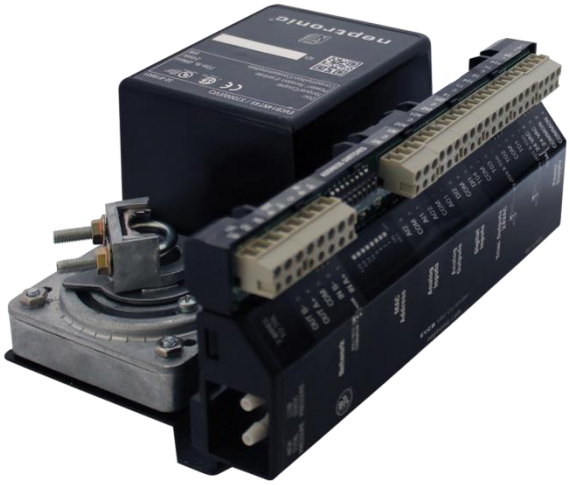
VAV Zone Controller

EVCBI4-ZB

Zoning System



BACnet Communication Module User Guide

Introduction

The EVCBI4-ZB VAV Zone Controller BACnet Communication Module User Guide provides information about using the controllers in the zoning system with BACnet communications feature. The BACnet communication protocol for building automation and control networks enables communication between client devices within a network. The controller provides a BACnet network interface between BACnet client devices and Neptronic Controller series devices. It uses the BACnet Master Slave/Token Passing (MS/TP) protocol at the BACnet MAC layer.

Pre-requisites

The BACnet communication user guide assumes that you are familiar with the concepts of BACnet and its terminology.

Advantages of BACnet

BACnet enabled controllers have the following advantages:

- *Quick Message Transmission.* The controller uses a synchronous implementation for BACnet messages making it quick and efficient. Each BACnet confirmed service request is answered as quickly as possible without using the **Reply Postponed** frame. The MS/TP implementation is performed within **Tusage_delay** of 15 minutes to ensure a **Tusage_timeout** value within 20 minutes.
- *MS/TP Support.* The controller supports a Full Master Node state machine for MS/TP. The Max_Master and the instances are configured to the device object through **BACnet WriteProperty** service or via the device's Programming Mode. The MAC address and the MS/TP baud rate setting of 9600, 19200, 38400, and 76800 are also set through the **BACnet Write Property** service or via the device's Programming Mode. In Programming mode, the device is configured through the device's keypad. For more information about the WriteProperty, refer to *Table 3 - Object Types Supported*.
- *BIBB Support*. The controller functions the same way as the B-ASC type profile server and supports the specific BIBB as per their relevant definitions.
  - DS-RP-B
  - DS-RPM-B
  - DS-WP-B
  - DS-WPM-B
  - DM-DCC-B
  - DM-DDB-B
  - DM-DOB-B
  - DM-RD-B
  - DM-TS-B
  - DM-UTC-B
  - DS-COV-B
  - DS-COVP-B
  - SCHED-WS-I-B
- *Object Support*. The controller supports a fixed list of BACnet visible values, which appear as Present_Values of various BACnet standard object types in addition to a device object. For more information, refer to *Table 3 - Object Types Supported*.
- *Alarms*. The controller supports indication of various alarm conditions through value changes in properties of several objects. However, it does not generate BACnet event notifications.

BACnet Properties Configuration

To establish communication on the network, and guarantee a unique ID of devices in a BACnet system, the following properties may have to be configured.

Table 1 - BACnet Properties Configuration

Property	Default Value	Configuration
MAC Address	000	• Set to a unique address on the network between 000 and 254. • The value can be set manually via the menu. • The value can be set manually through the **WriteProperty** service to **Device Object.proprietary-property#1000 MSTP-Address**. • The values from 128-254 represent MS/TP non-token passing slave devices.
Device Instance	Auto	• The controller automatically configures its device instance to 153,000 + MAC address. • The value can be set manually via the menu. • The value can be set manually through the **WriteProperty** service to **Device Object.Object_Identifier**. • The device's **Object_Identifier** is a combination of the **Device Object_Type** (8) and the **Device_Instance** (0-4194302), therefore its decimal or hexadecimal representation tends to be incomprehensible. • For example, the **Device_Instance**=1000 has an equivalent **Object_Identifier** of 0x020003E8 hexadecimal or 33555432 decimal.
Baud Rate	0 = Auto	• The controller configures its baud rate automatically by detecting the network upon connection. • The value can be set manually from the available values of Auto, 9600, 19200, 38400, and 76800.
Max_Master	127	• Configure **Max_Master** value to increase network efficiency when there are less than 127 devices on the network. • The **Max_Master** value can be changed through the **WriteProperty** service to **Device Object.Max_Master**. For more information, refer to the MAC Address and Max_Master section.
Device Object.Object_Name	Name of the device	• Configure the name of the device through the **WriteProperty** service to **Device Object.Object_Name**. For example, EVCBI4-ZB.

Configuration Options

The following Configuration options enable you to configure and run the BACnet features of the controllers quickly.

Quick Setup

Configure the controller for BACnet communication without programming.

1. Ensure that no other device on the network has a MAC address of 0 (the controller's default address).
2. Connect the controller to the network and power it up.
3. The controller automatically configures the baud rate and device instance allowing BACnet Property Configuration through the Write Property service. See Table 1 - BACnet Properties Configuration.
4. Repeat the steps for each controller.

Manual Setup

Configure the controller for BACnet communication with programming.

1. Access Operation Mode (jumper set to RUN position).
2. Press and hold both function buttons for 5 seconds to access the Quick Access menu.
3. Enter the password, **637**.
4. Follow the instructions to configure the MAC Address, MAX Master, Device Instance, and Baud Rate, manually.
5. Disconnect the power to the controller, connect the controller to the network, and connect the power again.

MAC Address and Max_Master

The MAC address must be unique on the entire MS/TP network. However, having a unique MAC address and a high baud rate does not guarantee efficient operation of the controller and other MS/TP units on the MS/TP network. Some MAC address and Max_Master combinations are more efficient than others. BACnet requires token-passing units to occasionally “poll” for other masters based on the MAC address and Max_Master.

