



Series D

District Heating Controller

RVD230

for one heating circuit and d.h.w., communicating

- Controller for use in autonomous or interconnected plants with a district heat connection
- Weather- or room-compensated control of a pump or mixing heating circuit or demand-dependent pre-control
- D.h.w. heating with a storage tank or instantaneous system (with idle heat function) or directly (off the heat exchanger)
- 28 preprogrammed plant types with automatic assignment of the functions required for each type of plant
- Direct analog setting of the room temperature setpoint, the other settings are digital and made via the operating lines
- Communication capability, via LPB or M-bus
- Operating voltage AC 230 V, controller for flush panel mounting measuring 96×144 mm, conforming to CE
- Optional remote operation via the room unit

Use

- Plants:
 - Autonomous heating zone with own d.h.w. heating, with connection to a district heat substation
 - Interconnected plants consisting of several heating zones and own d.h.w. heating (within the district heat substation)
- Buildings:
Residential and non-residential buildings with own district heat connection
- Space heating systems:
All types of common heating systems, such as radiator, convector, underfloor and ceiling heating systems, or radiant panels

Functions

- Heating circuit control**
- Weather-compensated flow temperature control, mixing valve with a 3-position actuator
 - Weather-compensated flow temperature control with room temperature influence, mixing valve with a 3-position actuator
 - Room-compensated flow temperature control, mixing valve with a 3-position actuator
 - Demand-dependent control of the common flow temperature
- Pre-control**
- Demand-dependent control of the pre-controlled flow temperature in interconnected plants
- D.h.w. control**
- D.h.w. heating with storage tanks, with or without a mixing valve in the secondary circuit
 - D.h.w. heating with instantaneous systems
 - D.h.w. directly via the heat exchanger
- Other functions**
- Optimum start / stop control
 - Automatic heating limit (ECO function)
 - Frost protection (for the building, plant and d.h.w.)
 - Annual clock for annual holidays, with automatic summer-/wintertime changeover
 - Independent time switch programs for space heating and d.h.w.
 - Maximum limitation of the rate of flow temperature increase and flow alarm
 - Analog (DC 0...10 V) and digital input
 - PWM output for controlling a variable speed pump
 - Communication via LPB (Local Process Bus)
 - Communication via M-bus
 - Pump kick and valve kick
 - Idle heat function in the case of instantaneous d.h.w. heating via the parallel heat exchanger
 - Flow switch with adjustable load limit, protection against tampering and adaptation to the seasons
 - Maximum limitation of return temperature differential (DRT function)
 - Minimum limitation of the flow rate for suppressing hydraulic creep
 - Relay and sensor tests
 - Remote operation via the room unit

Ordering

When ordering, please give type reference **RVD230** and the language code letter (-A or -C) for the Operating Instructions and the Installation Instructions in the requested language:

-A for English, French, Italian, German (e.g. RVD230-A for English)

-C for Danish, Finnish, Swedish, Polish (e.g. RVD230-C for Danish)

Sensors, room unit, actuators and valves must be ordered as separate items.

Equipment combinations

Suitable sensors and room units	<i>Type of sensor</i>	<i>Type reference</i>	<i>Data sheet</i>
	Outside sensor LG-Ni 1000	QAC22	N1811
	Outside sensor NTC 575	QAC32	N1811
	Strap-on temperature sensor	QAD22	N1801
	Immersion temperature sensor	QAE212...	N1781
	Other sensors with LG-Ni 1000 sensing element	QA...	–
	Immersion temperature sensor Pt 500	Commercially available	–
	Room unit	QAW70	N1637
	Room unit	QAW50	N1635
	Room temperature sensor	QAA10	N1725
	Digital time signal receiver (LPB)	AUF77	–

Suitable actuators

All types of electric and electrohydraulic actuators made by SBT HVAC Products with the following features can be used:

- Operating voltage AC 24...230 V
- 3-position control

When used in connection with d.h.w. heating, the actuator running times and time constants of the temperature sensors must be taken into consideration. For detailed information, refer to Basic Documentation P2383.

For the different types of actuators and valves, refer to data sheets N4000...N4999.

Suitable room units

Available are 2 different types of room units and a room temperature sensor:



QAW70 room unit, with room temperature sensor, time switch, setpoint adjustment and readjustment of the room temperature setpoint (setting knob)



QAW50 room unit, with room temperature sensor, and readjustment of the room temperature setpoint (setting knob)



QAA10 room temperature sensor

Technical design

Functioning

The RVD230 controller has 7 types of heating circuits and 11 types of d.h.w. heating modes preprogrammed. By combining the 2, it is possible to configure 28 different types of plant.

When commissioning the system, the required plant type must be entered. The necessary functions, settings and displays will then automatically be assigned, and the parameters not required for the respective type of plant will be hidden.

Operating modes



Automatic operation

Automatic heating according to the time switch program, ECO function and room unit active



Continuous operation

Heating with no time switch program, setpoint adjustment with the setting knob

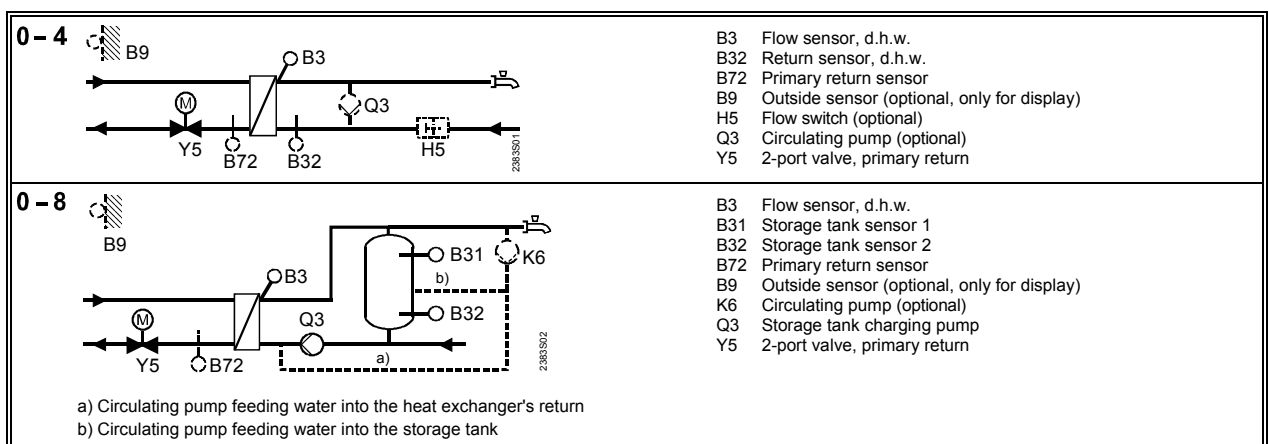


Standby

Heating off, frost protection ensured

The operating mode of the heating circuit does not affect d.h.w. heating.

