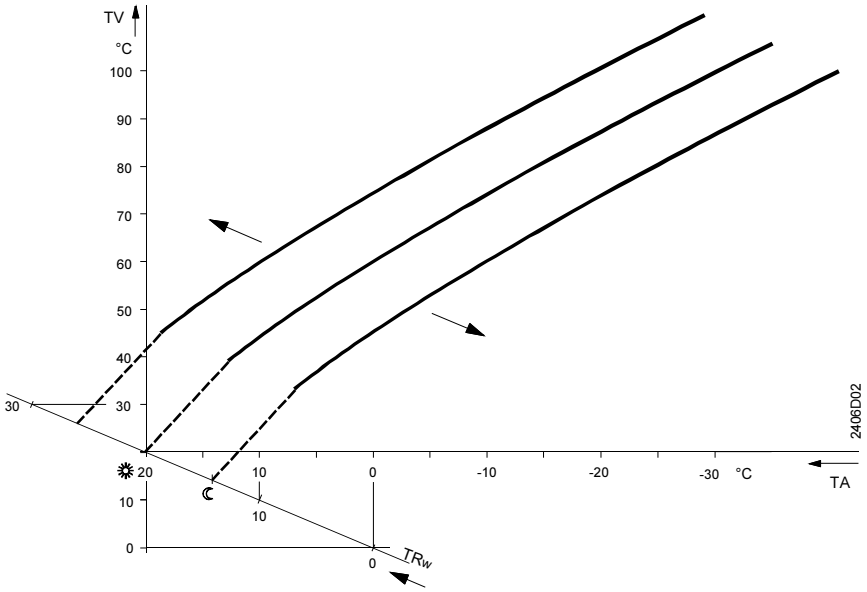
By changing the value entered, all room temperature setpoints will be appropriately raised or lowered. This allows the room temperature setpoints to be matched to the effective room temperatures.

Example:

If a nominal room temperature setpoint of 20 °C adjusted on the controller always produces a room temperature of 22 °C (independent of the prevailing outside temperature), displace the heating curve downward by 2 °C.

Parallel displacement

Each setpoint readjustment, be it by changing the setting value or the operational level, corresponds to a parallel displacement of the heating curve.



TV Flow temperature
TA Composite outside temperature
TRw Room temperature setpoint

4.28 Room influence

Benefit

- More accurate room temperature control due to temperature checkback signal from the space
- Use of heat gains
- Possibility of boost heating and quick setback

Description

Defines the impact of room temperature deviations on the controlled system.
Room temperature deviation is the temperature differential between actual room temperature and room temperature setpoint.

Setting

1. Press the operating line selection buttons to select operating line 101.
2. Press the + / – buttons to select the room influence.

Setting range	*Unit*	*Factory setting*
0 / 1	Increment	1

Effect

The setting will activate or deactivate the effect of room temperature deviations on the temperature control.
Entry:

0 Room influence inactive:
The measured room temperature will not affect temperature control

1 Room temperature influence active: The measured room temperature will affect the temperature control

Room influence

Room influence means:
Deviations of the actual room temperature from the setpoint are acquired and taken into account by temperature control.

To use the control variant "Weather compensation with room influence", the following conditions must be satisfied:

- **An outside sensor** must be connected (either to B9, the PPS or the LPB).
- Setting "Room temperature influence" (101) **must** be active (1)
- The respective room unit **must** be connected to terminal A6 (PPS)
- There may be **no controlled thermostatic radiator valves**
  (If such valves are present, they must be set to their fully open position).

4.29 Switching differential of the room temperature

Benefits

- Temperature control with pump heating circuit
- Prevents overtemperatures in the room in the case of pump heating circuits

Description

Serves as a room temperature limitation with pump heating circuits

Setting

1. Press the operating line selection buttons to select operating line 102.
2. Press the + / – buttons to set the room temperature switching differential.

Setting range	*Unit*	*Factory setting*
– – . –	-	– – . –
0.5...4.0	°C	

Effect

The switching differential for two-position control will be changed.
Entry:

- - . - Switching differential is inactive
- The pump always remains activated

Decrease: Switching differential will become smaller
- Pumps are switched on and off **more often**
- Room temperature varies within a **narrower** band

Increase: Switching differential will become greater
- Pumps are switched on and off **less often**
- Room temperature varies within a **wider** band

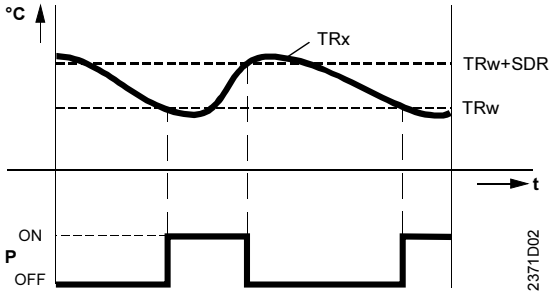
Room temperature control

With pump heating circuits, the amount of heat supplied is controlled by switching the pumps on and off. This is accomplished with two-position control by means of the room temperature's switching differential.

➔ Note

Room temperature acquisition requires a room unit.

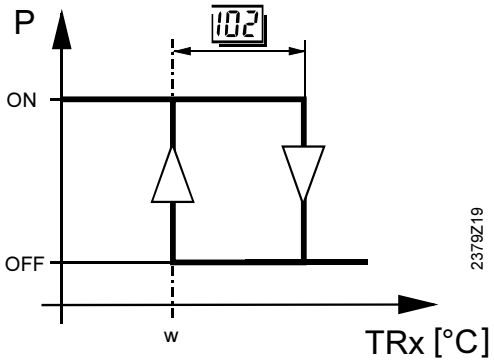
Functioning:



Legend

TRx	Actual value of the room temperature
TRw	Room temperature setpoint
SDR	Switching differential of room temperature
ON	Switch-on point
OFF	Switch-off point
t	Time
P	Pump

Switching differential



TRx Actual value of the room temperature
TRw Room temperature setpoint
SDR Switching differential of room temperature
P Pump (ON / OFF)
w Setpoint
△ Switch-on point
▽ Switch-off point

Pump ON	TRx	=	TRw
Pump OFF	TRx	=	TRw + SDR

4.30 Minimum limitation of the flow temperature setpoint

Benefit

- Prevents too low flow temperatures

Description

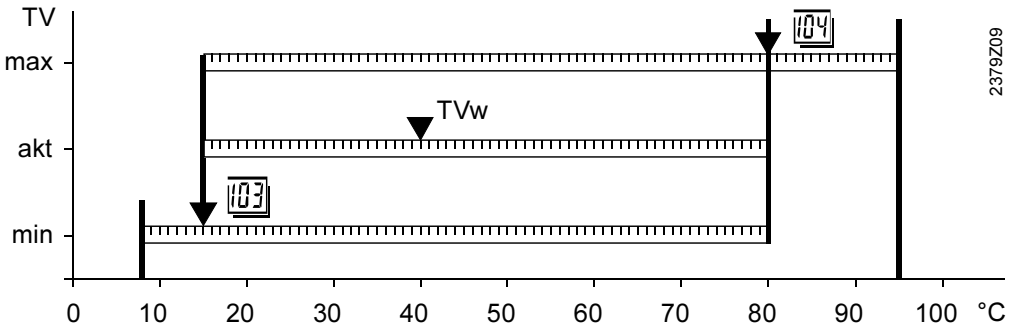
Minimum and maximum limitation define the range within which the flow temperature setpoint may vary.

Setting

1. Press the operating line selection buttons to select operating line 103.
2. Press the + / - buttons to set the minimum limitation of the flow temperature setpoint.

Einst ellbereich	*Unit*	*Factory setting*
8...TVmax	°C	8

TVmax Maximum limitation of flow temperature setpoint (setting on operating line 104)



TVw Current flow temperature setpoint
103 Minimum limitation of flow temperature setpoint
104 Maximum limitation of the flow temperature setpoint

Effect

The setting will make certain that the flow temperature setpoint will not fall below a minimum level.

Limitation

If the flow temperature setpoint demanded by the heating circuit reaches the minimum limit and the outside temperature rises, the flow temperature setpoint will be maintained at that limit, in other words, it will not be allowed to fall below it.

4.31 Maximum limitation of the flow temperature setpoint

Benefit

- Prevents too high flow temperatures

Description

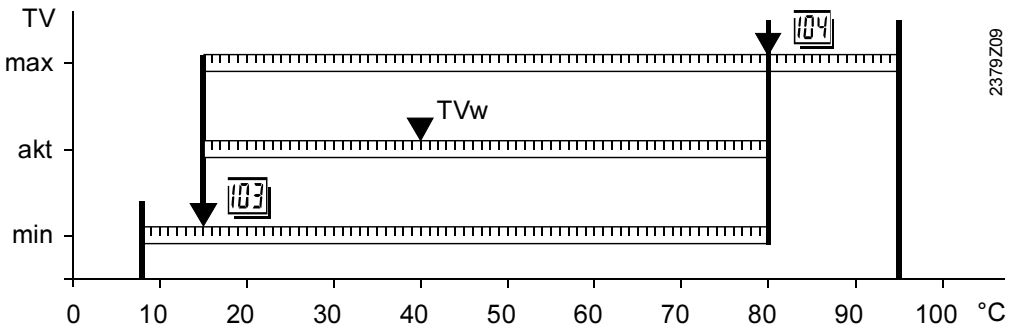
Minimum and maximum limitation define the range within which the flow temperature setpoint may vary.

Setting

1. Press the operating line selection buttons to select operating line 104.
2. Press the + / - buttons to set the maximum limitation of the flow temperature setpoint.

Setting range	*Unit*	*Factory setting*
TVmin...95	°C	80

Tvmin Minimum limitation of flow temperature setpoint (setting on operating line 103)



TVw Current flow temperature setpoint
103 Minimum limitation of the flow temperature setpoint
104 Maximum limitation of the flow temperature setpoint

Effect

The setting will ensure that the flow temperature setpoint will not exceed a maximum level.

➔ Important

Maximum limitation is **not** to be regarded as a safety function as required with underfloor heating systems, for example.

Limitation

If the flow temperature setpoint demanded by a consumer reaches the maximum limit and the outside temperature falls, the flow temperature setpoint will be maintained at that limit, in other words, it will not be allowed to exceed it.

4.32 Type of building construction

Benefit

- Consideration is given to the building's thermal dynamics

Description

Enables the control system's response to be matched to the type of building construction.

Setting

1. Press the operating line selection buttons to select operating line 105.
2. Press the + / – buttons to select the type of building construction.

105

Setting range	*Unit*	*Factory setting*
0 / 1	Increment	1

Effect

When the outside temperature varies, the room temperature changes at different rates, depending on the building's thermal storage capacity.
The above setting ensures that the generation of the composite outside temperature will be matched to the type of building construction. Also refer to "Composite outside temperature" in section "Functions without settings".
Entry:

0 Heavy building structures: The room temperature will respond *slower* to outside temperature variations

1 Light building structures: The room temperature will respond *quicker* to outside temperature variations

Building construction

- Heavy building structures:
  Buildings with thick walls or with external insulation
- Light building structures:
  Buildings with a light envelope

4.33 Adaption of the heating curve

Benefit

- No heating curve adjustments required
- Automatic adaption of heating curve

Description

The adaption facility learns from the different heating situations and matches the control to the heating circuit at regular intervals. Also refer to section ”Adaption sensitivities” (lines 36_{OEM} + 37_{OEM}).

Setting

1. Press the operating line selection buttons to select operating line 106.
2. Press the + / – buttons to select the type of heating curve adaption.

Setting range	*Unit*	*Factory setting*
0 / 1	Increment	1

Effect

The setting will switch automatic adaption of the heating curve on or off.
Entry:

0 Automatic adaption *inactive:* The heating curve will use the setting made

1 Automatic adaption *active:* In automatic mode (nominal room temperature setpoint ⏱), the heating curve will automatically and continuously be adapted

➔ Note

Prerequisite is the presence of a room temperature sensor.

Adaption

The adaption facility automatically matches the heating curve to the type of building construction and the heating requirements. Adaption gives consideration to room temperature deviations, outside temperature characteristics and adaption sensitivity.

➔ Note

To achieve optimum adaption, the following situations should occur as rarely as possible - especially after commissioning - since this would reset certain calculations required for the adaption:

– Manual correction of heating curve
– Power failure
– Heating curve set to --.-
– Changes to the room temperature setpoint

Process

Every day at midnight, the room temperature control differential of the previous day is evaluated. This evaluation leads to an automatic readjustment of the heating curve.

- Simple adaption (range ③):
  At attenuated outside temperatures below 4 °C, it is only the slope of the heating curve that is adapted.

  Within this temperature range, the readjustment is weighted with the factor f2 and adaption sensitivity 2 (line 37_{OEM}).

- Combined adaption (range ②):
  At attenuated outside temperatures of between 4 and 12 °C, it is partly the slope and partly the parallel displacement that are adapted.

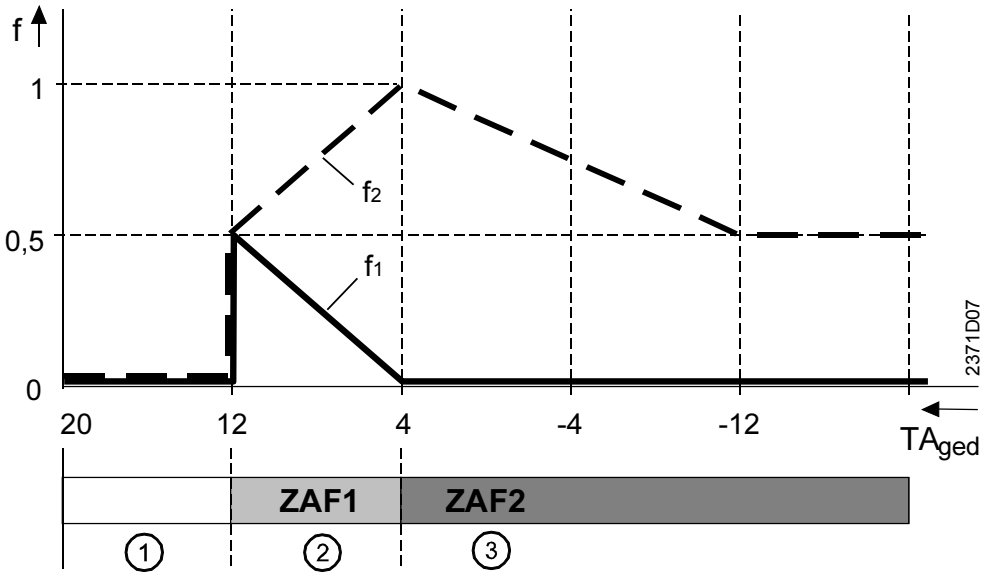
  Within this temperature range, the readjustment of the parallel displacement is weighted with the factor f1 and adaption sensitivity 1 (line 36_{OEM}).

The readjustment of the slope in this temperature range is weighed with factor f2 and adaption sensitivity 2 (line 37OEM).

- No adaption (range ①):
  At attenuated outside temperatures above 12 °C, the heating curve will not be adapted.

Diagram

Example using a nominal room temperature setpoint of 20 °C.



f	Factor
f1	Factor for parallel displacement
f2	Factor for slope
TAged	Attenuated outside temperature
ZAF1	Adaption sensitivity 1 (line 36_{OEM})
ZAF2	Adaption sensitivity 2 (line 37_{OEM})

4.34 Maximum forward shift of optimum start control

Benefit

- Maximum forward shift of optimum start control.

Description

Maximum forward shift is a limit function that defines the range of optimum start control.

Setting

107

Setting range	Unit	Factory setting
00:00...06:00	hh:mm	00:00

Effect

00:00	Optimum start control switched off
00:10...06:00	Optimum start control switched on

4.34.1 Optimum start control

Optimum start control acts with or without room influence.
The maximum forward shift can be set with parameter ”Maximum forward shift with optimum start control” (range 0…6 h). This parameter can also be used to switch optimum start control off (setting 0).

During non-occupancy hours, the heating is maintained at the reduced level. Towards the end of the nonoccupancy time, optimization switches the control back to the normal level.
Optimization calculates the changeover time such that, at the start of occupancy, the room temperature will have reached the nominal setpoint.

4.34.2 Without room influence

The composite outside temperature is used as the compensating variable. In the case of floor heating systems, the maximum forward shift should be longer than with radiator systems.
Using the parameter for the constant of quick setback and optimum start control (KON), the forward shift can be matched the building dynamics.

Forward shift tE in hours and minutes with optimum start control without room influence:

TAgem	KON					
	0	4	8	12	16	20
- 20	0	1h20	2h40	4h00	5h20	6h00
- 10	0	0h50	1h50	2h40	3h40	4h30
0	0	0h30	1h00	1h30	2h00	2h30
+ 10	0	0	0h10	0h10	0h20	0h20
	tE					

TAgem Composite outside temperature
tE Forward shift
KON Parameter for quick setback and optimum start control without room influence

Parameter KON:

KON = 0: Function deactivated
note: KON also acts on quick setback
Small KON: for high building structures can be heated up fairly quickly
Large KON: for heavy, well insulated building structures whose heating up time is fairly long

4.34.3 With room influence

Optimum start control acts only when room influence is active.

The switch-on time for the heating (change to nominal level) is selected such that, at the beginning of the occupancy time according to the heating program, the room temperature reached will be the room temperature setpoint - 0.25 K.
The correct switch-on time is determined by adaption.

4.35 Maximum forward shift of optimum stop control

Benefit

- Maximum forward shift of optimum stop control.

Description

Maximum forward shift is a limit function that defines the range of optimum stop control.

Setting

Setting range	*Unit*	*Factory setting*
00:00...06:00	hh:mm	00:00

Effect

00:00 Optimum stop control deactivated

00:10...06:00 Optimum stop control activated

4.35.1 Optimum stop control

Optimum stop control acts only when a room sensor is used and when room influence is active.
The maximum forward shift can be set with parameter ”Maximum forward shift with optimum stop control” (range is 0…6 h). This parameter can also be used to switch optimum stop control off (setting = 0).

During occupancy hours, the heating is maintained at the nominal level. Towards the end of the occupancy time, the control switches to the reduced level.
Optimization calculates the changeover time such that, at the end of occupancy time, the room temperature will be 0.5 °C below the nominal setpoint (early shutdown).

Adaption takes place only with the first occupancy period per day. The switch-off point is adapted in steps of 10 minutes. If the 0.25 K are not reached, the switch-off point is shifted forward by 10 minutes (earlier shutdown). In the other case, the switch-off point is shifted backward by 10 minutes (later shutdown).

4.36 Reduced setpoint of the d.h.w. temperature

Benefit

- High d.h.w. temperatures only if required
- Energy savings due to lower temperatures in the remaining time

Description

Reduction of the d.h.w. temperatures outside main occupancy times.
The time switch integrated in the controller automatically switches between main and secondary occupancy times. For more detailed information, refer to "D.h.w. heating program", operating lines 29...35

➔ Note

If the d.h.w. is heated by means of a control thermostat connected to terminal B3, reduced setpoint operation will not be possible.

Setting

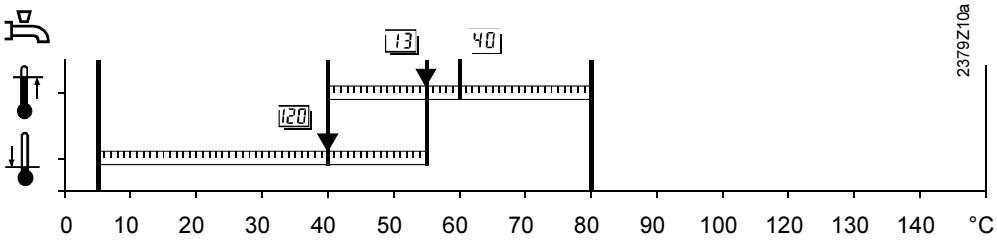
1. Press the operating line selection buttons to select operating line 120.
2. Press the + / – buttons to adjust the reduced setpoint of the d.h.w. temperature.

Setting range	*Unit*	*Factory setting*
8...TBWw	°C	40

TBWw Nominal setpoint of d.h.w. temperature (setting on line 13)

Effect

The temperature setpoint during reduced d.h.w. operation will be changed.



13 Setting "Nominal setpoint of d.h.w. temperature"
120 Setting "Reduced setpoint of the d.h.w. temperature"
40_{OEM} Setting "Maximum nominal setpoint of the d.h.w. temperature"

D.h.w. temperature setpoints

D.h.w. heating has 2 different setpoints that can be used:

- Nominal setpoint of the d.h.w. temperature (setting on line 13)
  Produces the d.h.w. temperature required during main occupancy times
- Reduced setpoint of the d.h.w. temperature (setting on line 120)
  Produces the d.h.w. temperature required outside the main occupancy times

The periods of time during which these d.h.w. temperature setpoints shall be used can be set on line 121.

4.37 Release of d.h.w. heating

Benefit

- Release of d.h.w. heating to the nominal setpoint as demanded by the consumers
- Release of d.h.w. heating can be matched to the plant's load curve

Description

Makes it possible to limit the period of time during which d.h.w. heating at the nominal setpoint is released.

Setting

1. Press the operating line selection buttons to select operating line 121.
2. Press the + / – buttons to enter the required period of time during which d.h.w. heating at the nominal setpoint shall be released.

Setting range	*Unit*	*Factory setting*
0...2	Increment	1

Effect

The setting defines the period of time during which d.h.w. heating at the nominal setpoint is released. Outside this period of time, the reduced d.h.w. setpoint applies. There is one exception, however, function d.h.w. push (function with no setting). Release of d.h.w. heating to the nominal setpoint takes place when using the following settings:

0 24 hours per day

1 According to the heating circuit time switch program)s) with forward shift

2 According to the d.h.w. time switch program of the RVA47.320

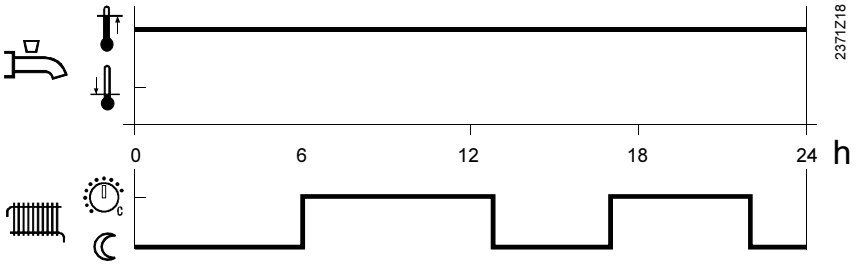
➔ Note

The frost protection temperature for d.h.w. is fixed at 5 °C and is always active.

