



## Heating Controller

including d.h.w. heating

Series C

## RVL472

- Multifunctional heating controller for use in residential and non-residential buildings
- Suited for:
  - Heating zone control with or without room influence through weather-compensated flow temperature control and, at the same time, demand-compensated boiler temperature control
  - Pre-control through demand-compensated boiler temperature control; suited for integration into heat source cascades or heat source systems (with heat pump, solar collectors or wood-fired boilers)
- Boiler temperature control with single-, 2-stage or modulating burners
- Control of d.h.w. heating with extended legionella function
- Communicating
- 21 preprogrammed plant types with automatic assignment of the functions required for each plant type
- Analog or digital setting of the heating curve; analog room temperature readjustment; operating line principle for all other parameters
- 2 scalable voltage inputs DC 0...10 V for heat demand signals from external consumers
- Connection facility for solar and wind sensors
- Multifunctional relay
- Operating voltage AC 230 V, CE conformity

- Types of houses and buildings:
  - Multifamily houses
  - Single-family houses
  - Smaller non-residential buildings
- Types of plants:
  - Heating zones including d.h.w. heating
  - Interconnected plants consisting of heat source, several heating zones and central or decentral d.h.w. heating plant
- Types of heating systems:
  - Radiator, convector, underfloor and ceiling heating systems, or radiant panels

## Functions

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### Heating zone control

- Weather-compensated flow temperature control through control of the mixing valve in one of the heating zones
- Weather-compensated flow temperature control through control of the mixing valve and demand-compensated control of the boiler temperature through control of the burner in one of the heating zones
- Weather-compensated flow temperature control through control of the mixing valve and demand-compensated control of the boiler temperature through control of the burner in one of the heating zones; with separate mixing valve for minimum limitation of the boiler return temperature

### Precontrol

- Demand-compensated control of the boiler temperature through control of the burner; heat demand signal via data bus
- Demand-compensated control of the boiler temperature through control of the burner; heat demand signal via data bus; with separate mixing valve for minimum limitation of the boiler return temperature

### D.h.w. control

- D.h.w. heating:
  - Through control of the charging pump
  - Through control of the mixing valve
  - Via heat exchanger through control of the valve in the primary return
- Control of a circulating pump and of an electric immersion heater

### Operating modes



#### Automatic mode

Automatic changeover from the normal to the reduced room temperature, and vice versa, according to the 7-day program, automatic changeover to holiday mode, demand-compensated control of the heating system (ECO function)



#### Setback mode

Continuous heating to the reduced temperature (with ECO function)



#### Comfort mode

Continuous heating to the normal temperature (without ECO function)



#### Standby



#### Automatic d.h.w. heating

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 tools
- Communication functions

## Ordering

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When ordering, please give type reference **RVL472** 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. RVL472-A for English)
- B** for French, Dutch, Spanish (e.g. RVL472-B for French)
- C** for Danish, Finnish, Swedish (e.g. RVL472-C for Danish)

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

## Equipment combinations

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### Suitable sensors and room units

- Flow , return and d.h.w. temperature: All sensors with sensing elements LG-Ni 1000  $\Omega$  at 0 °C, for example:
  - Strap-on temperature sensor QAD22
  - Immersion temperature sensor QAE212... or QAP21.3
- Room temperature:
  - Room unit QAW50 or QAW70
  - Room temperature sensor QAA24
- Outdoor temperature:
  - Outside sensor QAC22 (LG-Ni 1000 sensing element)
  - Outside sensor QAC32 (NTC sensing element)
  - Wind sensor (commercially available, DC 0...10 V)
  - Solar impact sensor QLS60

### Suitable actuators

All electromotoric and electrohydraulic actuators for 3-position control made by SBT HVAC Products can be used.  
For details, refer to Data Sheets N4500...N4599.

### Communication

The controller can communicate with:

- All LPB-compatible devices made by SBT HVAC Products
- The SYNERGYR OZW30 central unit (software version 3.0 or higher)

### Incoming heat demand signals

The RVL472 has 2 separately scalable DC 0...10 V inputs (corresponding to 0...x °C) to which heat demand signals from external consumers can be fed (RVL55, UNIGYR, etc.).  
The value of "x" can be adjusted in the range of 30...130 °C.

