Cyrus

Features

- Modern Appearance
- Stylish rotary dial and buttons
- Large LCD with backlight
- Support Modbus RTU protocol
- Support standalone operation on RS485 communication failure
- Retention of temperature set-point and fan-speed upon power failure
- Separate Power Supply Unit provides high-current application
- Unoccupied mode contact for energy-saving
- Window contact for remote on-off control
- 2-wire on-off, 0-10 VDC and 3-wire floating models
- Dual-output model provides auto cooling/heating changeover with adjustable deadband or/and manual override
- PI Algorithm (modulating models)
- Parameter setup manual
- Remote temperature sensor capability
- Seasonal changeover sensor availability
- Optional remote controller
- Additional Binary Input
- Extendibility to BACnet network with our BACnet MS/TP Gateway module (BMG-MR)

Selectable Functions

- Selectable ºC or ºF temperature display
- Field selectable program to retain last operating event upon power failure
- Measured temperature off-set
- Selectable P-band and I-time
- Selectable Actuator stoke time (3-wire floating model)
- Field selectable 1 to 5 K deadband for dual-output models
- Field adjustable high and low set point limit
- Field adjustable cooling and heating energy saving mode set points
- Selectable fan action in unoccupied mode
- Selectable Auto Fan sequence in heating mode
- Selectable operating mode sequence for dual-output models
- Selectable manual/auto operating sequence for single output models
- Selectable constant display of temperature

General

The NT10 Series RS485 Modbus RTU networking LCD Fan Coil applies communication technology of Modbus RTU master/slave protocol to monitor and supervise year around air conditioning units in commercial, industrial and residential Installation. Typical application includes the control of fan coil units, packaged terminal air conditioners and combination heating and cooling equipment, as part of the system that consists of two-way or three-way valve and a multi-speed line voltage fan. The maximum number of NT10 slaves in a Modbus RTU network is 32.

Optional BACnet MS/TP Gateway module (BMG-MR) is available for order. It works as an interface to link up the NT10 thermostats with BACnet MS/TP communication bus. Please refer to the product bulletin of BMG-MR BACnet MS/TP Gateway for details.

Ordering

To order the NT10 Series thermostat, contact the nearest Cyrus' representative. Specify the desired product code number from model selection guide.

E030-1308

Product Overview

NT10 are line voltage Modbus RTU Networking LCD fan coil thermostat with 8 basic models that cover all type of FCU standalone applications in additional to networking capability. NT10 consists of two units; the Networking Control Unit (NCU) and Power Supply Unit (NPSU). There are models for cooling only, heating only and heating-cooling fan coil system integrate with 2-wire, 3-wire or 0-10 VDC input valve control. On-board high accuracy NTC sensor allows precision comfort control over occupied space area.

NT10-1   consists of NCU11 and NPSU10-1 (220 VAC supply, 220 VAC single 2-wire on-off output)
NT12-1   consists of NCU11 and NPSU12-1 (220 VAC supply, 24 VAC single 2-wire on-off output)
NT10-1F   consists of NCU11F and NPSU12-1F (220 VAC supply, 220 VAC single 3-wire floating output)
NT12-1F   consist of NCU11F and NPSU12-1F (220 VAC supply, 24 VAC single 3-wire floating output)
NT10-1A   consists of NCU11A and NPSU10-1A (220 VAC supply, 0-10 VDC single output)
NT10-2   consists of NCU12 and NPSU10-2 (220 supply, 220 VAC dual 2-wire on-off output)
NT10-2F   consists of NCU12F and NPSU1-2F (220 VAC supply, 220 VAC dual 3-wire floating output)
NT12-2   consists of NCU12 and NPSU12-2 (220 VAC, 24 VAC dual 2-wire on-off output)
NT12-2F   consists of NCU12F and NPSU12-2F (220 VAC supply, 24 VAC dual 3-wire floating output)
NT10-2A   consists of NCU12A and NPSU10-2A (220 VAC, dual 0-10 VDC output)
NT10-2AH   consists of NCU12AH and NPSU10-2AH (220 VAC, 0-10 VDC cooling and 2-wire on-off heating)

Model NT10-1 & NT12-1

The Model NT10-1 is Modbus RTU networking LCD with backlight line voltage fan coil thermostat that is designed for cooling only / heating only fan coil unit with 2-wire line-voltage valve actuator application (NT12-1 provides 24 VAC valve output). Integral with system of Cooling/Heating -Fan-Off switch that allows users to cutoff power for fan and the output for valve actuator. Simply pressing the fan speed button, allows users to select Auto-High-Med-Low fan speed. All fan outputs by relay that can withstand max. of 5 Amp (resistive) 2 Amp (Inductive) operating current.

