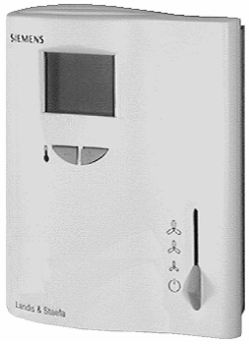
SIEMENS

3055



Room Temperature Controller with LCD

RDF50.1

for 2-pipe fan coil units

Modulating PI control
Output for a DC 0…10 V valve actuator
Outputs for a 3-speed fan
Control depending on the room or the return air temperature
Automatic heating / cooling changeover
Operating modes: Normal, Economy and Standby
Operating mode changeover input for remote control
Function for avoiding damage resulting from moisture
Selectable installation and control parameters
Display of room temperature or setpoint selectable
Minimum and maximum setpoint limitation
Operating voltage AC 24 V

Use

Typical use:

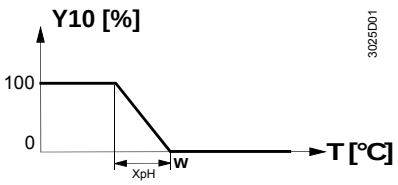
- Control of the room temperature in individual rooms that are heated or cooled with 2-pipe fan coil units
- For opening and closing a DC 0…10 V valve operating on AC 24 V and for switching a 3-speed fan

Suited for use in systems with

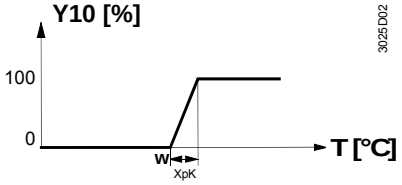
- automatic heating / cooling changeover
- continuous heating or cooling mode

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 continuous DC 0...10 V control commands to the valve. 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

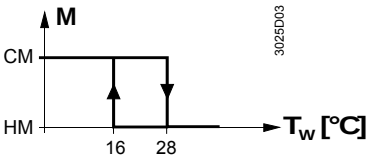


T	Room temperature	w	Room temperature setpoint
XpH	Proportional band “Heating”	Y10	Manipulated variable
XpK	Proportional band “Cooling”		

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 (adjustable), the controller switches to heating mode, below 16 °C (adjustable) 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 temperature is acquired at half-minute intervals and the operating state is updated. The value of the current temperature reading and the mode can be temporarily visualized by selecting parameter P15.



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

In systems without automatic changeover, the temperature sensor can be replaced by an external switch (must be suited for mains voltage) 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.

Purging function (optional)

The task of the changeover sensor is to initiate the change from heating to cooling mode, based on the acquired water temperature. If a 2-port valve is used, it is highly recommended to activate the purging function (parameter P16). This function ensures the correct acquisition of the medium temperature even if the 2-port valve is closed for a longer period of time. To achieve this, the valve is opened for 1 to 5 minutes (adjustable) at 2-hour intervals during off hours.
When the purging function is activated, the first purging action is done after changing parameter P16 and quitting the parameter setting mode.

Return air temperature (optional)

The RDF50.1 provides control either depending on the acquired room temperature or depending on the fan coil unit’s return air temperature. It detects if a QAH11.1 cable temperature sensor is connected to input B1-M and then operates automatically according to that temperature.

Fan operation

The fan is switched to the selected speed via control output Q1, Q2 or Q3.

When function “Temperature-dependent fan control“ is activated (can be selected with DIP switch no. 1), the fan is switched depending on the temperature, that is, together with the valve. It is switched off when

- leaving the heating or cooling sequence, provided function “Temperature-dependent fan control “ is activated
- manually changing to Standby “⏻”, provided no setpoints (e.g. for frost protection) are set and active
- activating an external operating mode changeover switch, provided plant conditions do not call for Economy mode
- turning off the controller’s power supply

Display

If DIP switch no. 2 is set to ON (factory setting), the controller displays the acquired room or return air temperature (unless parameter or setpoints are temporarily selected). If the DIP switch is set to OFF, the controller displays the Normal mode setpoint. In this case, the value of the current temperature reading can only be temporarily visualized by selecting parameter P14.

Operating modes

The following operating modes are available:

Normal mode

Heating or cooling mode with automatic changeover and with manually selected fan speed III, II or I. In Normal mode, the controller maintains the adjusted setpoint.

Economy 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 to Economy. In this operating mode, the relevant setpoints of heating or cooling are maintained (setting of control parameters P01 and P02).
The operating action of the switch (N.C. or N.O.) can be selected (DIP switch no. 3).

Standby

In Standby “⏻”, the relevant setpoints of heating and cooling are maintained, provided such setpoints have been adjusted (setting of control parameters P03 and P04).

Avoiding damage resulting from moisture (optional)

To avoid damage due to moisture in very warm and humid climatic zones resulting from lack of air circulation in Economy mode (e.g. in hotel rooms during unoccupied periods), the fan can be kept running in Economy mode when activating parameter P17. In this case, the fan keeps running at the selected speed or at speed 1 if the operating mode selector is in Standby “⏻”.

Setting the control parameters

A number of control parameters can be set to optimize 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.

