

## BACnet Integration Manual ITG-VZ7xxx-BAC-E04.doc (028-6011\_R4 Issue Date: May 31<sup>st</sup>, 2012)



## VZ7260 Product Overview

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The Viconics VZ7260 PI controller family is specifically designed for local pressure dependent VAV zone control within Viconics Zoning System product family.

The product features a backlit LCD display with dedicated function menu buttons for simple user operation. Accurate temperature control is achieved due to the product's PI proportional control algorithm, which virtually eliminates temperature offset associated with traditional, differential-based controllers.

The controllers are used in conjunction with the Viconics VZ76561000B Roof Top Controller for total system operation of each zones and the RTU.

A local BACnet RS485 MS-TP communication bus between all devices insures proper communication and data exchange of all required information between the Zone controllers and RTU controller. They can be seamlessly integrated into any 3<sup>rd</sup> party BACnet supervision system.

The Zone controllers are also compatible with the new Viconics PIR cover accessories. Controllers equipped with a PIR cover provide advanced active occupancy logic, which will automatically switch occupancy levels from occupied to stand-by as required by local activity being present or not. This advanced occupancy functionality provides advantageous energy savings during occupied hours without sacrificing occupant comfort. All Zone controllers can be ordered with or without a factory installed PIR cover (see ordering notes below).



## VZ7656 Product Overview

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The Viconics VZ7656 controller is specifically designed for RTU control of the Viconics Zoning System product family.

The RTU controller is designed for single stage or multi-stage control of heating and cooling equipment such as rooftop and self-contained units used in zoning systems.

The product features a backlit LCD display with dedicated function menu buttons for simple user operation. Accurate temperature control is achieved due to the product's PI proportional control algorithm, which virtually eliminates temperature offset associated with traditional, differential-based controllers.

The controller also contains extra digital inputs, which can be set by the user to monitor filter status or used as a general purpose service indicator. All models contain a SPST auxiliary switch, which can be used to control lighting or disable the RTU economizer function during unoccupied periods. It also features a discharge air sensor input. Proportional static pressure logic (input and output) has been integrated onto the controller to provide a complete single packaged unit for most small to medium size jobs.



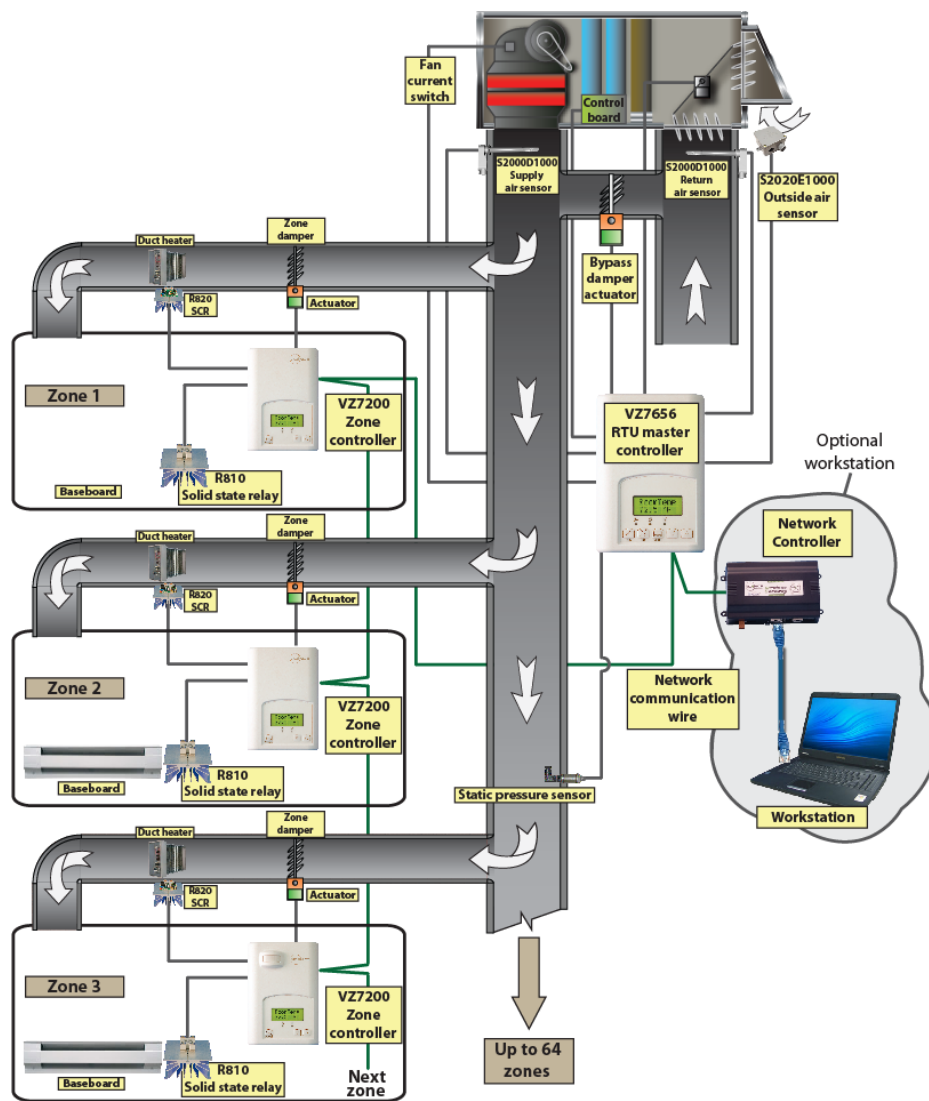
Fig.2 -VZ7656BController

The controllers are used in conjunction with the Viconics VZ7260 Zone controllers for total system operation of each zones and the RTU.

A local BACnet RS485 MS-TP communication bus between all devices insures proper communication and data exchange of all required information between the Zone controllers and the RTU controllers. They can be seamlessly integrated into any 3<sup>rd</sup> party BACnet supervision system.

## BACnet System Overview

Viconics VZ7260 zone controllers are used in conjunction with the VZ7656 roof top controllers. Combined, they are designed for operate typical single or multistage RTUs and their associated local zones.



Typical BACnet zoning system installation

Please refer to the following Viconics documents for detailed information and design guidelines for the BACnet zoning system version:

As an example, a typical job layout system may feature three RTU controllers with thirty one total zones. This would bring to total number of nodes (individual Com addresses) to thirty four. RTU one would have ten zones under its command, RTU two would have ten zones under its command and RTU three would have eleven zones under its command.

The additional following documents are available at: [www.viconics.com](http://www.viconics.com)

- For detailed information on the Viconics Zoning System, please refer to the Zoning System Product Guide. Installation and commissioning information is available in document: *Zoning-System-Guide-Exx*
- For detailed information on the Viconics VZ72 Zone controller, please refer and read the VZ72 Product Guide. Installation and commissioning information is available on document: *LIT-VZ7260-Exx*
- For detailed information on the Viconics VZ7656 RTU controller, please refer and read the VZ76 Product Guide. Installation and commissioning information is available on document: *LIT-VZ7656-Exx*
- PIR cover installation information is available in document: *PIR Cover Installation-Exx*

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#### VZ7656 series Protocol Implementation Conformance Statements (PICS)

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**VZ7260 Series Protocol Implementation Conformance Statement (PICS)** \_\_\_\_\_

**Vendor Name:** Viconics

**Vendor ID:** 140

**Product Name:** VZ7260 Zoning System Zone Controller

**Product Model Number:** VZ7260F5x00B

**Product Description:**

The Viconics VZ7260 PI controller family is specifically designed for local pressure dependent VAV zone control within Viconics Zoning System product family.

The controllers are used in conjunction with the Viconics VZ76561000B Roof Top Controller for total system operation of each zones and the RTU.

**VZ7260 Supported BACnet Services**

The BACnet communicating controller meets all requirements for designation as an Application Specific Controller (B-ASC). The BACnet controller series supports the following BACnet Interoperability Building Blocks (BIBBs).

