Heating controller

Installation Instructions

RVL470

1 Installation

1.1 Place of installation

- In a dry room, e.g. the boiler room
- Mounting choices:
  - In a control panel (on the inner wall or on a DIN mounting rail)
  - On a panel
  - In the control panel front
  - In the sloping front of a control desk

Permissible ambient temperature: 0...50 °C

1.2 Electrical installation

- Local regulations for electrical installations must be complied with
- Cable tension relief must be provided
- The cables from the controller to the actuator and the pump carry mains voltage
- The cables to the sensors should not be run parallel to mains carrying cable (e.g. power supply for the pump)

1.3 Permissible cable lengths

- For all sensors and external contacts:
  Copper cable 0.6 mm dia. max. 20 m
  Copper cable 1.0 mm^2 max. 80 m
  Copper cable 1.5 mm^2 max. 120 m
- For the room units:
  Copper cable 0.25 mm^2 max 25 m.
  Copper cable 0.5 mm^2 max. 50 m
- For the data bus:
  0.75...2.5 mm^2 refer to data sheets N2030E and N2032E

1.4 Mounting and wiring the base

1.4.1 Wall mounting

1. Separate base from the controller
2. Hold base against the wall. Marking «TOP» must be at the top!
3. Mark fixing holes on the wall
4. Drill holes
5. If required, knock out holes on the base for cable entry glands
6. Screw base to the wall
7. Wire up base

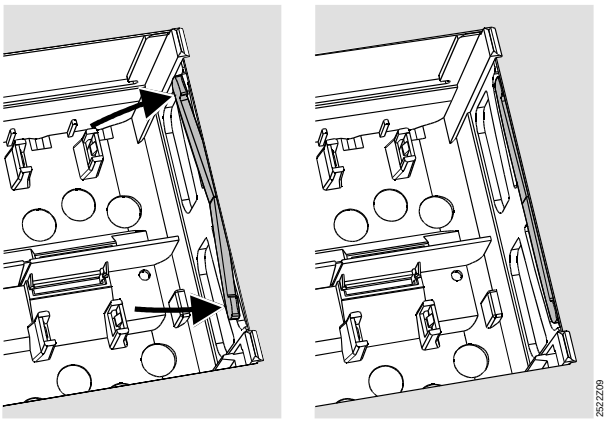
1.4.2 DIN rail mounting

1. Fit rail
2. Separate base from the controller
3. If required, knock out holes on the base for cable entry glands
4. Fit base to the rail. Marking «TOP» must be at the top!
5. If required, secure base (depending on the type of rail used)
6. Wire up base

1.4.3 Flush panel mounting

- Panel cutout required: 138 x 138 mm (+1 mm / –0 mm)
- Maximum thickness: 3 mm

1. Separate base from the controller
2. If required, knock out holes on the base for cable entry glands
3. Insert base in the panel cutout from behind until stop is reached. Marking «TOP» must be at the top!
4. Push lateral tongues behind the front panel (refer to illustration)
5. Wire up base. Make sure the cable lengths are such that there is sufficient space to open the control panel door



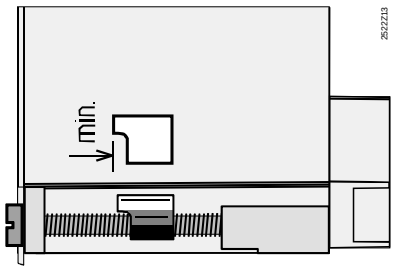
Wrong **Correct**

Place the tongues correctly – they must not be inside the cutout!