Model NT10-1F & NT12-1F

The Model NT10-1F is Modbus RTU networking LCD with backlight line voltage fan coil thermostat that is designed for cooling only / heating only fan coil unit with 3-wire line-voltage valve actuator application (NT12-1F provides 24 VAC valve outputs). Integral with system of Cooling/ Heating-Fan-Off switch that allows users to cutoff power for fan and the output for valve actuator. Simply pressing the fan speed button, allows users to select Auto-High-Med-Low fan speed. All fan outputs by relay that can withstand max. of 5 Amp (resistive) 2 Amp (Inductive) operating current.

Model NT10-1A

The Model NT10-1A is Modbus RTU networking LCD with backlight line voltage fan coil thermostat that is designed for cooling only / heating only fan coil unit with 0-10 VDC valve actuator application. Integral with system of Cooling/ Heating-Fan-Off switch that allows users to cutoff power for fan and the output for valve actuator. Simply pressing the fan speed button, allows users to select Auto-High-Med-Low fan speed. All fan outputs by relay that can withstand max. of 5 Amp (resistive) 2 Amp (Inductive) operating current.

Model NT10-2 & NT12-2

The Model NT10-2 is Modbus RTU networking LCD with backlight line voltage fan coil thermostat that is designed for cooling / heating fan coil unit with 2-wire line-voltage valve actuator application (NT12-2 provides 24 VAC valve out-

Off switch that allows users to cutoff power for fan and the output for valve actuator. Simply pressing the fan speed button, allows users to select Auto-High-Med-Low fan speed. All fan outputs by relay that can withstand max. of 5 Amp (resistive) 2 Amp (Inductive) operating current.

Model NT10-2F and NT12-2F

The Model NT10-2F is Modbus RTU LCD fan coil thermostat that is designed for cooling / heating fan coil unit with 3 -wire line-voltage valve actuators application (NT12-2F provides 24 VAC valve outputs). Integral with system of Cooling-Heating-Auto-Fan-Off switch that allows users to cutoff power for fan and the output for valve actuator. Simply pressing the fan speed button, allows users to select Auto-High-Med-Low fan speed. All fan outputs by relay that can withstand max. of 5 Amp (resistive) 2 Amp (Inductive) operating current.
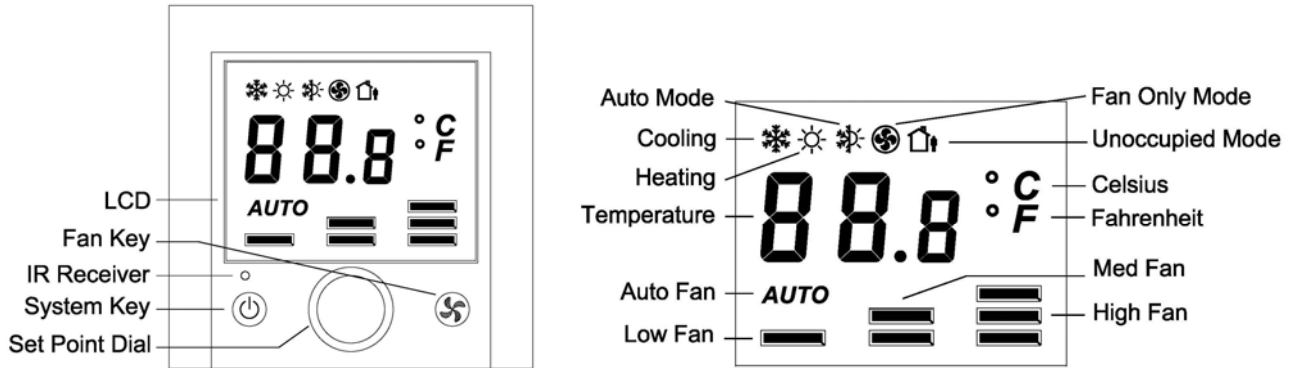
Model NT10-2A

The Model NT10-2A is Modbus RTU networking LCD with backlight line voltage fan coil thermostat that is designed for cooling / heating fan coil unit with 0-10 VDC valve actuator application. Integral with system of Cooling-Heating-Auto-Fan-Off switch that allows users to cutoff power for fan and the output for valve actuator. Simply pressing the fan speed button, allows users to select Auto-High-Med-Low fan speed. All fan outputs by relay that can withstand max. of 5 Amp (resistive) 2 Amp (Inductive) operating current.

