



VT8000 Room Controllers

VT8350 Engineering Guide Specification

Low Voltage Fan Coil Unit (FCU) Controller and Zone Thermostat

General – The VT8350 Room Controller is a low-voltage microprocessor-based fan-coil controllers. Models are available controlling single speed and multi-speed (up to three (3) speeds) fan-coil units as well as ON/OFF, 0-10Vdc analog, staged, three-point floating heating/cooling applications. By default, controllers communicate using BACnet™ IP, and ZigBee™ Pro radio option (can be upgraded with a ZigBee™ Pro wireless module) as needed. Models with an integrated relative humidity sensor are available for increased occupant comfort through dehumidification. Special hotel/lodging models available with temperature scale button instead of Mode button to prevent room override.

Quality Assurance - The controller shall be manufactured within a systems certified **ISO 9001** and **ISO 14001** facility and must have the following specifications and industry approvals:

Terminal Equipment Controller power requirements:	20 - 28 Vac, 50/60Hz 6VA + Output Load (100 VA total Max.) RC to RH jumper 2.0 Amps 48 VA maximum
Operating conditions:	0 °C to 50 °C (32 °F to 122 °F) 0% to 95% R.H. non-condensing
Storage conditions:	-30 °C to 50 °C (-22 °F to 122 °F) 0% to 95% R.H. non-condensing
Temperature sensor:	Local 10 K NTC type 2 thermistor
Temperature sensor resolution:	± 0.1 °C (± 0.2 °F)
Temperature control accuracy:	±0.5 °C (± 0.9 °F) @ 21 °C (70 °F) typical calibrated
Humidity sensor and calibration	Single point calibrated bulk polymer type sensor Reading range from 10-90% R.H. non-condensing
Humidity sensor precision:	10 to 20% precision is 10% 20 to 80% precision is 5% 80 to 90% precision is 10%
Humidity sensor stability:	Less than 1.0% yearly (typical drift)
Dehumidification set point range	30 to 95% R.H
Contact output rating:	Electronic Relay output: 1 Amp. Maximum, 3 Amp. Inrush (<100ms).
Occ, Stand-By and Unocc cooling set point range:	12.0 to 37.5 °C (54 to 100 °F)
Occ, Stand-By and Unocc heating set point range:	4.5 °C to 32 °C (40 °F to 90 °F)
Room and outdoor air temperature display range:	-40 °C to 50 °C (-40 °F to 122 °F)
Proportional band for room temperature control:	Cooling & Heating: Default: 1.8 °C (3.2 °F)
Binary inputs:	Dry contact across terminal UI16, UI17 & UI19 to Common
Humidity Sensor Precision:	Reading range from 10-90 % R.H. non-condensing 10 to 20% precision: 10% 20% to 70% precision: 5% 70% to 90% precision: 10%
Humidity Sensor Stability:	Less than 0.25 % yearly (typical drift)
Dehumidification Setpoint Range:	30% to 95% R.H.
Wire gauge:	18 gauge maximum, 22 gauge typical, 24 gauge minimum
Approximate shipping weight:	0.75 lb (0.34 kg)
EMC / Safety Standards:	EMC Directive 2014/30/EU LVD Directive 2014/35/EU FCC 15 Subpart B Class B ICES-003 Issue 6 2016 Class B EN 60730-1:2016 EMC EN 60730-2-9:2010 EN 60730-2-13 IEC 60730-1:2010 (4th Ed.) IEC 60730-2-9:2008 (3rd Ed.)+Am. 1:2011 CAN/CSA-E60730-1:2015



Radio Standards:	CAN/CSA-E60730-2-9:2015 IEC 60730-2-13:2014 UL 60730-1:2016 UL 60730-2-9:2017 RE Directive 2014/53/EU ETSI EN 300 328 V2.1.1 ETSI EN 301 489-1 V1.9.2 ETSI EN 301 489-17 V2.2.1 FCC Part 15 Subpart C 15.247:2016 RSS 247 Issue 2:2017
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VT8350 Series

Hardware/Firmware:

- **Controller shall be able to communicate with BMS using BACnet™ IP**
- **Controller shall be able to communicate using ZigBee™ Pro wireless protocol either with the onboard ZigBee radio option or when the VCM8000V5045P ZigBee Pro extended profile wireless communication adapter is installed**
 - Controller can be retrofitted with the adapter in the field.
 - Controller with the wireless option can communicate with specified ZigBee Pro enabled end devices by default.
 - Controller with the wireless option can communicate with a BMS using ZigBee Pro through a proprietary ZigBee Pro / BACnet IP gateway.
- Controller shall be equipped with a TFT transmissive LED-backlit LCD touch screen with a 70.08mm x 52.56mm (2.7in x 2.1in) active area. Display colours of LCD screen shall be a customizable choice among 5 colour options.
- Controller shall have a removable fascia that can be customized with replacement fascia available in multiple styles and colours.
- Controller shall have an embedded local configuration utility using the touch screen allowing for simplified configuration, sequence selection, re-initialization, setting of setpoints and control of display settings. Controllers requiring external configuration tools or network interface for start-up and configuration are not acceptable.
- Controller shall be configurable by default for display in several languages.
- Controllers shall be customizable with one of 12 different user interfaces selected based on intended use (Hospitality or Commercial) and level of local control.
- Controller shall achieve accurate temperature control using a PI proportional-integral algorithm. Traditional differential-based controllers are not acceptable.
- Controller shall be supplied (BACnet™ IP network interface, ZigBee™ wireless network interface). BACnet™ IP versions shall be provided with Protocol Implementation Conformance Statement disclosing all object/SNVT properties and instance numbers to facilitate the integration process. BACnet IP model can be field upgraded by adding the VCM8000V5045P ZigBee Pro extended profile wireless communication adapter.
- Controller shall utilize EEPROM memory to back up local configuration parameters in the event of power failure. Controllers requiring batteries, or have no provisions for retention during loss of power shall not be acceptable.
- Controller shall have password protection to prevent unauthorized access to the configuration menu parameters.
- Controller shall be provided with two (2) floating or two (2) analog proportional-integral control outputs and one configurable auxiliary output to be used for heating, or local digital output.



- Controller shall have six (6) adjustable lockout levels limiting access as follows:

Level	Occupied temperature set points	System mode setting	Fan mode setting	Unoccupied Override
0	Yes access	Yes access	Yes access	Yes access
1	Yes access	Yes access	Yes access	No access
2	Yes access	No access	No access	Yes access
3	Yes access	No access	No access	No access
4	No access	No access	No access	Yes access
5	No access	No access	No access	No access

- Controller shall be pre-programmed, containing all required I/O to accomplish local HVAC temperature control.
- Controllers shall be provided with intelligent HMI, to which will display services only as are available as switched through local digital input or network layer such as:
 - Outdoor air temperature displays only enabled when outdoor air temperature network variable is received.
 - COM Address and various other parameters when a communication module is integrated inside the unit.

Application:

- The low-voltage fan coil controller shall be capable of **(ON/OFF, three-point floating, 0-10Vdc analog)** control of a two-pipe heating and/or cooling application, or four-pipe heating and cooling applications as well as auxiliary re-heat (if necessary)
- For applications not covered by built-in program, the controller must accept custom programs to match project requirements.
- Controller shall have integrated changeover function, which will allow seamless switching between cooling and heating mode based upon temperature or network value input.
- Controller shall have an adjustable “Auto Fan” parameter (depending on selected Fan sequence):
 1. **AS (Default)** = Auto Speed during occupied periods. Fan is always on during occupied periods. Low, medium and high speeds operate on temperature offset from set point.
 2. **AS AD** = Auto Speed / Auto Demand during occupied periods. In this mode, medium and high speeds operate on temperature offset from set point. Low speed operates on demand and will shut down when no demand is present.
- Controller shall have configurable temporary or permanent local override set points. When the “temporary set points” mode is enabled, once the temporary occupancy timer expires, the set points will revert back to their default values.
- Controller shall be capable of local or remote override during unoccupied mode. The controller shall resume occupied set points and will revert back to unoccupied set points after a certain amount of time (adjustable from 0 – 24hours in one hour increments).
- Controller shall have adjustable local unoccupied heating and cooling set point limits as well as maximum heating and minimum cooling limits.
- Controller shall have an adjustable deadband (from 2 °F to 5 °F, 1 °C to 2.5 °C).
- Controller shall have an adjustable proportional band (from 3 °F to 10 °F, 1.2 °C to 5.6 °C).
- Controller shall provide the following local monitoring capabilities, useable with standard or custom applications:
 - UI-16
 1. **None:** No function will be associated with the input (free input to be used for alarming or monitoring of a remote digital contact to be shared over a communications network).