4.37.1 24-hour operation - *Setting 0*

The d.h.w. temperature is always maintained at the nominal d.h.w. temperature setpoint, independent of any time switch programs (setting line 13).

Example:



4.37.2 Operation according to heating program(s) with forward shift - *Setting 1*

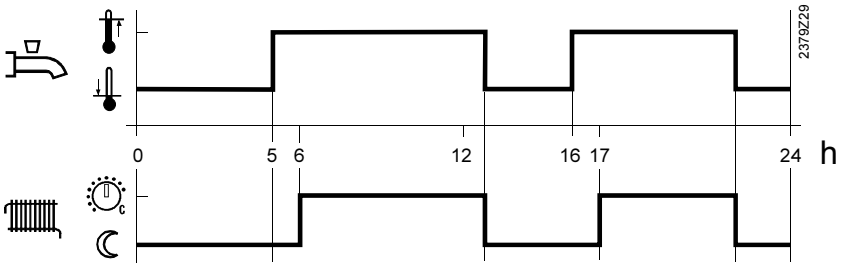
For d.h.w. heating, the heating circuit time switch programs of the controllers in the selected range are taken into consideration. The selection of the range (local / segment / system) for which the d.h.w. is produced is made on operating line 123.
The switch-on point for the release is shifted forward in time against the earliest switch-on point of all heating circuits. The switch-off point for the release coincides with the last switch-off point of all heating circuits.

At the switch-on point, the controller switches from the reduced d.h.w. temperature setpoint (operating line 120) to the nominal d.h.w. temperature setpoint (operating line 13).
At the switch-off point, the controller switches from the nominal to the reduced d.h.w. temperature setpoint.

➔ Note

The extent to which the switch-on point is shifted forward in time depends on the number of d.h.w. heating cycles permitted in a 24-hour period (operating line 124):

Example:



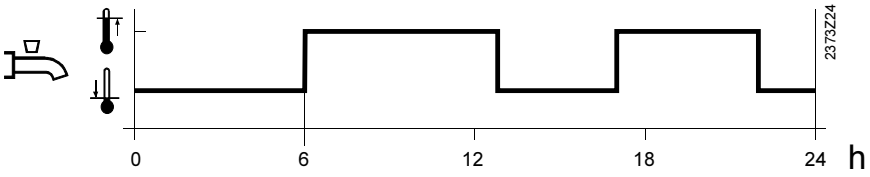
4.37.3 Operation according to the d.h.w. time switch program - Setting 2

For d.h.w. heating, time switch program (d.h.w.) of the local controller is taken into account. The set switching times of that program are then used to change over between the nominal d.h.w. setpoint (operating line 13) and the reduced d.h.w. setpoint (operating line 120).
D.h.w. heating takes place independent of the heating circuit programs.

Heating periods

With this d.h.w. heating program, it is possible to have a maximum of 3 heating periods per day. The forward shift of the switch-on times is inactive.

Example:



4.38 Switching program circulating pump

Benefit

- The circulating pump runs only during the selected periods of time
- No heat losses during the periods of time when there is no demand for d.h.w.

Description

Defines the time switch program according to which the circulating pump is switched on and off.

Setting

1. Press the operating line selection buttons to select operating line 122.
2. Press the + / - buttons to select the required time switch program.

Setting range	*Unit*	*Factory setting*
0...1	Increment	1

Effect

Depending on the setting made, the circulating pump will be operated according to the following time switch program:

0 For the switching program of the circulating pump, the switching program of the controller internal heating circuit will be adopted.
1 Switching program according to the selected d.h.w. release (operating line 121).

4.39 Assignment of d.h.w. heating

Benefit

- Assignment of d.h.w. heating to the respective consumers
- All relevant time switch programs are taken into consideration
- Controllers in holiday mode are taken into consideration

Description

Determines the consumers for which d.h.w. will be heated and which time switch programs will be appropriately considered, also checking whether the relevant controllers are in holiday mode.

Setting

1. Press the operating line selection buttons to select operating line 123.
2. Press the + / – buttons to select the required assignment.

Setting range	*Unit*	*Factory setting*
0...2	Increment	2

Effect

Depending on the selection made, the d.h.w. will be heated for the following consumers:

0 For the local consumer only (RVA47.320)

1 For all consumers (controllers) in the same segment

2 For all consumers (controllers) in the LPB system

In the case of d.h.w. heating according to the heating circuit time switch program (operating line 121, setting 1), the time switch programs are used from the appropriate range for the release of d.h.w. heating at the nominal temperature setpoint, based on the consumers selected here.
With all settings (operating line 121, setting 0 - 2), it is checked whether the controllers of the selected range are in holiday mode. Controllers in holiday mode will **not** be considered for d.h.w. heating.

➔ Important

If all controllers in the selected range are in holiday mode, d.h.w. heating will **not** be released. Only the frost protection function will remain active (function with no setting).

4.40 Number of d.h.w. charging cycles

Benefit

- Choice of one or several d.h.w. charging cycles
- Forward shift of release matched to the number of d.h.w. charging cycles

Description

With this setting, d.h.w. heating can be reduced to one charging cycle per day. The forward shift of d.h.w. heating against the range selected on operating line 123 will be appropriately adjusted.

Note

This setting is effective only if, on operating line 121, setting 1 (according to the heating circuit time switch program(s)) has been selected.

Setting

1. Press the operating line selection buttons to select operating line 124.
2. Press the + / - buttons to select the type of d.h.w. heating.

Setting range	*Unit*	*Factory setting*
0...1	Increment	1

Effect

According to the selection made, the controller releases d.h.w. heating either once or several times per day and adjusts the forward shift accordingly.

Setting	*Charging / day*	*Forward shift*
0	One	2.5 hours
1	Several	1 hourStunde

4.40.1 Once per day with a forward shift of 2.5 hours

Setting 0

The number of daily releases for d.h.w. heating at the nominal temperature setpoint is limited to one. Also with this setting, the switch-on point is shifted forward by 2.5 hours against the range selected on line 123.

On days where space heating at the nominal room temperature setpoint is provided for 24 hours, d.h.w. heating is released at midnight for 2.5 hours.

4.40.2 Several times per day with a forward shift of 1 hour

Setting 1

The number of d.h.w. charging cycles will not be limited. Also with this setting, the switch-on point is shifted forward by one hour against the range selected on line 123.

4.41 Type of d.h.w. demand

Benefit

- Possibility of using a d.h.w. storage tanks equipped with a control thermostat

Description

Defines the type of d.h.w. control (via d.h.w. sensor or control thermostat).

➔ Note

Setting of this function has an impact on automatic generation of the type of plant. Operating line 53.

Setting

1. Press the operating line selection buttons to select operating line 125.
2. Press the + / - buttons to select the type of d.h.w. demand.

Setting range	*Unit*	*Factory setting*
0 / 1	Increment	0

Effect

By making this setting, the controller takes into account the signal fed to it by the d.h.w. sensor connected to terminal B3.
Entry:

0: Sensor: the temperature measured with the sensor connected to terminal B3 is used for the control of the d.h.w. temperature.

1: Control thermostat: the switching status of the control thermostat connected to terminal B3 is used for the control of the d.h.w. temperature.

➔ Important

The contacts of the control thermostat must be suited for extra low voltage (gold-plated)!

Difference

When using a d.h.w. sensor:
The controller calculates the switching points with the respective switching differential as a function of the d.h.w. temperature setpoint entered.

Sensor / line with a short-	=	fault message
Sensor value available	=	d.h.w. according to the current setpoint
Sensor / line with a short-	=	no d.h.w.

When using a d.h.w. control thermostat:
The controller takes into consideration the switching statuses of the control thermostat.

Line / terminal with short-circuit	=	d.h.w. charging ON
Line / terminal with open-circuit	=	d.h.w charging OFF
Contact resistance too high	=	error message from the thermostat

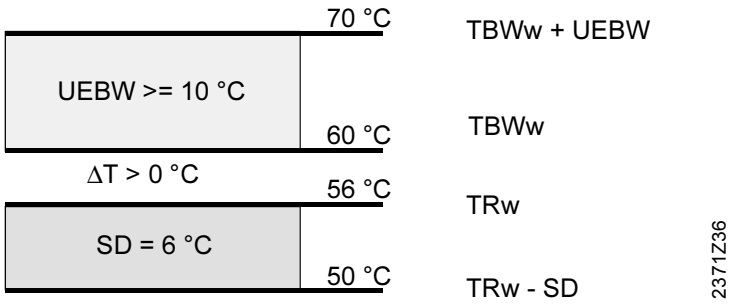
➔ Note

When using a d.h.w. control thermostat, reduced operation is not possible.

Important when using a d.h.w. thermostat

- The nominal d.h.w. temperature setpoint (operating line 13) must be equal to or higher than the setpoint adjusted on the control thermostat (thermostat is calibrated at switch-off point)
- Boost of the flow temperature setpoint (setting on operating line 126) must be minimum of 10 °C (has an impact on the charging time)
- In that case, frost protection for d.h.w. is not ensured

D.h.w. control thermostat (example)



UEBW = Boost of the temperature setpoint (setting 126)
TBWw = Nominal setpoint of the d.h.w. temperature (setting on operating line 13)
TRW - SD = setpoint of the thermostat minus the switching differential
TRw = setpoint of the thermostat (point of calibration)

4.42 Boost of the flow temperature setpoint for d.h.w.

Benefit

- Efficient d.h.w. heating

Description

To allow the d.h.w. to be heated up, the boiler temperature must be higher than the d.h.w. setpoint.

Setting

1. Press the operating line selection buttons to select line 126.
2. Press the + / - buttons to adjust the setpoint boost.

Setting range	*Unit*	*Factory setting*
0...30	°C (K)	16

Effect

The setting will raise the boiler temperature setpoint when there is demand for d.h.w.

Increase: Heating up time will become shorter
More overshoot

Decrease: Heating up time will become longer
Less overshoot

boiler boost

Using the two settings, the controller generates the boiler temperature setpoint for d.h.w. heating.

Setting on operating line 13	Nominal d.h.w. temperature setpoint
Setting on operating line 126	Boost
Total	Boiler temperature setpoint

➔ Note

For d.h.w. control, refer to section "Switching differential of d.h.w. temperature" (line 41 OEM).

4.43 D.h.w. priority

Benefit

- Optimum allocation of boilers' heat output

Description

Defines the priority of d.h.w. heating over space heating.

Setting

1. Press the operating line selection buttons to select line 127.
2. Press the + / - buttons to select the type of d.h.w. priority.

Setting range	*Unit*	*Factory setting*
0...3	Increment	1

Effect

During d.h.w. heating, space heating will be restricted, depending on the setting made. Entry:

0 **Absolute priority**
The controller-internal heating circuit and the heating circuits of other controllers connected to the LPB will be locked until the d.h.w. is heated up. The system pump remains in operation.

1 **Shifting priority** If the capacity of the heat generating equipment is no longer sufficient, the amount of heat supplied to the heating circuits will be restricted until d.h.w. heating is terminated.

2 No priority: D.h.w. heating and space heating at the same time.

In the case of tightly sized boilers and mixing heating circuits, the setpoint may not be reached if the heating load is great, since too much heat is required for space heating.

3 **Shifting / absolute priority**
If the capacity of the heat source is no longer sufficient, the mixing heating circuits will be restricted until d.h.w. heating is terminated. The pump heating circuits will be locked until d,h.w. is heated up.

Frost protection for the plant

Frost protection for the plant is fully active only in the case of setting 2. With setting 0 or 1, it will be partly or fully restricted. If the boiler is correctly sized, frost protection for the plant is also ensured when using setting 1. In the case of plants where there is a considerable risk of frost (e.g. plants with outdoor heating), setting 0 should not be used.

4.43.1 Shifting priority

The purpose of the function "Shifting priority" is to achieve optimum d.h.w. heating. This means that during d.h.w. heating, the actual boiler temperature should be as close as possible to the boiler temperature setpoint without shutting down the burner. To achieve this, it may be necessary to restrict the heating circuits by means of a locking signal. The signal is generated by a temperature-time integral.
Depending on the consumer, the locking signal will lead to switching on / off or a setpoint reduction.

Impact on 2-position loads

Cycling or deactivation of the pumps will reduce the amount of heat drawn from the heat source. This will considerably shorten the time required for heating up the d.h.w.

- Heating circuit pump:

Status	*Effect*
Locking signal < 20 %	Normal pump operation
Locking signal > 20 %	Heating circuit pump cycles
Locking signal > 93 %	Heating circuit pump OFF

- D.h.w. pump or boiler pump:
  No effect

Switching point

Through the generation of the temperature-time integral it is not only the period of time that is considered, but also the extent of the undershoot. This means that when the crossing is significant, the pumps will be deactivated earlier.

Impact on modulating loads

The consumption of heat is considerably reduced through the reduction of the flow temperature setpoints. This reduces considerably the heating up time for d.h.w., with a minimum impact on the heating circuits.

- Mixing valve:

Status	*Effect*
Locking signal > 0 %	Flow temperature setpoints will be lowered. The extent of lowering is dependent on the magnitude and the period of time of the undershoot.
Locking signal reduced to 0 %	Setpoints according to the normal control condition

setpoint reduction

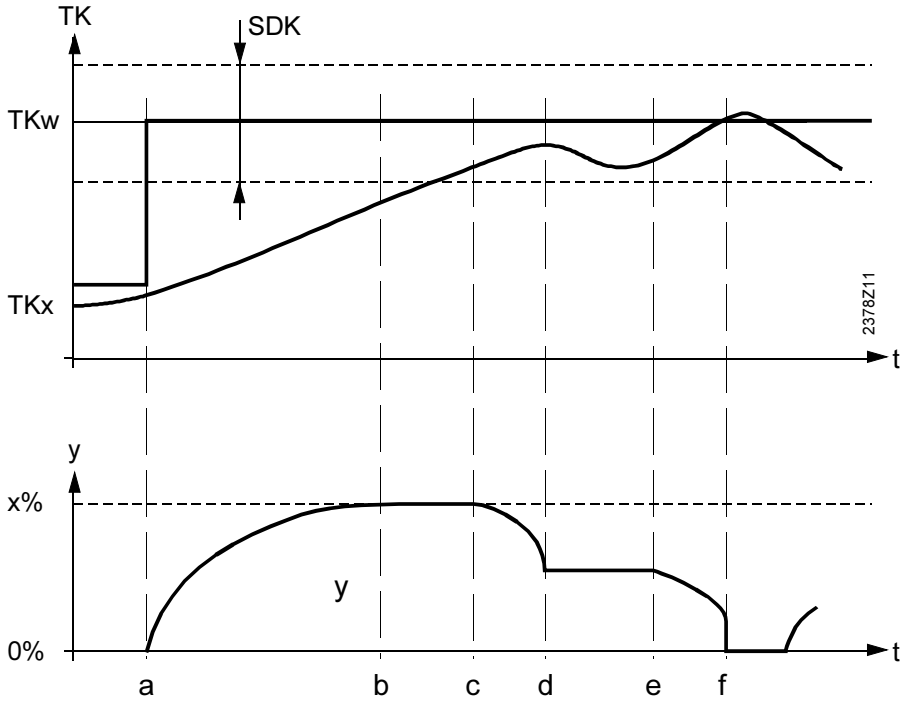
Through the generation of the temperature-time integral it is not only the period of time that is considered, but also the extent of the undershoot. This means that when the undershoot is significant, the setpoint reduction will be greater.

Temperature-time integral

This temperature-time integral generates the locking signal for restricting the heating circuits.
When generating the locking signal, one of four different procedures is used:

Diagram	*Procedure*
a to b	Within a foreseeable period of time, the actual value of the boiler temperature (TKx) will **no** longer be within the switching differential of the boiler temperature setpoint. ➔ Locking signal will be increased
b to c and d to e	Within a foreseeable period of time, the actual boiler temperature (TKx) will lie within the switching differential of the boiler temperature setpoint. ➔ **Locking signal will remain at a constant level**
c to d and e to f	Within a foreseeable period of time, the actual boiler temperature (TKx) will lie **above** TKw. ➔ **Locking signal will be decreased**
f	The actual boiler temperature (TKx) **exceeds** the boiler temperature setpoint. ➔ Locking signal will be set to 0 %.

Example:



a Start of d.h.w. heating
TK Boiler temperature
TKw Boiler temperature setpoint
TKx Actual value of the boiler temperature
SDK Boiler's switching differential (factory setting 8K)
t Time
Y Locking signal

4.44 Demand for heat with reduced d.h.w. setpoint

Benefit

- Selectable type of heat demand with reduced d.h.w. setpoint

Description

In connection with alternative sources of energy, an early release of heat generation (BMUs) for d.h.w. heating outside the main occupancy times is often undesirable. A choice of two different procedures is available releasing the cascade earlier or later.

Setting

1. Press the operating line selection buttons to select operating line 129.
2. Press the + / - buttons to select the required assignment.

Setting range	*Unit*	*Factory setting*
0 / 1	-	1

Effect

The setting determines whether or not heat generation will be released for maintaining the reduced d.h.w. setpoint:

No (use with buffer storage tank and alternative heat source).
Outside the main occupancy hours, the attempt is made to bring the d.h.w. temperature to the reduced setpoint level using energy from the buffer storage tank. This means that the d.h.w. charging pump runs but the demand for heat will be suppressed. Heat generation for d.h.w. charging will be released only (d.h.w. push) when the d.h.w. temperature has dropped below the reduced setpoint by twice the d.h.w. switching differential (41_{OEM}).

Yes (standard procedure).
Outside the main occupancy hours, the d.h.w. temperature is raised to the level of the reduced setpoint. This is accomplished by sensing a heat demand signal to the heat source (individual boiler or cascade).

4.45 Changeover of boiler sequence in a cascade

Benefit

- Even wear and tear of the boilers in a cascade, or
- Selectable fixed switching on / off sequence
- Different time intervals for changeover of boiler sequence can be set

Description

The parameter determines whether or not the switching on / off sequence of the boilers shall be changed after an adjustable period of time.

Setting

1. Press the operating line selection buttons to select operating line 130.
2. Press the + / – buttons to select "---" or enter the number of operating hours after which changeover of boiler sequence shall take place.

Setting range	*Unit*	*Factory setting*
--- / 10...990	- / hours	500

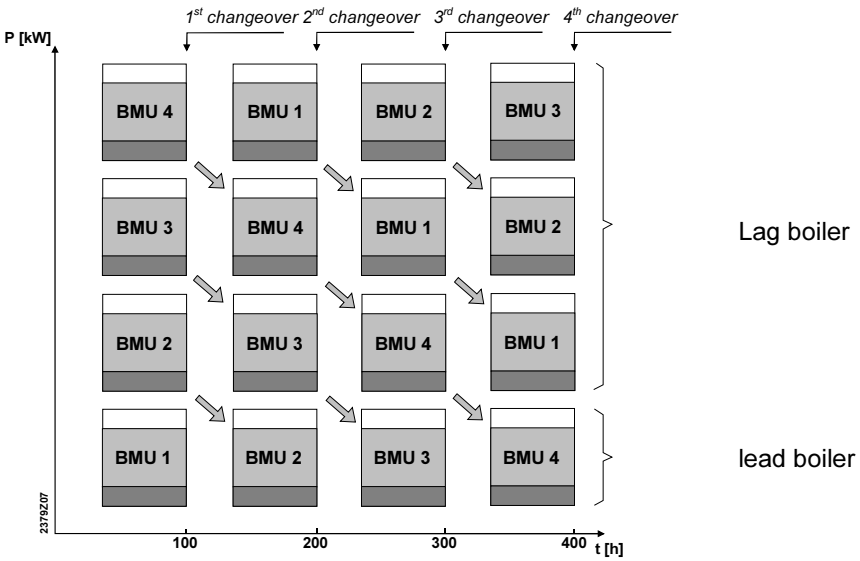
Effect

--- Fixed switching on / off sequence of the boilers in the cascade. The lead boiler can be freely selected (refer to operating line 132); the other boilers are switched on and off in the order of the device addresses / subaddresses.

10...990 On completion of the number of operating hours set here, the switching sequence of the boilers in the cascade will change. This means that the boiler with the next higher device address will become the lead boiler.

Example:

Example of four boilers with a set differential of 100 operating hours.



t = Total number of operating hours of all lead boilers [h]

P= Total output of cascade [kW]

4.46 Exemption from automatic changeover of the boiler sequence

Benefit

- Individual boilers can be exempted from automatic changeover

Description

Use this function if you want to operate a certain boiler as the first and / or last boiler of the switching on sequence.

Setting

1. Press the operating line selection buttons to select line 131.
2. Press the + / – button to enter the boiler(s) to be exempted from automatic changeover.

Setting range	*Unit*	*Factory setting*
0...3	-	0

➔ Important

Setting this parameter has an effect only if, on operating line ”Changeover of boiler sequence in a cascade” (line 130), setting ”Automatic changeover according to the number of operating hours” (10...990 h) has been selected.

Effect

Depending on the selected setting, the respective boiler will be exempted from automatic changeover of the boiler sequence.
Entry:

0 **No exemption.**
The switching on sequence of the boilers will change on completion of the number of operating hours set (line 130).

1 **The first boiler is exempted.**
The first boiler in the addressing scheme always remains the lead boiler. With the other boilers, the switching on sequence changes when the set number of operating hours have elapsed (line 130).

2 **The last boiler is exempted.**
The last boiler in the addressing scheme always remains the last boiler. The other boilers will be switched over on completion of the number of operating hours set (line 130).

3 **The first and the last boiler are exempted.**
The first boiler in the addressing scheme always remains the lead boiler. the last boiler in the addressing scheme always remains the last boiler. The boilers in between will be switched over on completion of the number of operating hours set (line 130).

➔ Note

The boiler sequence is to be determined on operating lines ”Device address” (line 140) and ”Segment address” (line 141).

4.47 Lead boiler with a fixed changeover of the boiler sequence

Benefit

- Lead boiler of the cascade with a fixed changeover of the boiler sequence can be freely selected
- Better adjustment to the plant's demand profile by selecting a suitable type of boiler as the lead boiler

Description

With a fixed changeover of the boiler sequence (refer to operating line 130), the lead boiler can be freely selected.

Setting

1. Press the operating line selection buttons to select operating line 132.
2. Press the + / - buttons to select the required lead boiler.

