SIEMENS

Fan Coil Unit Room Thermostat with BACnet MS/TP Communication

RDB160BNU

The RDB160BNU controls fan coil units with the following features:

- HVAC applications: 2-pipe, 2-pipe with electric heater, and 4-pipe
- Communication: BACnet MS/TP
- Operating voltage: AC 24 V
- Fan: 1, 2, 3-speed or DC 0...10 V (automatic or manual)
- Valve actuators: On/off, 3-position or DC...10 V
- Electric heater: On/off
- Built-in temperature sensor
- Three configurable inputs for external room/return air temperature, supply air temperature limitation, heating/cooling changeover, window contact, and occupancy sensor.
- Operating modes: Comfort, Standby (Economy), OFF, and mold protection
- Room temperature control: Based on built-in temperature sensor or room/return air temperature
- Heating/cooling changeover: manual, or automatic via water temperature sensor or digital input
- Supply air temperature limitation
- Automatic valve exercise
- Backlit LCD

Use

The RDB160BNU is suitable for commercial applications where communication to a building management system is required, such as offices, healthcare, education, retail, shopping malls or other commercial facilities.

Functions

Temperature control

- Built-in temperature sensor or
- External room/return air temperature

Operating modes

- Comfort
- Standby (Economy)
- OFF mode
- Mold protection (optional in OFF mode)

Additional functions

- Heating/cooling changeover
  - Manual: via thermostat (P02) or BACnet object
  - Automatic: via water temperature sensor or digital input
- Supply air temperature limitation function

Security functions

- Lock buttons
- Lock parameter menu access
- Block device during fire alarms
- Valve exercising feature

Energy efficiency functions

- Setpoint limitation
- Window state
- Occupancy

Fan operation

- Automatic and manual modes
- Fan operation in dead zone (fan kick)
- Fan over-run for electric heater

Fan blocking functions

- Block fan speed control in Auto mode
- Block fan speed control in Manual mode

BACnet MS/TP communication

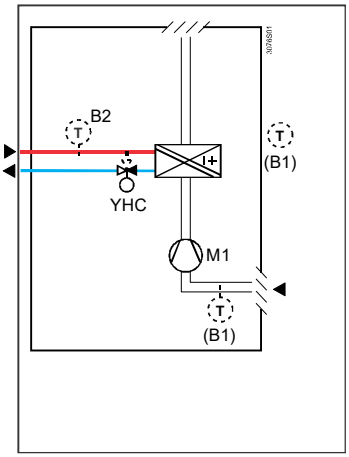
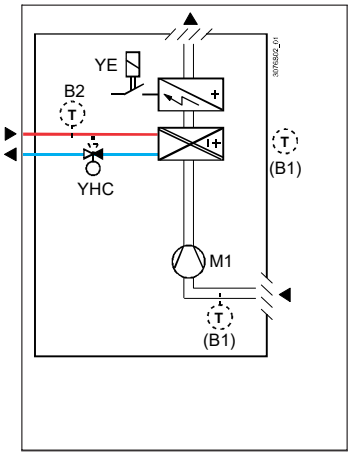
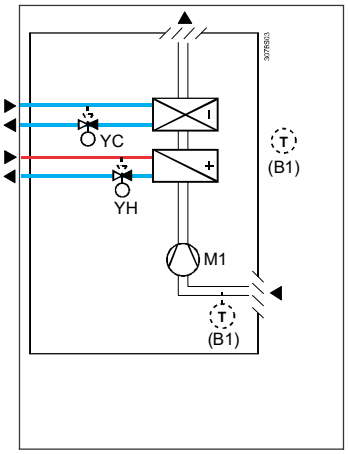
- BACnet MS/TP MAC address: set from 0 to 127. Factory setting is 127.
- BACnet MS/TP device instance number: set from 0 to 4194302. Factory setting is 0.
- Baud rate: selectable between 9600, 19200, 38400 and 76800 (default setting) bps.

