



RCU15

Room Temperature Controllers for heating and cooling systems

RCU15

Choice of two-position or modulating PI control
ON / OFF or PWM outputs for heating and cooling
Control depending on room- or return air temperature
Operating modes: normal operation, energy saving and standby
Operating mode changeover input for remote control
Operating voltage AC 24 V

Use

Control of the room temperature in individual rooms of ventilation or air conditioning plants that are heated or cooled with radiators, chilled ceilings, etc.

For the control of the following pieces of equipment:

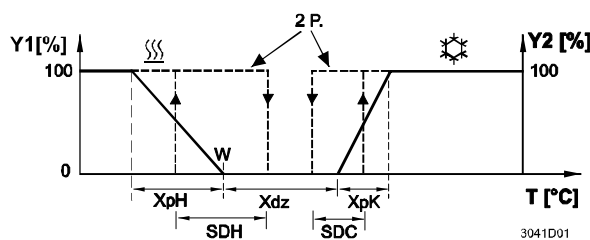
- Thermic valve actuators
- Damper actuators

Functions

The controller acquires the room temperature with its integrated sensor or external room temperature sensor (QAA32) or return air temperature sensor (QAH11.1) - if used - and maintains the setpoint by delivering control commands. It is possible to choose PI control with PWM actuating commands or two-position control with ON / OFF actuating commands.

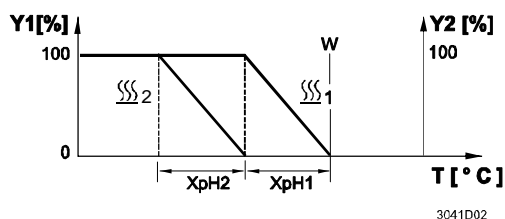
The proportional band or the switching differential can be 1 or 4 K in heating mode and 0.5 or 2 K in cooling mode (selectable). The integration time cannot be adjusted and is 10 minutes. The operating sequence "Heating – cooling or heating – heating" can be selected with DIP switch no. 7.

Function diagram "Heating-cooling"



T Room temperature
Y1, Y2 output percentage
W Room temperature setpoint
Xdz Dead band
XpH Proportional band heating
XpK Proportional band cooling
SDH Switching differential for heating
SDC Switching differential for cooling
2 P. 2-position outputs

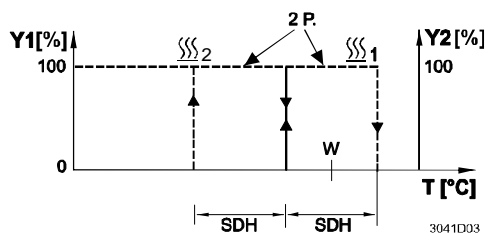
Function diagram "Heating-heating" with PWM output



T Room temperature
Y1 Heating sequence output 1
Y2 Heating sequence output 2
W Room temperature setpoint
XpH1 Proportional band heating 1
XpH2 Proportional band heating 2

When two heating sequences are selected, the two outputs cannot be switched ON at the same time. Two outputs are switched ON separately with at least 10 seconds delay. In case of set-point change, the two heaters are allowed to switch OFF together.

Function diagram "Heating-heating" with 2 position output



T Room temperature
Y1 Heating sequence output 1
Y2 Heating sequence output 2
W Room temperature setpoint
SDH Switching differential for heating
2 P. 2-position outputs

Pulse width modulation

If actuating signal "Pulse width modulation" (PWM) is selected with DIP switches no. 5 and no. 6, the output is activated and deactivated for a certain period of time, proportional to the calculated manipulated variable and following an interval.

The interval of the PWM actuating signal can be selected as follows:

Heating and cooling (DIP switch 7 on position ON)

Y1 interval can be selected with DIP switch 8 and is either 240 s or 90 s.

Y2 interval is 240 s and cannot be changed.

Heating 2-stage (DIP switch 7 on position OFF)

Y1 interval is 240 s and cannot be changed.

Y2 interval can be selected with DIP switch 8 and is either 240 s or 90 s.

Note

Output Y1 (heating): when used in connection with thermic actuators, the selected interval should be 240 seconds. When using electric heaters, it should be 90 seconds.

Caution

When used in connection with electric valve actuators, DIP switches no. 5 and no. 6 must be set to ON for two-position control.

PWM actuating signals may never be used for driving electric actuators!