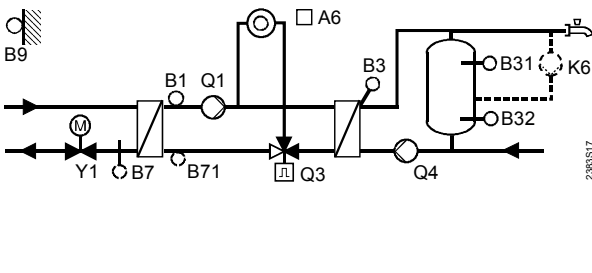
Plant types



<p>0-9</p> <p>2383503</p>	<p>B3 Flow sensor, d.h.w. B31 Storage tank sensor 1 B32 Storage tank sensor 2 B72 Primary return sensor B9 Outside sensor (optional, only for display) K6 Circulating pump (optional) Q3 D.h.w. intermediate circuit pump Y5 2-port valve, d.h.w. primary return</p>
<p>0-10</p> <p>a) Circulating pump feeding water into the heat exchanger's return b) Circulating pump feeding water into the storage tank</p> <p>2383504</p>	<p>B12 Flow sensor, d.h.w. 2 B3 Flow sensor, d.h.w. 1 B31 Storage tank sensor 1 B32 Storage tank sensor 2 B72 Primary return sensor B9 Outside sensor (optional, only for display) K6 Circulating pump (optional) Q3 D.h.w. intermediate circuit pump Q4 Storage tank charging pump Y5 2-port valve, d.h.w. primary return</p>
<p>1-0</p> <p>2383505</p>	<p>A6 Room unit B1 Flow sensor, heating circuit B7 Primary return sensor* B71 Secondary return sensor B9 Outside sensor Q1 Heating circuit pump Y1 2-port valve, primary return</p> <p>* Suppression of hydraulic creep</p>
<p>1-3</p> <p>2383506</p>	<p>A6 Room unit B1 Flow sensor, heating circuit B31 Storage tank sensor 1 B32 Storage tank sensor 2 B7 Primary return sensor, heating circuit* B71 Secondary return sensor, heating circuit B72 Primary return sensor, d.h.w. B9 Outside sensor K6 Circulating pump (optional) Q1 Heating circuit pump Y1 2-port valve, heating circuit primary return Y5 2-port valve, d.h.w. primary return</p> <p>* Suppression of hydraulic creep</p>
<p>1-4</p> <p>2383507</p>	<p>A6 Room unit B1 Flow sensor, heating circuit B3 Flow sensor, d.h.w. B32 Return sensor, d.h.w. circuit B7 Primary return sensor, heating circuit* B71 Secondary return sensor, heating circuit B72 Primary return sensor, d.h.w. circuit B9 Outside sensor H5 Flow switch (optional) Q1 Heating circuit pump Q3 Circulating pump (optional) Y1 2-port valve, heating circuit primary return Y5 2-port valve, d.h.w. primary return</p> <p>* Suppression of hydraulic creep</p>
<p>1-8</p> <p>a) Circulating pump feeding water into the heat exchanger's return b) Circulating pump feeding water into the storage tank</p> <p>2383509</p>	<p>A6 Room unit B1 Flow sensor, heating circuit B3 Flow sensor, d.h.w. B31 Storage tank sensor 1 B32 Storage tank sensor 2 B7 Primary return sensor, heating circuit* B71 Secondary return sensor, heating circuit B72 Primary return sensor, d.h.w. circuit B9 Outside sensor Q1 Heating circuit pump Q3 Circulating pump (optional) Q4 Storage tank charging pump Y1 2-port valve, heating circuit primary return Y5 2-port valve, d.h.w. primary return</p> <p>* Suppression of hydraulic creep</p>
<p>1-9</p> <p>2383510</p>	<p>A6 Room unit B1 Flow sensor, heating circuit B3 Flow sensor, d.h.w. B31 Storage tank sensor 1 B32 Storage tank sensor 2 B7 Primary return sensor, heating circuit* B71 Secondary return sensor, heating circuit B72 Primary return sensor, d.h.w. circuit B9 Outside sensor K6 Circulating pump (optional) Q1 Heating circuit pump Q3 D.h.w. intermediate circuit pump Y1 2-port valve, heating circuit primary return Y5 2-port valve, d.h.w. primary return</p> <p>* Suppression of hydraulic creep</p>