HVAC applications

The RDB160BNU can control fan coil units of the following types:

- 2-pipe system
- 2-pipe system with electric heater
- 4-pipe system

The applications can be configured using the local parameter menu or via BACnet objects:

HVAC applications		
• 2-pipe fan coil (P01 = 2)	• 2-pipe fan coil with electric heater (P01 = 4)	• 4-pipe fan coil (P01 = 3)
		

YHC	Heating/cooling valve actuator	M1	Fan
YH	Heating valve actuator	B1	Return air temperature sensor or external room temperature sensor (optional)
YC	Cooling valve actuator	B2	Changeover sensor (optional)
YE	Electric heater		

Control applications

The RDB160BNU can control 29 different FCU control applications with up to 2 DC 0…10 V control outputs i.e., the control of a DC fan, DC cooling valve, and DC heating valve is not possible.

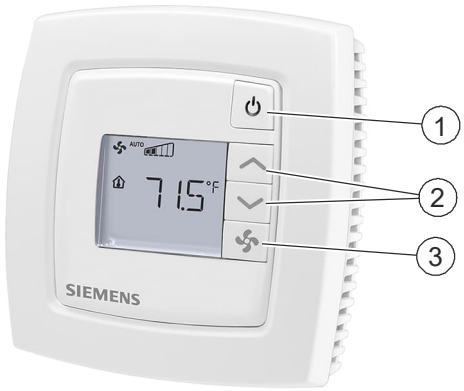
	2-pipe		2-pipe with electric heater		4-pipe		
Fan	1/2/3-speed	DC 0…10 V	1/2/3-speed	DC 0…10 V	1/2/3-speed	DC 0…10 V	
Output #1	On/Off, PWM, 3-position, DC 0…10 V		On/Off, PWM, DC 0…10 V		On/Off, PWM, DC 0…10 V	On/Off, PWM	DC 0…10 V
Output #2	N/A		On/Off			On/Off, PWM	

Mechanical design

The RDB160BNU consists of 3 parts:

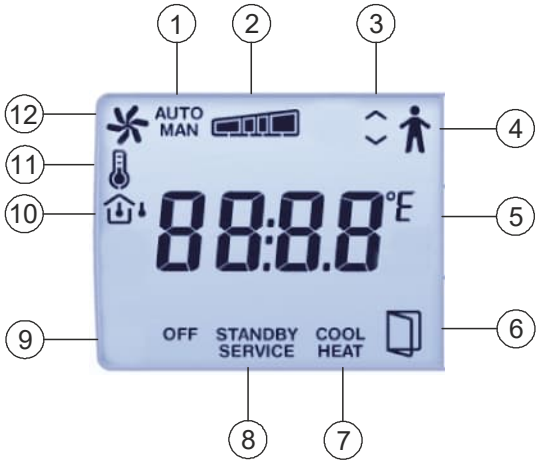
- Mounting plate with screw terminals
- Plastic housing with electronics, buttons, display, and room temperature sensor
- Frame

Buttons



1 On/Off
2 Up/down
3 Fan

Display



1 ˈAUTO/MANˈ: Automatic or manual mode indication for the fan

2 Current fan speed (Low, Medium, High)

3 Up/Down buttons to adjust setpoints and parameters

4 Occupancy indication

5 Current room temperature or setpoint in °F or °C (one decimal point)

6 Open window

7 ˈCOOL/HEATˈ: Shows the current control mode

8 ˈSTANDBYˈ: Economy mode indication
ˈSERVICEˈ: Commissioning mode (setting parameters)

9 ˈOFFˈ: OFF mode

10 Indoor / outdoor temperature

11 Setpoint temperature

12 Fan status

Type summary

Type	Order number	Designation
RDB160BNU	S55770-T437	RDB160BNU BACnet FCU Room Thermostat

Equipment combinations

The thermostat can be combined with sensors and actuators with compatible signal types as listed in chapter 'Technical data'.

Product documentation

Topic	Document ID:
Installation instructions	A6V12045441
Commissioning instructions	A6V12045450

The Installation instructions document is available in English, Spanish, and French.

It is included with the thermostat in the same packaging box.