Model NT10-2AH

The Model NT10-2AH is Modbus RTU networking LCD with backlight line voltage fan coil thermostat that is designed for cooling / heating fan coil unit with 0-10 VDC cooling valve actuator and 2-wire on-off heating application. Integral with system of Cooling-Heating-Auto-Fan-Off switch that allows users to cutoff power for fan and the output for valve actuator. Simply pressing the fan speed button, allows users to select Auto-High-Med-Low fan speed. All fan outputs by relay that can withstand max. of 5 Amp (resistive) 2 Amp (Inductive) operating current.

LCD Segments and Buttons

LCD
Fan Key
IR Receiver
System Key
Set Point Dial

Auto Mode — Fan Only Mode
Cooling — Unoccupied Mode
Heating — Celsius
Temperature — Fahrenheit
Auto Fan — Med Fan
Low Fan — High Fan

Operation Notes

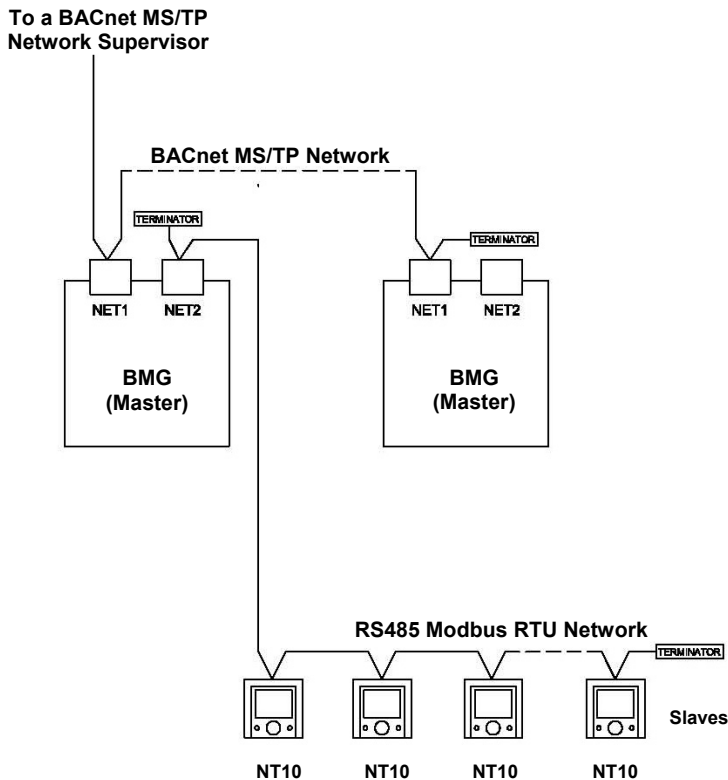|	
Temperature Display	LCD shows measured temperature constantly except when temperature set point adjustment is being made
Backlight	The backlight will light up for 5 seconds when any button is pressed
Mode of operation	Press the system control key ⏻ to enter into the desired operating mode: Cooling-Heating-Auto-Fan Only-Off
Fan speed	Press the fan control key ⟳ to change the fan speed mode: High-Med-Low-Auto
Temperature Set-point	Increase or decrease temperature set point by rotating the adjustment dial clockwise or counter-clockwise. When the dial is rotated, the LCD shows the set point temperature
Unoccupied Mode (Energy -saving)	The energy saving mode is activated while "OCU" contact is in closure. In unoccupied mode, the factory temperature set points are 26 ^{o}C and 16 ^{o}C for cooling and heating respectively. Fan speed is always set at "low".
Window Mode	The window mode is activated while "WIN" contact is in closure. In window mode, the FCU is shut down and locks out the functions of the thermostat.
Parameter setup menu	The thermostat allows authorized service agents to change certain number of operating parameters, please refer to parameter setup manual for details.

