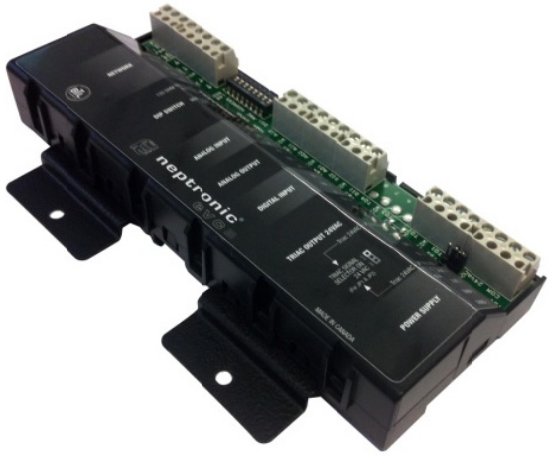
EVCB14NIT4X

(4 TRIACS / pressure independent / external motor)

BACnet Communication Module User Guide



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Introduction

The EVCB Controller BACnet® Communication Module User Guide provides information about using the EVCB controller 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. Max_Master and the instances are configured to the device object through **BACnet WriteProperty** service. The MAC address is set via the DIP switches. Programming mode determines the MS/TP baud rate setting of 9600, 19200, 38400, and 76800. In the configuration 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 value between 000 and 127 via DIP switches. Can also be set to a value between 000 and 254 via menu. 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, 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 via the menu or through the WriteProperty service to the 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 WriteProperty service to the **Device Object.Object_Name**. For example, EVCB14NIT4X.

Configuration Options

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

Quick Setup

Configure the controller's baud rate and device instance without programming.

1. Set a unique MAC address using the DIP switches located on the controller.
2. Connect the controller to the network and power it up.
3. The controller automatically configures the baud rate and device instance.
4. Repeat the steps for each controller.

Manual Setup

To use a **Device_Instance** other than 153,000, and /or if your site has more than one controller network, go to the thermostat menu.

1. Ensure the thermostat jumper is in the RUN position.
2. Press the **[*]** and **[↵]** buttons simultaneously for 5 seconds. The *"ENTER PASSWORD"* screen appears.
3. Enter the 637 password within 1 minute by using the arrow keys to increase or decrease the value and the **[*]** and **[↵]** buttons to toggle between the digits.
4. Follow the menus 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.

Configure the **Max_Master** value through **WriteProperty** service to the **Device Object.Max_Master** to increase network efficiency or if there are less than 127 devices on the network.

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 slower. 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 to controllers of 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.

However, the BACnet Schedule is not copied during a Copy Config operation.

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:

- *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=153000 (Vendor_Identifier*1000)	W
Object_Name	EVBN_, programmable up to 32 bytes	W
Description	Programmable up to 32 characters (default: BACnet VAV controller)	W
Object_Type	Device	
System_Status	Operational	
Vendor_Identifier	Always 153	
Vendor_Name	Always Neptronic	
Model_Name	Example, EVBN14X	Read Only
Firmware_Revision	currently, 4.10	Read Only
Application_Software_Version	currently, 2.03	Read Only
Protocol_Version	Always 1	Read Only
Protocol_Revision	Always 14	Read Only
DataBase_Revision	Default 0; incremented if Object Name and/or device ID change	Read Only
Max_APDU_Length_Accepted	Always 480	Read Only
Segmentation_Supported	(3) = No Segmentation	Read Only
APDU_Timeout	6000	W
Number_of_APDU_Retries	Always 3	Read Only
Local_Time	00:00:00	W
Local_Date	01-Jan-2015 (Thu)	W
Uts_Offset	-300 minutes	W
Daylight_Savings_Status	False	W
Backup_Failure_Timeout	300	W
Configuration_Files	File-1	
Last_Restore_Time	2015-01-01 (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	160	Read Only
Device_Address_Binding	Always empty	
Max_Master	Programmable in the range of 0-127 (default: 127)	W
Max_Info_Frames	Always 1	
Proprietary property #1000	• Represents the MS/TP MAC address in the range of 0 to 254 (default: 0) • Writable if all MAC address DIP switches are OFF • Values 128 to 254 represent MS/TP non-token passing slave devices	W
Proprietary property #1001	• Programmable (default: Auto)	W

Property	Value	Writable
	• Represents the MS/TP Baud rate (unsigned type) • Values are 0 (auto), 9600, 19200, 38400, 76800 • Reading this property always returns the actual Baud rate	
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 = 0-120 minutes (unsigned type) • Writing 0 means no automatic return to normal	W

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	• If "Out of Service" is true, Present_Value and Status_Flag become writable properties. • Out_of_Service property is writable for objects to which Present_Value is not writable. Refer to Out of Service Property section on page 7 for more information. • Object will automatically return to Normal after a programmable period of time. 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	• Present_Value property is writable for every AV object except AV.20, AV.23, AV.40, AV.45, AV.55. • Out_of_Service property is writable for objects indicated in Table 6 - Object Table Information: Analog Value (AV) on page 9. • Refer to Out of Service Property section on page 7 for more information. • Object will automatically return to Normal after a programmable period of time. Refer to Proprietary property #1002 of Device Object in Table 2 - Device Object Properties. Some objects are commandable. In such case, the priority-array and relinquish-default properties are available.
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	• If "Out of Service" is true, Present_Value and Status_Flag become writable properties. • Out_of_Service property is writable for objects to which Present_Value is not writable. Refer to Out of Service Property section on page 7 for more information. • Object will automatically return to Normal after a programmable period of time. 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	• Present_Value property is writable for every Binary Value object. • Out_of_Service property is writable for every Binary Value object. • Some objects are commandable. In such case, the priority-array and relinquish-default properties are available. • 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	Present_Value	

Object Type	Enabled	Optional Properties Supported	Writable Properties	Notes
		• Inactive-text • Active-text		
Device	☑	• Max_Master • Max_Info_Frame • Description • Active-COV-Subscriptions • #1000 (MSTP addr) • #1001 (Baud rate) • #1002 (Time out) • Local_Time • Local_Date • Uts_Offset • Daylight_Savings_Status • Apdu_Timeout • Backup_Failure_Timeout	• Object_Identifier • Object_Name • Max_Master • Description • Local_Time • Local_Date • Uts_Offset • Daylight_Savings_Status • Apdu_Timeout • Backup_Failure_Timeout • #1000 • #1001 • #1002 • Configuration_Files • Last_Restore_Time • Backup_And_Restore_State • Backup_Preparation_Time • Restore_Completion_Time • Restore_Preparation_Time	Refer to Table 2 - Device Object Properties on page 5.
Multi-State Value	☑	• Description • Reliability • States_Text	Present_Value	• Present_Value property is writable for every Multi State Value object except MSV.12, MSV.13, MSV.15. • Out_of_Service property is not writable for MSV.
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 to file size.
Schedule	☑	• Description • Weekly Schedule	• Effective Period • Weekly Schedule • Schedule Default • Priority For Writing • Out_of_Service	If "Out of Service" is true, Present_Value becomes writable property.

