SIEMENS

3065

RDU50

RDU50.2

Room Temperature Controller with LCD

RDU50...

for heating and cooling systems

Modulating PI control
Control depending on the room or the return air temperature
Output for a DC 0…10 V actuator
Automatic heating / cooling changeover (RDU50)
Manual heating / cooling changeover (RDU50.2)
Operating modes: normal and energy saving or off (RDU50)
Operating modes: normal, energy saving and off (RDU50.2)
Operating mode changeover input for remote control
Selectable installation and control parameters
Adjustable minimum limitation for cooling output
Output signal inversion as an option
Display of room temperature or setpoint selectable
Minimum and maximum setpoint limitation
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. The RDU50 is suitable for use with VAV systems in connection with the VAV compact controllers types G…B181.1E/3.

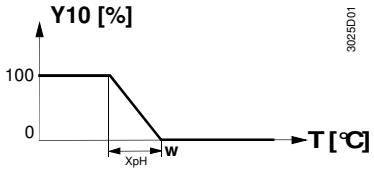
For the control of the following pieces of equipment:

- 0…10V valve actuators
- 0…10V damper actuators

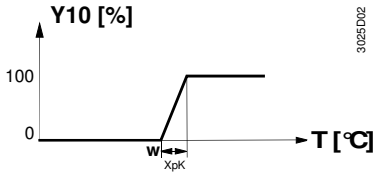
VAV compact controllers (with RDU50)

The controller acquires the room temperature with its integrated sensor, external room temperature sensor (QAA32) or – if used- via a remote return air temperature sensor (QAH11.1) and maintains the setpoint by delivering continuous DC 0...10 V control commands to the actuators. The controller provides PI control. The proportional band in heating mode is 2 K and in cooling mode 1 K (adjustable). The integral action time is 5 minutes (adjustable).

Heating mode



Cooling mode

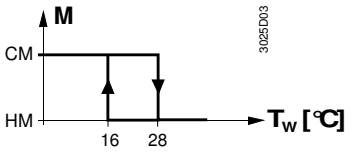


T	Room temperature
XpH	Proportional band “Heating”
XpK	Proportional band “Cooling”
w	Room temperature setpoint
Y10	Manipulated variable

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

Automatic changeover (RDU50)

The water or air temperature acquired by the changeover sensor (QAH11.1) is used by the controller to automatically switch from heating to cooling mode, or vice versa. When the temperature lies above 28 °C (adjustable), the controller switches to heating mode, below 16 °C (adjustable) it switches to cooling mode. If, immediately after switching on, the temperature lies between the 2 changeover points, the controller will start in heating mode. The medium temperature is measured at half-minute intervals and the operational status updated. The value of the current temperature reading and the mode can be visualized temporary by selecting parameter P14.

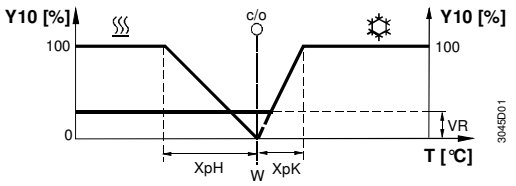


CM	Cooling mode
HM	Heating mode
T_W	Medium temperature
M	Operating mode

In systems without automatic changeover, the temperature sensor can be replaced by an external switch for manual changeover. In systems with continuous heating mode, no sensor will be connected to the controller’s input. With continuous cooling mode, the controller input must be bridged.

Minimum limitation of cooling signal

Using parameter P11 the cooling signal output can be limited to a minimum value of between 0 and 100 %. This can be used to ensure a minimum supply air volume. When used in connection with a VAV controller, this setting must be taken into account.



T	Room temperature
Y10	Output percentage
W	Room temperature setpoint
XpH	Proportional band heating
XpK	Proportional band cooling
VR	0 – 100 % min. limitation of cooling output
c/o	Heat-cool changeover

Function diagram “Heating–cooling“ with minimum limitation cooling

Inversion of output signal

The output signal can be inverted with the help of DIP switch no. 2. If set to ON, 0V corresponds to 0% travel and 10V to 100% travel. In position OFF, 0V corresponds to

100% travel and 10V to 0% travel.
This function is useful in conjunction with normally open valves.