2 Commissioning

2.1 Preparatory checks

1. DO NOT switch on power supply yet
2. Check wiring according to the plant connection diagram
3. Ensure correct position and location of levers by turning the fixing screws (refer to illustration on the lateral wall of the unit)



4. Insert unit in the base until stop is reached. Marking «TOP» must be at the top!
5. Tighten fixing screws alternately
6. Check regulating unit (seat or slipper value): See if
   - it is correctly installed (observe direction of flow indicated on the valve body)
   - the slipper travels in the correct angular range (note position indicators)
   - the hand lever is disengaged
7. Note with underfloor and ceiling heating systems:
   The limit thermostat must be set to the correct value.
   During the functional test, the flow temperature may not exceed the maximum permissible level (usually 55 °C). If it does, proceed immediately as follows:
   - Either close the valve manually, or
   - Switch off the pump, or
   - Close the pump isolating valve
8. Switch on power supply. The display must show something (e.g. time of day). If not, the reason may be one of the following:
   - No mains voltage present
   - Main fuse defect
   - Main switch not set to ON

2.2 General information about operation

- Setting elements:
  - Heating curve
  - Setting knob
  - Display; one operating line is assigned to each setting
  - Buttons for selecting and readjusting the values:
    - Selecting the next operating line below
    - Selecting the next operating line above
    - Decreasing the displayed value
    - Increasing the displayed value
- Adopting a setting value:
  The setting value is adopted by selecting the next operating line (or: Press Info button or one of the operating mode buttons)
- Entering **--.-** or **--:--** :
  Press − or + until the required display appears
- Block jump function:
  To select a single operating line quickly, two button combinations can be used:
  Press ▽ and + for selecting the next line block above
  Press ▽ and − for selecting the next line block below

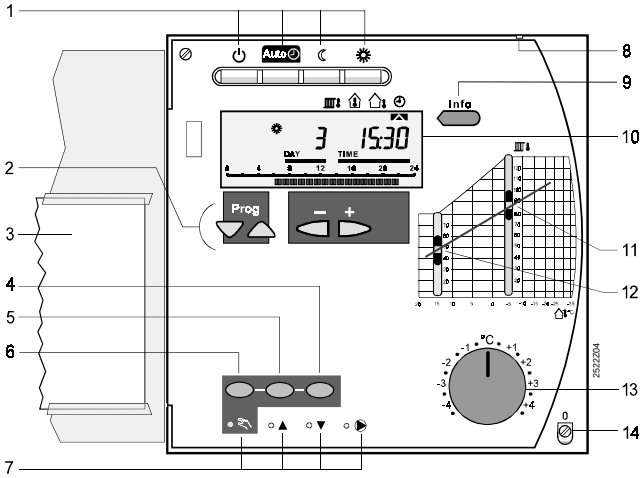
2.3 Setting procedure

1. Only with analog adjustment of heating curve: Adjust the bar in agreement with the planning documentation or according to local practice
2. Make settings on operating lines 1...41 (enduser) (table on page 3)
3. Select plant type on operating line 51 (page 3)
4. Make the relevant settings in the following parameter list. All functions and operating lines required for the selected plant type will be activated and can be set. All operating lines that are not required are locked
5. Enter the values set in the table!
6. If required, set the sevice functions (independent of plant type)
7. Carry out the final work (locking of settings, etc.; page 8)

2.4 Commissioning and functional check

- Specific operating lines for the functional check:
  – = simulation of outside temperature
  – = relay test
  – = sensor test
  – = test of H-contacts
- If ERROR appears on the display: Interrogate operating line 50 to pinpoint error (table on page 3)

