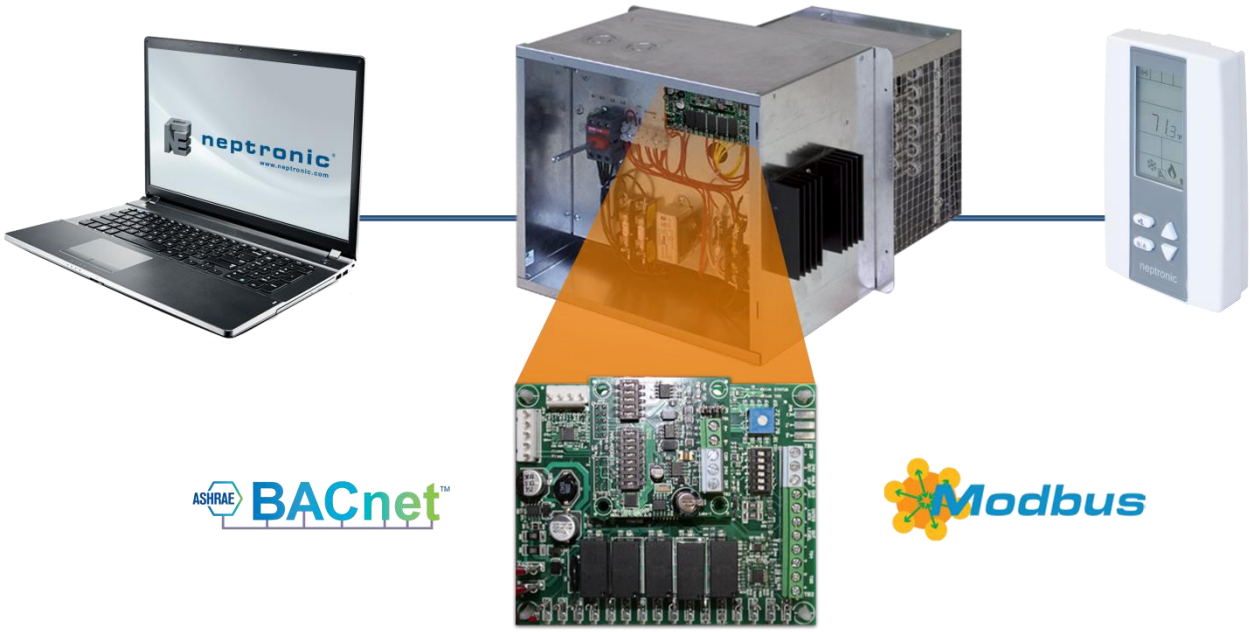
HECB

Intelligent Controller for Duct Heaters

BACnet User Guide



BACnet

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Introduction

The Intelligent Controller for Duct Heaters (HECB) BACnet® Communication Module user guide provides information about using the HECB with BACnet communications feature. The BACnet communication protocol for building automation and control networks enables communication between client devices within a network. The HECB 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 HECB 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 HECB 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.
- *BIBB Support*. The HECB controller functions the same way as the B-ASC type profile server and supports the specific BIBB as per their relevant definitions.
    - DM-DCC-B
    - DM-DDB-B
    - DM-DOB-B
    - DS-RPM-B
    - DS-RP-B
    - DS-WPM-B
    - DS-WP-B
- *Object Support*. The HECB 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.
- *Alarms*. The HECB 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 via the DIP switches 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 configured through 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, HECB.

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 PGM 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.

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. For more information, refer to the MAC Address and Max_Master section.

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. 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.