Setting range	*Unit*	*Factory setting*
00.1...16.3	-	-

Effect

The boiler defined as the lead boiler is always the first boiler to be switched on and the last to be switched off. The other boilers are switched on and off in accordance with the order of the device addresses / device subaddresses.
For example, display 1.1 means that device 1 (in segment 0), device subaddress 1 (BMU 1), is the selected lead boiler.

➔ Note

All cascade boilers must be in segment 0 so that the heat demand signals from all segments can be acquired. For more detailed information about the device address / device subaddress, refer to "Local Process Bus (LPB), Basic Documentation, System Engineering" (document no. CE1P2370E).

➔ Important

This setting has an effect only if function "Changeover of boiler sequence in cascades" (operating line 130) is set to "---" = fixed switching on / off sequence.

4.48 Switch-on delay lag boilers

Benefit

- Smooth operation due to stable operating conditions
- Adjustable rate of release of total capacity

Description

After a BMU has switched on, an adjustable period of time must elapse until another BMU can be switched on.

Setting

1. Press the operating line selection buttons to select operating line 133.
2. Press the + / - buttons to enter the number of minutes on completion of which another BMU can be switched on.

Setting range	*Unit*	*Factory setting*
1...120	Minutes	5

Effect

For stability reasons, each BMU added to the cascade will first run in its basic stage for about one minute. This minute is already contained in the adjusted switch-on delay. Correct adjustment of the switch-on delay ensures that plant operating conditions will be stable. This prevents frequent cycling of the BMUs.

Note

The function is only active with "Serial 2" (setting on line OEM 61 = 0)

4.49 Restart lock of BMUs

Benefit

- Too frequent switching on / off cycles of the BMUs will be avoided

Description

A BMU that has just been switched off can be switched on again only after an adjustable period of time has elapsed.

Setting

1. Press the operating line selection buttons to select operating line 134.
2. Press the + / - buttons to enter the number of minutes on completion of which a switched off BMU can be switched on again.

Setting range	*Unit*	*Factory setting*
0...1800	Seconds	300

Effect

The restart lock ensures that a BMU that has just been switched off will not be switched on again a short time later. The BMU will be released again only after the adjusted period of time has elapsed. This prevents frequent cycling of the BMUs and ensures that plant conditions will be more stable.

Benefit

- Creation of systems
- Wide field of use with a smaller number of unit versions
- Plants can be extended in a straightforward manner

Description

The LPB is used as a communication basis for generating a system with additional ALBATROS™ controllers or controllers of other manufacture.

4.50 LPB device address

Description

The device address and the segment address are used as destinations in the bus system (similar to a postal address). To ensure communication, each device must be correctly addressed.

Setting

1. Press the operating line selection buttons to select operating line 140.
2. Press the + / - buttons to enter the device number.

Setting range	*Unit*	*Factory setting*
0...16	Increment	1

Effect

Entry of the device address is especially important when using combinations of units, or in a system. The addresses classify the controllers within a segment.
Entry:

Address	***Effect***	***Example***
0	Standalone	Single controllers
1	Master (LPB)	– Controllers with master function – Cascade master – Heat generation master – Consumer master in the respective segment
2...16	Slave (LPB)	– Controllers with slave function – Other heat generation controller – Heating circuit controller – D.h.w. controller

Device address

The device addresses should be assigned in consecutive order in accordance with the controllers connected. It is not permitted to assign an address several times within a bus segment, since this would lead to communication errors. Each segment must have a device as a master (address 1).

➔ Note

For more detailed information about the addressing of devices in a system, refer to ”Local Process Bus (LPB), Basic Documentation, System Engineering” (document no. CE1P2370E).

4.51 LPB segment address

Description

The segment address and the device address are used as destinations in the bus system (similar to a postal address). To ensure communication, each device must be correctly addressed.

Setting

1. Press the operating line selection buttons to select operating line 141.
2. Press the + / - buttons to enter the segment address.

Setting range	*Unit*	*Factory setting*
0...14	Increment	0

Effect

Entry of the segment address is especially important when used in a system. With this setting, the system can be subdivided into a number of segments.
Entry:

0	Heat generation segment
1...14	Heat consumer segment

Segment number

A bus segment is comprised of a number of devices that are used in the same place of application. All devices in a segment must carry the same segment address.

➔ Note

For more detailed information about the addressing of devices in a system, refer to ”Local Process Bus (LPB), Basic Documentation, System Engineering” (document no. CE1P2370E).

4.52 LPB power supply

Benefit

- A central bus power supply is not required in systems with up to 16 devices
- Straightforward extension of systems

Description

The bus power supply via the controllers enables the bus system to be powered directly by the individual controllers (no central bus power supply).

Setting

1. Press the operating line selection buttons to select operating line 142.
2. Press the + / - buttons to select the type of bus power supply.

Setting range	*Unit*	*Factory setting*
0 / 1	Increment	1

Effect

Entry:

0 Off
No bus power supply via the controller.

1 Automatically
The bus power supply (LPB) via the controller is automatically switched on and off depending on the requirements of the LPB.

➔ Note

The actual status of the power supply is shown on operating line 143.

Bus power supply

The bus system (LPB) can be powered either via the individual controller bus power supplies or via a central bus power supply.

➔ Note

For more detailed information about the bus power supply and its engineering, refer to ”Local Process Bus (LPB), Basic Documentation, System Engineering” (document no. CE1P2370E).

4.53 Displaying the LPB power supply

Benefit

- Overview of operational status of the bus power supply via controllers

Description

The display shows whether the controller currently powers the bus (LPB).

Setting

1. Press the operating line selection buttons to select operating line 143.
2. No setting can be made with the + / - buttons.

Display	*Unit*
ON / OFF	-

Effect

The status of the bus power supply via controllers will automatically be displayed on this operating line.
Display:

ON The bus power supply via controllers is currently active.
At the moment, the controller supplies some of the power required by the bus.

OFF The bus power supply via controllers is currently inactive.

Bus power supply

Power supply to the bus can be accomplished in different ways. The respective setting is made on operating line 142.

4.54 Displaying the LPB communication

Benefit

- Overview of communication status of bus (LPB)

Description

Indicates whether communication on the LPB is currently active.

Setting

1. Press the operating line selection buttons to select operating line 144.
2. No setting can be made with the + / - buttons.

Display	*Unit*
ON / OFF	-

Effect
Display

The status of the BUS communication will automatically be displayed on this line.

ON Communication active
The controller communicates with another controller via the LPB.

OFF Communication inactive

4.55 Range of action of central changeover

Benefit

- The range of action of the central changeover actions can be defined

Description

Function for defining the range of action of central changeover.

Setting

1. Press the operating line selection buttons to select operating line 145.
2. Press the + / - buttons to select the required range of action of changeover.

Setting range	*Unit*	*Factory setting*
0 / 1	Increment	1

Effect

The range of action can be defined for the central changeover actions ”Changeover of operating mode”, ”Summer / winter changeover” and ”Standby”. The range of action can be defined by making the following settings:

0 Changeover takes place with all controllers in the same segment.

1 Changeover takes place with all controllers in the entire system (LPB).

➔ Note

The setting is of importance only if the controller is defined as the master and located in segment 0 (address 0/1). With any other addressing, it has no effect.

4.56 Automatic summer / winter changeover

Benefit

- Makes possible a uniform changeover of all heating circuits in the selected range of action

Description

Summer / winter changeover of the selected range of action takes place when the changeover temperature set on operating line 16 is reached.

Setting

1. Press the operating line selection buttons to select operating line 146.
2. Press the + / - buttons to select the effect of automatic summer / winter changeover.

Setting range	*Unit*	*Factory setting*
0 / 1	Increment	0

Effect

The setting will change the effect of summer / winter changeover:
Entry:

0 Local effect
Automatic summer / winter changeover switches the local heating circuit on and off.

1 Central effect
Either the heating circuits of the segment or those of the entire system are switched on and off by automatic summer / winter changeover, depending on the setting made on operating line ”Range of action of central changeover”.

➔ Important

Setting 1 (central effect) is active only if the controller has been defined as a master controller (setting on line 140 = 1).

4.57 Central standby switch

Benefit

- Central operation of the interconnected system

Description

From the master controller, the entire heating system can be switched to standby.

Setting

1. Press the operating line selection buttons to select operating line 147.
2. Press the + / - buttons to select central standby switching.

Setting range	*Unit*	*Factory setting*
0 / 1	Increment	0

➔ Important

Setting 1 (central effect) is active only if the controller has been defined as a master controller (setting on line 140 = 1).

Effect

Entry:

0 Central standby switching is deactivated

1 Central standby switching is activated

➔ Important

If central standby on the master controller is switched on, it can only be switched off again from that controller!

D.h.w.

The central standby circuit does not affect d.h.w. heating. This means that the d.h.w. is heated according to the settings made.

Display

If the function is activated from the master controller, the operating mode buttons ⏻ of all affected controllers in the segment or system will flash.

4.58 Clock mode

Benefit

- Straightforward time synchronization of the controllers in the system

Description

Clock operation is an important setting for time synchronization if several controllers are interconnected to form one system.

Setting

1. Press the operating line selection buttons to select operating line 148.
2. Press the + / - buttons to select clock mode.

Setting range	*Unit*	*Factory setting*
0...3	Increment	3

➔ Important

For time adjustment of the controllers connected to the system, **one** device per system must be set as a **system lock (setting 3)**.

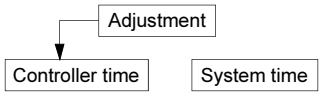
Effect

The setting will change the effect of the system time on the controller's time setting (settings on operating lines 1 to 2).

Entry:

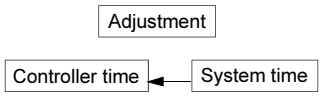
0 Autonomous clock

- The clock time on the unit can be adjusted
- The controller's clock time will not be matched to the system time



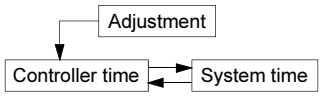
1 System time

- The clock time on the unit cannot be adjusted
- The controller's clock time will automatically and continuously be matched to the system time



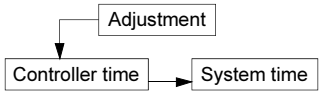
2 System time with adjustment

- The clock time on the unit can be adjusted and, at the same time, adjusts the system time since the change will be adopted by the master
- The controller's clock time is still automatically and continuously matched to the system time



3 System clock (master)

- The clock time on the unit can be adjusted and, at the same time, adjusts the system time
- The controller's time is used for the system



4.59 Winter- / summertime changeover

Benefit

Automatic changeover of the yearly clock to summertime.

International standards

In accordance with present international standards, the change from wintertime to summertime takes place on the last Sunday in March. The standard setting of the controller complies with this rule since that Sunday lies between the standard setting and the last day of the relevant month. With this setting, the day of changeover can be matched to changing standards.

Description

On the Sunday following that date, the controller's time of day will switch over to summertime.
For that purpose, the time of day is shifted forward by one hour.

Setting

Setting range	*Unit*	*Factory setting*
01.01...31.12.	tt.MM	25.03.

4.60 Summer- / wintertime changeover

Benefit

Automatic changeover of the yearly clock to wintertime.

International standards

In accordance with present international standards, the change from summertime to wintertime takes place on the last Sunday in October. The standard setting of the controller complies with this rule since that Sunday lies between the standard setting and the last day of the relevant month. With this setting, the day of changeover can be matched to changing standards.

Description

On the Sunday following that date, the controller's time of day will switch over to wintertime.
For that purpose, the time of day is shifted backward by one hour.

Setting

	Setting range	*Unit*	*Factory setting*
	01.01...31.12.	tt.MM	25.10.

4.61 Input H1

Benefit

- Changeover of operating mode via telephone (e.g. in a holiday house)
- Minimum demand for heat
- Heat generation lock
- Demand for heat

Description

Terminal H1 is an input that provides different functions, depending on the selected setting.

Setting

1. Press the operating line selection buttons to select operating line 170.
2. Press the + / - buttons to select the required function.

Setting range	*Unit*	*Factory setting*
0...4	Increment	0

Effect

With this setting, the function of terminal H1 can be changed. The selected function will be activated when the potential-free contact connected to terminal H1 closes or when an analog voltage signal of DC 0...10 V is transmitted.
Entry:

0 **Changeover of operating mode** (remote telephone switch) for heating circuit and d.h.w.: The operating mode is changed when the contact closes

1 **Changeover of operating mode** (remote telephone switch) for heating circuit only: The operating mode is changed when the contact closes

2 **Minimum setpoint of flow temperature, contact H1**
The "Minimum setpoint of flow temperature contact H1" set on operating line 171 will be activated when the contact closes.

3 **Heat generation lock**
The heat sources will be locked when the contact closes.

4 **Demand for heat**
The demand for heat (between 0 and 130 °C) is delivered to the heat sources in the form of a voltage signal.

➔ Note

When using terminal H1 as a contact (settings 0 -3), **several** switches can be connected in **parallel**. The function will be activated when one or several contacts close(s), depending on the selected setting.
When using terminal H1 as a voltage input (setting 4), it is **not** possible to connect several signals in parallel**.**
When 2 heat demand signals are received at the same time, one via contact H1 (settings 2 + 4) and another (LPB, d.h.w. or controller internally), the highest of them will be selected. Exception D.h.w. cannot be boosted by another heat requisition.

➔ Important

The relay contacts must be suited for use with extra low voltage (gold-plated).

4.61.1 Changeover of operating mode (remote telephone switch) - *Setting 0 / 1*

Description

A remote telephone switch is a potential-free relay contact, e.g. in the form of a modem, which can be switched by making a phone call plus dialing a code.

The operating mode is changed when the contact connected to terminal H1 (e.g. a remote telephone switch) closes. In that case, the LEDs in the operating mode buttons ⏻ and 🚿 will flash.

D.h.w.

Whether or not d.h.w. heating takes place when the remote telephone switch is activated depends on the setting made:

Setting 0: D.h.w. heating is locked when changeover is activated.
Setting 1: D.h.w. heating remains released when changeover is activated.

Effect

Activation of this function will produce different actions, depending on the function of the controller within the LPB system (also refer to ”Local Process Bus (LPB), Basic Documentation, System Engineering, document no. CE1P2370E).

The effect depends on the setting made on operating line 145.

Changeover of system

• **Changeover of all controllers in the entire LPB system**	
Prerequisite:	– Operating line 145 must be set to 1 (range of action = entire system) – The contact must be connected to the master controller in segment 0 *Possible address: Device address 1 (line 140)* *Segment address 0 (operating line 141)*
Effect:	– All controllers in the system switch to operating mode ⏻ – With setting 0, d.h.w. heating is switched off in the entire system; with setting 1, it is released in the entire system – With all controllers, operating mode changeover with the buttons is no longer possible – When the contact of the remote telephone switch opens, all controllers will return to the operating mode selected last
Check:	– Buttons ⏻ or ⏻ + 🚿 flash on all controllers in the system [1)]

[1)] With setting 0 as selected above (d.h.w. heating locked), the two buttons ⏻ and 🚿 will flash.
With setting 1 as selected above (d.h.w. heating remains released), only operating mode button ⏻ will flash.

Changeover of segment

• **Changeover of all controllers in the same segment**	
Prerequisite:	– With segment 0, setting 0 must be made on operating line 145 (range of action of segment); with the other segments, the setting on operating line 145 has no impact. – The contact must be connected to the master controller in segments 0 to 14 *Possible addresses: Device address 1 (line 140)* *Segment address 0...14 (operating line 141)*
Effect:	– All controllers in the same segment switch to operating mode ⏻ – With setting 0, d.h.w. heating is switched off in the entire segment; with setting 1, it is released in the entire segment – With all controllers in the same segment, operating mode changeover with the buttons is no longer possible – When the contact of the remote telephone switch opens, all controllers will return to the operating mode selected last
Check:	– Buttons ⏻ or ⏻ + 🚿 flash on all controllers in the same segment [1)]

[1)] With setting 0 as selected above (d.h.w. heating locked), the two buttons ⏻ and 🚿 will flash.
With setting 1 as selected above (d.h.w. heating remains released), only operating mode button ⏻ will flash.

4.61.2 Minimum setpoint of flow temperature contact H1

see operating line 171 - *Setting 2*

4.61.3 Heat generation lock - *Setting 3*

BMU on PPS

The heat sources connected to the PPS will be locked when contact H1 closes (e.g. via ripple control).
All heat demand signals from the heating circuits connected to LPB and from the d.h.w. storage tank connected to the RVA47.320 will be ignored while frost protection for the boiler will remain ensured.
However, a local d.h.w. storage tank connected directly to the BMU can still trigger d.h.w. heating.

Chimney sweep function

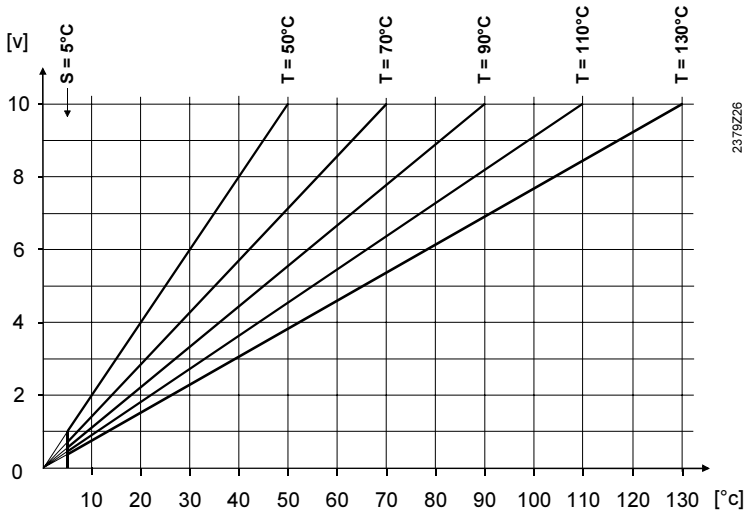
The chimney sweep function can be activated directly on the BMU although the heat generation lock is switched on.

BMU on LPB

All at LPB connected heat generations are not applied from the heat generation lock.
The setting for this function must be made at the BMU.

4.61.4 Demand for heat - *Setting 4*

External consumers can transmit a demand for heat in the form of an analog signal of DC 0...10 V. The RVA47.320 converts this voltage signal to a temperature setpoint of 0...130 °C and considers this value when generating the setpoint of the cascade.



T = maximum value of heat demand
S = minimum limitation of heat demand = 5 °C

The setpoint for 10 V can be set with parameter ”Maximum value of heat demand” (operating line 172, setting range 5...130 °C). The voltage corresponding to the displayed temperature can then be calculated as follows:

$$[V] = \frac{10\,[V] * \text{"actual temperature"}\,[°C]}{\text{"Maximum value of heat demand"}\,[°C]}$$

4.62 Minimum setpoint of flow temperature contact H1

Benefit

- Handling of heat demand signals from units incompatible with LPB
- Temporary startup of boiler via switching contact

Description

Function for setting the temperature at which the cascade or the boiler is maintained when contact H1 is closed.

➔ Important

This setting has an effect only if on operating line 170 “Input H1” setting 1 "Minimum setpoint of flow temperature contact H1" has been selected.

Setting

1. Press the operating line selection buttons to select operating line 171.
2. Press the + / – buttons to set the required value of the "Minimum setpoint of flow temperature contact H1".

Setting range	*Unit*	*Factory setting*
8...TKmax	°C	70

...TKmax Maximum limitation of BMU setpoint, operating line 2 $_{OEM}$.

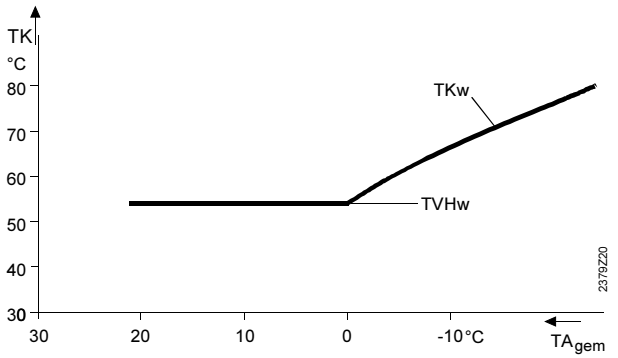
Effect

Function "Minimum setpoint of flow temperature contact H1" selected on operating line 170 will be activated when contact H1 closes. The heat source or the cascade will maintain the temperature level set here until either contact H1 reopens or more heat is demanded.

➔ Notes

If several heat demand signals are received at the same time (LPB, contact H1, d.h.w., or from the controller itself), the highest of them will automatically be selected.

If the demand for heat is so small that a single BMU running on its basic stage still produces too much heat, it will start cycling within the switching differential set on it. Otherwise, the required output will be provided through modulation of the burner.



TVHw Minimum setpoint of the flow temperature, contact H1

TKw Boiler temperature setpoint

4.63 Maximum value of heat demand signal DC 0...10 V (H1)

Benefit

- Adjustable temperature range for heat demand signal via input H1
- Can be matched to the voltage outputs of devices of other manufacture

Description

The parameter determines which temperature the maximum voltage of the setting ”Heat demand via H1” (operating line 170, setting 4) corresponds to.

➔ Important

This setting is active only if on operating line 170 (input H1) setting 4 ”Heat demand DC 0…10 V” has been selected.

Setting

1. Press the operating line selection buttons to select operating line 172.
2. Press the + / – buttons to set the required ”Maximum value of the heat demand signal”.

Setting range	*Unit*	*Factory setting*
5...130	°C	100

Effect

This setting defines the temperature corresponding to 10 V of the setting ”Heat demand via H1” (operating line 170, setting 4).
Based on this temperature, the controller converts the heat demand voltage signal to a temperature.

4.64 Operating action of the contact connected to H1

Benefit

- The operating action of the contact can be matched to the type of output signal delivered by a device of other manufacture
- More flexibility when selecting non-Landis & Staefa products (both operating actions can be considered)

Description

This function enables the operating action of contact H1 to be matched to the operating action of a device of other manufacture.

Setting

1. Press the operating line selection buttons to select operating line 173.
2. Press the + / - buttons to select the operating action of contact H1.

Setting range	*Unit*	*Factory setting*
0...1	-	1

Entry:

0 The contact is a N.C. contact, which means that it is normally closed and opened only when the third party device delivers a signal.

1 The contact is a N.O. contact, which means that it is normally open and closed only when the third party device delivers a signal.

➔ Note

If input H1 is used for a heat demand signal (line 170, setting 4), this setting will have no effect.