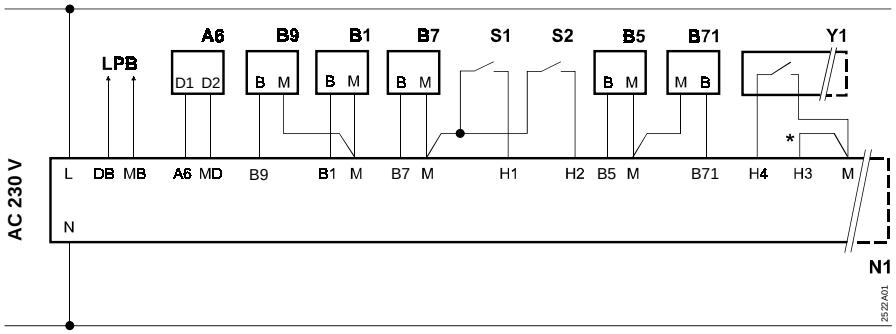
2.5 Setting elements



1 Operating mode buttons (selected button is lit)
2 Buttons for operating the display:
Prog = selection of operating line
– + = adjustment of displayed value
3 Operating instructions
4 Button for "Close valve" or burner stage 2 ON / OFF in manual operation
5 Button for "Open valve" in manual operation
6 Button for manual operation
7 LEDs for:
Manual operation
▲ Valve opens / burner stage 1 ON
▼ Valve closes / burner stage 2 ON
Pump runs
8 Sealing facility in the cover
9 Info button for the display of actual values
10 Display (LCD)
11 Setting slider for flow temperature setpoint at an outside temperature of –5 °C
12 Setting slider for flow temperature setpoint at an outside temperature of 15 °C
13 Setting knob for readjustment of room temperature
14 Fixing screw with sealing facility

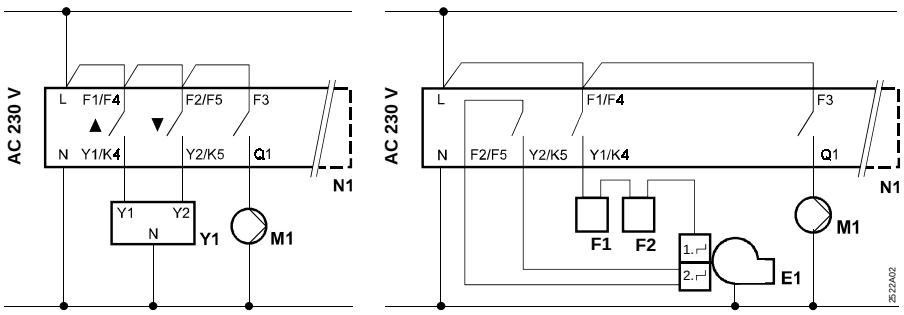
3 Connection diagrams

Basic connections on the low voltage side



Basic connections on the mains voltage side

Left: Connections for plant types 1, 3, 4 and 6 (mixing valve or district heat)
Right: Connections for plant types 2 and 5 (boiler with a two-stage burner)



A6	Room unit QAW50 or QAW70
B1	Flow or boiler temperature sensor
B5	Room temperature sensor
B7	Return temperature sensor (primary circuit)
B71	Return temperature sensor (secondary circuit)
B9	Outside sensor
E1	Two-stage burner
F1	Thermal reset limit thermostat
F2	Manual reset safety limit thermostat
LPB	Data bus (Local Process Bus)
M1	Heating circuit or boiler pump
N1	Controller RVL470
S1	Remote control operating mode
S2	Remote control flow temperature setpoint
Y1	Actuator of heating circuit (with contact for minimum stroke limitation)
*	Wire link for locking the district heat parameters

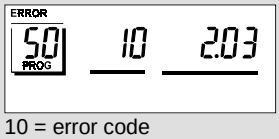
4 Settings

Legend for the setting tables:

Adjustable
Display only

4.1 Settings on the "Enduser" level

Press ▽ or △ thus activating the "Enduser" level.

