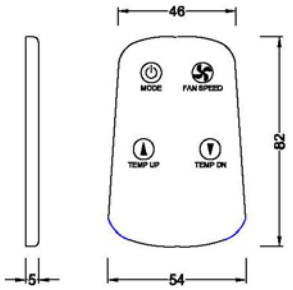
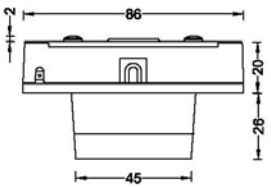
Modbus RTU Room Thermostats with LCD
Installation and Operation Instructions

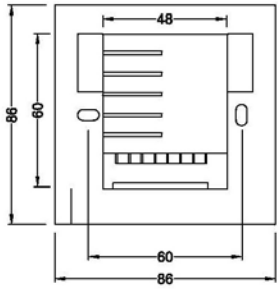
Dimensions in mm

Remote Control Unit

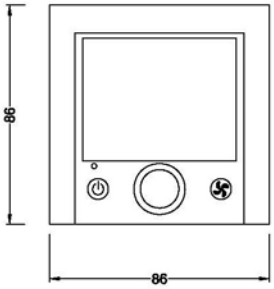


Bottom View



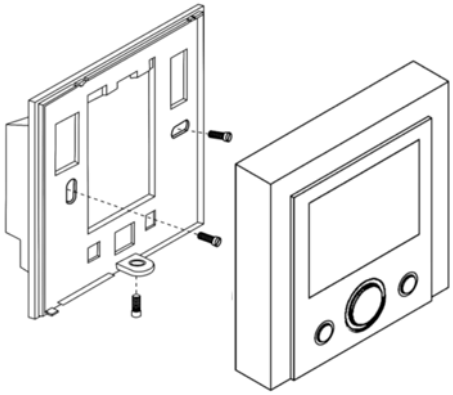


Back View



Front View

Mounting Details



Mounting

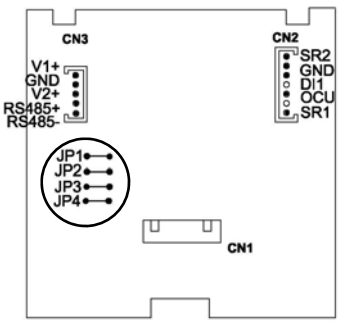
The thermostat can be surface mounted or secured to a standard European 75 x 75 x 47 mm electrical box. Two mounting screws are included.

Model Number Selection Guide

Default Model	Application	Standard Model	Remarks
50-1	Single on-off output, cool only or heat only	50-1	Factory setting
	Single on-off output, manual cool/heat changeover	50-1M	Select via setup menu
50-1A	Single 0-10 VDC output, cool only or heat only	50-1A	Factory setting
	Single 0-10 VDC output, manual cool/heat changeover	50-1AM	Select via setup menu
50-1F	Single 3-wire floating output, cool only or heat only	50-1F	Factory setting
50-2	Dual on-off outputs, manual/auto cool/heat changeover	50-2	Factory setting
	Single 3-wire floating output, cool only or heat only	50-1F	Cut jumper JP2
	Single 3-wire floating output, manual cool/heat changeover	50-1FM	Cut jumper JP2 and select via setup menu
	Single on-off output, cool only or heat only	50-1	Cut jumpers JP2 and JP3
	Single on-off output, manual cool/heat changeover	50-1M	Cut jumpers JP2 & JP3 & select via setup menu
50-2A	Dual 0-10 VDC outputs, manual/auto cool/heat changeover	50-2A	Factory setting
	Single 0-10 VDC output, cool only or heat only	50-1A	Cut jumpers JP2 and JP3
	Single 0-10 VDC output, manual cool/heat changeover	50-1AM	Cut jumpers JP2 & JP3 & select via setup menu

The default models 50-2 and 50-2A can be re-configured in the field to various standard models by a qualified servicing agent, if necessary, by changing the jumper positions of JP2 and JP3. The locations of these jumpers can be found after removing the thermostat cover from its mounting plate.

Re-configuration of Model Number	Jumper Settings of JP2 and JP3	
	JP2	JP3
50-2 → 50-1	Cut	Cut
50-2 → 50-1M	Cut	Cut
50-2	Uncut	Uncut
50-2 → 50-1F	Cut	Uncut
50-2 → 50-1FM	Cut	Uncut
50-2A → 50-1A	Cut	Cut
50-2A → 50-1AM	Cut	Cut
50-2A	Uncut	Uncut

