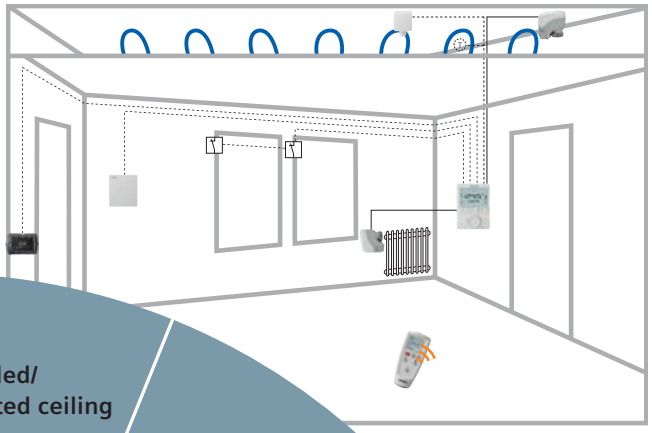
SIEMENS

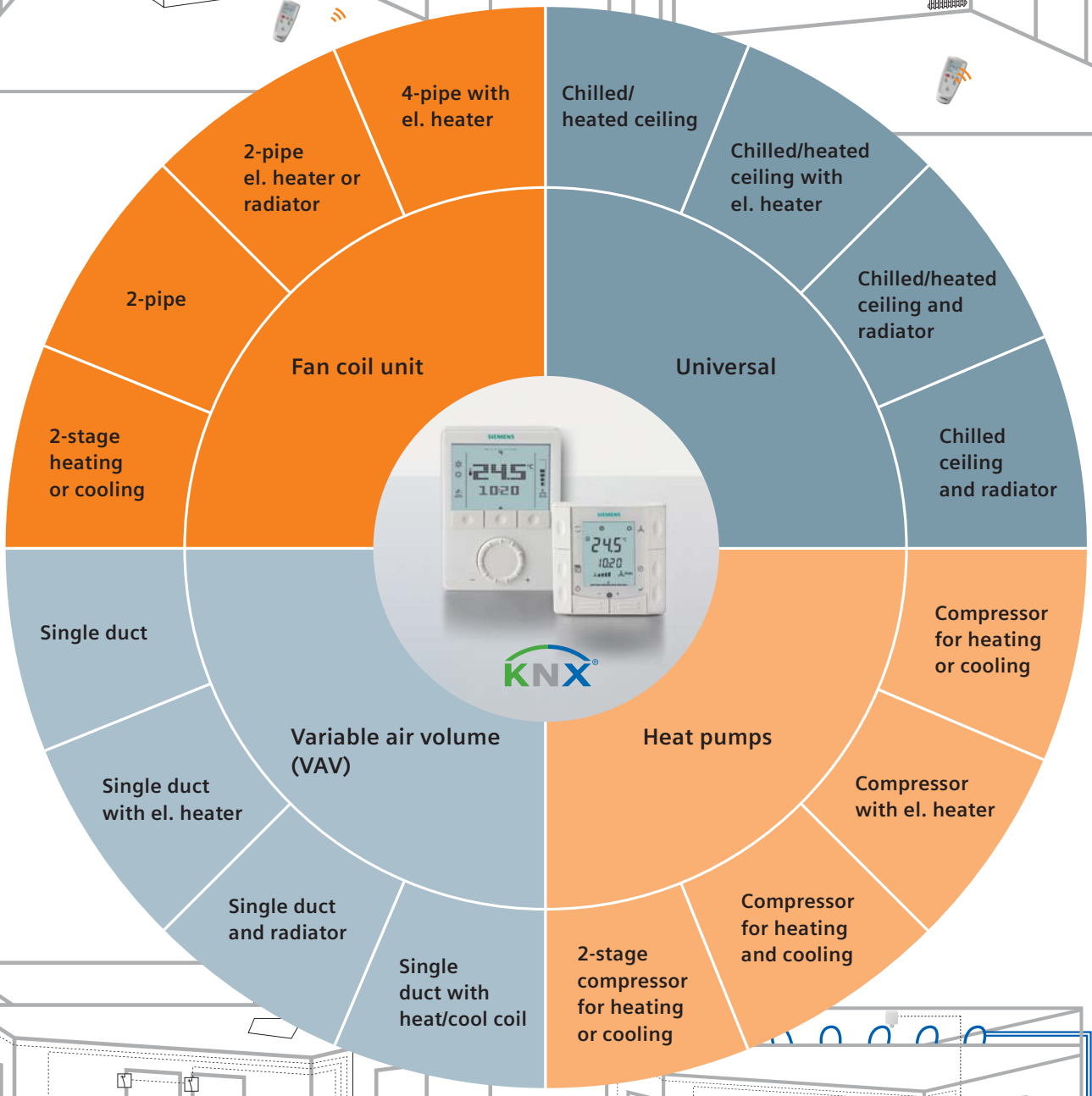
RDG/RDF – room thermostats

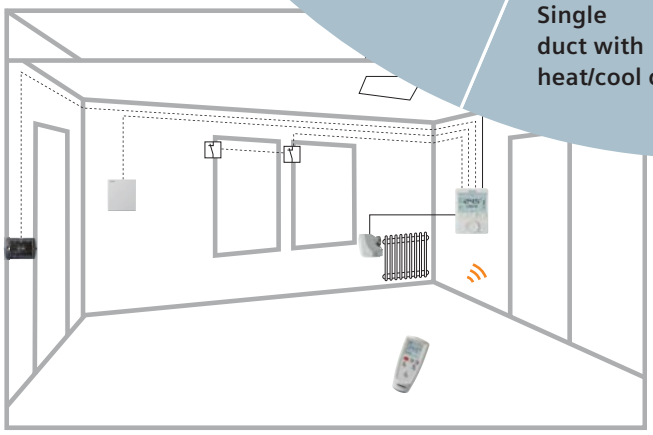
Application Guide

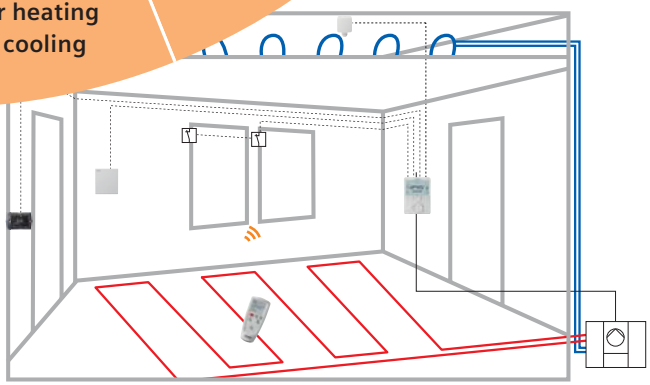
Answers for infrastructure.

Application overview









Contents

Introduction

The RDG and RDF thermostat range is very versatile and includes a number of products. RDG and RDF offer extensive features and cover a broad range of applications.

The document:
- **provides you an overview of the new RDG and RDF ranges**
- **assists you in selecting the suitable product and**
- **provides helpful installation and commissioning information**

The section "application overview" for each main application – i.e. fan coil unit (FCU, universal, heat pumps and VAV – shows what applications are covered by which thermostat line.
The sections "product overview" show the available thermostat variants and their supported applications.

Before you start

We recommend proceeding as follows prior to selecting a thermostat:
- Type of main application: FCU, universal, heat pump or VAV
- Application: e.g. 2-pipe with electric heater
- Type of control output 1: ON/OFF, PWM, 3-position, or DC 0...10 V
- Type of control output 2: ON/OFF, PWM, 3-position, or DC 0...10 V
- Type of inputs: e.g. external room temperature sensor, changeover sensor, keycard contact etc.
- Type of thermostat: stand-alone, stand-alone with 7-day timer, or communicating thermostat
- Thermostat design: wall- or semi flush-mounted
- Other important requirements

Description of RDG range

The RDG is a compact, wall-mounted version with an elegant and modern design.

The product consists of 2 lines of versatile products – RDG100 and RDG400:
- RDG100 line for FCUs plus universal (e.g. chilled ceilings or radiators) and heat pump applications
- RDG400 line for VAV applications

The thermostats are available as stand-alone versions, stand-alone with 7-day program and KNX versions tailored for use with Synco 700 via LTE-mode, for integration in Synco living or BACS (Building Automation and Control System) via S-mode.