5 Description of the OEM settings

Heat generation values

5.1 Minimum limitation of the boiler temperature setpoint OEM ($TKmin_{OEM}$)

Benefit

- Minimum limitation of the boiler temperature setpoint

Description

This function provides minimum limitation of the boiler temperature setpoint.

Setting

1. Press the line selection buttons to select operating line 1OEM.
2. Press the + / - buttons to set the minimum limitation of the boiler temperature.

Setting range	*Unit*	*Factory setting*
8...95	°C	8

Effect

The setting ensures minimum limitation of the boiler temperature setpoint which can be adjusted on line 90 (TKmin).

5.2 Maximum limitation of the boiler temperature setpoint

Benefit

- Maximum limitation of the boiler temperature setpoint.
- Preset temperature for manual operation.

Description

Maximum limitation of the boiler temperature setpoint and delivery of the flow temperature setpoint for the cascade in manual operation.

Setting

1. Press the line selection buttons to select line 2OEM.
2. Press the + / - buttons to set the maximum limitation of the boiler temperature setpoint.

Setting range	*Unit*	*Factory setting*
8...120	°C	80

Effect

This setting provides maximum limitation of the boiler and cascade flow temperature setpoint. The boilers controlled by the BMUs are operated at a temperature no higher than the adjusted temperature, even if the consumers call for more heat.
In **manual operation**, the value set is used directly as the flow temperature setpoint. The boilers controlled by the BMUs are operated at this temperature.

5.3 Pump overrun time

Benefit

- Protects the boiler against overtemperatures
- Use of residual heat in the boiler.

Description

Overrun of the primary, heating circuit and d.h.w. charging pump ensures that residual heat will be carried away from the pressureless header. This makes certain that the boiler pump controlled by the BMU will be able to draw the residual heat from the boiler, thus avoiding boiler overtemperatures and preventing the manual reset safety limit thermostat from cutting out.

Setting

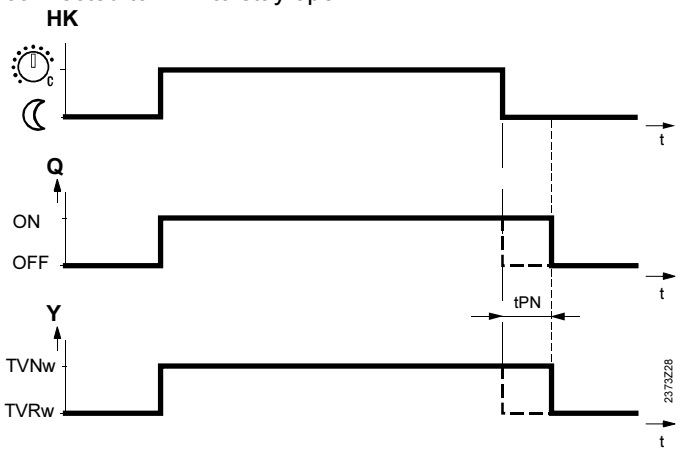
1. Press the line selection buttons to select line 8OEM.
2. Press the + / - buttons to set the pump overrun time.

Setting range	*Unit*	*Factory setting*
0...20	min	5

Effect

All pumps that, at the time of burner shutdown of the last boiler, were operating, continue to run for the period of time set here. At the same time, the previous flow temperature setpoint remains valid, allowing the mixing valves of the controllers connected to LPB to stay open.

Example



HK	Operating mode		Nominal operation
Q	Pumps		Reduced operation
Y	External mixing valve (via LPB)		
TVNw	Nominal flow temperature setpoint		
TVRw	Reduced flow temperature setpoint	tPN	Pump overrun time

➔ Note

With no burner shutdown, the general pump overrun time is one minute.

5.4 Minimum limitation of the boiler return temperature

Benefit

- The minimum boiler return temperature can be adjusted
- The effect on the consumers can be adjusted

Description

The setting defines the permitted minimum boiler return temperature.

Setting

1. Press the line selection buttons to select line 22OEM.
2. Press the + / - buttons to set the required minimum limitation of the boiler return temperature.

Setting range	*Unit*	*Factory setting*
8...95	°C	8

Effect

If the boiler return temperature drops below the minimum limit set here, the consumers' heat c7onsumption will be restricted.

5.5 Calibration of actual output range of BMU 1-4

Benefit

- More accurate control through optimized signal transmission.
- Calibration of the output signals delivered by the BMUs to match the actual values.

Description

The output signals delivered by the BMUs can be calibrated to match the actual load. This enhances the control performance.

Setting

1. Press the line selection buttons to select line 25OEM - 28OEM.
2. Press the + / - buttons to adjust the calibration factors.

Setting range	*Unit*	*Factory setting*
-100...100	-	0

In that case:

- Operating line 25 = BMU 1
- Operating line 26 = BMU 2
- Operating line 27 = BMU 3
- Operating line 28 = BMU 4

Effect

The output signal delivered by the respective BMU is corrected by the adjusted factor and then used for controller-internal calculations.
In principle, operation without the adjusted calibration factor is possible, but to achieve the greatest possible accuracy the adjustment should be made.

Calculation

Calculation of the calibration factor for the respective BMU is made based on the following formula:

$$K_{\%} = \frac{P_{\%GS} - \frac{P_{Gs}}{P_N} \cdot 100}{1 - \frac{P_{\%GS}}{100}}$$

Legend

$K_{\%}$	Calibration factor	[%]
$P_{\%GS}$	Output provided on the basic stage	[%]
P_{GS}	Output on the basic stage	[W]
P_N	Nominal output	[W]

➔ Note

The value of $P_{\%GS}$ is obtained by making a readout with the ACS69 service tool.
On the ACS69, the value is displayed on page "Heat source state" under the name "Actual capacity value BMU X".
The values of P_{GS} and P_N are given on the type field of the BMUs.

5.6 Gain factor of room influence (KORR)

Benefit

- The influence of room temperature deviations on the controlled system can be adjusted

Note

Defines the influence of room temperature setpoint deviations on the controlled system.
The room influence can be activated and deactivated (operating line 101).

Setting

1. Press the line selection buttons to select operating line 30OEM.
2. Press the + / – buttons to set the gain factor.

Setting range	*Unit*	*Factory setting*
0...20	-	4

Effect

Changing this setting has the following impact:
Entry:

Increase: Authority of room influence will increase

Decrease: Authority of room influence will decrease

Correction

The value of setting 30_{OEM} is divided by 2 and multiplied by the differential (room temperature setpoint – actual room temperature).
The result is then added to the room temperature setpoint.

$$TRwk = TRw + \frac{30_{OEM}}{2}(TRw - TRx)$$

TRw Room temperature setpoint
TRx Actual value of the room temperature
TRwk Corrected room temperature setpoint

➔ Note

The gain factor of the room influence is only active when a room unit is connected.

5.7 Constant for quick setback (KON)

Benefit

- Making use of the building's thermal storage capacity.

Description

Quick setback is dependent on whether or not a room temperature sensor is used. A differentiation is made between quick setback with and without room temperature sensor.

➔ Important

This setting is active only if **no** room sensor is used.

Setting

1. Press the line selection buttons to select line 31OEM.
2. Press the + / – buttons to set the constant.

Setting range	*Unit*	*Factory setting*
0...20	-	2

Effect

The duration of quick setback will be changed.
Entry:

Increase: Setback time will become longer
For well insulated buildings that cool down slowly

Decrease: Setback time will become shorter
For poorly insulated buildings that cool down rather quickly

Quick setback without room temperature sensor

Quick setback is started as soon as a change to a lower room temperature setpoint takes place (e.g. switching times in automatic mode).
During quick setback, the heating circuit pump will be deactivated and no heat demand signal delivered.

Exception Due to frost protection for the plant, the heating circuit pump can be activated however in spite of quick setback.

The quick setback time is generated based on setting 31_{OEM} , the composite outside temperature in the room temperature setpoint step. It is limited to a maximum of 15 hours.

Example

The example applies to a setpoint step change of 4 °C (e.g. TRw from 20 to 16 °C):

TAgem	Setting 31_{OEM}					
	0	4	8	12	15	20
- 20	0	0	0	0	0	0
- 10	0	0.5	1	1.5	2	2.5
0	0	3	6	9	11	15
+10	0	5	11	15 (16.5)	15 (21)	15 (27)
	Values in hours					

➔ Note

If a room sensor is connected, the quick setback time will not be generated from this setting. For details, refer to section "Quick setback with room temperature sensor" (Chapter 6, "Functions with no settings").

5.8 Boost of room temperature setpoint

Benefit

- Reduction of the room's heating up time

➔ Note

Boosts the room temperature setpoint temporarily, aimed at achieving shorter heating up times for the room. This setting is active only if a room temperature sensor is used.

Setting

1. Press the line selection buttons to select line 32OEM.
2. Press the + / – buttons to adjust the room temperature setpoint boost.

32

Setting range	*Unit*	*Factory setting*
0...20	°C (K)	5

Effect

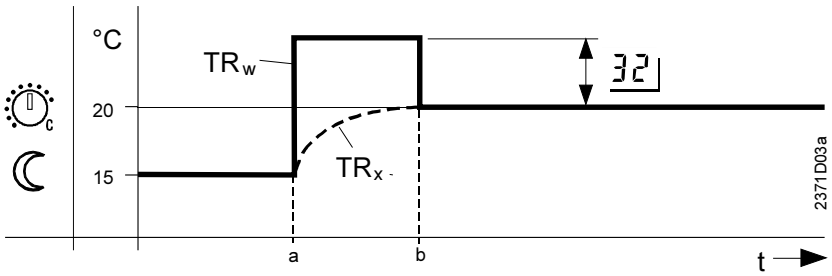
The duration of boost heating will be changed.
Entry:

Increase: More setpoint boost
Heating up time will become shorter

Decrease: Less setpoint boost
Heating up time will become longer

Boost heating

Boost heating is started as soon as switching to a higher room temperature setpoint occurs (e.g. switching times in automatic mode).
The room temperature setpoint will be raised by the setting made on line 32_{OEM} until the room is heated up (TRw - ¼ °C).
The boost produces an increase in the flow temperature setpoint.



TRx	Actual value of the room temperature	32OEM	Setpoint boost
TRw	Room temperature setpoint	t	Time

5.9 Frost protection for the plant

Benefit

- Protects the plant against freezing

Description

When this function is activated and there is a risk of frost, the heating will automatically switch on, thus preventing the heating plant from freezing.

➔ Important

This function is ensured only if the plant works properly and is fully operational!

Setting

1. Press the line selection buttons to select line 33OEM.
2. Press the + / - buttons to activate or deactivate the frost protection for the plant.

33

Setting range	*Unit*	*Factory setting*
0 / 1	-	1

Effect

Depending on the selection made, the plant will be protected by activating the pumps. Entry:

0 Frost protection for the plant **OFF**
Function deactivated

1 Frost protection for the plant **ON**
Function activated

frost protection for the plant

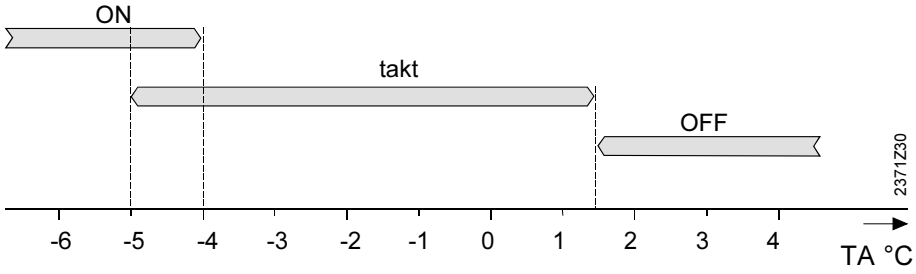
The heating circuit pump will be switched on in function of the actual **outside temperature,** even if there is no demand for heat.

Outside temperature	Pump	Diagram
... -4°C	Continuously ON	ON
-5...1.5 °C	ON for 10 minutes at 6-hour intervals	takt
1.5 °C...	Continuously OFF	OFF

Exception

Between -4...-5°C, different statuses can occur. In this temperature range, it is decisive which situation prevailed:

– If the temperature was previously higher (in the range of "takt"), the pump is switched on / off also in the range -4 to -5 °C and is continuously running only when the outside temperature is lower
– If the temperature was previously lower (in the range of "ON"),the pump is continuously activated also in the range up to -4 °C and is switched on / off when the outside temperature is higher



5.10 Overtemperature protection for the pump heating circuit

Benefit

- Prevents overtemperatures in the pump heating circuit
- Enhances the control performance of a pump heating circuit

Description

The flow temperature can be higher than that called for by the pump heating circuit (e.g. in the case of a higher setpoint demand by another consumer). The controller offsets the surplus energy by letting the pump cycle, thus preventing the pump heating circuit from overheating.

Setting

1. Press the line selection buttons to select operating line 34OEM.
2. Press the + / - buttons to activate or deactivate the overtemperature protection.

Setting range	*Unit*	*Factory setting*
0 / 1	-	1

Effect

The pump of the pump heating circuit will cycle in a way that the effect of too high flow temperatures will be offset.

0 Overtemperature protection deactivated
1 Overtemperature protection activated

The cycling period is fixed at 10 min. This period of time will be broken down according to the following on time ratio:

On time ratio

$$\varepsilon = \frac{\mathrm{TVwGef} - \mathrm{TRw}}{\mathrm{TVxGed} - \mathrm{TRw}}$$

ε On time ratio
TVwGef Demanded flow temperature setpoint
TRw Current room temperature setpoint
TVxGed Actual value of the attenuated flow temperature
TVKx Actual value of cascade flow temperature (B10)

➔ Note

In the case of a single boiler plant without a cascade flow temperature sensor (B10), the boiler temperature is used in place of the actual value of the cascade flow temperature (TVKx).

Running time

Multiplication of the on time ratio by the cycling period (10 minutes) gives the number of minutes for which the pump runs.
This means that with an on time ratio ε of 0.6, the pump runs for 6 minutes and is then switched off for the remaining 4 minutes of the cycling period.

Limitations

The pump's running time is set to a minimum of 3 minutes.
The pump's off time is set to a minimum of 2 minutes.
Also, the pump will be activated and deactivated at the following switching points:

- Pump continuously ON TVxGed ≤ TVwGef (ε ≥1)
- Pump continuously OFF TVwGef ≤ TRw < TVxGed

➔ Important

The function of a room temperature sensor - if present - overrides that of the overtemperature protection.

5.11 Heat gains

Benefit

- To save energy, heat gains are taken into consideration

Description

This setting takes into account potential heat gains from machines, pieces of equipment, or other constant heat sources, that might adversely affect accurate control. The value will change when the heating curve adaption is activated.

Setting

1. Press the line selection buttons to select line 35OEM.
2. Press the + / - buttons to set the effect of heat gains.

Setting range	*Unit*	*Factory setting*
-2...+4	°C	0

Effect

The setting compensates the sum of all constant heat gains as follows:

Increase: For more compensation
In the case of significant heat sources

Decrease: For less compensation
In the case of less significant heat sources

The setting in °C corresponds to the temperature differential that would result if the room was solely heated by the heat gains.

5.12 Adaption sensitivity 1

Benefit

- Adaption of the heating curve as a function of the outside temperature

Description

Adaption sensitivity 1 serves for calculating the adaption of the heating curve in the temperature range 4 to 12 °C (also refer to section "Adaption of heating curve, line 106").

Setting

1. Press the line selection buttons to select line 36OEM.
2. Press the + / - buttons to adjust adaption sensitivity 1.

Display	*Factory setting*
1...15	15

The level of adaption sensitivity is automatically adapted by the controller and, therefore, need not be manually adjusted.

Effect

The heating curve in the temperature range 4 to 12 °C will be differently adapted, depending on the level of adaption sensitivity 1.
Increase: More adaption
Decrease: Less adaption

Reduction

Each time a significant adaption of the heating curve **between** 4 and 12 °C (ZAF1) has taken place, adaption sensitivity 1 will automatically be reduced by one step. This means that the extent of adaption and thus the readjustment of the slope and the heating curve's parallel displacement will gradually be reduced .

➔ Note

When readjusting the slope of the heating curve (line 17), the adaption sensitivity will automatically be reset to the factory-set value.

Diagram

Refer to the next section "Adaption sensitivity 2".

➔ Note

For more detailed information about the effects, refer to operating line "Adaption of heating curve" (line 106).

5.13 Adaption sensitivity 2

Benefit

- Adaption of the heating curve as a function of the outside temperature

Description

Adaption sensitivity 2 serves for adapting the heating curve in the temperature range **below** 4 °C (also refer to section "Adaption of heating curve", line 106).

Setting

1. Press the line selection buttons to select line 37OEM.
2. Press the + / – buttons to adjust the adaption sensitivity.

Setting range	*Unit*	*Factory setting*
1...15	-	15

The level of adaption sensitivity is automatically adapted by the controller and, therefore, need not be manually adjusted.

Effect

The heating curve in the temperature range below 4 °C will be adapted differently, depending on the level of adaption sensitivity 2.
Increase: More adaption
Decrease: Less adaption

Reduction

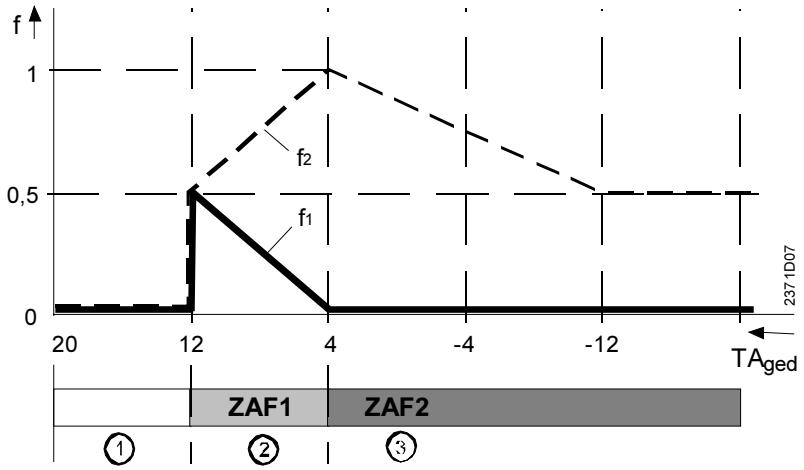
Each time a significant adaption of the heating curve **below** 4 °C (ZAF2) has taken place, adaption sensitivity 2 will automatically be reduced by one step. This means that the extent of adaption and thus the readjustment of the heating curve's slope will gradually be reduced.

➔ Note

When readjusting the slope of the heating curve (line 17), the adaption sensitivity will automatically be reset to the factory-set value.

Diagram

Example using a nominal room temperature setpoint of 20 °C:



f Factor
f1 Factor for parallel displacement
f2 Factor for slope
TAged Attenuated outside temperature
ZAF1 Adaption sensitivity 1 (line 36_{OEM})
ZAF 2 Adaption sensitivity 2 (line 37_{OEM})

➔ Note

For more detailed information about the effects, refer to operating line ”Adaption of heating curve” (line 106).

5.14 Maximum nominal setpoint of d.h.w. temperature

Benefit

- Setting can be limited by the enduser
- Reduced risk of scalding

Minimized proneness to lime buildup

Description

Function for limiting the nominal setpoint of the d.h.w. temperature.

Setting

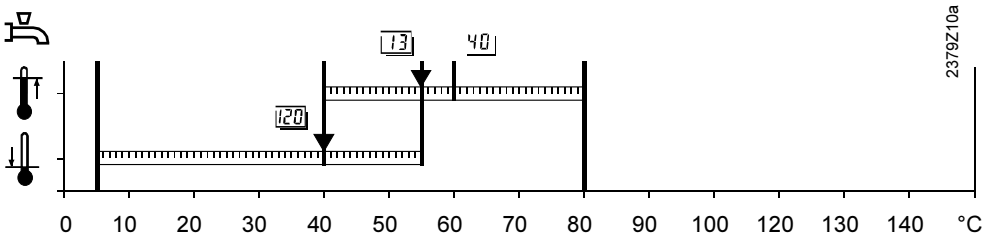
1. Press the line selection buttons to select line 40OEM.
2. Press the + / - buttons to adjust the nominal setpoint of the d.h.w. temperature.

40

Setting range	*Unit*	*Factory setting*
8...80	°C	60

Effect

The setting will ensure maximum limitation of the nominal d.h.w. temperature setpoint (setting on line 13).



13 Setting "Nominal setpoint of d.h.w. temperature"
120 Setting "Reduced setpoint of d.h.w. temperature"
40_{OEM} Setting "Maximum nominal setpoint of d.h.w. temperature"

5.15 Switching differential of the d.h.w. temperature

Benefit

- Optimum frequency of d.h.w. heating

Description

D.h.w. control is in the form of a two-position controller with an adjustable switching differential.

➔ Note

The switching differential for d.h.w. control has no impact on d.h.w. with a control thermostat or changeover valve (via BMU).

Setting

1. Press the line selection buttons to select line 41OEM.
2. Press the + / - buttons to adjust the switching differential for d.h.w.

41

Setting range	*Unit*	*Factory setting*
0...20	°C (K)	5

Effect

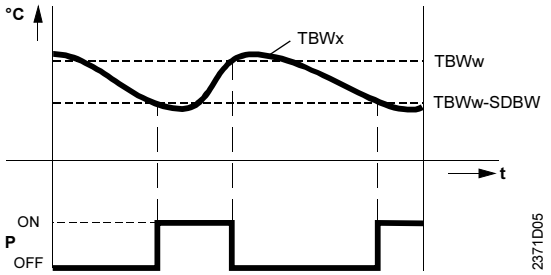
The setting will change the switching differential of the d.h.w. temperature control.
Entry:

Increase: Switching differential will become larger
Fewer and longer heating up times, larger temperature variations

Decrease: Switching differential will become smaller
More frequent and shorter heating up times, smaller temperature variations

6 D.h.w. temperature control

2-position control heats the d.h.w. at certain intervals. The duration of d.h.w. heating depends mainly on the storage tank's capacity and water volume and the amount of d.h.w. currently required.