Return air temperature

The RDU provide control either depending on the measured room temperature or depending on the return air temperature. The return air temperature measurement overrides the internal measurement automatically if a QAH11.1 cable temperature sensor is connected to input B1-M. Parameter P12 shows which temperature sensor is currently active.

Display

If the DIP switch 1 is set to ON (factory setting) the controller displays the measured room or return air temperature (unless parameter or setpoints are temporarily selected). If the DIP switch is set to OFF, the controller displays the active setpoint (normal operation or energy saving mode). In this case the value of the current temperature reading can only be visualized temporary by selecting parameter P13.

Operating modes

The following operating modes are available:

Normal operation

Heating or cooling mode with automatic changeover. In normal operation the controller maintains the adjusted setpoint.

Energy saving mode

A changeover switch can be connected to status input «D1–GND». When the switch closes its contact (due to an open window, for instance), the operating mode will change from normal operation to energy saving mode. In this operating mode, the relevant setpoints of heating or cooling are maintained (setting of control parameters P01 and P02). If the energy saving mode setpoints are set to OFF, the controller is OFF when the switch closes its contact.
The operating action of the switch is N.O.

When activated, the status input «D1–GND» overrides the RDU50.2 user switch setting positions Heat and Cool, but not OFF.

Setting the control parameters

A number of control parameters can be set to optimise the control performance. These parameters can also be set during operation without opening the unit.
In the event of a power failure, all control parameters set will be maintained.

Settings

The parameters can be changed as follows:

1 Press buttons + and – simultaneously for a minimum of 3 seconds and a maximum of 5 seconds. Release them and press button + again for approximately 3 seconds until the display shows “P01“.

2 Select the required parameter by repeatedly pressing buttons + and – :

3 By pressing buttons + and – simultaneously, the current value of the selected parameter appears, which can be changed by repeatedly pressing buttons + and –.

4 By pressing buttons + and – simultaneously again or after 5 seconds after the last press of a button, the last parameter will be displayed again.

5 If you wish to display and change additional parameters, repeat steps 3 through 5.

6 10 seconds after the last display or setting, all changes will be stored and the controller returns to normal operation.

Control parameters

Parameter	Meaning	Setting range	Factory setting
P01	Setpoint of heating in energy saving mode (operating mode changeover switch activated)	OFF, 5…18 °C (in increments of 0.5 K)	16 °C
P02	Setpoint of cooling in energy saving mode (operating mode changeover switch activated)	OFF, 24…35 °C (in increments of 0.5 K)	28 °C
P03	Minimum setpoint limitation in normal mode	5…20 °C (in increments of 0.5 K)	5 °C
P04	Maximum setpoint limitation in normal mode	21…35 °C (in increments of 0.5 K)	35 °C
P05*	Heat-cool changeover switching point cooling	10…25 °C (in increments of 0.5 K)	16 °C
P06*	Heat-cool changeover switching point heating	27…40 °C (in increments of 0.5 K)	28 °C
P07	Sensor calibration	-3…+3 K (in increments of 0.5 K)	0 K
P08	P-band in heating mode	0.5…+4 K (in increments of 0.5 K)	2 K
P09	P-band in cooling mode	0.5…+4 K (in increments of 0.5 K)	1 K
P10	Integration time	1…10 min. (in increments of 1 min.)	5 min.
P11	Minimum output limitation in cooling mode (normal operation)	0…100% (in increments of 10%)	0%
P12	Active temperature sensor (no setting, display only)	1: room temperature sensor active 2: return air temperature sensor active	-
P13	Value of current room temperature reading (no setting, display only)	0…49 °C = current temperature value	-
P14*	Value of current heat-cool changeover temperature reading including indication of current mode (☼,♨) (no setting, display only)	100 = input open (no sensor connected, heating mode (♨)) 0…49 °C = current temperature value 00 = input bridged, cooling mode (☼)	-

* Use in RDU50 only, RDU50.2 shows “NA” in place.