A poor combination of MAC addresses and Max_Master can lead to a slower network due to lost time polling for masters that are not present. Unless there are 126 other units on the MS/TP network, the default Max_Master value of 127 is not the most efficient choice for the controller. The Max_Master default value of 127 was selected to ensure that any master, specifically a BACnet client can be found when the controller is initially started.

Examples of MAC Address and Max_Master Configurations

The following are some of the examples to indicate the optimum combination of Mac address and Max_Master configurations to ensure a quick and efficient output.

Example 1

- MAC=0. Max_Master=127
- MAC=1, Max_Master=127

This configuration is slow and inefficient because every time either unit is required to find another master unit, it has to poll 126 units until it finds the right one to pass the token.

Example 2

- MAC=0. Max_Master=5
- MAC=1 to MAC=4 are not used
- MAC=5, Max_Master=5

This configuration is better than Example 1 but it is still not optimal. The Max_Master is set to the most efficient value but the gap between the two MAC addresses is high. Therefore, each unit must poll four units until it finds the right one to pass the token.

Example 3

- MAC=0, Max_Master=1
- MAC=2, Max_Master=2

This is an incorrect configuration. The MAC=0 will never find MAC=2 because it will never poll for the master MAC address=2.

Example 4

- MAC=0. Max_Master=3
- MAC=1, Max_Master=3
- MAC=2, Max_Master=3
- MAC=3, Max_Master=3

This is an efficient configuration as the units are numbered consecutively and the MAX_Master is set to the most efficient value. As a general guideline, the most efficient setup for an MS/TP network is one in which the units are consecutively numbered starting at MAC address 0 and having Max_Master=the maximum MAC address in the system. If consecutive numbering is not possible, then the next most efficient setup is one in which all units have Max_Master=the maximum MAC address in the system.

Copy Config

Copy and broadcast the entire configuration of a controller over the network to controllers of the same type using the Copy Config feature.

1. Access Operation Mode (jumper set to RUN position).
2. Press and hold both function buttons for 5 seconds to access the Quick Access menu.
3. Enter the password, **637**.
4. Scroll to **Copy Config** programming menu and select **Yes**. Follow the rest of the onscreen instructions.

Note: A Copy Config can also be executed via BACnet. See AV.165, AV.166, AV.167, and BV.90 in Table 6 - Object Table Information: Analog Value (AV) and Table 9 - Object Table Information: Binary Value (BV) for details.

Network Reset

Reset the controller via BACnet using the **Reinitialize Device** service. The Reinitialize Device service can be accessed using the following password: **nep.**

The Reinitialize Device service has two types of reset such as:

- *Warm Reset.* The Warm Reset restarts the controller with actual configuration.
- *Cold Reset. The Cold Reset restarts the controller with **Factory configuration**.*

***Warning:** The Cold Reset erases the actual configuration when setting the MSTP address. Therefore, exercise caution while performing a Cold Reset.*

Device Object Properties

The following table lists all the BACnet properties supported for the device object. The W indicates that the property is writable using the BACnet **WriteProperty** service.

Table 2 - Device Object Properties

Property	Value	Writable
Object_Identifier	• Programmable where the instance part of the Object_Identifier is in the range of 0-4194302 • The device instance must be unique system-wide • The default value for the device instance=153002 (Vendor_Identifier*1000)	W
Object_Name	EVCBI4-ZB, programmable up to 32 Bytes	W
Description	Programmable up to 32 Bytes (default: BACnet Zone controller)	W
Object_Type	Device	
System_Status	Operational	
Vendor_Identifier	Always 153	
Vendor_Name	Always Neptronic	
Model_Name	Example, EVCBI4-ZB	
Firmware_Revision	currently, 1.02	
Application_Software_Version	currently, 2.07	
Protocol_Version	Always 1	
Protocol_Revision	Always 14	
DataBase_Revision	5	
Max_APDU_Length_Accepted	Always 480	
Segmentation_Supported	(3) = No Segmentation	
APDU_Timeout	6,000	W
Number_of_APDU_Retries	Always 3	
Local_Time	00:00:00	W
Local_Date	01-Jan-2015 (Thu)	W
UtC_Offset	-300 minutes	W
Daylight_Savings_Status	False	W
Backup_Failure_Timeout	300	W
Configuration_Files	File-1	
Last_Restore_Time	2017-04-13 (Thu), 00:00:00:00	
Backup_And_Restore_State	IDLE	
Backup_Preparation_Time	0	
Restore_Completion_Time	0	
Restore_Preparation_Time	0	
Protocol_Services_Supported	• subscribeCOV • atomicReadFile • atomicWriteFile • readProperty • readPropertyMultiple • WriteProperty • writePropertyMultiple • deviceCommunicationControl • reinitializeDevice • unconfirmedPrivateTransfer • timeSynchronization • who-Has • who-Is • utcTimeSynchronization • subscribeCOVProperty	
Protocol_Object_Types_Supported	• analog-input • analog-output • analog-value • binary-input • binary-output • binary-value • device • file • program • schedule • multi-state-value	
Object_List	100	
Device_Address_Binding	Always empty	
Max_Master	Programmable in the range of 1-127 (default: 127)	W
Max_Info_Frames	Always 1	
Active_COV_Subscription	Empty by default. COV subscription will be lost on a power cycle.	
Property_List	List of properties that exist within the object.	

Property	Value	Writable
Proprietary property #1000	• Programmable (default:0) • Represents the MS/TP MAC address in the range of 0 to 254 • Values 128 to 254 represent MS/TP non-token passing slave devices	W
Proprietary property #1001	• Programmable (default: Auto) • Represents the MS/TP Baud rate (unsigned type) • Values are 0 (Auto), 9600, 19200, 38400, and 76800 • Reading this property always returns the actual Baud rate	W
Proprietary property #1002	• Programmable (default: 15 minutes) • Represents the period of time that an object in/out of service will automatically return to normal. Range = 0 to120 minutes (unsigned type) • Writing 0 means no automatic return to normal	W
Proprietary property #1003	• 0 = Mode ZNB, 1 = Mode EVCB	

Object Types Supported

The following table lists all the BACnet properties supported for each object type. Most of the properties are locked. The exception is **Present_Value**, which represents the dynamic operating values of the device, and the Status_Flag, Event_State**,** and Reliability properties, which reflect the availability of the **Present_Value**. Unless otherwise specified, properties are not changeable.