Product range RDG

- **RDG100 –** the **versatile** stand-alone thermostat with ON/OFF and modulating (PWM or 3-position) outputs
- **RDG100T –** the **versatile** stand-alone thermostat with 7-day program and same functionality as RDG100, plus infrared receiver for remote control
- **RDG100T/H –** the **versatile** stand-alone thermostat is the landscape version of RDG100T, the 7-day program can be disabled
- **RDG100KN –** the **versatile communicating** thermostat with the same functionality as RDG100, plus KNX interface
- **RDG110 –** the **robust** stand-alone thermostat with relay outputs (SPDT) for applications with max. 5 A current on the control outputs. This thermostat is the ideal solution for ON/OFF applications with electric heater, heat pumps, or heat pumps with reversing valve (RV).
- **RDG140 –** the **modulating** thermostat operating on AC 24 V (SELV) with DC 0...10 V control outputs

- **RDG160 –** the **energy-efficient** modulating thermostat to control electronic commutated fan motors (ECM Fans), operating on AC 24 V (SELV) with DC 0...10 V outputs for valve and fan
- **RDG160KN –** the communicating **energy-efficient** modulating thermostat for controlling electronic commutated fan motors (EC Fans) and either DC or 2-position valves, or for 3-speed fan and DC valves, including KNX interface
- **RDG400 –** the **versatile** stand-alone thermostat for VAV applications with modulating and ON/OFF outputs
- **RDG400KN –** the **versatile communicating** thermostat with the same functionality as RDG400, plus KNX interface

A number of control parameters can be adjusted on each thermostat to optimize the control performance.

Description of RDF semi flush-mount range

The RDF.. range is a compact semi flush mount solution. The RDF6.. line fits into round conduit boxes with a 60 mm diameter and a minimum 40 mm of depth. The RDF3.. and RDF4.. lines are designed to fit into conduit boxes with fixing center 60.3 mm (British standard BS4662).

The RDF and RDU are two product ranges featuring versatile and slim products:
- RDF range for FCUs and heat pump applications
- RDU range for VAV applications

The thermostats are available as stand-alone, stand-alone with 7-day program and KNX versions tailored for use with Synco 700 via LTE-mode, for Synco living or for integration in BACS via S-mode. There is also a version available with ModBus interface.

Product range RDF/RDU stand-alone

- **RDF300 –** the **versatile** stand-alone thermostat with ON/OFF or modulating 3-position outputs
- **RDF300.02 –** also includes backlit display
- **RDF340 – modulating** thermostat operating on AC 24 V (SELV) with DC 0...10 V control outputs
- **RDF310.2 – basic** stand-alone thermostat for 2-pipe applications
- **RDF310.21–** also offers a backlit display and infrared receiver for remote control
- **RDF600 – versatile** stand-alone thermostat for use with round conduit boxes conforming to CEE/VDE with the same functionality as RDF300.02
- **RDU340 –** the **versatile** stand-alone thermostat for VAV applications with modulating DC 0...10 V and ON/OFF outputs

RDF product range, stand-alone with time program

- **RDF600T –** the **versatile** stand-alone thermostat with 7-day program and same functionality as RDF600, plus infrared receiver for remote control and backlit digital display for use with round conduit boxes conforming to CEE/VDE
- **RDF410.21 – basic** stand-alone thermostat for 2-pipe applications, with 7-day program, backlit digital display and infrared receiver for remote control

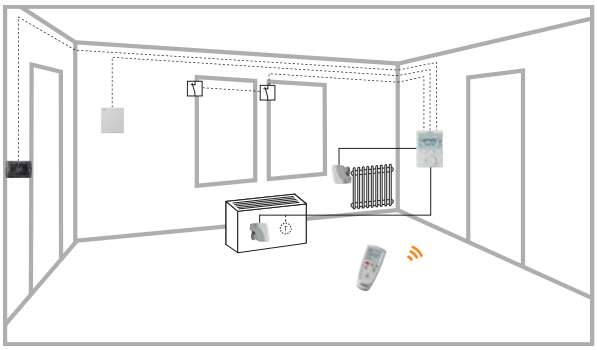
Product range RDF/RDU with bus interface

- **RDF301 – communicating** thermostat with the same functionality as RDF300, plus KNX interface and backlit display
- **RDF301.50 – communicating** thermostat with the same functionality as RDF301, plus switching groups for lighting and blind control via KNX S-mode
- **RDF600KN – communicating** thermostat for use with round conduit boxes conforming to CEE/VDE with the same functionality as RDF301
- **RDF302 – communicating** thermostat with the same functionality as RDF300, including ModBus interface
- **RDU341 – communicating** thermostat with the same functionality as RDU340, plus KNX interface

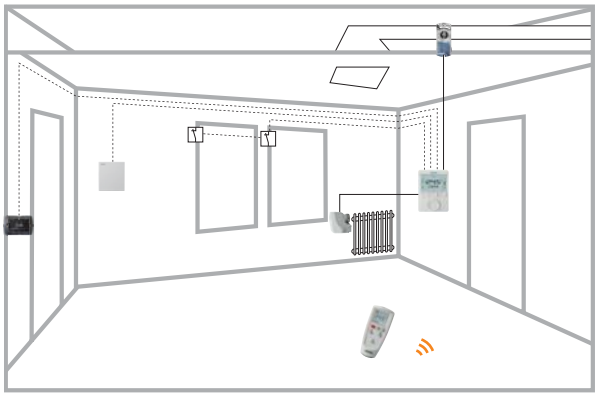
Description of applications

The RDG/RDF thermostats cover the following applications:

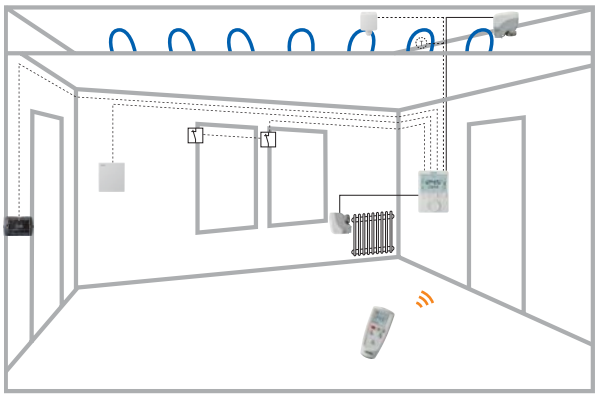
FCUs via ON/OFF or modulating control outputs:
- 2-pipe system
- 2-pipe system with electric heater
- 2-pipe system and radiator/floor heating[1]
- 4-pipe system
- 4-pipe system with electric heater[1]
- 2-stage heating or cooling system[1]



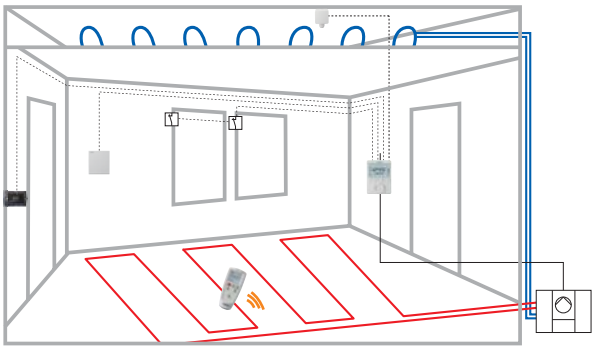
VAV systems via ON/OFF or modulating control outputs:
- Single-duct system
- Single-duct system with electric heater
- Single-duct system and radiator/floor heating[1]
- Single-duct system with heating/cooling coil[1]



Chilled/heated ceilings (or radiators) via ON/OFF or modulating control outputs:
- Chilled/heated ceiling
- Chilled/heated ceiling with electric heater
- Chilled/heated ceiling and radiator/floor heating[1]
- Chilled/heated ceiling, 2-stage heating or cooling[1]



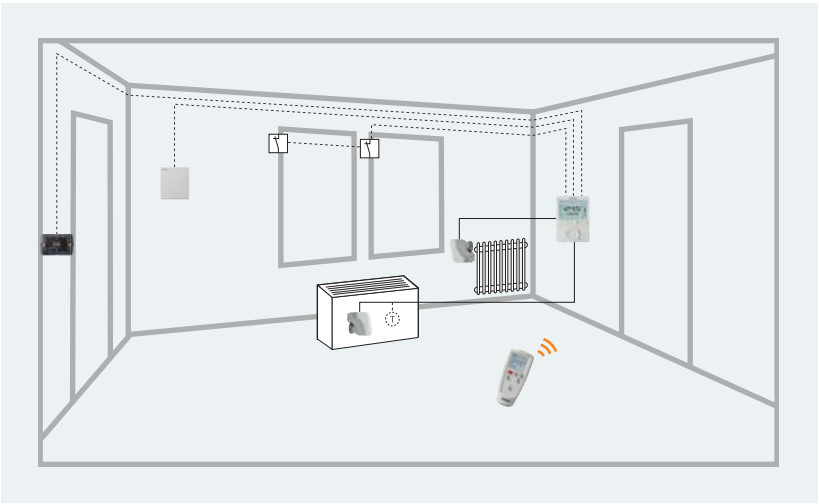
Heat pumps with DX type equipment:
- 1-stage compressor for heating or cooling
- 1-stage compressor for heating or cooling with electric heater
- 1-stage compressor for heating or cooling and radiator/floor heating[1]
- 1-stage compressor for heating and cooling with reversing valve[1]
- 2-stage compressor for heating or cooling[1]



