



Series B

Heating Controller

RVL470

- Multifunctional heating controller for use in residential and non-residential buildings; suitable for weather-dependent flow temperature control of heating zones with or without room temperature compensation and load-dependent control of heat generators (pre-control)
- With communication capability
- 6 preprogrammed plant types with automatic assignment of the functions required for each type of plant
- Analog or digital setting of the heating curve, analog room temperature readjustment, operating line principle for all other parameters
- Operating voltage AC 230 V, CE conformance

Use

- Types of buildings:
 - Multi-family houses
 - Single-family houses
 - Smaller non-residential buildings
- Types of plants:
 - Heating zones equipped with their own boilers
 - Heating zones with district heat connection
 - Combined plants consisting of several heating zones and heat generation
- Types of heating systems:
 - Radiator, convector, underfloor and ceiling heating systems, radiating panels

Functions

Heating zone control

- Weather-dependent flow temperature control through control of the mixing valve in a heating zone
- Weather-dependent flow temperature control through control of the burner in a heating zone
- Weather-dependent flow temperature control through control of the valve in the primary return of a heating zone with district heat connection (transfer station)

Pre-control

- Load-dependent control of the main flow temperature through control of the mixing valve in the main flow; demand for heat via data bus
- Load-dependent control of the boiler temperature through control of the burner; demand for heat via data bus
- Load-dependent control of the secondary flow temperature through control of the valve in the primary return of a district heat connection; demand for heat via data bus

Operating modes



Automatic mode

Automatic changeover from normal to reduced temperature, and vice versa, according to the weekly program, automatic changeover to holiday mode, demand-dependent control of heating system (ECO function)



Setback mode

Continuous heating to the reduced temperature, with ECO function



Comfort mode

Continuous heating to the normal temperature, no ECO function



Standby

Frost protection is ensured in all operating modes.

The controller can be switched to manual operation.

Other functions

- Optimization functions
- Protective functions
- Remote control
- Commissioning aids
- Communication functions

Ordering

When ordering, please give type reference **RVL470** and the language code letter (-A, -B or -C) for the Operating Instructions and the Installation Instructions in the requested language:

-A for English, French, Italian, German (e.g. RVL470-A for English)

-B for French, Dutch, Spanish (e.g. RVL470-B for French)

-C for Danish, Finnish, Swedish (e.g. RVL470-C for Danish)

Sensors and, if required, room unit, actuator and valve must be ordered as separate items.

Equipment combinations

Suitable

- Flow and return temperature: all sensors with LG-Ni 1000 Ω at 0 °C, for example.
 - Strap-on temperature sensor QAD22
 - Immersion temperature sensors QAE212... and QAP21.3
- Room temperature:
 - Room unit QAW50
 - Room unit QAW70
 - Room temperature sensor QAA24
- Outside temperature:
 - Outside sensor QAC22 (Ni sensing element)
 - Outside sensor QAC32 (NTC sensing element)

Suitable actuators

All electromotoric and electrohydraulic actuators for 3-position control made by SBT HVAC Products can be used.

For the different types of actuators, refer to Data sheets N4500...N4599.

Communication

The controller is capable of communicating with:

- All units with LPB capability made by SBT HVAC Products
- SYNERGYR OZW30 central unit (from software version 3.0)