<b>BACnet Interoperability Building Block</b>
Data Sharing COV-B (DS-COV-B)
Data Sharing-ReadProperty-B (DS-RP-B)
Data Sharing-ReadPropertyMultiple-B (DS-RPM-B)
Data Sharing-WriteProperty-B (DS-WP-B)
Device Management-Dynamic Device Binding-B (DM-DDB-B)
Device Management-Dynamic Object Binding-B (DM-DOB-B)
Device Management-DeviceCommunicationControl-B (DM-DCC-B)

The following BACnet Interoperability Building Blocks supported are used ONLY with the VZ76561000B Roof Top Controller for system operation. The following BiBBS are NOT listed under the “protocol service supported” device attribute. As such, the VZ7260 application cannot use these services to communicate with “other” third party devices (see Annex K in BACnet 2004):

<b>BACnet Interoperability Building Block</b>
Data Sharing COV-A (DS-COV-A)
Data Sharing-ReadProperty-A (DS-RP-A)
Data Sharing-WriteProperty-A (DS-WP-A)

**Note:** The controller does not support segmented requests or responses.

Device Object List for VZ7260 Models

Object Name	VZ7260F5x00B	VZ7260C5x00B	Object Property	Object Type	Instance #
GUI Damper Position	X		R	AI	1
Cfg Zone MAC	X	X	R	AV	1
Cfg RTC MAC	X	X	R/W	AV	2
Cfg AO2 OA Lock Spt	X		R/W	AV	3
Cfg BO5 OA Lock Spt	X	X	R/W	AV	4
Cfg Damper Min Pos	X	X	R/W	AV	5
Cfg Damper Max Pos	X	X	R/W	AV	6
Cfg Damper Max Heat Pos	X	X	R/W	AV	7
Cfg Heating Stpt Limit	X	X	R/W	AV	8
Cfg Cooling Spt Limit	X	X	R/W	AV	9
Cfg Deadband	X	X	R/W	AV	10
GUI Occupied Heat Spt	X	X	R/W	AV	11
GUI Occupied Cool Spt	X	X	R/W	AV	12
GUI Unoccupied Heat Spt	X	X	R/W	AV	13
GUI Unoccupied Cool Spt	X	X	R/W	AV	14
GUI Stand-By Heat Spt	X	X	R/W	AV	15
GUI Stand-By Cool Spt	X	X	R/W	AV	16
GUI AO2 Status	X		R	AV	17
GUI UI3 Status	X	X	R	AV	18
GUI PI Heat Weighted Demand	X	X	R	AV	19
GUI PI Cool Weighted Demand	X	X	R	AV	20
GUI Room Temperature	X	X	R	AV	21
GUI Outdoor Temperature	X	X	R/W	AV	22
Cfg Device Instance	X	X	R	AV	23
GUI PI Heat Demand	X	X	R	AV	24
GUI PI Cool Demand	X	X	R	AV	25
Cfg Password	X	X	R/W	AV	26
Cfg Stand-by Time	X	X	R/W	AV	27
Cfg Unoccupied Time	X	X	R/W	AV	28
GUI Heating Performance	X	X	R	AV	29
GUI Cooling Performance	X	X	R	AV	30
Cfg BO3-BO4 OA Lock Spt		X	R/W	AV	31
GUI Room CO2 Level	X	X	R/W	AV	32
GUI Transferred CO2 Value	X	X	R/W	AV	33
GUI AI4 Value	X	X	R	AV	34
GUI BI1 Status	X	X	R	BI	1

Object Name	VZ7260F5x00B	VZ7260C5x00B	Object Property	Object Type	Instance #
GUI BI1 Status	X	X	R	BI	1
Cfg Temperature Scale	X	X	R/W	BV	1
Cfg Menu Scroll	X	X	R/W	BV	2
Cfg AO2 DA/RA	X		R/W	BV	4
Cfg BO5 Time Base	X	X	R/W	BV	5
Cfg BO5 Conf	X	X	R/W	BV	6
GUI BO5 Status	X	X	R	BV	7
Sta AO2 Lock Status	X		R	BV	8
Sta BO5 Lock Status	X	X	R	BV	9
GUI Room Temp Override	X	X	R/W	BV	10
Sta RTC Smart Recovery	X	X	R	BV	11
Cfg Setpoint Type	X	X	R/W	BV	12
Cfg Disable Min Pos	X	X	R/W	BV	13
Sta BO3-BO4 Lock Status		X	R	BV	14
Cfg Zone Baud	X	X	R	MV	1
Cfg Reheat Config	X	X	R/W	MV	2
Cfg BI1 Configuration	X	X	R/W	MV	3
Cfg PI Heat Weight	X	X	R/W	MV	4
Cfg PI Cool Weight	X	X	R/W	MV	5
Cfg Temporary Occupancy Time	X	X	R	MV	6
Cfg Network Handle	X	X	R/W	MV	7
GUI Zone Keypad Lockout	X	X	R/W	MV	8
GUI Occupancy	X	X	R/W	MV	9
Sta RTC Zone Sequencing	X	X	R	MV	10
GUI Effective Occupancy	X	X	R	MV	11
Cfg BO1-BO2 Floating Time		X	R/W	MV	12
Cfg BO3-BO4 Floating Time		X	R/W	MV	13
Cfg AI4 Configuration	X	X	R/W	MV	14
Cfg Proportional Band	X	X	R/W	MV	15

Device Object List for VZ7656 Models

Object Name	VZ7656R1000B	VZ7656H1000B	VZ7656F1000B	VZ7656E1000B	Object Property	Object Type	Instance #
GUI Discharge Air Temp	X	X	X	X	R	AI	1
GUI Analog Heat Output			X		R	AI	5
GUI By-Pass Damper / VFD	X	X	X	X	R	AI	4
GUI Return Air Temp	X	X	X	X	R	AI	2
GUI Static Pressure	X	X	X	X	R	AI	3
Cfg RTC MAC	X	X	X	X	R	AV	1
Cfg Device Instance	X	X	X	X	R	AV	21
GUI Highest PI Cool Demand	X	X	X	X	R	AV	18
GUI Highest PI Heat Demand	X	X	X	X	R	AV	17
GUI CO2 Level				X	R	AV	40
GUI Current Zone PI Cool Demand	X	X	X	X	R	AV	12
GUI Current Zone PI Heat Demand	X	X	X	X	R	AV	11
GUI Economizer Output				X	R	AV	42
GUI Fresh Air Level				X	R	AV	39
GUI Highest CO2 Zone				X	R	AV	41
GUI Highest PI Cool Zone	X	X	X	X	R	AV	16
GUI Highest PI Heat Zone	X	X	X	X	R	AV	15
GUI Supply PI Heat Demand			X		R	AV	28
GUI Transferred PI Cool Demand	X	X	X	X	R	AV	14
GUI Transferred PI Heat Demand	X	X	X	X	R	AV	13
Cfg Changeover Setpoint				X	R/W	AV	30
Cfg Cooling Lockout Temp	X	X	X	X	R/W	AV	3
Cfg Deadband	X	X	X	X	R/W	AV	22
Cfg Discharge High Limit Spt	X	X	X	X	R/W	AV	5
Cfg Discharge Low Limit Spt	X	X	X	X	R/W	AV	6
Cfg Economizer Max Position				X	R/W	AV	33
Cfg Economizer Min Position				X	R/W	AV	32
Cfg Fresh Air Max Range				X	R/W	AV	34



Object Name	VZ7656R1000B	VZ7656H1000B	VZ7656F1000B	VZ7656E1000B	Object Property	Object Type	Instance #
Cfg Heating Lockout Temp	X	X	X	X	R/W	AV	2
Cfg High Balance Point		X			R/W	AV	24
Cfg Low Balance Point		X			R/W	AV	25
Cfg Maximum CO2 Level				X	R/W	AV	38
Cfg Maximum Fresh Air				X	R/W	AV	36
Cfg Minimum CO2 Level				X	R/W	AV	37
Cfg Minimum Fresh Air				X	R/W	AV	35
Cfg Minimum Supply Heat Setpoint			X		R/W	AV	26
Cfg Mixed Air Setpoint				X	R/W	AV	31
Cfg Password	X	X	X	X	R/W	AV	23
Cfg Power-up Delay	X	X	X	X	R/W	AV	20
Cfg Return Air Occ CL Spt	X	X	X	X	R/W	AV	7
Cfg Return Air Occ HT Spt	X	X	X	X	R/W	AV	9
Cfg Return Air Unocc CL Spt	X	X	X	X	R/W	AV	8
Cfg Return Air Unocc HT Spt	X	X	X	X	R/W	AV	10
Cfg Static Pressure Spt	X	X	X	X	R/W	AV	4
Cfg Supply Heat Lockout Temperature			X		R/W	AV	27
GUI Outdoor Temperature	X	X	X	X	R/W	AV	19
GUI AUX Status	X	X	X		R	BI	7
GUI BI Status	X	X	X		R	BI	6
GUI G Fan	X	X	X	X	R	BI	1
GUI W1 Heat	X	X		X	R	BI	4
GUI W2 Heat	X			X	R	BI	5
GUI Y1 Compressor		X			R	BI	16
GUI Y1 Cool	X		X	X	R	BI	2
GUI Y2 Compressor		X			R	BI	15
GUI Y2 Cool	X		X	X	R	BI	3
Sta Clock Alarm	X	X	X	X	R	BI	12
Sta Cooling Lockout Status	X	X	X	X	R	BI	9
Sta Discharge Temp Alarm	X	X	X	X	R	BI	13
Sta Filter Alarm	X	X	X	X	R	BI	11
Sta Fresh Air Alarm				X	R	BI	17