Table 3 - Object Types Supported

Object Type	Enabled	Optional Properties Supported	Writable Properties	Notes
Note: Writable properties are different for some objects. Refer to the respective Object Table information to know the writable property for objects.				
Analog Input	☑	• Reliability • Description • Min_Present_Value • Max_Present_Value • Resolution • COV-Increment	• Out_of_Service • COV-Increment	Object will automatically return to Normal after a programmable period. Refer to Proprietary property #1002 of Device Object in Table 2 - Device Object Properties.
Analog Value	☑	• Reliability • Description • COV-Increment • Priority_Array • Relinquish_Default	• Present_Value • Out_of_Service • COV-Increment	• Refer to Out_of_Service Property section on page 7 for more information. • Object will automatically return to Normal after a programmable period. Refer to Proprietary property #1002 of Device Object in Table 2 - Device Object Properties.
Analog Output	☑	• Description • Reliability • Min-Pres-Value • Max-Pres-Value • Resolution • COV-Increment	• Present_Value • COV-Increment	
Binary Input	☑	• Reliability • Active_Text • Inactive_Text • Description	Out_of_Service	Object will automatically return to Normal after a programmable period. Refer to Proprietary property #1002 of Device Object in Table 2 - Device Object Properties.
Binary Value	☑	• Reliability • Active_Text • Inactive_Text • Description • Priority_Array • Relinquish_Default	• Present_Value • Out_of_Service	Object automatically returns to Normal after a programmable time. Refer to Proprietary property #1002 of Device Object in Table 2 - Device Object Properties.
Binary Output	☑	• Description • Reliability • Inactive-text • Active-text	Present_Value	
Device	☑	• Max_Master • Max_Info_Frame • Description • active-COV-subscriptions • #1000 (MSTP addr) • #1001 (Baud rate) • #1002 (Time out) • Local_Time • Local_Date • UTC_Offset • Daylight_Savings_Status	• Object_Identifier • Object_Name • Max_Master • Description • Local_Time • Local_Date • UTC_Offset • Daylight_Savings_Status • Apdu_Timeout • Backup_Failure_Timeout • #1000	

Object Type	Enabled	Optional Properties Supported	Writable Properties	Notes
		• Apdu_Timeout • Backup_Failure_Timeout • Configuration_Files • Last_Restore_Time • Backup_And_Restore_State • Backup_Preparation_Time • Restore_Completion_Time • Restore_Preparation_Time	• #1001 • #1002 • #1003	
Multi-State Value	☑	• Description • Reliability • States_Text • Priority_Array • Relinquish_Default	Present_Value	Some objects are commandable. In such case, the priority-array and Relinquish Default properties are available.
Program	☑	• Description • Reliability	Program_Change	• Only LOAD and RESTART are supported for Program Change. • Use LOAD to apply the new firmware.
File	☑	Description	• Archive • File Size	Only 0 is the accepted value to be written into file size.
Schedule	☑	• Description • Weekly Schedule	• Effective Period • Weekly Schedule • Schedule Default • Priority For Writing • Out_of_Service	

Out_of_Service Property

Neptronic controllers offer the use of the Out_of_Service writable property. When the value of this property is set to True, it disconnects the object from the physical input, enabling you to input other values. This is useful for special applications or while troubleshooting. For example, you can ignore the temperature read from a sensor and input the desired temperature value in order to perform specific tests.

For security reasons, a timeout will set the Out_of_Service property back to False after 15 minutes. This value can be modified to between 0 and 120 minutes (For more information, see proprietary property #1002 in *Table 2 - Device Object Properties*).

Object Table Information

The EVCBI4-ZB system uses the following BACnet object tables, categorized based on their ID. The type is the BACnet Object type, the instance is the BACnet Object. Together, the type and instance form the **BACnet Object_Identifier** for an object according to the following C-language algorithm:

- object_identifier=(unsigned long)((unsigned long)type<<22)+instance

Analog Input (AI)

Table 4 - Object Table Information: Analog Input (AI)

ID	Name	List	Description	W?	Notes
AI.2	AI2_AuxIn	Integrator	Auxiliary analog input 2 status. 0 to 100% (0 to 100% = 0 to 10 Vdc) or ON/OFF Range and units vary depending on the configuration of **MSV.5 Cfg_AI2_Type**.	Out_of_Service COV Increment (0.5)	0V to 100V or -40°F to 212°F (-40°C to 100°C) or 0 to 1. Resolution 0.1V or 0.2°F (0.1°C) or 1
AI.3	RoomTemperature	Integrator	Room temperature reading of the TRL integrated temperature sensor.	Out_of_Service COV Increment (0.5)	32ºF to 122ºF (0ºC to 50ºC) Resolution 0.02ºF (0.01ºC)
AI.5	InternHumidity	Integrator	Humidity reading of on board humidity sensor of TRLH or TRLGH24 unit	Out of service COV Increment (0.5)	5% RH to 95% RH, Resolution 0.1% RH
AI.6	TrIg_CO2	Integrator	CO2 reading of on-board sensor of TRLG24 or TRLGH24 thermostat unit.	Out of service COV Increment (0.5)	0 to 2000 ppm, Resolution 1 ppm

Analog Output (AO)

Table 5 - Object Table Information: Analog Output (AO)

ID	Name	List	Description	W?	Notes
AO.1	AnalogOutput1	Integrator	Status value that represents the modulating duct reheat percentage of analog output 1 based on demand. Only available if **MSV.51 Cfg_DuctReheat** is set to Analog.	Present Value COV Increment (0.5)	0% to 100%, Resolution 0.1%
AO.2	AnalogOutput2	Integrator	Status value that represents the modulating perimeter reheat status. Only available if **MSV.52 Cfg_PerimeterReheat** is set to 1 Stage Pulse.	Out_of_Service COV Increment (0.5)	0% to 100%, Resolution 0.1%

Analog Value (AV)

