# Wall-mounted Room Thermostat with Display RDG400

for VAV 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 and auxiliary output ON/OFF, PWM or 3-pos**
- **Automatic or manual heating/cooling changeover**
- **Operating modes: Comfort, Energy Saving and Protection**
- **Three multifunctional inputs for keycard contact, external sensor, etc.**
- **Adjustable commissioning and control parameters**
- **Minimum and maximum setpoint limitation**
- **Minimum and maximum limitation for air flow signal DC 0..10 V**
- **Output signal inversion as an option**
- **AC 24 V operating voltage**
- **Backlit display**

## Use

The room thermostat is suitable for following systems:

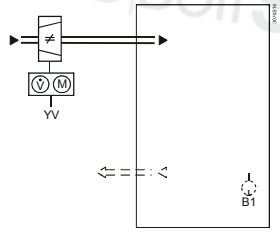
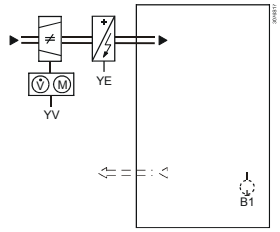
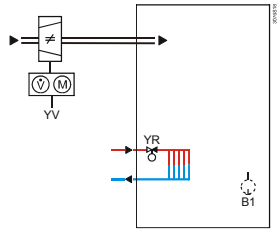
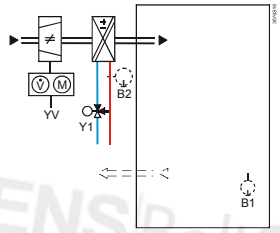
**VAV** systems via ON/OFF or modulating control outputs:
- Single-duct system
- Single-duct system with electrical heater
- Single-duct system and radiator / floor heating
- Single-duct system with heating / cooling coil

## Functions

- Maintain room temperature via built-in temperature sensor or external room temperature / return air temperature sensor
- Automatic or manual changeover between heating and cooling mode
- Select applications via DIP switches
- Select operating mode via the operating mode button on the thermostat
- Display current room temperature or setpoint in °C and/or °F
- Minimum and maximum setpoint limitation
- Keypad lock (automatic and manual)
- 3 multifunctional inputs, freely selectable for:
  - Operating mode switchover contact (key card, window contact etc)
  - Automatic heating/cooling changeover sensor
  - External room temperature or return air temperature
  - Dewpoint sensor
  - Electric heater enable
  - Fault input
- Minimum and maximum limitation of air flow signal DC 0..10 V
- Floor heating temperature limit
- Reload factory settings for commissioning and control parameters

## Applications

The thermostat supports following applications, which can be configured by DIP-switch on the rear side of the thermostat. The control output for the damper actuator is either DC 0…10 V (factory-setting) or 3-position (see parameter P47), and for the auxiliary heating/cooling output either ON/OFF, PWM, 3-pos or DC 0…10 V respectively.

| Application | | DIP-switch | Control output |
|---|---|---|---|
| **Single duct**<br>• DC 0…10 V damper actuator<br>• 3-pos damper actuator |  | | DC 0..10 V<br>3-pos |
| **Single duct with auxiliary heater**<br>• DC 0…10 V damper actuator and either 2-pos, PWM or 3-pos auxiliary heater<br>• 3-pos damper actuator and DC 0…10 V auxiliary heater |  | | DC 0..10 V<br>ON/OFF, PWM or 3-pos |
| **Single duct and radiator / floor heating**<br>• DC 0…10 V damper actuator and either 2-pos, PWM or 3-pos radiator<br>• 3-pos damper actuator and DC 0…10 V radiator |  | | DC 0..10 V<br>ON/OFF, PWM or 3-pos |
| **Single duct heating and cooling coil**<br>• DC 0…10 V damper actuator and either 2-pos, PWM or 3-pos heating and cooling<br>• 3-pos damper actuator and DC 0…10 V heating and cooling |  | | DC 0..10 V<br>ON/OFF, PWM or 3-pos |

## Type summary

| Type reference | Operating Voltage | Number of control outputs | | | |
|---|---|---|---|---|---|
| | | ON/OFF | PWM | 3-pos | DC 0..10 V |
| **RDG400** | AC 24 V | **1**[1)] | **1**[1)] | **1**[1)] | **1** |