<p>1-10</p> <p>a) Circulating pump feeding water into the heat exchanger's return b) Circulating pump feeding water into the storage tank</p>	<p>A6 Room unit B1 Flow sensor, heating circuit B12 Flow sensor, d.h.w. 2 B3 Flow sensor, d.h.w. 1 B31 Storage tank sensor 1 B32 Storage tank sensor 2 B7 Primary return sensor, heating circuit* B71 Secondary return sensor, heating circuit B72 Primary return sensor, d.h.w. circuit B9 Outside sensor K6 Circulating pump (optional) Q1 Heating circuit pump Q3 D.h.w. intermediate circuit pump Q4 Storage tank charging pump Y1 2-port valve, heating circuit primary return Y5 2-port valve, d.h.w. primary return</p> <p>* Suppression of hydraulic creep</p>
<p>2-1</p>	<p>A6 Room unit B1 Sensor, common flow B31 Storage tank sensor 1 B32 Storage tank sensor 2 B7 Sensor, common primary return* B71 Sensor, common secondary return B72 Return sensor, d.h.w. circuit B9 Outside sensor Q1 Heating circuit pump Q3 D.h.w. intermediate circuit pump Y1 2-port valve, common return</p> <p>* Suppression of hydraulic creep</p>
<p>2-2</p>	<p>A6 Room unit B1 Sensor, common flow B3 Flow sensor, d.h.w. B31 Storage tank sensor 1 B32 Storage tank sensor 2 B7 Sensor, common primary return* B71 Sensor, common secondary return B72 Return sensor, d.h.w. circuit B9 Outside sensor K6 Circulating pump (optional) Q1 Heating circuit pump Q3 D.h.w. intermediate circuit pump Y1 2-port valve, common return Y5 Mixing valve, d.h.w. circuit</p> <p>* Suppression of hydraulic creep</p>
<p>2-6</p>	<p>A6 Room unit B1 Sensor, common flow B3 Flow sensor, d.h.w. B31 Storage tank sensor 1 B32 Storage tank sensor 2 B7 Sensor, common primary return* B71 Sensor, common secondary return B9 Outside sensor K6 Circulating pump (optional) Q1 Heating circuit pump Q3 D.h.w. intermediate circuit pump Q4 Storage tank charging pump Y1 2-port valve, common return</p> <p>* Suppression of hydraulic creep</p>
<p>2-7</p> <p>a) Circulating pump feeding water into the heat exchanger's return b) Circulating pump feeding water into the storage tank</p>	<p>A6 Room unit B1 Sensor, common flow B12 Flow sensor, d.h.w. 2 B3 Flow sensor, d.h.w. 1 B31 Storage tank sensor 1 B32 Storage tank sensor 2 B7 Sensor, common primary return* B71 Sensor, common secondary return B72 Return sensor, d.h.w. circuit B9 Outside sensor K6 Circulating pump (optional) Q1 Heating circuit pump Q3 D.h.w. intermediate circuit pump Q4 Storage tank charging pump Y1 2-port valve, common return Y5 Mixing valve, d.h.w. circuit</p> <p>* Suppression of hydraulic creep</p>
<p>2-11</p>	<p>A6 Room unit B1 Sensor, common flow B31 Storage tank sensor 1 B32 Storage tank sensor 2 B7 Sensor, common primary return* B71 Sensor, common secondary return B9 Outside sensor K6 Circulating pump (optional) Q1 System pump Q3 Diverting valve Y1 2-port valve, common return</p> <p>* Suppression of hydraulic creep</p>

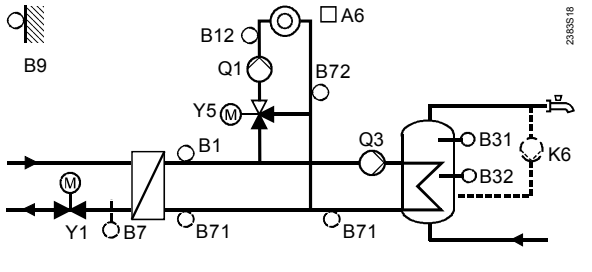
2-12



- A6 Room unit
- B1 Sensor, common flow
- B3 Flow sensor, d.h.w.
- B31 Storage tank sensor 1
- B32 Storage tank sensor 2
- B71 Sensor, common primary return*
- B71 Sensor, common secondary return
- B9 Outside sensor
- K6 Circulating pump (optional)
- Q1 System pump
- Q3 Diverting valve
- Q4 Storage tank charging pump
- Y1 2-port valve, common return

* Suppression of hydraulic creep

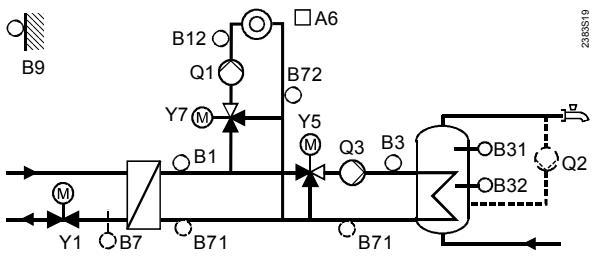
3-1



- A6 Room unit
- B1 Sensor, common flow
- B12 Flow sensor, heating circuit
- B31 Storage tank sensor 1
- B32 Storage tank sensor 2
- B7 Sensor, common primary return*
- B71 Sensor, common secondary or d.h.w. return
- B72 Return sensor, heating circuit
- B9 Outside sensor
- K6 Circulating pump (optional)
- Q1 Heating circuit pump
- Q3 D.h.w. intermediate circuit pump
- Y1 2-port valve, common return
- Y5 Mixing valve, heating circuit

* Suppression of hydraulic creep

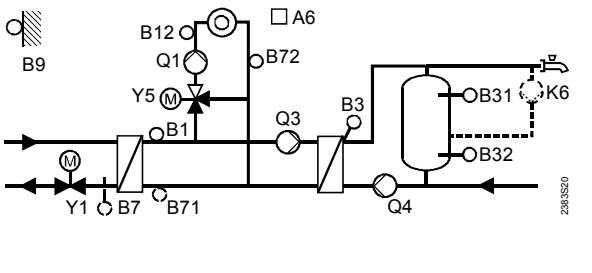
3-2



- A6 Room unit
- B1 Sensor, common flow
- B12 Flow sensor, heating circuit
- B3 Flow sensor, d.h.w.
- B31 Storage tank sensor 1
- B32 Storage tank sensor 2
- B71 Sensor, common primary return*
- B71 Sensor, common secondary or d.h.w. return
- B72 Return sensor, heating circuit
- B9 Outside sensor
- Q1 Heating circuit pump
- Q2 Circulating pump (optional)
- Q3 D.h.w. intermediate circuit pump
- Y1 2-port valve, common return
- Y5 Mixing valve, d.h.w. circuit
- Y7 Mixing valve, heating circuit

* Suppression of hydraulic creep

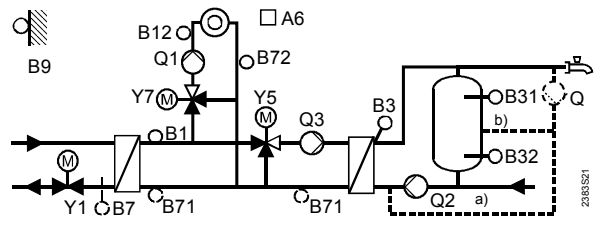
3-6



- A6 Room unit
- B1 Sensor, common flow
- B12 Flow sensor, heating circuit
- B3 Flow sensor, d.h.w.
- B31 Storage tank sensor 1
- B32 Storage tank sensor 2
- B7 Sensor, common primary return*
- B71 Sensor, common secondary return
- B72 Return sensor, heating circuit
- B9 Outside sensor
- K6 Circulating pump (optional)
- Q1 Heating circuit pump
- Q3 D.h.w. intermediate circuit pump
- Q4 Storage tank charging pump
- Y1 2-port valve, common return
- Y5 Mixing valve, heating circuit