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 EVCB Controller series use the following BACnet object tables, categorized on the basis of 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	Description	W?	Notes
AI.1	AnalogInput1	Status value in volts of Analog Input 1. Value is active only when MSV.1 is set to Airflow Setpoint or Motor Position.	Out of service COV Increment (0.5)	0.00 to 10.00 Vdc, Resolution 0.01 V
AI.2	AnalogInput2	Status value in volts of Analog Input 2. Value is active only when MSV.2 is set to Airflow Setpoint or Motor Position.	Out of service COV Increment (0.5)	0.00 to 10.00 Vdc, Resolution 0.01 V
AI.3	InternTemp	Status of the intern temperature sensor (ITS). This is the value read by the integrated temperature sensor of the TRL.	Out of service COV Increment (0.5)	32ºF to 122ºF or 0ºC to 50ºC Resolution 0.02ºF/0.01ºC
AI.5	InternHumidity	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	TrlgCO2	CO_2 reading of on-board sensor of TRLG24 or TRLGH24 thermostat unit.	Out of service COV Increment (50)	0 to 2000 ppm, Resolution 1 ppm

Analog Output (AO)

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

ID	Name	Description	W?	Notes
AO.1	AnalogOutput1	Status value that represents the modulation percentage of analog output 1 based on demand.	Present Value COV Increment (0.5)	0 to 100%, Resolution 0.1%
AO.2	AnalogOutput2	Status value that represents the modulation percentage of analog output 2 based on demand.	Present Value COV Increment (0.5)	0 to 100%, Resolution 0.1%

Analog Value (AV)

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

ID	Name	Description	W?	Notes
AV.1	ControlTemp	Status of the control temperature used to calculate demand. This value is configured with MSV.4 Temp Control Source.	Out of service Writable if MSV.4 is set to "Network Sensor" COV Increment (0.5)	-40°F to 212°F or -40°C to 100°C Resolution 0.02°F/0.01°C
AV.2	ExternTemp	Value read from extern temperature sensor (ETS) when MSV.1 or MSV.2 is set to Extern Sensor.	Out of service COV Increment (0.5)	-40°F to 212°F or -40°C to 100°C Resolution 0.02°F/0.01°C
AV.3	ChangeOverTemp	Status of the changeover temperature sensor (SENS). This is the value read by the changeover sensor when MSV.1 or MSV.2 is set to Changeover Sensor.	Out of service COV Increment (0.5)	-40°F to 212°F or -40°C to 100°C Resolution 0.02°F/0.01°C
AV.4	AirSupplyTemp	Status of the air supply temperature sensor (AST). This is the value read by the discharge temperature sensor when MSV.1 or MSV.2 is set to Air Supply Temp. Note that this value is for reference only. No action is linked to this temperature.	Out of service COV Increment (0.5)	-40°F to 212°F or -40°C to 100°C Resolution 0.02°F/0.01°C
AV.5	CO2Sensor	Status of the carbon dioxide sensor (CO2). This is the value read CO2 sensor in parts per million (PPM) when MSV.1 or MSV.2 is set to CO2 sensor. AV.140 (Range) and AV.141 (Setpoint) must be configured for proper reading.	Out of service COV Increment (50)	0 to 5,000 PPM, Resolution 1 PPM
AV.10	Cfg_InternTempOffset	Configuration value used to calibrate the integrated temperature sensor of the TRL (ITS).	Present Value COV Increment (0.1	±10°F or ±5°C, Resolution 0.2°F/0.1°C
AV.11	Cfg_ExternTempOffset	Configuration value used to calibrate the external temperature sensor (ETS).	Present Value COV Increment (0.1)	±10°F or ±5°C, Resolution 0.2°F/0.1°C
AV.15	TempSetPoint	Configuration value used to set the actual user setpoint of the zone in occupied/day mode. This value may be locked to prevent the user from changing the setpoint (BV.2).	Present Value COV Increment (0.5)	AV.16 to AV.17, Resolution 1ºF/0.5ºC
AV.16	Cfg_MinpSetPoint	Configuration value used to set the user minimum permitted setpoint of the zone in occupied/day mode.	Present Value COV Increment (0.5)	50°F to AV.17 or 10°C to AV.17 Resolution 1ºF/0.5ºC
AV.17	Cfg_MaxpSetPoint	Configuration value used to set the user maximum permitted setpoint of the zone in occupied/day mode.	Present Value COV Increment (0.5)	AV.16 to 104ºF or AV.16 to 40ºC Resolution 1ºF/0.5ºC
AV.18	SetPointCoolNoOccNSB	Configuration value of the cooling setpoint when in night setback or unoccupied. BV.20 must be set to Setpoint for the value to be active.	Present Value COV Increment (0.5)	AV.19 to 104ºF or AV.19 to 40ºC Resolution 1ºF/0.5ºC
AV.19	SetPointHeatNoOccNSB	Configuration value of the heating setpoint when in night setback or unoccupied. BV.20 must be set to Setpoint for the value to be active.	Present Value COV Increment (0.5)	50ºF to AV.18 or 10ºC to AV.18 Resolution 1ºF/0.5ºC
AV.20	HeatingDemand1	Status value that represents the heating demand in percentage for the Heating Ramp 1. This value is based on zone temp, zone set point and values set for the actual ramp (AV.21 and AV.22).	Read only COV Increment (5)	0 to 100%, Resolution 0.5%
AV.21	Cfg_HeatingPropBand1	Configuration value that represents the range through which the controller will modulate the heating output from 0-100%.	Present Value COV Increment (0.5)	1ºF to 10ºF or 0.5ºC to 5ºC, Resolution 1ºF/0.5ºC
AV.22	Cfg_HeatingDeadBand	Configuration value that represents the range where the controller will not take action when below the zone setpoint.	Present Value COV Increment (0.1)	0°F to 10°F or 0°C to 5°C, Resolution 0.2ºF/0.1ºC
AV.23	HeatingDemand2	Status value that represents the heating demand in percentage for the Heating Ramp 2. This value is based on zone temp, zone setpoint and values set for the actual ramp (AV.24 and AV.25).	Read only COV Increment (5)	0-100%, Resolution 0.5%

ID	Name	Description	W?	Notes
AV.24	Cfg_HeatingPropBand2	Configuration value that represents the range through which the controller will modulate the heating output from 0-100%.	Present Value COV Increment (5)	1ºF to 10ºF or 0.5ºC to 5ºC, Resolution 1ºF/0.5ºC
AV.25	Cfg_HeatingDeadBand2	Configuration value that represents the range where the controller will not take action when below the zone setpoint.	Present Value COV Increment (0.1)	0°F to 10°F or 0°C to 5°C, Resolution 0.2ºF/0.1ºC
AV.30	Cfg_IntegralTimeHeating	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)	0-250 seconds, Resolution 5 seconds
AV.40	CoolingDemand1	Status value that represents the cooling demand for the Cooling Ramp 1. This value is based on zone temp, zone setpoint and values set for the actual ramp.	Read only COV Increment (5)	0-100%, Resolution 0.5%
AV.41	Cfg_CoolingPropBand1	Configuration value that represents the range through which the controller will modulate the cooling output from 0-100%.	Present Value COV Increment (0.5)	1ºF to 10ºF or 0.5ºC to 5ºC Resolution 1ºF/0.5ºC
AV.42	Cfg_CoolingDeadBand1	Configuration value that represents the range at which the controller will not take action when above the zone setpoint.	Present Value COV Increment (0.1)	0°F to 10°F or 0°C to 5° Resolution 0.2ºF/0.1ºC
AV.45	CoolingDemand2	Status value that represents the cooling demand for the Cooling Ramp 2. This value is based on zone temp, zone setpoint and values set for the actual ramp.	Read only COV Increment (5)	0-100%, Resolution 0.5%
AV.46	Cfg_CoolingPropBand2	Configuration value that represents the range through which the controller will modulate the cooling output from 0-100%.	Present Value COV Increment (0.5)	1°F to 10°F or 0.5°C to 5°C Resolution 1ºF/0.5ºC
AV.47	Cfg_CoolingDeadBand2	Configuration value that represents the range at which the controller will not take action when above the zone setpoint.	Present Value COV Increment (0.1)	0°F to 10°F or 0°C to 5°C Resolution 0.2°F/0.1°C
AV.50	Cfg_IntegralTimeCooling	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)	0-250 seconds, Resolution 5 seconds
AV.51	Cfg_CoolingAntiCycleDelay	Configuration value in minutes to prevent the cooling outputs to cycle on and off. This a protection feature used when cooling is done through compressors.	Present Value COV Increment (1)	0-15 minutes, Resolution 1 minute
AV.55	ChangeOverDemand	Status value that represents the changeover demand for the VAV box. This value is based on zone temp, zone setpoint and values set for the actual ramp. Available only if Motor is set to Cor.	Read Only COV Increment (5)	0-100%, Resolution 0.5%
AV.56	Cfg_ChangeOverPropBand	Configuration value that represents the range through which the controller will modulate the cooling and heating output from 0-100%. The heating and cooling proportional band will be set by this value. Available only if Motor is set to Cor.	Present Value COV Increment (0.5)	1°F to 10°F or 0.5°C to 5°C Resolution 1ºF/0.5ºC
AV.57	Cfg_ChangeOverDeadBand	Configuration value that represents the range at which the controller will not take action when above or below the zone setpoint. The heating and cooling dead band will be set by this value. Available only if Motor is set to Cor.	Present Value COV Increment (0.1)	0°F to 10°F or 0°C to 5°C Resolution 0.2°F/0.1°C
AV.58	ChangeOverSetPoint	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.60	Cfg_NSBSetBackOverrideDelay	Configuration time in minutes when in night setback and an override has been activated on the TRL.	Present Value COV Increment (5)	0 to 180 minutes, Resolution 15 minutes
AV.61	Cfg_NoOccOverrideDelay	Configuration time in minutes when unoccupied and an override has been activated on the TRL.	Present Value COV Increment (1)	0 to 180 minutes, Resolution 15 minutes
AV.64	Cfg_DigitalInput2Delay	Configuration time in seconds. Used with the Override function of MSV.14. When DI2 is activated, AV.64 will countdown from the set value. Once the time has expired, the EVC goes to the "OFF" mode.	Present Value COV Increment (1)	0-3,600 seconds, Resolution 10 seconds
AV.70	Cfg_AnalogOutput1Min*	This value represents the minimum control signal of the controlled element. If the signal is 0-10Vdc then the minimum value is 0 Volts and if the signal is 2-10 Vdc then minimum value is 2 Volts. This value is the 0 position at 0% demand. If set	Present Value COV Increment (0.5)	0 Volt to AV.71, Resolution 0.1 Volt

