SIEMENS

Synco™ 100

Room Temperature Controller   RLA162.1

with 2 outputs DC 0…10 V plus operating mode selector

Room temperature controller for basic ventilation, air conditioning and heating plants. Compact design with 2 analog control outputs DC 0…10 V for heating and/or cooling. Option for external connected temperature sensor (LG-Ni 1000).

Use

Plant types:
- Small ventilation or air conditioning plants with own air handling section
- Small heating plants
- Heating section of larger ventilation or air conditioning plants
- Ventilation zones of ventilation or air conditioning plants with central air handling

Building types:
- Small residential buildings
- Non-residential buildings of all types
- Apartments with a suitable reference room
- Individual rooms (e.g. conference rooms, training centers)

Devices that can be controlled:
- Heating valve actuators
- Cooling valve actuators
- Variable speed drives
- Air damper actuators
- Current valves of electric air heater batteries

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Functions

Main function
- Control of the room or air temperature through modulating control of the actuating device on the water- or air-side with selectable operating action of the control signals for heating only or cooling only or heating and cooling

Other functions
- Connection of an external temperature sensor (LG-Ni 1000)
- Outside temperature compensation (QAC160 active sensor)
- Operating mode selection (Comfort, Economy, Standby)
- Setpoint changeover via external contact
- Test mode as a commissioning aid

Ordering

When ordering, please give the type reference **RLA162.1**.

Equipment combinations

Actuators and controls must meet the following specification:
- Control input: modulating, DC 0…10 V
- Operating voltage: AC 24 V

For auxiliary functions, the following products can be used:

Type of unit	Type ref.	Data Sheet
Outside temperature sensor	**QAC160**	N1813

Technical design

Application
- 1-stage heating
- 1-stage cooling
- 2-stage heating
- 1-stage heating and 1-stage cooling

Operating modes
- ☀ Normal
- ☾ Energy saving mode
- ⏻ Standby/OFF

Settings

Normal operation

In normal operation, the controller maintains the adjusted setpoint. The relay contact Q1 is closed.
Normal operation is activated when
- the operating mode selector is set to ☀ and
- the external operating mode changeover switch D1–GND is not activated.(i.e. open)

Energy saving mode

In energy saving mode, the setpoint is either raised and/or lowered to save energy (see section setpoint changeover for details). Relay contact Q1 is closed.
Energy saving mode can be activated either;
- by manually switching to energy saving mode ☾, or
- by activating an external operating mode changeover switch connected at D1–GND

Standby/OFF

In standby mode the controller is switched off and no frost protection functions are provided. The relay contact Q1 is open.
Standby mode is activated when the operating mode selector is set to ⏻.

Note	*The relay contact (L−Q1) is purely a manual contact enabled and disabled by the selector switch as described above. The relay is independent of the temperature control functions provided by the controller.*

Temperature control

Settings

The following settings are required:
- Room temperature setpoint: to be adjusted with the setting knob which can be accessed by the user
- Operating action: the 2 control outputs Y1 and Y2 can act as follows:
  – 1-stage heating: control output Y2 is not used
  – 1-stage cooling: control output Y2 is not used
  – 2-stage heating: both control outputs have the same operating action and operate in sequence
  – 1-stage heating and 1-stage cooling: the control outputs have opposed operating actions; the dead zone is fixed at 1.5 K
- Control mode: P or PI; with PI mode, the integrated action time is fixed at 600 seconds
- P-band: the P-band of control output Y1 is adjustable.
  For Y2, the following applies:
  – With operating action heating, the P-band of Y2 is identical to the P-band of Y1
  – With operating action cooling, the P-band of Y2 is 50 % of the P-band of Y1

Control

The RLA162.1 temperature controller compares the room temperature measured by the sensor connected at terminals B1−M with the set value. If no sensor is connected to B1−M, the controller uses its own built-in temperature sensor.

If there is a deviation, the controller generates a DC 0…10 V control signal to adjust the regulating unit(s) between 0…100 %. In P-mode the output is proportional to the offset, in PI mode the output is proportional to the heating or cooling load.