Return air temperature or external room temperature

The RCU15 provides control depending on the temperature acquired either by its integrated sensor, external room sensor or return air temperature sensor in the fan coil unit. Changeover is automatic if a QAH11.1 cable temperature sensor or external room temperature sensor QAA32 is connected to the device.

Energy saver

The room temperature setpoint can be limited in increments of 1 K by making use of the minimum and maximum limitation facility. Arbitrary setpoint readjustments can thus be prevented.

Operating modes

The following operating modes are available:

Normal operation

Normal operation is activated when the external operating mode changeover switch is not activated. In normal operation, the controller maintains the adjusted setpoint.

Frost protection mode

Frost protection mode can be activated using the external operating mode changeover switch, provided DIP switch no. 1 is set to OFF

If the room temperature falls below 8 °C, the controller will automatically switch to frost protection mode. In that case, the heating valve opens and the room temperature is maintained at a setpoint of 8 °C. The setpoint adjusted by the user will be ignored.

Energy saving mode

Energy saving mode can be activated using the external operating mode changeover switch, provided DIP switch no. 1 is set to ON

In energy saving mode, the setpoint of heating is 16 °C and the setpoint of cooling 28 °C, independent of the position of the setpoint knob.

Operating mode changeover switch

A changeover switch can be connected to status input D1–GND. When the switch activates (caused by an open window, for instance), the operating mode will change from normal operation or standby to energy saving mode (provided DIP switch no. 1 is set to ON), or from normal operation or energy saving mode to standby (provided DIP switch no. 1 is set to OFF).

The operating action of the switch (N.C. or N.O.) can be selected.

Ordering

When ordering, please give name and type reference, e.g. room temperature controller RCU15.

Valve and air damper actuators are to be ordered as separate items.

Equipment combinations

Type of unit	Type reference	Data sheet ^{*)}
Temperature sensor	QAH11.1	1840
Room sensor	QAA32	1747
Motoric on/off actuator (not suitable for PWM mode)	SFA71...	4863
Thermal actuator (radiator valve)	STA71...	4877
Thermal actuator (small valve 2,5 mm)	STP71...	4878
Air damper actuators	GCA12...1	4613

*) The documents can be downloaded from <http://siemens.com/bt/download>.

Mechanical design

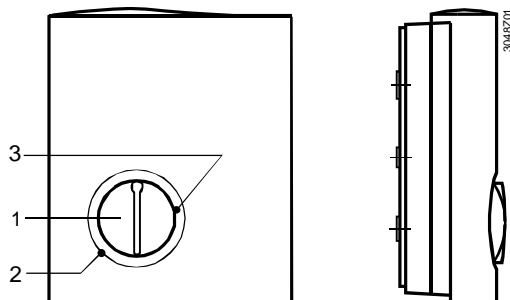
The unit consists of two parts:

- A plastic housing which accommodates the electronics, the operating elements and the built-in room temperature sensor
- A mounting base

The housing engages in the mounting base and snaps on.

The base carries the screw terminals. The DIP switches are located at the rear of the housing.

Setting and operating elements



Legend

- 1 Room temperature setpoint knob
- 2 Setting facility for minimum setpoint limitation (in increments of 1 K)
- 3 Setting facility for maximum setpoint limitation (in increments of 1 K)

Set of DIP switches

DIP switch no.	Meaning	Position ON	Position OFF
1	Operating mode changeover via external switch	Changeover from normal operation or standby to energy saving mode	Changeover from normal operation or energy saving to standby ¹⁾
2	Operating action of switch for external operating mode changeover	Changeover activated when contact of switch is closed (N.O.) ¹⁾	Changeover activated when contact of switch is open (N.C.)
3	Switching different or P-band	1 K in heating mode 0.5 K in cooling mode	4 K in heating mode ¹⁾ 2 K in cooling mode ¹⁾
4	Dead zone in normal operation	2 K ¹⁾	5 K
5	Signal output Y1 (heating)	ON / OFF ¹⁾	PWM
6	Signal output Y2 (heating or cooling)	ON / OFF ¹⁾	PWM
7	Operating action of output Y2	Cooling ¹⁾	Heating
8	PWM signal interval for outputs heating and cooling (DIP switch 7 set on position ON) Y1 (heating) Y2 (cooling) PWM signal interval for outputs heating 2 stage (DIP switch set on position OFF) Y1 (heating) Y2 (heating)	240 s ¹⁾ 240 s (not selectable)	90 s 90 s