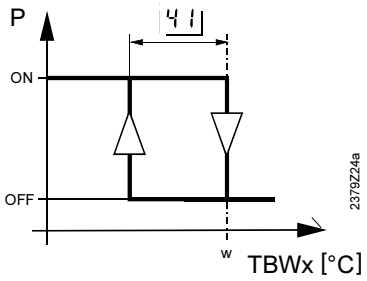


Legend

TBWx	Actual value of d.h.w. temperature
TBWw	D.h.w temperature setpoint
SDBW	Switching differential of d.h.w.
ON	Switch-on point
OFF	Switch-off point
t	Time
P	Pump

Switching differential

D.h.w. ON:	TBWx	=	TBWw - SDBW
D.h.w. OFF:	TBWx	=	TBWw



TBWx	Actual value of d.h.w. temperature
TBWw	D.h.w temperature setpoint
SDBW	Switching differential of d.h.w. (41)
P	Pump (ON / OFF)
w	Setpoint
△	Switch-on point
▽	Switch-off point

6.1 Legionella function

Benefit

- Potential legionella viruses in the d.h.w. storage tank will be killed at regular intervals.

Description

The legionella function ensures that the d.h.w. in the storage tank will periodically be raised to a temperature of at least 60 °C, thus making certain that potential legionella viruses will be killed.

Setting

1. Press the line selection buttons to select line 42OEM.
2. Press the + / – buttons to activate or deactivate the legionella function.

42

Setting range	*Unit*	*Factory setting*
0 / 1	Increment	1

Effect

The setting activates or deactivates the legionella function.
Entry:

0 OFF: Function not active.

1 ON: The function will be activated every Monday morning when d.h.w. is heated up for the first time and lasts a maximum of 2.5 hours. The d.h.w. is heated up to the adjusted legionella setpoint. Also refer to line 43_{OEM}.

➔ Notes

This function is possible only when d.h.w. heating is released by the d.h.w. heating program.
If the legionella function is aborted during the usual time (on Mondays), it will be repeated the next time the d.h.w. setpoint is changed

6.2 Setpoint of the legionella function

Benefit

- Adjustable temperature level to kill legionella viruses

Description

The setpoint of the legionella function is an adjustable temperature level to which the d.h.w. temperature is raised when the legionella function is activated (also refer to section "Legionella function"). For details, also refer to "Legionella function", line 42_{OEM}.

Setting

1. Press the line selection buttons to select line 43OEM.
2. Press the + / – buttons to adjust the required setpoint.

Setting range	*Unit*	*Factory setting*
8...95	°C	65

Effect

The setting changes the d.h.w. setpoint during the period of time the d.h.w. is heated up as a result of the legionella function.

6.3 Protection against discharging of d.h.w.

Benefit

- Prevents inadvertent discharging of the d.h.w. storage tank via the heating system

Description

Prevents inadvertent discharging of the d.h.w. storage tank by cold water from the heating circuit.

Setting

1. Press the line selection buttons to select line 44OEM.
2. Press the + / - buttons to activate or deactivate the protection against discharging.

Setting range	*Unit*	*Factory setting*
0...2	-	2

Effect

The setting activates or deactivates the protection against discharging:

0 Protection against discharging is **not** active

1 Protection against discharging is **active**
Continuous protection with released or logged heat generation based on the actual value of flow sensor B10, boiler sensor B2 or of the buffer storage tank.

2 Protection against discharging is **active** only when heat generation is locked
Protection only either when heat generation is logged based on comparison between flow sensor B2 and buffer storage tank or

in the case of heat generation lock via contact H and when there is no buffer storage tank sensor based on B10 or B2.

When protection against discharging of the d.h.w. is active, the boost of the flow temperature (operating line 126) is checked during the heating cycle:

- If at least half the boost value is reached, d.h.w. heating will be **released**
- If the boost value is less than 1/8 of the value set, d.h.w. heating will **not** be released

➔ Note

Setting 1 may be used only if the cascade return temperature sensor is connected.

6.4 Cascade management strategy

Benefit

- Selection of required type of lead boiler operation.

Combination with optimum running time strategy.

Description

For the plant configuration used, this setting represents an optimum combination of lead boiler operation and running time strategy.

Setting

1. Press the line selection buttons to select line 50OEM.
2. Press the + / - buttons to select the required combination of lead boiler operation and running time strategy.

Setting range	*Unit*	*Factory setting*
1...6	1	2

There is a total of 2 types of lead boiler operation and three running time strategies available. The 6 combinations are assigned as follows:

Einstellung (Kombination)	*type of lead boiler operation*	*running time trategyrunning*
1	autonomous	1
2	autonomous	2
3	autonomous	3
4	linked	1
5 (Standard setting)	linked	2
6	linked	3

➔ Note

Proceed as follows to make the required setting:
- First, determine the required type of lead boiler operation
- Determine the required running time strategy
- Use the above table to choose the setting required for your application

6.4.1 Type of lead boiler operation

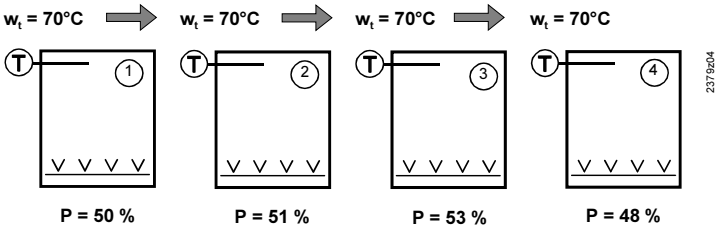
General

The type of lead boiler operation describes the way the individual boilers in the cascade are controlled.

Autonomous:

The RVA47.320 delivers a boiler temperature setpoint to the BMUs.
The released BMUs then control their output autonomously between 0 and 100 % in order to reach the preset boiler temperature setpoint.

Example:



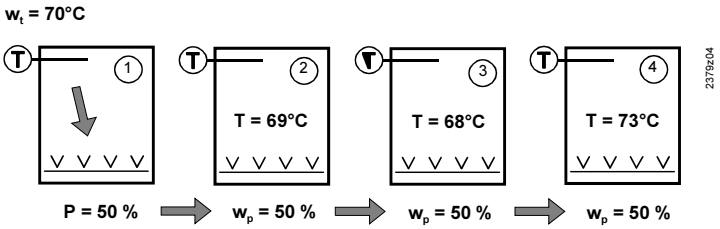
w_t = Boiler temperature setpoint = Actual output

It is thus possible that individual boilers will be operated outside their output range. The average actual output is within the defined output range, however (for exceptions, refer to lines 51 and 52).

linked:

A differentiation is made between lead boiler and lag boilers. The RVA47.320 delivers a temperature setpoint to the lead boiler, which translates it into output. The lag boilers take this output as maximum limitation of output, thus following the lead boiler.

Example:



w_t = Boiler temperature setpoint for lead boiler
w_p = Nominal output setpoint for BMUs 1 - 4
P = Actual output
T = Actual temperature

This means that all boilers will be operated within the defined output range (for exceptions, refer to pages 14 and 132).

➔ Note

In the case of linked lead boiler operation, the controller considers the ratio of the nominal BMU outputs and matches the speed of lag boiler operation accordingly.

6.4.2 Running time strategies

General

The running time strategy defines the criteria for the switching on / off of the lag boilers. It is determined by the following parameters:

- Nominal output of BMU 1 - 4 — See line 91 -94
- Entry of minimum limit of output range (Pmin) — See line 10_{OEM}
- Entry of maximum limit of output range (Pmax) — See line 52_{OEM}

The RVA47.320 initiates changeover only when it leads to a valid operational status while taking the above parameters into consideration.

➔ Notes

The following parameters also have an impact on the function:

- Delayed switching on of BMU — see line 133
- Restart lock for BMU — see line 134

For stability reasons, each BMU added to the cascade first runs on the basic stage for about one minute on completion of which it will be released for modulating control to deliver the output required.

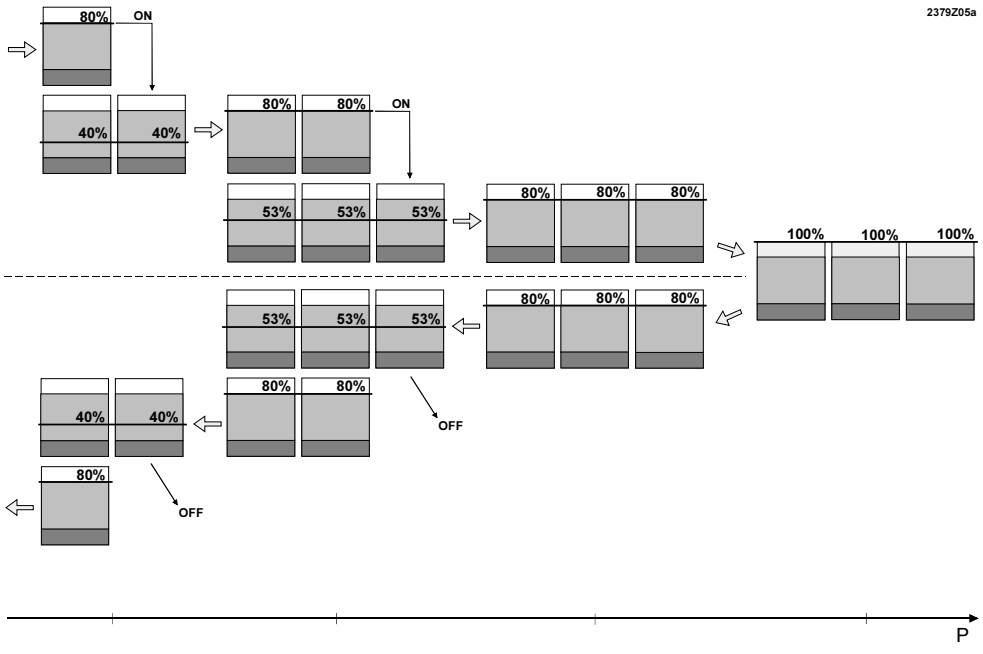
➔ Important

The running time strategies described below become active only when the flow temperature setpoint is reached. During the heating up time (e.g. after night setback), the boilers required are run up to the maximum released output as quickly as possible (short heating up time).

Strategy 1:

Additional boilers are switched on as late as possible and switched off again as early as possible. Hence, the aim is to have the **smallest possible number of boilers in operation**, or to obtain short running times for additional boilers.

Example of three boilers with an output range of 20 - 80 %:



⇨ = increase in output

⇦ = decrease in output

↴ = Switching onZuschaltung

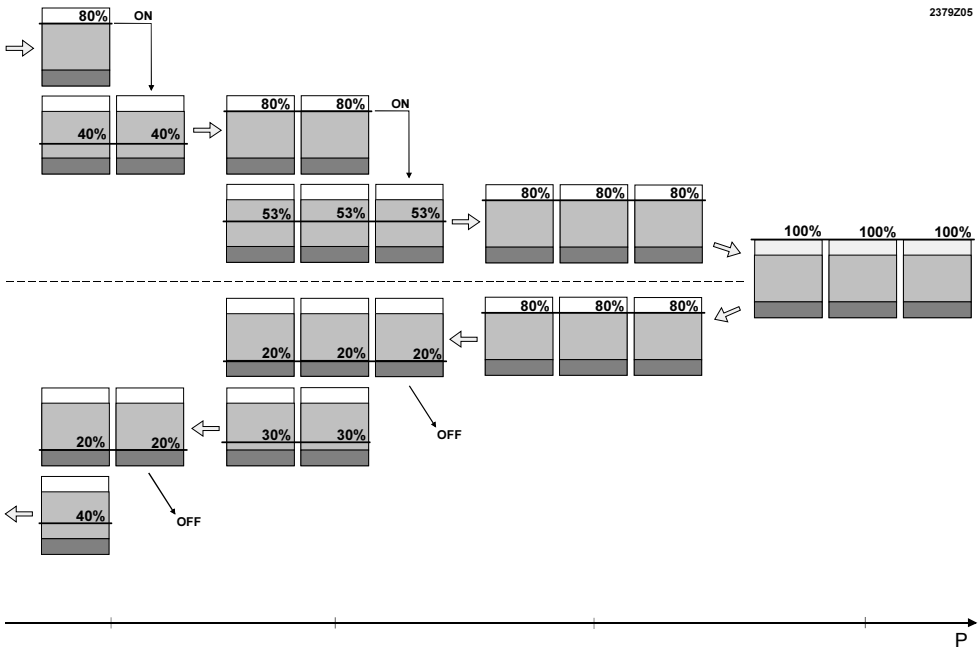
↘ = Switching offWegschaltung

P = OutputLeistung

Strategy 2:

Additional boilers are switched on as late as possible and switched off again as late as possible. Hence, the aim is to obtain the **smallest possible number of switching on / off cycles** for the boilers.

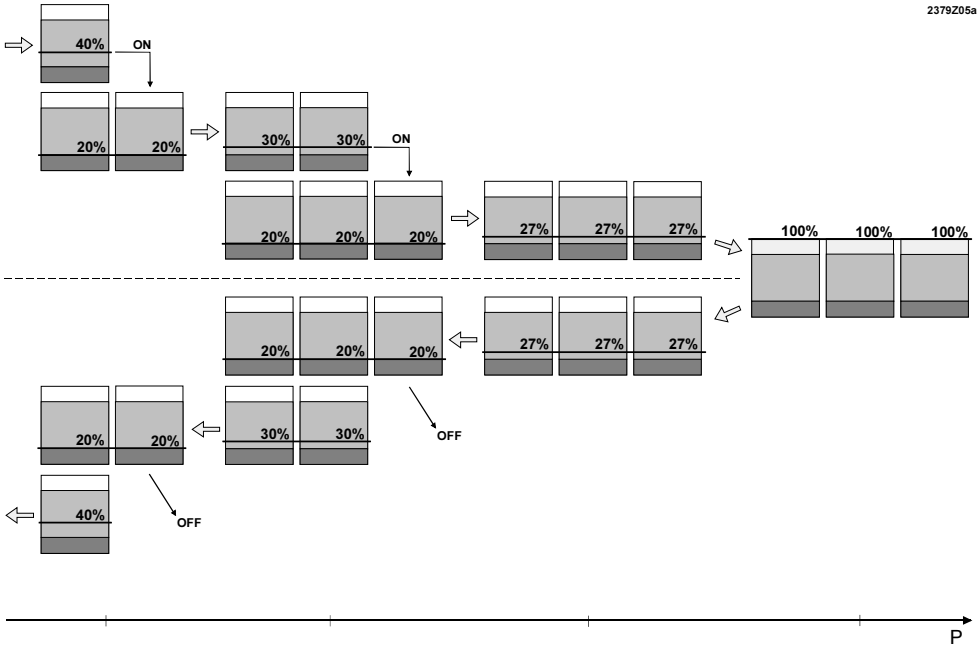
Example of three boilers with an output range of 20 - 80 %:



Strategy 3:

Additional boilers are switched on as early as possible and switched off as late as possible. Hence, the aim is to have the **highest possible number of boilers in operation**, or to obtain long running times for additional boilers.

Example of three boilers with an output range of 20 - 80 %:



⇨ = increase in output ⇩ = Switching on

⇦ = decrease in output ↘ = Switching off

P = Output

6.5 Lower limit of output range (Pmin)

Benefit

- The minimum output of the boilers controlled by the BMUs can be defined.

Description

Defines the minimum limit of the optimum output range used by the BMUs.

Setting

1. Press the line selection buttons to select line 51OEM.
2. Press the + / - buttons to set the minimum limitation of the output.

51

Setting range	*Unit*	*Factory setting*
5...Pmax	%	40

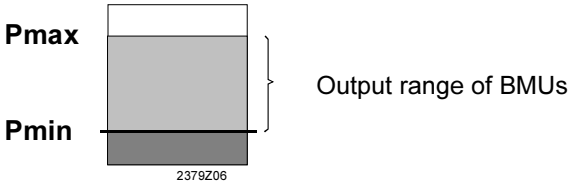
Pmax. = upper limit of output range (operating line 52)

➔ Note

Typically, the set minimum limitation of the output lies above the lowest basic stage of all BMUs. A lower setting causes several BMUs to cycle Do not use lower settings without having tested them in practical operation.

Effect

The setting defines the minimum limit of the output range within which the BMUs are controlled. The value is used as the switch-on or switch-off criterion according to the selected running time strategy (refer to page 129).



The minimum limit of the output range is crossed only in exceptional cases, e.g. when the setting of the value is too high, or when, due tot he BMUs' output ratio, an invalid operational status would result after changeover.

6.6 Upper limit of output range (Pmax)

Benefit

- The maximum output of the BMUs can be defined.

Description

Defines the maximum limit of the optimum output range used by the BMUs.

Setting

1. Press the line selection buttons to select operating line 52OEM.
2. Press the + / - buttons to set the maximum limitation of the output.

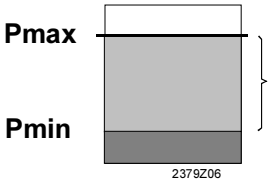
52

Setting range	*Unit*	*Factory setting*
Pmin...100	%	90

Pmin. = minimum limit of output range (operating line 51)

Effect

The setting defines the maximum limit of the output range within which the BMUs are controlled. The value is used as the switch-on or switch-off criterion according to the selected running time strategy (refer to page 129).



Output range of BMUs

The maximum limit of the output range (when <100 %) is crossed only when all available BMUs run at Pmax and there is still demand for heat.
Otherwise, crossing only takes place in exceptional cases, e.g. when the setting of the value is too low, or when, due to the BMUs output ratio, an invalid operational status would result after changeover.
When using a setting of 100 %, the value will of course never be exceeded.

6.7 Mandatory time on basic stage

Benefit

- The minimum running time on the basic stage can be defined

Description

This function allows the minimum running time on the basic stage to be set. This enables the controller to operate smoothly even if BMUs of very high capacity are used.

Setting

1. Press the line selection buttons to select operating line 56OEM.
2. Press the + / - buttons to adjust the mandatory time on the basic stage.

56

Setting range	*Unit*	*Factory setting*
10...1200	s	60

Effect

When started up, each BMU is operated on the basic stage for the period of time adjusted here. The BMU will be released for modulation only when this time has elapsed. This period of time enables the controller to analyse the current operational status and then plan the next steps.

➔ Note

When using heat generating equipment of very high capacity, the longer time leads to a more stable (slower) operating performance.

6.8 Minimum temperature differential at the pressureless header

Benefit

- Detection of a too high flow rate on the heat generation side.

Avoiding excessive return temperatures.

Description

An excessive flow rate on the heat generation side and the resulting increase of the return temperature is quickly detected and, if necessary, offset by shutting down one of the BMUs.

Setting

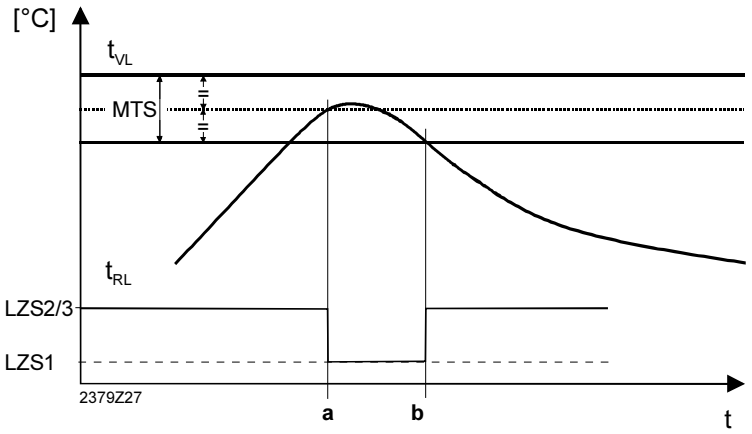
1. Press the line selection buttons to select line 60OEM.
2. Press the + / - buttons to set the minimum temperature differential.

60

Setting range	*Unit*	*Factory setting*
0...20	K (°C)	4

Effect

The minimum temperature differential at the pressureless header prevents the return temperature from exceeding a certain level.
The setting is only active when running time strategy 2 or 3 is selected (see page 35).
With running time strategy 1, the function is inactive.
When the return temperature rises to a level which is half a switching differential (MTS/2) below the flow temperature (point a), the selected running time strategy 2 or 3 is switched over to running time strategy 1. This means that one of the BMUs is shut down as soon as possible.
If the return temperature moves away from the flow temperature by one full switching differential MTS (point b), changeover is cancelled again. This means that running time strategy 1 switches back to the previous running time strategy 2 or 3.



t_{VL} Cascade flow temperature (B10)
t_{RL} Cascade return temperature (B70)
MTS Minimum temperature differential at the pressureless header
LZS1-3 Running time strategy 1 - 3
a / b Changeover points of running time strategy

6.9 Continuous display

Benefit

- Selection of value for the continuous display.

Description

Determines to kind of information to appear on the continuous display.

Setting

1. Press the line selection buttons to select operating line 90_{OEM}.
2. Press the + / - buttons to select the required continuous display.

90

Setting range	*Unit*	*Factory setting*
0 / 1	-	0

Effect

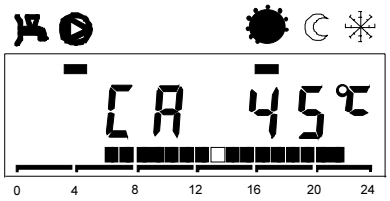
This setting changes the continuous display of the device. It appears when no operating line is selected.

0 Day / time of day
The continuous display shows the weekday (1...7 = Mo...Su) and the time of day.

1 Cascade flow temperature sensor (common flow temperature sensor)
The continuous display shows the temperature measured with the cascade flow temperature sensor (B10)

➔ Caution!

When connecting several BMUs to the controller, the continuous display always shows the cascade flow temperature. In that case, setting 0 can be no longer selected.



6.10 Software version

Benefit

- Straightforward display of software version used, without removing the controller

Description

The software version installed represents the state of the software available at the time the controller was produced.

Setting

1. Press the line selection buttons to select line 91_{OEM}.
2. No setting can be made with the + / - buttons.

Display	*Unit*
00.0 ... 99.9	Digits

Effect

The software version will automatically be displayed on this line.
Example: 01.0
The first 2 digits give the software version (01.)
The third digit gives the software revision (.0)

6.11 Device operating hours

Benefit

- Display of the number of device operating hours

Description

Here, you can read the number of hours the controller has been in operation

Setting

1. Press the line selection buttons to select operating line 92_{OEM}.
2. No setting can be made with the + / - buttons.

Display	*Unit*
0... 500‘000	h

Effect

The number of operating hours since the controller was first commissioned will automatically be displayed on this line.
The hours considered as operating hours are those during which power was supplied to the controller, that is, including the periods of time with no effective heating operation.
The number of operating hours cannot be reset.

7 Functions with no settings

Introduction

The functions described below require no settings. They are performed automatically but have an impact on the plant.
For the rectification of faults, planning and plant maintenance, it may therefore be very advantageous to know about their impact on plant operation.