The RDG/RDF offer extensive features and functions[2]

- Operating mode: Comfort, Economy and Protection
- Energy saving functions: external operating mode switchover, 7-day program, keycard or window contact, minimum and maximum setpoint limitation, etc.
- Numerous applications selectable via DIP switch
- Heating/cooling changeover: automatic or manual
- Control output signals: ON/OFF (triac or relay), PWM, 3-position and DC 0...10 V
- Fan control: automatic or manual fan speed for 1-speed, 3-speed or ECM[3] fan
- Fan operation: fan enable, heating only, cooling only, fan disable
- Multifunctional inputs: (function selectable)
  - External temperature sensor
  - Heating/cooling changeover sensor or switch
  - Operating mode switchover for keycard, window or time switch contact
  - Electric heater release
  - Dew point monitor
  - Fault input
- 7-day program
- Timer for prolonged presence and absence function
- Button lock
- Backlit display
- Infrared remote control
- Reminder for cleaning fan filter
- Floor temperature limitation function
- Various parameters for setpoint adjustment and control setting
- KNX communication interface: Synco700 via LTE mode, Synco living and BACS (Building Automation and Control System) via S-mode
- Switching groups for lighting and blind control via KNX S-mode
- ModBus communication interface

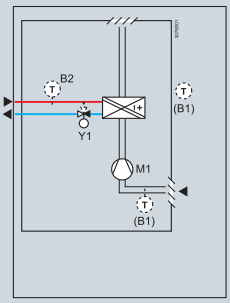
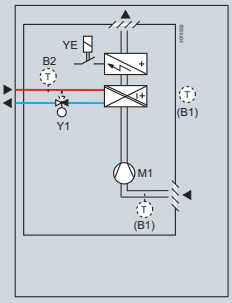
[1] Applications covered by RDG thermostats only
[2] Feature availability depends on thermostat type
[3] Electronic commutated motor, DC 0...10 V

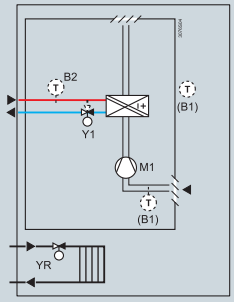
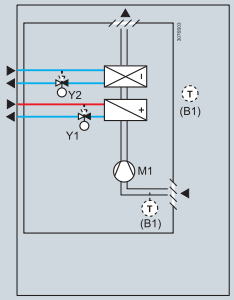
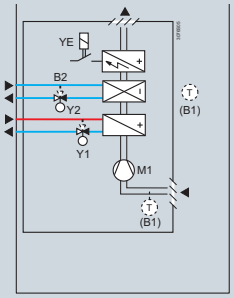
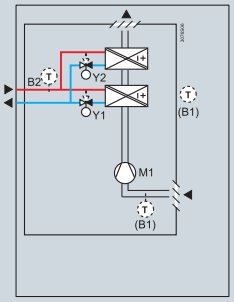


Application description

– Control sequences for heating and/or cooling, 1 or 2 stages
– Multifunctional inputs for keycard contact, external sensor, etc.
– Automatic or manual heating/cooling changeover
– Automatic or manual fan speed
– 3-speed, 1-speed and mod. (ECM) fan control (DC 0...10 V)
– Fan operation selectable in heating and cooling mode (enable, disable, heating only or cooling only)

Fan coil – application overview

Application	Type of control outputs	RDG.. Wall-mounted range	RDF.. Semi flush-mounted range
			
2-pipe system			
	2-pipe (ON/OFF)	RDG100.. RDG110	RDF300.. RDF310.. RDF600.. RDF410..
	2-pipe mod. (PWM)	RDG100..	
	2-pipe mod. (3-pos.)	RDG100..	RDF300.. RDF600..
	2-pipe mod. (DC 0...10 V)	RDG140 RDG160KN	RDF340
	2-pipe mod. (DC 0...10 V) ECM fan control (DC 0...10 V)	RDG160..	
	2-pipe (ON/OFF) ECM fan control (DC 0...10 V)	RDG160KN	
2-pipe system with el. heater			
	2-pipe (ON/OFF), with el. heater (ON/OFF)	RDG100.. RDG110	RDF300.. RDF600..
	2-pipe (ON/OFF), with el. heater (mod. PWM or 3-pos.)	RDG100..	
	2-pipe mod. (PWM), with el. heater (ON/OFF, PWM or 3-pos.)	RDG100..	
	2-pipe mod. (3-pos.), with el. heater (ON/OFF, PWM or 3-pos.)	RDG100..	
	2-pipe mod. (DC 0...10 V), with el. heater (DC 0...10 V)	RDG140 RDG160KN	RDF340
	2-pipe mod. (ON/OFF, DC 0...10 V), with el. heater (ON/OFF, DC 0...10 V). ECM fan control (DC 0...10 V)	RDG160..	

Application	Type of control outputs	RDG.. Wall-mounted range	RDF.. Semi flush-mounted range
2-pipe system and radiator heating			
	2-pipe (ON/OFF) and radiator (ON/OFF)	RDG100.. RDG110	
	2-pipe (ON/OFF) and radiator (mod. PWM or 3-pos.)	RDG100..	
	2-pipe mod. (PWM) and radiator (ON/OFF, PWM or 3-pos.)	RDG100..	
	2-pipe mod. (3-pos.) and radiator (ON/OFF, PWM or 3-pos.)	RDG100..	
	2-pipe mod. (DC 0...10 V) and radiator (DC 0...10 V)	RDG140 RDG160KN	
	2-pipe mod. (ON/OFF, DC 0...10 V) and radiator (ON/OFF, DC 0...10 V). ECM fan control (DC 0...10 V)	RDG160..	
4-pipe system			
	4-pipe (ON/OFF)	RDG100.. RDG110	RDF300.. RDF600..
	4-pipe mod. (PWM)	RDG100..	
	4-pipe mod. (3-pos.)	RDG100..	
	4-pipe mod. (DC 0...10 V)	RDG140 RDG160KN	RDF340
	4-pipe mod. (ON/OFF, DC 0...10 V). ECM fan control (DC 0...10 V)	RDG160..	
4-pipe system with el. heater			
	4-pipe (ON/OFF) with el. heater (ON/OFF)	RDG100..	
	4-pipe (ON/OFF and 3-pos.) with el. heater (ON/OFF)	RDG100..	
	4-pipe mod. (PWM) with el. heater (ON/OFF)	RDG100..	
	4-pipe mod. (PWM and 3-pos.) with el. heater (ON/OFF)	RDG100..	
2-stage, heating or cooling			
	2-stage (ON/OFF) heating or cooling	RDG100.. RDG110	
	2-stage mod. (PWM) heating or cooling	RDG100..	
	2-stage mod. (3-pos.)	RDG100..	
	2-stage mod. (DC 0...10 V)	RDG140 RDG160KN	
	2-stage mod. (ON/OFF, DC 0...10 V). ECM fan control (ON/OFF, DC 0...10 V)	RDG160..	

Abbreviations

ON/OFF:	2-position control	ECM fan:	Electronic Commutated Motor for fan, DC 0...10 V
3-pos.:	Modulating 3-position control signal	el. heater:	Electric heater
PWM:	Pulse Width Modulation control signal	mod. output:	Modulating output
DC 0...10 V:	Modulating DC 0...10 V control signal		

Fan coil – product overview

Product	Application	Stand-alone	Stand-alone with 7-day program	Communicating
Communicating				

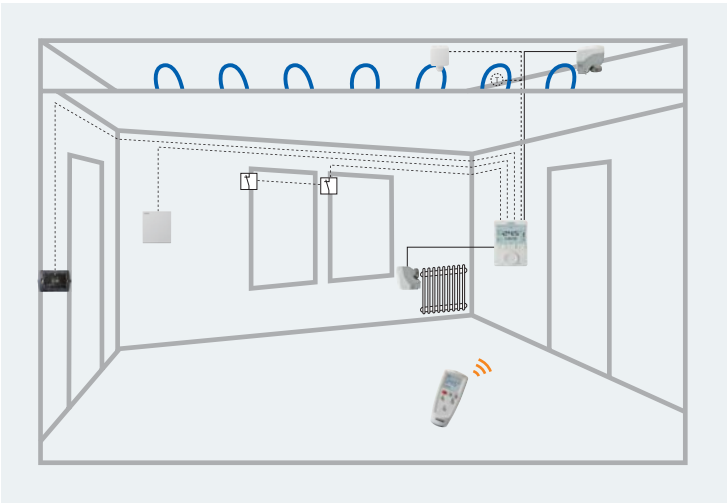
RDG100...
 	