Object Name	VZ7656R1000B	VZ7656H1000B	VZ7656F1000B	VZ7656E1000B	Object Property	Object Type	Instance #
Sta Heating Lockout Status	X	X	X	X	R	BI	8
Sta High CO2 Alarm				X	R	BI	18
Sta Reversing Valve Status		X			R	BI	14
Sta Service Alarm	X	X	X	X	R	BI	10
GUI Smart Recovery	X	X	X	X	R	BV	7
Sta Comm Lost Status	X	X	X	X	R	BV	3
Sta Supply Heat Lockout Status			X		R	BV	12
Cfg Aux Contact	X	X	X		R/W	BV	4
Cfg Compressor Interlock		X			R/W	BV	11
Cfg Emergency Heat Mode		X			R/W	BV	9
Cfg Fan Purge Delay	X	X	X	X	R/W	BV	5
Cfg Progressive Recovery	X	X	X	X	R/W	BV	2
Cfg Reversing Valve		X			R/W	BV	10
Cfg Static Pressure Ctrl Type	X	X	X	X	R/W	BV	8
Cfg Units	X	X	X	X	R/W	BV	1
GUI Outdoor Temp Override	X	X	X	X	R/W	BV	6
Cfg RTC Baud	X	X	X	X	R	MV	1
GUI Zone Sequence	X	X	X	X	R	MV	4
Cfg B11 Configuration	X	X	X		R/W	MV	11
Cfg CO2 Control Type				X	R/W	MV	18
Cfg Control Type	X	X	X	X	R/W	MV	2
Cfg Cooling CPH	X	X	X	X	R/W	MV	9
Cfg Cooling Stages	X		X	X	R/W	MV	7
Cfg Event Display	X	X	X	X	R/W	MV	13
Cfg Heat Pump Stages		X			R/W	MV	16
Cfg Heating CPH	X	X		X	R/W	MV	8
Cfg Heating Stages	X			X	R/W	MV	6
Cfg Local Keypad Lockout	X	X	X	X	R/W	MV	3
Cfg Minimum On/Off Time	X	X	X	X	R/W	MV	10
Cfg Static Pressure Transducer Range	X	X	X	X	R/W	MV	5
Cfg Temporary Occupied Time	X	X	X	X	R/W	MV	12
GUI System Mode	X		X	X	R/W	MV	15
GUI System Mode HP		X			R/W	MV	17
GUI Occupancy	X	X	X	X	R/W	MV	14
GUI Schedule	X	X	X	X	R	SCH	1

VZ7260 Device Object Table

Object Name	Type and Instance	Object Property	Controller Parameter
VZ7260F5x00B	Device	Object_Identifier Property 75 (R,W)	Unique ID number of a device on a network
		Object_Name Property 77 (R,W)	Unique name of a Device on a network
		Model Name Property 70 (R)	Controller Model number
		Firmware Revision Property 44 (R)	Current BACnet firmware revision used by the controller
		Protocol Version Property 98 (R)	Current BACnet firmware protocol version Default is Version 1
		Protocol Revision Property 139 (R)	Current BACnet firmware protocol revision Default is Version 2
		Max ADPU Length Property 62 (R)	Maximum ADPU Length accepted Default is 244
		ADPU Timeout Property 10 (R)	ADPU timeout value Default is 60 000 ms
		Max_Master (R,W)	Maximum master devices allowed to be part of the network. 0 to 127, default is 127

## VZ7260 Standard Object Types Supported

Object Type	Supported	Dynamically Creatable	Dynamically Removable	Optional Properties Supported	Writable Properties
Analog Input	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Reliability	Out_of_Service
Analog Value	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Reliability	Present_Value <sup>a</sup> Out_of_Service
Binary Input	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Reliability Active_Text Inactive_Text	Out_of_Service
Binary Value	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Reliability Active_Text Inactive_Text	Present_Value <sup>b</sup> Out_of_Service
Device	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Max_Master Max_Info_frames	Object_Identifier Object_name Max_Master
Multi-state Value	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Reliability States_Text	Present_Value <sup>c</sup> Out_of_Service

a: Present\_Value property is writable for every AV objects except :

- Cfg Zone MAC (AV 1)
- Cfg RTC MAC (AV 2)
- GUI AO2 Status (AV 17)
- GUI UI3 Status (AV 18)
- GUI PI Heat Weighted Demand (AV 19)
- GUI PI Cool Weighted Demand (AV 20)
- GUI Room Temperature (AV 21) ( Present Value can be only be written if BV 10 GUI Room Temp Override is set to true )
- GUI Outdoor Temperature (AV 22)
- Cfg Device Instance (AV 23) – This object is not writable even when OUT OF SERVICE is TRUE. Changing the device ID will affect communication to the device even is OUT OF SERVICE is TRUE, so it's not recommended.

b: Present\_Value property is writable for every BV objects except :

- GUI BO5 Status (BV 7)
- Sta AO2 Lock Status (BV 8)
- Sta BO5 Lock Status (BV 9)
- Sta RTC Prog Recovery (BV 11)

c: Present\_Value property is writable for every MV objects except :

- Cfg Zone Baud (MV 1)
- GUI Occupancy (MV 9) ( Present Value can be only be written permanently if MV 7 Cfg Network Handle is set to index 2 or 3. Index 1 resets present value as per application )
- GUI Effective Occupancy (MV 11)

**VZ7260 List of Property Value Range Restrictions for AI and AV objects**

Object name	Object Type and instance	Under range value	Over range value	Default value
GUI Damper Position	AI 1	0%	100%	N/A
Cfg Zone MAC	AV 1	1	255	255
Cfg RTC MAC	AV 2	1	127	4
Cfg AO2 OA Lock Setpoint	AV 3	-40°F (-40°C)	122°F (50°C)	55°F (13°C)
Cfg BO5 OA Lock Setpoint	AV 4	-40°F (-40°C)	122°F (50°C)	32°F (0°C)
Cfg Damper Min Pos	AV 5	0%	100%	10%
Cfg Damper Max Pos	AV 6	0%	100%	100%
Cfg Damper Max Heat Pos	AV 7	0%	100%	30%
Cfg Heating Spt Limit	AV 8	40°F (4.5°C)	90°F (32°C)	90°F (32°C)
Cfg Cooling Spt Limit	AV 9	54°F (12°C)	100°F (37.5)	54°F (12°C)
Cfg Deadband	AV 10	2°F (1°C)	5°F (2.5°C)	2°F (1°C)
GUI Occupied Heat Spt	AV 11	40°F (4.5°C)	90°F (32°C)	72°F (22°C)
GUI Occupied Cool Spt	AV 12	54°F (12°C)	100°F (37.5°C)	74°F (24°C)
GUI Unoccupied Heat Spt	AV 13	40°F (4.5°C)	90°F (32°C)	72°F (22°C)
GUI Unoccupied Cool Spt	AV 14	54°F (12°C)	100°F (37.5°C)	74°F (24°C)
GUI Stand-by Heat Spt	AV 15	40°F (4.5°C)	90°F (32°C)	62°F (16.5°C)
GUI Stand-by Cool Spt	AV 16	54°F (12°C)	100°F (37.5°C)	80°F (26.5°C)
GUI AO2 Status	AV 17	0%	100%	N/A
GUI UI3 Status	AV 18	-40°F (-40°C)	122°F (50°C)	N/A
GUI PI Heat Weighted Demand	AV 19	0%	100%	N/A
GUI PI Cool Weighted Demand	AV 20	0%	100%	N/A
GUI Room Temperature	AV 21	-40°F (-40°C)	122°F (50°C)	N/A
GUI Outdoor Temperature	AV 22	-40°F (-40°C)	122°F (50°C)	N/A
Cfg Device Instance	AV 23	72000	72255	N/A
GUI PI Heat Demand	AV 24	0%	100%	N/A
GUI PI Cool Demand	AV 25	0%	100%	N/A
Cfg Password	AV 26	0	1000	N/A
Cfg Stand-by Time	AV 27	0.5 hours	24 hours	0.5 hours
Cfg Unoccupied Time	AV 28	0 hours	24 hours	0 hours
GUI Heating Performance	AV 29	32°F (0°C)	100°F (37.5°C)	N/A
GUI Cooling Performance	AV 30	32°F (0°C)	100°F (37.5°C)	N/A
Cfg BO3-BO4 OA Lock Spt	AV 31	-40°F (-40°C)	122°F (50°C)	N/A
GUI Room CO2 Level	AV 32	0 PPM	2000 PPM	N/A
GUI Transferred CO2 Value	AV 33	0 PPM	2000 PPM	N/A
GUI AI4 Value	AV 34	0 VDC	10 VDC	N/A