Line	Function, display	Factory setting	Range	Setting	Explanations, notes, tips
1	Setpoint for NORMAL heating	20.0 °C	0...35	..... °C	
2	Setpoint for REDUCED heating	14.0 °C	0...35	..... °C	
3	Setpoint for holidays mode / frost protection	10.0 °C	0...35	..... °C	
4	Weekday (for heating program)	1...7	1...7	.....	1 = Monday 2 = Tuesday 1-7 = all days
5	1st heating period, start of NORMAL heating	06:00	00:00...24:00	.... :	--:-- = period inactive
6	1st heating period, start of REDUCED heating	22:00	00:00...24:00	.... :	--:-- = period inactive
7	2nd heating period, start of NORMAL heating	--:--	00:00...24:00	.... :	--:-- = period inactive
8	2nd heating period, start of REDUCED heating	--:--	00:00...24:00	.... :	--:-- = period inactive
9	3rd heating period, start of NORMAL heating	--:--	00:00...24:00	.... :	--:-- = period inactive
10	3rd heating period, start of REDUCED heating	--:--	00:00...24:00	.... :	--:-- = period inactive
11	Holidays period	--:--	1...8		
12	Date of first day of holiday	--:--	01.01. ... 31.12.	....	Day.Month
13	Date of last day of holiday	--:--	01.01. ... 31.12.	....	Day.Month
14	Heating curve, flow setpoint TV1 at 15 °C outside temperature	30 °C	20...70	..... °C	These operating lines are only active if digital adjustment of the heating curve has been selected (refer to entry made on operating line 73)
15	Heating curve, flow setpoint TV2 at –5 °C outside temperature	60 °C	20...120	..... °C	
38	Time of day		00:00...23:59		Hours:Minutes
39	Weekday		1...7		1 = Monday 2 = Tuesday 7 = Sunday
40	Date		01.01. ... 31.12.	....	Day.Month (e.g. 02.12 for 2. Dec.)
41	Year		1995...2094	.....	
50	Faults	**Display function** Display example for interconnected plants:  10 = error code 2 = segment number (LPB) 03 = unit number(LPB)			10 = fault outside sensor 30 = fault flow or boiler temperature sensor 40 = fault return temperature sensor (primary circuit) 42 = fault return temperature sensor (secondary circuit) 60 = fault room temperature sensor 61 = fault room unit 62 = wrong room unit connected 81 = short-circuit on data bus 82 = same bus address used several times 100 = two clock time masters on the data bus 120 = flow alarm 140 = wrong controller address (LPB)

With plant types 4, 5 and 6, these operating lines cannot be used

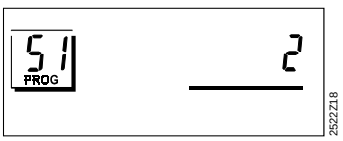
4.2 Settings on the " Heating engineer's" level

Press ▽ and △ simultaneously for 3 seconds, thus activating the "Heating engineer's" level for setting the plant type and the plant-related variables.

Setting the plant type on operating line 51:

The required plant type must be set on operating line 51 using buttons − and +. This activates all functions required for the respective type of plant and shows the associated operating lines.

Display example for plant type 2:

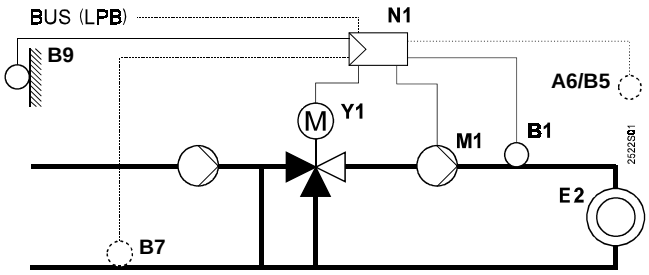


Line	Function, display	Factory setting	Range	Setting	Explanations, notes, tips
51	Plant type	1	1…6	.....	Type numbers in the following section 4.3

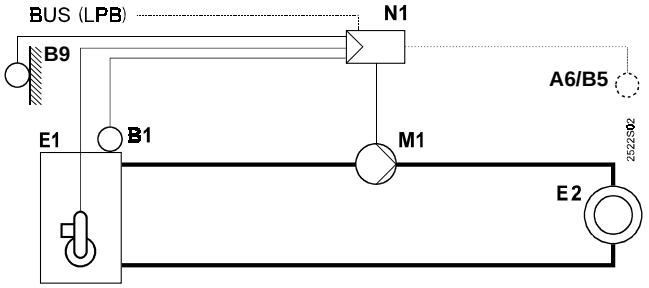
4.3 Plant types

Space heating:

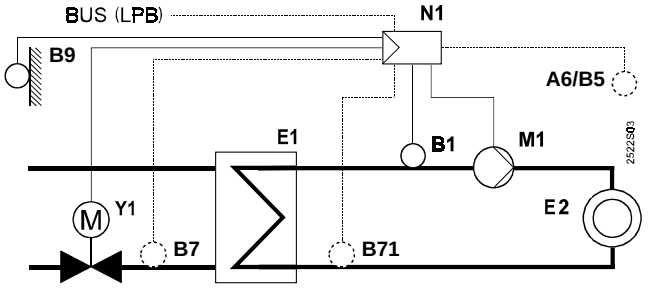
Plant type 1: space heating with mixing zone
three-position control, acting on seat or slipper valve