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	• Programmable up to 32 characters • The device name must be unique system-wide • The default value is Model_Name	W
Description	• Programmable up to 32 characters • The default value is Intelligent Controller for Duct Heaters.	W
Object_Type	Device	
System_Status	Operational	
Vendor_Identifier	Always 153	
Vendor_Name	Always Neptronic	
Model_Name	Example, HECB.	
Firmware_Revision	currently, V1.xx.xx	
Application_Software_Version	currently, 2.07	
Protocol_Version	Always 1	
Protocol_Revision	Always 14	
DataBase_Revision	Currently 7, but the value is incremented when an object is created, deleted, or edited and when performing a restore. Undefined. This property, of type Unsigned, is a logical revision number for the device's database. It is incremented when an object is created, an object is deleted, an object's name is changed, an object's Object_Identifier property is changed, or a restore is performed with the exception that the creation and deletion of temporary configuration files during a backup or restore procedure shall not affect this property.	
Max_APDU_Length_Accepted	Always 480	
Segmentation_Supported	(3) = No Segmentation	
APDU_Timeout	6,000	W
Number_of_APDU_Retries	Always 0	
Local_Time	00:00:00	
Local_Date	01-Jan-2015 (Thu)	
UTC_Offset	-3:00	
Daylight_Savings_Status	False	
Backup_Failure_Timeout	300	
Configuration_Files	File-1	

Property	Value	Writable
Last_Restore_Time	2015-01-01 (Thu), 00:01:50:00	
Backup_Preparation_Time	0	
Restore_Preparation_Time	0	
Restore_Completion_Time	0	
Backup_And_Restore_State	IDLE	
Active_COV_Subscription		
Protocol_Services_Supported	• confirmedCOVNotification • subscribeCOV • atomicReadFile • atomicWriteFile • readProperty • readPropertyMultiple • writeProperty • writePropertyMultiple • deviceCommunicationControl • reinitializeDevice • i_Am • i_Have • unconfirmedCOVNotification • unconfirmedPrivateTransfer • timeSynchronization • who_Has • who_Is • utcTimeSynchronization • subscribeCOVProperty	
Protocol_Object_Types_ Supported	• analog_input • analog_value • analog_output • binary_input • binary_value • binary_output • device • file • program • schedule • multi_state_value	
Object_List	Per the standard. Because of restrictions on the size of the transmit buffers, the entire Object_List cannot be returned at once, rather the Object_List must be read, one-at-a-time. Depends on number of objects.	
Device_Address_Binding	Always empty	
Max_Master	• Programmable in the range of 0-127 • Default value=127	W
Max_Info_Frames	Always 1	
Proprietary property #1000	• Read only • The proprietary property represents the MS/TP MAC address in the range of 0 to 254 • Values from 128 to 254 represent MS/TP non-token passing slave devices • Default is zero	Writable only if DIP switch MAC = 0
Proprietary property #1001	Programmable. This proprietary property represents the MS/TP baud rate. This value is Unsigned type, and available values are 9600, 19200, 38400, 76800. Writing 0 will activate auto baud rate functionality. Reading this property will always return actual baud rate. Default : Auto*	Not writable, DIP switch only
Proprietary property #1002	Programmable. This proprietary property represents that 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. Default: 15 minutes.	W

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, there is a timeout that 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*).

Change of Value Reporting

The HECB can support up to 20 COV (change of value) subscriptions. The user will be able to subscribe to COV notification services (permanently or temporarily) in order to receive notifications and to track the COV of specific object(s) based on fixed criteria(s). Users are notified when the value exceeds the COV increment threshold that is set for the specific property. It is highly recommended that this feature only be used by someone who has knowledge of COV reporting systems. Ensure to select only objects that will be important for the desired application, such as a BMS system or a monitoring system.

Object Table Information

The controller series use the following BACnet object tables, that are categorized based on their IDs. 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 3 - Analog Input Object Table