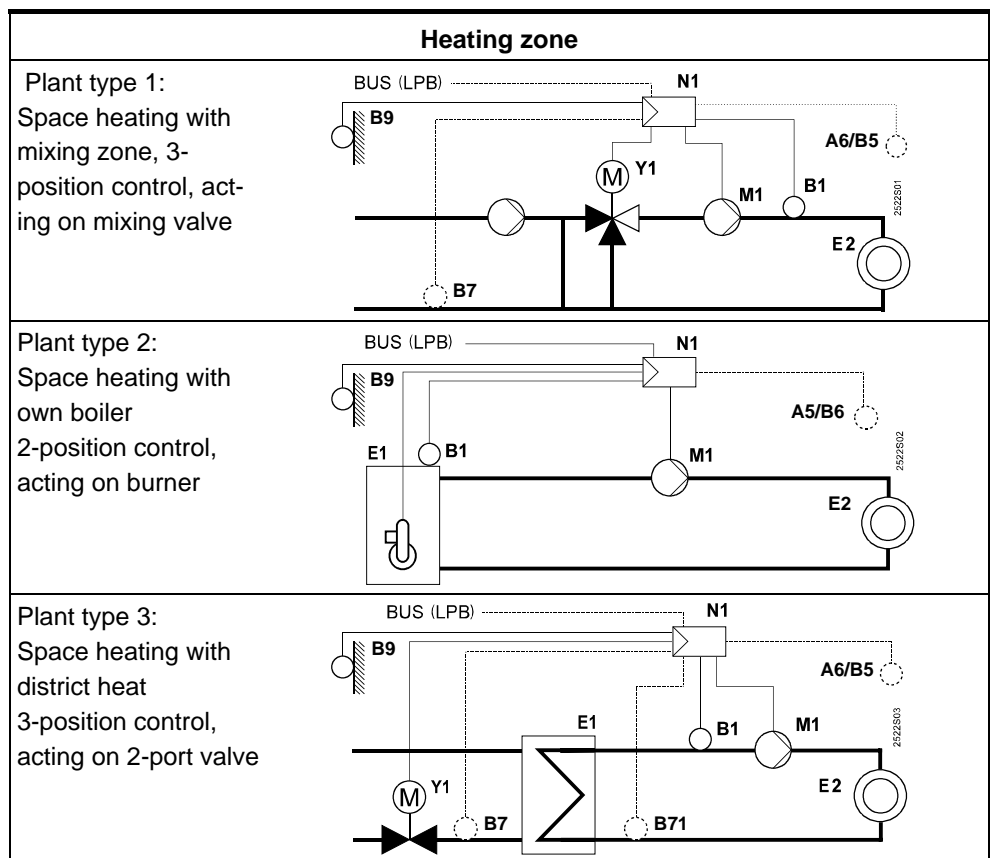
Technical design

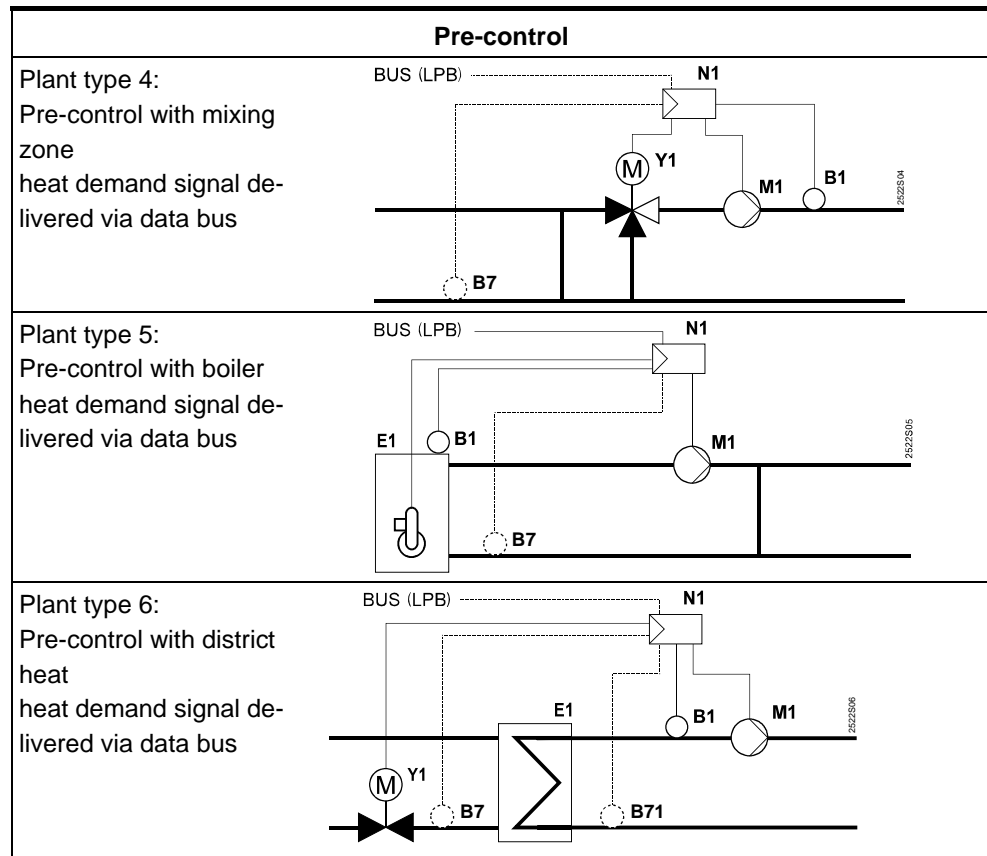
Working principle

The RVL470 offers 6 different plant types that are ready programmed in the controller. When commissioning the system, the respective plant type must be entered. This activates all functions that are required for the selected plant type. The standard settings are practice-oriented.

