



Viconics VT7600 Series Rooftop Unit Controllers Engineering Guide Specification

General – The VT7600 series is designed for single-stage and multi-stage control of heating/cooling equipment such as rooftop and self-contained units. Non-communicating “Network-Ready” models as well as communicating BACnet™ MS-TP, Echelon™ Lontalk™ and Zigbee™ wireless models are available depending on the application. Programmable and non-programmable models, multi-stage with economizer function models as well as a heat pump model for three heating / two cooling stages are also available depending on the applications.

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:	19-30 VAC 50 or 60 Hz; 2 VA Class 2
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 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
Contact output rating	Relay output: 30 VAC, 1 Amp. Maximum, 3 Amp. In-rush.
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: 1.1°C (2°F)
Digital inputs:	Dry contact across terminal DI1, DI2
Economizer analog output rating	0 to 10 VDC into 2KΩ resistance min
Economizer analog output accuracy:	± 3% typical
Wire gauge:	18 gauge maximum, 22 gauge
Approximate shipping weight:	0.75 lb (0.34 kg)
Agency Approvals all models:	UL: UL 873 (US) and CSA C22.2 No. 24 (Canada), File E27734 with CCN XAPX (US) and XAPX7 (Canada) Industry Canada: ICES-003 (Canada) FCC: Compliant to CFR 47, Part 15, Subpart B, Class A (US) CE : EMC Directive 89/336/EEC (Europe Union) C-Tick: AS/NZS CISPR 22 Compliant (Australia / New Zealand) Supplier Code Number N10696 FCC: Compliant to: Part 15, Subpart C
Agency Approvals Wireless models:	



VT7600 Series

General – The low-voltage rooftop unit controller shall be capable of

Models with integrated 7 day schedule:

VT7652A5000x (1 Heat/1 Cool)
VT7652B5000x (2 Heat/2 Cool)
VT7656B5000x (2 Heat /2 Cool with 0-10Vdc economizer actuator output)
VT7652F5000x (0-10Vdc Heat / 2 Cool)
VT7652H5000x (3 heat / 2 cool heatpump controller)

Models without integrated 7 day schedule:

VT7600A5000x (1 Heat/1 Cool)
VT7600B5000x (2 Heat/2 Cool)
VT7605B5000x (2 Heat /2 Cool with 0-10Vdc economizer actuator output)
VT7600F5000x (0-10Vdc Heat / 2 Cool)
VT7600H5000x (3 heat / 2 cool heatpump controller)

The controller shall be **(a non-communicating “Network-Ready” model, BACnet™ MS-TP communicating model, Echelon™ Lontalk™ communicating model or Zigbee™ wireless communicating model).**

- Controller shall be equipped with large, 2 line, 16 character LCD dual intensity backlit display with three status LEDs showing FAN, HEAT, COOL.
- Controller shall achieve accurate temperature control using a PI proportional-integral algorithm. Traditional differential-based controllers are not acceptable.
- Controller shall have an embedded local “real text” configuration utility for simplified sequence selection, start-up and configuration using an integrated five-button keypad. Controllers requiring external configuration tools or network interface for start-up and configuration are not acceptable.
- Controller shall be supplied (without networking interface, BACnet™ MS-TP network interface, Echelon™ Lontalk™ network interface, Zigbee™ wireless network interface). BACnet™ MS-TP versions shall be provided with Protocol Implementation Conformance Statement or Lonmark approval disclosing all object/SNVT properties and instance numbers to facilitate the integration process. Echelon™ Lontalk™ communicating versions shall be provided with appropriate application files and LNS plug-in as required free of charge from the manufacturer. “Network Ready” non-communicating model can be field upgraded by adding one of the following communication adapters:
 1. VCM7600V5000B: Terminal Equipment Controller BACnet™ MS-TP communication adapter
 2. VCM7600V5000E: Terminal Equipment Controller Echelon™ Lontalk™ communication adapter
 3. VCM7000V5000W: Terminal Equipment Controller 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 have built-in frost protection for all system modes pre-configured at 42 °F (5.6 °C). Frost protection can be enabled or disabled.
- Controller shall support continuous, “smart” and auto-fan sequences.
- 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 inputs for remote mixing/return temperature sensors, outdoor temperature sensor and discharge air temperature sensor (model dependent).
- Controller shall be compatible with the Viconics VI-PIR “Passive Infrared” cover for advanced active occupancy logic. The controller can be retrofitted with the VI-PIR cover on the site.
- 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 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 have configurable maximum heating set points (40 to 90 °F, 4.5 to 32.0 °C) and minimum cooling set points (54 to 100 °F, 12.0 to 37.5 °C).
- Controller shall have an adjustable deadband between heating and cooling set points (from 2°F to 4°F, 1°C to 2.0°C).
- Controller shall have an adjustable proportional band between heating and cooling set points (from 2°F to 8°F, 1.1°C to 4.4°C).
- Controller shall have an adjustable anti-cycling on/off operation time of cooling and heating stages from 0 minutes to 5 minutes.
- Controller shall have adjustable heating and cooling cycles per hour.
- Controller shall have removable connectors for easier wiring.
- Controller shall have a PCB board that swings on hinges for easier installation. Controller shall have an auxiliary contact that can be used to energize peripheral devices such as: lighting equipment, exhaust fans, economizers, etc. This contact shall operate in parallel with the internal occupied/unoccupied schedule of the controller or the remote night setback contact if DI1 or DI2 is used. When the system is in OFF mode, the contact shall remain in its unoccupied status independently of the occupied / unoccupied schedule.
- Controller shall have an auxiliary contact that can be used to energize peripheral devices such as lighting equipment, exhaust fans, economizers etc. This contact shall operate in parallel with the internal occupied / unoccupied schedule of the controller or the remote night setback contact. This auxiliary contact can be configured normally open or normally closed.
- 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 display only enabled when outdoor air temperature sensor is connected
 - COM Address and various other parameters when a communication module is integrated inside the unit.
- Controller shall have three (3) adjustable keypad lockout levels limiting access as follows:

Level	Resume/Override scheduling	Permanent Occupied and Unoccupied Set points	Temporary set points using arrows	System mode setting	Fan mode setting	Schedules setting	Clock setting	Permanent hold
	Resume sched Y/N	RoomTemp set Y/N	Up key (▲) Down key (▼)	Sys mode set Y/N	Fan mode set Y/N	Schedule set Y/N	Clock set Y/N	Schedule hold Y/N
0	Yes access	Yes access	Yes access	Yes access	Yes access	Yes access	Yes access	Yes access
1	Yes access	No access	Yes access	No access	No access	No access	Yes access	No access
2	No access	No access	No access	No access	No access	No access	Yes access	No access



Controller shall provide the following local monitoring capabilities:

- DI-1
 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. **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 (ex. rooftop unit malfunction) is energized.

- DI-2
 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. **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 (ex. rooftop unit malfunction) is energized.
 - 6.

Heat pump model specific features:

- Heat pump model shall have adjustable high and low balance points to cut off either the heat pump or the auxiliary heating based on outside air temperature (when outside air temperature sensor is installed).
- Heat pump model shall have a “comfort” and “economy”. When the controller is in “heating mode” and “comfort” mode is enabled, the auxiliary heating will turn on if the heat pump is not able to satisfy the heating set point. When “economy” mode is enabled, the auxiliary heating will only be energized when the temperature has dropped 2°F below the heating set point.



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Economizer model specific features

- Economizer model shall have an adjustable changeover set point from 14°F to 70°F (-10.0°C to 21.0°C) based on outside air temperature. The controller will switch between mechanical (compressor) cooling or free cooling (economizer) based on this set point.
- Economizer model shall have an adjustable minimum outside air damper position from 0% to 100%. This function shall be enabled on when the controller is in “occupied” mode.
- Economizer model shall have an adjustable free cooling mixed air set point 50°F to 90°F (10.0°C to 32.0°C) if mixed air temperature sensor is installed. The controller shall have the ability to display the mixed air temperature directly on the local LCD screen.

VI-PIR Viconics Passive Infrared Cover

- Controller shall be supplied with (or capable of being retrofitted on site) with the VI-PIR cover. Passive infrared sensor shall be integrated into the cover of the controller. Controls with remote motion detectors are not acceptable.
- VI-PIR shall add an adjustable “Unoccupied timer” integrated to change the occupancy mode from “Occupied” to “Unoccupied” if no motion is detected.

Controllers shall be Viconics model:

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Models without integrated 7 day schedule:

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VT7605B5000x (2 Heat /2 Cool with 0-10Vdc economizer actuator output)
VT7600F5000x (0-10Vdc Heat / 2 Cool)
VT7600H5000x (3 heat / 2 cool heatpump controller)

Models with integrated PIR motion sensor end in **5500x**

x = “Blank” for Network-Ready model
x = B for BACnet MS/TP communication
x = E for Echelon Lonworks communication
x = W for wireless communication