Q	Heating or cooling load or offset
Xp	P-band
Xdz	Dead zone

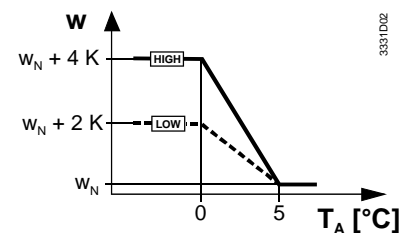|	
Y1, Y2	Positioning signal
⊕	Heating
⊖	Cooling
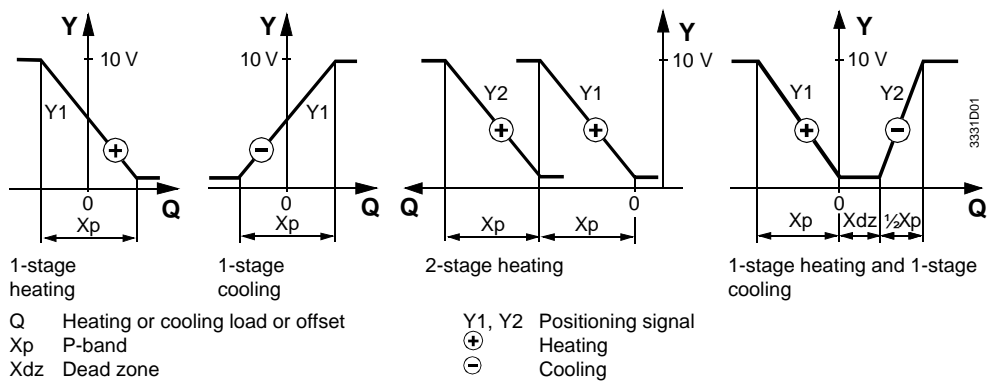
Outside temperature compensation

When using an outside sensor, the current setpoint will be shifted depending on the outside temperature. The shift function is automatically activated when an active sensor (DC 0…10 V, QAC160) is connected to terminal U9. A choice of 2 ranges is available: LOW or HIGH. Within the selected range, compensation is based on fixed values. Depending on the operating action, compensation operates as follows:

Winter compensation

Winter compensation (**operating action Heating**):
If the outside temperature falls from 5 °C to 0 °C, the setpoint will be continuously raised by 2 K (LOW) or 4 K (HIGH). Below an outside temperature of 0 °C, the temperature increase will be kept constant

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Room temperature controller RLA162.1

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| Summer compensation | Summer compensation (**operating action Cooling**): If the outside temperature rises from 22 °C to 35 °C, the setpoint will be continuously raised by 5 K (LOW) or 10 K (HIGH). Above an outside temperature of 35 °C, the temperature increase will be kept constant |

T_A Outside temperature
w   Current setpoint
w_N Nominal setpoint
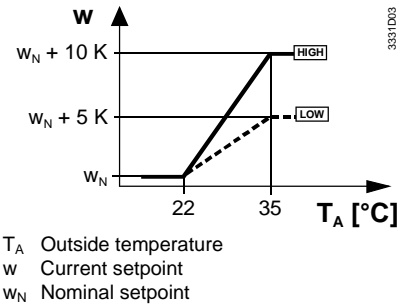
Setpoint changeover

Changeover of the nominal setpoint can be accomplished by setting the operating mode selector to energy saving mode ☾ **or** by closing an external potential-free contact across terminals D1–GND, aimed at saving energy:

- Operating action **Heating**: the nominal setpoint will be **lowered**
- Operating action **Cooling**: the nominal setpoint will be **raised**

Examples

- Manual setting via operating mode selector
- Night setback; changeover provided by a time switch
- Setback during non-occupancy times; changeover provided by a presence detector

A potentiometer is provided to set the temperature by which the nominal setpoint shall be lowered or raised. This setting is not accessible by the user.

Test mode

In test mode, the control is switched off. The setpoint setting knob acts as a positioning unit to manually drive the actuating device (or both actuating devices) to any position required. The positioning range in test mode is configured to match the selected operating mode. The test mode is indicated by an LED, which flashes.

Mechanical design

The controller consists of mounting base and plastic housing.
The front carries the setting knob and the operating mode selector; the mounting base carries the screw terminals and is suited for direct wall mounting or for mounting on a recessed conduit box.
The controller electronics, all internal operating elements and the internal room temperature sensor are located at the rear of the unit.
The following operating elements are provided:

1   Setting potentiometer the setpoint increase or decrease
2   Setting potentiometer for the P-band
3   Block of DIP switches
4   Setting knob for the setpoint
5   Operating mode selector

All functions are selected via the DIP switch block, which comprises 5 switches:

Function	1	2	3	4	5	Action
Operating mode	▣	▣				Heating and cooling in sequence
	▣	▣				2-stage heating
	▣	▣				1-stage cooling
	▣	▣				1-stage heating
Control mode			▣			PI (integral action time 600 s)
			▣			P
Test mode				▣		Test mode
				▣		Normal operation
Outside temperature compensation					▣	HIGH
					▣	LOW

Engineering notes

Only one contact is needed to cut the voltage supply when switching off the control system (e.g. time switch). This contact is used to isolate the controllers from the system potential (terminal G). Actuators need not be switched off (unless used in conjunction with a frost protection unit) as the controller output(s) are automatically set to zero when the system potential is disconnected or the controller is switched off.

The controller is supplied complete with Mounting and Installation Instructions.