7.1 Chimney sweep

Benefit

- Produces the operational status required for flue gas measurements.

Description

No chimney sweep function can be triggered on the controller itself. the chimney sweep function is activated directly on the respective BMU.

Effect

As soon as the chimney sweep function is triggered on one of the BMUs of the cascade, the BMU transmits the signal to the controller, which shuts down all other BMUs. The controller allows the boiler temperature to rise to a level of 64 °C, which is required to make flue gas measurements, then maintaining that temperature level by enforcing heat consumption of both the heating circuits and d.h.w.
This action is independent of whether a lead or lag boiler is involved.
By deactivating the chimney sweep function on the BMU, or on completion of a period of time to be adjusted on the BMU, the controller returns to its initial operational status.

➔ Note

For information about the activation of the chimney sweep function and other information, refer to the technical documentation of the type of BMU used.

7.2 Generating the boiler temperature setpoint

Benefit

- Demand-dependent control of the burner

Description

The various heating circuits require different flow temperature setpoints depending on the demand for heat. However, since boiler temperature control can consider only one setpoint, a selection is made.

Process

Generally, the demand for the highest setpoint required by a consumer (e.g. by a heating circuit) generates the current boiler temperature setpoint.
The setpoint requirements considered stem from both controller-internal setpoints (heating circuit or input H1) and setpoints transmitted via LPB.
Auxiliary functions, such as setpoint boosts and the like, are included in the setpoints actually demanded at the time.

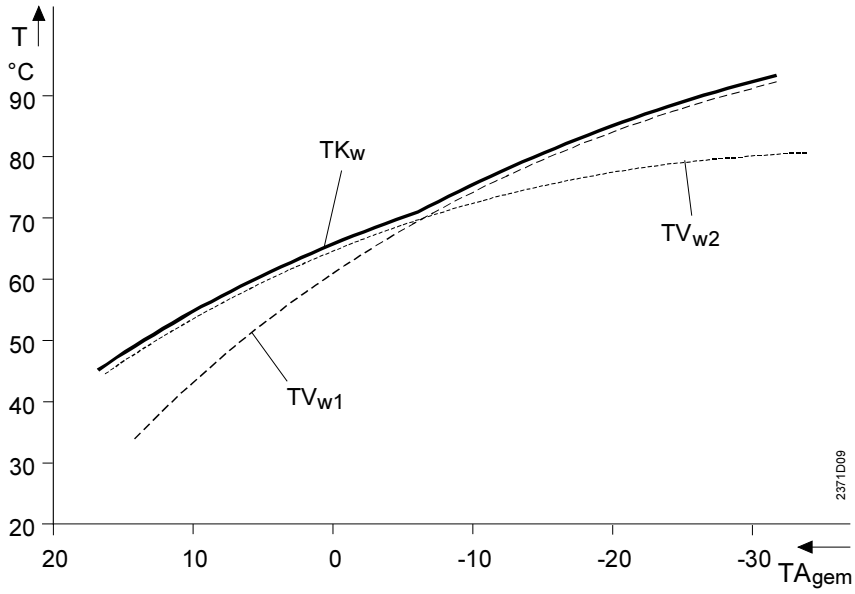
Exception

A demand for d.h.w. has priority over all other setpoint requirements, which means that the required d.h.w. setpoint will be maintained, even if it is lower than that called for by a heating circuit.

Effect

The boiler temperature is maintained at the highest setpoint currently demanded - unless d.h.w. is required.

Example



TKw Boiler temperature setpoint
TVw1 Flow temperature setpoint of the controller-internal heating circuit (incl. setpoint boost if any)
TVw2 Flow temperature setpoint of a controller-external heating circuit (incl. setpoint boost if any)

7.3 Automatic 24-hour heating limit

Benefit

Automatic shutdown of heating.
Saving energy without sacrificing comfort.

Description

This is a fast-acting savings function since the heating is switched off when there is no more demand for heat. Economical operation is ensured throughout the year, especially during intermediate seasons. Manual switching off is no longer required.

Notes

The automatic 24-hour heating limit does not function in continuous operation
The display shows the automatic 24-hour heating limit as ”ECO”

7.3.1 Without room influence

Introduction

If **no** room unit is connected, the room temperature setpoint will **not** be readjusted by the room influence. In that case, the automatic 24-hour heating limit operates according to the selected setpoint of or .

Process

The temperature basis used for this process are the values of the flow temperature setpoint and the current room temperature setpoint.

Switching off

If the flow temperature setpoint falls below the room temperature setpoint plus a correction value, the heating will be switched off.

Heating OFF:

TVw	=	TRw +2 S/10

Switching on

If the flow temperature setpoint exceeds the room temperature setpoint plus a correction value, the heating will be switched on.

Heating's switch-on point:

$$TVw = TRw + 4\ S/10$$

TVw Flow temperature setpoint
TRw Room temperature setpoint
s Slope of the heating curve

7.3.2 With room influence

Introduction

The automatic 24-hour heating limit operates depending on the current flow temperature setpoint. If a room unit is connected, the room influence continuously readjusts the flow temperature setpoint.
This means that the automatic 24-hour heating limit differs when room influence is used.

Process

The temperature basis used for this process are the values of the flow temperature setpoint and the current room temperature setpoint.

Switching off

If the flow temperature setpoint corrected by the room influence falls below the room temperature setpoint plus a correction value, the heating will be switched off.

- Heating's switch-off point:

$$TVwk \leq TRw + 2\frac{S}{10} - \frac{31OEM}{16}$$

Switching on

If the flow temperature setpoint corrected by the room influence exceeds the room temperature setpoint plus a correction factor, the heating will be switched on.

- Heating's switch-on point:

$$TVwk \geq TRw + 4\frac{S}{10} - \frac{31OEM}{16}$$

TVwk Flow temperature setpoint corrected by the room temperature
TRw Room temperature setpoint
s Slope of the heating curve

7.4 Quick setback with room sensor

Benefit

- Making use of the building's thermal storage capacity.

Description

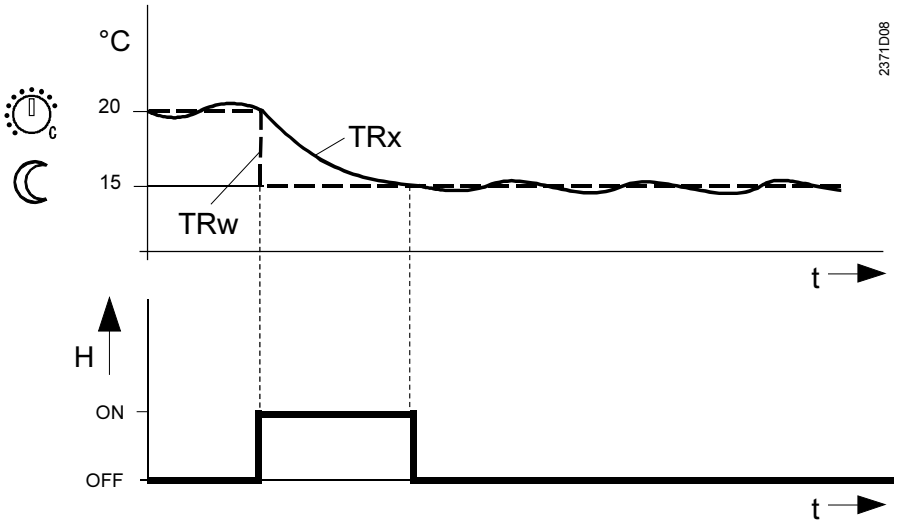
Quick setback is dependent on whether or not a room temperature sensor is used. A differentiation must therefore be made between quick setback with or without room sensor.

➔ Important

This process has an impact only when a room temperature sensor is used.

Process

Quick setback is started as soon as a change to a lower room temperature setpoint takes place (e.g. switching times in automatic mode).
Quick setback is terminated as soon as the actual room temperature reaches the level of the respective room temperature setpoint (TRx = TRw).



TRx Actual value of the room temperature
TRw Room temperature setpoint
H Quick setback

Effect

During quick setback, the heating circuit pump will be deactivated and there will be no demand for heat. This means that the room temperature falls quicker since the supply of heat from the flow or boiler is cut off.

Exception Due to frost protection for the plant, the heating circuit pump can be activated however in spite of quick setback.

➔ Note

If no room sensor is connected, quick setback will not be accomplished through this process. For details, refer to section "Quick setback constant", operating line 31_{OEM}.

7.5 D.h.w. push

Benefit

- Availability of d.h.w. is also ensured during non-occupancy times.

Description

If, due to unexpected demand, the d.h.w. storage tank is emptied, the d.h.w. push provides one-time charging of the storage tank until the nominal d.h.w. temperature setpoint is reached.

Process

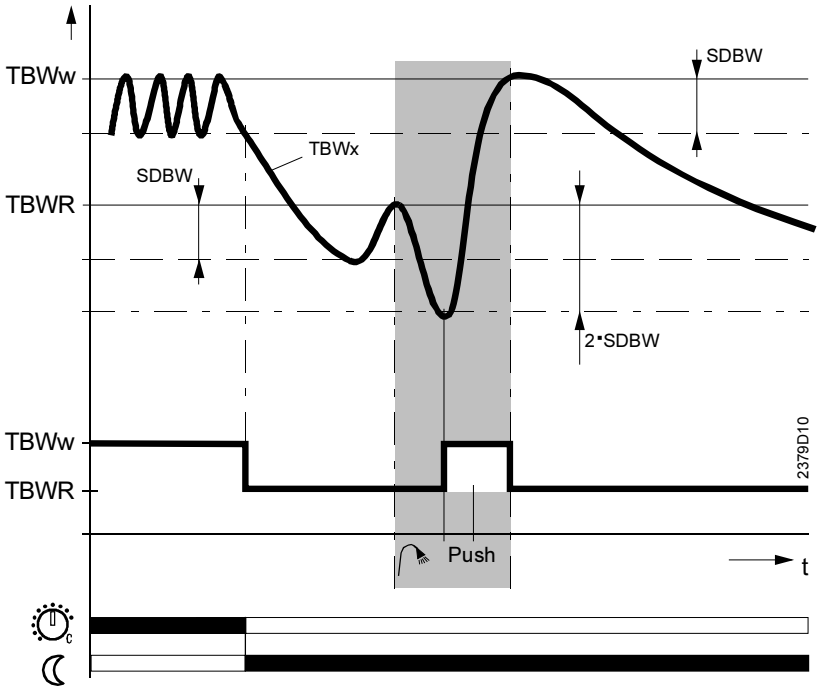
The d.h.w. push is triggered as soon as the actual d.h.w. temperature falls below the reduced d.h.w. setpoint (line 120) by more than twice the switching differential (line 41OEM).

TBWx < TBWR - 2 SDBW

Effect

When the d.h.w. push is triggered, the storage tank is charged once until the nominal d.h.w. temperature setpoint (operating line 13) is reached.
Then, normal operation according to the d.h.w. heating program is resumed.

Example



SDBW Switching differential d.h.w.
TBWw Nominal d.h.w. temperature setpoint
TBWR Reduced setpoint of the d.h.w. temperature

7.6 Pump kick

Benefit

- No seizing of pumps

Description

The pump kick is a protective function aimed at preventing the pumps from seizing.

Process

Every Friday at 10:00 h, the pumps connected directly to the RVA47.320 are activated for 30 seconds, one by one at an interval of one minute.

The pump kick is activated without giving consideration to any of the other functions.

Effect

During the periods of time pump kick is activated, the water circulates. The mechanical parts of the pumps will be purged, thus preventing the pumps from seizing.

➔ Note

The kick of the d.h.w. pump is the last pump kick made in order to prevent the transfer of heat from the d.h.w. storage tank to the heating system.

7.7 Protection against discharging after d.h.w. heating

Benefit

- Inadvertent discharging of the d.h.w. storage tank will be prevented

Description

The ”Protection against discharging after d.h.w. heating” prevents inadvertent discharging of the d.h.w. storage tank resulting from the pump overrun. Together with ”Protection against discharging during d.h.w. heating” (operating line 44_{OEM}), efficient protection against discharging is thus ensured.

Process

The controller compares the storage tank temperature with the cascade flow temperature (common flow temperature) or, in certain situations, with the boiler temperature.
If the cascade temperature (or the boiler temperature) is lower than the storage tank temperature, pump overrun will be stopped prematurely.

7.8 Overview of pump operation

Benefit

- Straightforward checking of proper functioning of the various pumps.

Description

Operation of the various pumps depends on a number of factors. To enable you to quickly understand the different interrelationships when commissioning and checking the plant, please make use of the list below. It provides information about the setting combinations (pump settings / demand for heat) at which a pump runs (the meaning of the different pump settings is defined on operating line 95).

Pumps Settings	*Demand for heat*		
	via HC:	*Input H1*	*via d.h.w.:*
Q1 ***Setting 1***	Pump runs when there is demand for heat	Pump does not run	Pump does not run
Q1 ***Setting 2***	* Pump runs when there is demand for heat	Pump runs when there is demand for heat	Pump does not run
Q1 ***Setting 3***	* Pump runs when there is demand for heat	Pump runs when there is demand for heat	* Pump runs when there is demand for heat
Q1 ***Setting 4***	No influence from type of heat demand. Pump runs according to the settings made on operating line 122.		
Q1 ***Setting 5***	Pump does not run	Pump runs when there is demand for heat	Pump does not run
Q3 ***Setting 1***	Pump does not run	Pump does not run	Pump runs when there is demand for heat

* = the pump also runs when the demand for heat comes from another controller integrated via LPB

When there is no more demand for heat, the pumps in operation overrun for the period of time set on line ”Pump overrun time” (8_{OEM}), with the exception of the d.h.w. circulating pump, Q1 setting 4.

There are situations, however, where the pumps (with the exception of pump H1, Q1 setting 5) do not run, for example with:

- Summer / winter changeover
- 24-hour heating limit
- Quick setback
- Room temperature limitation by room sensor

7.9 Frost protection

Benefit

- Ensures that the boiler and d.h.w. temperature will not fall below a certain level

➔ Note

In addition to the frost protection modes described here, frost protection for the building and frost protection for the plant, whose parameters can be set, are also active. For details, refer to the description given on lines 15 and 33 $_{OEM}$.

7.9.1 For the boiler

The frost protection function for the boilers is integrated in the BMUs. For detailed information, refer to the technical documentation of the product used.
For details, refer to the documentation of the relevant product.

7.9.2 For the d.h.w.

Description

Frost protection for the d.h.w. prevents freeze-ups of the d.h.w. storage tank that is connected directly to the RVA47.320. Whenever the d.h.w. temperature drops excessively, forced charging will be initiated.

Process

If...	*then...*
the actual value of the d.h.w. temperature falls below 5 °C... (TBWx < 5 °C)	... the frost protection function for the d.h.w. becomes **active**
the actual value of the d.h.w. temperature exceeds 5 °C by more than one d.h.w. switching differential (line 41$_{OEM}$)... (TBWx > 5 °C + SDBW)	... the frost protection function for d.h.w. will be **terminated**

➔ Notes

- The frost protection setpoint for the d.h.w. is factory-set at 5 °C and cannot be changed
- Pump overrun will be activated when d.h.w. heating is terminated.

➔ Important

- The frost protection function only acts on a d.h.w. storage tank connected directly to the RVA47.320. In the case of plant types with d.h.w. heating via BMU, this function must be provided by the BMU.

- The frost protection function is only active when using a temperature sensor. If the d.h.w. is heated with the help of a control thermostat, no frost protection function is possible because there is no actual value of the storage tank temperature.

8 Application examples

General

The RVA47.320 can control up to four modulating gas-fired heating boilers. For this purpose, the boilers must be equipped with an appropriate BMU which controls the boiler temperature.
In the controller's internal cascade circuit, the RVA47.320 determines the order the individual BMUs are switched on and off based on the output balance. The boilers are thus switched on and off temperature over- or undershoot. The individual boilers are controlled by the respective BMUs.

Furthermore, the controller can ensure the coordination of additional boiler controllers of a cascade (cascade master function).
D.h.w. heating is provided either directly by the RVA47.320 or by one of the BMUs based on the values adjusted on the RVA47.320.

- The RVA47.320 accepts and handles heat demand signals of additional controllers connected to the LPB, and of controllers delivering their signals via input H1.

➔ Note

On the consumer side, the plant can be extended to include up to 16 controllers without an additional bus power supply, and up to 40 controllers when using a central bus power supply (also refer to Basic Documentation LPB System Engineering, reference number CE1P2370E).
On the heat generation side, additional RVA47.320 or RVA43.222 can be used to build up a cascade of up to 16 heat sources (modulating, multi-stage or mixed).

Hydraulic circuit

Where shown, the applications require proper hydraulic decoupling between heat generation and heat consumption since the volumetric flows on both sides vary and are different from one another. The simplest hydraulic decoupling method is the use of a sufficiently large pressureless header (bypass, hydraulic decoupler; about two to three nominal sizes larger than the header of the boiler circuit).
With plant types using no boiler pump, a flow switch is required to ensure the flow of water through the boiler.
When using heating boilers with a speed controlled pump, the pump must be set to a fixed speed.

➔ Important

When designing the plant, it should be made certain that the volumetric flows on the heat generation and heat consumption side at nominal output are about the same.

outside temperature sensor

The outside sensor can be connected either directly to the RVA47.320 or to one of the BMUs to transmit its value to the controller via the PPS, but it can also be connected to some other LPB capable controller to transmit its value to the other LPB capable controllers via the LPB. But it can be connected to some other LPB-compatible controller to transmit its value via LPB to the other LPB-compatible controllers.
We recommend to connecte it directly to the RVA47.320.

D.h.w. priority

When using d.h.w. heating with a charging pump, d.h.w. priority is possible only in connection with LPB-compatible controllers. Controllers not suited for use with the LPB cannot be acted upon.

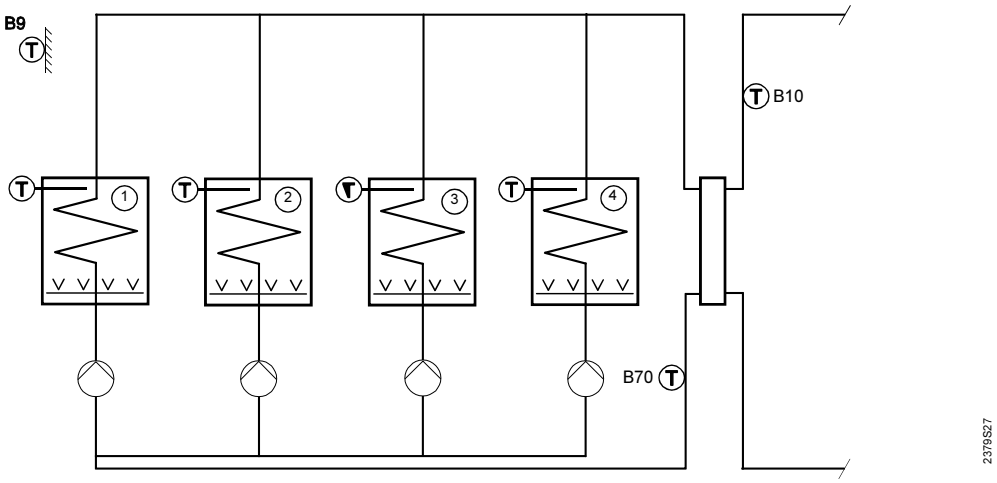
8.1 Plant types RVA47.320 - no. 27

➔ Note

The plant type no. is identical with the number displayed on line 53.

Hydraulic circuit

Control of a single BMU or cascade control of up to four BMUs. No d.h.w. heating via the RVA47.320.



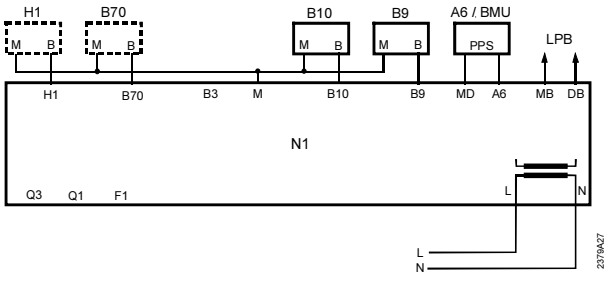
Type of unit	BMU 1	BMU 2	BMU 3	BMU 4	**RVA47.320**
Display of plant type					**27**
Heating curve (line 17)					--- (inactive)
Pump function Q1 (line 95)					1 (heating circuit pump or no pump)

➔ Important

This application requires the heat demand signal from a consumer to release heat generation:

- LPB capable controllers signal the RVA47.320 their current heat demand directly via LPB.
- Controllers not suited for use with the LPB can deliver their heat demand signal via input H1.

Electrical connections



Legend

For a detailed legend, refer to page 158.

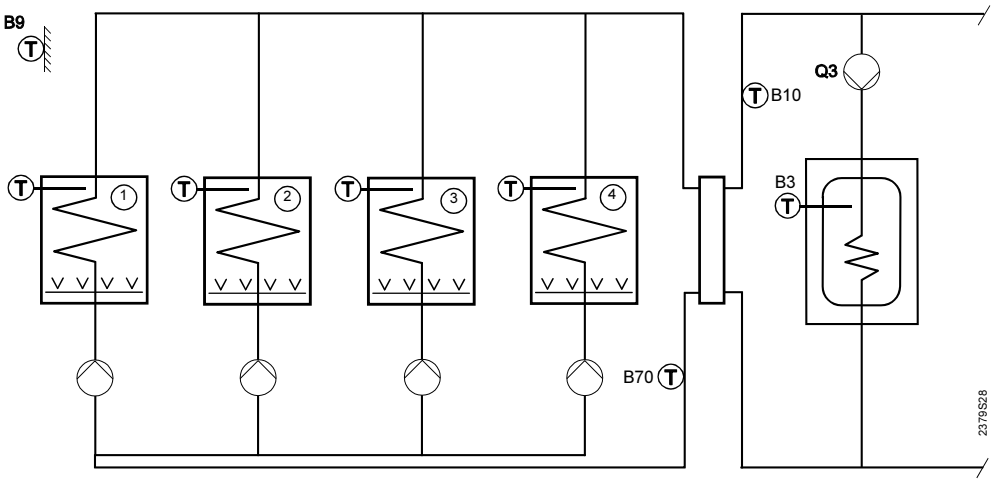
8.2 Plant types RVA47.320 - no. 28

➔ Note

The plant type no. is identical with the number displayed on line 53.