* Suppression of hydraulic creep

3-7

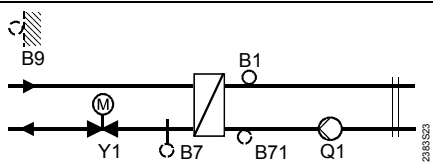


- a) Circulating pump feeding water into the heat exchanger's return
- b) Circulating pump feeding water into the storage tank

- A6 Room unit
- B1 Sensor, common flow
- B12 Flow sensor, heating circuit
- B3 Flow sensor, d.h.w.
- B31 Storage tank sensor 1
- B32 Storage tank sensor 2
- B7 Sensor, common primary return*
- B71 Sensor, common secondary or d.h.w. return
- B72 Return sensor, heating circuit
- B9 Outside sensor
- Q Circulating pump (optional, controlled externally)
- Q1 Heating circuit pump
- Q2 Storage tank charging pump
- Q3 D.h.w. intermediate circuit pump
- Y1 2-port valve, common return
- Y5 Mixing valve, d.h.w. circuit
- Y7 Mixing valve, heating circuit

* Suppression of hydraulic creep

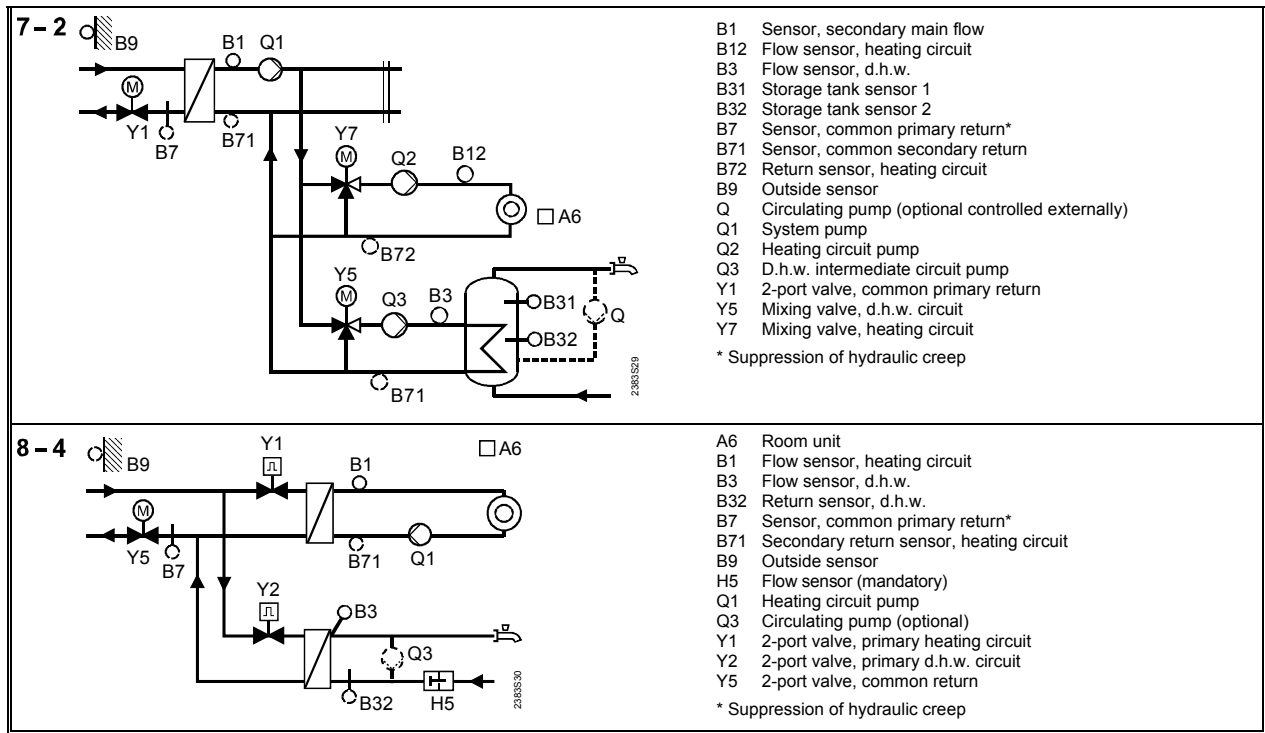
5-0



- B1 Sensor, pre-controlled secondary flow
- B7 Sensor, pre-controlled primary return*
- B71 Sensor, secondary return
- B9 Outside sensor (optional, only for display)
- Q1 System pump
- Y1 2-port valve, pre-controlled primary return