Plant type 2: space heating with own boiler
on/off control, acting on burner

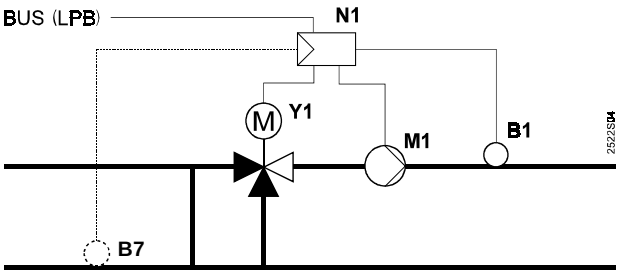


Plant type 3: space heating with district heat connection
three-position control, acting on seat valve

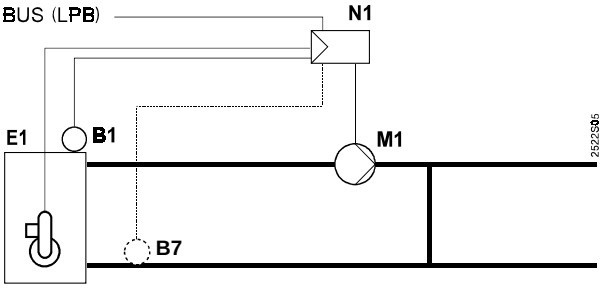


Primary control:

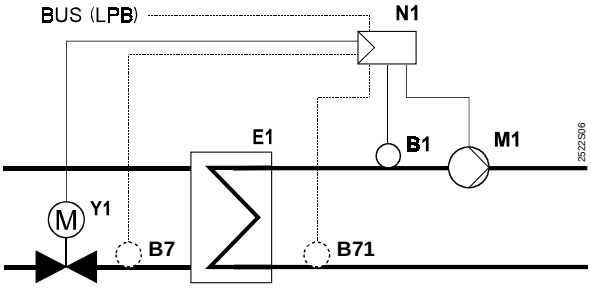
Plant type 4: primary control with mixing zone
heat demand signal via data bus



Plant type 5: primary control with boiler
heat demand signal via data bus



Plant type 6: primary control with district heat connection
heat demand signal via data bus



A6 Room unit QAW50 or QAW70
B1 Flow or boiler temperature sensor
B5 Room temperature sensor
B7 Return temperature sensor (primary circuit)
B71 Return temperature sensor (secondary circuit)
B9 Outside sensor
E1 Boiler or heat exchanger
E2 Load
LPB Data bus (Local Process Bus)
M1 Circulating pump or boiler pump
N1 Controller RVL470
Y1 Actuator for seat or slipper valve

4.4 Parameter list

Line	Function, display	Factory setting	Range	Setting	Explanations, notes and tips

4.4.1 Block "Space heating"

61	Heating limit for NORMAL heating (ECO day)	17.0 °C	--.- or –5...+25	..... °C	Setting --.- = function disabled
62	Heating limit for REDUCED heating (ECO night)	5.0 °C	--.- or –5...+25	..... °C	Setting --.- = function disabled
63	Building time constant	20 h	0...50	..... h	Light = 10 h, medium = 25 h, heavy = 50 h
64	Quick setback	1	0 / 1	.....	0 = no quick setback 1 = quick setback
65	Room temperature source	A	0 / 1 / 2 / 3 / A	.....	0 = no room temperature sensor present 1 = room unit at terminal A6 2 = room temperature sensor at terminal B5 3 = mean value of the two units at terminals A6 and B5 A = automatic selection
66	Type of optimization	0	0 / 1	.....	0 = optimization with room model 1 = optimization with room temperature sensor / room unit (setting 0 only allows optimum start control)