Plant types

Plant types "Space heating"	
<p><b>1</b></p> <p>Space heating with a mixing zone. 3-position control acting on mixing valve</p> <p>Optional d.h.w. combinations: → 1, 2, 3</p>	0, 4
<p><b>2</b></p> <p>Space heating with a mixing zone. 3-position control acting on mixing valve</p> <p>Optional d.h.w. combinations: → 0, 4</p>	0, 4
<p><b>3</b></p> <p>Space heating with a mixing zone. 3-position control acting on mixing valve. Minimum limitation of the return temperature with own mixing valve</p> <p>Optional d.h.w. combinations: → 1</p>	0, 4
<p><b>4</b></p> <p>Precontrol with boiler, heat demand signal via data bus</p> <p>Optional d.h.w. combinations: → 1, 2, 3</p>	0, 4
<p><b>5</b></p> <p>Precontrol with boiler, heat demand signal via data bus. Minimum limitation of the return temperature with own mixing valve</p> <p>Optional d.h.w. combinations: → 1</p>	0, 4

\* Circulating pump or bypass pump can be selected

- A6 Room unit QAW50 or QAW70
- B1 Flow sensor
- B2 Boiler sensor
- B3 Flow sensor for d.h.w.
- B31 D.h.w. storage tank sensor / control thermostat 1
- B32 D.h.w. storage tank sensor / control thermostat 2
- B5 Room sensor
- B7 Return sensor

- B9 Outside sensor
- E1 Heat source (boiler)
- E2 Consumer (space)
- LPB Data bus
- K6 Electric immersion heater
- M1 Circulating pump / bypass pump
- M2 Heating circuit pump
- M3 Charging pump

- M4 Boiler pump / circulating pump
- N1 Controller RVL472
- U1 Solar impact sensor
- U2 Wind sensor
- Y1 Heating circuit mixing valve
- Y7 D.h.w. mixing valve or mixing valve for minimum limitation of the boiler return temperature

Plant types "D.h.w. heating"	
<b>0</b>	No d.h.w. heating
<b>1</b>	<p>D.h.w. heating through control of the charging pump.</p> <p>Circulating pump M4 only possible with space heating types 1, 2 and 4. Optional electric immersion heater not possible with modulating burners</p>
<b>2</b>	<p>D.h.w. heating through control of the mixing valve.</p> <p>Circulating pump M4 only possible with space heating types 1, 2 and 4. Optional electric immersion heater not possible with modulating burners</p>
<b>3</b>	<p>D.h.w. heating through control of the valve.</p> <p>Circulating pump M4 only possible with space heating types 1, 2 and 4</p>
<b>4</b>	<p>D.h.w. heating through electric immersion heater only. Not possible with modulating burners.</p> <p>Circulating pump M4 only possible with space heating types 1, 2 and 4</p>

## Working principle

The RVL472 offers 5 different plant types for space heating and precontrol, and 5 plant types for d.h.w. heating all of which are ready programmed. By combining the different plant types, a total of 21 plants can be configured.

When commissioning the system, the appropriate plant types for space heating / pre-control and d.h.w. heating need to be entered. This activates all functions required for the respective type of plant. The default settings are practice-oriented.

All functions that are not required for the configured plant type will not be shown and are deactivated.

## Enduser settings

With weather-compensated control, the flow temperature is controlled via the heating curve as a function of the outdoor temperature. 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 setting knob.

In addition, following can be entered by the enduser:

- The room temperature setpoints of normal heating, reduced heating and frost protection / holidays
- The d.h.w. temperature setpoints
- 2 independent 7-day switching programs and a maximum of 8 holiday periods per year
- The operating mode
- The time of day and the date

## Temperature acquisition

- Flow temperature: With 1 or 2 sensors (averaging)
- Outdoor temperature: With Ni or NTC sensor; the RVL472 automatically identifies the type of sensor used. In interconnected plants, it is also possible to identify the source of the outdoor temperature
- Room temperature: With a room sensor or room unit, or both (averaging)

## Space heating

- The room temperature is included in the control. It can be acquired with a sensor or can be simulated by a room model that uses an adjustable building time constant. When using a sensor, the impact on the control can be adjusted. It is also possible to limit the maximum room temperature
- The influence of solar radiation and/or wind can be acquired by a solar impact and/or wind sensor, which is then included in the control. The authority of both is adjustable. In interconnected plants, the sensor signals can be provided from external locations via data bus
- The heating is switched on and off depending on demand (ECO function). It is switched off when the amount of heat stored in the building structure is sufficient to maintain the required room temperature. In that case, the controller takes into account the progression of the room temperature and the building's heat storage capacity. It is possible to set 2 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 setpoint for the nonoccupancy time is reached (quick setback, can be deactivated). During heating up, the room temperature setpoint can be raised (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-compensated flow temperature control. P-band and integral action time are adjustable. The flow temperature is controlled via the controlling element (seat or slipper valve).