Hydraulic circuit

Control of a single BMU or cascade control of up to four BMUs. D.h.w. heating with charging pump through the RVA47.320.



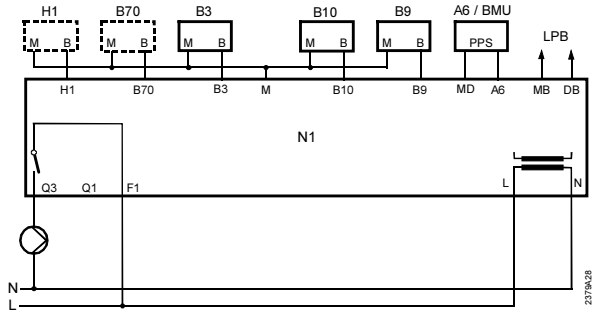
Type of unit	BMU 1	BMU 2	BMU 3	BMU 4	**RVA47.320**
Display of plant type					**28**
Heating curve (line 17)					--- (inactive)
Pump function Q1 (line 95)					1 (heating circuit pump or no

➔ Important

This application requires the heat demand signal from a consumer (or d.h.w. heating) to release heat generation:

- LPB capable controllers signal the RVA47.320 their current heat demand directly via LPB.
- Controllers not suited for use with the LPB can deliver their heat demand signal via input H1.

Electrical connections



Legend

For a detailed legend, refer to page 158.

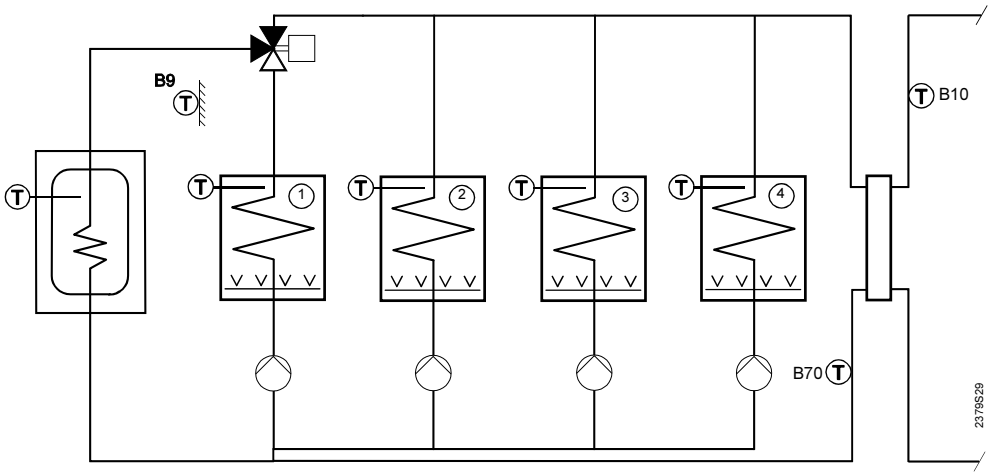
8.3 Plant types RVA47.320 - no. 29

➔ Note

The plant type no. is identical with the number displayed on line 53.

Hydraulic circuit

Control of a single BMU or cascade control of up to four BMUs. D.h.w. heating by <u>one</u> BMU, with changeover valve.



Type of unit Display of plant type Heating curve (line 17) Pump function Q1 (line 95)	BMU 1	BMU 2	BMU 3	BMU 4	**RVA47.320**
					29
					--- (inactive)
					1 (heating circuit pump or no pump)

➔ Important

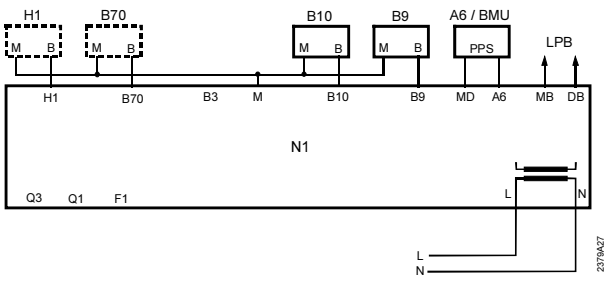
This application requires the heat demand signal from a consumer to release heat generation:

- LPB capable controllers signal the RVA47.320 their current heat demand directly via LPB.
- Controllers not suited for use with the LPB can deliver their heat demand signal via input H1.

➔ Note

A heat demand signal from the d.h.w. storage tank releases only that boiler to which the storage tank is hydraulically connected. The other boilers of the cascade will not be released.

Electrical connections



➔ Note

The d.h.w. sensor (B3) is connected directly to BMU 1.

Legend

For a detailed legend, refer to page 158.

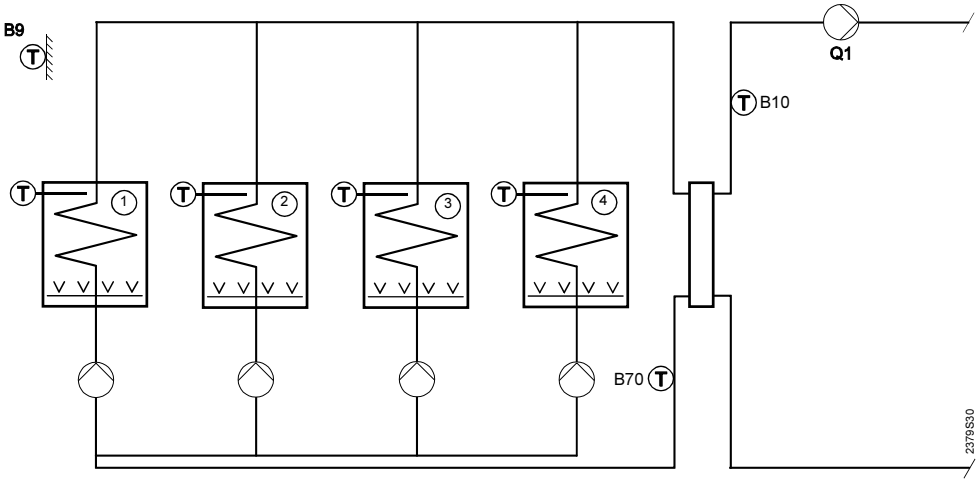
8.4 Plant types RVA47.320 - no. 30

➔ Note

The plant type no. is identical with the number displayed on line 53.

Hydraulic circuit

Control of a single BMU or cascade control of up to four BMUs. System pump for heating circuits connected to the RVA47.320.
No d.h.w. heating via the RVA47.320.



Type of unit	BMU 1	BMU 2	BMU 3	BMU 4	**RVA47.320**
Display of plant type					**30**
Heating curve (line 17)					--- (inactiv) or 2.5...40
Pump function Q1 (line 95)					2 (primary pump for HC only) or 3 (primary pump for HC and d.h.w.)

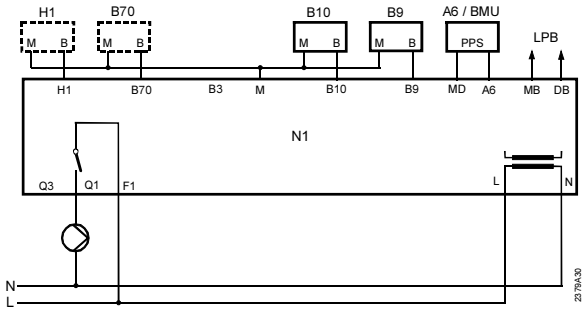
➔ Important

Heat generation is released by the heat demand signal from a consumer:

- LPB capable controllers signal the RVA47.320 their current heat demand directly via LPB.
- Controllers not suited for use with the LPB can deliver their heat demand signal via input H1.

When there is no heat demand signal from the consumers (no LPB capable controllers connected and no possibility to use input H1), the controller itself can generate a weather-compensated flow temperature (adjustment of heating curve with a valid value).

Electrical connections



Legend

For a detailed legend, refer to page 158.

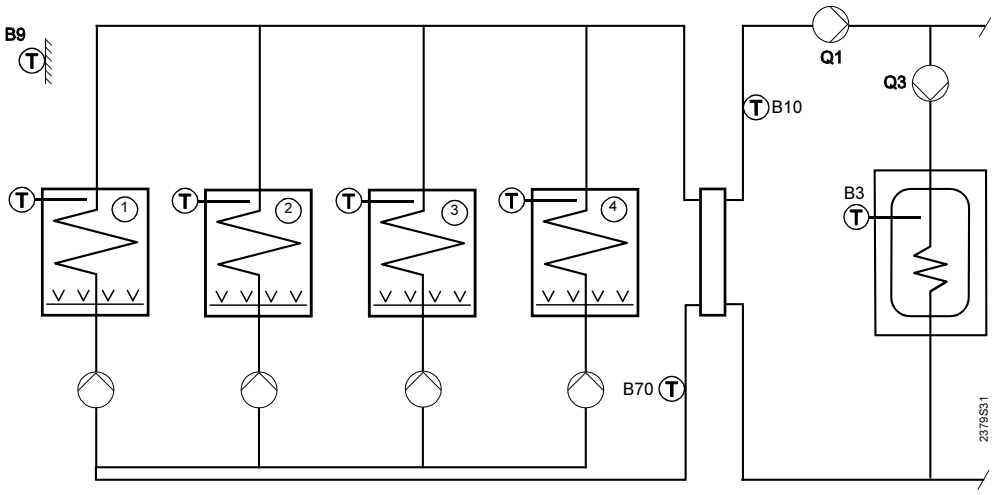
8.5 Plant types RVA47.320 - no. 31

➔ Note

The plant type no. is identical with the number displayed on line 53.

Hydraulic circuit

Control of a single BMU or cascade control of up to four BMUs. D.h.w. heating with charging pump through the RVA47.320.
System pump for heating circuits and d.h.w. heating connected to RVA47.320.



Type of unit	BMU 1	BMU 2	BMU 3	BMU 4	**RVA47.320**
Display of plant type					**31**
Heating curve (line 17)					--- (inactiv) or 2.5...40
Pump function Q1 (line 95)					3 (primary pump for HC and d.h.w.)

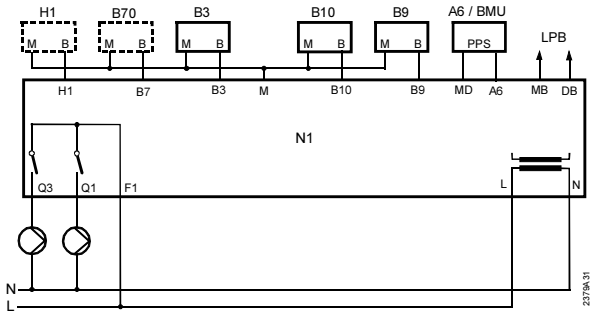
➔ Important

Heat generation is released by the heat demand signal from a consumer (or d.h.w. heating):

- LPB capable controllers signal the RVA47.320 their current heat demand directly via LPB.
- Controllers not suited for use with the LPB can deliver their heat demand signal via input H1.

When there is no heat demand signal from the consumers (no LPB capable controllers connected and no possibility to use input H1), the controller itself can generate a weather-compensated flow temperature (adjustment of heating curve with a valid value).

Electrical connections



Legend

For a detailed legend, refer to page 158.

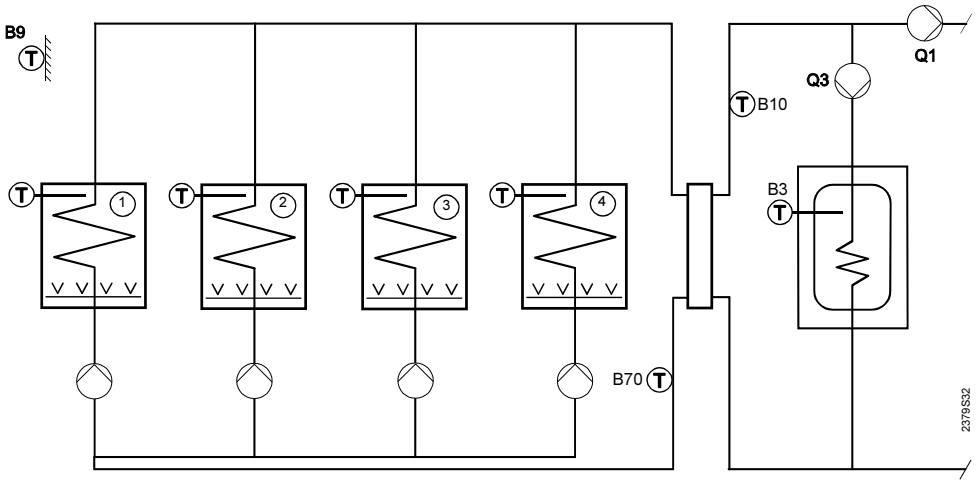
8.6 Plant types RVA47.320 - no. 32

➔ Note

The plant type no. is identical with the number displayed on line 53.

Hydraulic circuit

Control of a single BMU or cascade control of up to four BMUs. D.h.w. heating with charging pump through the RVA47.320.
Primary pump for heating circuits connected to the RVA47.320.



Type of unit	BMU 1	BMU 2	BMU 3	BMU 4	**RVA47.320**
Display of plant type					**32**
Heating curve (line 17)					--- (inactiv) or 2.5...40
Pump function Q1 (line 95)					2 (primary pump for HCs only)

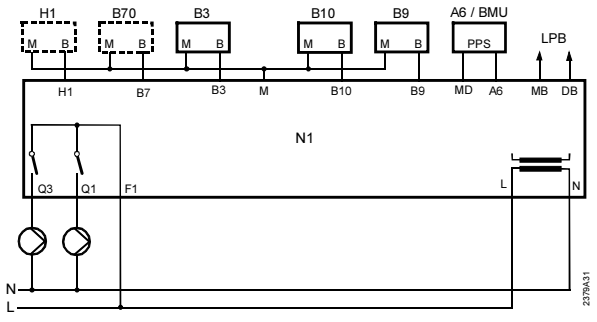
➔ Important

Heat generation is released by the heat demand signal from a consumer (or d.h.w. heating):

- LPB capable controllers signal the RVA47.320 their current heat demand directly via LPB.
- Controllers not suited for use with the LPB can deliver their heat demand signal via input H1.

When there is no heat demand signal from the consumers (no LPB capable controllers connected and no possibility to use input H1), the controller itself can generate a weather-compensated flow temperature (adjustment of heating curve with a valid value).

Electrical connections



Legend

For a detailed legend, refer to page 158.

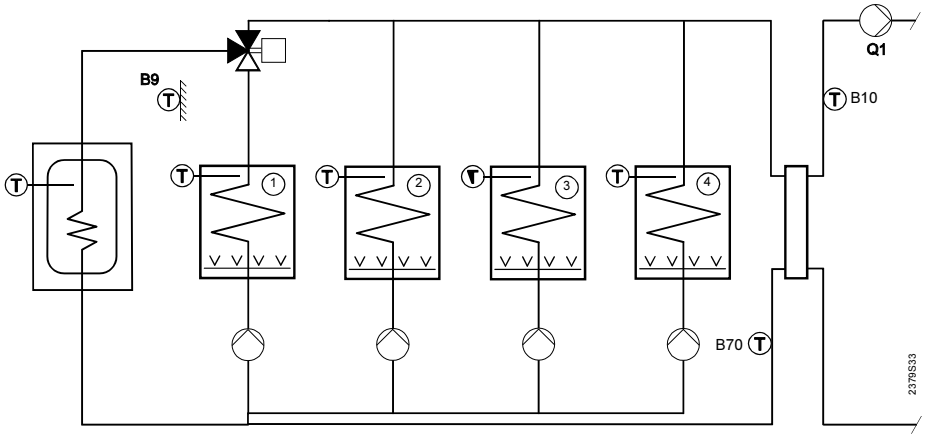
8.7 Plant types RVA47.320 - no. 33

➔ Note

The plant type no. is identical with the number displayed on line 53.

Hydraulic circuit

Control of a single BMU or cascade control of up to four BMUs. D.h.w. heating by one BMU, with changeover valve. System pump for heating circuits connected to the RVA47.320.



Type of unit	BMU 1	BMU 2	BMU 3	BMU 4	**RVA47.320**
Display of plant type					**33**
Heating curve (line 17)					--- (inactiv) or 2.5...40
Pump function Q1 (line 95)					2 (primary pump for HC only)

➔ Important

Heat generation is released by the heat demand signal from a consumer:

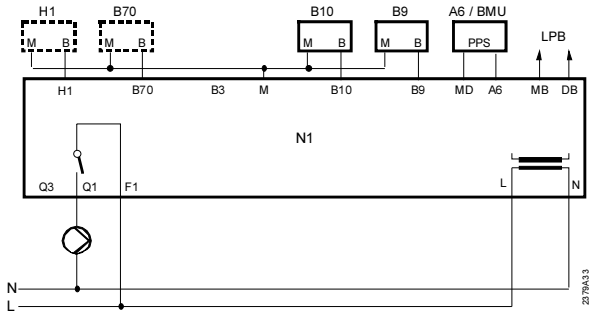
- LPB capable controllers signal the RVA47.320 their current heat demand directly via LPB.
- Controllers not suited for use with the LPB can deliver their heat demand signal via input H1.

When there is no heat demand signal from the consumers (no LPB capable controllers connected and no possibility to use input H1), the controller itself can generate a weather-compensated flow temperature (adjustment of heating curve with a valid value).

➔ Notes

A heat demand signal from the d.h.w. storage tank releases only that boiler to which the storage tank is hydraulically connected. The other boilers of the cascade will not be released.

Electrical connections



➔ Note

The d.h.w. sensor (B3) is connected directly to BMU 1.

Legend

For a detailed legend, refer to page 158.

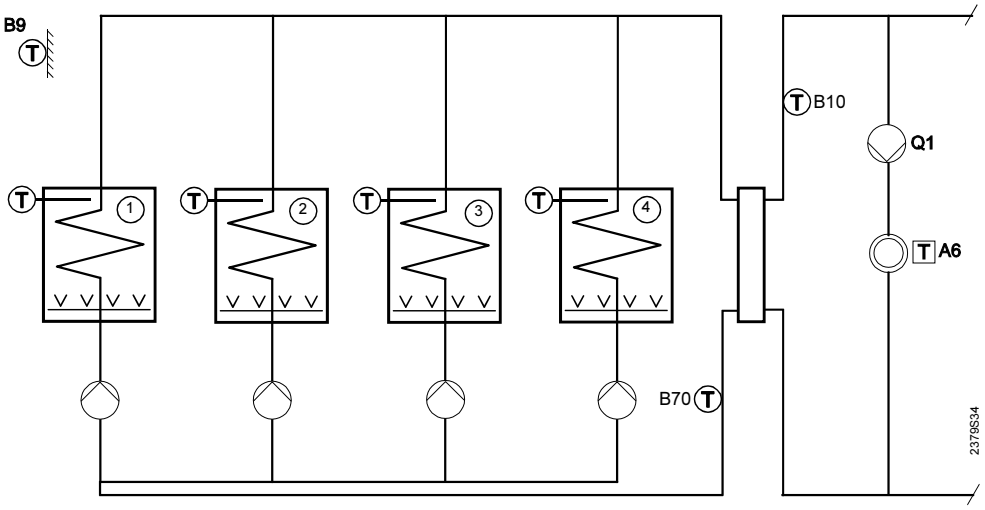
8.8 Plant types RVA47.320 - no. 34

➔ Note

The plant type no. is identical with the number displayed on line 53.

Hydraulic circuit

Control of a single BMU or cascade control of up to four BMUs. Control of pump heating circuit by the RVA47.320.
No d.h.w. heating via the RVA47.320.

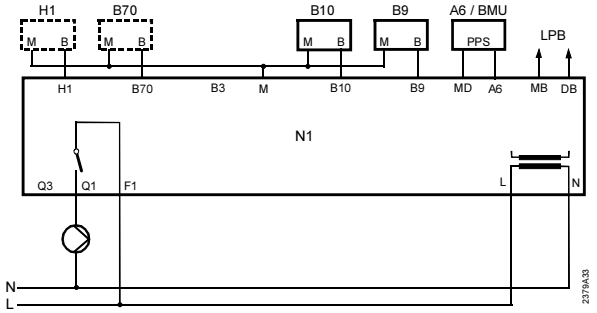


Type of unit	BMU 1	BMU 2	BMU 3	BMU 4	**RVA47.320**
Display of plant type					**34**
Heating curve (line 17)					2.5...40
Pump function Q1 (line 95)					1 (heating circuit pump)

➔ Important

Other LPB capable controllers on the consumer side signal the RVA47.320 their current heat demand directly via LPB.
Controllers not suited for use with the LPB can deliver their heat demand signal via input H1.

Electrical connections



Legend

For a detailed legend, refer to page 158.

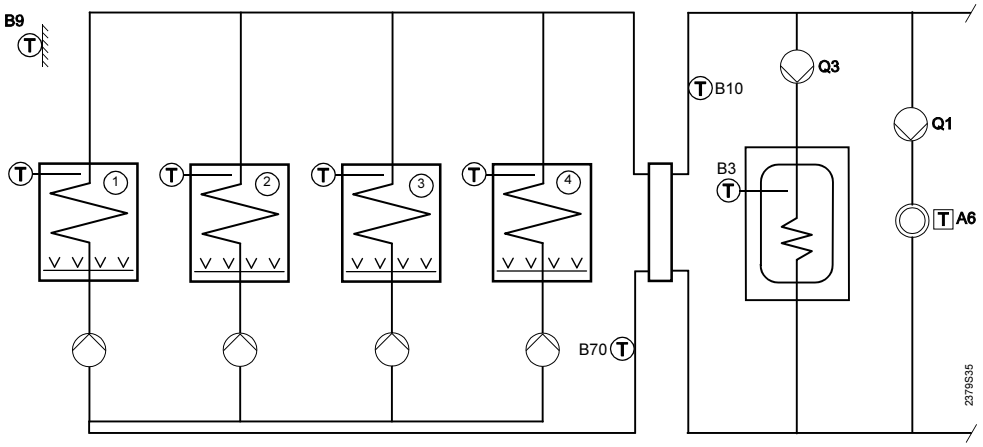
8.9 Plant types RVA47.320 - no. 35

➔ Note

The plant type no. is identical with the number displayed on line 53.

Hydraulic circuit

Control of a single BMU or cascade control of up to four BMUs. Control of the pump heating circuit by the RVA47.320. D.h.w. heating with charging pump by the RVA47.320.