Mounting notes

The controller must be fitted on a flat wall. The connecting wires can be run to the controller from a recessed conduit box. Ensure that the local safety regulations are complied with. A suitable mounting location is the inner wall of the space to be heated and/or cooled. Not in niches or shelves, not behind curtains, not above or near heat sources and not exposed to direct solar radiation. Mounting height about 1.5 m above the floor.
To mount the controller, fit the mounting base first. After the electrical connections are made, engage the housing in the base and snap it on.

Commissioning notes

To check the control wiring, the controller can be switched into test mode so that the response of the actuating device can be checked.
If the control is instable, increase the proportional band; if it is too slow, decrease the proportional band.
If the reference room is equipped with thermostatic radiator valves, they must be set to their fully open position and then fixed.

Technical data

Power supply	Operating voltage	AC 24 V ±20 %
	Frequency	50 / 60 Hz
	Power consumption	max. 2 VA
Functional data	Setting range nominal setpoint	8…30 °C
	Setting range setpoint changeover	0…10 K
	P-band	1…50 K
	Integral action time with PI control	600 s
	Dead zone with heating and cooling in sequence	1.5 K
	Control outputs Y1, Y2	
	Voltage	DC 0…10 V, continuous
	Current	max. 1 mA
	Max. cable length copper cable 1.5 mm2	
	For signal input B1	80 m
	For switching input D1	80 m
	Relay output L, Q1	
	Voltage	AC 24…230 V
	Current	max. 2 A
	Contact sensing (input D1–M)	DC 6…15 V, 3…6 mA
Environmental conditions	Operation	
	Climatic conditions	to IEC 721-3-3, class 3K5
	Temperature	0…+50 °C
	Humidity	<95 % r.h.
	Transport	
	Climatic conditions	to IEC 721-3-2, class 2K3
	Temperature	−25…+70 °C
	Humidity	<95 % r.h.
	Mechanical conditions	class 2M2
Norms and standards	CE conformity according to	
	EMC directives	89/336/EEC
	Low voltage directive	73/23/EEC and 93/68/EEC
	Product standards	
	Automatic electrical controls for household and similar use	EN 60 730-1 and EN 60 730-2-9
	Electromagnetic compatibility	
	Emissions	EN 50081-1
	Immunity	EN 50082-1
	Degree of protection	IP 30 EN 60 529
	Safety class	II to EN 60 730
	Degree of contamination	normal
General	Connection terminals for solid wires or stranded wires	2 x 1.5 mm^2 or 1 x 2.5 mm^2
	Weight	0.25 kg

## Connection terminals
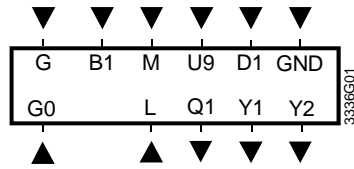
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B1	External temperature sensor
D1	Input for operating mode changeover
G	Operating voltage AC 24 V, system potential SP
G0	Operating voltage AC 24 V, system neutral SN
GND	Ground
L, Q1	Relay output, AC 24…230 V
U9	Outside temperature sensor DC 0…10 V
Y1	Control output DC 0…10 V
Y2	Control output DC 0…10 V

Connection diagrams
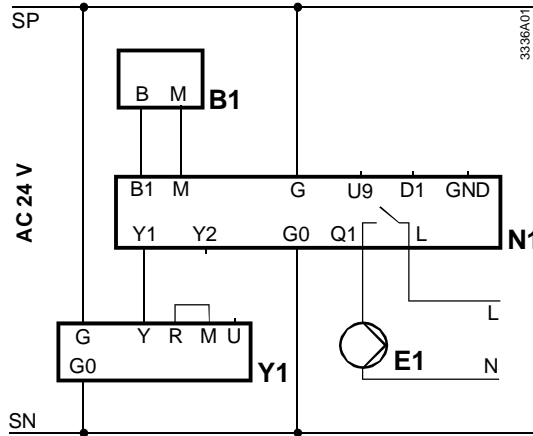
Room/air duct temperature control via external LG-Ni 1000 sensor and heating coil.
Manual switching of the fan via operating mode selector switch.
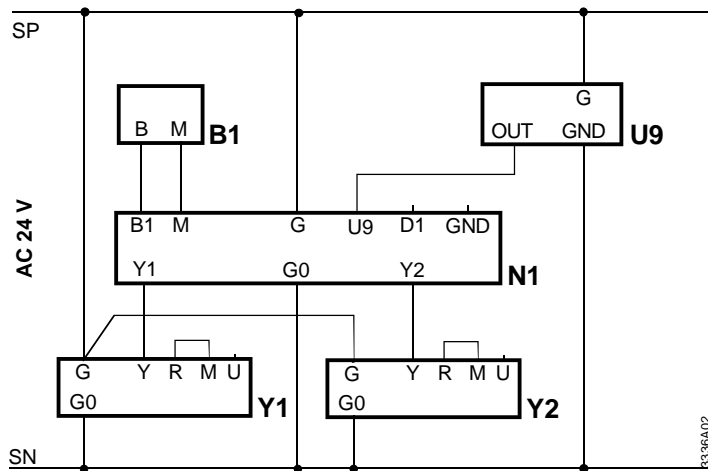
Room/air duct temperature control via external LG-Ni 1000 sensor and heating and
cooling in sequence. Outside temperature compensation via active sensor
(DC 0…10 V)