Line	Function, display	Factory setting	Range	Setting	Explanations, notes and tips
67	Maximum heating-up time	00:00 h	00:00 ... 42:00	..... h	Maximum forward shift for switching on before start of occupancy Setting 00:00 = optimization of switching on disabled
68	Maximum optimum shutdown	0:00 h	0:00...6:00	..... h	Maximum forward shift for switching off before end of occupancy Setting 0:00 = optimization of switching off disabled
69	Maximum limitation of room temperature	--.-	--.- or 0...35	..... °C	Setting --.- = limitation disabled Only with room temperature sensor / room unit
70	Effect of room temperature	4	0...20	.....	Compensation factor for effect of room temperature Function possible only with room unit / room temperature sensor
71	Boost of room temperature setpoint with boost heating	5 °C	0...20	..... °C	
72	Parallel shift of heating curve	0.0 °C	–4.5...+4.5	..... °C	Value in °C room temperature (remote setting via data bus)
73	Type of heating curve adjustment	0	0...2	.....	0 = analog adjustment 1 = digital adjustment on the controller and via bus 2 = digital adjustment via bus only

4.4.2 Block "Three-position actuator for heating circuit"

81	Maximum limitation of flow temperature	---	--- or 0...140	..... °C	Setting --- = function disabled (e.g. for floor heating 55 °C)
82	Minimum limitation of flow temperature	---	--- or 0...140	..... °C	Setting --- = function disabled
83	Maximum increase rate of flow temperature	---	--- or 1...600	..... °C/h	Setting --- = function disabled (function prevents cracking noise in piping)
84	Excess temperature mixing valve	10 °C	0...50	..... °C	For use in interconnected plants (setpoint elevation for primary controller)
85	Actuator running time	120 s	30...873	..... s	
86	P-band of control (Xp)	32.0 °C	1...100	..... °C	
87	Integral action time of control (Tn)	120 s	10... 873	..... s	

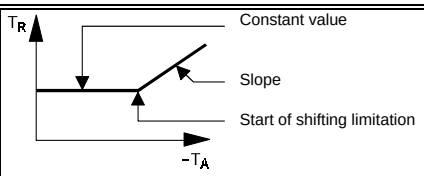
4.4.3 Block "Boiler"

91	Operating mode	0	0 / 1	.....	0 = with manual shutdown (⏻ key) 1 = with automatic shutdown (OFF when therev is no demand for heat)
92	Maximum limitation of boiler temperature	95 °C	25...140	..... °C	No safety function
93	Minimum limitation of boiler temperature	10 °C	5...140	..... °C	
94	Switching differential	6 °C	1...20	.....	
95	Minimum burner running time	4 min	0...10	.....	
96	Release limit for second burner stage	50 °C*min	0...500	.....°C*min	
97	Reset limit for second burner stage	10 °C*min	0...500	.....°C*min	
98	Waiting time for second burner stage	20 min	0...40	.....min	
99	Operating mode pump M1	1	0 / 1	.....	0 = circulating pump without shutdown in the case of protective boiler startup 1 = circulating pump with shutdown in the case of protective boiler startup

4.4.4 Block "Setpoint of return temperature limitation"

101	Limitation of return temperature Constant value	---	--- or 0...140	..... °C	Setting --- = function disabled Plant types 1, 4, 5: Minimum limitation Plant types 3, 6: Maximum limitation

4.4.5 Settings for plant type 3

112	Maximum limitation of return temp. Slope	0.7	0.0...4.0	.....	
113	Maximum limitation of return temp. Start of shifting limitation	10 °C	–50...+50	..... °C	
114	Maximum limitation of return temperature Integral action time	30 min	0...60	..... min	For maximum limitation of return tempearture and for DRT limitation
115	Maximum limitation of differential return temperature	--.-	--.- or 0.5...50	..... °C	Differential temperature (DRT): Difference between primary return and secondary return temperature. Setting --.- = function disabled
116	Minimum limitation of stroke (Y_{min}-function)	6 min	-- or 1...20	..... min	Stroke limitation of regulating unit in the primary return Setting -- = function disabled