Table 6 - Object Table Information: Analog Value (AV)

ID	Name	List	Description	W?	Notes
AV.3	Local_AI1_SAT_CO	Integrator	Local suply air temperature on analog input 3. Used with local changeover.	Out_of_Service COV Increment (0.5)	-40°F to 212°F (-40°C to 100°C) Resolution 0.02ºF (0.01°C)
AV.6	OAT	Integrator	Outside air temperature reading from the associated RTU controller. Read from MU, used for local lockouts and the local OAT display.	COV Increment (0.5)	-40°F to 212°F (-40°C to 100°C) Resolution 0.02ºF (0.01°C)
AV.10	Cfg_CalibRoomTemperature	Advanced	Configuration value used to calibrate the TRL integrated temperature sensor. Can be calibrated from the minimum to the maximum temperature.	Present Value COV Increment (0.1)	-10°F to 10°F or -5°C to 5°C Resolution 0.2ºF/0.1°C
AV.15	OccupiedTemperatureSetpoint	Integrator	Configuration value used to set the actual user setpoint of the zone in occupied/day mode.	Present Value COV Increment (0.5)	AV.16 to AV.17, Resolution 1ºF (0.5°C)
AV.16	Cfg_MinSetpoint	Integrator	Configuration value used to set the user minimum temperature to limit the user setpoint range.	Present Value COV Increment (0.5)	50°F to AV.17 (10°C to AV.17) Resolution 1ºF (0.5ºC)
AV.17	Cfg_MaxSetpoint	Integrator	Configuration value used to set the user maximum temperature to limit the user setpoint range.	Present Value COV Increment (0.5)	AV.16 to 104ºF (AV.16 to 40ºC) Resolution 1ºF (0.5ºC)
AV.18	UnoccupiedCoolSetpoint	Integrator	Value of the cooling setpoint during no occupancy mode. The cooling setpoint is restricted by the heating setpoint.	Present Value COV Increment (0.5)	AV.19 to 104ºF (AV.19 to 40ºC) Resolution 1ºF (0.5ºC)
AV.19	UnoccupiedHeatSetpoint	Integrator	Value of the heating setpoint during no occupancy mode. The heating setpoint is restricted by the cooling setpoint.	Present Value COV Increment (0.5)	50ºF to AV.18 (10ºC to AV.18) Resolution 1ºF (0.5ºC)
AV.20	HeatingDemand	Integrator	VAV box heating demand status in percentage.	Read only COV Increment (5)	0 to 100%, Resolution 0.5%
AV.21	Cfg_HeatingPropBand	Advanced	Configuration value of VAV box heating proportional band.	Present Value COV Increment (0.5)	1ºF to 10ºF (0.5ºC to 5ºC), Resolution 1ºF (0.5ºC)
AV.22	Cfg_HeatingDeadBand	Advanced	Configuration value of VAV box heating dead band.	Present Value COV Increment (0.1)	0°F to 10°F (0°C to 5°C), Resolution 0.2ºF (0.1ºC)
AV.23	Reheat Demand	Integrator	Status value that represents the reheat demand in percentage.	Read only COV Increment (5)	0 to 100%, Resolution 0.5%
AV.24	Cfg Reheat Prop Band	Advanced	Configuration value of duct reheat proportional band.	Present Value COV Increment (5)	1ºF to 10ºF (0.5ºC to 5ºC), Resolution 1ºF (0.5ºC)
AV.25	Cfg Reheat Dead Band	Advanced	Configuration value of duct reheat dead band configuration.	Present Value COV Increment (0.1)	0°F to 10°F (0°C to 5ºC), Resolution 0.2ºF (0.1ºC)
AV.26	PerimeterReheatDemand	Integrator	Status value that represents the perimeter (baseboard) reheat demand in percentage.	Read only COV Increment (5)	0 to 100%, Resolution 0.1%
AV.27	Cfg_PerimeterReheatPropBand	Advanced	Configuration value that represents the perimeter reheat proportional band.	Present Value COV Increment (0.5)	1ºF to 10ºF (0ºC to 5ºC), Resolution 0.2ºF (0.1ºC)
AV.28	Cfg_PerimeterReheatDeadBand	Advanced	Configuration value that represents the perimeter reheat dead band.	Present Value COV Increment (0.1)	1ºF to 10ºF (0ºC to 5ºC), Resolution 0.2ºF (0.1ºC)