ID	Name	Description	W?	Notes	Control Mode					
					Network	External	Internal	TPM	Neptronic Signal	Pneumatic
Integrator										
AI.1	AnalogInput	Voltage measured at the analog input.	Out of service*	0 mV to 10000 mV		X	X		X	X
AI.2	InputTemp/ExternalTemp	Temperature measured by room sensor or duct sensor.	Out of service*	32ºF to 122ºF or 0ºC to 50ºC Resolution 0.1ºF/ºC						
AI.3	HeaterSensor1Temp	Temperature measured by EAS heater sensor 1. ***[1] = Factory Setting***	*	-40ºF to 212ºF or -40ºC to 100ºC Resolution 0.1ºF/0.1ºC	X[1]	X[1]	X[1]	X[1]	X[1]	X[1]
AI.4	HeaterSensor2Temp	Temperature measured by EAS heater sensor 2. ***[1] = Factory Setting***	*	-40ºF to 212ºF or -40ºC to 100ºC Resolution 0.1ºF/0.1ºC	X[1]	X[1]	X[1]	X[1]	X[1]	X[1]
AI.5	SSRTemp	Temperature measured on the solid-state relay. ***[1] = Factory Setting***	*	-40ºF to 212ºF or -40ºC to 100ºC Resolution 0.1ºF/0.1ºC	X[1]	X[1]	X[1]	X[1]	X[1]	X[1]
AI.6	SupplyTemp	Temperature measured by the duct sensor connected to TS5 input of HEC board. Available only if sensor has been pre-configured at factory or detected on TS5.	Out of service*	-40ºF to 212ºF or -40ºC to 100ºC Resolution 0.1ºF/0.1ºC	X	X	X	X	X	X
AI.7	ReturnTemp	Temperature measured by the duct sensor connected to TS4 input of HEC board. Available only if sensor has been pre-configured at factory or detected on TS4.	Out of service*	-40ºF to 212ºF or -40ºC to 100ºC Resolution 0.1ºF/0.1ºC	X	X	X	X	X	X

ID	Name	Description	W?	Notes	Control Mode					
					Network	External	Internal	TPM	Neptronic Signal	Pneumatic
AI.8	OnBoardSetpoint	Setpoint value from the control board's potentiometer. With HECFxxxP models only. Available only when MSV.102 = OnBoardSetpoint (1).	Out of service*	57.0ºF to 93.0ºF or 13.9ºC to 33.9ºC, Resolution 0.1ºF/0.1ºC			X			
AI.9	BoardTemp	Temperature of printed circuit board.	Out of service*	32.0ºF to 212.0ºF or 0.0ºC to 100.0ºC, Resolution 0.1ºF/0.1ºC	X	X	X	X	X	X
AI.10	TRLTemp	Room temperature measured by TRL. ***[2] = If TRL is connected.***	Out of service	-40ºF to 392ºF or -40ºC to 200ºC Resolution 0.1ºF/ºC	X[2]	X[2]	X[2]	X[2]	X[2]	X[2]
AI.11	Phase1current	Phase 1 current value.	Out of service	0A to 42949672A Resolution 0.1A						
AI.12	Phase2current	Phase 2 current value.	Out of service	0A to 42949672A Resolution 0.1A						
AI.13	Phase3current	Phase 3 current value.	Out of service	0A to 42949672A Resolution 0.1A						
AI.14	LineFrequency	Reading of line frequency.	Out of Service*	0 to 255 Hz, Resolution 1 Hz	X	X	X	X	X	X
AI.15	TRLRH	Humidity measure by TRL.	Out of service	0 to 100%, Resolution 1%						
Advanced *(displayed only if MSV.103 = 2)*										
AI.200	AI_TpmDuty	Time pulse modulation duty cycle of analog input.	Out of Service	0 ms to 1000 ms				X		
AI.201	PneumaticPressure	Pneumatic pressure measured by the external sensor (input signal).	Out of service	0.0 PSI to 15.0 PSI						X
AI.202	DI_TpmDuty	Time pulse modulation duty cycle of digital input.	Out of Service	0 ms to 1000 ms	X	X	X	X	X	X

(*): *Fixed COV Increment of 0.1 on Temperature values and of 1 on mV and other units.*

Analog Value (AV)