Versatile thermostats with control output signal (ON/OFF) or mod. (PWM or 3-pos.)
	– 2-pipe (ON/OFF, PWM or 3-pos.)
	– 2-pipe with electric heater
	  – FCU: (ON/OFF, PWM or 3-pos.)
	  – el. heater: (ON/OFF, PWM or 3-pos.)
	– 2-pipe and radiator
	  – FCU: (ON/OFF, PWM or 3-pos.)
	  – radiator: (ON/OFF, PWM or 3-pos.)
	– 4-pipe (ON/OFF, PWM and/or 3-pos.)
	– 4-pipe with electric heater
	  – FCU: (ON/OFF, PWM and ON/OFF, PWM or 3-pos.)
	  – el. heater: (ON/OFF)
	– 2-stage heating or cooling
	  – FCU: (ON/OFF, PWM or 3-pos.)
		RDG100	RDG100T
			RDG100T/H
				RDG100KN
				(KNX)

RDG110 Robust thermostat with relay outputs (SPDT) for ON/OFF – control sequences	– 2-pipe (ON/OFF) – 2-pipe (ON/OFF) with el. heater (ON/OFF) – 2-pipe (ON/OFF) and radiator (ON/OFF) – 4-pipe (ON/OFF) – 2-stage (ON/OFF) heating or cooling	RDG110		
RDG140 Thermostat for mod. control sequences with (DC 0...10 V) output signals	– 2-pipe (DC 0...10 V) – 2-pipe (DC 0...10 V) with el. heater (DC 0...10 V) – 2-pipe (DC 0...10 V) and radiator (DC 0...10 V) – 4-pipe heating (DC 0...10 V) and cooling (DC 0...10 V) – 2-stage (DC 0...10 V) heating or cooling	RDG140		
RDG160.. Thermostat for mod. control sequences with (DC 0...10 V) output signals for valve and fan control (ECM) DC 0...10 V	– 2-pipe (DC 0...10 V) – 2-pipe (DC 0...10 V) with el. heater (DC 0...10 V) – 2-pipe (DC 0...10 V) and radiator (DC 0...10 V) – 4-pipe heating (DC 0...10 V) and cooling (DC 0...10 V) – 2-stage (DC 0...10 V) heating or cooling	RDG160		RDG160KN (KNX)
RDG160KN Communicating thermostat for mod. control sequences with DC 0...10 V or ON/OFF output signals for valve and fan control DC 0...10 V (ECM), 1- or 3-speed	With ECM fan control (DC 0...10 V signal) – 2-pipe (ON/OFF) – 2-pipe (DC 0...10 V) – 2-pipe (ON/OFF) with el. heater (ON/OFF) – 2-pipe (DC 0...10 V) with el. heater (ON/OFF) – 2-pipe (DC 0...10 V) with el. heater (DC 0...10 V) – 2-pipe (ON/OFF) and radiator (ON/OFF) – 2-pipe (DC 0...10 V) and radiator (ON/OFF) – 2-pipe (DC 0...10 V) and radiator (DC 0...10 V) – 4-pipe heating (ON/OFF) and cooling (ON/OFF) – 4-pipe heating (DC 0...10 V) and cooling (DC 0...10 V) – 2-stage (ON/OFF) heating or cooling – 2-stage (DC 0...10 V) heating or cooling With 3- or 1-speed fan – 2-pipe (DC 0...10 V) – 2-pipe (DC 0...10 V) with el. heater (DC 0...10 V) – 2-pipe (DC 0...10 V) and radiator (DC 0...10 V) – 4-pipe heating (DC 0...10 V) and cooling (DC 0...10 V) – 2-stage (DC 0...10 V) heating or cooling			RDG160KN (KNX)

Product	Application	Stand-alone	Stand-alone with 7-day program	Communicating
Semi flush-mounted units: RDF				
RDF300.. Versatile thermostats with relay ouputs: ON/OFF or 3-pos.	– 2-pipe – FCU: (ON/OFF or 3-pos.) – 2-pipe (ON/OFF) with el. heater (ON/OFF) – 4-pipe (ON/OFF)	RDF300..		RDF301.. (KNX) RDF302 (ModBus)
RDF310../410..* Basic thermostats for 2-pipe application	– 2-pipe (ON/OFF)	RDF310..	RDF410.21	
RDF340 Thermostat for mod. control sequences with (DC 0...10 V) output signals	– 2-pipe (DC 0...10 V) – 2-pipe (DC 0...10 V) with el. heater (DC 0...10 V) – 4-pipe heating (DC 0...10 V) and cooling (DC 0...10 V)	RDF340		
RDF600..* Thermostats for use with round conduit boxes conforming to CEE/VDE, with relay outputs: ON/OFF or 3-pos.	– 2-pipe – FCU: (ON/OFF or 3-pos.) – 2-pipe (ON/OFF) with el. heater (ON/OFF) – 4-pipe (ON/OFF)	RDF600	RDF600T	RDF600KN (KNX)

***Variants**

RDF300	Basic version
RDF300.02	Thermostat with backlit display
RDF301	Thermostat with KNX interface
RDF301.50	Communicating thermostat with 4 buttons for lighting and blinds
RDF310.2	Basic version
RDF310.21	Basic version with backlit display and infrared remote control
RDF410.21	Basic version with backlit display, 7-day program and infrared remote control
RDF600	Basic version for use with round conduit boxes
RDF600T	Basic version with 7-day program
RDF600KN	Communicating thermostat with KNX interface
RDF302	Communicating thermostat with ModBus interface

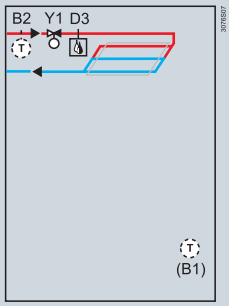
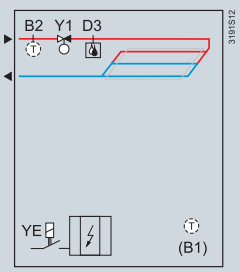


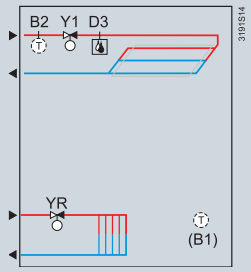
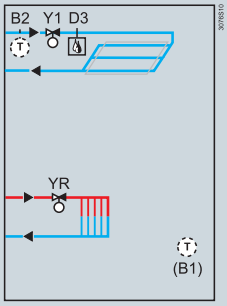
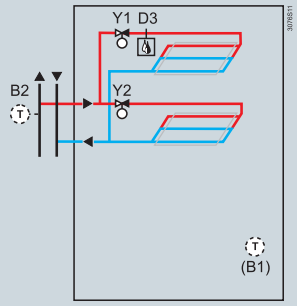
Application description

– For heating and/or cooling applications with heated/chilled ceiling or radiator
– Control sequences for heating and/or cooling, 1- or 2-stages
– Dew point monitoring
– Multifunctional inputs for keycard contact, external sensor, etc.
– Automatic or manual heating/cooling changeover

Universal – application overview

Chilled/heated ceiling or radiator

Application	Type of control outputs	RDG... Wall-mounted range
		
Chilled/heated ceiling with changeover		
	Chilled/heated ceiling (ON/OFF)	RDG100.. RDG110
	Chilled/heated ceiling, mod. (PWM)	RDG100..
	Chilled/heated ceiling, mod. (3-pos.)	RDG100..
	Chilled/heated ceiling, mod. (DC 0...10 V)	RDG140 RDG160..
Chilled/heated ceiling and el. heater		
	Chilled/heated ceiling (ON/OFF) and el. heater (ON/OFF)	RDG100.. RDG110
	Chilled/heated ceiling (ON/OFF) and el. heater (mod. PWM or 3-pos.)	RDG100..
	Chilled/heated ceiling, mod. (PWM) and el. heater (ON/OFF, PWM or 3-pos.)	RDG100..
	Chilled/heated ceiling, mod. (3-pos.) and el. heater (ON/OFF, PWM or 3-pos.)	RDG100..
	Chilled/heated ceiling, mod. (ON/OFF, DC 0...10 V) and el. heater (ON/OFF, DC 0...10 V)	RDG140 RDG160..