* Suppression of hydraulic creep

<p>5-4</p> <p style="text-align: right;">2383524</p>	<p>B1 Sensor, pre-controlled secondary flow B3 Flow sensor, d.h.w. B32 Secondary return sensor, d.h.w. B7 Sensor, pre-controlled primary return* B71 Sensor, pre-controlled secondary return B72 Primary return sensor, d.h.w. B9 Outside sensor (optional, only for display) H5 Flow switch (optional) Q1 System pump Q3 Circulating pump (optional) Y1 2-port valve, pre-controlled primary return Y5 2-port valve, d.h.w. circuit primary return</p> <p>* Suppression of hydraulic creep</p>
<p>5-9</p> <p style="text-align: right;">2383525</p>	<p>B1 Sensor, pre-controlled secondary flow B3 Flow sensor, d.h.w. B31 Storage tank sensor 1 B32 Storage tank sensor 2 B7 Sensor, pre-controlled primary return* B71 Sensor, pre-controlled secondary return B72 Primary return sensor, d.h.w. B9 Outside sensor (optional, only for display) K6 Circulating pump (optional) Q1 System pump Q3 D.h.w. intermediate circuit pump Y1 2-port valve, pre-controlled primary return Y5 2-port valve, d.h.w. circuit primary return</p> <p>* Suppression of hydraulic creep</p>
<p>5-10</p> <p style="text-align: right;">2383526</p> <p>a) Circulating pump feeding water into the heat exchanger's return b) Circulating pump feeding water into the storage tank</p>	<p>B1 Sensor, pre-controlled secondary flow B12 Flow sensor, d.h.w. 2 B3 Flow sensor, d.h.w. 1 B31 Storage tank sensor 1 B32 Storage tank sensor 2 B7 Sensor, pre-controlled primary return* B71 Sensor, pre-controlled secondary return B72 Primary return sensor, d.h.w. B9 Outside sensor (optional, only for display) K6 Circulating pump (optional) Q1 System pump Q3 D.h.w. intermediate circuit pump Q4 Storage tank charging pump Y1 2-port valve, pre-controlled primary return Y5 2-port valve, d.h.w. circuit primary return</p> <p>* Suppression of hydraulic creep</p>
<p>6-2</p> <p style="text-align: right;">2383527</p>	<p>B1 Sensor, secondary main flow B3 Flow sensor, d.h.w. B31 Storage tank sensor 1 B32 Storage tank sensor 2 B7 Sensor, common primary return* B71 Sensor, common secondary return B72 Secondary return sensor, d.h.w. B9 Outside sensor (optional, only for display) K6 Circulating pump (optional) Q1 System pump Q3 D.h.w. intermediate circuit pump Y1 2-port valve, common primary return Y5 Mixing valve, d.h.w. circuit</p> <p>* Suppression of hydraulic creep</p>
<p>6-7</p> <p style="text-align: right;">2383528</p> <p>a) Circulating pump feeding water into the heat exchanger's return b) Circulating pump feeding water into the storage tank</p>	<p>B1 Sensor, common secondary flow B12 Flow sensor, d.h.w. 2 B3 Flow sensor, d.h.w. 1 B31 Storage tank sensor 1 B32 Storage tank sensor 2 B7 Sensor, common primary return* B71 Sensor, common secondary return B72 Secondary return sensor, d.h.w. B9 Outside sensor (optional, only for display) K6 Circulating pump (optional) Q1 System pump Q3 D.h.w. intermediate circuit pump Q4 Storage tank charging pump Y1 2-port valve, common primary return Y5 Mixing valve, d.h.w. circuit</p> <p>* Suppression of hydraulic creep</p>



Heating circuit control

Plant types

The RVD230 makes possible the control of the following types of plant:

- Pump heating circuit off heat exchanger
- Mixing heating circuit off heat exchanger
- Common flow off heat exchanger
- Common flow off heat exchanger and separate mixing heating circuit

Acquisition of measured values

The measuring variables of the heating circuit are acquired with the following types of temperature sensors (sensing elements):

- Heating circuit flow, common flow and pre-controlled flow B1: LG-Ni 1000
- Heating circuit flow B12: LG-Ni 1000
- District heat return B7: LG-Ni 1000 or Pt 500
- Secondary return B71 and B72: LG-Ni 1000 or Pt 500

The controller automatically identifies the type of sensor used.

Compensating variables

With weather-compensated control systems, the composite outside temperature is used as the compensating variable. It is generated from the actual and the attenuated outside temperature (calculated by the controller).

The building's time constant can be adjusted.

Generation of flow temperature setpoint

The setpoints of the nominal room temperature, the reduced room temperature and the room temperature for frost protection can be adjusted. The assigned flow temperature setpoint is generated as follows:

- Weather-compensated control: the flow temperature setpoint is continuously controlled depending on the prevailing weather conditions. The assignment of the flow temperature to the actual outside temperature is made via the heating curve
- Weather-compensated control with room influence: the flow temperature setpoint is controlled depending on the prevailing weather conditions and, in addition, depending on the deviation of the actual room temperature from the setpoint
- Room-compensated control: the flow temperature setpoint is controlled depending on the deviation of the actual room temperature from the setpoint

The maximum rate of the flow temperature setpoint increase can be limited. Also, a flow alarm is provided: the period of time during which the flow temperature may stay

outside a defined setpoint range can be adjusted. A fault message will be delivered when the period of time has elapsed.

Heating circuit control

The controlled variable is always the flow temperature measured with B1. With **all** types of plant, it is controlled through the 2-port valve in the primary return depending on the plant's total demand for heat (heating circuit(s) and d.h.w. circuit).

Maximum limitation of return temperature

- Primary circuit: the valve in the primary circuit starts traveling towards the closed position when the limit value is exceeded. The characteristic is constant-shifting-constant depending on the outside temperature
- Secondary circuit: the valve in the primary circuit starts traveling towards the closed position when the limit value is exceeded. The differential to the primary circuit limit value must be set

Optimization

The control is optimized. Switching on, heating up and switching off are controlled such that the required room temperature is ensured during occupancy times. At the end of each occupancy period, the heating is switched off (circulating pump) until the room temperature setpoint of the non-occupancy time is reached (quick setback, can be deactivated).
Maximum limit values can be set for the heating up time and for early shutdown. The optimization functions can be deactivated.

ECO function

With the automatic ECO function, the heating is controlled depending on demand. It will be shut down if permitted by the prevailing outside temperature. Consideration is given to the actual, the attenuated and the composite outside temperature, as well as to an adjustable heating limit.
The ECO function necessitates an outside sensor. It can be deactivated, if required.

Maximum and minimum limitation of the flow temperature

Both limitations are accomplished via the heating curve. When the limit value is reached, the heating curve assumes a constant value. The display shows whenever a limitation is active.
Both limitations can be deactivated.

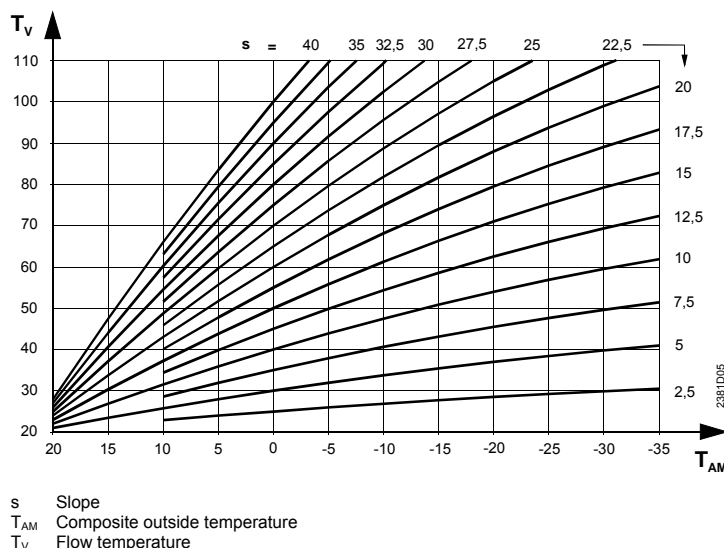
DRT function

The differential between the primary and the secondary temperature is limited to a maximum value.