Equipment combinations

Type of unit	Type reference	Data Sheet
Temperature sensor	**QAH11.1**	1840
Room sensor	**QAA32**	1747
Changeover mounting kit for pipes	**ARG86.3**	1840
Changeover mounting kit for ducts	**ARG22.2**	1831
Motoric actuator (radiator valve)	**SSA61...**	4893
Motoric actuator (small valve 2,5 mm)	**SSP61…**	4864
Motoric actuator (small valve 5,5 mm)	**SSB61...**	4891
Motoric actuator (valve 5,5 mm)	**SSC61…**	4895
Motoric actuator (valve 5,5 mm)	**SQS65…**	4573
DC 0…10 V damper actuators	**GDB161...**	4634
	GLB161...	4634
	GCA161...	4613
	GBB161...	4626
	GIB161…	4626
VAV compact controller (with RDU50)	**GDB181.1E/3**	3544
	GLB181.1E/3	3544

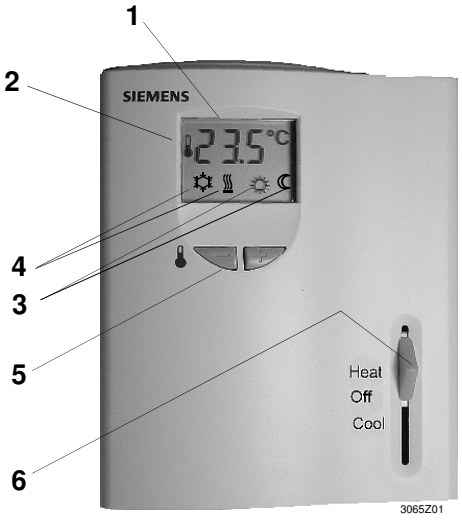
Mechanical design

The controller consists of 2 parts:

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

The housing engages in the baseplate and is secured with two screws.
The baseplate carries the screw terminals. The DIP switches are located at the rear of the housing.

Setting and operating elements



Legend

1 Display of the room or return air temperature, setpoints and control parameters

2 Symbol used when displaying the current room temperature

3 Normal operation
Energy saving mode

4 Cooling valve open
Heating valve open

5 Buttons for adjusting the setpoints and the control parameters

6 Slider switch for manual heat-off-cool setting (RDU50.2 only)

Set of DIP switches

DIP switch no.	Meaning	Position ON (factory setting)	Position OFF
1	Display of temperature or setpoint	Room (or return air) temperature display	Setpoint display
2	Signal inversion DC 0...10V	Used for normally closed actuators: Output signal DC 0...10 V	Used for normally open actuators: Output signal DC 10...0 V

Accessories

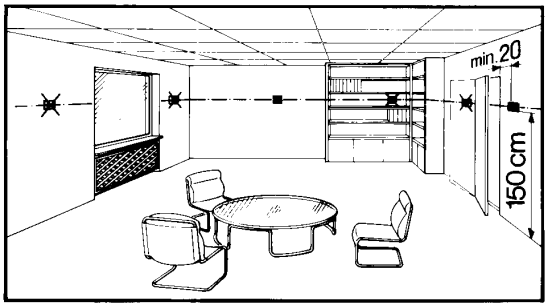
Description	Type reference
Adapter plate 120 x 120 mm for 4“ x 4“ conduit boxes	ARG70
Adapter plate 96 x 120 mm for 2“ x 4“ conduit boxes	ARG70.1
Adapter plate for surface wiring 112x130 mm	ARG70.2

Engineering notes

RDU50 with heating-cooling changeover input B2-M:
In systems without automatic changeover, the temperature sensor can be replaced by an external switch for manual changeover.
In systems with continuous heating mode, no sensor will be connected to the controller's input.
With continuous cooling mode, the controller input must be bridged.

Mounting, installation and commissioning notes

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.



Check the position of the DIP switches and change them, if required. After applying power, the controller makes a reset during which all LCD segments flash, indicating that the reset has been correctly made. This takes about 3 seconds. Then, the controller is ready to operate.

Prior to fitting the changeover sensor on a pipe, thermal conductive paste must be applied to the location on the pipe where the sensor is placed

The controller is supplied with Mounting Instructions.