ID	Name	List	Description	W?	Notes
AV.30	Cfg_IntegralTimeHeating	Advanced	Configuration value that represents the reciprocal of the integral time in seconds (1/I or repeats per second). To obtain a slower reaction time, the value of the integral must be small. To obtain a quicker reaction, the integral must be bigger.	Present Value COV Increment (5)	0 to 250 seconds, Resolution 5 seconds
AV.36	Cfg_HeatingDemandBalance	Integrator	Zone heating weight configuration in percentage. This configuration affects the zone heating demand at the RTU.	Present Value COV Increment (0.1)	0 to 100%, Resolution 0.1%
AV.37	HeatingWeightedDemand	Integrator	Result of the heating demand status when weight is applied.	COV Increment (0.1)	0 to 100%, Resolution 0.1%
AV.38	Cfg_CoolingDemandBalance	Integrator	Zone cooling weight configuration in percentage. This configuration affects the zone cooling demand at the RTU.	Present Value COV Increment (0.1)	0 to 100%, Resolution 0.1%
AV.39	CoolingWeightedDemand	Integrator	Result of the cooling demand status when weight is applied.	COV Increment (0.1)	0 to 100%, Resolution 0.1%
AV.40	CoolingDemand	Integrator	VAV box cooling demand status in percentage.	Read only COV Increment (5)	0 to 100%, Resolution 0.5%
AV.41	Cfg_CoolingPropBand	Advanced	Configuration value of VAV box cooling proportional band.	Present Value COV Increment (0.5)	1ºF to 10ºF (0.5ºC to 5ºC), Resolution 1ºF (0.5ºC)
AV.42	Cfg_CoolingDeadBand	Advanced	Configuration value of VAV box cooling dead band.	Present Value COV Increment (0.1)	0°F to 10°F (0°C to 5°C), Resolution 0.2ºF (0.1ºC)
AV.50	Cfg_IntegralTimeCooling	Advanced	Configuration value that represents the reciprocal of the integral time in seconds (1/I or repeats per second). To obtain a slower reaction time, the value of the integral must be small. To obtain a quicker reaction, the integral must be bigger.	Present Value COV Increment (5)	0 to 250 seconds, Resolution 5 seconds
AV.58	Cfg_ChangeOverSetpoint	Integrator	Configuration value of the temperature at which the primary air from the central system is considered to be in cooling or heating. Note that there is a 1.5°C (2.7°F) dead band on each side of the setpoint.	Present Value COV Increment (0.5)	50°F to 104°F or 10°C to 40°C Resolution 1ºF (0.5ºC)
AV.59	Cfg_ChangeOverDelay	Integrator	Configuration value that represents the delay in changeover. Only applies when **BV.68 Cfg_ChangeOverType** is set to Master Unit.	Present Value COV Increment (1)	0 to 2 minutes, Resolution 1 minute
AV.61	Cfg_NoOccOverrideDelay	Integrator	Configuration time in minutes in unoccupied mode and an override has been activated on the controller. Zone mode changes to occupied for that duration. When the time elapses, the zone returns to unoccupied mode.	Present Value COV Increment (1)	0 to 180 minutes, Resolution 15 minutes
AV.70	Cfg_AnalogOutput1 Min	Advanced	Configuration value that represents the minimum control signal of the controlled element. If the reheat signal is 0 to 10 Vdc then the minimum value is 0 Volts and if the reheat signal is 2 to 10 Vdc then the minimum value is 2 Volts. This value is the 0 position at 0% demand. If set to 2 Volts, a 2 Volt is applied continuously even when there is no demand. It cannot be used to set the minimum starting activation position.	Present Value COV Increment (0.5)	0 Volts to AV.71 Resolution 0.1 Volt
AV.71	Cfg_AnalogOutput1 Max	Advanced	Configuration value that represents the maximum control signal of the controlled element. If the signal is 0 to 10 Vdc or 2 to 10 Vdc then the maximum value is 10 Volts. It can also be used to limit the maximum output of the controller. If the control signal is 0 to 10 Vdc and the maximum voltage value is set to 8 Volts, the controlled element will never go over 80% of its total capacity.	Present Value COV Increment (0.5)	AV.70 to 10.0 Volts Resolution 0.1 Volt

ID	Name	List	Description	W?	Notes
AV.72	Cfg_AnalogOutput2 Min	Advanced	Configuration value that represents the minimum control signal of the controlled element. If the signal is 0 to 10 Vdc then the minimum value is 0 Volts and if the signal is 2 to 10 Vdc then the minimum value is 2 Volts. This value is the 0 position at 0% demand. If set to 2 Volts, a 2 Volt is applied continuously even when there is no demand. It cannot be used to set the minimum starting activation position.	Present Value COV Increment (0.5)	0 Volts to AV.73 Resolution 0.1 Volt
AV.73	Cfg_AnalogOutput2 Max	Advanced	Configuration value represents the maximum control signal of the controlled element. If the signal is 0 to 10Vdc or 2 to 10Vdc then the maximum value is 10 Volts. It can also be used to limit the maximum output of the controller. If the control signal is 0 to 10Vdc and the maximum voltage value is set to 8 Volts, the controlled element will never go over 80% of its total capacity.	Present Value COV Increment (0.5)	AV.72 to 10.0 Volts Resolution 0.1 Volt
AV.88	Cfg_DamperMaxPositionCool	Integrator	Configuration value that represents the maximum damper position when the VAV box is set to pressure dependent. Pressure dependent box settings (0% to100% of opening).	Present Value COV Increment (1)	AV.90 to 100%, Resolution 1%
AV.89	Cfg_DamperMaxPositionHeat	Integrator	Configuration value that represents the maximum damper position when the VAV box is set to pressure dependent. Pressure dependent box settings (0% to100% of opening).	Present Value COV Increment (1)	AV.90 to 100%, Resolution 1%
AV.90	Cfg_DamperMinPosition	Integrator	Configuration value that represents the minimum damper position when the system is in cooling or heating mode (at all times). Pressure dependent box settings (0% to100% of opening).	Present Value COV Increment (1)	0% to 100%, Resolution 1%
AV.92	Cfg_DamperMaxPositionReheat	Integrator	Configuration value of maximum reheat damper position configuration when VAV box is set to pressure dependent	Present Value COV Increment (1)	0% to 100%, Resolution 1%
AV.93	CurrentDamperPosition	Integrator	Value that represents the current position of the damper. Available for pressure dependent as well as pressure independent applications.	Out of service COV Increment (1)	0 to 100%, Resolution 1%
AV.101	Cfg_AirFlowKFactor	Integrator	Configuration value that represents the maximum airflow of the VAV box at 1" W.C. VAV box maximum airflow (pressure independent only). Refer to VAV box manufacturer specifications. Note that there are no measuring units. The Kfactor can be entered as CFM or Litres/second, as long as all the other configurations use the same format. Factor of V=K*sqrt(dP), where dP = 1.	Present Value COV Increment (5)	100 to 9,995 No units, Resolution 5 No units
AV.102	Cfg_AirFlowMin	Integrator	Configuration value used during airflow balancing sequence for Minimum airflow setpoint (cool and heat) when VAV box is set to pressure independent. Refer to EVCB-Airflow Balance Instructions.	Present Value COV Increment (5)	0 to 9995 No units, Resolution 5 No units Restricted by AV.103 and Airflow sensor precision.
AV.103	Cfg_AirFlowCoolMax	Integrator	Configuration value that represents the maximum cooling airflow when VAV box is set to pressure independent.	Present Value COV Increment (5)	(12.7%) Kfac to 9,995, Resolution 5 No units Restricted by AV.102 and Airflow sensor precision.
AV.105	Cfg_AirFlowHeatMax	Integrator	Configuration value that represents the maximum cooling airflow when VAV box is set to pressure independent.	Present Value COV Increment (5)	(12.7%) Kfac to 9,995, Resolution 5 No units
AV.107	Cfg Air Flow Reheat Max	Integrator	Maximum reheat airflow setpoint configuration when VAV box is set to pressure independent.	Present Value COV Increment (5)	AV.102 to AV.103, Resolution 1 No unit
AV.110	ActualAirFlow	Integrator	Status value that represents the actual converted airflow measured by the differential pressure transducer.	Out of Service COV Increment (1)	0 to 9995 No units, Resolution 1 No units Restricted by AV.103 and AV.105
AV.111	AirFlowSetPoint	Integrator	Status value that represents the airflow calculated by demand.	Out of Service COV Increment (1)	0 to 9995 No units, Resolution 1 No units Restricted by AV.103 and AV.105
AV.112	Cfg_AdjustAirFlowMax	Integrator	Configuration value of maximum airflow calibration used during airflow balancing sequence. Set the **MSV.42 AirFlowBal_Mode** to Max Flow or Opened while calibrating. Refer to EVCB-Airflow Balance Instructions.	Present Value COV Increment (1)	0 to 9,995 No units, Resolution 1 No unit Writable only if system is in balancing mode