Related documents such as environmental declarations, CE declarations, etc., can also be downloaded at the following Internet address:

www.siemens.com/bt/download

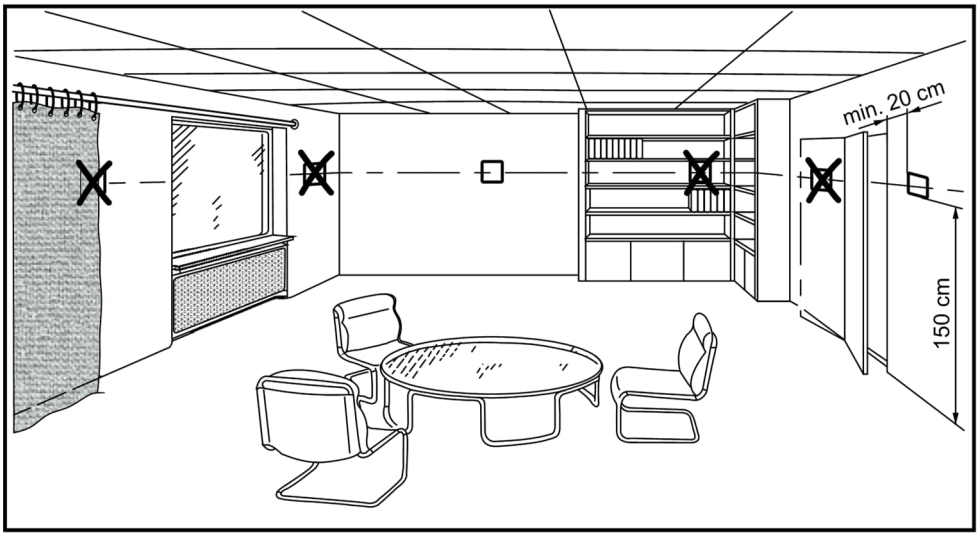
The BTL listing can be found at https://www.bacnetinternational.net/btl/.

Notes

Safety

⚠ CAUTION	
	National safety regulations Failure to comply with national safety regulations may result in personal injury and property damage. ● Observe national provisions and comply with the appropriate safety regulations.

Mounting



- The thermostat is suitable for mounting directly on the wall or on a 4” x 4” conduit box (using the ARG70 adapter plate).
- Recommended height: 1.5 m above the floor.
- Do not mount the devices in recesses, shelves, behind curtains or doors, or above or near heat sources.
- Avoid direct solar radiation and drafts.
- Seal the conduit box or the installation tube if any, as air currents can affect sensor readings.
- Adhere to allowed ambient conditions.

Installation

⚠ WARNING	
	No internal line protection for supply lines to external consumers Risk of fire and injury due to short-circuits ● The AC 24 V mains supply line must have an external circuit breaker with a rated current of no more than 10 A. ● Adapt the supply line cable diameters as per local regulations to the rated value of the installed over-current protection device. ● Disconnect the thermostat from the power supply before removing it from the mounting plate.

⚠ WARNING	
	Relay outputs (DO1, DO2, DO3, DO4 or UO1) connected to mains voltage Injuries caused by electric shock when touching the device ● Adapt the relay cable diameters as per local regulations to the rated value of the installed over-current protection device. ● Use only valve actuators rated for AC 24 V.

Commissioning

The RDB160BNU thermostat is delivered with pre-programmed control sequences. The relevant application and its parameters can be selected using the buttons on the thermostat. This can be done through:

- Setup Wizard: Only appears the first time the thermostat is powered on. It enables rapid system configuration of the most important parameters. For a list of these parameters, please refer to the installation instructions. See chapter 'Product documentation [▶ 6]'.
- Parameter Menu: Available anytime. Used to access and change the complete parameter set. For a list of these parameters, please refer to the commissioning instructions. See chapter 'Product documentation [▶ 6]'.

Disposal

The symbol with the crossed-out waste container means that electrical and electronic products and batteries may not be disposed of in normal household waste. They must be placed in separate collection and recycling containers according to the applicable laws. Please also refer to any applicable national labelling requirements. Proper disposal helps save valuable resources and prevents potentially harmful effects to people and the environment. Spent batteries and accumulators that can be removed from old devices for disposal, must be removed and placed in the indicated disposal channels. You are responsible for deleting any personal data from old devices for disposal. The registered manufacturers or distributors of electrical and electronic devices have established a common system for returning old devices. Suppliers of electrical devices must accept the returned devices at no charge. You can return old devices to the original sales location or to recycling or collection centers for old electrical devices. Please contact your regional or municipal offices/authorities for information on recycling centers or collection centers for old electrical devices.

Warranty

Technical data on specific applications are valid only together with Siemens products listed under "Equipment combinations". Siemens rejects any and all warranties in the event that third-party products are used.