ID	Name	Description	W?	Notes
		at 2 Volts, a 2 Volt is applied continuously even when there is no demand. It is not used to set the minimum starting activation position.		
AV.71	Cfg_AnalogOutput1Max*	This value represents the maximum control signal of the controlled element. If the signal is 0-10Vdc or 2-10Vdc then the maximum value is 10 Volts. It can also be used to limit the maximum output of the EVC. If the control signal is 0-10Vdc 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.70 to 10.0 Volt, Resolution 0.1 Volt
AV.72	Cfg_AnalogOutput2Min*	This value represents the minimum control signal of the controlled element. If the signal is 0-10Vdc then the minimum value is 0 Volts and if the signal is 2-10 Vdc then minimum value is 2 Volts. This value is the 0 position at 0% demand. If set at 2 Volts, a 2 Volt is applied continuously even when there is no demand. It is not used to set the minimum starting activation position.	Present Value COV Increment (0.5)	0 Volt to AV.73, Resolution 0.1 Volt
AV.73	Cfg_AnalogOutput2Max*	This value represents the maximum control signal of the controlled element. If the signal is 0-10Vdc or 2-10Vdc then the maximum value is 10 Volts. It can also be used to limit the maximum output of the EVC. If the control signal is 0-10Vdc 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 Volt, Resolution 0.1 Volt
AV.75	FloatingTO1/TO2Timer	Represents the time required by the valve actuator to complete a 90° run. Value required only when MSV.26 TO1 Signal Type is set to floating.	Present Value COV Increment (5)	15 to 420 seconds; resolution 5 seconds Available only if MSV.26 = Floating
AV.76	FloatingTO3/TO4Timer	Represents the time required by the valve actuator to complete a 90° run. Value required only when MSV.28 TO3 Signal Type is set to floating.	Present Value COV Increment (5)	15 to 420 seconds; resolution 5 seconds
AV.77	Cfg_TO1ClosePos	Configuration value that indicates at what percentage of the demand the contact closes to energize the controlled element.	Present Value COV Increment (1)	15 to 80%, Resolution 1%
AV.78	Cfg_TO1OpenPos	Configuration value that indicates at what percentage of the demand the contact opens to de-energize the controlled element.	Present Value COV Increment (1)	0 to 76% (TO1 close pos-4%), Resolution 1%
AV.79	Cfg_TO2ClosePos	Same as AV.77.	Present Value COV Increment (1)	15 to 80%, Resolution 1%
AV.80	Cfg_TO2OpenPos	Same as AV.78.	Present Value COV Increment (1)	0 to 76% (TO2 close pos-4%) Resolution 1%
AV.81	Cfg_TO3ClosePos	Same as AV.77.	Present Value COV Increment (1)	15 to 80%, Resolution 1%
AV.82	Cfg_TO3OpenPos	Same as AV.78.	Present Value COV Increment (1)	0 to 76% (TO3 close pos-4%) Resolution1%
AV.83	Cfg_TO4ClosePos	Same as AV.77.	Present Value COV Increment (1)	15 to 80%, Resolution 1%
AV.84	Cfg_TO4OpenPos	Same as AV.78.	Present Value COV Increment (1)	0 to 76% (TO4 close pos-4%) Resolution1%
AV.90	Cfg_MotorMinPositionCool	Configuration value of the minimum position in cooling mode the VAV box is allowed. This value is available for pressure dependent boxes or if BV.52 Pressure Mode Change is activated.	Present value COV Increment (1)	0 to 100%, Resolution 5%
AV.91	Cfg_MotorMinPositionHeat	Configuration value of the minimum position in heating mode the VAV box is allowed. This value is available for pressure dependent boxes or if BV.52 Pressure Mode Change is activated.	Present Value COV Increment (1)	0 to 100%, Resolution 5%
AV.93	MotorPosition	Status value that represents the damper actuator position.	Out of service COV Increment (1)	0 to 100%, Resolution 1%