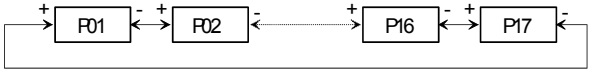
Settings

The parameters can be changed as follows:

1 Set the operating mode selector to Standby “⏻”.

2 Press buttons + and – simultaneously for a minimum of 3 seconds and a maximum of 5 seconds. Release them and, within 2 seconds, press button + again for 3 seconds. Then, the display will show “P01“.

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



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

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

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

7 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 Economy mode (operating mode changeover switch activated)	OFF, 5…20 °C (in increments of 0.5 K)	16 °C
P02	Setpoint of cooling in Economy mode (operating mode changeover switch activated)	OFF, 21…35 °C (in increments of 0.5 K)	28 °C
P03	Setpoint of heating in Standby "⏻"	OFF, 5…20 °C (in increments of 0.5 K)	8 °C
P04	Setpoint of cooling in Standby "⏻"	OFF, 21…35 °C (in increments of 0.5 K)	OFF
P05	Minimum setpoint limitation in Normal mode	5…20 °C (in increments of 0.5 K)	5 °C
P06	Maximum setpoint limitation in Normal mode	21…35 °C (in increments of 0.5 K)	35 °C
P07	Heating / cooling changeover switching point cooling	10…25 °C (in increments of 0.5 K)	16 °C
P08	Heating / cooling changeover switching point heating	27…40 °C (in increments of 0.5 K)	28 °C
P09	Sensor calibration	-3…+3 K (in increments of 0.5 K)	0 K
P10	P-band in heating mode	0.5…+4 K (in increments of 0.5 K)	2 K
P11	P-band in cooling mode	0.5…+4 K (in increments of 0.5 K)	1 K
P12	Integral action time	1…10 min. (in increments of 1 min.)	5 min.
P13	Active temperature sensor (no setting, display only)	1: Room temperature sensor active 2: Return air temperature sensor active	-
P14	Value of current room temperature reading (no setting, display only)	0…49 °C = current temperature value	-
P15	Value of current heating / cooling 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 (☼)	-
P16	Purging function	0 min.: Not active 1…5 min.: Active with selected duration	0 min.
P17	Fan control in Economy mode	OFF: Fan is off in the dead zone ON: Fan is on in the dead zone, running in selected speed or in speed 1 if in standby ⏻ position	OFF

Ordering

When ordering, please give name and type reference.

The QAH11.1 temperature sensor (can be used as a return air temperature or changeover sensor), the changeover sensor 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
Room sensor	**QAA32**	1747
Changeover mounting kit	**ARG86.3**	1840
Electromotoric actuator (radiator valve)	**SSA61...**	4893
Electromotoric actuator (small valves 2.5 mm)	**SSP61…**	4864
Electromotoric actuator (small valves 5.5 mm)	**SSB61...**	4891
Electromotoric actuator (valves 5.5 mm)	**SSC61…**	4895
Electromotoric actuator (valves 5.5 mm)	**SQS65…**	4573

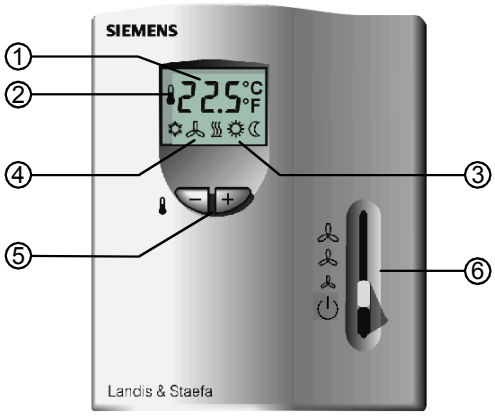
Mechanical design

The controller consists of 2 parts:

- Plastic housing which accommodates the electronics, the operating elements and the built-in room temperature sensor
- Base

The housing engages in the base and is secured with 2 screws.
The base 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 temperature, setpoints or control parameters

2 Symbol used when displaying the current room temperature

3 Normal mode
Economy mode

4 Cooling valve open
Fan on
Heating valve open

5 Buttons for adjusting the setpoints and the control parameters

6 Operating mode selector
(Standby "⏻", heating or cooling mode with manual selection of fan speed)

Set of DIP switches

DIP switch no.	Meaning	Position ON (factory setting)	Position OFF
1	Fan control in Normal mode	Fan control is temperature-independent	Fan control is temperature dependent
2	Display of temperature or setpoint	Room (or return air) temperature display	Setpoint display
3	Operating action of switch for external operating mode changeover	Changeover activated when switch is closed (N.O.)	Changeover activated when switch is open (N.C.)