All functions not required for the selected plant type will not be shown and are disabled.

Plant types





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

Enduser settings

With weather-dependent control, the flow temperature is controlled in function of the prevailing outside temperature via the heating curve. Its basic setting is made with the little bar on the front of the unit or on an operating line. The room temperature can be readjusted with the knob.

In addition, following can be entered by the enduser:

- Room temperature set values for normal heating, reduced heating and frost protection/holidays
- Weekly switching program and a maximum of eight holiday periods per year
- Operating mode
- Time of day and date

Temperature acquisition

- Flow temperature: with one or two (averaging) sensors
- Outside temperature: with Ni or NTC sensor; the RVL470 identifies the type of sensor used; with interlinked controllers, it is also possible to define the source of the outside temperature
- Room temperature: with a room temperature sensor or a room unit or both (averaging)

Space heating

- The room temperature is included in the control. It can be acquired with a sensor or simulated by a room model with an adjustable building time constant. When using a sensor, the effect on the control can be adjusted. It is also possible to limit the maximum room temperature.

- The heating is switched on and off depending on demand (ECO function). It is switched off when the amount of heat stored by the building mass is sufficient to maintain the required room temperature. In that case, the controller takes into account the development of the room temperature and the building's heat storage capacity. It is possible to set two heating limits, one for normal heating and one for reduced heating.
- The control is optimized. Switching on, heating up and shutting down are controlled such that, during occupancy times, the required room temperature is always maintained.

At the end of each occupancy period, the heating will be shut down (circulating pump) until the room temperature set value for the non-occupancy time is reached (quick setback, can be disabled). During heating up, the room temperature set value can be boosted (boost heating). It is possible to set maximum limits for the heating up time and for early shutdown.

3-position control

3-position control operates as weather-dependent or load-dependent flow temperature control. P-band and integral action time are adjustable. The flow temperature is controlled via the regulating unit (control or slipper valve). Minimum and maximum limitation of the flow temperature as well as maximum limitation of the rate of set value rise are adjustable.

2-position control

2-position control operates as weather-dependent or load-dependent boiler temperature control. The boiler temperature is controlled through cycling of the single- or 2-stage burner (direct burner control). 2-stage operation is enabled when the release limit is reached, and disabled when the reset limit is reached. The limits can be adjusted. When there is no demand for heat, the boiler will either be shut down or maintained at the minimum temperature limit (selectable). Both minimum and maximum limitation of the boiler temperature are adjustable.

District heat

The secondary flow temperature is controlled via the valve in the primary return, either weather- or load-dependent.
Maximum limitations act on the:

- primary return temperature, whereby the following selections can be made: type of compensation (local outside sensor or bus signal), slope of limit curve, and start of compensation
- difference of primary return and secondary return temperature (DRT)

Minimum stroke limitation (Y_{min} function) prevents measuring errors in connection with heat metering when flow rates fall below a certain level.

The integral action time of the limit functions is adjustable.

Minimum limitation of return temperature

Minimum limitation of the return temperature acts with both 3-position control and load-dependent control of the boiler temperature and helps prevent flue gas condensation.

Locking functions

On the software side, all settings can be locked to prevent unauthorized readjustments. The district heat settings can be locked on the hardware side.

Time switch

- The RVL470 has one weekly time switch for entering the daily occupancy times. Each day can accommodate 3 occupancy times, whereby each weekday may have different occupancy times
- For entering a maximum of eight holiday periods, the RVL470 is equipped with a yearly time switch featuring automatic summer- / wintertime changeover

Remote control

- Changeover of operating mode with the QAW50 room unit
- Overriding the major controller functions with the QAW70 room unit
- Selection of another (programmable) operating mode with an external switch
- Preselection of a fixed flow temperature set value with an external switch. Type of set value (fixed or minimum) and flow temperature can be selected