ID	Name	List	Description	W?	Notes
AV.113	Cfg_AdjustAirFlowMin	Integrator	Configuration value of minimum airflow calibration used during airflow balancing sequence. Set the **MSV.42 AirFlowBal_Mode** to Min Flow while calibrating. Refer to EVCB-Airflow Balance Instructions.	Present Value COV Increment (1)	0 to 9,995 No units, Resolution 1 No unit Writable only if system is in balancing mode
AV.114	Cfg_AirFlowOffset	Integrator	Configuration value of Airflow offset calibration when balancing is enabled. Note that **MSV.42 Airflow Balancing Mode** must be set to Closed while calibrating. Eliminates any airflow reading when there are no airflows or the system is off. Refer to EVCB-Airflow Balance Instructions.	Present Value COV Increment (1)	-500 to 500 No units, Resolution 1 No unit
AV.133	Cfg_Input3 Reading	Advanced	Differential pressure transducer reading status in milli-volts (250 mV = 0" W.C., 4000 mV = 1" W.C.)	Out of Service COV Increment (5)	250 mV to 4,000 mV or 0" W.C to 1" W.C
AV.150	MSTPBaudRate	Integrator	Status value that indicates the rate at which the Baud rate can be configured on an MSTP network. Note that all controllers have an automatic baud rate detection. However, one controller should be configured with the desired baud rate.	Present Value	(0) Auto, 9600, 19200, 38400, and 76800 Resolution Auto
AV.151	MSTPAdd	Integrator	MSTP MAC address configuration of the EVCBI4-ZB controller.	Present Value	0 to 127, Resolution 1 unit
AV.152	DeviceInstance	Integrator	Status value that indicates the device identification instance configuration of the EVCBI4-ZB controller. The instance is configured as per the Auto Instance Setting.	Present Value	0 to 4194302, Resolution 1 unit
AV.160	Cfg_DuctOATHeatLock	Integrator	Configuration value at which the duct reheat will be locked out based on outside air temperature. When temperature rises above the setpoint, the duct reheat is disabled. Locks duct local heating.	Present Value COV Increment (0.5)	-15°F to 122°F (-26°C to 50°C) Resolution 0.1°F (0.1°C)
AV.161	Cfg_PerimeterOATHeatLock	Integrator	Configuration value at which the baseboard reheat will locked out based on outside air temperature. When temperature rises above setpoint, the baseboard reheat is disabled. Locks perimeter local heating.	Present Value COV Increment (0.5)	-15°F to 122°F (-26°C to 50°C) Resolution 0.1°F (0.1°C)
AV.165	CopyCfgStartAddress	Integrator	When using copy config, this value represents the first address in the range of copied controllers.	Present Value	0 to 254, Resolution 1
AV.166	CopyCfgEndAddress	Integrator	When using copy config, this value represents the last address in the range of copied controllers.	Present Value	0 to 254, Resolution 1
AV.167	CopyCfgResult	Integrator	When using copy config, this value is used to verify that the copy to the controllers was successful or failed.	Present Value	Succeed, Progerr, Typeerr, Modlerr, Memerr, Slave, Commerr
AV.182	TO1 Pulsing	Integrator	Duct reheat pulse status. Only available if **MSV.51 Cfg_DuctReheat** is set to 1 Stage Pulse.	Present Value COV Increment (1)	0% to 100%, Resolution 0.1%
AV.185	TO4 Pulsing	Integrator	Perimeter reheat pulse status. Only available if **MSV.52 Cfg_PerimeterReheat** is set to 1 Stage Pulse.	Present Value COV Increment (1)	0% to 100%, Resolution 0.1%
AV.200	Cfg_MU_MSTP_MacAdd	Integrator	MSTP MAC address of the associated RTU controller (CMMB-ZB).	Present Value	0 to 255, Resolution 1

Binary Input (BI)

Table 7 - Object Table Information: Binary Input (BI)

ID	Name	List	Description	W?	Notes
BI.1	DigitalInput1	Integrator	Contact status of the digital input 1. (0) Open, (1) Close	Out_of_Service	0 = Open, 1 = Close
BI.2	DigitalInput2	Integrator	Contact status of the digital input 2. (0) Open, (1) Close	Out_of_Service	0 = Open, 1 = Close

Binary Output (BO)

Table 8 - Object Table Information: Binary Output (BO)

ID	Name	List	Description	W?	Notes
BO.1	BinaryOutput1	Integrator	Duct reheat first stage contact status when **MSV.51 Cfg_DuctReheat** is set to 1 Stage On/Off, 2 Stages On/Off, and/or 3 Stages On/Off.	Present Value	0 = Off, 1 = On
BO.2	BinaryOutput2	Integrator	Duct reheat second stage contact status when **MSV.51 Cfg_DuctReheat** is set to 2 Stages On/Off and/or 3 Stages On/Off.	Present Value	0 = Off, 1 = On
BO.3	BinaryOutput3	Integrator	Duct reheat third stage contact status when **MSV.51 Cfg_DuctReheat** is set to 3 Stages On/Off.	Present Value	0 = Off, 1 = On
BO.4	BinaryOutput4	Integrator	Perimeter reheat contact status when **MSV.52 Cfg_PerimeterReheat** is set to 1 Stage On/Off.	Present Value	0 = Off, 1 = On