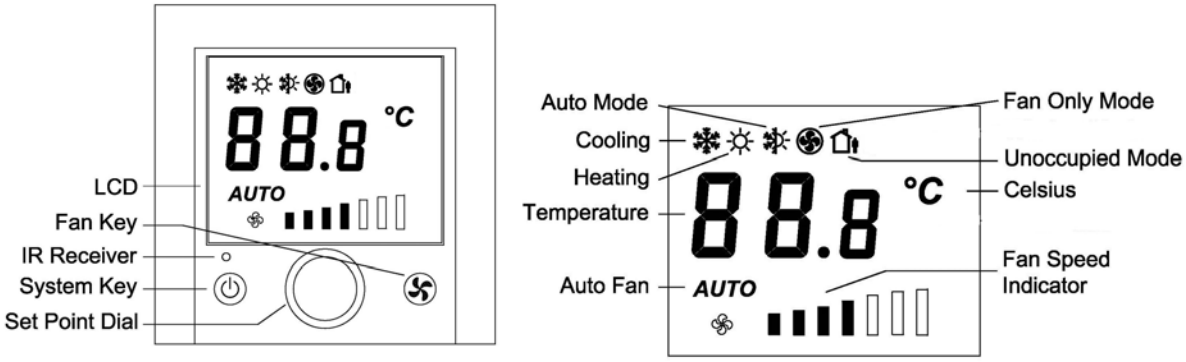


Note: Terminals V1+, GND and V2+ are only available in 0-10 VDC output models.

Jumper Settings of JP1 and JP4		
Jumper	Cut	Uncut
JP1	With External Sensor	With Built-in Sensor
JP4	For 2-10 VDC Output	For 0-10 VDC Output

Note: JP4 is available in 0-10 VDC/2-10 VDC output models only. Factory setting is 0-10 VDC.

Network Control Unit and LCD Layout



Operation Notes

Operation

- LCD shows ambient temperature constantly except when set point adjustment is being made.
- Press the system key **Φ** to enter into the desired operating mode: Cool-Heat-Auto-Fan Only-Off, etc.
- Press the fan key ✱ to change the fan speed mode: High-Med-Low-Auto.
- Increase or decrease temperature set point by rotating the adjustment dial clockwise or counter-clockwise. When the dial is rotated, the LCD shows the existing set point setting.

Unoccupied Mode

- When the unoccupied contact closes, it will override the operating mode and operate the thermostat in energy saving mode despite the thermostat being in operating or standby mode.
- In unoccupied mode, the factory-set temperature cut-in points are 26°C for cooling and 16°C for heating. Meanwhile, the operation of all operating keys are locked out until the unoccupied contact opens.
- During unoccupied mode, the default fan speed is set at “low” when pre-set cut-in temperature is reached, or otherwise the fan output is always “off”.
- Unoccupied mode can be activated in the following manner when the unoccupied contact closes:
  For 2-pipe models with auto seasonal changeover, the unoccupied cooling or heating mode is determined by the status of the SR2 seasonal changeover sensor and the valve output is activated according to the measured temperature.
  For 2-pipe models with manual seasonal changeover, the unoccupied cooling or heating status is determined by the last status of the occupied mode and the valve output is controlled according to the measured temperature.
  For 4-pipe models, the unoccupied cooling or heating mode is always determined by the measured temperature and valve output is also activated according to the measured temperature.
  Unoccupied mode activation in operating mode only or in both standby and operating mode will be determined by activation setting in setup menu. Low fan will run according to fan action setting in setup menu.

Parameter Setup Mode

- The thermostat allows authorized service agent to change a number of operating parameters in the field. For setup procedure details, refer to the parameter setup manual.
- When “1F” or “1FM” is used for on-off control, its parameter settings must be set as A1, bD and C3. and its effective operating temperature differential will be 1 K.

Error Reporting

- All valve and fan outputs will be shut down when error is reported. Details of error reporting are described below.

Thermostat Errors Reporting

When the following errors are reported on the LCD unit, these errors will prevent the thermostat from normal operation and all thermostat functions will be locked out:

E-1 EEPROM read/write error
E-2* Temperature sensor open-circuited
E-3 Temperature sensor short-circuited

* If jumper JP1 is cut open and external sensor is used, **E-2** means the external sensor may have been disconnected from Terminals SR1 and GND. Check the external sensor’s connectivity and resistive value. If **E-2** error is still reported, return the thermostat to the manufacturer for repair.

When the error **E-1** or **E-3** is reported or when the error **E-2** is reported without jumper JP1 being cut and external sensor being installed, return the thermostat to the manufacturer for repair.