- 2. **Remote Night Setback:** Remote night setback timer clock input. Scheduling shall be set as per the binary input providing low cost setback operation via a dry contact.
- 3. **Motion NO and Motion NC:** Advanced PIR occupancy functions using Normally Open (NO) or Normally Closed (NC) remote PIR motion sensor.
Occupancy mode shall be set as per applied PIR function and configuration.
- 4. **EMS:** Door/window strategy. Shall display an alarm if door/window is open and thus heating/cooling has stopped.
- UI-17
 - 1. **None:** No function will be associated with the input (free input to be used for alarming or monitoring of a remote digital contact to be shared over a communications network)
 - 2. **(Door Dry) Door contact & Motion detector:** This configuration is only functional if binary input #1 is set to Motion NO or Motion NC or a PIR accessory cover is used. When sequence is enabled, the occupancy shall be dictated through 2 inputs. Any motion detected shall set the zone to occupied status. The zone shall remain permanently in occupied mode until the door contact switch opens momentarily. The controller shall then go in stand-by mode. If more movements are detected, the occupied mode shall resume. While the door is opened, any movements detected by the remote PIR sensor or the PIR accessory cover shall be ignored.
 - 3. **Remote Override:** Temporary occupancy remote override contact. Local keypad override shall be disabled. Override function shall be controlled only by a manual remote toggle signal.
 - 4. **Filter:** A backlit flashing Filter alarm shall be displayed on the local controller LCD screen when input (from a differential pressure switch) is energized.
 - 5. **Service:** A backlit flashing Service alarm shall be displayed on the local controller LCD screen when input is energized.
- UI-19
 - 1. **None:** No function will be associated with the input (free input to be used for monitoring of a remote 10k type II thermistor (discharge air, outside air, return air etc.) to be shared over a communications network)
 - 2. **COC/NH:** Change over dry contact - Normally Heat: For two-pipe systems
 - 3. **COC/NC:** Change over dry contact - Normally Cool: For two-pipe systems
 - 4. **(COS):** Change over analog sensor: For two-pipe systems
- Controller shall be provided with six unique sequences to meet the needs of most zone temperature control applications.

Sequence selected	Mode Menu
0 = Cooling only	Off - Cool
1 = Heating only	Off - Heat
2 = Cooling With Reheat	Off – <u>Auto</u> * – Heat – Cool
3 = Heating With Reheat	Off - Heat
4 = Cooling / Heating 4 pipes	Off – <u>Auto</u> * – Heat – Cool
5 = Cooling / Heating 4 pipes with Reheat	Off – <u>Auto</u> * – Heat – Cool

* Auto. The Auto mode can be disabled from the menu

- **For hotel/lodging applications only:** Controller shall be provided with a temperature scale touchscreen button instead of a Mode button to prevent occupant from overriding the schedule. Occupant may change between F° and C°.



Optional: Passive Infrared (PIR) Sensor

- Controller can be supplied with an installed PIR sensor. Passive infrared sensor shall be integrated into the controller. Controls with remote motion detectors are not acceptable.
- PIR sensor shall add a third level of occupancy, “Stand-by” in between “Occupied” and “Unoccupied”.
- Controller shall have an adjustable timer integrated to change the occupancy mode from “Occupied” to “Stand-by” if no motion is detected for the specified amount of time during “Occupied” mode.
- Controller shall have an adjustable timer integrated to change the occupancy mode from “Stand-by” mode to “Unoccupied” if no motion is detected for the specified amount of time during “Stand-by” mode;
- “Stand-by” mode shall have adjustable heating and cooling set points. Stand-by set points are intended to be set a few degrees less or more respectively than “Occupied” set points to ensure a quick recovery to “Occupied” set points when motion is detected.
- Controls with motion detectors that only switch from “Unoccupied” mode to “Occupied” mode without a stand-by mode are not acceptable.

Optional: Mixed voltage relay

- Controller shall be capable of mixed voltage applications through the use of a VC1300/VC2300 Fan Coil Relay Board to connect to the line voltage fan coil units.
- Controller shall require wires to the VC1300/VC2300 Fan Coil Relay Board for power (7Vdc, Common) as well as the communication wires.
- VC1300/VC2300 relay shall require a separate 120V/240V power supply.
- VC1300/VC2300 relay shall receive commands from Controller and change fan coil settings accordingly.

Optional: ZigBee Pro wireless communication on-board or adapter

- Controller shall be able to pair with up to 10 ZigBee end devices using interface screen to enter pairing mode.

Controllers are Viconics Technologies Inc. model VT8350U5000B

Controllers with integrated PIR sensor are Viconics Technologies Inc. model VT8350U5500B

Controllers with integrated PIR sensor and onboard ZigBee radio are Viconics Technologies Inc. model VT8350U5500BP