Technical data

General	
Operating voltage	AC 18…30 V
Frequency	50…60 Hz
Power consumption	2.5 VA
No internal fuse! External preliminary protection with max. C 10 circuit breaker required in all cases.	

Ambient conditions, environmental conditions	
Ambient temperature	32…122 °F (0...50 °C)
Storage temperature	-4…+158 °F (-20...+70 °C)
Ambient humidity	Max. 90%

Communication	
Communication	BACnet MS/TP
Communication speed	9600, 19200, 38400 or 76800 bps

Inputs	
Analog input (AI1)	PT1000-sensor, 32...122 °F (0…50 °C)
Universal input (UI1)	• Analog input: PT1000 sensor, 32...212 °F (0…100 °C) • Digital input: potential-free contact
Digital input (DI1)	Potential free contact
Common ('C') power output (for UI1 and DI1 only)	DC 24 V, max. 10 mA, short circuit-protected

Outputs	
Digital outputs (Dox)	AC 24 V, max. 0.5 A
Do NOT connect fans in parallel. Connect one fan directly. For additional fans, install one relay for each speed.	
Universal outputs (UOx)	• Digital output (DO): AC 24 V, max. 2.0 A • Analog output (AO): DC 0...10 V, max. 5 mA

Operational data	
Built-in temperature sensor	
Technology	NTC linearized 15 kΩ
Measuring range	32…122 °F (0…50 °C)
Accuracy	±0.9 °F (±0.5 °C) at 59...86 °F (15...30 °C)
Setpoint range	41…95 °F (5…35 °C)

Standards and directives	
UL certificates	UL916 *)
BACnet BTL Listing	BACnet Application Specific Controller (B-ASC)
EU conformity (CE)	See EU declaration of conformity *)
UK conformity (UKCA)	See UK declaration of conformity *)
The product environmental declaration contains data on environmentally compatible product design and assessments (RoHS compliance, materials composition, packaging, environmental benefit, disposal)	See product environmental declaration *)

General	
Mounting	Indoor, wall (directly, or on a 4” x 4” conduit box using the ARG70 adapter plate).
Terminal blocks	Lift type for max. cable cross-section: 2.1 mm^2
Display	Backlit LCD
Casing material	Polycarbonate, PC
Color	Signal white RAL 9003
Safety class	IP20
Net weight	3.88 ounces (110 g)