VZ7260 List of Property Enumeration Sets for BI and BV objects

Object Name	Object Type and instance	Inactive_Text	Active_Text	Default value
GUI BI 1 Status	BI 1	Not Activated	Activated	Not Activated
GUI BI 2 Status	BI 2	Not Activated	Activated	Not Activated
Cfg Temperature Scale	BV 1	°C	°F	°F
Cfg Menu Scroll	BV 2	No Scroll	Scroll Active	Scroll Active
Cfg Motion Detector Function	BV 3	Not Activated	Activated	Not Activated
Cfg AO2 RA/DA	BV 4	Direct Acting	Reverse Acting	Direct Acting
Cfg BO5 Time Base	BV 5	15 Minutes	10 Seconds	15 Minutes
Cfg BO5 Configuration	BV 6	N.O.	N.C.	N.O.
GUI BO5 Status	BV 7	Off	On	Off
Sta AO2 Lock Status	BV 8	Not Activated	Activated	Not Activated
Sta BO5 Lock Status	BV 9	Not Activated	Activated	Not Activated
GUI Room Temp Override	BV 10	Normal	Override	Normal
Sta RTC Prog Recovery	BV 11	Off	On	Off
Cfg Setpoint Type	BV 12	Permanent	Temporary	Permanent
Cfg Disable Min Pos	BV 13	Enabled	Disabled	Disabled
Sta BO3-BO4 Lock Status	BV 14	Inactive	Active	Inactive

VZ7260 List of Property Enumeration Sets for MV Objects

Object Name	Object Type and instance	BACnet Index	Text	Default value
Cfg Zone Baud	MV 1	1	9600 ( Bps )	Auto
		2	19200 ( Bps )	
		3	38400 ( Bps )	
		4	76800 ( Bps )	
		5	Auto	
Cfg Reheat Configuration	MV 2	1	None	None
		2	Analog Duct Heater Only	
		3	On/Off Duct Heater Only	
		4	On/Off Perimeter Heater Only	
		5	Analog Duct Heater with On/Off Perimeter Heater	
Cfg BI1 Configuration	MV 3	1	None	None
		2	Motion NO	
		3	Motion NC	
Cfg PI Heat Weight	MV 4	1	0 %	100 %
		2	25 %	
		3	50 %	
		4	75 %	
		5	100 %	
Cfg PI Cool Weight	MV 5	1	0 %	100 %
		2	25 %	
		3	50 %	
		4	75 %	
		5	100 %	
Cfg Temporary Occupancy Time	MV 6	1	0 hour	2 hours
		2	1 hour	
		3	2 hours	
		4	3 hours	
		5	4 hours	
		6	5 hours	
		7	6 hours	
		8	7 hours	
		9	8 hours	
		10	9 hours	
		11	10 hours	
		12	11 hours	
		13	12 hours	

Object Name	Object Type and instance	BACnet Index	Text	Default value
Network Handle	MV 7	1	Default Zone Handle	Default Zone Handle
		2	Default Minus Occupancy	
		3	Full Release	

This property is used to release the functions of the VZ7260 Zone controller from its attached master RTC VZ7656. It is used when remote scheduling of the zones are required externally to the master VZ7656 RTU controller or when integration is required without a VZ7656 RTU controller.

Network Handle	Occupancy	PI Heat Weighted	PI Cool Weighted	Prog Rec Enabled	RTC Sequence
1 = Default Zone Handling	From the VZ76	To the VZ76	To the VZ76	From the VZ76	From the VZ76
2 = Zone Handling minus occupancy		To the VZ76	To the VZ76	From the VZ76	From the VZ76
3 = Full Release	The VZ7260 controller will operate without any dependencies from the VZ7656 RTU controller. It can be fully integrated with any supervision device for control and operation				

Object Name	Object Type and instance	BACnet Index	Text	Default value
Cfg Zone Keypad Lockout	MV 8	1	Level 0	Level 0
		2	Level 1	
		3	Level 2	
		4	Level 3	
GUI Occupancy Command	MV 9	1	Local Occupancy	Local Occupancy
		2	Occupied	
		3	Unoccupied	
Cfg RTC Zone Sequencing	MV 10	1	Cool	Cool
		2	Heat	
GUI Effective Occupancy	MV 11	1	Occupied	Depends on local occupancy
		2	Unoccupied	
		3	Temporary Occupied	
		4	Stand-by	
Cfg BO1-BO2 Floating Time	MV 12	1	0.5 minutes	1.5 minutes
		2	1 minute	
		3	1.5 minutes	
		4	2 minutes	
		5	2.5 minutes	
		6	3 minutes	
		7	3.5 minutes	
		8	4 minutes	
		9	4.5 minutes	
		10	5 minutes	
		11	5.5 minutes	
		12	6 minutes	
		13	6.5 minutes	
		14	7 minutes	
		15	7.5 minutes	
		16	8 minutes	
		17	8.5 minutes	
		18	9 minutes	



Object Name	Object Type and instance	BACnet Index	Text	Default value
Cfg BO3-BO4 Floating Time	MV 13	1	0.5 minutes	1.5 minutes
		2	1 minute	
		3	1.5 minutes	
		4	2 minutes	
		5	2.5 minutes	
		6	3 minutes	
		7	3.5 minutes	
		8	4 minutes	
		9	4.5 minutes	
		10	5 minutes	
		11	5.5 minutes	
		12	6 minutes	
		13	6.5 minutes	
		14	7 minutes	
		15	7.5 minutes	
		16	8 minutes	
		17	8.5 minutes	
		18	9 minutes	
Cfg A14 Configuration	MV 14	1	None	None
		2	CO2	
Cfg Proportional Band	MV 15	1	3°F(1.7°C)	3°F(1.7°C)
		2	4°F(2.2°C)	
		3	5°F(2.8°C)	
		4	6°F(3.3°C)	
		5	7°F(3.9°C)	
		6	8°F(4.4°C)	
		7	9°F(5.0°C)	
		8	10°F(5.6°C)	

## VZ7260 Integration

Please note that no special programming or network bindings are required for the Zoning system to operate. As such the VZ7260 Zone controllers and their associated VZ7656 RTU controller can operate in stand-alone mode with all required data transfer binding already handled by the controllers themselves. If BACnet supervision is added, it is only for GUI, trends, logs or remote views of the devices. The zoning system operation is already taken care of by the controllers themselves.

The example showed below is valid on MV 7 (Network Handle) index being: 1 – Default Zone Handle. As such outdoor temperature, Zone mode and Zone Occupancy are NOT dependent on the BAS front end and are objects dependent on the attached VZ76561000B RTU controller

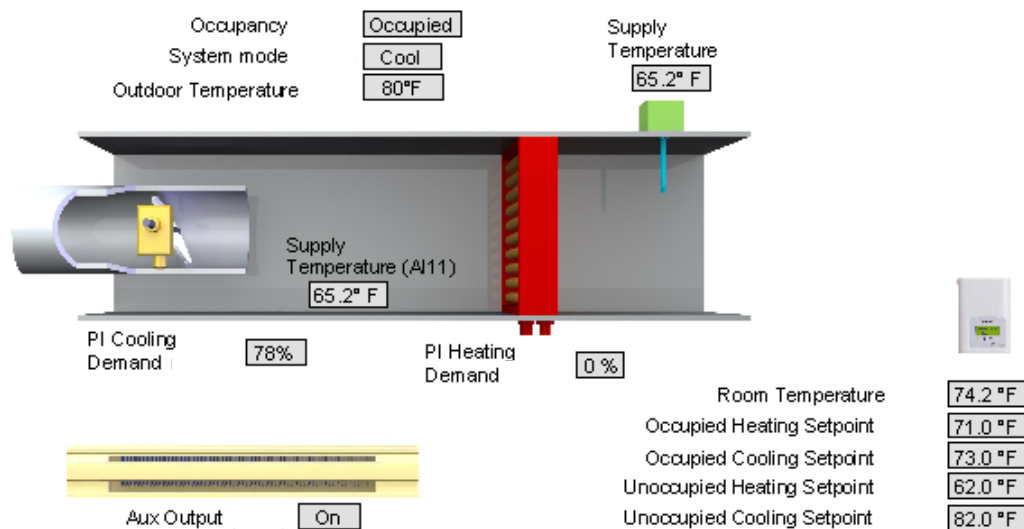
- All object names starting with a “GUI” prompt are normally used for graphic GUI views.
- All object names starting with a “Sta” prompt are Status normally used for graphic GUI views.
- All object name starting with a “Cfg” prompt are associated to configuration properties of the controller and typically do not need to be associated to any GUI views

If your BAS allows you to remove objects from your database, Viconics recommends removing all configuration objects once your setup is complete. This will prevent unnecessary polling of non-used objects and will help speed up your network.

The following figure shows the typical objects from the controller which can be monitored and commanded from a BAS front-end.