Binary Value (BV)

Table 9 - Object Table Information: Binary Value (BV)

ID	Name	List	Description	W?	Notes
BV.1	Cfg_TempUnitBACnet	Integrator	Configuration value of BACnet measuring unit when objects are viewed with BACnet. If set to (0) Celsius, the units will be in Metric system. If set to (1) Fahrenheit, the units will be in Imperial system.	Present Value	0 = Celsius,1 = Fahrenheit
BV.2	Cfg_TempSetPointLock	Integrator	Configuration to lock the zone setpoint and prevent users to change the value. (0) disable setpoint lock, (1) enable setpoint lock	Present Value	0 = Disable, 1 = Enable
BV.4	Cfg_TempUnitTstat	Integrator	Configuration of the user temperature units used on TUHB-ZB. If set to (0) Celsius, the units will be in Metric system. If set to (1) Fahrenheit, the units will be in Imperial system.	Present Value	0 = Celsius,1 = Fahrenheit
BV.5	LocalChangeOverMode	Integrator	EVCBI4-ZB changeover mode status. Note that this status is based on the selection at **AV.59 Cfg_ChangeOverDelay**. (0) System in cooling mode, (1) System in heating mode	Present Value	0 = Cooling, 1 = Heating
BV.32	Cfg BO 1 Direction	Advanced	Configuration value of duct reheat signal polarity when **MSV.51 Cfg_DuctReheat** is set to 1 Stage On/Off only. (0) Direct Acting, (1) Reverse Acting	Present Value	0 = Direct, 1 = Reverse
BV.35	Cfg BO 4 Direction	Advanced	Perimeter reheat signal polarity configuration when **MSV.52 Cfg_PerimeterReheat** is set to 1 Stage On/Off only. (0) Direct Acting, (1) Reverse Acting	Present Value	0 = Direct, 1 = Reverse
BV.37	OverrideOccupancy	Integrator	Unoccupied mode system override status, command from TUHB-ZB. (0) No override, (1) override enabled (system is occupied).	Read Only	0 = No, 1 = Yes
BV.40	Cfg_MotorDirection	Integrator	Configuration to change the rotation direction of the damper actuator. When set to (0) Direct, the damper actuator is configured to open from 0° to 90°. When set to (1) Reverse the damper actuator is configured to open from 90° to 0°. When this value is changed, the controller will execute an auto-stroke to reset the actuator's position.	Present Value	0 = Direct, 1 = Reverse
BV.45	AirFlowBalancing	Integrator	Command from the EVCBI4-ZB to enable the local balancing mode (VAV box only). Note that **MSV.42 AirFlowBal_Mode** must be set appropriately for proper balancing. Refer to EVCB-Airflow Balance Instructions. (0) Airflow Balancing is disabled, (1) Airflow Balancing is enabled.	Present Value	0 = Disable, 1 = Enable
BV.47	BalancingModeActive	Integrator	Command from the TUHB-ZB to enable the system balancing mode. (0) No, balancing mode is disabled, (1) Yes, balancing mode is enabled. When balancing mode is enabled, **BV.45 Airflow Balancing** is also enabled and **MSV.42 AirflowBal_Mode** is set to Max Flow. This forces all the VAV boxes go to the highest maximum airflow setpoint (heating or cooling).	Present Value	0 = Disable, 1 = Enable
BV.50	Cfg_PressureModeSelect	Integrator	Configuration value to configure the VAV box as (0) pressure independent (airflow reading) or (1) pressure dependent (motor position).	Present Value	0 = Independent, 1 = Dependent
BV.60	Cfg_DisplayRH	Integrator	Determines if the thermostat displays the %RH value. The display will alternate between %RH for 2 seconds and temperature for 8 seconds.	Present Value	0= Off, 1= On
BV.65	Cfg_DisplayCO2	Integrator	Determines if the thermostat displays the CO2 value. CO2 is displayed on the first line above the temperature, replacing the time display.	Present Value	0= Off, 1= On
BV.68	Cfg_ChangeOverType	Integrator	Changeover type configuration. (0) Master Unit (RTU) controller sends the changeover status, (1) Locally (EVCBI4-ZB) local temperature sensor connected on AI.1.	Present Value	0 = Master Unit, 1 = Locally

ID	Name	List	Description	W?	Notes
BV.69	MU_ChangeOverMode	Integrator	RTU changeover mode status. (0) RTU in cooling mode, (1) RTU in heating mode.	Present Value	0 = Cooling, 1 = Heating
BV.90	CopyCfgExecute	Integrator	When using copy config, this value is used to start the copy to other controllers. (0) Disable, (1) Enable. Note: The BACnet schedule is not copied during a Copy Config operation.	Present Value	0 = No, 1 = Yes
BV.105	Cfg_NoMinPositionC_Over	Integrator	No minimum position changeover configuration allows the VAV box damper to completely close when the system mode and zone demand are opposite. (0) No, VAV will maintain the minimum position/airflow defined by AV.90. A minumum position of at least 10% will always be maintaned. (1) Yes, the VAV close-off will be enabled.	Present Value	0 = No, 1 = Yes
BV.110	AI_DuctReheatLock	Integrator	Duct reheat lock alarm status to indicate that the duct reheat is locked out due to outside air temperature (refer to **AV.160 Cfg_DuctOATHeatLock**). (0) No alarm, (1) Yes, alarm is active	Present Value	0 = No, 1 = Yes
BV.111	AI_PerimeterReheatLock	Integrator	Perimeter reheat lock alarm status to indicate that the baseboard reheat is locked out due to outside air temperature (refer to **AV. 161 Cfg_PerimeterOATHeatLock**). (0) No alarm, (1) Yes, alarm is active.	Present Value	0 = No, 1 = Yes

Multi State Value (MSV)

Table 10 - Object Table Information: Multi State Value (MSV)