Dimensions in mm

Networking Control Unit

Power Supply Unit

Remote Controller

3
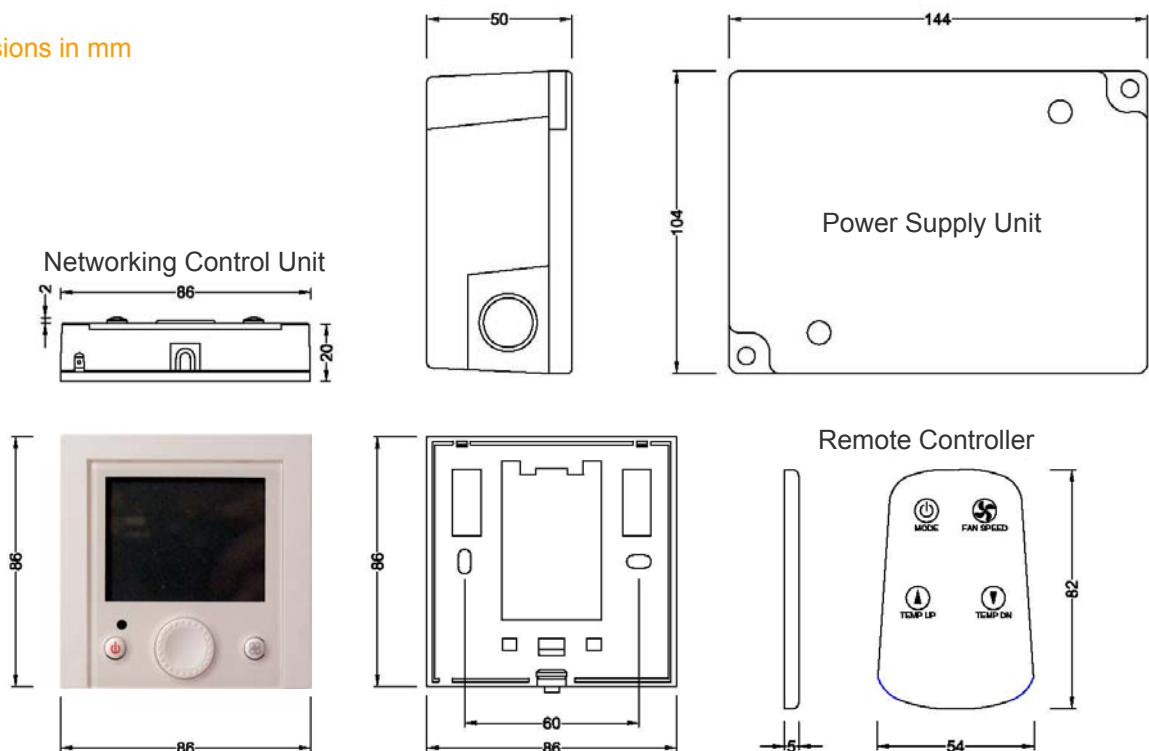
To ensure network stability and reliable communications, particularly at high speeds on a BACnet MS/TP or Modbus RTU network for a number of devices, it is imperative that the following network and cabling requirements are adhered to:

Item	Description
Cabling	For BACnet MS/TP and Modbus RTU networks, it is recommended to use networking cabling that matches the following specifications: • Balanced 100 to 120 ohms nominal impedance, 22 or 24 AWG Twisted Shielded Pair (TSP) Cable • Nominal capacitance of 52 pF/m or lower • Nominal velocity of propagation of 66% or higher
Topology	Ensure the MS/TP or Modbus RTU network cable is installed as a daisy chain from one device to the next.
Maximum Nodes	The maximum number of devices per MS/TP or Modbus RTU network without any repeaters is 32.
Terminator	A terminator of 120-ohm impedance must be installed at each end of each MS/TP or Modbud RTU network segment, or two per MS/TP or Modbus RTU network. Ensure that this requirement is not overlooked in laying out the network architecture and ordering product.
Repeater	A repeater is not necessary unless the MS/TP or Modbus RTU network is extended beyond 1,000 m.

