



RCU20

Room Temperature Controller for heating or cooling systems

RCU20

Modulating PI control
Three-position output for heating or cooling
Operating modes: normal operation, energy saving or OFF
Automatic heating / cooling changeover
Operating mode changeover input for remote control
Operating voltage AC 230 V

Use

Control of the room temperature in individual rooms of ventilation or air conditioning plants that are heated or cooled.

For the control of the following pieces of equipment:

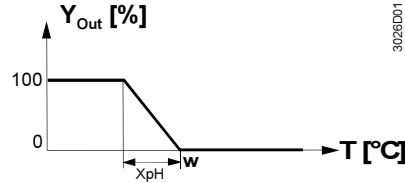
- Three-position valve actuators
- Three-position air damper actuators

Functions

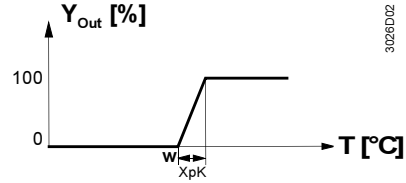
The controller acquires the room temperature with its integrated sensor and maintains the setpoint by delivering three-position control commands to the valve. The controller provides PI control. The proportional band in heating mode is 4 Kelvin and in cooling mode 2 Kelvin. The integration time is 5 minutes.

Function diagram

Heating



Cooling

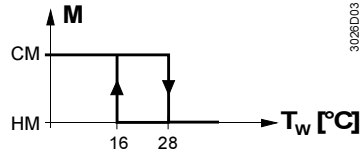


Note: the diagrams only show the proportional part of the PI controller

- | | | | |
|------------------|---------------------------|-----|---------------------------|
| T | Room temperature | XpH | Proportional band heating |
| Y _{Out} | Manipulated variable | XpK | Proportional band cooling |
| w | Room temperature setpoint | | |

Automatic changeover

The water temperature acquired by the changeover sensor (QAH11.1 + ARG86.3) is used by the controller to switch from heating to cooling mode, or vice versa. When the water temperature lies above 28 °C, the controller switches to heating mode, below 16 °C it switches to cooling mode.



- | | |
|----------------|-------------------|
| CM | Cooling mode |
| HM | Heating mode |
| T _w | Water temperature |
| M | Operating mode |

Three-position control signal

Outputs Y1 = opening, Y2 closing and N = neutral are used to drive three-position actuators with a maximum running time of 150 seconds from the fully closed to the fully open position.

When commissioning the controller, an opening signal of 200 seconds is delivered, followed by a closing signal of 200 seconds to ensure the actuator will be fully closed. When the actuator has reached the position calculated by the controller, a waiting time of 30 seconds is observed in order to stabilize the outputs.

The control outputs carry AC 230 V.



Energy saver

The room temperature setpoint can be limited in increments of 1 Kelvin 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.

Energy saving mode

Energy saving mode can be activated with 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 closes its contact (caused by an open window, for instance), the operating mode will change from normal operation to energy saving mode (provided DIP switch no. 1 is set to ON), or from normal operation to OFF (provided DIP switch no. 1 is set to OFF).

Ordering

When ordering, please give name and type reference.
The QAH11.1 temperature sensor (can be used as a changeover sensor), the changeover mounting kit and the 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
Changeover mounting kit	ARG86.3	1840
Motoric actuator (radiator valve)	SSA31...	4893
Motoric actuator (small valve 2,5 mm)	SSP31...	4864
Motoric actuator (small valve 5,5 mm)	SSB31...	4891
Motoric actuator (valve 5,5 mm)	SSC31...	4895
Motoric actuator (valve 5,5 mm)	SQS35...	4573
Air damper actuator	GDB33... / GLB33...	4634
Air damper actuator	GBB33...	4626
Air damper actuator	GIB33...	4626

Mechanical design

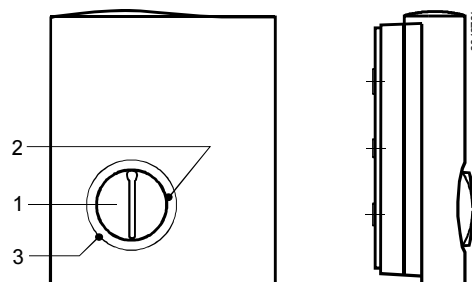
The unit consists of two parts:

- 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 unit.

**Operating and setting
elements**



Legend

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

DIP switch

DIP switch no.	Meaning	Position ON	Position OFF
1	Operating mode changeover via external switch	Changeover between normal operation and energy saving mode ¹⁾	Changeover between normal operation and OFF

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

In systems without automatic changeover, the temperature sensor can be replaced by an external switch for manual changeover.

In systems with continuous heating operation, no sensor will be connected to the controller's input.

With continuous cooling operation, the controller input (B2–M) must be bridged.

Check the position of DIP switch no. 1 and change it, if required. If setpoint limitation is required, use the minimum and maximum limitation facility (energy saver).

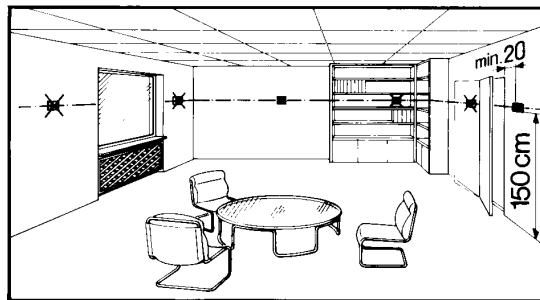
After applying power, the controller makes a reset, which takes about 3 seconds. Then, it will be ready to operate.

