



Room Temperature Controller

RCC60.1

for two-pipe fan coil units

Modulating PI control
Output for three-position valve actuator
Outputs for three-speed fan
Automatic heating / cooling changeover
Operating modes: normal and energy saving or OFF
Operating mode changeover input for remote control
Function for avoiding damage resulting from moisture
Operating voltage AC 230 V

Use

Typical use:

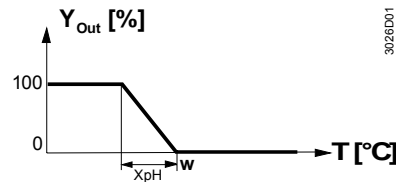
- Control of the room temperature in individual rooms that are heated or cooled with two-pipe fan coil units.
- For opening and closing a three-position valve actuator operating on AC 230 V and for switching a three-speed fan.

Suited for use in systems with

- automatic heating / cooling changeover
- continuous heating or cooling operation.

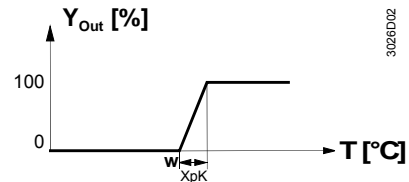
The controller acquires the room temperature with its integrated sensor and maintains the setpoint by delivering three-position control commands to the valve. The controller provides PI control. The proportional band in heating mode is 4 K and in cooling mode 2 K. The integration time is 5 minutes.

Heating mode



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Cooling mode



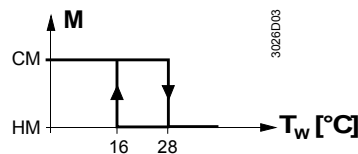
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- | | | | |
|-----|---------------------------|--------------------|---------------------------|
| T | Room temperature | w | Room temperature setpoint |
| XpH | Proportional band heating | YB _{OutB} | Manipulated variable |
| XpK | Proportional band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

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

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. If, immediately after switching on, the water temperature lies between the 2 changeover points, the controller will start in heating mode. The water temperature is measured at minute-intervals and the operational status updated.



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|------------------|-------------------|
| CM | Cooling mode |
| HM | Heating mode |
| TB _{wB} | Water temperature |
| M | Operating mode |

Purging function

The task of the changeover sensor is to initiate the change from heating to cooling mode even if the two-port valves are shut down for a longer period of time. To ensure this function, the valves are opened for one minute at 2-hour intervals during off hours.

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 K by making use of the minimum and maximum limitation facility. Arbitrary setpoint readjustments can thus be prevented.

The fan is switched to the selected speed via control output Q1, Q2 or Q3.
When the function "Temperature-dependent fan control" is activated (can be selected with DIP switch no. 1), the fan is switched on / off depending on the temperature, that is, together with the valve.

Fan operation

It is switched off by

- leaving the heating or cooling sequence, provided the function "Temperature-dependent fan control" is activated, or
- manually changing to OFF '⏻', or
- activating an external operating mode changeover switch, provided plant conditions do not call for energy saving, or
- turning the controller's power supply off

Operatingmodes

The following operating modes are available:

Normal operation

Heating or cooling mode with automatic changeover and with manually selected fan speed III, II or I. In normal operation, the controller maintains the adjusted setpoint. In operating mode selector position ⏻, the controller is switched off.

Energy saving mode

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. This operating mode will be activated when input D1 for operating mode changeover is active and DIP switch no. 2 is set to ON.

Avoiding damage resulting from moisture

To avoid damage due to moisture in very warm or humid climatic zones resulting from lack of air circulation in energy saving mode, DIP switch no. 1 must be set to OFF. With this configuration, the fan in energy saving mode operates at the speed manually selected or, if the operating mode selector is set to OFF ⏻, at speed I.

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. 2 is set to ON), or from normal operation to standby (provided DIP switch no. 2 is set to OFF).

Ordering

When ordering, please give name and type reference.

The QAH11 temperature sensor (can be used as a changeover sensor), the changeover mounting kit and the valves 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

Mechanical design

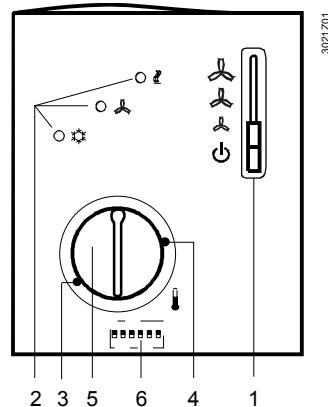
The unit consists of two parts:

- 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 Operating mode selector
(OFF , heating or cooling mode with manual selection of fan speed)
- 2 LEDs for indicating heating mode, cooling mode and fan operation
- 3 Setting facility for minimum setpoint limitation
(in increments of 1 K)
- 4 Setting facility for maximum setpoint limitation
(in increments of 1 K)
- 5 Room temperature setpoint knob

6 Set of DIP switches

DIP switch no.	Meaning	Position ON	Position OFF
1	Fan control	Fan control is temperature-dependent in normal operation and energy saving mode	Fan control in normal operation and in energy saving mode is temperature-independent ¹⁾
2	Operating mode change-over via external switch	Changeover between normal operation and energy saving mode	Changeover between normal operation and OFF ¹⁾

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

In systems with automatic changeover, the temperature sensor can be replaced by an external switch for manual changeover.