ID	Name	Description	W?	Notes
AV.95	Cfg_MotorMinVoltage	This value represents the minimum control signal of the external actuator. If the signal is 0-10Vdc, then the minimum value is 0 Volts and if the signal is 2-10Vdc, then the minimum value is 2 Volts. This value should be set according to the external actuator's control signal specification.	Present Value COV Increment (0.1)	0 Volt to AV.96, Resolution 0.1 Volt
AV.96	Cfg_MotorMaxVoltage	This value represents the maximum control signal of the external actuator. If the signal is 0-10Vdc or 2-10Vdc, then the maximum value is 10 Volts. This value should be set according to the external actuator's control signal specification.	Present Value COV Increment (0.1)	AV.95 to 10.0 Volt, Resolution 0.1 Volt
AV.97	Cfg_FeedBackMinVoltage	This value represents the minimum feedback signal of the external actuator. If the signal is 0-10Vdc, then the minimum value is 0 Volts and if the signal is 2-10Vdc, then the minimum value is 2 Volts. This value should be set according to the external actuator's feedback signal specification.	Present Value COV Increment (0.1)	0 Volt to AV.98, Resolution 0.1 Volt
AV.98	Cfg_FeedBackMaxVoltage	This value represents the maximum feedback signal of the external actuator. If the signal is 0-10Vdc or 2-10Vdc, then the maximum value is 10 Volts. This value should be set according to the external actuator's feedback signal specification.	Present Value COV Increment (0.1)	AV.97 to 10.0 Volt, Resolution 0.1 Volt
AV.100	Cfg_PressureNumFilter	Configuration value used to stabilize the reading of the differential pressure transducer when balancing.	Present Value COV Increment (1)	0 to 10 seconds, Resolution 1 second
AV.101	Cfg_AirFlowVnomOrKFactor	Configuration value that represents the maximum airflow of the VAV box at 1" w.c.	Present Value COV Increment (5)	100 to 9995 No units, Resolution 5 No units
AV.102	Cfg_AirFlowCoolMin	Configuration value that represents the minimum cooling airflow when system is in cooling mode.	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	Configuration value that represents the maximum cooling airflow when system is in cooling mode.	Present Value COV Increment (5)	(12.7%) Kfac to 9,995, Resolution 5 No units Restricted by AV.102 and Airflow sensor precision
AV.104	Cfg_AirFlowHeatMin	Configuration value that represents the minimum heating airflow when system is in heating mode.	Present Value COV Increment (5)	0 to 9,995 No units, Resolution 5 No units Restricted by AV.105 and Airflow sensor precision
AV.105	Cfg_AirFlowHeatMax	Configuration value that represents the maximum cooling airflow when system is in heating mode.	Present Value COV Increment (5)	(12.7%) Kfac to 9,995, Resolution 5 No units Restricted by AV.104 and Airflow sensor precision
AV.106	Cfg_AirFlowIntegralTime	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 (1)	0 to 60 minutes, Resolution 1 minute
AV.110	ActualAirFlow	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.102, AV.103, AV.104, AV.105
AV.111	AirFlowSetPoint	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.102, AV.103, AV.104, AV.105
AV.112	Cfg_AdjustAirFlowMax	Configuration value used during airflow balancing sequence. 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.113	Cfg_AdjustAirFlowMin	Configuration value used during airflow balancing sequence. 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	Configuration value used to adjust the calibration of the differential pressure transducer. Refer to EVCB Airflow Balance Instructions.	Present Value COV Increment (1)	-500 to 500 No units, Resolution 1 No unit
AV.116	Cfg_AirFlowHysteresisStop	Represents the airflow setpoint percentage used to prevent damper actuator oscillations. The actuator stops moving when in range of the airflow setpoint percentage value. Consult Neptronic technical support before changing this value.	Present Value COV Increment (1)	1 to 100%, Resolution 1%

ID	Name	Description	W?	Notes
AV.117	Cfg_AirFlowHysteresisStart	Configuration value that represents the airflow setpoint percentage used to prevent actuator from oscillations. The damper actuator starts moving when the airflow setpoint percentage value is out of range. Consult Neptronic technical support before changing this value.	Present Value COV Increment (1)	1 to 100%, Resolution 1%, Restricted by AV.116
AV.132	Cfg_Input3 Minimum Reading	This setting represents the deadband of the pressure sensor in mV. For advanced users or special applications only. We recommend that you use the default setting of 60mV.	Present Value COV Increment (1)	10mV to 180mV, Resolution 1mV
AV.133	Cfg_Input3 Reading	Status value that represents the voltage output value in mV of the pressure sensor.	Out of Service COV Increment (5)	250mV (0") to 4,000mV (1")
AV.140	CO2Range	Configuration value that represents the maximum range of the CO2 sensor (PPM).	Present Value COV Increment (1)	100 to 5,000 PPM
AV.141	CO2Setpoint	Configuration value that represents the maximum limit of CO2 concentration before the EVC sends an alarm.	Present Value COV Increment (1)	100 to the greater ppm value between 2000 and AV.140
AV.145	NetworkTimeOut	Configuration time value. If MSV.4 is set to "Remote" and no value has been sent via BMS for more than AV.145 time, then EVC goes to "OFF" mode. AV.1 will display 999°C and object in Fault. If time is set to "0" minutes, AV.1 is reset to AV.15 value.	Present Value COV Increment (1)	0 to 60 minutes, Resolution 1 minute
AV.165	CopyCfgStartAddress	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	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	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.170	CL_HT_SwitchTimer	Configuration value of the time required before the changeover is permitted to take place (time in minutes).	Present Value COV Increment (1)	0 to 120 minutes, Resolution 1 minute
AV.171	CL_HT_SwitchTimerCount	Status value of the remaining time before the changeover is authorised. This value counts down from the time set in AV.170.	Read Only COV Increment (1)	0 to 7200 seconds, Resolution 1 second, Writable
AV.180	FloatingTO1/TO2	Status value to show the floating signal demand. This value may be overridden. Activated only if TO1 signal type MSV.26 is set to floating.	Present Value COV Increment (0.5)	0 to 100%, Resolution 0.1% Available only if MSV.26 = Floating
AV.181	FloatingTO3/TO4	Status value to show the floating signal demand. This value may be overridden. Activated only if TO3 signal type MSV.30 is set to floating.	Present Value COV Increment (0.5)	0 to 100%, Resolution 0.1% Available only if MSV.26 = Floating
AV.182	TO1Pulsing	TR Status value to show the pulse signal demand. This value may be overridden. Activated only if TO1 signal type MSV.26 is set to pulsing. IAC output 1 when set to Pulsed, indicates the pulse signal demand.	Present value if MSV.26 = pulse COV Increment (1)	0 to 100%, Resolution 0.1% Available only if MSV.26 = Pulsing
AV.183	TO2Pulsing	Status value to show the pulse signal demand. This value may be overridden. Activated only if TO2 signal type MSV.28 is set to pulsing.	Present value if MSV.28 = pulse COV Increment (1)	0 to 100%, Resolution 0.1% Available only if MSV.26 = Pulsing
AV.184	TO3Pulsing	Status value to show the pulse signal demand. This value may be overridden. Activated only if TO3 signal type MSV.30 is set to pulsing.	Present value if MSV.28 = pulse COV Increment (1)	0 to 100%, Resolution 0.1% Available only if MSV.26 = Pulsing
AV.185	TO4Pulsing	Status value to show the pulse signal demand. This value may be overridden. Activated only if TO4 signal type MSV.32 is set to pulsing.	Present value if MSV.30 = pulse COV Increment (1)	0 to 100%, Resolution 0.1% Available only if MSV.26 = Pulsing

Binary Input (BI)

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

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

Binary Output (BO)

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

ID	Name	Description	W?	Notes
BO.1	TO1OnOff	Status value to show if TO1 is active or not. (0) OFF, (1) ON. This value may be overridden. Activated only if TO1 signal type MSV.26 is set to On/Off.	Present Value	0 = Off 1 = On
BO.2	TO2OnOff	Status value to show if TO2 is active or not. (0) OFF, (1) ON. This value may be overridden. Activated only if TO2 signal type MSV.28 is set to On/Off.	Present Value	0 = Off 1 = On
BO.3	TO3OnOff	Status value to show if TO3 is active or not. (0) OFF, (1) ON. This value may be overridden. Activated only if TO3 signal type MSV.30 is set to On/Off.	Present Value	0 = Off 1 = On
BO.4	TO4OnOff	Status value to show if TO4 is active or not. (0) OFF, (1) ON. This value may be overridden. Activated only if TO4 signal type MSV.32 is set to On/Off.	Present Value	0 = Off 1 = On

Binary Value (BV)

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

ID	Name	Description	W?	Notes
BV.1	Cfg_TempUnitBACnet	Configuration of the temperature units used in BACnet. If set to (0), the temperature will be in Celsius, If set to (1), the temperature will be in Fahrenheit.	Present Value	0 = Celsius, 1 = Fahrenheit
BV.2	Cfg_TempSetPointLock	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.3	UserSysOffMode	Configuration to allow users to turn off the EVC. (0) Enable user to turn off the EVC, (1) Disable prevents the user from turning off the EVC.	Present Value	0 = Enable, 1 = Disable
BV.4	Cfg_TempUnitTstat	Configuration of the user temperature units used on TRL. If set to (0), the temperature will be in Celsius, If set to (1), the temperature will be in Fahrenheit.	Present Value	0 = Celsius, 1 = Fahrenheit
BV.5	ChangeOverMode	Status value of the actual mode (0) Cooling, (1) Heating. Note that this value is also affected if a digital input is set to NoCL or NoHt.	Present Value	0 = Cooling, 1 = Heating
BV.6	Cfg_FreezeProtection	Configuration to prevent a zone from falling below 4°C (39.2°F). If set to (1) On, the EVC will prevent the zone from freezing by activating the heating outputs even if the EVC is Off. If set to (0) Off, no action will be taken.	Present Value	0 = Off , 1 = On