Pump kick and valve kick

To prevent seizing, a kick can be set for all pumps and valves. The kick is made once a week and lasts 30 seconds.

Heating curve



Relay and sensor tests	To facilitate commissioning and fault tracing, the controller provides the following tests: <ul style="list-style-type: none"> • Relay test: each of the relays can be manually energized • Sensor test: all actual sensor values can be interrogated • Setpoint test: all actual setpoints can be interrogated
Pulse lock for actuators	To reduce relay contact wear, the total duration of the closing pulses delivered to an actuator is limited to five times the actuator's running time.
Raising the reduced room temperature	The setpoint of the reduced room temperature can be raised as the outside temperature falls. The increase (authority) is adjustable. This function can be deactivated, if required.
Frost protection for the building	Frost protection for the building maintains an adjustable minimum room temperature. This function cannot be deactivated.
Frost protection for the plant	Frost protection for the plant protects the heating plant against freeze-ups through activation of the heating circuit pump. This function can be used with or without outside sensor: <ul style="list-style-type: none"> • With outside sensor: <ul style="list-style-type: none"> Outside temperature ≤ 1.5 °C: the heating circuit pump runs for 10 minutes at 6-hour intervals Outside temperature ≤ -5 °C: the heating circuit pump runs continuously • Without outside sensor: <ul style="list-style-type: none"> Flow temperature ≤ 10 °C: the heating circuit pump runs for 10 minutes at 6-hour intervals Flow temperature ≤ 5 °C: the heating circuit pump runs continuously This function can be deactivated, if required.
Signal inputs	The following signal inputs are available: <ul style="list-style-type: none"> • Analog input for display and for passing on DC 0...10 V signals resp. for heat demand DC 0...10 V • Binary input for pulses or signals delivered by a flow switch or heat meter, for heat demand signals or alarms
Suppression of hydraulic creep	Minimum limitation of the flow rate aimed at suppressing hydraulic creep can act on both the heating circuit and the common primary return. This limitation is accomplished via an auxiliary switch in the actuator
Pre-control	The flow temperature is pre-controlled depending on demand through the valve in the heat exchanger's primary return. The demand signal is delivered via the LPD data bus.
D.h.w. heating	
Plant types	The RVD230 controller makes possible d.h.w. heating with the following types of plant and d.h.w. heating systems: <ul style="list-style-type: none"> • With a stratification storage tank and a storage tank charging pump (or diverting valve) and 2 sensors, with or without a mixing valve in the d.h.w. circuit (or intermediate circuit) • With a storage tank and intermediate circuit pump and 2 sensors, with or without mixing valve in the d.h.w. circuit • Directly via own heat exchanger Heat can be delivered to the d.h.w. circuit via the own heat exchanger or off the common flow (heating circuit and d.h.w. circuit).
Acquisition of measured values	The measuring variables required for d.h.w. heating are acquired with the following types of temperature sensors (sensing elements):

- Flow sensor B3: LG-Ni 1000 or Pt 500
 - Flow sensor B12: LG-Ni 1000
 - Storage tank sensor B31: LG-Ni 1000
 - Storage tank or secondary return sensor B32: LG-Ni 1000
 - Primary or secondary return sensors B71 and B72: LG-Ni 1000 or Pt 500
- The controller automatically identifies the type of sensor used.

Settings	Adjustable are: Normal setpoint and reduced setpoint, maximum setpoint, setpoint boost, switching differential, overrun time of the charging pump and maximum time of d.h.w. heating.
Frost protection for d.h.w.	A minimum d.h.w. temperature of 5 °C is always maintained.
Manual operation	<p>Manual d.h.w. heating can take place:</p> <ul style="list-style-type: none"> • Independent of the time switch program and temperature conditions • During standby periods <p>D.h.w. heating can also be switched off manually. Frost protection will remain active.</p>
Limitation	It is possible to provide maximum limitation of the primary return temperature. The adjusted limit value is independent of the heating circuit control.
Releases	<p>The release of d.h.w. heating and that of the circulating pump can be selected:</p> <ul style="list-style-type: none"> • Continuously (24 hours per day) • According to own d.h.w. time switch program • During the controller's heating circuit time switch program (d.h.w. heating with forward shift of the first daily release)
Priority	<p>The behavior of the heating circuit during d.h.w. heating can be selected:</p> <ul style="list-style-type: none"> • Absolute: heating circuit pump deactivated or heating circuit mixing valve closed and pump activated • Shifting: heating circuit pump remains activated as long as there is sufficient heating energy available. The d.h.w. setpoint or the maximum setpoint is maintained • Parallel: no priority; heating circuit remains on. The d.h.w. setpoint or the maximum setpoint is maintained
Idle heat function	In instantaneous systems, the heat exchanger's primary side is heated up at regular intervals.
Flow switch	To improve the heat exchanger's control performance, with adjustable load limit, adapts to the seasons, tamperproof (prevents the control system from responding too frequently).
Forced charging	D.h.w. heating takes place every day with the first release (or at midnight with the 24-hour program). It also takes place when the actual value lies within the switching differential.
Legionella function	The d.h.w. is heated up at regular intervals to kill potential legionella viruses.
	With certain types of d.h.w. heating systems, some of the functions listed above are not possible.

Extra functions

Time switch programs	<p>To provide automatic operation of the heating system, the RVD230 controller features a seven-day program with 3 adjustable heating periods for every day. Another seven-day program is available for the release of d.h.w. heating.</p> <p>A yearly clock with summer-/wintertime changeover is used for the dates of up to 8 holiday periods. During the holiday periods, heating circuit control is in standby and d.h.w. is not heated.</p>
Remote operation via the room unit	<ul style="list-style-type: none">• QAW50: room unit: changeover of operating mode, room temperature setpoint adjustments and room temperature readjustments• QAW70: room unit: overriding the setpoints, the heating program and the annual holiday program
PWM output	The PWM (pulse width modulation) output can be used to control a variable speed pump.
Communication	<p>Communication with other devices, controllers, etc., can be established via</p> <ul style="list-style-type: none">• LPB, e.g. assignment of d.h.w. heating, reception of time signal, master / slave assignments for the time switch, reception of outside temperature signal or reception of heat demand signals (when the RVD230 is used as a pre-controller)• M-bus
Reset	All time switch program can be reset to their factory settings.
Manual operation	<p>In manual operation, the heating can be controlled manually, in which case d.h.w. heating remains activated. The relays will be switched as follows:</p> <ul style="list-style-type: none">• Actuator of the primary return valve: no power, but can be manually controlled from the controller• All other actuators: fully closed, no power• Heating circuit pump: activated

Mechanical design

Controller

The RVD230 consists of controller insert and base.