Application	Type of control outputs	RDG... Wall-mounted range
Chilled/heated ceiling and radiator		
	Chilled/heated ceiling (ON/OFF) and radiator (ON/OFF)	RDG100.. RDG110
	Chilled/heated ceiling (ON/OFF) and radiator (mod. PWM or 3-pos.)	RDG100..
	Chilled/heated ceiling, mod. (PWM) and radiator (ON/OFF, PWM or 3-pos.)	RDG100..
	Chilled/heated ceiling, mod. (3-pos.) and radiator (ON/OFF, PWM or 3-pos.)	RDG100..
	Chilled/heated ceiling, mod. (ON/OFF, DC 0...10 V) and radiator (ON/OFF, DC 0...10 V)	RDG140 RDG160..
Chilled ceiling and radiator		
	Chilled ceiling (ON/OFF) and radiator (ON/OFF)	RDG100.. RDG110
	Chilled ceiling (ON/OFF) and radiator (mod. PWM or 3-pos.)	RDG100..
	Chilled ceiling (PWM) and radiator (ON/OFF, PWM or 3-pos.)	RDG100..
	Chilled ceiling (3-pos.) and radiator (ON/OFF, PWM or 3-pos.)	RDG100..
	Chilled ceiling (ON/OFF, DC 0...10 V) and radiator (ON/OFF, DC 0...10 V)	RDG140 RDG160..
Chilled/heated ceiling with 2-stage cooling or 2-stage heating		
	2-stage (ON/OFF) heating or cooling	RDG100.. RDG110
	2-stage mod. (PWM) heating or cooling	RDG100..
	2-stage mod. (3-pos.) heating or cooling	RDG100..
	2-stage mod. (ON/OFF, DC 0...10 V) heating or cooling	RDG140 RDG160..

Abbreviations

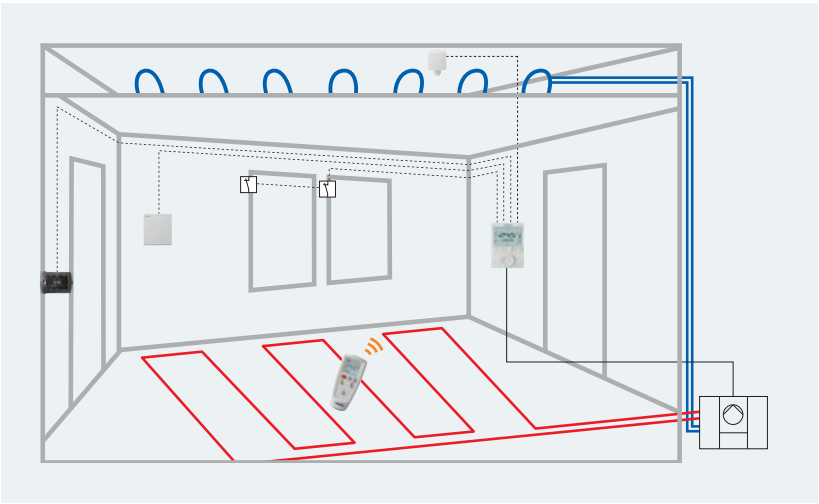
ON/OFF:	2-position control	DC 0...10 V:	Modulating DC 0...10 V control signal
3-pos.:	Modulating 3-position control signal	el. heater:	Electric heater
PWM:	Pulse Width Modulation	mod. output:	Modulating output

Universal – product overview

Product	Application	Stand-alone	Stand-alone with 7-day program	Communicating
Wall-mounted units: RDG				

RDG100...
 	
Versatile thermostats with control outputs signal ON/OFF or mod. (PWM or 3-pos.)
	– Chilled/heated ceiling (ON/OFF, PWM or 3-pos.)
	– Chilled/heated ceiling and el. heater
	  – CLC: (ON/OFF, PWM or 3-pos.)
	  – el.heater: (ON/OFF, PWM or 3-pos.)
	– Chilled/heated ceiling and radiator
	  – CLC: (ON/OFF, PWM or 3-pos.)
	  – radiator: (ON/OFF, PWM or 3-pos.)
	– Chilled ceiling and radiator
	  – CLC: (ON/OFF, PWM or 3-pos.)
	  – radiator: (ON/OFF, PWM or 3-pos.)
	– Chilled/heated ceiling 2-stage
	  – CLC: (ON/OFF, PWM and/or 3-pos.)
		RDG100	RDG100T	RDG100KN (KNX)

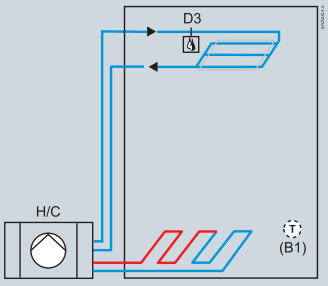
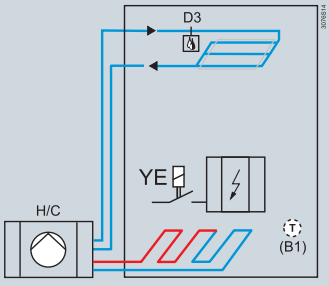
RDG110 Thermostats with relay outputs (SPDT) for (ON/OFF) control sequences	– Chilled/heated ceiling (ON/OFF) – Chilled/heated ceiling (ON/OFF) and el. heater (ON/OFF) – Chilled/heated ceiling (ON/OFF) and radiator (ON/OFF) – Chilled ceiling (ON/OFF) and radiator (ON/OFF) – Chilled/heated ceiling 2-stage (ON/OFF)	RDG110		
RDG140 Thermostat for mod. control sequences with (DC 0...10 V) outputs signals	– Chilled/heated ceiling (DC 0...10 V) – Chilled/heated ceiling (DC 0...10 V) and el. heater (DC 0...10 V) – Chilled/heated ceiling (DC 0...10 V) and radiator (DC 0...10 V) – Chilled ceiling (DC 0...10 V) and radiator (DC 0...10 V) – Chilled/heated ceiling 2-stage (DC 0...10 V)	RDG140		
RDG160.. Thermostat for mod. control sequences with (DC 0...10 V) outputs signals	– Chilled/heated ceiling (DC 0...10 V) – Chilled/heated ceiling (DC 0...10 V) and el. heater (DC 0...10 V) – Chilled/heated ceiling (DC 0...10 V) and radiator (DC 0...10 V) – Chilled ceiling (DC 0...10 V) and radiator (DC 0...10 V) – Chilled/heated ceiling, 2-stage (DC 0...10 V)	RDG160		RDG160KN (KNX)
RDG160KN Communicating thermostat for mod. control sequences with DC 0...10 V or ON/OFF output signals for valves	– 2-pipe (ON/OFF) – 2-pipe (DC 0...10 V) – 2-pipe (ON/OFF) with el. heater (ON/OFF) – 2-pipe (DC 0...10 V) with el. heater (ON/OFF) – 2-pipe (DC 0...10 V) with el. heater (DC 0...10 V) – 2-pipe (ON/OFF) and radiator (ON/OFF) – 2-pipe (DC 0...10 V) and radiator (ON/OFF) – 2-pipe (DC 0...10 V) and radiator (DC 0...10 V) – 4-pipe heating (ON/OFF) and cooling (ON/OFF) – 4-pipe heating (DC 0...10 V) and cooling (DC 0...10 V) – 2-stage (ON/OFF) heating or cooling – 2-stage (DC 0...10 V) heating or cooling			RDG160KN (KNX)

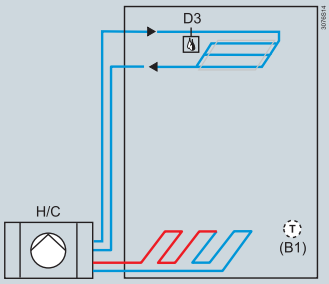
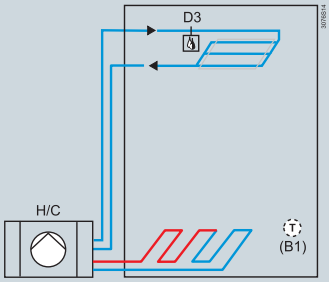


Application description

– Control sequences for heating and/or cooling, 1- or 2-stage
– Dew point monitoring
– Multifunctional inputs for keycard, contact, external sensor, etc.
– Min. ON/OFF time for compressor short cycle protection

Heat pumps – application overview

Application	Type of control outputs	RDG.. Wall-mounted range	RDF.. Semi flush-mounted range
			
Compressor in DX-type equipment for heating or cooling			
	1-stage compressor (ON/OFF)	RDG110 RDG160KN	RDF300.. RDF310.. RDF410.. RDF600..
Compressor in DX-type equipment for heating or cooling, with el. heater			
	1-stage compressor (ON/OFF), with el. heater (ON/OFF)	RDG110 RDG160KN	RDF300.. RDF600..