ID	Name	Description	W?	Notes
BV.7	Cfg_KeyPadUpperLeftLock	Configuration to lock the Cool/Heat button. (0) Off, (1) On	Present Value	0 = Off, 1 = On (If set to “On”, functionality of these buttons will not be available.)
BV.8	Cfg_KeyPadBottomLeftLock	Configuration to lock the °C/°F button. (0) Off, (1) On	Present Value	0 = Off, 1 = On If set to “On”, functionality of these buttons will not be available.
BV.9	Cfg_KeyPadArrowsLock	Configuration to lock the arrow buttons. (0) Off, (1) On	Present Value	0 = Off, 1 = On If set to “On”, functionality of these buttons will not be available.
BV.10	Cfg_ProgramLock	Configuration to lock the all TRL buttons. (0) Off, (1) On	Present Value	0 = Off, 1 = On If set to “On”, functionality of these buttons will not be available.
BV.20	Cfg_NightSetBackMode	Configuration to determine the action of the EVC when in night setback. When set to (0) setpoint, the EVC will maintain the setpoint values of AV.18 and AV.19. If set at (1) OFF, the EVC will turn off and will not take in consideration the setpoint values for cooling and heating.	Present Value	0 = Setpoint, 1 = OFF
BV.25	Cfg_AnalogOutput1Direction	Configuration of the analog output direction. When set to (0) Direct, the signal ramp is configured to be from 0-10Vdc. When set to (1) Reverse, the signal ramp is configured to be from 10-0Vdc.	Present Value	0 = Direct, 1 = Reverse
BV.26	Cfg_AnalogOutput2Direction	Configuration of the analog output direction. When set to (0) Direct, the signal ramp is configured to be from 0-10Vdc. When set to (1) Reverse, the signal ramp is configured to be from 10-0Vdc.	Present Value	0 = Direct, 1 = Reverse
BV.30	Cfg_FloatingTO1/TO2Direction	Configuration of the TRIAC contact normal state (Normally Open, Normally Close) when MSV.26 TO1 Signal Type is set to floating. This object affects the valve actuator rotation. When set to (0) Direct, TO1 closes the valve and TO2 opens the valve. When set to (1) Reverse, TO1 opens the valve and TO2 closes the valve.	Present Value	0 = Direct, 1 = Reverse
BV.31	Cfg_FloatingTO3/TO4Direction	Configuration of the TRIAC contact normal state (Normally Open, Normally Close) when MSV.30 TO3 Signal Type is set to floating. This object affects the valve actuator rotation. When set to (0) Direct, TO3 closes the valve and TO4 opens the valve. When set to (1) Reverse, TO3 opens the valve and TO4 closes the valve.	Present Value	0 = Direct, 1 = Reverse
BV.32	Cfg_TO1 Direction	Configuration of the TRIAC contact normal state value of the rotation when MSV.26 TO1 Signal Type is not set to floating. (0) Direct, (1) Reverse. If signal type is set to "On/Off", then the output is active when there is no demand and inactive when there is no demand.	Present Value	0 = Direct, 1 = Reverse
BV.33	Cfg_TO2 Direction	Configuration of the TRIAC contact normal state value of the rotation when MSV.28 TO2 Signal Type is not set to floating. (0) Direct, (1) Reverse. If signal type is set to "On/Off", then the output is active when there is no demand and inactive when there is no demand.	Present Value	0 = Direct, 1 = Reverse
BV.34	Cfg_TO3 Direction	Configuration of the TRIAC contact normal state value of the rotation when MSV.30 TO3 Signal Type is not set to floating. (0) Direct, (1) Reverse. If signal type is set to "On/Off", then the output is active when there is no demand and inactive when there is no demand.	Present Value	0 = Direct, 1 = Reverse
BV.35	Cfg_TO4 Direction	Configuration of the TRIAC contact normal state value of the rotation when MSV.32 TO4 Signal Type is not set to floating. (0) Direct, (1) Reverse. If signal type is set to "On/Off", then the output is active when there is no demand and inactive when there is no demand.	Present Value	0 = Direct, 1 = Reverse
BV.36	Cfg_Digital Input 2 Contact	Configuration to change the contact's normal position. Input can be set to (0) Normally Opened or (1) Normally Closed.	Present Value	0 = Norm Open, 1 = Norm Close

ID	Name	Description	W?	Notes
BV.40	Cfg_MotorDirection	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 EVC will execute an auto-stroke to reset the actuator's position.	Present Value	0 = Direct, 1 = Reverse
BV.45	AirFlowBalancing	Configuration value to enable and disable the airflow balancing.	Present Value	0= Disable, 1= Enable
BV.50	Cfg_PressureModeSelect	Configuration value to configure the VAV box as (0) pressure independent or (1) pressure dependent.	Present Value	0= Independent, 1= Dependent
BV.51	PressureModeStatus	Status value that represents the actual pressure mode.	Read only	0= Independent, 1= Dependent
BV.55	AL_HighCO2Level	Status which indicates that the CO2 concentration is above setpoint. (0) No, (1) Yes.	Read only	0= No, 1= Yes
BV.56	AL_Override	Status to inform if an override is active. (0) No, (1) Yes	Read only	0= No, 1= Yes
BV.60	Cfg_DisplayRH	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	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.66	Cfg_CO2ControlSource	Determines the source of the CO2 reading. Analog Input = external sensor on AI. TRLG = Onboard sensor of TRLG or TRLGH unit.	Present Value	0= Analog Input, 1= TRLG
BV.70	Cfg_ActiveSchedule	Configuration to activate the schedule. The schedule is configurable via BACnet. If no schedule is configured, the mode will always be occupied. On the TRL, the time and day will be displayed.	Present Value	0= No, 1= Yes
BV.90	CopyCfgExecute	When using copy config, this value is used to start the copy to other controllers. Note: The BACnet schedule is not copied during a Copy Config operation.	Present Value	0= No, 1= Yes
BV.91	Cfg_Pressure Calibration	Configuration value to recalibrate the differential pressure transducer. Consult Neptronic technical support before changing this value. * = BV.92 must be set to (1) Unlock in order to activate this object.	Present Value*	0= No, 1= Yes
BV.92	Cfg_Pressure Calibration Lock	Configuration value to unlock the calibration process of BV.91.	Present Value	0 = Lock, 1 = Unlock

Multi State Value (MSV)