*) The documents can be downloaded at http://siemens.com/bt/download

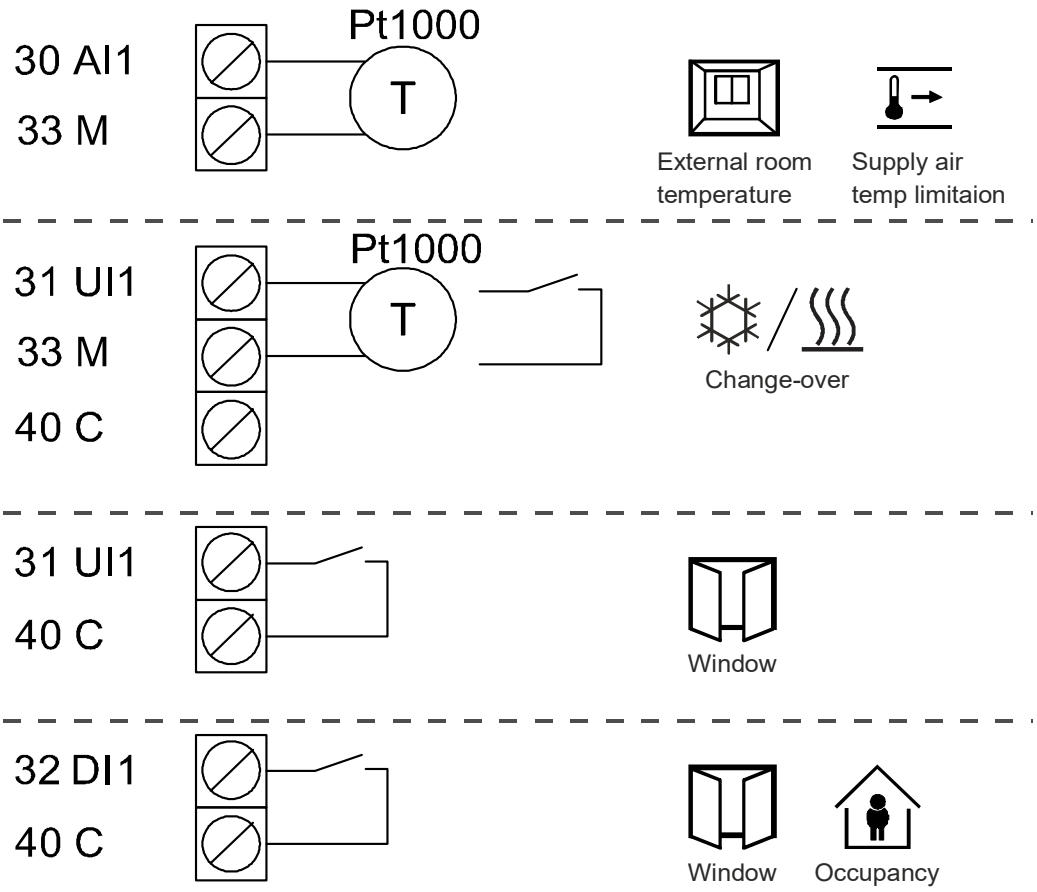
Connection terminals

No.	Label	Description
10	G	Supply voltage (AC 24 V~)
11	G0	Supply voltage (AC 24 V⊥)
12	DO1	**D**igital **O**utput 1 (AC 24 V⊥, max. 0.5 A): Fan speed low
13	DO2	**D**igital **O**utput 2 (AC 24 V⊥, max. 0.5 A): Fan speed medium
14	DO3	**D**igital **O**utput 3 (AC 24 V⊥, max. 0.5 A): Fan speed high
20	CDO	**C**ommon (AC 24 V~) for **D**igital **O**utputs: for DOs or UO1 (when configured as DO)
21	MUO	**M**easuring ground for **U**niversal **O**utputs (-DC 0…10 V): for UOs (when configured as AOs)
22	DO4	**D**igital **O**utput 4 (AC 24 V⊥, max. 0.5 A): ● Electric heater (2-pipe FCU with electric heater) ● Cooling valve (4-pipe FCU)
23	UO1	**U**niversal **O**utput 1 (AC 24 V⊥, max. 2.0 A or +DC 0…10 V, max. 5 mA): ● Heating or cooling valve (2-pipe FCU and 2-pipe FCU with electric heater) ● Heating valve (4-pipe FCU)
24	UO2	**U**niversal **O**utput 2 (+DC 0…10 V): ● Fan (all applications with DC fan) ● Cooling valve (4-pipe FCU with 3-speed fan)
30	AI1	**A**nalog **I**nput 1 (PT1000 sensor, 32…122 °F (0…50 °C)): ● External room temperature sensor ● Supply air temperature sensor
31	UI1	**U**niversal **I**nput 1 (PT1000 sensor, 32…212 °F (0…100 °C) or contact): ● Change-over temperature sensor or contact ● Window contact
32	DI1	**D**igital **I**nput 1 (Contact): ● Presence detector ● Window contact
33	M	**M**easuring ground: for AI1 or UI1 (when configured as AI)

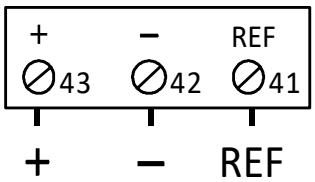
40	C	**C**ommon (DC 24 V): for DI1 and UI1 (when configured as DI)
41	REF	BACnet MS/TP Reference
42	-	BACnet MS/TP -
43	+	BACnet MS/TP +

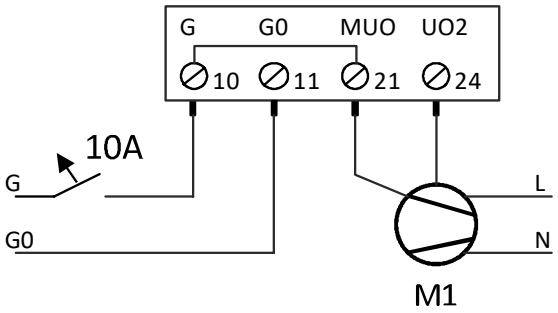
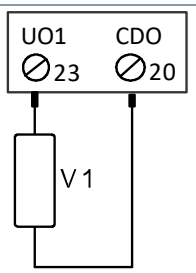
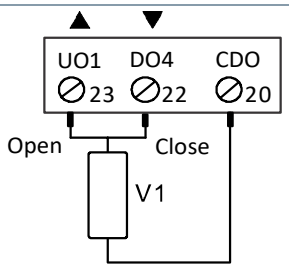
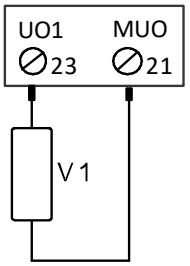
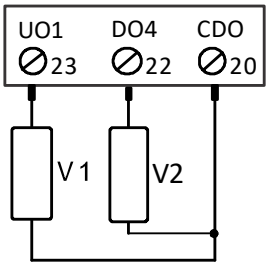
Connection diagrams