Network Configuration

To a BACnet MS/TP Network Supervisor

BACnet MS/TP Network

TERMINATOR

NET1 NET2

BMG (Master)

TERMINATOR

NET1 NET2

BMG (Master)

RS485 Modbus RTU Network

TERMINATOR

Slaves

NT10   NT10   NT10   NT10

BACnet MS/TP Network Notes:

1. Ensure the recommended balanced cable is used.
2. Ensure the cable is installed as a daisy chain from one device to the next (1,000 m maximum) and the shield is grounded at one single point of the network only.
3. Ensure a MS/TP terminator is installed on each end of each MS/TP network.
4. The maximum nodes per MS/TP network is 32 without a repeater.

Modbus RTU Network Notes:

1. Ensure the recommended balanced cable is used.
2. Ensure the cable is installed as a daisy chain from one device to the next (1,000 m maximum) and the shield is grounded at one single point of the network only.
3. Ensure a terminator is installed on each end of each or Modbus RTU network.
4. The maximum nodes per Modbus RTU network is 32

Wiring Diagrams and Application Notes

The NT10 thermostat consists of two basic units: the Network Control Unit and the Power Supply Unit. While all line-voltage wiring is terminated at the Power Supply Unit, all connections between Network Control Unit and Power Supply Unit are of low-voltage signaling wires.

- Cut jumper JP1 if external sensor is wired to SR1 and GND. Run the wiring away from any electrical motors or power wiring. Failure to do so may result in poor thermostat performance due to electrical noise.
- 22 AWG twisted shielded pair double-insulated cable is recommended as remote sensor wiring and its length must not exceed 25 m.
- Do not bundle and run power wiring and remote sensor wiring in the same conduit.
- Connecting wires between Network Control Unit and Power Supply Unit must not exceed 15 m.
- Seasonal changeover sensor or switch is only applicable to heat only or cool only 2-pipe model only.
- The seasonal changeover sensor should be wrapped around the supply water pipe when associated with a water system. When the changeover sensor temperature exceeds 30 ºC, the thermostat enters into heating mode.
- Unoccupied contact closure activates energy saving mode.
- Window contact closure activates window mode.
- Hidden-line wiring for Terminals V2 and 6 are applicable to dual-output model only.
- The thermostat outputs are designed for controlling zone valves. If used for controlling electric heaters, external contactors must be used.

More wiring diagrams are available, please contact the nearest Cyrus' representative for details

WARNING
Incorrect wiring connection may cause permanent equipment damages to the thermostat

NT10-1 / NT10-2 Wiring Diagram
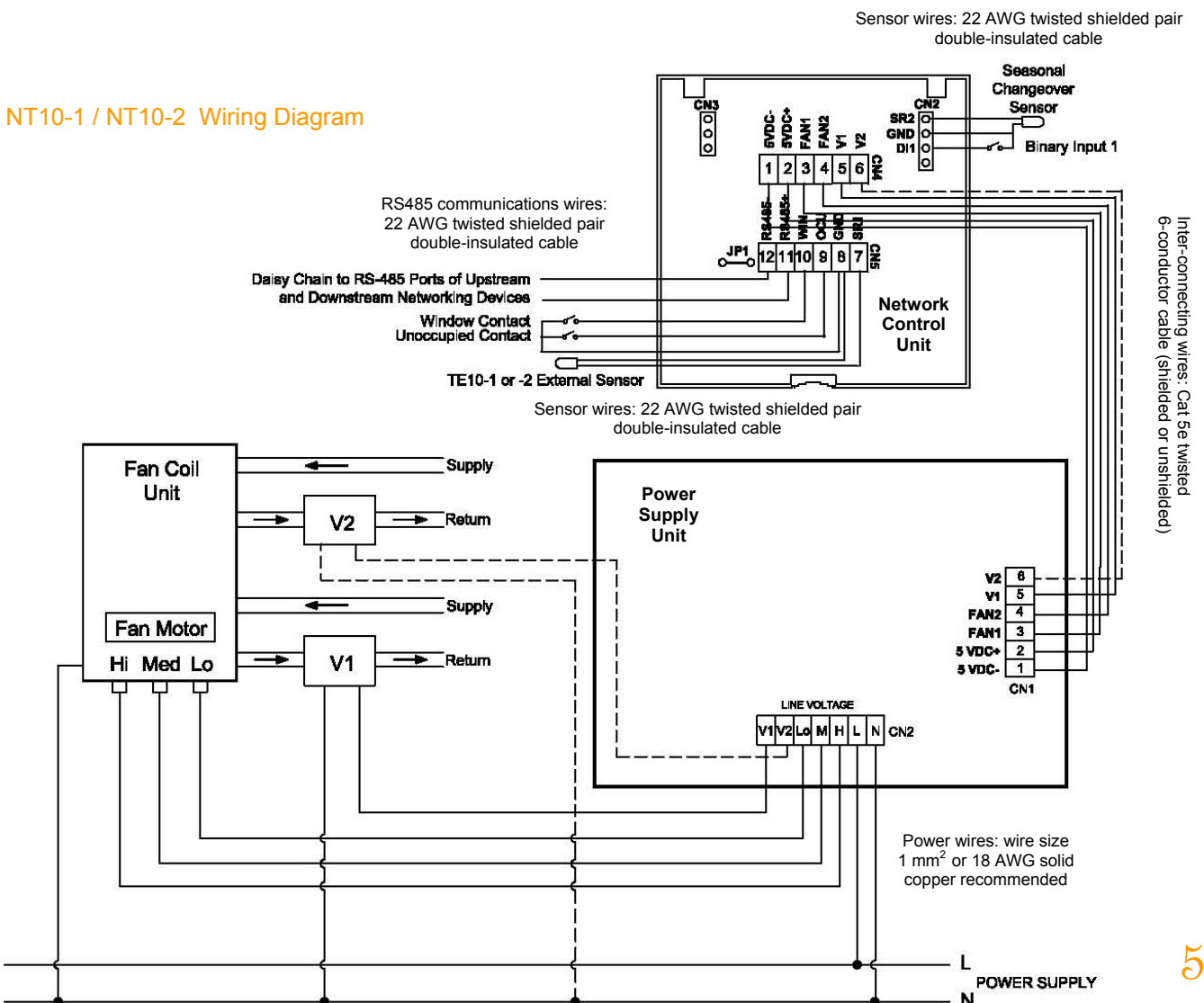
Model Selection Guide