Before the controller starts its control action, it performs a three-position synchronization of the actuator. As a result, the actuator will be fully opened and then closed again. This process takes 400 seconds. Then, the controller will be ready to operate.

- Prior to fitting the changeover sensor, thermal conductive paste must be applied to the location on the pipe where the sensor is placed
- The cables used must satisfy the insulation requirements with regard to mains potential
- Sensor input B2-M carries mains potential. If the sensor's cables must be extended, the cables used must be suited for mains voltage.

The controller is supplied with Mounting Instructions.

Mounting location: on a wall of the room to be heated or cooled. 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.



Caution: AC 230 V

Mounting, installation and commissioning

Only authorized personnel may open the controller.

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.




Maintenance

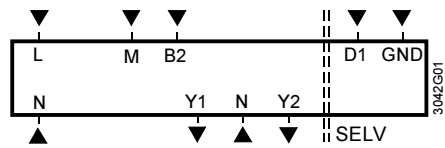
The cables used must satisfy the insulation requirements with regard to mains potential.

The room controller is maintenance-free.

Technical data

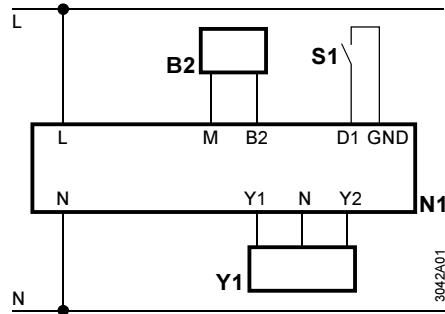
⚠ Power supply	Operating voltage	AC 230 V +10 %, -15 %
	Frequency	50/60 Hz
Functional data	Power consumption	max. 6 VA
	P-band X _p	4 K heating / 2 K cooling
	Setpoint setting range	8 ...30 °C
	Setpoint «Energy saving mode (C)», heating	16 °C
	Setpoint «Energy saving mode (C)», cooling	28 °C
	Integration time	5 min.
	Control outputs Y1, Y2	3-position
	Voltage	AC 230 V +10 % - 15 %
	Current	0.02...0.1 A
	Changeover - status input B2	QAH11.1, safety class II NTC resistor 3 kΩ at 25°C
	Status input D1 and GND	
	Contact sensing	SELV DC 6-15 V / 3-6 mA
Insulation against mains	4 kV	
Operating action	N.O.	
Environmental conditions	Perm. cable length with copper cable 1.5 mm ²	
	For signal input B2	80 m
	For signal input D1	80 m
	Operation	
	Climatic conditions	to IEC 721-3-3 class 3K5
	Temperature	0...+50 °C
	Humidity	<95 % r.h.
	Transport	to IEC 721-3-2
	Climatic conditions	class 2K3
	Temperature	-25...+70 °C
Humidity	<95 % r.h.	
Mechanical conditions	class 2M2	
Norms and standards	CE conformity to	
	EMC directive	89/336/EEC
	Low voltage directive	73/23/EEC and 93/68/EEC
	 N474 C-Tick conformity to	
	EMC emission standard	AS/NSZ 4251.1:1994
	Product standards	
	Automatic electrical controls for household and similar use	EN 60 730 – 1 and EN 60 730 – 2 - 9
	Electromagnetic compatibility	
	Emissions	EN 50 081-1
	Immunity	EN 50 082-1
Degree of protection of housing	IP30 EN 60 529	
Safety class	II to EN 60 730	
Pollution class	normal	
Design	Connection terminals for	Use solid wires or prepared stranded wires. 2 x 1.5 mm ² or 1 x 2.5 mm ²
	Weight	0.25 kg
	Colour of housing front	white, NCSS0502-G (RAL 9003)

Connection terminals



- L Operating voltage AC 230 V
- N System neutral
- B2 Signal input "Changeover sensor"
- D1 Signal input for potential-free operating mode changeover switch (selectable operating action)
- Y1 Control output "Open valve", AC 230 V
- Y2 Control output "Close valve", AC 230 V

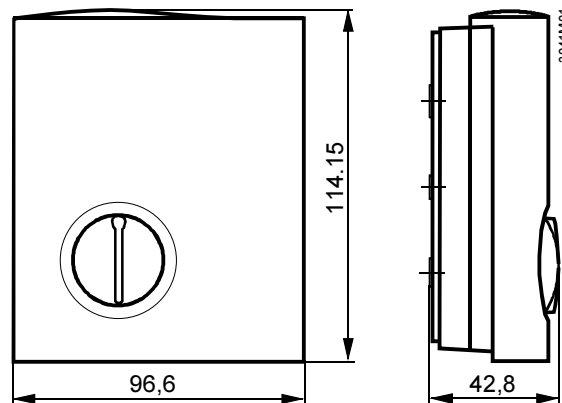
Connection diagram



- N1 Room temperature controller
- S1 External operating mode changeover switch (N.O.)
- B2 Automatic heating/cooling changeover
- Y1 3-point actuator

Dimensions

Controller



Baseplate