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

ID	Name	Description	W?	Notes
MSV.1	Cfg_UniversalInputAI1Type	Configuration of the input. Off: Input not used. Extern Sensor: Input set to external sensor (EtS). Changeover Sensor: Input set to 10kΩ changeover sensor (SENS). ChOv Contact Norm Cool: Input set as a changeover contact. When contact is opened, the system is in cooling mode. When contact is closed, the system is in heating mode. ChOv Contact Norm Heat: Input set as a changeover contact. When contact is opened, the system is in heating mode. When contact is closed, the system is in cooling mode. Airflow Setpoint: Input set to slave mode (StFL). See motor ramp in StFL mode. CO2Sensor: Input set to 0-10Vdc CO2 sensor. See CO2 Settings. Air Supply Temp: Input set to a 10kΩ discharge temperature sensor. This value is for information only. No action is taken by the EVC. Motor Position: Input set to 0-10Vdc slave mode. The input acts directly on the damper actuator when MSV.35 Motor Ramp is set to Analog (0-10Vdc).	Present Value	The available options vary based on selection of other objects. Off Extern Sensor Changeover Sensor ChOvContactNormCool ChOvContactNormHeat Airflow Setpoint CO2 Sensor Air Supply Temp Motor Position
MSV.2	Cfg_UniversalInputAI2Type	Same as MSV.1.	Present Value	The available options vary based on selection of other objects. Off Extern Sensor Changeover Sensor ChOv Contact Norm Cool ChOv Contact Norm Heat Airflow Setpoint CO2 Sensor Air Supply Temp Motor Position
MSV.3	Cfg_ChangeOverControlMode	Indicates where the changeover value is coming from. Locally: Analog or digital input is configured in the EVC and will execute the changeover with the set parameters. Cooling: Changeover is sent and controlled by the BMS. No changeover will occur unless the BMS sends the signal to do so. Heating: Changeover is sent and controlled by the BMS. No changeover will occur unless the BMS sends the signal to do so.	Present Value	The available options vary based on selection of other objects. Locally Cooling Heating
MSV.4	Cfg_TempControlSource	Configuration value to set the control temperature to be used by the EVC. Intern Temp, the control temperature will be set to intern (ITS). Extern Temp, the control temperature will be set to extern (ETS). Remote Temp, the control temperature will be set to remote (temperature sent by the BMS). See AV.145 for safety feature.	Present Value	The available options vary based on selection of other objects. Intern Sensor Extern Sensor Network Sensor

ID	Name	Description	W?	Notes
MSV.10	Cfg_NsbOccContact	Configuration of DI1 mode. The mode will determine the action taken by the EVC when DI.1 is activated or deactivated. OFF: Digital Input is not used. OCC Norm Open: Occupancy normally opened contact. If the value of BI.1 is (0), then the zone is occupied. If the value of BI.1 is (1), then the zone is unoccupied. OCC Norm Close: Occupancy normally closed contact. If the value of BI.1 is (0), then the zone is unoccupied. If the value of BI.1 is (1), then the zone is occupied. NSB Norm Open: Night Setback normally opened contact. If the value of BI.1 is (0), then the zone is in day operation. If the value of BI.1 is (1), then the zone is in night setback. NSB Norm Close: Night Setback normally closed contact. If the value of BI.1 is (0), then the zone is in night setback. If the value of BI.1 is (1), then the zone is in day operation.	Present Value	The available options vary based on selection of other objects. Off Occ Norm Open Occ Norm Close NSB Norm Open NSB Norm Close
MSV.11	NsbOccCommand	Configuration to set the occupancy or night setback mode. Locally: Occupancy or Night setback is activated via a configured input wired to a timer or an occupancy sensor. OFF: Forces the EVC Off. Signal sent via BMS. Occupancy: Forces the EVC to occupied or day mode. Signal sent via BMS. No Occupancy: Forces the EVC to unoccupied or night setback mode. Signal sent via BMS.	Present Value	The available options vary based on selection of other objects. OFF/Locally/Locally Occupancy/OFF/OFF No Occupancy/Occupancy/Day -- /No Occupancy/Night
MSV.12	OccupancyStatus	Status that indicates the actual occupancy when occupancy is used. Unoccupied: Zone is not occupied. Occupied: Zone is occupied. Override: Zone is unoccupied but put back to occupied mode for a maximum pre-determined time set at AV.61.	Read only	The available options vary based on selection of other objects. NoOccupancy Occupancy Override
MSV.13	NightSetBackStatus	Status that indicates the actual mode of the zone when night setback is used. Day: Zone is in day operation. Night: Zone is in night setback. Override: Zone is in night setback but put back to day operation for a maximum pre-determined time set at AV.60.	Read only	The available options vary based on selection of other objects. Day Night Override
MSV.14	Cfg_DigitalInput2Type	Configuration of DI2 mode. The mode will determine the action taken by the EVC when DI.2 is activated or deactivated. OFF: Digital input not used. Override: If activated for more than AV.64 time in seconds, the EVC turns off. Over Heat 1: If activated, all heat outputs on Heating Ramp 1 turn off. Over Heat 2: If activated, all heat outputs on Heating Ramp 2 turn off. Over Heat All: If activated, all heat outputs on Heating Ramp 1 and 2 turns off. NoCL: Normally Cool changeover. If contact is open, zone is in cooling mode. If contact closes, zone is in heating mode. This can be reversed with BV.36. NoHt: Normally Heat changeover. If contact is open, zone is in heating mode. If contact closes, zone is in cooling mode. This can be reversed with BV.36.	Present Value	The available options vary based on selection of other objects. Off Override Over Heat1 Over Heat2 Over Heat All ChOv Contact Norm Cool ChOv Contact Norm Heat

ID	Name	Description	W?	Notes
MSV.15	OverHeatStatus	Status to inform if a heat override is active. Over Heat Normal: No heat override. Over Heat 1: Heating Ramp 1 outputs are overridden. Over Heat 2: Heating Ramp 2 outputs are overridden. Over Heat All: Heating Ramp 1 and 2 outputs are overridden.	Out of Service	The available options vary based on selection of other objects. OverHeatNormal Over Heat1 Over Heat2 Over Heat All
MSV.16	UserSystemMode	Status of the zone mode the user has set on the TRL. Not to be confused with the changeover mode of the system. These values may be restricted by MSV.17 Auto: Automatic mode changes from heating to cooling based on the zone demand. Heating: Heating mode is forced by the user. The zone will only consider the heating demand. Cooling: Cooling mode is forced by the user. The zone will only consider the cooling demand. Off: The EVC is forced to Off by the user. The EVC is inactive. This option is only available if BV.3 is set to (0) Enable.	Present Value	The available options vary based on selection of other objects. Auto Heating Cooling Off
MSV.17	UserSysModeSelect	Configuration to set the permissions or restrictions to change the zone mode by the user. This configuration affects MSV.16 directly. Auto: User has permission to change the mode from Auto, Cooling, Heating, and Off (if permitted by BV.3). Heating: User is restricted to Heating mode and Off (if permitted by BV.3). Cooling: User is restricted to Cooling mode and Off (if permitted by BV.3). Heating or Cooling: User is restricted to Heating or Cooling mode and Off (if permitted by BV.3). Auto Lock: User is restricted to Auto and Off (if permitted by BV.3).	Present Value	The available options vary based on selection of other objects. Auto Heating Cooling Heating or Cooling Auto Lock
MSV.20	Cfg_AnalogOutput1Ramp	Configuration of the ramp used to modulate AO1 based on demand. Off: Output not used. Cooling Ramp 1 (Cr1): This ramp is used for cooling. The ramp is configured with AV.41 Cooling Proportional Band 1 and AV.42 Cooling Dead Band 1. Pulse signal type is not available for cooling ramp 1. Cooling Ramp 2 (Cr2): This ramp is used for cooling. The ramp is configured with AV.46 Cooling Proportional Band 2 and AV.47 Cooling Dead Band 2. Pulse signal type is not available for cooling ramp 2. Heating Ramp 1 (Hr1): This ramp is used for heating. The ramp is configured with AV.21 Heating Proportional Band 1 and AV.22 Heating Dead Band 1. Heating Ramp 2 (Hr2): This ramp is used for heating. The ramp is configured with AV.24 Heating Proportional Band 2 and AV.25 Heating Dead Band 2. CO2 Alarm (CO2): This ramp is used to activate or deactivate controlled elements based on CO2 levels. The ramp is configured with "AV.140 CO2 Range" and "AV.141 CO2 Setpoint". When "BV.55 CO2 Alarm" is activated, AO1 will activate as well. With this option, AO1 becomes a binary output (0 or 10Vdc). Airflow Setpoint (StFL): This ramp is used as a master/slave control. The master controller must be set to Pressure Independent (BV.50) and will transmit a 0-10Vdc signal to the slave controller based on minimum/maximum airflows in	Present Value	The available options vary based on selection of other objects. Off Cooling Ramp1 Cooling Ramp2 Heating Ramp1 Heating Ramp2 CO2 Alarm Airflow Setpoint