The following objects could be typically used in a GUI:

- Room Temperature (AV 21);
- Occupied, Stand-by and Unoccupied Heat Setpoints (AV 11, AV 13 and AV 15);
- Occupied, Stand-by and Unoccupied Cool Setpoints (AV 12, AV 14 and AV 16);
- Outdoor Temperature (AV 22); Value from VZ7656
- UI3 Status / Supply Temperature (AV 18) (If available);
- Occupancy Command (MV 9); Value from VZ7656
- RTC Zone Sequencing (MV 10);
- Damper Position (AI 1);
- AO2 Status (AV 17);
- PI Heat Demand & Weighted PI Heat Demand (AV 19 & AV 24)
- PI Cool Demand & Weighted PI Cool Demand (AV 20 & AV 25)



## VZ7656 Series Protocol Implementation Conformance Statement (PICS) \_\_\_\_\_

**Vendor Name:** Viconics

**Vendor ID:** 140

**Product Name:** VZ7656 Zoning System RTU Controller

**Product Model Number:** VZ76561000B

### **Product Description:**

The Viconics VZ76561000B controller is specifically designed for RTU control of the Viconics Zoning System product family.

The RTU controller is designed for single stage or multi-stage control of heating and cooling equipment such as rooftop and self-contained units used in zoning systems.

The controllers are used in conjunction with the Viconics VZ7260F5x00B Zone controllers for total system operation of each zones and the RTU.

### **VZ7656 Supported BACnet Services**

The BACnet communicating controller meets all requirements for designation as an Application Specific Controller (B-ASC). The BACnet controller series supports the following BACnet Interoperability Building Blocks (BIBBs).

<b>BACnet Interoperability Building Block</b>
Data Sharing COV-B (DS-COV-B)
Data Sharing-ReadProperty-B (DS-RP-B)
Data Sharing-ReadPropertyMultiple-B (DS-RPM-B)
Data Sharing-WriteProperty-B (DS-WP-B)
Device Management-Dynamic Device Binding-B (DM-DDB-B)
Device Management-Dynamic Object Binding-B (DM-DOB-B)
Device Management-DeviceCommunicationControl-B (DM-DCC-B)
Device Management-TimeSynchronisation-B (DM-TS-B)
Scheduling-Readonly-B (SCHED-R-B)

**Note:** The controller does not support segmented requests or responses.

VZ7656 Device Object Table

Object Name	Type and Instance	Object Property	Controller Parameter
VZ7656	Device	Object_Identifier Property 75 (R,W)	Unique ID number of a device on a network
		Object_Name Property 77 (R,W)	Unique name of a Device on a network
		Model Name Property 70 (R)	Controller Model number
		Firmware Revision Property 44 (R)	Current BACnet firmware revision used by the controller
		Protocol Version Property 98 (R)	Current BACnet firmware protocol version Default is Version 1
		Protocol Revision Property 139 (R)	Current BACnet firmware protocol revision Default is Version 2
		Max ADPU Length Property 62 (R)	Maximum ADPU Length accepted Default is 244
		ADPU Timeout Property 10 (R)	ADPU timeout value Default is 60 000 ms
		Max_Master (R,W)	Maximum master devices allowed to be part of the network. 0 to 127, default is 127

## VZ7656 Standard Object Types Supported

Object Type	Supported	Dynamically Creatable	Dynamically Removable	Optional Properties Supported	Writable Properties
Analog Input	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Reliability	Out_of_Service
Analog Value	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Reliability	Present_Value <sup>a</sup> Out_of_Service
Binary Input	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Reliability Active_Text Inactive_Text	Out_of_Service
Binary Value	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Reliability Active_Text Inactive_Text	Present_Value <sup>b</sup> Out_of_Service
Device	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Max_Master Max_Info_frames	Object_Identifier Object_name Max_Master
Multi-state Value	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Reliability States_Text	Present_Value <sup>c</sup> Out_of_Service
Schedule	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Weekly_schedule	Read Only

a: Present\_Value property is writable for every AV objects except :

- Cfg RTC MAC (AV 1)
- GUI Current Zone PI Heat Demand (AV 11)
- GUI Current Zone PI Cool Demand (AV 12)
- GUI Transferred PI Heat Demand (AV 13)
- GUI Transferred PI Cool Demand (AV 14)
- GUI Highest PI Heat Zone (AV 15)
- GUI Highest PI Cool Zone (AV 16)
- GUI Highest PI Heat Demand (AV 17)
- GUI Highest PI Cool Demand (AV 18)
- Cfg Device Instance (AV 21)

b: Present\_Value and Out\_of\_Service properties are writable for every BV objects except :

- Sta Comm Lost Status (BV 3)
- Sta Smart Recovery (BV 7)

c: Present\_Value and Out\_of\_Service properties are writable for every MV objects except :

- Cfg RTC Baud (MV 1)
- GUI Zone Sequence (MV 4)

**VZ7656 List of Property Value Range Restrictions for AI and AV objects**

Object name	Object Type and instance	Under range value	Over range value	Default value
GUI Discharge Air Temp	AI 1	-40°F (-40°C)	150°F (65°C)	N/A
GUI Return Air Temp	AI 2	-40°F (-40°C)	122°F (50°C)	N/A
GUI Static Pressure Input	AI 3	0" WC (0 Pa)	5" WC (1250 Pa)	N/A
GUI By-Pass Damper	AI 4	0%	100%	N/A
Cfg RTC MAC	AV 1	1	255	4
Cfg Heating Lockout Temperature	AV 2	-15°F (-26°C)	120°F (49°C)	120°F (49°C)
Cfg Cooling Lockout Temperature	AV 3	-40°F (-40°C)	95°F (35°C)	-40°F (-40°C)
Cfg Static Pressure Spt	AV 4	0" WC (0 Pa)	2" WC (500 Pa)	0.8" WC (200 Pa)
Cfg Discharge High Limit Spt	AV 5	70°F (21°C)	150°F (65°C)	120°F (49°C)
Cfg Discharge Low Limit Spt	AV 6	35°F (2°C)	65°F (19°C)	45°F (7°C)
Cfg Return Air Occ Cool Spt	AV 7	54°F (12°C)	100°F (37.5°C)	74°F (24°C)
Cfg Return Air Unocc Cool Spt	AV 8	54°F (12°C)	100°F (37.5°C)	74°F (24°C)
Cfg Return Air Occ Heat Spt	AV 9	40°F (4.5°C)	90°F (32°C)	72°F (22°C)
Cfg Return Air Unocc Heat Spt	AV 10	40°F (4.5°C)	90°F (32°C)	72°F (22°C)
GUI Current Zone PI Heat Demand	AV 11	0%	100%	N/A
GUI Current Zone PI Cool Demand	AV 12	0%	100%	N/A
GUI Transferred PI Heat Demand	AV 13	0%	100%	N/A
GUI Transferred PI Cool Demand	AV 14	0%	100%	N/A
GUI Highest PI Heat Zone (Com Address)	AV 15	0	255	N/A
GUI Highest PI Cool Zone (Com Address)	AV 16	0	255	N/A
GUI Highest PI Heat Demand	AV 17	0%	100%	N/A
GUI Highest PI Cool Demand	AV 18	0%	100%	N/A
GUI Outdoor Temperature	AV 19	-40°F (-40°C)	122°F (50°C)	N/A
Cfg Power Delay	AV 20	10 Seconds	120 Seconds	30 Seconds
Cfg Device Instance	AV 21	76000	76255	N/A
Cfg Deadband	AV 22	2°F (1°C)	4°F (2°C)	2°F (1°C)
Cfg Password	AV 23	0	1000	N/A
Cfg High Balance Point	AV 24	34°F(1°C)	90°F(32°C)	90°F(32°C)
Cfg Low Balance Point	AV 25	-40°F(1°C)	-40°F(32°C)	-40°F(-40°C)
Cfg Minimum Supply Heat Setpoint	AV 26	50°F(1°C)	72°F(32°C)	64°F(18°C)

Cfg Supply Heat Lockout	AV 27	-15°F(-26°C)	120°F(49°C)	32°F(0°C)
GUI Supply PI Heat Demand	AV 28	0%	100%	N/A
Cfg Changeover Setpoint	AV 30	14°F(-26°C)	70°F(-26°C)	55°F(13°C)
Cfg Mixed Air Setpoint	AV 31	50°F(10°C)	90°F(32°C)	55°F(13°C)
Cfg Economizer Min Position	AV 32	0%	100%	0%
Cfg Economizer Max Position	AV 33	0%	100%	100%
Cfg Fresh Air Max Range	AV 34	0 CFM (0 l/s)	20000 CFM (9440 l/s)	0 CFM (0 l/s)
Cfg Minimum Fresh Air	AV 35	0 CFM (0 l/s)	20000 CFM (9440 l/s)	0 CFM (0 l/s)
Cfg Maximum Fresh Air	AV 36	0 CFM (0 l/s)	20000 CFM (9440 l/s)	0 CFM (0 l/s)
Cfg Minimum CO2 Level	AV 37	0 PPM	2000 PPM	800 PPM
Cfg Maximum CO2 Level	AV 38	0 PPM	2000 PPM	1200 PPM
GUI Fresh Air Level	AV 39	0 CFM (0 l/s)	20000 CFM (9440 l/s)	N/A
GUI CO2 Level	AV 40	0 PPM	2000 PPM	N/A
GUI Highest CO2 Zone	AV 41	1	127	N/A
GUI Economizer Output	AV 42	0%	100%	N/A

Note:

The GUI Current Zone PI Heat & Cool Demand objects represent the actual calculated average demand values from either the highest, the demands of the actual highest 3 zones or the demands of the actual highest 5 zones as per selected by MV2 Control Type object.