Minimum and maximum limitation of the flow temperature as well as maximum limitation of the rate of setpoint rise are adjustable.

<b>Boiler temperature control</b>	<p>Boiler temperature control is demand-compensated. If there is no demand for heat, the boiler will either be shut down or maintained at the minimum limit value (selectable). Minimum and maximum limitation of the boiler temperature are adjustable.</p> <p>With regard to the heat source, a differentiation is made between multistage and modulating burners. The type of heat source can be selected.</p>
Multistage burner	<p>In the case of a multistage burner, the boiler temperature is controlled through 2-position control. The boiler temperature is controlled by activating and deactivating the single- or 2-stage burner (direct burner control). 2-stage operation is enabled when the release limit of burner stage 2 is reached, and disabled when the reset limit of burner stage 2 is reached. The limits can be adjusted.</p>
Modulating burner	<p>In the case of a modulating burner, boiler temperature control is achieved through activation and deactivation of the burner and control of the burner's modulating actuator (PID mode). P-band, integral action time and derivative action time are adjustable. Modulation is activated during the second stage of the 2-stage burner.</p>
<b>Minimum limitation of the return temperature</b>	<p>Minimum limitation of the return temperature protects the boiler against flue gas condensation. With the RVL472, this function can be implemented in 3 different ways:</p> <ul style="list-style-type: none"> <li>• Lowering of the consumers' flow temperature setpoint</li> <li>• Use of a bypass pump (only with plant types 2-x and 4-x)</li> <li>• Own mixing valve in the boiler return (only with plant types 3-x and 5-x)</li> </ul>
<b>Maximum limitation of the return temperature</b>	<p>The RVL472 offers 2 types of return temperature maximum limitation:</p> <ul style="list-style-type: none"> <li>• With plant types 1-x: Limitation acts on the setpoint of the heating circuit's flow temperature</li> <li>• With plant types 2-x and 4-x: Limitation acts on the boiler temperature setpoint (suited for bivalent plants)</li> </ul>
<b>Locking functions</b>	<p>On the software side, all settings can be locked to prevent tampering.</p>
<b>Time switches</b>	<ul style="list-style-type: none"> <li>• The RVL472 has 3 independent 7-day time switches whose assignment can be selected. Each 7-day time switch affords 3 daily on periods, which may differ from one weekday to the other.</li> </ul> <p>The heating circuit, d.h.w. heating, circulating pump and multifunctional relay can be assigned to one of the three 7-day time switches</p> <ul style="list-style-type: none"> <li>• For entering a maximum of 8 holiday periods, the RVL472 is equipped with a yearly time switch featuring automatic summer- / wintertime changeover</li> </ul>
<b>D.h.w. heating</b>	<p>D.h.w. heating is controlled independent of the heating circuit. Charging to the normal or reduced d.h.w. setpoint can be adjusted to meet individual needs. It can be released:</p> <ul style="list-style-type: none"> <li>• According to its own 7-day program</li> <li>• According to the switching program of the heating circuit (one hour before space heating starts)</li> <li>• According to the switching programs of the zone controllers on the data bus</li> <li>• Continuously (24 hours a day)</li> </ul> <p>D.h.w. heating features a legionella function that can be deactivated. It is activated at a pre-determined date and time and for a selected duration.</p> <p>The d.h.w. temperature is acquired:</p> <ul style="list-style-type: none"> <li>• With 1 or 2 sensors</li> <li>• With 1 or 2 thermostats</li> </ul> <p>D.h.w. control also includes the control of a circulating pump and of an electric immersion heater. The impact of the legionella function on the circulating pump can be disabled.</p> <p>The d.h.w. storage tank can be forcedly charged once a day.</p>

## Remote control

- Changeover of operating mode with room unit QAW50
- Overriding the major controller functions with room unit QAW70
- Selection of another (programmable) operating mode with an external switch
- Preselection of a boiler or flow temperature setpoint with an external contact. Adjustable are the type of setpoint (constant or minimum), its action (on the heating circuit or boiler), and the flow temperature