1) Factory setting

Accessories

Description	Type reference
Adapter plate 120 x 120 mm for 4" x 4" conduit boxes	ARG70
Adapter plate 96 x 120 mm for 2" x 4" conduit boxes	ARG70.1
Adapter plate for surface wiring 112x130 mm	ARG70.2

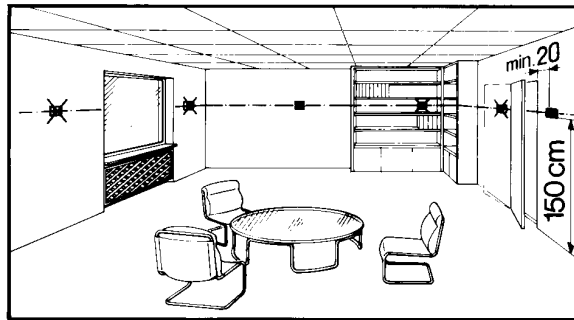
Notes

Check the settings of DIP switches no. 1 through no. 8 and change them, if required. If setpoint limitation is required, use the minimum and maximum limitation facility (energy saver).

After applying power, the controller makes a reset, which takes about 3 seconds. Then, it will be ready to operate.

The controller is supplied with Mounting Instructions.

Mounting location: on a wall of the room to be conditioned. Not in niches or bookshelves, not behind curtains, above or near heat sources and not exposed to direct solar radiation. Mounting height is about 1.5 m above the floor. The connecting wires can be run to the controller from a recessed conduit box.



Only authorized personnel may open the controller.

Mounting, installation and commissioning

When mounting the unit, fix the baseplate first. Then, make the electrical connections and fit and secure the cover.

The controller must be mounted on a flat wall and in compliance with local regulations. If there are thermostatic radiator valves in the reference room, they must be set to their fully open position.



Warning!

No internal line protection for supply lines to external consumers (Y1, Y2)

Risk of fire and injury due to short-circuits!

- Adapt the line diameters as per local regulations to the rated value of the installed overcurrent protection device.

Maintenance

The room controller is maintenance-free.


Disposal



The device is considered an electronic device for disposal in accordance with European Directive and may not be disposed of as domestic waste.

- Use only designated channels for disposing the devices.
- Comply with all local and currently applicable laws and regulations.

Technical data

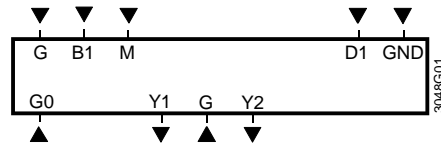
Power supply	Operating voltage	AC 24 V ± 20 %
	Frequency	50/60 Hz
	No internal fuse	
	External preliminary protection with max. C 10 A circuit breaker in the supply line required under all circumstances	
Functional data	Power consumption	max. 1.2 VA
	Setpoint setting range	8...30 °C
	Max. control deviation at 25 °C	max. ±0.7 K
	Switching differential heating SDH or P-band (selectable)	1 K or 4 K
	Switching differential cooling SDC or P-band (selectable)	0,5 K or 2 K
	Dead zone X_{dz} in normal operation (selectable)	2 K or 5 K
	Setpoint «Energy saving mode (C)», heating	16 °C
	Setpoint «Energy saving mode (C)», cooling	28 °C
	Setpoint «Standby (U)»	8 °C
	Integration time T_n	10 min
	Control outputs Y1, Y2	PWM or ON / OFF
	Voltage	AC 24 V ± 20 %
	Current	0.02...1 A
	Cycle time PWM (selectable for Y1)	240 s or 90 s
	Signal input B1 for return air sensor	QAH11.1, safety class II NTC resistor 3 kΩ at 25 °C
	Status input D1 and GND	
	Contact sensing	DC 6-15 V / 3-6 mA
	Perm. cable length with copper cable 1.5 mm ² for connection to terminals B1 and D1	80 m
	Environmental conditions	Operation
Climatic conditions		class 3K5
Temperature		0...+50 °C
Humidity		<95 % r.h.
Transport		to IEC 60721-3-2
Climatic conditions		class 2K3
Temperature		-25...+70 °C
Humidity		<95 % r.h.
Norms and standards	Mechanical conditions	class 2M2
	EU Conformity (CE)	CE1T3040xx ^{*)}
	RCM Conformity	CE1T3040en_C1 ^{*)}
	Degree of protection of housing	IP30 EN 60 529
	Safety class	III to EN 60 730-1
Pollution class	Normal	
Environmental compatibility	The product environmental declaration CE1E3040 ^{*)} contains data on environmentally compatible product design and assessments (RoHS compliance, materials composition, packaging, environmental benefit, disposal).	
Eco design and labelling directives	Based on EU Regulation 813/2013 (Eco design directive) and 811/2013 (Labelling directive) concerning space heaters, combination heaters, the following classes apply:	
	- Application with On/Off operation of a heater	Class I value 1%
	- PWM (TPI) room thermostat, for use with On/Off output heaters	Class IV value 2%