ID	Name	Description	W?	Notes
		heating and/or cooling mode. AV.70 and AV.71 will also affect the signal. The master controller's 0-10Vdc output resets based on the mode of the central unit (cool or heat) which is given by the changeover signal in order to match signal to the airflow setpoints (see analog and/or digital input settings for changeover). The slave controller must be set to pressure independent and will convert the 0-10Vdc from the master to match the airflow setpoint. If a changeover is required for the master, it will also be required for the slave controller. Maximum and minimum cooling/heating Airflow setpoints are also required to operate correctly.		
MSV.22	Cfg_AnalogOutput2Ramp	Same as MSV.20.	Present Value	The available options vary based on selection of other objects. Off Cooling Ramp1 Cooling Ramp2 Heating Ramp1 Heating Ramp2 CO2 Alarm Airflow Setpoint
MSV.25	Cfg_TO1Ramp	Configuration of the ramp used to modulate (pulse or floating) or activate/deactivate (On/Off) TO1 based on demand. Off: Output not used. Cooling Ramp 1 (Cr1): This ramp is used for cooling. The ramp is configured with AV.41 Cooling Proportional Band 1 and AV.42 Cooling Dead Band 1. Cooling Ramp 2 (Cr2): This ramp is used for cooling. The ramp is configured with AV.46 Cooling Proportional Band 2 and AV.47 Cooling Dead Band 2. Heating Ramp 1 (Hr1): This ramp is used for heating. The ramp is configured with AV.21 Heating Proportional Band 1 and AV.22 Heating Dead Band 1. Heating Ramp 2 (Hr2): This ramp is used for heating. The ramp is configured with AV.24 Heating Proportional Band 2 and AV.25 Heating Dead Band 2. CO2 Alarm (CO2): This ramp is used to activate or deactivate controlled elements based on CO2 levels. The ramp is configured with "AV.140 CO2 Range" and "AV.141 CO2 Setpoint". When "BV.55 CO2 Alarm" is activated, TO1 will activate as well. "Pulse" signal type is not available for this ramp. Air Flow Set Point (StFL): This ramp is used as a master/slave control. The master controller must be set to Pressure Independent (BV.50)and will transmit a 0-10Vdc signal to the slave controller based on minimum/maximum airflows in heating and/or cooling mode. AV.70 toAV.73 will also affect the signal. The master controller's 0-10Vdc output resets based on the mode of the central unit (cool or heat) which is given by the changeover signal in order to match signal to the airflow setpoints (see analog and/or digital input settings for changeover). The slave controller must be set to pressure independent and will convert the 0-10Vdc from the master to match the airflow setpoint. If a changeover is required for the master, it will also be required for the slave controller. Maximum and minimum cooling/heating Airflow setpoints are also required to operate correctly. Change Over Ramp (Cor): This ramp is used when the central system does	Present Value	The available options vary based on selection of other objects. Off Cooling Ramp1 Cooling Ramp2 Heating Ramp1 Heating Ramp2 CO2 Alarm Air Flow Set Point Change Over Ramp Cooling Heating Ramp 1 Analog

ID	Name	Description	W?	Notes
		both heating and cooling. It requires a changeover sensor to operate. The ramp is configured with AV.56 Changeover Proportional Band and AV.57 Changeover Dead Band. When the zone is in cooling demand, the EVC will modulate the damper actuator between the minimum and maximum cooling airflow setpoints (AV.102 and AV.103). When the zone is heating demand, the EVC will modulate the damper actuator between the minimum and maximum heating airflow setpoints (AV.104 and AV.105). Cooling Heating Ramp 1 (CH1): This ramp is used when central system does cooling only and a reheat coil is present at the zone level. The ramp is configured with AV.21 Heating Proportional Band 1, AV.22 Heating Dead Band 1, AV.41 Cooling Proportional Band 1 and AV.42 Cooling Dead Band 1. When the zone is in cooling demand, the EVC will modulate the damper actuator between the minimum and maximum cooling airflow setpoints (AV.102 & AV.103). When the zone is heating demand and a heating output is active, the EVC will modulate the damper actuator between the minimum and maximum heating airflow setpoints (AV.104 & AV.105). Analog (0-10Vdc): This ramp is used to set the VAV box as a slave controller. The damper actuator follows the 0-10Vdc signal received by analog input 1 or 2 when MSV.1 or MSV.2 is set to motor position.		
MSV.26	Cfg_TO1SignalType	Configuration of the output signal type. Pulse: Modulating output affected by BV.32. Pulse is available for heating ramp 1 and 2 only. On/Off: Digital output affected by AV.77, AV.78 and BV.32. Floating: Modulating output affected by AV.75 and BV.30. Floating is available for cooling ramps and heating ramps. Option available for TO1 and TO3 only. When TO1 is set to (3) floating, it automatically changes MSV.27 TO2 Ramp and MSV.28 TO2 Signal Type settings to match the configuration of TO1.	Present Value	The available options vary based on selection of other objects. *Pulsing (If Hr1 or Hr2 is selected) * On_Off * Floating
MSV.27	Cfg_TO2Ramp	Same as MSV.25.	Present Value	The available options vary based on selection of other objects. Off Cooling Ramp1 Cooling Ramp2 Heating Ramp1 Heating Ramp2 CO2 Alarm Air Flow Set Point Change Over Ramp Cooling Heating Ramp 1 Analog
MSV.28	Cfg_TO2SignalType	Configuration of the output signal type. Pulse: Modulating output affected by BV.33. Pulse is available for heating ramp 1 and 2 only. On/Off: Digital output affected by AV.79, AV.80 and BV.33. Floating: Set automatically if MSV.26 TO1 Signal Type is set to floating.	Present Value	The available options vary based on selection of other objects. Pulsing (If Hr1 or Hr2 is selected) 2On_Off 3Floating

ID	Name	Description	W?	Notes
MSV.29	Cfg_TO3Ramp	Same as MSV.25.	Present Value	The available options vary based on selection of other objects. Off Cooling Ramp1 Cooling Ramp2 Heating Ramp1 Heating Ramp2 CO2 Alarm
MSV.30	Cfg_TO3SignalType	Configuration of the output signal type. Pulse: Modulating output affected by BV.34. Pulse is available for heating ramp 1 and 2 only. On/Off: Digital output affected by AV.81, AV.82 and BV.34. Floating: Modulating output affected by AV.76 and BV.31. Floating is available for cooling ramps and heating ramps. Option available for TO1 and TO3 only. When TO3 is set to (3) floating, it automatically changes MSV.31 TO4 Ramp and MSV.32 TO4 Signal Type settings to match the configuration of TO3	Present Value	The available options vary based on selection of other objects. Pulsing (If Hr1 or Hr2 is selected) On_Off Floating
MSV.31	Cfg_TO4Ramp	Same as MSV.25.	Present Value	The available options vary based on selection of other objects. Off Cooling Ramp1 Cooling Ramp2 Heating Ramp1 Heating Ramp2 CO2 Alarm Air Flow Set Point Change Over Ramp Cooling Heating Ramp 1 Analog
MSV.32	Cfg_TO4SignalType	Configuration of the output signal type. Pulse: Modulating output affected by BV.35. Pulse is available for heating ramp 1 and 2 only. On/Off: Digital output affected by AV.83, AV.84 and BV.35. Floating: Set automatically if MSV.30 TO3 Signal Type is set to floating.	Present Value	The available options vary based on selection of other objects. Pulsing (If Hr1 or Hr2 is selected) On_Off Floating
MSV.35	Cfg_MotorRamp	Configuration of the ramp used to modulate the damper actuator based on demand. Cooling Ramp 1 (Cr1): This ramp is used when central system does cooling only. The ramp is configured with AV.41 Cooling Proportional Band 1 and AV.42 Cooling Dead Band 1. When the zone is in cooling demand, the EVC will modulate the damper actuator between the minimum and maximum cooling airflow setpoints (AV.102 and AV.103). When the zone is heating demand, the EVC will maintain the minimum cooling airflow setpoint (AV.102). Cooling Ramp 2 (Cr2): This ramp is used when central system does cooling only. The ramp is configured with AV.46 Cooling Proportional Band 2 and AV.47 Cooling Dead Band 2. When the zone is in cooling demand, the EVC will modulate the damper actuator between the minimum and maximum cooling airflow setpoints (AV.102 and AV.103). When the zone is heating demand, the EVC will maintain the minimum cooling airflow setpoint (AV.102). Heating Ramp 1 (Hr1): This ramp is used when central system does heating	Present Value	The available options vary based on selection of other objects. Cooling Ramp1 Cooling Ramp2 Heating Ramp1 Heating Ramp2 AirflowSetPoint Changeover Ramp Cooling Heating Ramp 1 Analog