VZ7656 List of Property Enumeration Sets for BI and BV objects

Object Name	Object Type and instance	Inactive_Text	Active_Text	Default value
GUI G Fan	BI 1	Off	On	N/A
GUI Y1 Cool	BI 2	Off	On	N/A
GUI Y2 Cool	BI 3	Off	On	N/A
GUI W1 Heat	BI 4	Off	On	N/A
GUI W2 Heat	BI 5	Off	On	N/A
GUI BI 1 Status	BI 6	Not Activated	Activated	Not Activated
GUI Aux Status	BI 7	Off	On	N/A
Sta Heating Stages Lockout Status	BI 8	Not Activated	Activated	Not Activated
Sta Cooling Stages Lockout Status	BI 9	Not Activated	Activated	Not Activated
Sta Service Alarm	BI 10	Off	On	Off
Sta Filter Alarm	BI 11	Off	On	Off
Sta Clock Alarm	BI 12	Off	On	Off
Sta Discharge Temp Alarm	BI 13	Off	On	Off
Sta Reversing Valve Status	BI 14	Off	On	Off
GUI Y2 Compressor	BI 15	Off	On	Off
GUI Y1 Compressor	BI 16	Off	On	Off
Sta Fresh Air Alarm	BI 17	Off	On	Off
Sta High CO2 Alarm	BI 18	Off	On	Off
Cfg Units	BV 1	°C / SI Units	°F / Imperial Units	°F / Imperial Units
Cfg Progressive Recovery	BV 2	Off	Active	Off
Sta Com Lost Status	BV 3	Down	Up	N/A
Cfg Aux Contact	BV 4	N.O.	N.C.	N.O.



Cfg Fan Purge Delay	BV 5	Off	On	Off
GUI Outdoor Temp Override	BV 6	Normal	Override	Normal
Cfg Smart Recovery	BV 7	Off	Active	Off
Cfg Static Pressure Ctrl Type	BV 8	By-Pass Damper	VFD	VFD
Cfg Emergency Heat Mode	BV 9	Off	On	On
Cfg Reversing Valve	BV 10	Normally Cool	Normally Heat	Normally Heat
Cfg Compressor Interlock	BV 11	Off	On	On
Sta Supply Heat Lockout Status	BV 12	Inactive	Active	Active

VZ7656 List of Property Enumeration Sets for MV Objects

Object Name	Object Type and instance	BACnet Index	Text	Default value
Cfg RTC Baud	MV 1	1	9600 ( Bps )	Auto
		2	19200 ( Bps )	
		3	38400 ( Bps )	
		4	76800 ( Bps )	
		5	Auto	
Cfg Control Type	MV 2	1	Highest	AV_H3 /Average of Highest 3 Zones
		2	AV_H3 /Average of Highest 3 Zones	
		3	AV_H5 /Average of Highest 5 Zones	
Cfg Local Keypad Lockout	MV 3	1	Level 0 / No Lockout	Level 0 / No Lockout
		2	Level 1	
		3	Level 2	
GUI Zone Sequence	MV 4	1	Off / Never used	Cool
		2	Cool	
		3	Heat	
Cfg Static Pressure Transducer Range	MV 5	1	0 to 1.5" of WC	0 to 1.5" of WC
		2	0 to 2.0" of WC	
		3	0 to 3.0" of WC	
		4	0 to 4.0" of WC	
		5	0 to 5.0" of WC	
Cfg Heating Stages	MV 6	1	1 Stage	2 Stages
		2	2 Stages	
Cfg Cooling Stages	MV 7	1	1 Stage	2 Stages
		2	2 Stages	
Cfg Heating CPH	MV 8	1	3 CPH	4 CPH
		2	4 CPH	
		3	5 CPH	
		4	6 CPH	
		5	7 CPH	
		6	8 CPH	
Cfg Cooling CPH	MV 9	1	3 CPH	4 CPH
		2	4 CPH	
Cfg Min. On/Off Time (Anticycle)	MV 10	1	0 minute	2 minutes
		2	1 minute	
		3	2 minutes	
		4	3 minutes	
		5	4 minutes	
		6	5 minutes	

Object Name	Object Type and instance	BACnet Index	Text	Default value
Cfg BI1 Configuration	MV 11	1	None	None
		2	RemNSB	
		3	RemOVR	
		4	Filter	
		5	Service	
Cfg Temporary Occupancy Time	MV 12	1	0 hour	2 hours
		2	1 hour	
		3	2 hours	
		4	3 hours	
		5	4 hours	
		6	5 hours	
		7	6 hours	
		8	7 hours	
		9	8 hours	
		10	9 hours	
		11	10 hours	
		12	11 hours	
		13	12 hours	
Cfg Event Display	MV 13	1	2 Events	2 Event
		2	4 Events	
GUI Occupancy	MV 14	1	Local Occupancy	Local Occupancy
		2	Occupied	
		3	Unoccupied	
GUI System Mode	MV 15	1	Off	Auto
		2	Auto	
Cfg Heat Pump Stages	MV 16	1	1 Stage	2 Stages
		2	2 Stages	
GUI System Mode HP	MV 17	1	Off	Auto
		2	Auto	
		3	Cool	
		4	Heat	
		5	Emergency Heat	
Cfg CO2 Control Type	MV 18	1	Highest	AV_H3
		2	AV_H3	
		3	AV_H5	

## VZ7656 Integration

Please note that no special programming or network bindings are required for the Zoning system to operate. As such the VZ7260 Zone controllers & their associated VZ7656 RTU controller can operate in stand-alone mode with all required data transfer binding already handled by the controllers themselves. If BACnet supervision is added, it is only for GUI, trends, logs or remote views of the devices. The zoning system operation is already taken care of by the controllers.

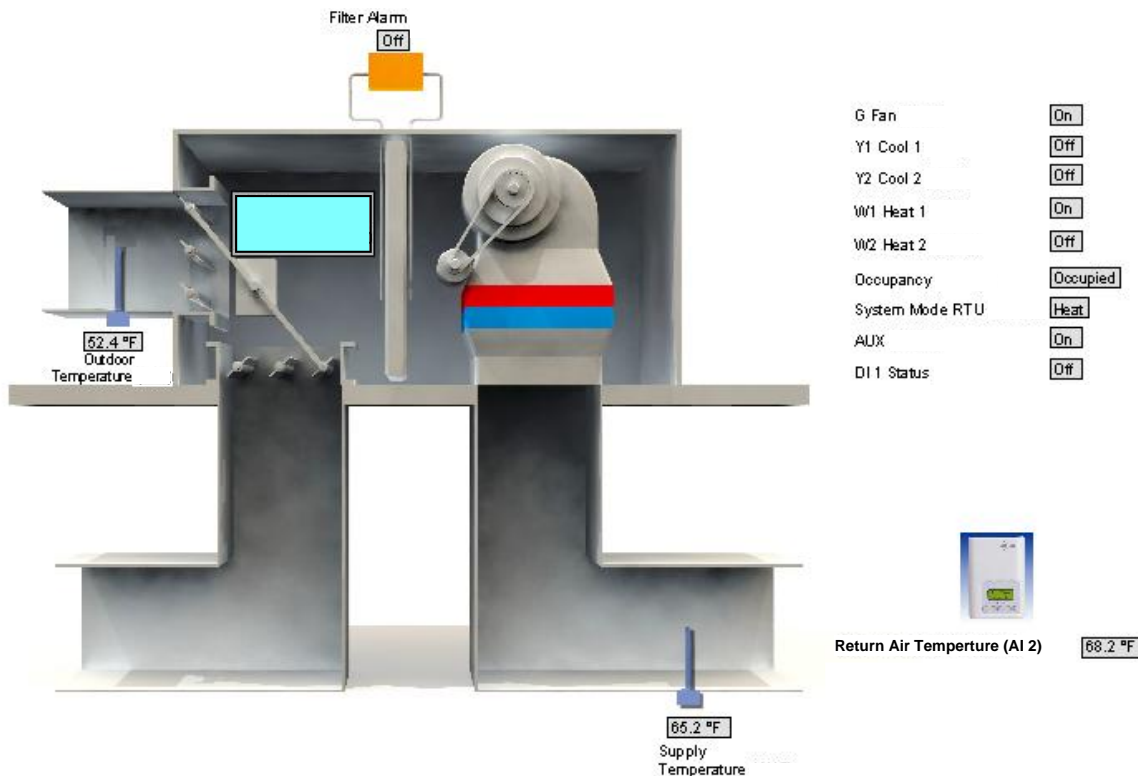
- All object names starting with a “GUI” prompt are normally used for graphic GUI views.
- All object names starting with a “Sta” prompt are Status normally used for graphic GUI views.
- All object names starting with a “Cfg” prompt are associated to configuration properties of the controller and typically do not need to be associated to any GUI views

If your BAS allows you to remove objects from your database, Viconics recommends removing all configuration objects once your setup is complete. This will prevent unnecessary polling of non used objects and will help speed up your network.