Line	Function, display	Factory setting	Range	Setting	Explanations, notes and tips

4.4.6 Block "Service functions and general settings"

161	Simulation of outside temperature	--.-	--.- or –50...+50		Simulation will automatically be terminated after 30 min --.- = no simulation
162	Relay test: Heating circuit control with **valve** (plants 1, 3, 4, 6)	0	0...		0 = normal operation 1 = all contacts open 2 = heating circuit valve OPENS Y1 3 = heating circuit valve CLOSES Y2 4 = heating circuit pump / circulating pump ON M1 To terminate the relay test: Select next line, or automatically after 30 minutes
	Heating circuit control with **burner** (plants 2, 5)				0 = normal operation 1 = all contacts open 2 = burner stage 1 ON K4 3 = burner stages 1 and 2 ON K4 and K5 4 = heating circuit pump / circulating pump ON M1 To terminate relay test: Select next line, or automatically after 30 minutes
163	Sensor test ***SET*** = setpoint or limit value ***ACTUAL*** = actual value 000 = short-circuit – – – = interruption	**Display function**			0 = outside sensor B9 1 = flow or boiler temperature sensor B1 2 = room sensor at terminal B5 3 = room unit sensor at terminal A6 4 = return sensor (primary circuit) B7 5 = return sensor (secondary circuit) B71
164	Test of H-contacts 000 = contact is closed – – – = contact is open	**Display function**			H1 = overriding the operation mode H2 = manually generated heat demand H3 = ocking the district heat settings H4 = auxiliary switch in actuator (for minimum stroke limitation)
165	Flow temperature setpoint	**Display function**			Current setpoint according to the composite outside temperature, heating curve, setting knob position and setting on operating line 72
166	Resulting heating curve	**Display function**			Resulting setpoint incl. position of setting knob and setting on line 72 *Left*: TV1, at 15 °C outside temperature *Right*: TV2, at –5 °C outside temperature
167	Outside temperature for frost protection for the plant	2.0 °C	--.- or 0...25	..... °C	Setting --- = function disabled
168	Flow temperature setpoint for frost protection for the plant	15 °C	0...140	..... °C	
169	Device number	0	0...16	.....	Bus address 0 = device with no bus
170	Segment number	0	0...14	.....	Bus address
171	Flow alarm	--:--	--:-- or 1...10	..... h	Period of time during which the flow / boiler temperature (sensor at terminal B1) may lie outside the limits Setting --:-- = function disabled
172	Operating mode when linking terminals H1–M	0	0...3	.....	0 = ⏻ Standby 1 = Auto AUTO 2 = ☾ REDUCED 3 = ☼ NORMAL
173	Amplification of locking signal	100 %	0...200	..... %	Response to locking signals
174	Pump overrun time	6 min	0...40	..... min	Plant with mixing valve: Setting disabled, fixed value = 1 min. Plant with burner: Min. value = 1 min.
175	Pump kick	0	0 / 1	.....	0 = no periodic pump run 1 = weekly pump run active
176	Changeover winter-/ summertime	25.03	01.01. ... 31.12	....	Setting: Earliest possible changeover time
177	Changeover summer-/ wintertime	25.10	01.01. ... 31.12	....	Setting: Earliest possible changeover time
178	Clock operation	0	0...3	.....	0 = autonomous clock in the controller 1 = time from bus; clock (slave) with no remote setting 2 = time from bus; clock (slave) with remote setting 3 = time from bus; central clock (master)
179	Bus supply	A	0 / A	.....	0 = no bus supply through the controller A = bus supply through the controller
180	Outside temperature source	A	A or 00.01...14.16	.....	No display means: Controller is autonomous (no data bus present) When from data bus: Enter segment and device number of source, **or** enter A, in which case the source is automatically ascertained

Line	Function, display	Factory setting	Range	Setting	Explanations, notes and tips

4.4.7 Block "Contact H2"

184	Function when terminals H2–M are linked	0	0 / 1	.....	0 = heat demand signal to heat source 1 = heat demand signal to heating circuit