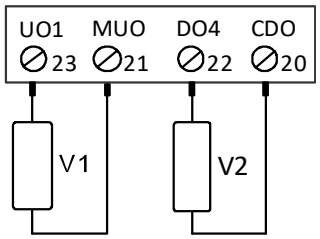
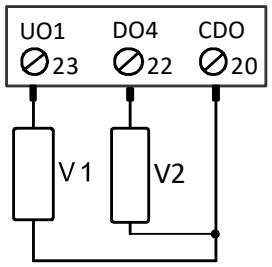
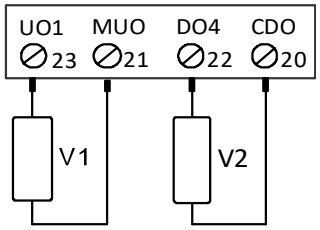
Inputs

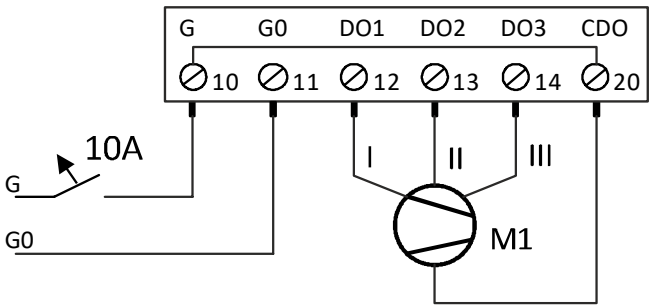
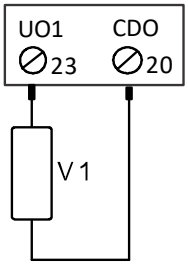
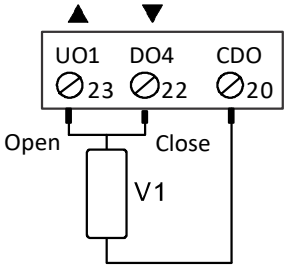
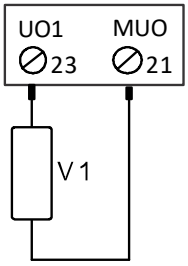
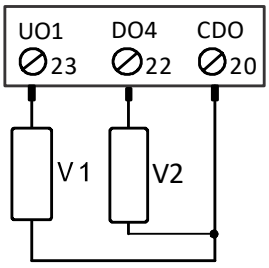
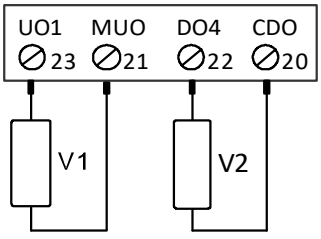


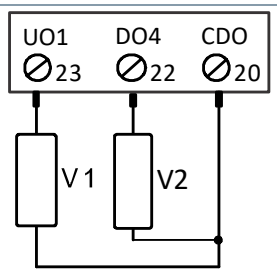
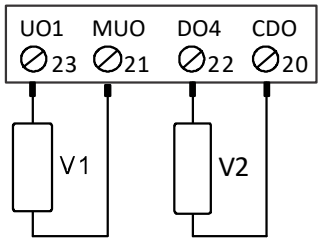
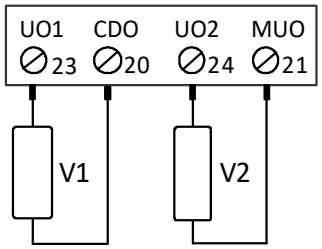
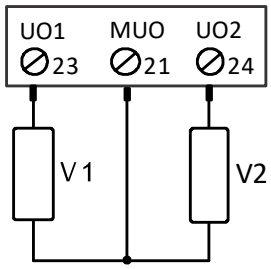
BACnet MS/TP