ID	Name	List	Description	W?	Notes
MSV.5	Cfg_AI2_Type	Integrator	Configuration of Auxiliary input on analog input 2 (monitoring only). **Percentage**: 0 to 10 Vdc input converted to 0 to 100%. **Temperature**: 10kΩ temperature sensor displays the temperature in degrees Celsius or Fahrenheit according to BV.1 configuration. **OnOff**: Dry or wet (24Vac) contact connected and displays the value in a binary format (0 or 1).	Present Value	Percentage Temperature OnOff
MSV.11	OccCommand	Integrator	Occupancy command sent by the TUHB-ZB controller to set the current system occupancy. Value is read from MU and used by zones. No local schedule at the zones **Off**: The system mode is off. **Occupancy**: The system mode is occupied. **NoOccupancy**: The system mode is unoccupied.	Present Value	Off Occupancy NoOccupancy
MSV.12	EffectiveOccupancy	Integrator	Status that indicates the actual occupancy mode as determined by TUHB-ZB controller. **NoOccupancy**: Zone is not occupied. **Occupancy**: Zone is occupied. **Override**: Zone is unoccupied but put back to occupied mode for a maximum pre-determined time set at AV.61.	Present Value	NoOccupancy Occupancy Override
MSV.41	Cfg_AirFlowScale	Integrator	Configuration value of the airflow scale used to get a better resolution when small airflows are configured. **Scale1**: No scale is used. **Scale 10**: Airflow is multiplied by 10. This scale is used for low airflows up to 999. **Scale 100**: Airflow is multiplied by 100. This scale is used for very low airflows up to 99.	Present Value	Scale1 Scale10 Scale100
MSV.42	AirFlowBal_Mode	Integrator	Position the damper actuator to preset positions. This object is used when balancing mode (BV.45) is activated	Present value if BV.45 is set to Enable	Closed

ID	Name	List	Description	W?	Notes
			Closed: The damper actuator moves to a fully closed position. Position used to calibrate airflow offset (AV.114). **Min Flow**: The damper actuator moves to the minimum airflow position of the actual mode it is in. Position used to calibrate the minimum airflow (AV.113). **Max Flow**: The damper actuator moves to the maximum airflow position of the actual mode it is in (AV.105 in heat or AV.103 in cool). Position used to calibrate the maximum airflow (AV.112). **Opened**: The damper actuator moves to a fully opened position. Position used to calibrate the maximum airflow (AV.112).		Min Flow Max Flow Full Open
MSV.50	Cfg_FanPoweredBox	Integrator	Select the configuration of the FAN Output (BO4). **No**: Fan powered box disabled. **Series**: Series fan powered box enabled. **Parallel**: Parallel fan powered box enabled.	Present Value	No Series Parallel
MSV.51	Cfg_DuctReheat	Integrator	Select the configuration of duct reheat output (AO1, BO1, BO2, BO3, Reverse Acting On/Off, refer to BV.32). **No**: Duct reheat disabled. **AnalogOutputDA**: Modulating 0 to 10 Vdc duct reheat, Direct Acting. **AnalogOutputRA**: Modulating 0 to 10 Vdc duct reheat, Reverse Acting. **1StageOnOff**: On/Off duct reheat, Direct Acting. Refer to BV.32 for Reverse Acting. **1StagePulsed**: Pulse duct reheat, Direct Acting. **2StagesOnOff**: 2 stage On/Off duct reheat, Direct acting only. **3StagesOnOff**: 3 stage On/Off duct reheat, Direct Acting only.	Present Value	No Analog Output DA Analog Output RA 1 Stage OnOff 1 Stage Pulsed 2 Stages OnOff 3 Stages OnOff
MSV.52	Cfg_PerimeterReheat	Integrator	Configuration of perimeter (baseboard) reheat. AO2, BO4 (Reverse Acting On/Off, refer to BV.35) **No**: Perimeter reheat disabled. **AnalogOutputDA**: Modulating 0 to 10 Vdc perimeter reheat, Direct Acting. **AnalogOutputRA**: Modulating 0 to 10 Vdc perimeter reheat, Reverse Acting. **1StageOnOff**: On/Off perimeter reheat, Direct Acting (Refer to BV.35 for Reverse Acting). **1StagePulse** Pulse perimeter reheat, Direct Acting.	Present Value	No AnalogOutputDA AnalogOutputRA 1StageOnOff 1StagePulsed
MSV.95	Cfg_DisplayInfo	Advanced	Configuration value of the information displayed on the TRL. **Temp and Demand**: TRL will display the actual temperature and cooling/heating demand. **Setpoint and Demand**: TRL will display the actual setpoint and cooling/heating demand. **Temp Only**: TRL will display the actual temperature but no demand. **Setpoint Only**: TRL will display the actual setpoint but no demand. **Off**: TRL display will be off (no display).	Present Value	Temp and Demand Setpoint and Demand Temp only Setpoint only Off
MSV.100	Cfg_ObjectList	Integrator	Configuration value of the object list. **Integrator**: Object list restricted to Integrator Object List. **Advanced**: Object list restricted to Integrator and Advanced Object List. **Factory**: Complete object list is available.	Present Value	Integrator Advanced Factory
MSV.101	Cfg_KeypadLockoutLevels	Integrator	Configurations option to lock TRL locking. **Level 0**: No lockouts. **Level 1**: Arrow buttons locked. **Level 2**: Arrow buttons and mode locked. **Level 3**: Arrow buttons, mode, and password menu locked. **Level 4**: Arrow buttons, mode, password menu and program mode locked.	Present Value	Level_0 Level_1 Level_2 Level_3 Level_4

Other

ID	Name	List	Description	W?	Notes
PGM.1	ProgramFirmware	Integrator	Program firmware. Set to LOAD to program the file in application memory. The controller will be reset and the firmware will be LOADED into the memory. Use only the binary file provided by Neptronic.	Program Change	Program Change, only LOAD (1) and RESTART (4) are supported
FIL.1	FirmwareBinaryFile	Integrator	Firmware binary file. Set to LOAD to program the file in application memory. The controller will be reset and the firmware will be LOADED into the memory. Use only the binary file provided by Neptronic.	File Size Archive	File Size is accepted for 0 value only.

Notes



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