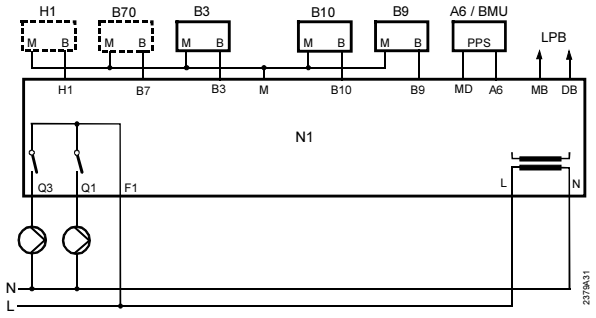


Type of unit	BMU 1	BMU 2	BMU 3	BMU 4	**RVA47.320**
Display of plant type					**35**
Heating curve (line 17)					2.5...40
Pump function Q1 (line 95)					1 (heating circuit pump)

➔ Important

Other LPB capable controllers on the consumer side signal the RVA47.320 their current heat demand directly via LPB.
Controllers not suited for use with the LPB can deliver their heat demand signal via input H1.

Electrical connections



Legend

For a detailed legend, refer to page 158.

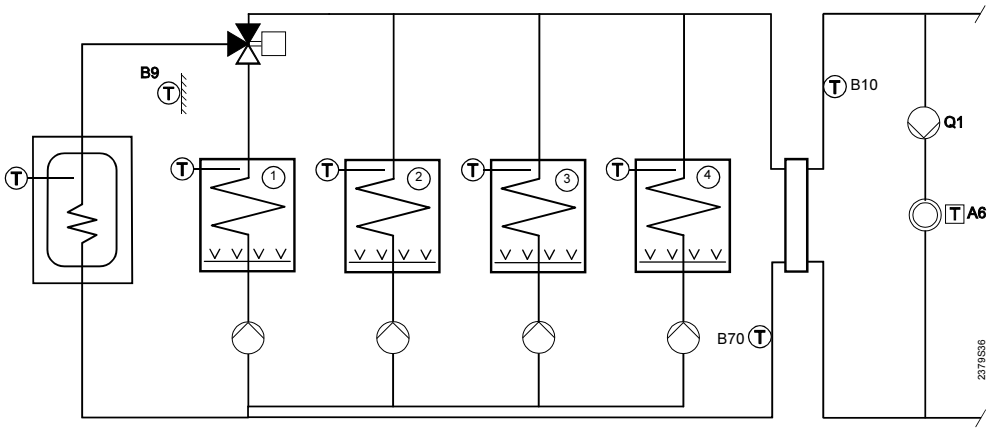
8.10 Plant types RVA47.320 - no. 36

➔ Note

The plant type no. is identical with the number displayed on line 53.

Hydraulic circuit

Control of a single BMU or cascade control of up to four BMUs. D.h.w. heating by one BMU, with changeover valve. Control of pump heating circuit by RVA47.320.



Type of unit	BMU 1	BMU 2	BMU 3	BMU 4	**RVA47.320**
Display of plant type					**36**
Heating curve (line 17)					2.5...40
Pump function Q1 (line 95)					1 (heating circuit pump)

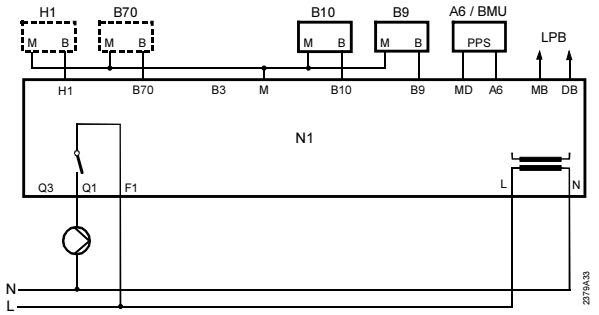
➔ Important

Other LPB capable controllers on the consumer side signal the RVA47.320 their current heat demand directly via LPB.
Controllers not suited for use with the LPB can deliver their heat demand signal via input H1.

➔ Notes

When there is only a heat demand signal from the d.h.w. storage tank (heating circuits do not currently call for heat), the boiler put into operation is only that to which the storage tank is hydraulically connected. The other boilers of the cascade will not be released.

Electrical connections



➔ Note

The d.h.w. sensor (B3) is connected directly to BMU 1.

Legend

For a detailed legend, refer to page 158.

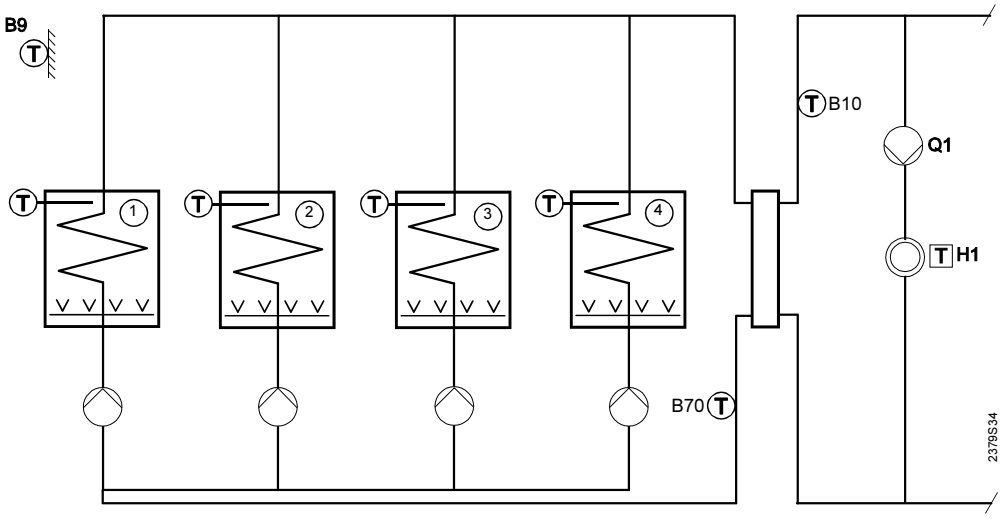
8.11 Plant types RVA47.320 - no. 65

➔ Note

The plant type no. is identical with the number displayed on line 53.

Hydraulic circuit

Control of a single BMU or cascade control of up to four BMUs. Control of the pump heating circuit by the RVA47.320 based on the heat demand signal received via input H1.



Type of unit	BMU 1	BMU 2	BMU 3	BMU 4	**RVA47.320**
Display of plant type					**65**
Heating curve (line 17)					--- (inactive) or 2.5...40
Pump function Q1 (line 95)					5 (pump H1)

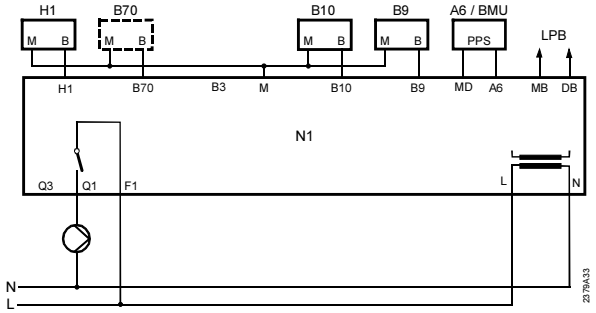
➔ Important

Other LPB capable controllers on the consumer side signal the RVA47.320 their current heat demand directly via LPB.

The heat demand signal for the pump heating circuit is generated via input H1.

In addition, the controller itself can generate a weather-compensated flow temperature (setting the heating curve to a valid value).

Electrical connections



Legend

For a detailed legend, refer to page 158.

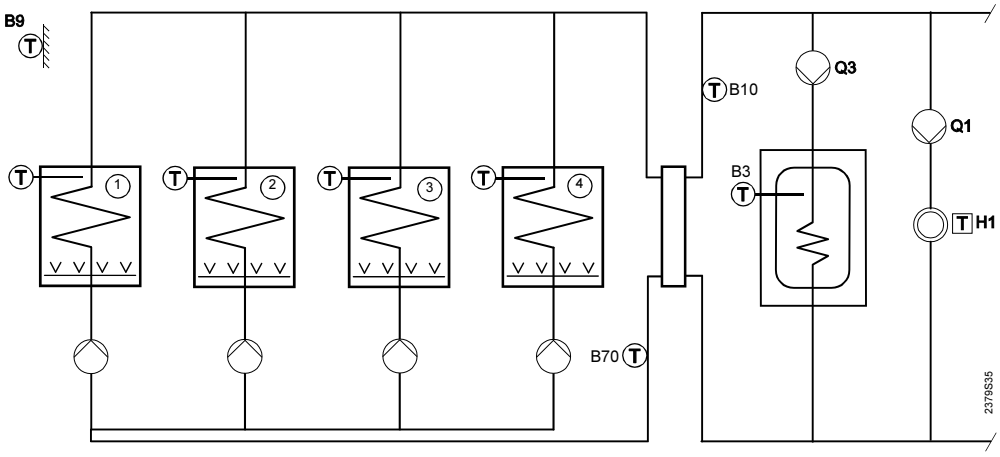
8.12 Plant types RVA47.320 - no. 66

➔ Note

The plant type no. is identical with the number displayed on line 53.

Hydraulic circuit

Control of a single BMU or cascade control of up to four BMUs.
D.h.w. heating with charging pump through the RVA47.320.
Control of the pump heating circuit by the RVA47.320 based on the heat demand signal received via input H1.



Type of unit	BMU 1	BMU 2	BMU 3	BMU 4	**RVA47.320**
Display of plant type					**66**
Heating curve (line 17)					--- (inactive or 2.5...40
Pump function Q1 (line 95)					5 (pump H1)

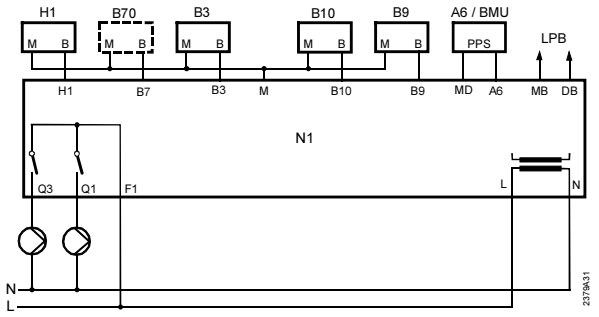
➔ Important

Other LPB capable controllers on the consumer side signal the RVA47.320 their current heat demand directly via LPB.

The heat demand signal for the pump heating circuit is generated via input H1.

In addition, the controller itself can generate a weather-compensated flow temperature (setting the heating curve to a valid value).

Electrical connections



Legend

For a detailed legend, refer to page 158.

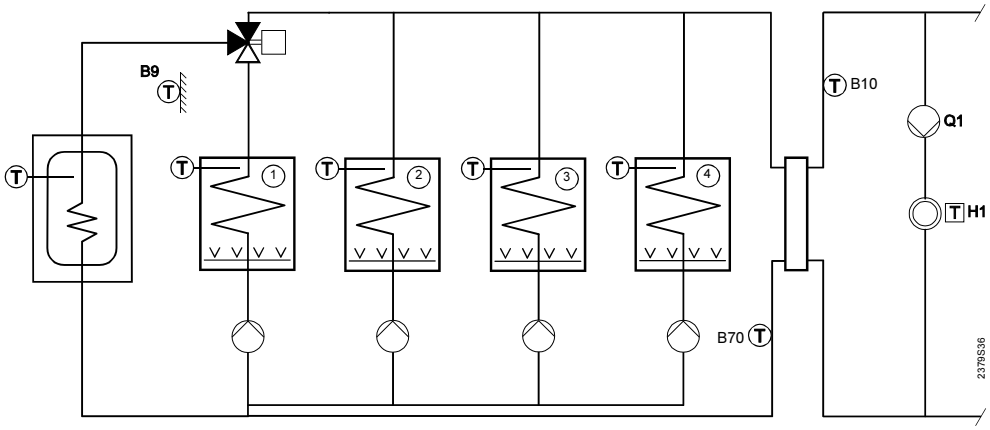
8.13 Plant types RVA47.320 - no. 67

➔ Note

The plant type no. is identical with the number displayed on line 53.

Hydraulic circuit

Control of a single BMU or cascade control of up to four BMUs. D.h.w. heating by one BMU, with changeover valve.
Control of the pump heating circuit by the RVA47.320 based on the heat demand signal received via input H1.



Type of unit	BMU 1	BMU 2	BMU 3	BMU 4	**RVA47.320**
Display of plant type					**67**
Heating curve (line 17)					--- (inactive) or 2.5...40
Pump function Q1 (line 95)					5 (pump H1)

➔ Important

Other LPB capable controllers on the consumer side signal the RVA47.320 their current heat demand directly via LPB.

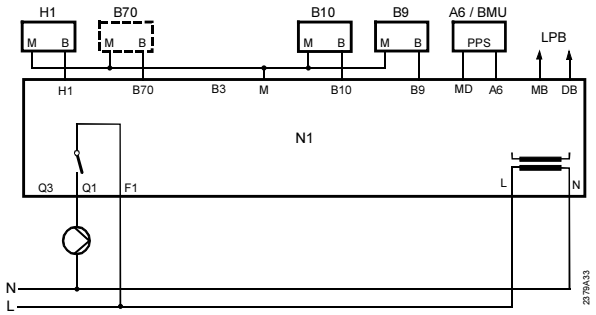
The heat demand signal for the pump heating circuit is generated via input H1.

In addition, the controller itself can generate a weather-compensated flow temperature (setting the heating curve to a valid value).

➔ Notes

When there is only a heat demand signal from the d.h.w. storage tank (heating circuits do not currently call for heat), the boiler put into operation is only that to which the storage tank is hydraulically connected. The other boilers of the cascade will not be released.

Electrical connections



➔ Note

The d.h.w. sensor (B3) is connected directly to BMU 1.

Legend

For a detailed legend, refer to page 158.

8.14 Legend

Low voltage side		Mains voltage side	
DB	Data bus (LPB)	N	Neutral conductor (mains connection)
MB	Ground bus (LPB)	L	Live AC 230 V (mains connection)
A6	PPS (room unit, BMU...)		
MD	Ground PPS		
B9	outside temperature sensor	F1	Line control contact relay Q1/Q3
B10	Cascade flow temperature sensor	Q1	Heating circuit pump / primary pump
B70	Cascade return temperature sensor		
M	Ground sensors	Q3	D.h.w. charging pump
B3	D.h.w. temperature sensor / control thermostat		
H1	input H1		

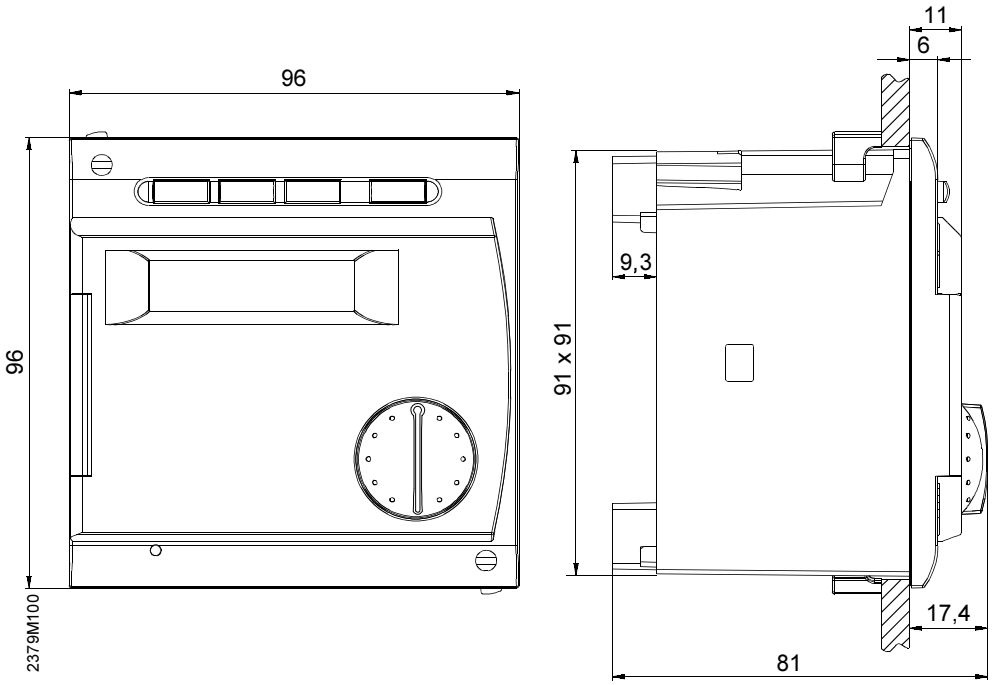
LPB	Local Process Bus (ALBATROS™-process bus)	N1	ALBATROS™controller RVA47.320
PPS	Point-to-point interface (ALBATROS™ peripheral bus)	BMU	Boiler Management Unit (burner control with additional management functions)

The connection diagrams show optional components with broken lines.

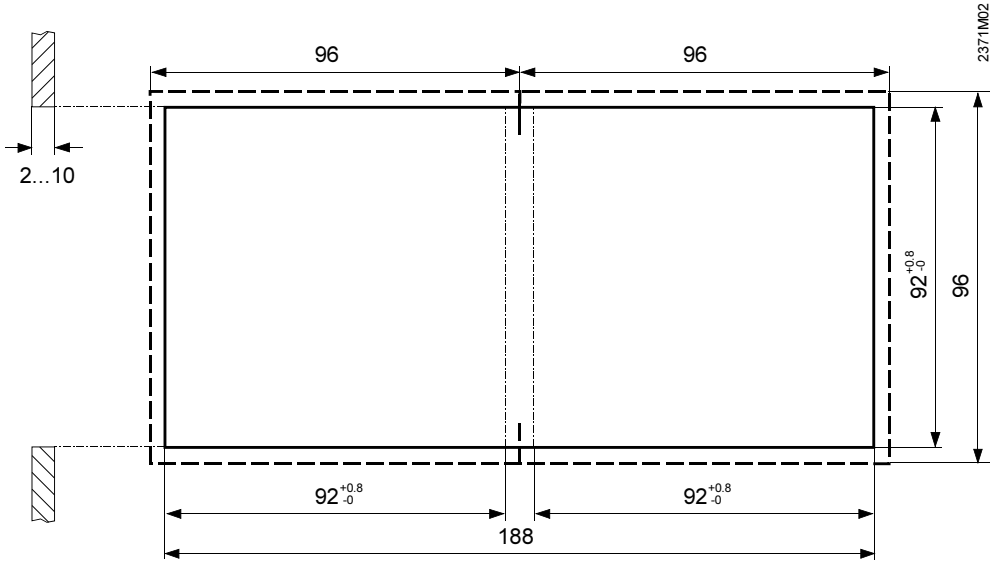
For application examples with a cascade integrated in systems with alternative heat generation, refer to Basic Documentation ”LPB System Engineering” (document no. CE1P2379E).

9 Dimensions

Room unit



Panel cutout



10 Technical data

Power supply	Nominal voltage	AC 230 V (±10 %)
	Nominal frequency	50 Hz (±6 %)
	Power consumption	max. 7 VA
Requirements	Safety class (when mounted properly)	II, to EN 60 730
	Degree of protection (when mounted correctly)	IP 40 to EN 60 529
	Electromagnetic immunity	conforming to the requirements of EN 50 082-2
	Electromagnetic emissions	conforming to the requirements of EN 50 081-1
Climatic conditions	Operation to IEC 721-3-3	lass 3K5 (noncondensing)
	Temperature	0...50 °C
	Storage to IEC 721-3-1	class 1K3 -25…70 °C
	Transport to IEC 721-3-2	class 2K3 -25…70 °C
Contamination	To EN 60 730	usual environment
Mechanical conditions	Operation to IEC 721-3-3	class 3M2
	Storage to IEC 721-3-1	class 1M2
	Transport to IEC 721-3-2	class 2M2
Mode of operation	To EN 60730 par. 11.4 11.4	1b
Output relays	Voltage range	AC 24...230 V
	Nominal current	AC 0.02…2 (2) A
	Switch-on peak	max. 10 A for max. 1 s
	Fusing	max. 10 A
Bus extension	Perm. cable length for PPS: (Telephone wire 0.8 mm dia., 2-wire interchangeable)	
	Max. cable length central unit / peripheral unit	75 m
	Max. total cable length (sum of all branches)	250 m
	Perm. cable length for LPB: (copper cable 1.5 mm^2, 2-wire **not** interchangeable)	
	With controller bus power supply (per controller)	250 m
	With central bus power supply (bus power supply / controller)	460 m
	Bus loading number	E = 3
Perm. sensor cable lengths	0.6 mm dia.	max. 20 m
	1.0 mm^2	max. 80 m
	1.5 mm^2	max. 120 m

Inputs	outside temperature sensor	NTC (QAC31) or Ni 1000 (QAC21)
	D.h.w. sensor	Ni 1000 Ω at 0 °C (QAZ21)
	Cascade flow temperature sensor	Ni 1000 Ω at 0 °C (QAD21)
	Cascade return temperature sensor	Ni 1000 Ω at 0 °C (QAD21)
	buffer storage tank sensor	Ni 1000 Ω at 0 °C (QAZ21)
	H1 as an analog input with safety extra low voltage (SELV)	U_{H1} = (12...24) V (contact open) I_{H1} = (2...5) mA (contact closed)
	H1 as an analog input with safety extra low voltage (SELV)	U_{in} = (0...10 V) für 0...130 °C R_{in} = 100 kΩ max. ratings 20 V; 20 mA
Miscellaneous	Backup of time switch	> 12 hours
	Weight	approx. 0.5 kg
	Software class to EN 60 730	class A

Index

Proof of change

The following changes have been made in this document compared to the last edition. The page numbers are those of the present edition. The pages numbers are those of the present edition.

Seite:	***Änderung:***
1	*Old version: V2.0 from 22.09.1999 new version: V2.2 from 15.07.2002*
8	*Short description: Text changed*
9	*Features – Group formed to heating circuit and heat generation*
12	*Range – Burner controls: LGM... and OCI12 deleted, LMU and OCI42 inserted*
22	*Line No. 3 and 4 inserted*
25	*Footnote for lines 90-94* *Lines 107 and 108 inserted*
27	*Footnote [1] inserted*
29	*Footnote for lines 1, 25-28*
30	*Footnote [1] inserted*
39	*Lines 3 and 4 description inserted*
55	*Example: Graphic and Note changed*
83-85	*Description for line 107 and 108 inserted*
92	*Effect for entry 3: Shifting/absolute priority – description changed*
130-134	*Chapter "Automatic 24-hour heating limit" changed*
161	*Output relays – Text deleted*

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