1) Either ON/OFF, 3-pos or PWM

## Equipment combinations

| | Type of unit | | Type reference | Data Sheet |
|---|---|---|---|---|
| *DC 0..10 V actuator* | Cable temperature sensor | | **QAH11.1** | 1840 |
| | Room temperature sensor | | **QAA32** | 1747 |
| | Condensation detector / Supply unit | | **QXA2000 / AQX2000** | 1542 |
| | Electrical actuator, DC 0..10 V (for radiator valve) | | **SSA61...** | 4893 |
| | Electrical actuator, DC 0..10 V (for 2 and 3 port valves / V…P45) | | **SSC61…** | 4895 |
| | Electrical actuator, DC 0..10 V (for small valve 2,5 mm) | | **SSP61…** | 4864 |
| | Electrical actuator, DC 0..10 V (for small valves 5.5 mm) | | **SSB61...** | 4891 |
| | Electromotoric actuator, DC 0..10 V (for valves 5.5 mm) | | **SQS65…** | 4573 |
| | Thermal actuator, DC 0..10 V (for small valves and radiator valves) | | **STS61** | 4880 |
| | DC 0…10 V damper actuator | | **GQD161…** | 4605 |
| | | | **GDB161…** | 4634 |
| | | | **GLB161…** | |
| | | | **GMA161…** | 4614 |
| | | | **GEB161…** | 4621 |
| | | | **GCA161…** | 4613 |
| | | | **GBB161…** | 4626 |
| | | | **GIB161…** | |
| | VAV compact controller | | **GDB181.1E/3** | 3544 |
| | | | **GLB181.1E/3** | |
| ON/OFF actuators | Electromotoric ON/OFF valve and actuator (only available in AP, UAE, SA and IN) | | **MVI…/MXI…** | 4867 |
| | Electromotoric ON/OFF actuator | | **SFA21...** | 4863 |
| | Thermal actuator (for radiator valve) | | **STA21...** | 4893 |

| | | | | |
|---|---|---|---|---|
| 3-position actuators | Thermal actuator<br>(for small valves 2.5 mm) | | **STP21...** | 4878 |
| | Zone valve actuators<br>(only available in AP, UAE, SA and IN) | | **SUA…** | 4830 |
| | Electrical actuator, 3-position<br>(for radiator valve) | | **SSA31...** | 4893 |
| | Electrical actuator, 3-position<br>(for small valve 2,5 mm) | | **SSP31…** | 4864 |
| | Electrical actuator, 3-position<br>(for small valve 5,5 mm) | | **SSB31...** | 4891 |
| | Electromotoric actuator, 3-position<br>(for valves 5.5 mm) | | **SQS35…** | 4573 |

## Accessories

| Type of unit | Type reference | Data Sheet |
|---|---|---|
| Changeover mounting kit (50 pcs/package) | **ARG86.3** | 1840 |
| Adapter plate 120 x 120 mm for 4“ x 4“ conduit boxes | ARG70 | |
| Adapter plate for surface wiring 112 x 130 mm | ARG70.2 | |

## Ordering

When ordering, indicate both product number and name:

E.g. **RDG400 room temperature thermostat**

Order valve actuators separately.

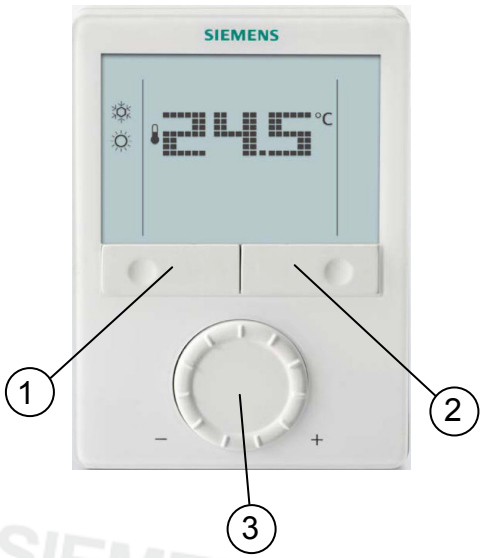
## Mechanical design

The thermostat consists of 2 parts:

- Plastic housing which accommodates the electronics, the operating elements and the built-in room temperature sensor
- Mounting plate with the screw terminals