The controller insert accommodates the electronics, the power section, the output relays – on the front of the unit – the LCD and all operating elements. 2 screws are used to secure the controller insert to the base, which carries the connection terminals. The controller contains nine relays.

The RVD230 can be mounted in 3 different ways:

- Wall mounting (on a wall, in a control panel, etc.)
- Rail mounting (on a DIN rail)
- Flush panel mounting (compact station, control panel front, etc.)

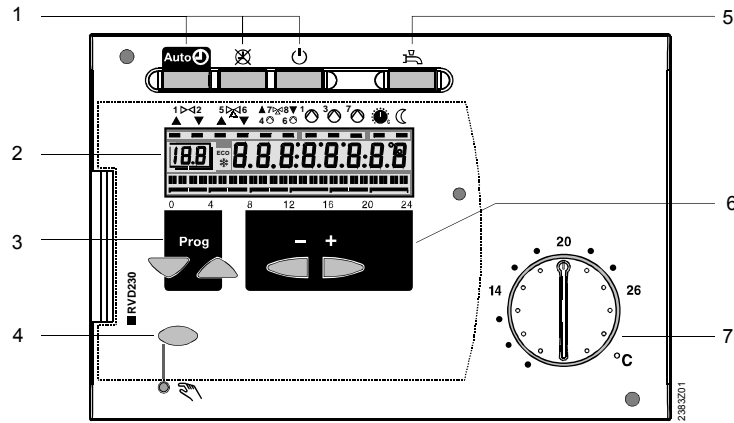
Operation

- Analog operating elements:
 - Setting knob for the room temperature setpoint in continuous operation
 - Buttons for selecting the required operating mode and for d.h.w. heating ON/OFF
 - Button for manual operation
- Digital operating elements:

Entry or readjustment of all other setting parameters, activation of the optional functions and readout of actual values and statuses is made based the operating line principle. Each parameter, each actual value and each selection function is assigned an operating line with an associated number. Selection of an operating line is made with one pair of buttons, readjustment of the display with another pair.

The buttons are located behind a hinged cover. The operating instructions are inserted at the rear of the cover.

Display and operating elements



- 1 Operating mode buttons
- 2 LCD
- 3 Buttons (Prog) for selecting the operating lines
- 4 Button for manual operation ON / OFF
- 5 Button for d.h.w. heating ON / OFF
- 6 Buttons (- and +) for changing values
- 7 Setting knob for room temperature setpoint in continuous operation

Engineering notes

Electrical installation

- The wires of the measuring circuits carry safety extra low voltage.
- The wires to the actuator and to the pumps carry AC 24...230 V.
- The local regulations for electrical installations must be complied with.
- Sensor cables may not be run parallel to mains carrying cables powering actuators, pumps, etc.

Radiator valves

In control systems using a room temperature sensor, the reference room may not be equipped with thermostatic radiator valves. Manual valves must be locked in their fully open position.

Lightning protection

- If bus cables are also laid outside the buildings, the devices are exposed to transients caused by lightning and must be appropriately protected.
- Every bus cable and the devices to be protected require specific protective elements.
- The protective function is ensured only if the installation is made in compliance with the directives and regulations.
- For notes relating to EMC-compatible installations, refer to data sheet N2034.

Mounting notes

- Suitable mounting locations are compact stations, control panels, control desks or the heating room. Not permitted are wet or damp locations.
- The controller is suited for wall, DIN rail or flush panel mounting.
- All connection terminals for safety extra low voltage (sensors, room unit bus) are located in the top section of the terminal compartment, those for mains voltage (actuators and pumps) in the bottom section.

Commissioning notes

- The plant type must be selected.
- The settings can be locked on the software side, either completely or partly. In addition, the district heat parameters can be locked on the hardware side.
- The controller is supplied with mounting, commissioning and operating instructions.

Technical data

Power supply	Rated voltage	AC 230 V $\pm 10\%$
	Rated frequency	50 Hz
	Max. power consumption	8.5 VA, 6.5 W, $\cos \varphi > 0.7$
Functional data	Reserve of clock	12 h
Classifications to EN 60 730	Software class	A
	Mode of operation	type 1b (automatic controls)
	Degree of contamination	normal contamination
Inputs Sensor inputs (B...)	Sensing element	refer to sections "Acquisition of measured values"
	Max. number of sensors per input	1
	Measuring range	0...150 °C
Digital input (H5)	Low-voltage up to	U < 10 V
	Switching current	I ≥ 2 mA (for reliable operation)
	Voltage with contact open	DC 12 V
	Voltage with contact closed	DC 2...5 mA
	Contact resistance	R $\leq 80 \Omega$
Outputs Switching outputs	Rated switching voltage	AC 24...230 V
	Rated current	
	Outputs Y1, Y2, Q1	AC 0.02...2(2) A
	Outputs Y5, Y6, Q3/Y7, Q7/Y8	AC 0.02...1(1) A
	Switch-on current	max. 10 A max. 1 s
Max. rating as mixing valve relay Y1, Y2, Y5, Y6, Y7, Y8	15 VA	
PMW output	Idle voltage	12 V
	Max. internal resistance	1340 Ω
	Frequency	2400 Hz
Interfaces		
	PPS	Connection (to the room unit) 2-wire connection, interchangeable
LPB	Connection	2-wire connection, not interchangeable
	Bus loading number E	3
	Detailed information for Standard Controls:	
	Basic System Data	Data Sheet N2030
	Local Process Bus	Data Sheet N2032
Detailed information for OEM:		
Local Process Bus	Basic documentation P2370	
Perm. cable lengths	To the sensors	
	Copper cable, 0.6 mm dia.	20 m
	Copper cable, 1.0 mm ²	80 m
	Copper cable, 1.5 mm ²	120 m
	To the room unit	
	Copper cable, 0.6 mm dia.	37 m
Copper cable, ≥ 0.8 mm dia.	75 m	
Degrees of protection	Degree of protection of housing to IEC 60 529	IP 40D
	Safety class to EN 60 730	II
Perm. environmental conditions	Transport	
	Temperature	-25...+70 °C
	Humidity	<95 % rH (noncondensing)