				NT1	0	-	2AH	-	W	R
Power	0	=	220 VAC, 50/60 Hz							
	2	=	220 VAC, 50/60 Hz with 24 VAC valve output		0					
Valve Control Output	1	=	2-wire on-off (Heating only or Cooling only2-pipe)							
	1F	=	3-wire floating (Heating only or Cooling only 2-pipe)							
	1A	=	0-10 VDC (Heating only or Cooling only 2-pipe)							
	2	=	2-wire on-off (Heating / Cooling 4-pipe)							
	2F	=	3-wire floating (Heating / Cooling 4-pipe)							
	2A	=	0-10 VDC (Heating / Cooling 4-pipe)							
	2AH	=	0-10 VDC Cooling, 2-wire on-off heating				2AH			
Options & LCD layout	Nil	=	Grey Face-plate							
	W	=	White Face-plate						W	
	R	=	IR Receiver for Remote Controller							R

Specifications

Product	**NT10 Series Modbus RTU Networking LCD Thermostat**	
Power	220 V, ±10%, 50/60 Hz	
Temperature display range	5-35°C in 0.5 K increments: accuracy ±1 K	
Temperature set point range	5-35°C in 0.5 K increments	
Temperature set point limits	5-35ºC	
Sensing element	NTC thermistor, 10 kΩ @ 25ºC,accuracy ± 0.5 K @ 25ºC	
Binary inputs	4 binary inputs for external voltage-free contacts (including Unoccupied / Window Contact)	
RS-485 communication speed	Selectable baud rate is fixed at 19,200 bps	
Device MAC address	01-32 thermostat addresses: change in setup menu	
Modbus network guideline	Maximum 32 devices and maximum 1,000 m cable length	
Enclosure	Material: Self-extinguishing, molded ABS	
	Finish: Off white housing	
Protective class	IP30	
Electrical ratings	Valve output (on-off and 3-wire floating models)	220 V, 5 A (2A)
	Valve output (on-off and 3-wire floating models)	24 V, 0.3A (0.3 A)
	Valve output impedance (0-10 VDC models)	Minimum 10,000 Ω
	Fan output relays	220 V, 5 A (2 A)
	Total rating	220 V, 5 A maximum
Ambient/ storage limits	0 to 55ºC / -30 to 50ºC, 10 to 90% RH non-condensing	
Termination	Non-removable terminal blocks and pluggable sockets	
Certifications	CE	
Shipping weight	Approx. 550g	
Dimensions	See Dimension drawing	