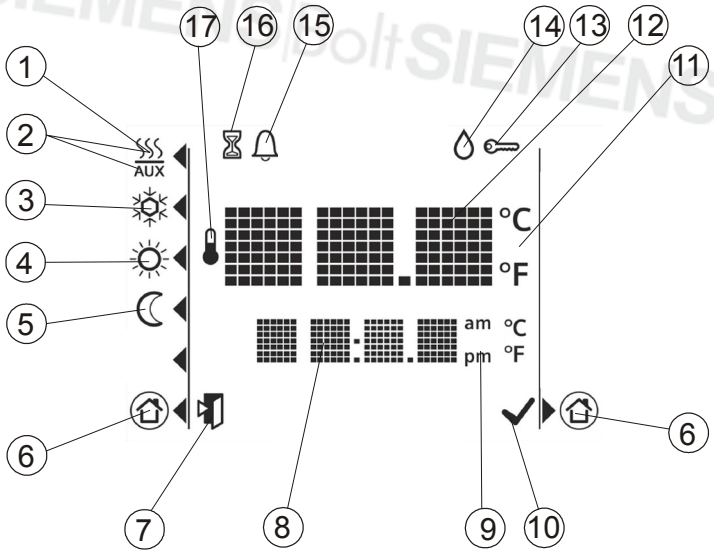
The housing engages on to the mounting plate and is secured with 2 screws.

## Operation and settings




1. Operating mode selector / Esc
2. Protection and Ok
3. Rotary knob for setpoint and parameter adjustment

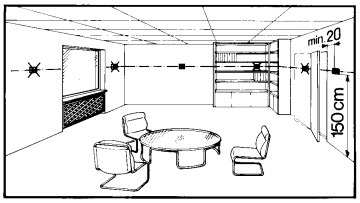
**Display**




| # | Symbol | Description | # | Symbol | Description |
|---|---|---|---|---|---|
| 1 | | Heating mode | 10 | | Confirmation of parameters |
| 2 | AUX | Heating mode<br>auxiliary heater on (2nd stage) | 11 | °C<br>°F | Degrees Celsius<br>Degrees Fahrenheit |
| 3 | | Cooling mode | 12 | | Digits for temperature and setpoint |
| 4 | | Operating mode Comfort | 13 | | Keylock active |
| 5 | | Operating mode Energy Saving | 14 | | Condensation in room (dewpoint sensor active) |
| 6 | | Operating mode Protected | 15 | | Fault |
| 7 | | Escape | 16 | | Temporary timer function (visible when Comfort prolong, or abcence function is active) |
| 8 | | Digits for temperature, setpoint etc | 17 | | Indicates Room temperature is displayed |
| 9 | am<br>pm | Morning, 12-hour system<br>Afternoon, 12-hour system | | | |

## Mounting and installation

Do not mount on a wall in niches or bookshelves, behind curtains, above or near heat sources, or exposed to direct solar radiation. Mount about 1.5 m above the floor.




**Mounting**

⚠

- Devices must be mounted on clean, dry indoor place and not be exposed to dripping or splashing

**Wiring**

See the mounting instructions M3182 enclosed with the thermostat

⚠
- Comply with local regulations to wire, fuse and earth the thermostat
- The power supply line must have an external fuse or circuit breaker with a rated current of no more than 10 A

⚠
⚠
- Inputs X1-M, X2-M or D1-GND of different units (e.g. summer/winter switch) may be connected in parallel with an external switch. Consider overall maximum contact sensing current for switch rating
- Disconnect from supply before removing the thermostat from the mounting plate!

**Commissioning**

Set the thermostat application and type of control output via the DIP switches before mounting the thermostat on the mounting plate.
After power is applied, the thermostat carries out a reset during which all LCD segments flash indicating that the reset was correct. After the reset, which takes about 3 seconds, the thermostat is ready for commissioning by qualified HVAC staff. The control parameters of the thermostat can be set to ensure optimum performance of the entire system (see basic documentation P3182).

Control sequence

- The control sequence may need to be set via parameter P01 depending on the application. The factory setting for the single duct application is “Cooling only”

Calibrate sensor

- Recalibrate the temperature sensor if the room temperature displayed on the thermostat does not match the room temperature measured. To do this, change parameter P05

Setpoint and range limitation

- We recommend to review the setpoints and setpoint ranges (parameters P08…P12) and change them as needed to achieve maximum comfort and save energy

**Disposal**

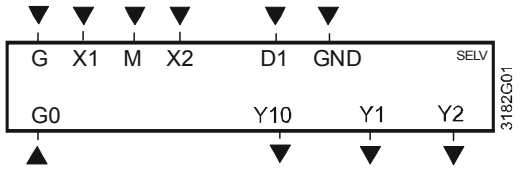
The device is classified as waste electronic equipment in terms of the European Directive 2002/96/EC (WEEE) and should not be disposed of as unsorted municipal waste. The relevant national legal rules are to be adhered to. Regarding disposal, use the systems setup for collecting electronic waste.
Observe all local and applicable laws.