Application	Type of control outputs	RDG.. Wall-mounted range	RDF.. Semi flush-mounted range
Compressor in DX-type equipment heating and cooling			
	1-stage compressor (ON/OFF) for heating and cooling	RDG110 RDG160KN	RDF300.. RDF600..
	1-stage compressor (ON/OFF) for heating and cooling with reversing valve	RDG110	
Compressor in DX-type equipment, cooling or heating, 2-stage			
	2-stage compressor (ON/OFF) for heating or cooling	RDG110 RDG160KN	

Abbreviation

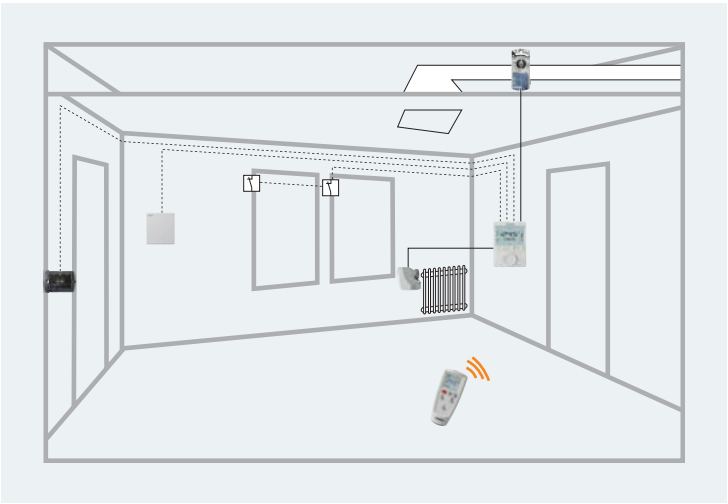
ON/OFF: 2-position control
el. heater: Electric heater

Heat pumps – product overview

Product	Application	Stand-alone	Stand-alone with 7-day program	Communicating
Wall-mounted units: RDG				
RDG110 Thermostat with relay output (SPDT) to ON/OFF control sequences	– 1-stage compressor (ON/OFF) for heating or cooling – 1-stage compressor (ON/OFF), with el. heater (ON/OFF) – 1-stage compressor (ON/OFF) for heating and cooling – 1-stage compressor (ON/OFF) for heating and cooling with reversing valve – 2-stage compressor (ON/OFF) for heating or cooling	RDG110		
RDF600..* Thermostats for use with round conduit boxes conforming to CEE/VDE, with relay outputs: ON/OFF	– 1-stage compressor (ON/OFF) for heating or cooling – 1-stage compressor (ON/OFF), with el. heater (ON/OFF) – 1-stage compressor (ON/OFF) for heating and cooling	RDF600	RDF600T	RDF600KN (KNX)
Semi flush-mounted units: RDF				
RDF300../400..* Versatile thermostats with relay ouputs: ON/OFF	– 1-stage compressor (ON/OFF) for heating or cooling – 1-stage compressor (ON/OFF), with el. heater (ON/OFF) – 1-stage compressor (ON/OFF) for heating and cooling	RDF300..		
RDF310.. Basic thermostats for 1-stage compressor	– 1-stage compressor(ON/OFF) for heating or cooling	RDF310..	RDF410..	
RDG160KN Communicating thermostat with relay output: ON/OFF	– 1-stage compressor (ON/OFF) for heating or cooling – 1-stage compressor (ON/OFF), with el. heater (ON/OFF) – 1-stage compressor (ON/OFF) for heating and cooling – 2-stage compressor (ON/OFF) for heating or cooling			RDG160KN (KNX)

***Variants**

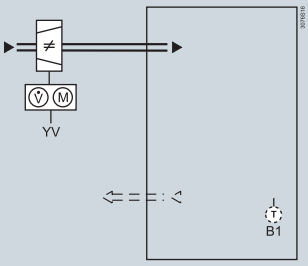
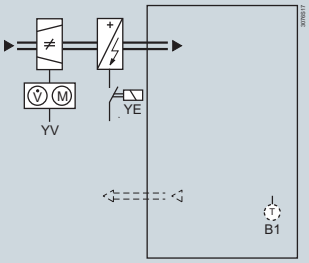
RDF300	Basic version	RDF410.21	Basic thermostat with backlit display, weekly time program and Infrared remote control
RDF300.02	Thermostat with backlit display		
RDF310.2	Basic version	RDF600	Basic version
RDF310.21	Basic thermostat with backlit display and Infrared remote control	RDF600T	Basic version with 7-day program
		RDF600KN	Communicating thermostat with KNX interface

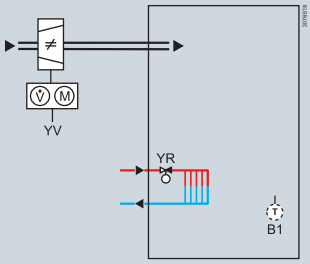
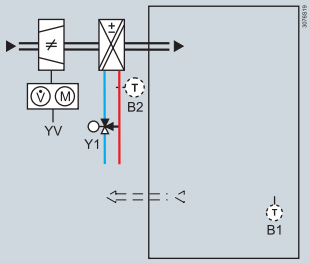


Application description

– Control sequences for heating and/or cooling
– Modulating control output DC 0...10 V or 3-pos. for VAV box/air flow controller
– Multifunctional inputs for keycard, contact, external sensor, etc.
– Automatic or manual heating/cooling changeover
– Adjustable minimum and maximum limitation of air flow signal (DC 0...10 V)
– Modulating PI control
– Output signal inversion as an option

VAV – application overview

Application	Type of control outputs	RDG.. Wall-mounted range	RDF.. Semi flush-mounted range
			
Single duct			
	Single duct (DC 0...10 V) for VAV-box	RDG400..	RDU34..
	Single duct mod. (3-pos.) for VAV-box	RDG400..	
Single duct with el. heater			
	Single duct (DC 0...10 V) for VAV-box, with el. heater (ON/OFF)	RDG400..	RDU34..
	Single duct (DC 0...10 V) for VAV-box, with el. heater (mod. PWM or 3-pos.)	RDG400..	
	Single duct (3-pos.) for VAV-box, with el. heater (DC 0...10 V)	RDG400..	

Application	Type of control outputs	RDG.. Wall-mounted range	RDF.. Semi flush-mounted range
Single duct with radiator			
	Single duct (DC 0...10 V) for VAV-box with radiator (ON/OFF)	RDG400..	
	Single duct (DC 0...10 V) for VAV-box with radiator (mod. PWM or 3-pos.)	RDG400..	
	Single duct (3-pos.) for VAV-box with radiator (DC 0...10 V)	RDG400..	
Single duct with heating/cooling coil			
	Single duct (DC 0...10 V) for VAV-box, with heating/cooling coil (ON/OFF)	RDG400..	
	Single duct (DC 0...10 V) for VAV-box, with heating/cooling (mod. PWM or 3-pos.)	RDG400..	
	Single duct (3-pos.) for VAV-box, with heating/cooling (DC 0...10 V)	RDG400..	

Abbreviations

VAV:	Variable Air Volume system	3-pos.:	Modulating 3-position control signal
ON/OFF:	2-position control	el. heater:	Electric heater
PWM:	Pulse Width Modulation	mod. output:	Modulating output
DC 0...10 V:	Modulating DC 0...10 V control signal		

VAV – product overview

Product	Application	Stand-alone	Stand-alone with 7-day program	Communicating
Wall-mounted units: RDG				

RDG400..
 	
Versatile thermostats with control outputs signal DC 0...10 V, ON/OFF, PWM or 3-pos.
	– Single duct for VAV-box
	  – VAV: (DC 0...10 V or 3-pos.)
	– Single duct for VAV-box with electric heater
	  – VAV: (DC 0...10 V) el. heater: (ON/OFF, PWM or 3-pos.)
	  – VAV: (3-pos.) el. heater: (DC 0...10 V)
	– Single duct for VAV-box with radiator
	  – VAV: (DC 0...10 V) radiator: (ON/OFF, PWM or 3-pos.)
	  – VAV: (3-pos.) radiator: (DC 0...10 V)
	– Single duct for VAV-box with heating/cooling coil
	  – VAV: (DC 0...10 V) coil: (ON/OFF, PWM or 3-pos.)
	  – VAV: (3-pos.) heating/cooling coil: (DC 0...10 V)
		RDG400		RDG400KN
				(KNX)

Semi flush-mounted units: RDU				
RDU34.. Thermostats for mod. control sequences with DC 0...10 V and ON/OFF outputs signals	– Single duct (DC 0...10 V) for VAV-box – Single duct (DC 0...10 V) for VAV-box with el. heater (ON/OFF)	RDU340		RDU341 (KNX)

How to prepare and set up your room thermostats

Introduction

The versatile RDG and RDF room thermostats help you to better meet your customer's needs. The following information supports you in setting up your RDG and RDF thermostats.