|	
B1	Temperature sensor LG-Ni 1000
E1	Fan or auxiliary unit
N1	Room temperature controller RLA162.1
U9	Outside temperature sensor QAC160
Y1	Heating valve actuator
Y2	Cooling valve actuator

Application examples
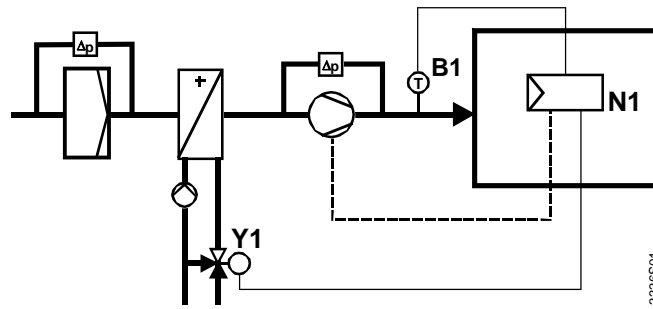
Supply air temperature control through control of the heating valve, with manual switching of the supply fan via operating mode selector switch
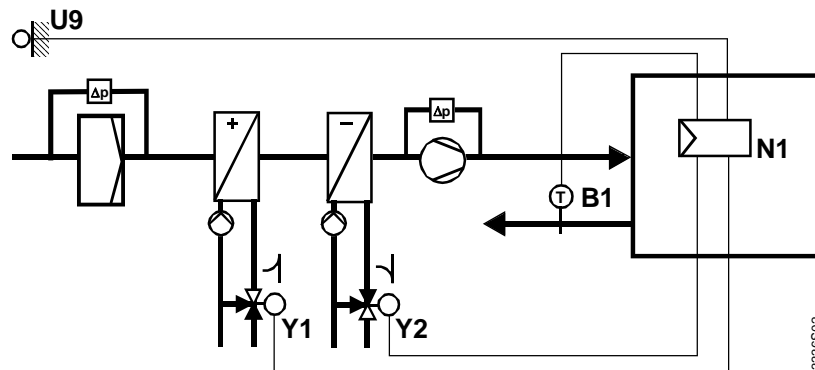
Extract air temperature control through control of the heating and cooling valve, with outside temperature compensation

B1   Duct temperature sensor QAM22
N1   Temperature controller RLA162.1
U9   Outside temperature sensor QAC160
Y1   Heating valve
Y2   Cooling valve

Dimensions
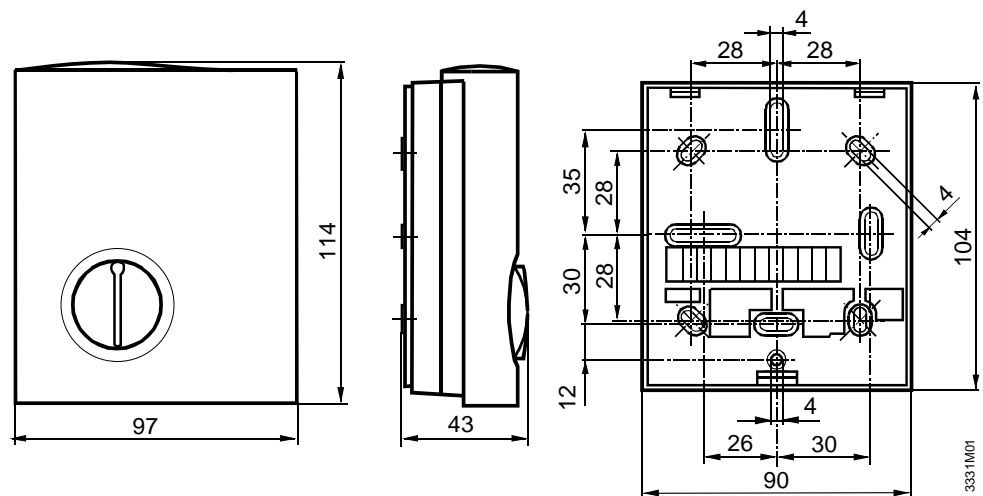
Dimensions in mm

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