## Technical data

| | | | |
|---|---|---|---|
| ⚠ Power supply | Operating voltage | | SELV AC 24 V ±20 % |
| | Frequency | | 50/60 Hz |
| | Power consumption | | Max. 2 VA |
| Outputs | Control output Y10-G0 | | DC 0…10 V |
| | Resolution | | 39 mV |
| | Current | | Max. ±1 mA |
| | Control output Y1, Y2 – G | | AC 24 V |
| | Rating | | Max. 1 A |
| Inputs | Multifunctional input | | |
| | X1-M/X2-M | | |
| | Temperature sensor input: | | |
| | Type | | QAH11.1 (NTC) |
| | Digital input: | | |
| | Operating action | | Selectable (N.O./N.C.) |
| | Contact sensing | | DC 0…5 V / max 5 mA |
| | D1-GND | | |
| | Operating action | | Selectable (N.O. / N.C.) |
| | Contact sensing | | SELV DC 6…15 V / 3…6 mA |
| | Function input:<br>External temperature sensor, heating/cooling changeover sensor, operating mode switchover contact, dewpoint monitor contact, enable electrical heater contact, fault contact | | Selectable |
| Operational data | Switching differential, adjustable | | |
| | Heating mode | (P30) | 2 K (0.5...6K) |
| | Cooling mode | (P31) | 1 K (0.5...6K) |
| | Setpoint setting and range | | |
| | ☼ Comfort mode | (P08) | 21°C (5...40 °C) |
| | ☾ Energy Saving mode | (P11-P12) | 15°C/30°C (OFF, 5...40 °C) |
| | ⌂ Protection | (P65-P66) | 8°C/OFF (OFF, 5...40 °C) |
| | Multifunctional input X1/X2/D1 | | Selectable |
| | Input X1 | | Ext. temperature sensor (P38=1) |
| | Input X2 | | Heat/cool changeover sensor (P40=2) |
| | Input D1 | | Operating mode switchover (P42=3) |
| | Built-in room temperature sensor | | |
| | Measuring range | | 0…49 °C |
| | Accuracy at 25 °C | | < ± 0.5 K |
| | Temperature calibration range | | ± 3.0 K |
| | Settings and display resolution | | |
| | Setpoints | | 0.5 °C |
| | Current temperature value displayed | | 0.5 °C |

| | | |
|---|---|---|
| Environmental conditions | Operation | As per IEC 721-3-3 |
| | Climatic conditions | Class 3K5 |
| | Temperature | 0...+50 °C |
| | Humidity | <95 % r.h. |
| | Transport | As per IEC 721-3-2 |
| | Climatic conditions | Class 2K3 |
| | Temperature | −25...+60 °C |
| | Humidity | <95 % r.h. |
| | Mechanical conditions | Class 2M2 |
| | Storage | As per IEC 721-3-1 |
| | Climatic conditions | Class 1K3 |
| | Temperature | −25...+60 °C |
| | Humidity | <95 % r.h. |
| Standards | CE conformity | |
| | EMC directive | 2004/108/EC |
| | N474 **C-tick** conformity to EMC emission standard | AS/NSZ 4251.1:1999 |
| | RoHS 2002/95/EC — Reduction of hazardous substances | 2002/95/EC |
| | Product standards | |
| | Automatic electrical controls for household and similar use | EN 60730–1 |
| | Special requirements for temperature-dependent controls | EN 60730–2-9 |
| | Electronic control type | 2.B (microdisconnection on operation) |
| | Electromagnetic compatibility | |
| | Emissions | IEC/EN 61000-6-3 |
| | Immunity | IEC/EN 61000-6-2 |
| | Protective class | III as per EN 60730 |
| | Pollution class | Normal |
| | Degree of protection of housing | IP 30 to EN 60529 |
| General | Connection terminals | Solid wires or prepared stranded wires<br>1 x 0.4…2.5 $mm^2$<br>or 2 x 0.4…1.5 $mm^2$ |
| | Housing front color | RAL 9003 white |
| | Weight | 0.350 kg |