Control parameters

A number of control parameters can be adjusted to optimize control performance and enable additional functions, making it possible to employ. The RDG and RDF thermostats in almost any type of application.

The control parameters are assigned to 2 levels:
- Service level and
- Expert level

The service level contains a small set of parameters to set up the thermostat for HVAC systems (control sequence) and to adjust the user interface.

The expert level contains control parameters for fan, control inputs/outputs and other functions. Take care when changing parameters on the expert level as these changes impact the thermostat's control performance and functionality.

TIP As a rule, you don´t need to adjust parameters once the required application is selected via the DIP switch since the thermostat works correctly using factory set parameters. It may be nevertheless necessary, in some cases, to adjust application specific parameters.
- Control sequence (P01): select heating/cooling sequence and changeover function
- Multifunctional inputs (P38...P42): select the input functionality for X1, X2 and D1
- Control outputs (P46...P47): select type of output signal (ON/OFF, PWM, 3-pos.)
- Fan function (P52...P62): select fan functionality

TIP

Installation and set up

1. Select a suitable thermostat.
2. Set application via DIP switch as per mounting instructions.
3. Wire and install the thermostat. Apply power.
4. Set parameter P01 (control sequence) and other application-specific parameters as needed.

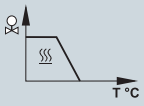
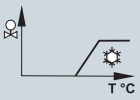
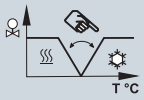
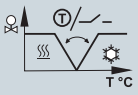
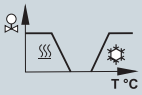
Note: ARG71 – conduit box suitable for RDF3.. and RDF4.. semi flush-mount thermostats is available as an accessory item.

Control sequence (P01)

Application-specific parameter

This parameter is used to set the required heating and/or cooling sequence and to select automatic/manual changeover. Parameter P01 is preset as follow, depending on the selected application:

– 2-pipe or single-duct application: P01: = 1 = cooling only
– 4-pipe application: P01: = 4 = heating and cooling

Sequence					
Mode	Heating only	Cooling only	Manually select heating or cooling mode	Automatic heating/cooling changeover	Heating and cooling mode
Parameter	P01=0	P01=1	P01=2	P01=3	P01=4

Multifunctional inputs (X1, X2, D1)

An NTC sensor of type NTC such as QAH11.1 (AI) or a switch (DI) can be connected to the input terminals. Input functionality can be freely configured. The factory settings are as follows:

	RDG range	RDF range
P38: Multifunctional input X1	External temperature sensor (1)	Operating mode switchover (3)
P40: Multifunctional input X2	Heating/cooling changeover (2)	Heating/cooling changeover (2)
P42: Multifunctional input D1	Operating mode switchover (3)	N/A

Available function on X1, X2 and D1

	Function of inputs	Description
1	External/return air temperature (AI) (not available for input D1)	Temperature sensor input for – External room temperature – Return air temperature – Floor temperature sensor to limit the heating output
2	Heating/cooling changeover (AI/DI)	Automatic heating/cooling changeover sensor or switch
3	Operating mode switchover (DI)	Digital input to switch the operating mode to Economy
4	Dew point monitor (DI)	Digital input for a dew point sensor to monitor condensation
5	Enable electric heater (DI)	Digital input to enable/disable the electric heater via remote control
6	Fault (DI)	Digital input to signal a fault on the display (e.g. dirty air filter)
7	Monitoring input (digital)	Digital input to monitor the state of an external switch via bus (only for communicating variants)
8	Monitoring input (temperature)	Sensor input to monitor the state of an external sensor (e.g. QAH11.1) via bus (only for communicating variants)

Control outputs (P46...P47)

– The RDG100.. offers two control outputs, each of either type On/Off, PWM or 3-position. To select the required type, use the DIP switch and P46 (1st control output) and/or P47 (2nd control output).
– The RDG400.. for VAV applications offers two control outputs, DC 0...10 V and either ON/OFF, PWM or 3-position. To select the required type use the DIP switch and P46 (reheater/cooler control output) and/or P47 (damper actuator, DC 0...10 V or 3-pos.).

Fan function (P03, P52...P62, P67):

RDG and RDF offer an extensive fan control concept with a wide choice of functions and features. The required options can be selected via the control parameters:

- Fan mode automatic-manual or manual only (P03)
- Fan active in cooling mode only, active in heating mode only, disable (P52)
- Control output for 3-speed/1-speed fan (P53)
- Control output for ECM fan, DC 0...10 V signal (P55...P57) on RDG160..
- Fan minimum on time (P59)
- Operation in dead zone for conjunction with return air sensor or to avoid damage due to moisture (P60, P61)
- Fan start kick from standstill to overcome inertia and friction (P58)
- Fan overrun to avoid overtemperatures after the electric heater turned off (P54)
- Fan start delay by ON/OFF control to avoid cold or warm air (P67)

Note: Fan operation must be disabled via control parameter (P52) for universal application.

Parameters on communicating thermostats

On communicating thermostats, control parameters can be downloaded via ACS and ETS Service Tools.

Note: RDG/RDF require an external KNX bus power supply if connected via OCI700.

Diagnostic parameters

TIP After installing and setting up the thermostat, you can check your configuration by going to the "Expert" level and selecting the diagnostic parameters dxx (d01, d02, etc.).

Communicating, KNX thermostats

In connection with Synco 700, the communicating, KNX thermostats operate in LTE-mode. The units are tailored as well for use with Synco living or for integration in BACS via S-mode. Refer to technical documentation CE1N3127 for detailed information on installing and commissioning a KNX system.

TIP **Suggestions for saving energy**

- Use thermostats with 7-day program
- Use thermostats with modulating control outputs (e.g. DC 0...10 V or 3-position)
- Use thermostats with ECM fan control (DC 0...10 V)
- Use KNX communicating thermostats
- Activate auto fan function
- Connect external operating mode switchover for central operating mode control
- Connect window contacts to avoid energy losses when windows are open
- Connect keycard contact for switching the unit to Economy mode when rooms are not occupied
- Define optimum setpoint limitations (heating max. 20 °C, cooling min. 25 °C) to minimize energy usage
- In application with electric heater, use function "Electric heater enable" (P38, P40...)
- Inform enduser of prolonged absences and presence function

FAQ

Where are the DIP switches located?
On RDG, the DIP switches are located at the rear of the unit; on RDF semi flush-mount thermostats, they are located on the inner side of the front panel.

Where do I find the correct DIP switch position?
Refer to the Mounting Instructions and on the product.

How can I set the parameters?
The procedure for setting the parameters (service or expert level) is described in the basic documentation of the thermostats.

When do I have to set the control parameters?
You generally do not need to adjust parameters since the unit works correctly using the factory-set parameters. Nevertheless, in some rare cases, you may need to adjust the application-specific parameters during commissioning to enable desired functions. For that, access the expert level. Refer to technical documentation for detailed information. The control parameters on the service level for HVAC systems and for adjusting the user interface can be accessed at any time.

Is it possible to reload the default timer setting?
Yes. The default timer setting (A1... A8) and the procedure for reloading are described in the technical documentation.

Is it possible to reset the control parameters?
Yes. The factory-set control parameters can be reloaded via parameter P71 by changing the value to “ON” and by confirming with the buttons. Refer to technical documentation for detailed information.

Can the current settings and installation be checked?
On the expert level, some diagnostic parameters (d01, d02, etc.) are available for checking the selected application, the status of the inputs and for testing the 3-position outputs. Refer to technical documentation for detailed information.