Table 4 - Analog Value Object Table

ID	Name	Description	W?	Notes	Control Mode					
					Network	External	Internal	TPM	Neptronic Signal	Pneumatic
Integrator										
AV.1	SystemDemand	Actual heating demand.	Present Value*	0.0% to 100.0%, Resolution 0.1%	X	X	X	X	X	X
AV.2	TPMStageOutput	Current Time Pulse Modulated stage output duty cycle in percent.	*	0 to 1000 millisecs Resolution 1ms	X	X	X	X	X	X
AV.3	HeatOutput	Actual heat output in % of full capacity.	*	0.0% to 100.0%, Resolution 0.1%	X	X	X	X	X	X
AV.4	HeatNominalPower	Theoretic demand in kW.	*	Range as per design Resolution 0.1kW	X	X	X	X	X	X
AV.5	HeatMeasuredPower	Actual measured power in kW using phase transducers. Available only if current sensing has been preconfigured in factory or detected.	*	Range as per design Resolution 0.1kW	X	X	X	X	X	X
AV.6	HeaterDeltaTemp[1] [1] = If TRL present and Network Setpoint = Src	Difference between EAS temperature sensors (AI.3 + AI.4). Available only if iEAS are present.	*	32ºF to 284ºF or 0ºC to 140ºC Resolution 0.1ºF/ºC	X	X	X	X	X	X
AV.7	DuctDeltaTemp[1] [1] = If TRL present and Network Setpoint = Src	Difference between Supply and Discharge temperature sensors (TS4 and TS5). Available only if both TS5 and TS4 are present.	*	-220ºF to 284ºF or -140ºC to 140ºC, Resolution 0.1ºF/ºC	X	X	X	X	X	X
AV.8	PowerDemandLimitInput	Programmable maximum system output limit in percent of total capacity.	Present Value	0.0% to 100.0%, Resolution 0.1%	X	X	X	X	X	X
AV.9	UnoccupiedSetpoint	Setpoint value used during no occupancy.	Present Value	50ºF to104ºF or 10ºC to 40ºC Resolution 0.5ºF/ºC			X			
AV.10	VacantSetpoint	Setpoint used during vacant mode.	Present Value	50ºF to 104ºF or 10ºC to 40ºC Resolution 0.5ºF/ºC			X			
AV.11	TRLSetpoint[1] [1] = If TRL present and Network Setpoint = Src	Setpoint value from the TRL.	Present Value	TRLSetpointMin to TRLSetpointMax	X		X			

ID	Name	Description	W?	Notes	Control Mode					
					Network	External	Internal	TPM	Neptronic Signal	Pneumatic
AV.12	NetworkSetpoint	Setpoint value coming from network BMS. Available only when MSV.100 = Internal (2) and MSV.102 = Network Setpoint (2).	Present Value	50ºF to 176ºF or 10ºC to 80ºC Resolution 0.5ºF/ºC			X			
AV.13	ReturnTempShutdownSetpoint	The system turns the unit off when temperature read by the Inlet Temperature Sensor (TS4) is higher than the Changeover Setpoint. BV.18 must be on.	Present Value	-40ºF to 212ºF or -40ºC to 100ºC Resolution 0.1ºF/0.1ºC	X	X	X	X	X	X
AV.14	NetworkTemp	Temperature value coming from network BMS. Available only when MSV.100 = Internal (2) and MSV.101 = NetworkTemp(2).	Present Value	32ºF to 122ºF or 0ºC to 50ºC Resolution 0.1			X			
AV.15	NetworkDowncounter	Countdown of Network timeout.	Out of service	0 to 900 secs, Resolution 1 sec	X		X[4]			
AV.16	EnergyAuditResult	Result of average kWh (see AV.106).	*	Range as per design Resolution 0.1kWh	X	X	X	X	X	X
Integrator - Configuration										
AV.100	Cfg_ProportionalBand	PID controller proportional band value. (P term gain Kp = 100/band)	Present Value	32.9°F to 122ºF or 0.5ºC to 50ºC Resolution 0.1ºF/ºC			X			
AV.101	Cfg_IntegralTime	PID controller integral time. (I term gain Ki = 1/Ti)	Present Value	0 (Ki = 0) to 300 secs Resolution 1 sec			X			
AV.102	Cfg_DifferentialTime	PID controller derivative time. (D term gain Kd = Td).	Present Value	0 (Kd = 0) to 60 secs Resolution 0.1 sec			X			
AV.103	Cfg_TRLSetpointMin[3] [3] = If set at factory	Minimum programmable setpoint value.	Present Value	50ºF /10ºC to SetpointMax Resolution 1ºF/ 0.5ºC	X	X	X	X	X	X
AV.104	Cfg_TRLSetpointMax[3] [3] = If set at factory	Maximum programmable setpoint value.	Present Value	SetpointMin to 104ºF / 40ºC Resolution 1ºF/ 0.5ºC	X	X	X	X	X	X
AV.105	Cfg_NetworkTimeout	Time without communication from network before generating an alarm and turning the system OFF. If Setpoint and/or Temp sources is Network. [2] Temp source = Network or TRL and not External.	Present Value	1 to 15 mins, Resolution 1 min	X		X[2]			
AV.106	Cfg_EnergyAuditPeriod	Defines rolling average used to calculate average kWh value.	Present Value	1 to 60 mins	X	X	X	X	X	X