## Communication

Communication with other devices takes place via data bus (LPB) and allows:

- Signaling of heat demand to the heat source
- Exchange of locking and enforced signals
- Exchange of measured values such as outdoor temperature, return temperature, flow temperature and of clock signals
- Integration of heat source cascades or heat source systems (heat pump, solar panels, wood-fired boiler)
- Reception of heat demand signal from the SYNERGYR OZW30 central unit (with software version 3.0 or higher)
- Exchange of error messages

## Error messages and flow temperature alarm

- Error messages in the event of sensor faults
- Error messages in the event of data bus or room unit faults
- Flow temperature alarm; adjustable is the period of time during which the flow temperature / boiler temperature may stay outside the set limits; an error message is delivered when the set time has elapsed

## Other functions

- One multifunctional relay. Choice of functions: Outdoor temperature switch, on / off according to the time switch, alarm contact in the event of error messages, on / off according to the occupancy time, on / off according to the occupancy time including optimization, on / off according to heat demand, on / off manually
- Display of parameters, actual values, operating states and error messages
- Simulation of outdoor temperature
- Relay test; all relays can be controlled manually
- Sensor test; all measured values from sensors and thermostats can be displayed
- Testing the contacts connected to terminals H1–M and H2–M
- Outdoor temperature-dependent frost protection for the plant; a minimum flow temperature is maintained; its setpoint and the response threshold can be adjusted
- Pump overrun to prevent the buildup of heat
- Periodic pump run (pump kick) to prevent seizing of the pumps in the summer
- Controller hours run meter

For more detailed information about technical features and functions and the data bus (LPB), refer to the following pieces of documentation:

- Basic Documentation RVL472: P2526
- Data Sheet Basic System Data LPB: N2030
- Data Sheet Basic Engineering Data LPB: N2032

## Mechanical design

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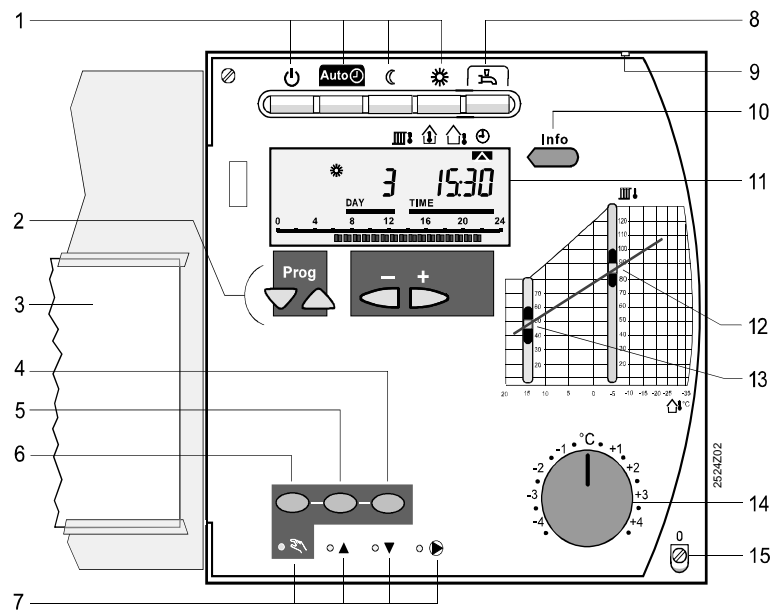
The RVL472 consists of controller insert, which accommodates the electronics, power section, output relays and – on the unit front – all operating elements, and base with the connection terminals. The operating elements are located behind a lockable transparent cover.

The operating instructions can be inserted in the transparent cover.

The controller insert is secured to the base with 2 screws, one of which can be sealed. The cover can also be sealed.