Reference to the basic documentation

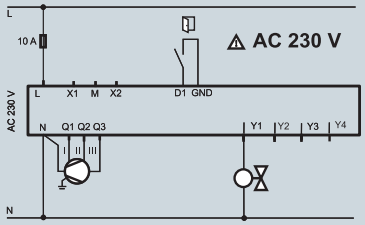
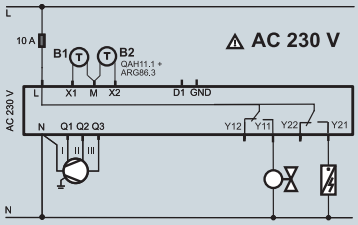
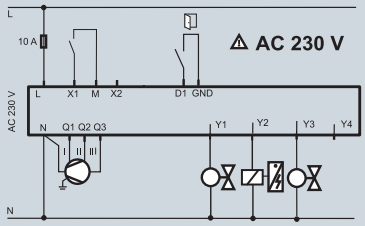
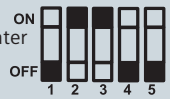
- P3076: RDF3../6.. stand-alone thermostats for FCUs
- P3171: RDF3../6.. KNX communicating thermostats for FCUs
- P3181: RDG1.. stand-alone thermostats for FCUs
- P3191: RDG1..KN KNX communicating thermostats for FCUs
- P3182: RDG400 stand-alone thermostat for VAV
- P3192: RDG400KN KNX communicating thermostats for VAV
- P3078: RDU340 stand-alone thermostat for VAV
- P3172: RDU341 KNX communicating thermostat for VAV
- P3079: RDF302 ModBus communicating thermostat for FCUs

Application examples

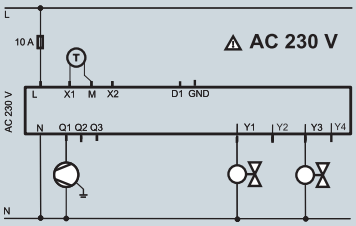
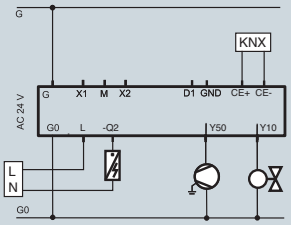
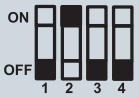
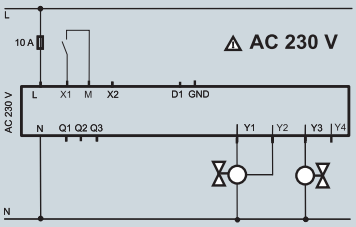
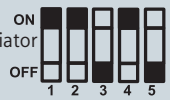
Installation and set up

1. Select a suitable thermostat.
2. Set application via DIP switch according to the mounting Instructions.
3. Wire and install the thermostat. Apply power.
4. If necessary, set parameter P01 (control sequence) and other application-specific parameters.

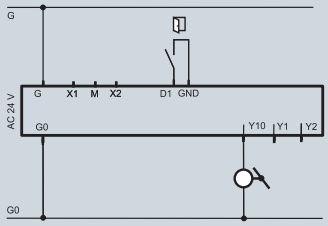
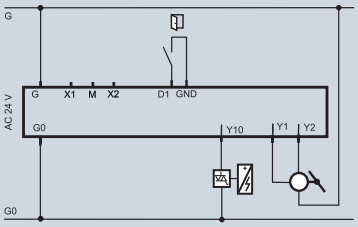
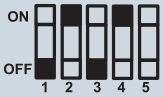
Fan coil application examples

Application	How to set the application
Fan coil unit, 2-pipe cooling only	
 – Valve actuator: ON/OFF – Keycard contact	1. Thermostat: RDG100 2. DIP switch: 2-pipe application Y1 = ON/OFF 3. Wiring: Actuator → Y1-N Fan → Q1...Q3-N Key card → D1-GND 4. Parameters: no change necessary (factory-setting)  **TIPS** – Keycard contact in hotel guest rooms helps saving energy costs – RDG100T with 7-day program – RDG100KN communicating KNX
Fan coil unit, 2-pipe with el. heater	
 – Valve actuator: ON/OFF – Heating with electric heater ON/OFF – Automatic changeover – Return air temperature sensor	1. Thermostat: RDG110 2. DIP switch: 2-pipe application, el. heater 3. Wiring: Actuator → Y11-N El. heater → Y21-N Fan → Q1...Q3-N Temp. sensor → X1-M H/C changeover sensor → X2-M 4. Parameters: P01 = 3 (automatic H/C changeover)  **TIPS** – RDG110 with relay outputs can drive direct an el. heater up to 1 kW
Fan coil, 4-pipe with el. heater	
 – Valve actuators H&C: PWM – Electric heater: ON/OFF – Electric heater enable input – Window contact	1. Thermostat: RDG100 2. DIP switch: 4-pipe application, el. heater Y1 = PWM Y3 = PWM 3. Wiring: Actuator heating → Y1-N Actuator cooling → Y3-N Contactor[1] for el. heater → Y2-N Fan → Q1...Q3-N El. heater enable → X1-M Window cont. → D1-GND 4. Parameters: P38 = 5 (El. heater Input) P46 = 2 (PWM heating) P47 = 2 (PWM cooling)  **TIPS** – Electric heater enable signal for saving energy costs – Note[1]: Add relay if load exceeds 1A!

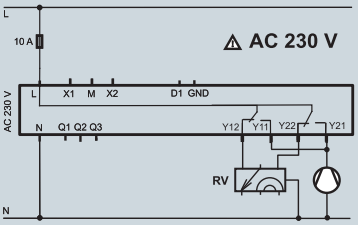
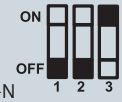
Universal application example

Application	How to set the application
FCU, 2-pipe and floor heating, single speed	
 – 2-pipe, cooling only: ON/OFF – Floor heating limitation (ON/OFF) with temperature limitation – Single speed fan	1. Thermostat: RDG100 2. DIP switch: 2-pipe application and radiator Y1 = ON/OFF Y3 = ON/OFF 3. Wiring: Actuator cooling → Y1-N Actuator heating → à Y3-N Fan → Q1-N Floor temperature sensor → X1-M 4. Parameters: P51 = 25 °C (floor Heat. Temp. limit) P53 = 1 (single speed fan)  **TIPS** – Limited heat supply to the floor to avoid overheating (DIN EN 1264) thus protecting the floor and ensuring more comfort – Select "2-pipe and el. heater" for application with electric floor heating
FCU, 2-pipe with electric heater, ECM fans, thermostat with KNX	
 – Valve actuators (DC 0...10 V) – Electric heater ON/OFF (relay) – ECM fan (DC signal)	1. Thermostat: RDG160KN 2. DIP switch: 2-pipe application, el. heater Y10 = DC 0...10 V Q2 = ON/OFF 3. Wiring: Actuator → Y10-Go El. heater → Q2-N ECM fan → Y50-Go 4. Parameters: No changes necessary (factory-setting)  **TIPS** – Modulating (ECM) fan control for optimal comfort, lower level of noise and energy costs saving – Check ECM fan max. (P55) and min. (P56)
Chilled ceiling and radiator	
 – Chilled ceiling (3-pos.) and radiator (PWM) – Dew point monitor	1. Thermostat: RDG100 2. DIP switch: 2-pipe application and radiator Y1/Y2 = 3-pos. Y3 = PWM 3. Wiring: Actuator cooling → Y1/Y2-N Actuator heating → Y3-N Dew point monitor → X1-M 4. Parameters: P38 = 4 (dew point input) P46 = 2 (PWM) P52 = 0 (fan disable)  **TIP** – Dew point monitoring to detect condensation. Cooling is stopped if condensation occurs.

VAV application examples

Application	How to set the application
VAV single duct, cooling only	
 – Damper actuator: 0...10 V – Window contact	1. Thermostat: RDG400 2. DIP switch: Single duct application Y10 = DC 0...10 V 3. Wiring: Actuator → Y10-Go-G Window contact → D1-GND 4. Parameters: no change (= default)  **TIP** – Window contact for saving energy during the airing of rooms
VAV single duct and el. reheater	
 – Damper actuator: 3-pos. – El. heater: DC 0...10 V – Central time switch	1. Thermostat: RDG400 2. DIP switch: Single duct application, el. heater Y10 = DC 0...10 V 3. Wiring: Actuator → Y1/Y2-G El. heater → Y10-Go Time switch → D1-GND 4. Parameters: P47 = 1 (VAV output 3-pos.)  **TIPS** – Use a central time switch (e.g. SEH62.1) to set back room temperature during non-business hours – Adjust parameter "Prolong comfort period" (P68) to allow occupant to override the central time switch, e.g. when working overtime

Heat pump application example

Compressor with reversing valve	
 – Compressor: ON/OFF – Reversing valve: ON/OFF	1. Thermostat: RDG110 2. DIP switch: 4-pipe application 3. Wiring: Compressor → Y11/Y21-N Reversing valve → Y12/Y22-N 4. Parameters: P52 = 0 (fan disable)  – Set control sequence to manual changeover (P01=2); then the user can select manually between heating and cooling

Notes

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