- Communication**
- Communication with other devices is effected via the data bus and allows:
- Signaling of heat demand to the heat generator
 - Exchange of locking and enforced signals
 - Exchange of measured values such as outside temperature, return temperature, flow temperature and of clock signals
 - Communication with other devices
 - Reception of heat demand from the SYNERGYR OZW30 central unit (from software version 3.0)
 - Exchange of error messages
- Error messages and flow temperature alarm**
- Error message in the event of sensor faults
 - Error message in the event of data bus or room unit faults
 - Flow temperature alarm; adjustable is a period of time during which the flow temperature may stay outside the set limits; an error message is given when the time has elapsed
- Other functions**
- Display of parameters, actual values, operational statuses and error messages
 - Simulation of outside temperature
 - Relay test; all relays can be controlled manually
 - Sensor test; all measured values of the sensors can be displayed
 - Testing the contacts connected to terminals H1–M, H2–M, H3–M and H4–M
 - Outside temperature-dependent frost protection for the plant; a minimum flow temperature is maintained, its set value and the response threshold can be adjusted
 - Pump overrun time to prevent buildup of heat
 - Periodic pump run (pump kick) to prevent seizing of the pump in the summer
 - Controller hours run meter

For more detailed information on technical features, functions and communication with LPB, please refer to the following pieces of documentation:

- Basic documentation RVL470: P2522
- Data sheet Basic System Data LPB: N2030
- Data sheet LPB: N2032

Mechanical design

The RVL470 is comprised of controller insert, which accommodates the electronics, the power section, the output relays and – on the front – all operating elements, and the base, which carries the connection terminals. The operating elements are located behind a lockable transparent cover.

The operating instructions can be inserted in the transparent cover.

The controller insert is secured to the base with two screws, one of which can be sealed. The cover can also be sealed.

The RVL470 can be fitted in 3 different ways:

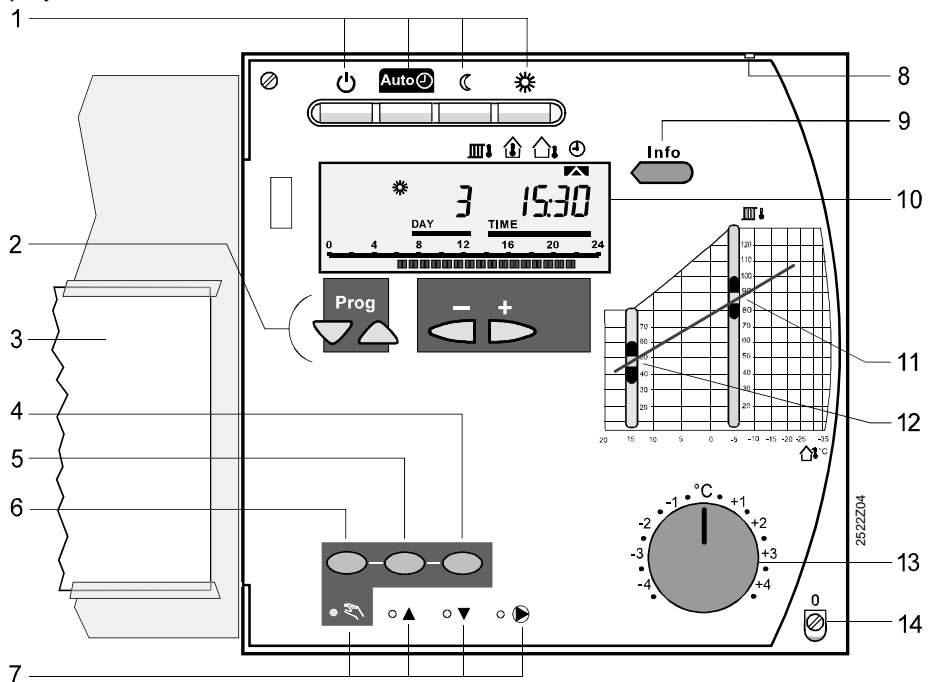
- Wall mounting (on a wall, in the control panel, etc.)
- Rail mounting (on a standard DIN mounting rail)
- Flush panel mounting (control panel door, etc.)

Analog operating elements

- Buttons for selecting the required operating mode
- Info button
- Direct adjustment of the heating curve with the help of the SIGMAGYR setting facility
- Knob for manual readjustment of the room temperature
- 3 buttons for manual operation and manual positioning commands

Digital operating elements

The entry or readjustment of all setting parameters, activation of optional functions and reading of actual values and statuses is made according to the operating line principle. An operating line with an associated number is assigned to each parameter, each actual value and each function that can be selected. One pair of buttons is used to select an operating line and one pair to readjust the display.