Accessories

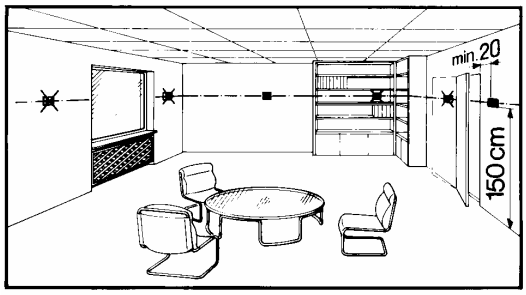
Description	Type reference
Adapter plate 120 x 120 mm for 4“ x 4“ conduit boxes	ARG70
Adapter plate 96 x 120 mm for 2“ x 4“ conduit boxes	ARG70.1
Adapter plate for surface wiring 112 x 130 mm	ARG70.2

Engineering notes

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 (B2-M) must be bridged.

Mounting, installation and commissioning notes

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 positions of DIP switches no. 1, 2 and 3 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, 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 inputs B1-M and B2-M carry mains potential. If the sensor’s cables must be extended, they must be suited for mains voltage

The controller is supplied with Mounting Instructions.

Calibrating the sensor

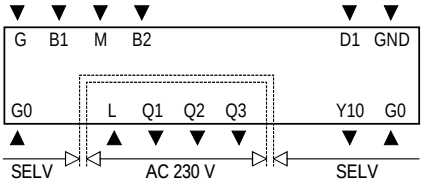
If the room temperature displayed by the controller does is inconsistent with the room temperature effectively measured, the temperature sensor can be recalibrated. In that case, parameter P09 must be changed.

Technical data

Power supply	Operating voltage	SELV AC 24 V ±20 %
	Frequency	50/60 Hz
	Power consumption	max. 6 VA
	Control outputs Q1, Q2, Q3-L	AC 230 V
	Rating	max. 6(4)A
	Control output Y10-G0	SELV DC 0…10 V
	Resolution	39 mV
	Effective current	max. ±1 mA
	Return air temperature sensor – status input B1-M	QAH11.1, safety class II NTC resistor 3 kΩ at 25 °C
	Changeover – status input B2 – M	QAH11.1, safety class II NTC resistor 3 kΩ at 25 °C
	Status input D1 and GND	
	Operating action selectable	normally open (N.O.) normally closed (N.C.)
	Contact sensing	SELV DC 6…15 V / 3…6 mA
	Insulation against mains (SELV)	4 kV, reinforced insulation
	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 «Economy mode ☾», heating (adjustable)	16 °C
	Setpoint «Economy mode ☾», cooling (adjustable)	28 °C
	Setpoint «Standby ⏻», heating (adjustable)	8 °C
	Setpoint «Standby ⏻», cooling (adjustable)	OFF
	Heating / cooling changeover switching point cooling (adjustable)	16 °C
	Heating / cooling changeover switching point heating (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	89/336/EEC
	EMC directive	73/23/EEC
	Low-voltage directive	
	N474 **C-Tick** conformity to	AS/NSZ 4251.1:1994
	EMC emission standard	

General	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	II to EN 60 730
	Pollution class	normal
	Degree of protection of housing	IP 30 to EN 60 529
	Connection terminals	solid or prepared stranded wires. 2 x 0.4-1.5 mm^2 or 1 x 2.5 mm^2
	Weight	0.23 kg
	Color of housing front	white, NCS S 0502-G (RAL 9003)

Connection terminals



G, G0 Operating voltage AC 24 V for the room temperature controller

L Operating voltage AC 230 V for the fan speeds

B1 Status input “Return air sensor” or external room temperature sensor QAA32

B2 Status input “Changeover sensor”

M Measuring neutral «Return air temperature sensor or external room temperature sensor QAA32» and «Changeover sensor»

D1, GND Status input for potential-free operating mode changeover switch

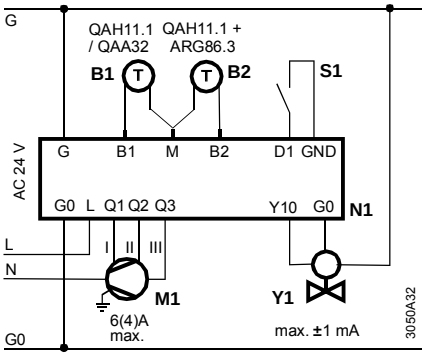
Q1 Control output “Fan speed I“, AC 230 V

Q2 Control output “Fan speed II'“, AC 230 V

Q3 Control output “Fan speed III'“, AC 230 V

Y10 Control output DC 0…10 V

Connection diagram



B1 Return air temperature sensor QAH11.1 or external room temperature sensor QAA32

B2 Changeover sensor (QAH11.1 temperature sensor + changeover mounting kit ARG86.3)

M1 3-speed fan

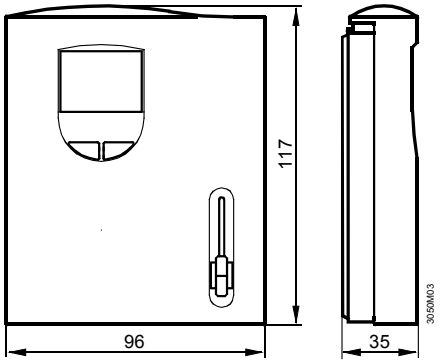
N1 RDF50.1 room temperature controller

S1 External operating mode changeover switch

Y1 DC 0…10 V valve actuator for heating or cooling

Dimensions

Controller



Base