Network & Cabling Requirements

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

Item	Description
Cabling	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 • Terminating the shield to ground at one end only for each isolated segment will prevent ground loops in the shield and drain RF energy to ground. Grounding at the BACnet router or controller is preferred.
Topology	Ensure the MS/TP network cable is installed as a daisy chain from one device to the next.
Maximum Nodes	The maximum number of devices is 32 per MS/TP network segment and 64 per network trunk with one Repeater.
Terminator	A terminator of 120-ohm impedance must be installed at each end of each MS/TP network segment, or two per MS/TP network. Ensure that this requirement is not overlooked in laying out the network architecture and ordering product.
Cable Shielding	Use a shielded, twisted pair cable for communications. Never directly ground wire in more than one point on the shield. Doing so can induce large currents and result in communication problem.
Repeater	A repeater is not necessary unless more than 32 nodes will be installed on a network or the MS/TP network is extended beyond 1,000 m.
Step-down Trans-former	A separate isolated double-wound transformer is recommended for supplying 24 VAC power to each BMG. If and when the same transformer is shared with other devices, observe the polarities of the power supply of all devices including the BMG.

Wiring and Application Notes

- Cut jumper JP1 open if an 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.
- Cut jumper JP4 open if 2-10 VDC proportional output is required.
- 22 or 24 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.
- 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.
- External seasonal changeover sensor or switch is applicable to heat only or cool only 2-pipe models only.
- Unoccupied contact closure activates unoccupied mode.
- Hidden-line wiring are applicable to dual-output models only.
- The thermostat on-off outputs are designed for controlling zone valves. If used for controlling electric heaters, external contactors must be used.
- For a 3-wire floating output model, in cooling mode, Terminal 6 of CN6 is wired to open valve on temperature rise and Terminal 7 of CN6 to close valve on temperature drop. The action in heating mode is reversed.

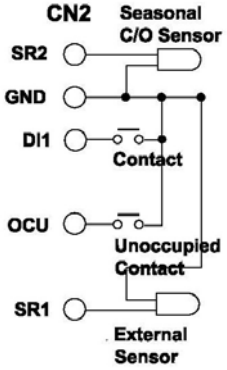
RS-485 Networking Room Thermostat Wiring Diagrams

Wiring Diagram for Single and Dual 2-Wire On-Off Valve Outputs

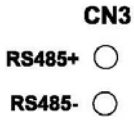
Notes:
1. V1 and V2 are 2-wire line-voltage on-off spring-return valves
2. On a single-output unit, V1 can be either a cooling or heating valve.
3. On a dual-output unit, V1 must be a cooling valve and V2 a heating valve.

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

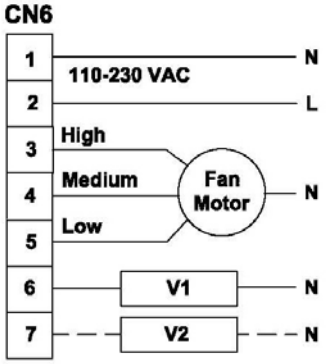
Connections of Sensors and Contacts



RS-485 Communication Port



Line-Voltage Connections

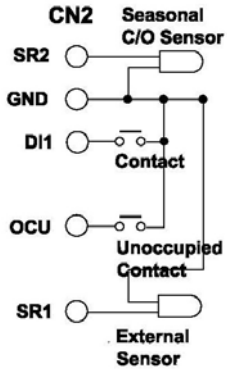


Wiring Diagram for Single 3-Wire Floating Valve Output

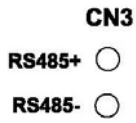
Notes:
1. V3 is a 3-wire line-voltage gloating valve.
2. In cooling mode, Output at Terminal 6 opens valve on temperature rise and output at Terminal 7 closes valve on temperature drop.

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

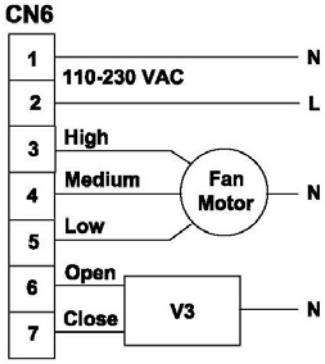
Connections of Sensors and Contacts



RS-485 Communication Port



Line-Voltage Connections

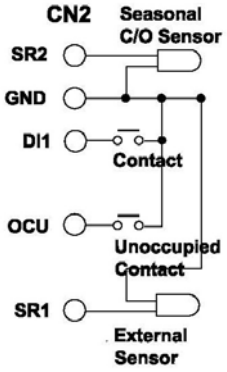


Wiring Diagram for Single and Dual 0-10 VDC Valve Outputs

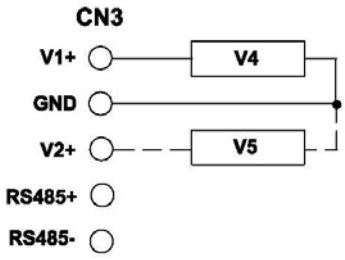
Notes:
1. V4 and V5 are 0-10 VDC valves
2. On a single-output unit, V4 can be either a cooling or heating valve.
3. On a dual-output unit, V4 must be a cooling valve and V5 a heating valve.

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

Connections of Sensors and Contacts



RS-485 Communication Port and 0-10 VDC Outputs



Line-Voltage Connections