- 1 Operating mode buttons (selected button is lit)
- 2 Buttons for operating the display
 - Prog** = selection of operating line
 - +** = readjustment 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 display of actual values
- 10 Display (LCD)
- 11 Setting slider for flow temperature set value at an outside temperature of $-5\text{ }^{\circ}\text{C}$
- 12 Setting slider for flow temperature set value at an outside temperature of $15\text{ }^{\circ}\text{C}$
- 13 Knob for room temperature readjustments
- 14 Fixing screw with sealing facility

Notes

Engineering

- The wires of the measuring circuits carry extra low voltage, those to the actuator and the pump carry AC 24...230 V.
- The local electrical regulations must be complied with.
- Sensor cables should not be run parallel to mains carrying cables for loads such as actuator, pump, burner, etc.

Commissioning

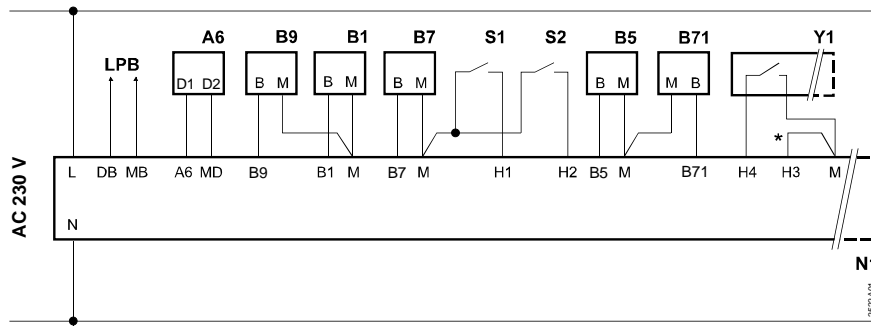
- The plant type must be selected.
- When used in district heat plants, the district heat parameters can be locked.
- Each controller is supplied complete with installation and commissioning instructions

Technical Data

CE conformance to	
EMC directive	89/336/EEC
Immunity	EN 50082-2
Emissions	EN 50081-1
Low voltage directive	73/23/EEC
Safety	EN 60730-1
Rated operating voltage	AC 230 V
Frequency	50 Hz
Power consumption	8 VA
Degree of protection (cover closed)	IP42 EN 60529
Insulation class	II EN 60730
Output relays	
Rated voltage	AC 230 V
Rated current	2(2) A
Contact current at AC 24...90 V	0.1...2 A, $\cos \varphi > 0.6$
Contact current at AC 90...250 V	0.02...2 A, $\cos \varphi > 0.6$
Rated current of ignition transformer	1 A max. during 30 s max.
Switch-on current of ignition transformer	10 A max. during 10 ms max.
Perm. ambient temperature	
Transport and storage	-25...+65 °C
Operation	0...50 °C
Perm. cable lengths to the sensors and external contacts	
Copper cable 0.6 mm dia.	20 m
Copper cable 1.0 mm ²	80 m
Copper cable 1.5 mm ²	120 m
Perm. cable lengths to the room unit	
Copper cable 0.25 mm ²	25 m
Copper cable from 0.5 mm ²	50 m
Bus loading characteristic E (LPB)	6
Backup of controller clock	min. 12 h
Weight (net)	1.1 kg

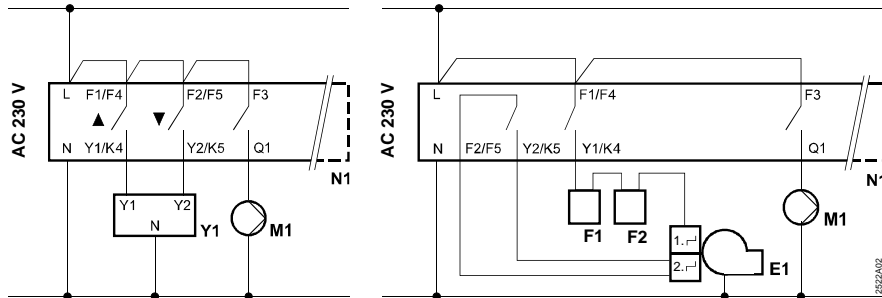
Connection diagrams

Basic connections on the low voltage



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 2-stage burner)



A6 Room unit QAW50 or QAW70
 B1 Flow or boiler sensor
 B5 Room sensor
 B7 Return sensor (primary circuit)
 B71 Return sensor (secondary circuit)
 B9 Outside sensor
 E1 2-stage burner
 F1 Thermal reset limit thermostat
 F2 Manual reset safety limit thermostat

LPB Data 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

Dimensions