Calibrating the sensor

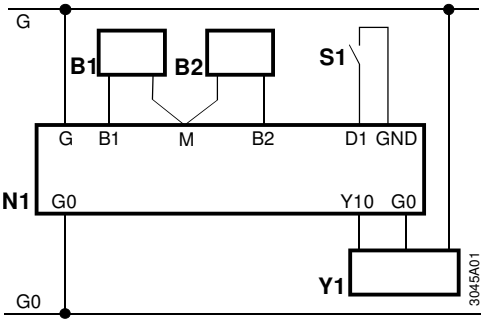
If the room temperature displayed by the controller does not agree with the room temperature effectively measured, the temperature sensor can be recalibrated. In that case, parameter P07 must be changed.

Technical data

Power supply	Operating voltage	SELV AC 24 V ±20 %
	Frequency	50/60 Hz
	Power consumption	max. 4 VA
	Control output Y10 – G0	SELV DC 0…10 V
	Resolution	39 mV
	Effective current	max. ±1 mA
	Return air temperature input B1-M and changeover	QAH11.1, safety class II
	temperature input B2-M (RDU50)	NTC resistor 3 kΩ at 25 °C
	Status input D1 and GND	
	Contact sensing	SELV DC 6-15 V / 3-6 mA
	Operating action	normal open (NO)
	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	5...35 °C
	Control deviation at 25 °C	max. ±0.5 K
	P-band in heating mode, adjustable	2 K
	P-band in cooling mode, adjustable	1 K

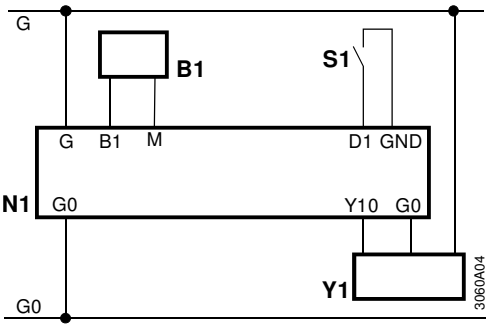
	Integral action time, adjustable	5 minutes
	Setpoint «Energy saving mode ☾», heating , adjustable	16 °C
	Setpoint «Energy saving mode ☾», cooling, adjustable	28 °C
Environmental conditions	Operation	to IEC 721-3-3
	Climatic conditions	class 3 K5
	Temperature	0...+50 °C
	Humidity	<95 % r. h.
	Transport	to IEC 721-3-2
	Climatic conditions	class 2 K3
	Temperature	−25...+70 °C
	Humidity	<95 % r. h.
	Mechanical conditions	class 2M2
	Storage	to IEC 721-3-1
	Climatic conditions	class 1 K3
	Temperature	−25...+70 °C
	Humidity	<95 % r. h.
Norms and standards	CE conformity to	
	EMC directive	89/336/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
	Special requirements on temperature-dependent controls	EN 60 730 – 2 - 9
	Electromagnetic compatibility	
	Emissions	EN 50 081-1
	Immunity	EN 50 082-1
	Device safety class	III to EN 60 730
	Pollution class	normal
General	Degree of protection of housing	IP 30 to EN 60 529
	Connection terminals	solid wires or prepared stranded wires. 2 x 0.4-1.5 mm^2 or 1 x 2.5 mm^2
	Weight	0.23 kg
	Colour of housing front	white, NCS S 0502-G (RAL9003)

Connection diagram



RDU50

B1	Return air temperature sensor
B2	Heating – cooling changeover sensor
N1	Room temperature controller
S1	External operating mode change-over switch
Y1	DC 0-10 V actuator for heating or cooling

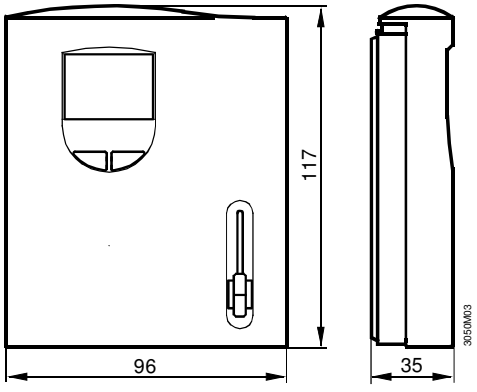


RDU50.2

B1	Return air temperature sensor
N1	Room temperature controller
S1	External operating mode change-over switch
Y1	DC 0-10 V actuator for heating or cooling

Dimensions

Controller



Baseplate