4.4.8 Block " Contact H2 and general displays"

185	Effect when connection terminals H2–M are linked	0	0 / 1	.....	0 = constant 1 = minimum
186	Demand for heat when connection terminals H2–M are linked	70	0...140	..... °C	
194	Hours run meter	**Display function**			Operating hours of controller
195	Controller's software version	**Display function**			
196	Identification code of room unit	**Display function**			
197	Radio clock, elapsed time since last reception	**Display function**			Range: 00:00...42:00 h --:-- = no radio clock connected

5 Final work

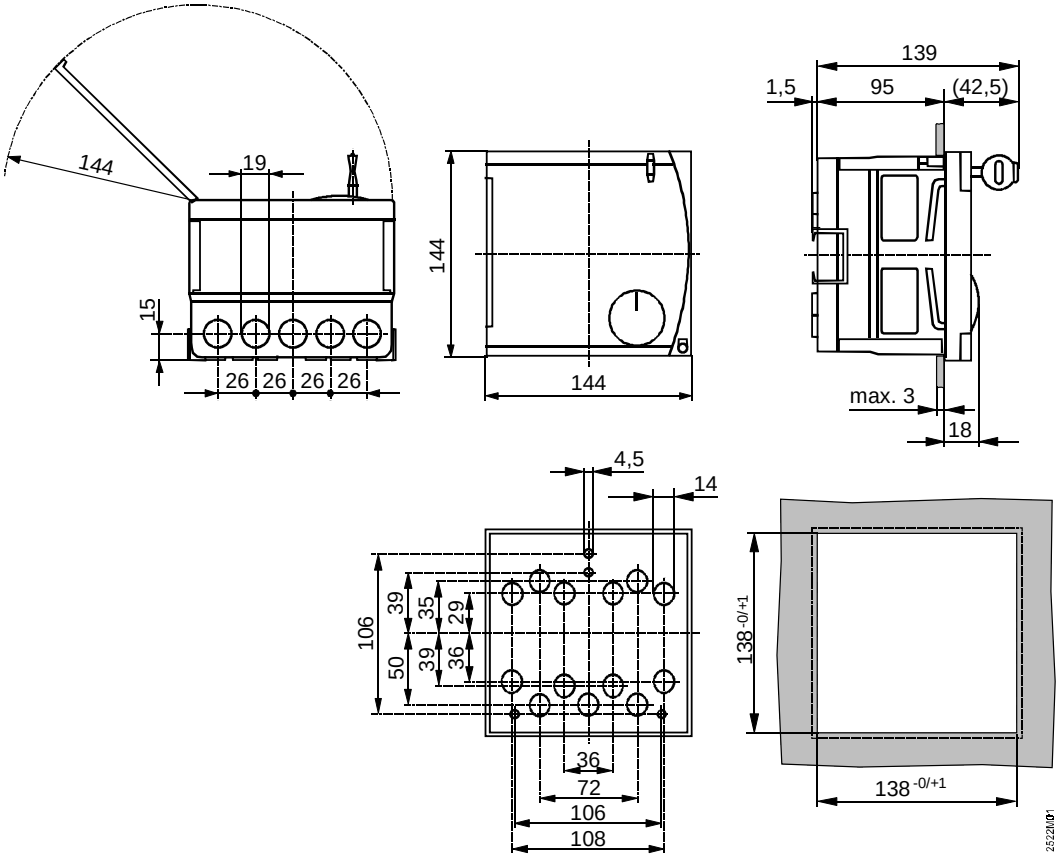
5.1 Locking the settings for district heat

The settings for district heat can be locked by linking teminals H3 and M.
Then, seal the fixing screw at the bottom: Insert plug (attached to the key ring) in the screw hole; introduce a wire through both lugs and seal.

5.2 Completing the installation work

1. If settings have been entered in these instructions: keep instructions in a safe place
2. Make entries in the Operating Instructions:
   – Setting choice of heating curve on page 9
   – Heating engineer's name and address on page 23
3. Keep Operating Instructions inside the controller
4. Seal the transparent cover, if required

6 Dimensions



Dimensions in mm