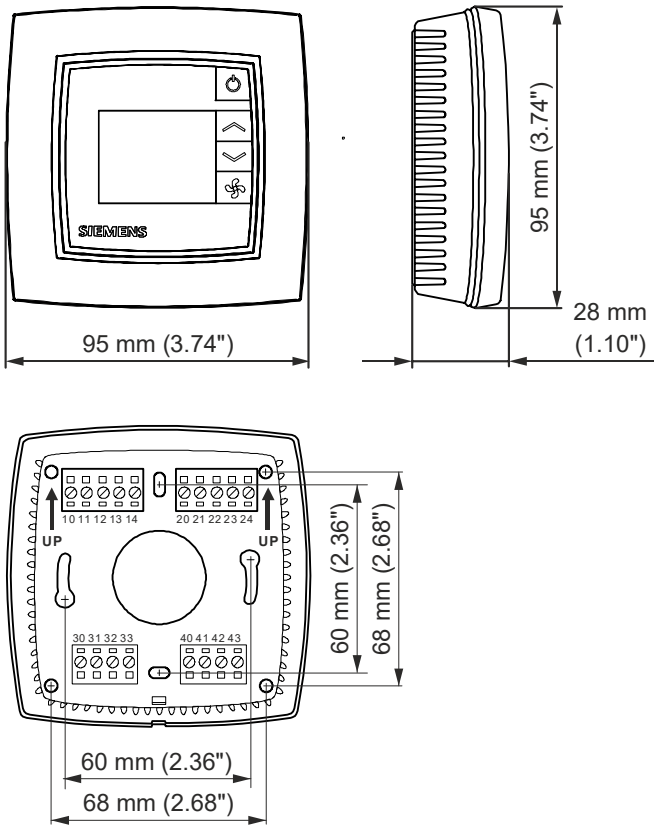
	DC 0…10 V fan	
		
HVAC application	**Control application**	**Wiring**
2-pipe	Heating/cooling valve (V1): On/Off or PWM	
2-pipe	Heating/cooling valve (V1): 3-position ● UO1 = Open ▲ ● DO4 = Close ▼	
2-pipe	Heating/cooling valve (V1): DC 0…10 V	
2-pipe with electric heater	Heating/cooling valve (V1): On/Off or PWM Electric heater (V2): On/Off	

2-pipe with electric heater	Heating/cooling valve (V1): DC 0…10 V Electric heater (V2): On/Off	
4-pipe	Heating valve (V1): On/Off or PWM Cooling valve (V2): On/Off or PWM	
4-pipe	Heating valve (V1): DC 0…10 V Cooling valve (V2): On/Off or PWM	

	3-/2-1-speed fan	
		
HVAC application	**Control application**	**Wiring**
2-pipe	Heating/cooling valve (V1): On/Off or PWM	
2-pipe	Heating/cooling valve (V1): 3-position ● UO1 = Open ▲ ● DO4 = Close ▼	
2-pipe	Heating/cooling valve (V1): DC 0…10 V	
2-pipe with electric heater	Heating/cooling valve (V1): On/Off or PWM Electric heater (V2): On/Off	
2-pipe with electric heater	Heating/cooling valve (V1): DC 0…10 V Electric heater (V2): On/Off	

4-pipe	Heating valve (V1): On/Off or PWM Cooling valve (V2): On/Off or PWM	
4-pipe	Heating valve (V1): DC 0…10 V Cooling valve (V2): On/Off or PWM	
4-pipe	Heating valve (V1): On/Off or PWM Cooling valve (V2): DC 0…10 V	
4-pipe	Heating valve (V1): DC 0…10 V Cooling valve (V2): DC 0…10 V	

Dimensions



All dimensions in mm

Issued by
Siemens Switzerland Ltd
Smart Infrastructure
Global Headquarters
Theilerstrasse 1a
CH-6300 Zug
+41 58 724 2424
www.siemens.com/buildingtechnologies

© Siemens Switzerland Ltd, 2022
Technical specifications and availability subject to change without notice.

Document ID A6V12045445_en--_a
Edition 2022-04-26