Storage	
Temperature	-5...+55 °C
Humidity	<95 % rH (noncondensing)
Operation	
Temperature	0...+50 °C
Humidity	<85 % rH (noncondensing)

Standards

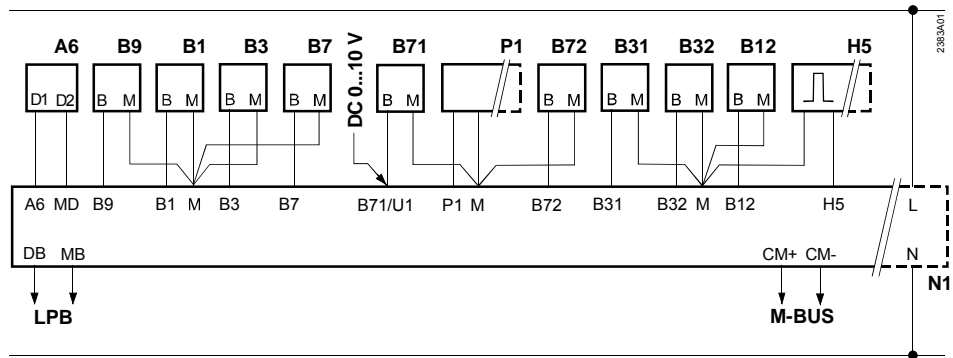
CE conformity to EMC directive	89/336/EEC
Immunity	EN 50082-2
Emissions	EN 50081-1
Low voltage directive	73/23/EEC
Product safety	
Automatic electrical controls for household and similar use	EN 60730-1
Particular requirements for temperature sensing controls	EN 60730-2-9
Special requirements for energy controllers	EN 60730-2-11

Weight

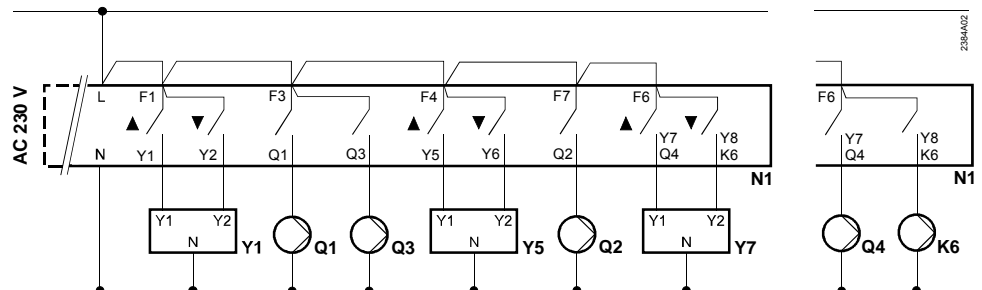
Net weight	0.84 kg
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Connection diagrams

Low voltage side

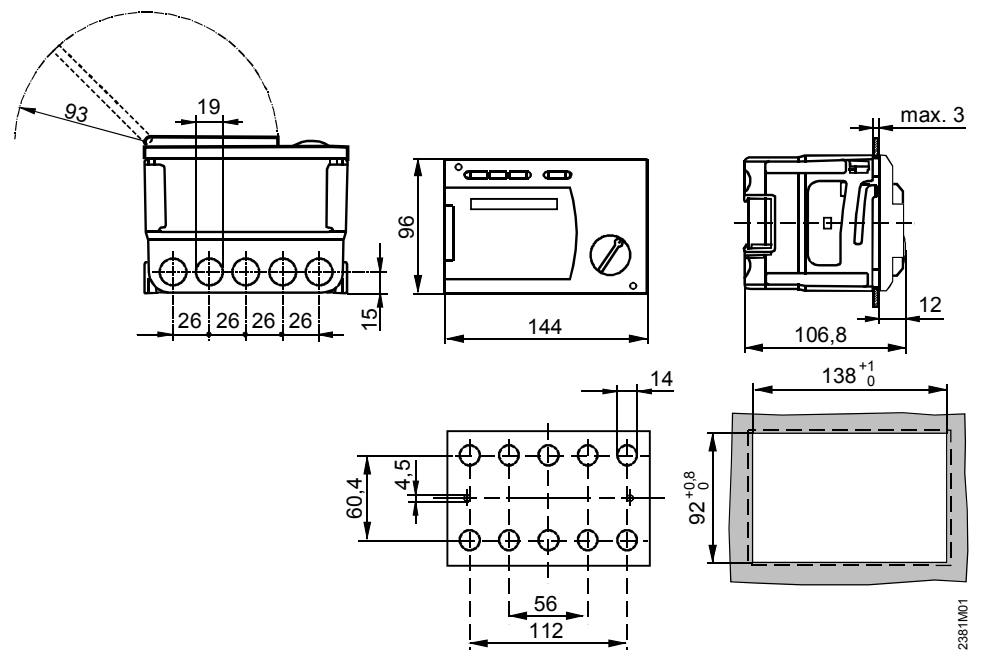


Mains voltage side



- A6 Room unit (QAW50, QAW70 or QAA10)
- B1 Flow sensor, heating circuit or common flow (depending on the type of plant)
- B12 Flow sensor, heating circuit or d.h.w. (depending on the type of plant)
- B3 Flow sensor, d.h.w.
- B31 D.h.w. storage tank sensor
- B32 D.h.w. storage tank sensor or return sensor (depending on the type of plant)
- B7 Primary return sensor
- B71 Primary or secondary return sensor (depending on the type of plant)
- B72 Primary or secondary return sensor (depending on the type of plant)
- B9 Outside sensor
- H5 Heat meter, flow switch, alarm contact, etc.
- K6 Circulating pump (depending on the type of plant)
- N1 RVD230 controller
- P1 Variable speed pump (PWM output)
- Q1 Heating circuit / system pump
- Q2 Heating circuit or storage tank charging pump (depending on the type of plant)
- Q3 D.h.w. intermediate circuit pump, circulating pump or diverting valve (depending on the type of plant)
- Q4 D.h.w. intermediate circuit or storage tank charging pump (depending on the type of plant)
- Y1 Actuator for 2-port valve in the primary return
- Y5 Actuator 2 (depending on the type of plant)
- Y7 Actuator 3 (depending on the type of plant)

Dimensions



2381M01

Dimensions in mm