ID	Name	Description	W?	Notes
		only. The ramp is configured with AV.21 Heating Proportional Band 1 and AV.22 Heating Dead Band 1. When the zone is in heating demand, the EVC will modulate the damper actuator between the minimum and maximum heating airflow setpoints (AV.104 and AV.105). When the zone is cooling demand, the EVC will maintain the minimum heating airflow setpoint (AV.104). Heating Ramp 2 (Hr2): This ramp is used when central system does heating only. The ramp is configured with AV.24 Heating Proportional Band 2 and AV.25 Heating Dead Band 2. When the zone is in heating demand, the EVC will modulate the damper actuator between the minimum and maximum heating airflow setpoints (AV.104 and AV.105). When the zone is cooling demand, the EVC will maintain the minimum heating airflow setpoint (AV.104). Airflow Setpoint (StFL): This ramp is used as a master/slave control. The master controller must be set to Pressure Independent (BV.50) and will transmit a 0-10Vdc signal to the slave controller based on minimum/maximum airflows in heating and/or cooling mode. AV.70 to AV.73 will also affect the signal. The master controller's 0-10Vdc output resets based on the mode of the central unit (cool or heat) which is given by the changeover signal in order to match signal to the airflow setpoints (see analog and/or digital input settings for changeover). The slave controller must be set to pressure independent and will convert the 0-10Vdc from the master to match the airflow setpoint. If a changeover is required for the master, it will also be required for the slave controller. Maximum and minimum cooling/heating Airflow setpoints are also required to operate correctly. Changeover Ramp (Cor): This ramp is used when the central system does both heating and cooling. It requires a changeover sensor to operate. The ramp is configured with AV.56 Changeover Proportional Band and AV.57 Changeover Dead Band. When the zone is in cooling demand, the EVC will modulate the damper actuator between the minimum and maximum cooling airflow setpoints (AV.102 and AV.103). When the zone is heating demand, the EVC will modulate the damper actuator between the minimum and maximum heating airflow setpoints (AV.104 and AV.105). Cooling Heating Ramp 1 (CH1): This ramp is used when central system does cooling only and a reheat coil is present at the zone level. The ramp is configured with AV.21 Heating Proportional Band 1, AV.22 Heating Dead Band 1, AV.41 Cooling Proportional Band 1 and AV.42 Cooling Dead Band 1. When the zone is in cooling demand, the EVC will modulate the damper actuator between the minimum and maximum cooling airflow setpoints (AV.102 & AV.103). When the zone is heating demand and a heating output is active, the EVC will modulate the damper actuator between the minimum and maximum heating airflow setpoints (AV.104 & AV.105). Analog (0-10Vdc): This ramp is used to set the VAV box as a slave controller. The damper actuator follows the 0-10Vdc signal received by analog input 1 or 2 when MSV.1 or MSV.2 is set to motor position.		
MSV.36	Cfg_NSBMotorMode	Configuration to set the motor position while in night setback. Auto: the damper actuator will modulate to maintain cooling and heating setpoints (AV.18 and AV.19). Open: the damper actuator will open the VAV box to a fully open position.	Present Value	The available options vary based on selection of other objects. Auto Open

ID	Name	Description	W?	Notes
MSV.37	MotorPositionOverride	Configuration value to override the motor position. Auto: Motor position in automatic mode (no override). Open: Motor position overridden to fully opened. Close: Motor position overridden to fully closed. Airflow Min: Motor position overridden to the minimum airflow of the current mode. When in heating mode, the position is minimum heating airflow (AV.104). When in cooling mode, the position is minimum cooling airflow (AV.102). Airflow Max: Motor position overridden to the maximum airflow of the current mode. When in heating mode, the position is maximum heating airflow (AV.105). When in cooling mode, the position is maximum cooling airflow (AV.103).	Present Value	The available options vary based on selection of other objects. Auto Open Close Air Flow Min (heat/cool as per current mode) Air Flow Max (heat/cool as per current mode)
MSV.40	Cfg_PressureIndOutput	Determines the output used to control the VAV damper actuator. Floating1: Floating actuator on TO1/TO2. MSV.26 must be set to Floating with running time configured at AV.75. Floating2: Floating actuator on TO3/TO4. MSV.30 must be set to Floating with running time configured at AV.76. Motor: Modulating actuator connected to the 4-wire actuator output cable.	Present Value	The available options vary based on selection of other objects. Floating1 Floating2 Motor
MSV.41	Cfg_AirFlowScale	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	The available options vary based on selection of other objects. Scale1 | Scale10 | Scale100
MSV.42	AirFlowBal_Mode	Position the damper actuator to preset positions. This object is used when balancing mode (BV.45) is activated 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 (AV.104 in heat or AV.102 in cool). 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). Full Open: The damper actuator moves to a fully opened position. Position used to calibrate the maximum airflow (AV.112).	Present value if BV.45 is set to Enable	The available options vary based on selection of other objects. Closed | Min Flow | Max Flow | Full Open
MSV.95	Cfg_DisplayInfo	Configuration value of the information displayed on the TRL. Display Temp Demand: the TRL will display the actual temperature and cooling/heating demand. Display Setpoint Demand: TRL will display the actual setpoint and cooling/heating demand. Display Temp: TRL will display the actual temperature but no demand. Display Setpoint: TRL will display the actual setpoint but no demand. Display Off: TRL display will be off (no display).	Present Value	The available options vary based on selection of other objects. Temp and Demand | Setpoint and Demand Temp only | Setpoint only | Off

Other

Table 11 - Object Table Information: Other

ID	Name	Description	W?	Notes
PGM.1	ProgramFirmware	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	Firmware binary file. Set File Size to 0 to erase the previous binary file before uploading a new one. Use only the binary file provided by Neptronic.	File Size Archive	File Size is accepted for 0 value only.
SCH.1	OccupancySchedule	Weekly occupancy schedule to specify which occupancy state is active during specific periods of day.	Weekly Schedule Schedule Default Priority for Writing Effective Period Out of Service	

neptronic®

400 Lebeau blvd, Montreal, Qc, H4N 1R6, Canada

www.neptronic.com

Toll free in North America: 1-800-361-2308
Tel.: (514) 333-1433
Fax: (514) 333-3163
Customer service fax: (514) 333-1091
Monday to Friday: 8:00am to 5:00pm (Eastern time)