The RVL472 can be mounted in 3 different ways:

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



- Buttons for selecting the operating mode (selected button is lit)
- Buttons for operating the display:  
**Prog** = selection of operating line  
- + = readjustment of displayed value
- Operating instructions
- Button for "close heating circuit mixing valve" or "reduce modulation" or "burner stage 2 on / off" in manual operation
- Button for "open heating circuit mixing valve" or "increase modulation" in manual operation
- Button for manual operation
- LEDs for  
  - Manual operation
  - ▲ Heating circuit mixing valve opens / modulating burner actuator opens / burner stage 1 on
  - ▼ Heating circuit mixing valve closes / modulating burner actuator closes / burner stage 2 on
  - Pump runs
- Button for d.h.w. heating on / off (on = button lit)
- Sealing facility in the cover
- Info button for the display of actual values
- Display (LCD)
- Setting slider for flow temperature setpoint at  $-5^{\circ}\text{C}$  outdoor temperature
- Setting slider for flow temperature setpoint at  $15^{\circ}\text{C}$  outdoor temperature
- Knob for room temperature readjustment
- Fixing screw with sealing facility

### Analog operating elements

- Buttons for selecting the operating mode
- Button for d.h.w. heating on / off
- Info button
- Direct setting of heating curve by means of the little bar (only if analog setting is selected)
- Knob for manual readjustment of the room temperature
- 3 buttons for manual operation and for manual positioning commands

### Digital operating elements

Entry or readjustment of all setting parameters, activation of optional functions and reading of actual values and states 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.



## Notes

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### 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 safety regulations must be complied with.  
Sensor cables should not be run parallel to mains carrying cables for loads such as actuators, pumps, burners, etc.

### Commissioning

The plant type must be configured.  
Each controller is supplied complete with mounting and commissioning instructions.

## Technical data

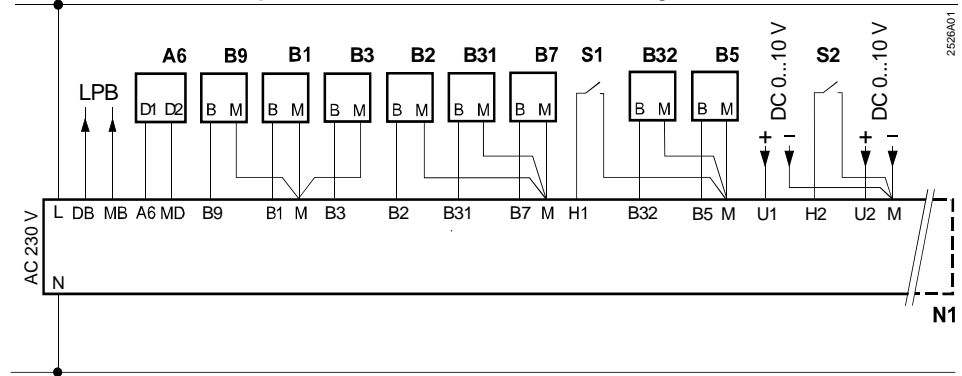
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<b>CE</b> conformity to	
EMC directive	89/336/EEC
Immunity	EN 50 082-2
Emissions	EN 50 081-1
Low voltage directive	73/23/EEC
Safety	EN 60 730-1
Nominal operating voltage	AC 230 V
Frequency	50 Hz
Power consumption	9 VA
Output relays	
Nominal voltage	AC 24... 230 V
Nominal current range K4, K5, Q1, Y1, Y2, Y7, Y8	AC 0,02...2 (2) A
Nominal current range Q3, Q2, Q4, K6	AC 0,02...1 (1) A
Nominal current of ignition transformer	max. 1 A for max. 30 s
Switch-on current of ignition transformer	max. 10 A for max. 10 ms
Degree of protection (cover closed)	IP42 EN 60 529
Safety class	II EN 60 730
Perm. ambient temperature	
Transport and storage	-25...+65 °C
Operation	0...50 °C
Perm. cable lengths to the sensors, thermostats and external contacts	
Copper cable 0.6 mm dia.	20 m
Copper cable 1.0 mm <sup>2</sup>	80 m
Copper cable 1.5 mm <sup>2</sup>	120 m
Perm. cable lengths to the room unit	
Copper cable 0.25 mm <sup>2</sup>	25 m
Copper cable from 0.5 mm <sup>2</sup>	50 m
Bus loading characteristic E (LPB)	9
Backup of controller clock	12 h
Weight (net)	1.2 kg