ID	Name	Description	W?	Notes	Control Mode					
					Network	External	Internal	TPM	Neptronic Signal	Pneumatic
AV.107	Cfg_FanOnDelay[3] [3] = If set at factory	Delay value to turn on the fan in seconds.	Present Value	1 to 255 secs, Resolution 1 sec	X	X	X	X	X	X
AV.108	Cfg_FanOffDelay[3] [3] = If set at factory	Delay value to turn off the fan in seconds.	Present Value	1 to 255 secs, Resolution 1 sec	X	X	X	X	X	X
Advanced - Configuration *(displayed only if MSV.103 = 2)*										
AV.300	Cfg_HeatOutputRamp	Heat ramp output.	Present Value	0 to 100%, Resolution 0.1% per second.						
AV.301	Cfg_DuctTempSetpoint	Duct temperature setpoint. Duct safety BV.106 must be ON. BV.106 = ON and AI.6 Discharge Temp be available.	Present Value	50ºF to 176ºF or 10ºC to 80ºC Resolution 0.1ºF/ºC	X	X	X	X	X	X
AV.302	Cfg_DuctTempCutout	Duct temperature cutout. Duct safety BV.106 must be ON. BV.106 = ON and AI.6 Discharge Temp be available.	Present Value	122ºF to 194ºF or 50ºC to 90ºC Resolution 0.1ºF/ºC	X	X	X	X	X	X
AV.303	Cfg_DuctTempPropBand	PID controller proportional band value for duct temperature. (P term gain Kp = 100/band). Does not appear if Auto PID BV.107 is ON. Available only if BV.106 = ON, AI.6 Discharge Temp available and BV.107 = OFF.	Present Value	32.9°F to 122ºF or 0.5ºC to 50ºC Resolution 0.1ºF/ºC	X	X	X	X	X	X
AV.304	Cfg_DuctTempIntegralTime	PID controller integral time for duct temperature. (I term gain Ki = 1/Ti). Does not appear if Auto PID BV.107 is ON. Available only if BV.106 = ON, AI.6 Discharge Temp available and BV.107 = OFF.	Present Value	0 (Ki = 0) to 720 secs Resolution 1 sec	X	X	X	X	X	X
AV.305	Cfg_DuctTempDerivativeTime	PID controller derivative time for duct temperature. (D term gain Kd = Td). Does not appear if Auto PID BV.107 is ON. Available only if BV.106 = ON, AI.6 Discharge Temp available and BV.107 = OFF.	Present Value	0 (Kd = 0) to 10 secs Resolution 0.1 sec	X	X	X	X	X	X
AV.306	Cfg_PowerAlarmThreshold	The % error between the nominal (AV.4) and measured (AV.5) power.	Present value	5 to 25%, Resolution 1%	X	X	X	X	X	X