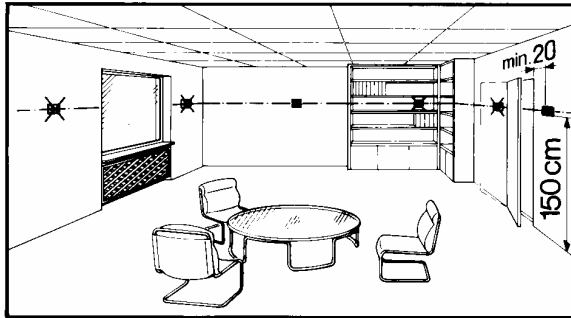
In systems with continuous heating operation, no sensor will be connected to the controller's input.

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

Mounting, installation and commissioning

Mounting location: on a wall or inside the fan coil unit 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.



Check the settings of the DIL switches no. 1 and no. 2 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 during which the fan LED flashes, indicating that the reset has been correctly made. This takes about 3 seconds. Then, the LED stops flashing and the controller 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.

Technical data

⚠ Power supply	Operating voltage	AC 230 V +10/-15 %
	Frequency	50/60 Hz
	Power consumption	max. 6 VA
	Control outputs Q1, Q2, Q3	AC 230 V
	Rating	max. 600 VA
	Control outputs Y1, Y2	AC 230 V, 0.02...2 A
	Signal input B2 for changeover-sensor	QAH11.1, Safety class II NTC resistor 3kΩ at 25°C
	Status input D1	
	Contact sensing	SELV, DC 15 V
	Insulation against mains voltage	4 kV
Max. number of contacts connected in parallel	50	
Operating action	N.O.	
Perm. cable length with copper cable 1.5 mm ² for connection to terminals B1, B2 and D1	80 m	
Operational data	Setpoint setting range	8...30 °C
	Max. control deviation at 25 °C	max. ±0.7 K
	P-band in heating mode XpH	4 K
	P-band in cooling mode XpK	2 K
	Integration time	5 min
	Setpoint «Energy saving mode  », heating	16 °C
Setpoint «Energy saving mode  », cooling	28 °C	
Environmental conditions	Operation	to IEC 721-3-3
	Climatic conditions	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
	Storage	to IEC 721-3-1
	Climatic conditions	class 1K3
	Temperature	-25...+70 °C
Humidity	<95 % r.h.	
Norms and standards	 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
Safety class	II to EN 60 730	
Pollution class	normal	
Degree of protection of housing	IP30 to EN 60 529	
General	Connection terminals	Use solid wires or prepared stranded wires. 2 x 0.4-1.5 mm ² or 1 x 2.5 mm ²

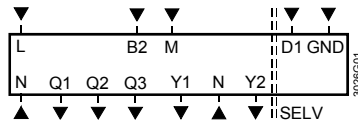
Weight

approx. 0.21 kg

Colour of housing front

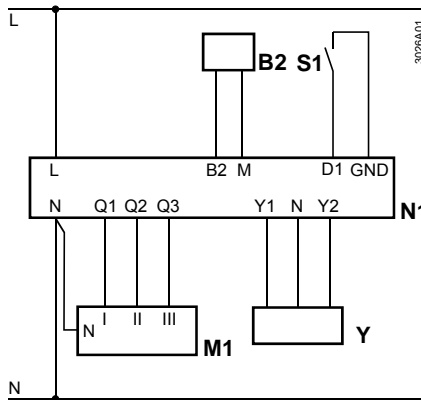
white, NCS S 0502-G (RAL9003)

Connection terminals



- L, N Operating voltage AC 230 V
- B2 Status input "Changeover sensor"
- M Measuring neutral "Changeover sensor"
- D1, GND Status input for potential-free operating mode changeover switch
- Q1 Control output "Fan speed I", AC 230 V
- Q2 Control output "Fan speed II", AC 230 V
- Q3 Control output "Fan speed III", AC 230 V
- Y1 Control output "Open valve", AC 230 V
- Y2 Control output "Close valve", AC 230 V

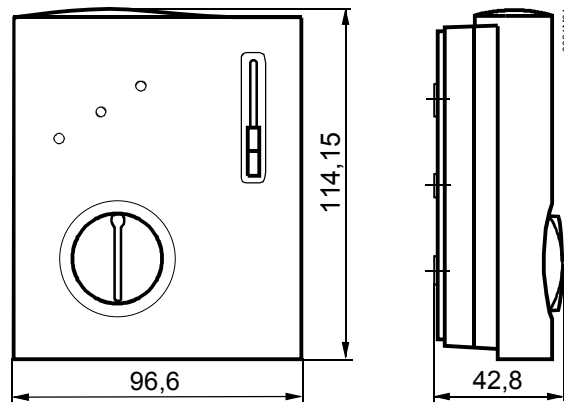
Connection diagram



- B2** Changeover sensor (QAH11.1 temperature sensor)
- M1** Three-speed span
- N1** RCC60.1 room temperature controller
- S1** External operating mode changeover switch
- Y** Three-position valve actuator
- Y1 Control output "Open valve", AC 230 V
- Y2 Control output "Close valve", AC 230 V

Dimensions

unit



baseplate