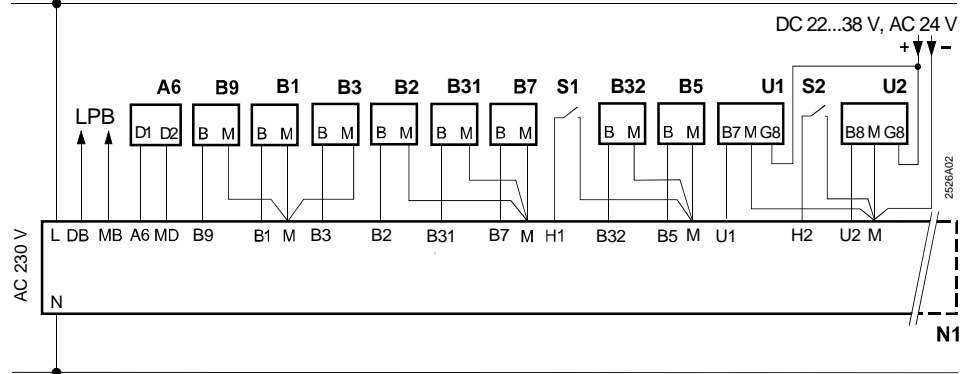
Connection diagrams

Low voltage side

Basic connections for plants with external heat demand signals

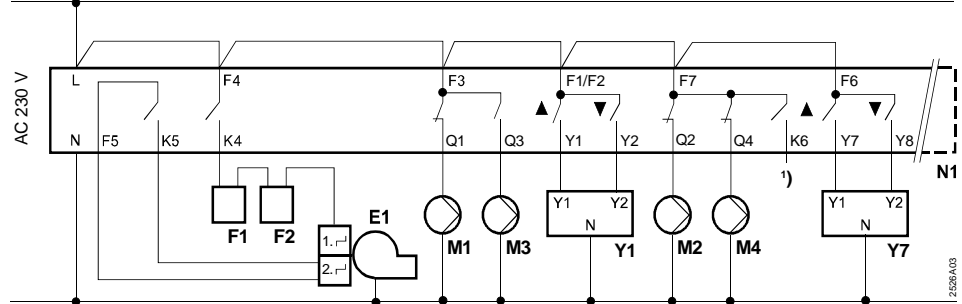


Basic connections for plants with solar impact and wind sensors

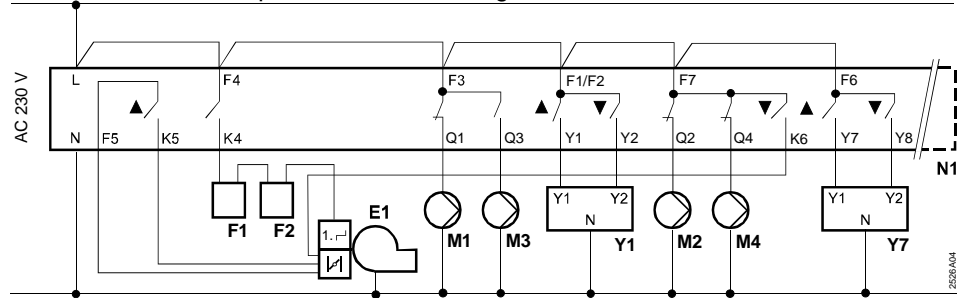


Mains voltage side

Basic connections for plants with 2-stage burner



Basic connections for plants with modulating burner



- |     |   |    |  |
|-----|---|----|--|
| A6  | Room unit QAW50 or QAW70                          | M1 | Circulating pump / bypass pump                             |
| B1  | Flow sensor                                       | M2 | Heating circuit pump                                       |
| B2  | Boiler sensor                                     | M3 | Charging pump  |
| B3  | Flow sensor for d.h.w.                            | M4 | Boiler pump / circulating pump                             |
| B31 | D.h.w. storage tank sensor / control thermostat 1 | N1 | Controller RVL472  |
| B32 | D.h.w. storage tank sensor / control thermostat 2 | S1 | Remote operation for operating mode                        |
| B5  | Room sensor                                       | S2 | Remote operation for the flow temperature setpoint         |
| B7  | Return sensor                                     | U1 | Solar impact sensor  |
| B9  | Outside sensor                                    | U2 | Wind sensor  |
| E1  | 2-stage or modulating burner                      | Y1 | Actuator heating circuit                                   |
| F1  | Limit thermostat                                  | Y7 | Actuator d.h.w. circuit or return temperature mixing valve |
| F2  | Safety limit thermostat                           | 1) | Multifunctional output                                     |
| LPB | Data bus  |    |  |

## Dimensions