The following figure shows the typical objects from the controller can be monitored and commanded from a BAS front-end.

The following objects could be typically used in a GUI:

- Return Air Temperature (AI 2); Outdoor Temperature (AV 19); Discharge Air Temperature (AI 1)
- Return Air Occupied and Unoccupied Heat Setpoints (AV 9 and AV 10);
- Return Air Occupied and Unoccupied Cool Setpoints (AV 7 and AV 8);
- Static Pressure & Static Pressure Setpoint (A1 3 and AV 4)
- Occupancy (MV 14); System Mode (MV 15); Zone Sequence (MV 4);
- G Fan (BI 1); Y1 Cool (BI 2); Y2 Cool (BI 3); W1 Heat (BI 4); W2 Heat (BI 5);
- Aux Status (BI 7); BI 1 Status (BI 6);
- Filter Alarm (BI 11) (if available); Service Alarm (BI 10) (if available);
- Discharge Air Temperature Alarm (BI 13)
- Current Zone PI Heat Demand (AV 11);
- Current Zone PI Cool Demand (AV 12);



Viconics uses EIA-485 as the physical layer between their devices and supervisory controllers.

For clarity we will use the term “Device” to represent any product with an active EIA-485 network connection, including Viconics and non-Viconics controllers.

**Summary Specifications:**

Parameter	Details
Media	Twisted pair 22AWG-24 AWG, shielded recommended
Characteristic Impedance	100-130 ohms
Distributed capacitance	Less than 100 pF per meter (30 pF per foot)
Maximum length per segment	1200 meters (4000 feet) Note: AWG 18 cable
Polarity	Polarity sensitive
Multi-drop	Daisy-chain (no T connections)
Terminations	<ol style="list-style-type: none"> <li>1. <b>Viconics’ devices are installed at both ends of the MSTP network:</b> 120 Ohms resistor should be installed at each end.</li> <li>2. <b>A Viconics device is installed at one end of the MSTP network and a 3<sup>rd</sup> party device is installed at the other end:</b> Install an End-Of-Line resistor value that matches the 3<sup>rd</sup> party device instruction regarding the End-Of-Line resistors</li> <li>3. <b>3<sup>rd</sup> party devices are installed at both ends of the MSTP network:</b> Follow the 3<sup>rd</sup> party device instructions regarding the End-Of-Line resistors.</li> </ol>
Network Bias Resistors	510 ohms per wire (max. of two sets per segment)
Maximum number of nodes per segment	64 (Viconics devices only)
Maximum number of nodes per network	128
Baud rate	9600, 19200, 38400, 76800 (Auto detect)

**Table 1: Summary of Specifications for a Viconics’ EIA-485 Network**

## Cable Type

Viconics recommends the use of balanced 22-24 AWG twisted pair with characteristic impedance of 100-130 ohms, capacitance of 30 pF per ft or lower. A braided shield is recommended.

## Impedance

A value based on the inherent conductance, resistance, capacitance and inductance that represent the impedance of an infinitely long cable. The nominal impedance of the cable should be between 100Ω and 120Ω. However using 120Ω will result in a lighter load on the network.

## Capacitance (pF per ft)

The amount of equivalent capacitive load of the cable, typically listed in a per foot basis. One of the factors limiting total cable length is the capacitive load. Systems with long lengths benefit from using low capacitance cable (i.e. 17pF per ft or lower).

## Network Configuration

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EIA-485 networks use a daisy chain configuration. A daisy chain means that there is only one main cable and every network device is connected directly along its path.

(Figure 3) illustrates two improper network configurations and the proper daisy chain configuration.

Other methods of wiring an EIA-485 network may give unreliable and unpredictable results. There are no troubleshooting methods for these types of networks. Therefore, a great deal of site experimentation may have to be done, making this a difficult task with no guarantee of success. Viconics will only support daisy chain configurations.

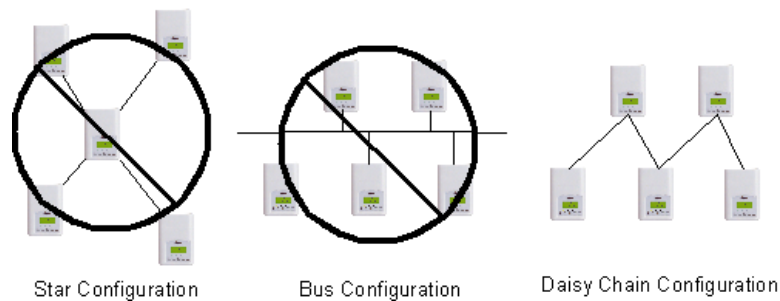


Figure 3: Three different network configurations: star, bus, and daisy chain. Only the daisy chain configuration is correct for an EIA-485 network.

## Maximum Number of Devices

A maximum of 64 nodes is allowed on a single daisy chain segment. A node is defined as any device (Panel, Zone, Repeater, etc) connected to the RS485 network. Terminators do not count as a node.

To determine the number of nodes on a network, add the following:

- One node for each device, including main panels
- One node for each repeater on the chain

For the example in (Figure 4), we have one node for the main Panel, plus 4 for the controllers, for a total of 5 nodes.

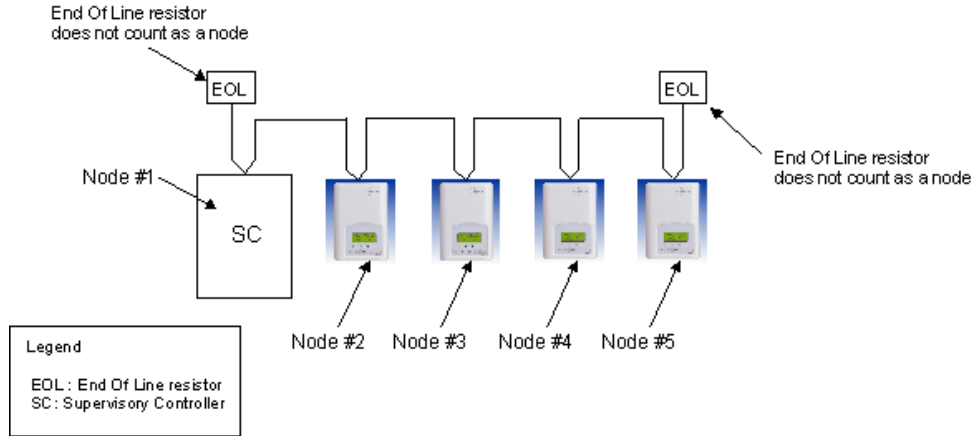


Figure 4: Five nodes network example.

If you have more than 64 devices, then repeaters are required to extend the network.

## Maximum Cable Length

The maximum length of a chain is related to its transmission speed. The longer the chain the slower the speed of transmission will be. Using proper cable, the maximum length of an EIA-485 daisy chain is 4000-ft (1200 m). This will only work reliably for data rates up to 100,000 bps. Viconics' maximum data rate is 76,800 bps.

If you require a maximum network length of more than 4000 feet, then repeaters are required to extend the network.

## EIA-485 Repeaters

If you have more than 64 devices, or require a maximum network length of more than 4000 feet, then repeaters are required to extend the network. The best configuration is to daisy chain the repeaters to the main panel. From each of these repeaters, a separate daisy chain will branch off. (Figure 5) demonstrates a valid use of repeaters in an EIA-485 network.