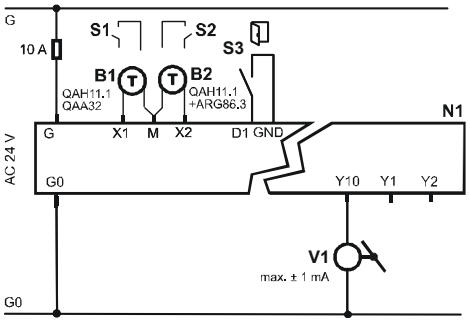
## Connection terminals



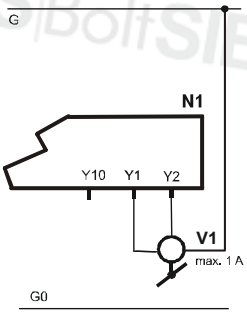

| | |
|---|---|
| G, G0 | Operating voltage thermostat AC 24 V |
| Y10/G0 | Control output for DC 0…10 V actuator |
| Y1/G, Y2/G | Control output for 2-pos, PWM or 3-pos actuators |
| X1, X2 | Multifunctional input for temperature sensor (e.g. QAH11.1) or potential-free switch<br>Factory setting:<br>- X1:= external room temp. sensor<br>- X2:= automatic heat/cool changeover/switch |
| M | Measuring neutral for sensor and switch |
| D1, GND | Multifunctional input for potential-free switch.<br>Factory setting: Operating mode switchover contact |

## Connection diagrams

### Application: Single duct



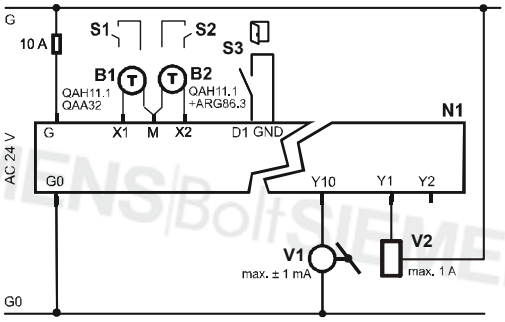

V1 DC 0…10 V damper actuator



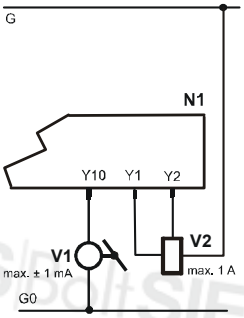

V1 3-pos damper actuator

N1 Room thermostat RDG400
S1..S3 Switch (keycard, window contact, etc.)
B1, B2 Temperature sensor (return air temp., external room temp., changeover sensor, etc.)

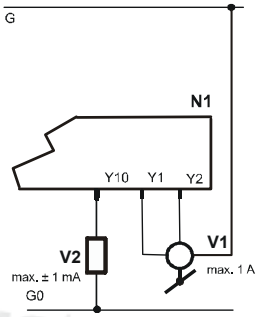
### Application: Single duct with electrical heater, radiator or heating/cooling




V1 DC 0 10V damper actuator
V2 2-pos or PWM electrical heater, radiator or heating/cooling valve




V1 DC 0 10V damper actuator
V2 3-pos electrical heater, radiator or heating/cooling valve

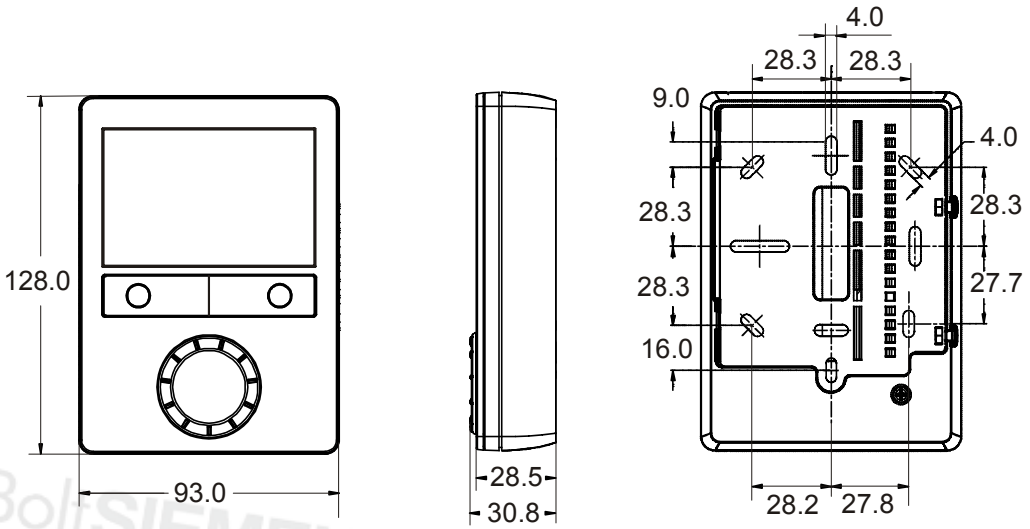



V1 3-pos damper actuator
V2 DC 0…10 V electrical heater, radiator or heating/cooling valve

N1 Room Thermostat RDG400
S1..S3 Switch (keycard, window contact, etc.)
B1, B2 Temperature sensor (return air temperature, external room temperature, changeover sensor, etc.)

## Dimensions

Dimensions in mm

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