General

Connection terminals for	Use solid wires or prepared stranded wires. 2 x 1.5 mm ² or 1 x 2.5 mm ²
Weight RCU15	0.23 kg
Colour of housing front	white, NCSS0502-G (RAL 9003)

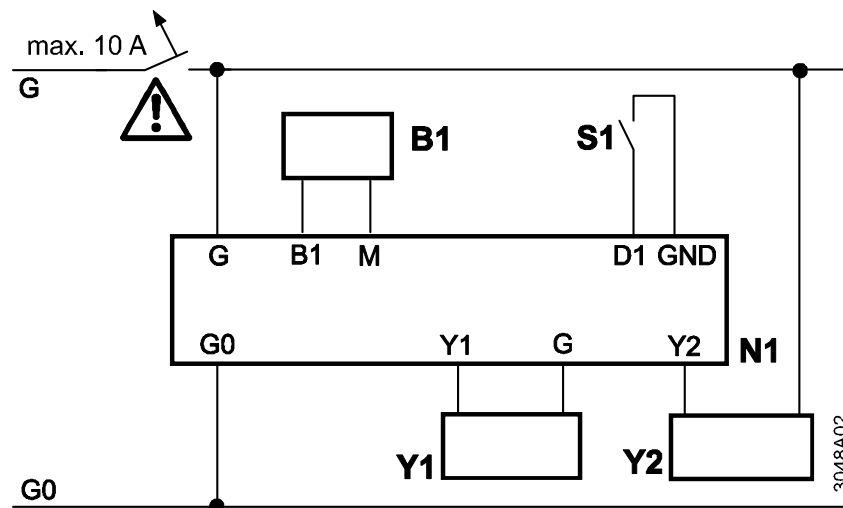
*) The documents can be downloaded from <http://siemens.com/bt/download>

Connection terminals



- G,G0 Operating voltage AC 24 V
- B1 Status input "external room temperature sensor or return air temperature sensor"
- D1,GND Status input for potential-free operating mode changeover switch
- M Measuring neutral "external room temperature sensor or return air temperature sensor"
- Y1 Control signal PWM / two-position AC 24 V
- Y2 Control signal PWM / two-position AC 24 V

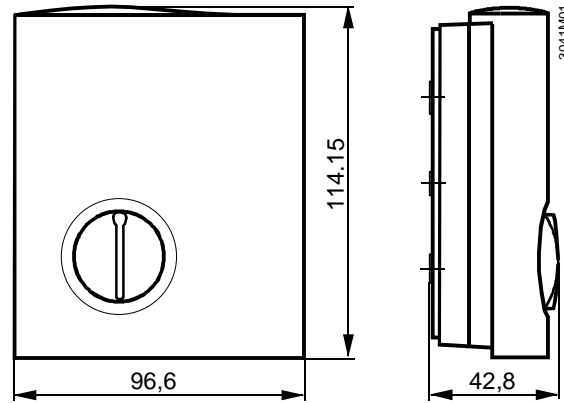
Connection diagram



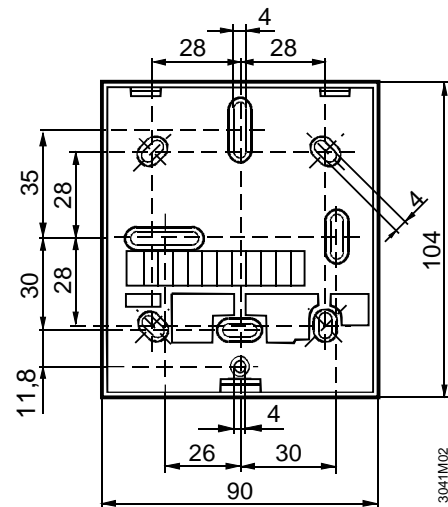
- B1** External room temperature sensor (QAA32) or return air temperature sensor (QAH11.1)
- N1** Room temperature controller
- S1** External operating mode changeover switch
- Y1** Actuator
- Y2** Actuator

Dimensions

Controller



Baseplate



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