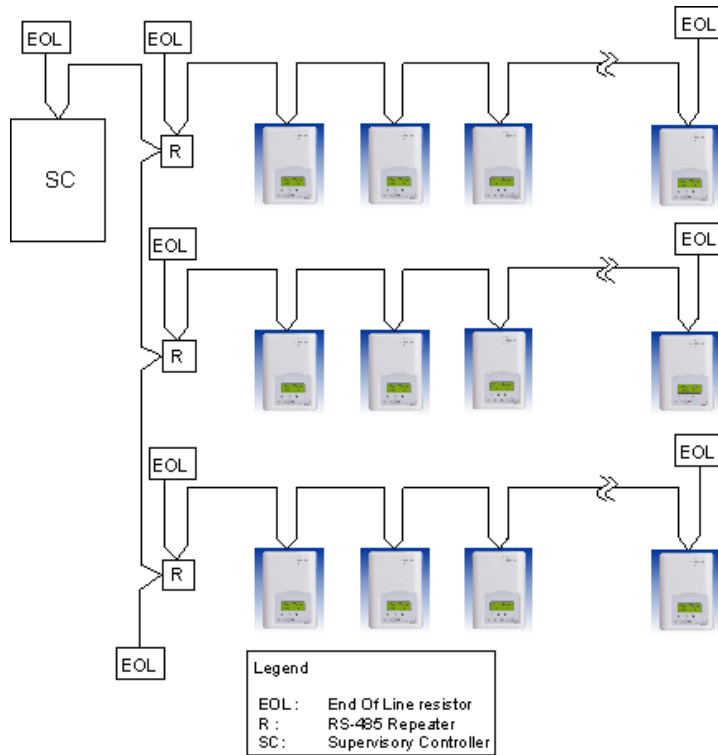


Figure 5: Correct usage – repeaters are daisy chained to the supervisory controller and separate daisy chains branch from each repeater.

Do not install repeaters in series, as this may result in network reliability problems. (Figure 6) demonstrates an incorrect use of a repeater in an EIA-485 network.

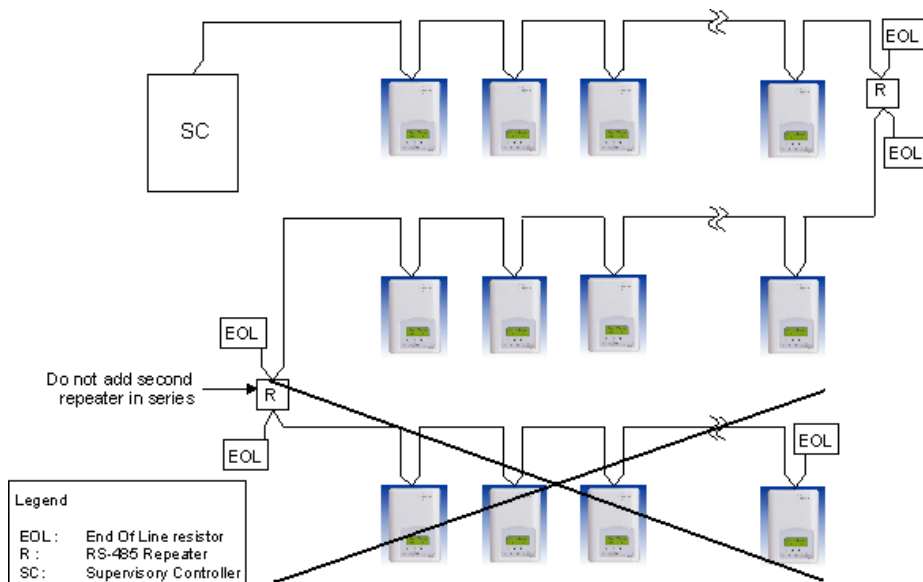


Figure 6: Incorrect usage – the second repeater in series may result in an unreliable system



## End of Line (EOL) Resistors

MS/TP network must be properly terminated. For daisy chain configurations, you must install an EOL resistor at each end of the daisy chain. Depending on your MSTP network configuration, the resistance value of the EOL resistor may change:

- **Viconics' devices are installed at both ends of the MSTP network:**  
120 Ohms resistor should be installed at each end.
- **A Viconics device is installed at one end of the MSTP network and a 3<sup>rd</sup> party device is installed at the other end:**  
Install an End-Of-Line resistor value that matches the 3rd party devices instructions regarding its EOL resistor value.
- **3<sup>rd</sup> party devices are installed at both ends of the MSTP network:**  
Follow the 3rd party devices instructions regarding its EOL resistor value.

## Network Adapter

The polarity of the connection to the cable is important. From one module to the other it is important that the same coloured wire be connected to "plus" or "+" and the other coloured wire be connected to the "minus" or "-". (Figure 7) shows the proper MS/TP connections and the location of the Status LED. This Status LED may help to troubleshoot network problems.

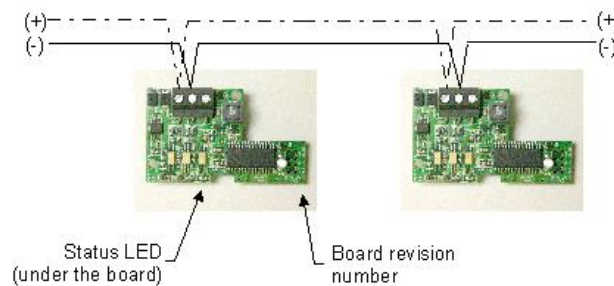


Figure 7: Correct MS/TP connections and location of a Status LED on a BACnet module

**IMPORTANT NOTE:** The Ref terminal should **NEVER** be used to wire shields. The 2 shields from each feed of the network connection to a controller should be wired together in the back of the controller and properly protected to prevent any accidental connection to the ground.

The joined shield connection should then be grounded at a single point on the whole segment. More than one ground connection to a shielded wire may induce ground loop noises and affect communication.

Table 2 shows the different possibilities with the Status LED behaviour of the BACnet module.

Condition of the Status LED	Possible Cause	Solution
➤ 2 short blink (no wires connected to the module)	Controller is searching for an MS-TP BACnet network. Either at selected Baud rate or is currently Auto-Bauding	Connect Controller to Network
➤ 2 short blink (wires connected to the module)	Module is not at the same baud rate as the network or set at a different Baud rate than Main network	If Auto-Bauding, power off and on the controller. If wrong Baud rate is selected, match network Baud rate for each device.
➤ 2 short blinks and a longer blink (wires connected to the module)	The module has detected the presence of a network and is in the Token Pass of the ring	N/A

Table 2: Status LED condition and possible solutions

#### Default Device Name and default Device ID

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Default **Device Name** is set to: Model number – MAC:

- Where MAC is the current MAC address of the device.
- Where Model number is Viconics part number.

The device name will be upgraded as soon as there is a change to the device MAC address.

- Default **Device ID** is set to: 76000 + MAC
- Where MAC is the current MAC address of the device.

The device ID will also be upgraded as soon as there is a change to the device's MAC.

For an RTU controller example, when a VZ76561000B controller with a MAC address of 63 is connected to a network, its default Device Name will be VZ76561000B-63 and its default Device ID will be 76063.

For a zone controller example, when a VZ7260F5x00B controller with a MAC address of 12 is connected to a network, its default Device Name will be VZ7260F5x00B-12 and its default Device ID will be 72012.

Device Name and Device ID properties are writable in Viconics' device object. Both properties can be renamed from any BACnet network management tool as long as the tool itself can write to these properties.

## Things You Need To Know

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- After the initial configuration of your device and if your BAS allows you to remove objects, we suggest that you remove all the configuration objects to prevent unnecessary polling of non used objects and to help speed up the network.
- In its default mode of operation (Auto-Bauding), the device will automatically match its baud rate to the baud rate of the network. Automatic baud rate detection will occur when the MS/TP communication port is initialized (on power up). If the network speed is changed, the device will keep listening at the previously detected speed for 2.5 minutes before resuming auto-bauding. Re-powering the devices will force right away auto-bauding.
- If the device should go off-line, the following binded controller parameters will be released:
  - Room Temperature
  - Outdoor Temperature
  - Occupancy
- The BACnet Data Link layer has two key parameters: the device object name and the device object ID. The device object name must be unique from any other BACnet device object name on the BACnet network (i.e. not just the MS/TP sub-network). The device object ID must be unique from any other BACnet device object ID on the entire BACnet network (i.e. not just the MS/TP sub-network).
- For the VZ76561000B. Time synchronization can be made through a network even if the controller does not support the full date. The local date & time reported are not dynamic & will represent the last time stamp received during the last synchronization.
- Device Name and Device ID properties are writable in Viconics' device object. Both properties can be renamed from any BACnet network management tool as long as the tool gives write access to these properties.

## Troubleshooting Section

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Error / Trouble Condition	Possible Cause	Solution
<b>Controller does not come online</b>	Two or more controllers have the same MAC address.	Modify each duplicate address to a unique number.
	The MS/TP network has too many devices.	Do not exceed the maximum number of devices and maximum length allowed by the EIA-485 specifications.
	Too many devices were installed without any repeaters.	Repeaters need to be installed as specified in this document.
	The MS/TP cable runs are broken	Locate the break and correct wiring
	MS/TP connections at the module were reversed	Respect polarity of the wires on a MS/TP network.
	The controller does not have power	Apply power to the controller