ID	Name	Description	W?	Notes	Control Mode					
					Network	External	Internal	TPM	Neptronic Signal	Pneumatic
AV.307	Cfg_StageOnDelay	Delay value to turn on a stage in seconds.	Present Value	1 to 255 secs, Resolution 1 sec	X	X	X	X	X	X
AV.308	Cfg_StageOffDelay	Delay value to turn off a stage in seconds.	Present Value	1 to 255 secs, Resolution 1 sec	X	X	X	X	X	X
AV.309	Cfg_PneumaticSignalMin	Pneumatic signal minimum value.	Present Value	0 to Cfg_PneumaticSignalMax Resolution1 millivolt						X
AV.310	Cfg_PneumaticSignalMax	Pneumatic signal maximum value.	Present Value	Cfg_PneumaticSignalMin to 10,000, Resolution1 millivolt						X
AV.311	Cfg_InputTempOffset	Input temperature offset calibration. Only if AI.2 is available.	Present Value	±10.0ºC, Resolution 0.1ºC	X	X	X	X	X	X
AV.312	Cfg_HeaterSensor1TempOffset	Heater sensor 1(EAS) temperature offset calibration. Only if AI.3 is available.	Present Value	±10.0ºC, Resolution 0.1ºC	X	X	X	X	X	X
AV.313	Cfg_HeaterSensor2TempOffset	Heater sensor 3(EAS) temperature offset calibration. Only if AI.4 is available.	Present Value	±10.0ºC, Resolution 0.1ºC	X	X	X	X	X	X
AV.314	Cfg_SSR TempOffset	SSR temperature offset calibration. Only if AI.5 is available.	Present Value	±10.0ºC, Resolution 0.1ºC	X	X	X	X	X	X
AV.315	Cfg_SupplyTempOffset	Discharge sensor (TS5) temperature offset calibration. Only if AI.6 = SupplyTemp.	Present Value	±10.0ºC, Resolution 0.1ºC	X	X	X	X	X	X
AV.316	Cfg_ReturnTempOffset	Supply sensor (TS4) temperature offset calibration.	Present Value	±10.0ºC, Resolution 0.1ºC	X	X	X	X	X	X
AV.317	Cfg_BoardTempOffset	PCB temperature offset calibration.	Present Value	±10.0ºC, Resolution 0.1ºC	X	X	X	X	X	X
AV.318	Cfg_TRLRoomTempOffset	TRL thermostat internal temperature offset calibration. Only if AI.10 TRLTemp is available.	Present Value	±10.0ºC, Resolution 0.1ºC	X	X	X	X	X	X
AV.319	Cfg_TRLRoomRHOffset	TRL thermostat internal humidity offset calibration. Only if AI.15 TRLRH is available.	Present Value	±10.0%RH, Resolution 0.1%RH						

(*): *Fixed COV Increment of 0.1 on Temperature values and of 1 on mV and other units.*

Analog and Binary Output (AO and BO)

Table 5 - Analog and Binary Output Object Table

ID	Name	Description	W?	Notes	Control Mode					
					Network	External	Internal	TPM	Neptronic Signal	Pneumatic
AO.1	FeedbackVoltage	Voltage output read at pin 7.	Present Value*	0 to 10,560 mV, Resolution 1mV	X	X	X	X	X	X
BO.1	FanOutput	Fan output status. If fan is available (factory).	Present Value Out of service	0 = Off, 1 = On	X	X	X	X	X	X

(*): *Fixed COV Increment of 0.1 on Temperature values and of 1 on mV and other units.*

Binary Input (BI)

Table 6 - Binary Input Object Table

ID	Name	Description	W?	Notes	Control Mode					
					Network	External	Internal	TPM	Neptronic Signal	Pneumatic
BI.1	ThermalCutout	Status is On when Thermal Input = opened.	-	0 = Open, 1 = Close	X	X	X	X	X	X
BI.2	AirflowCutout	Status is On when no air flow (AirFlowInput = opened).	-	0 = Open, 1 = Close	X	X	X	X	X	X
BI.3	InterlockCutout	Status is On when Interlock Input = opened.	-	0 = Open, 1 = Close	X	X	X	X	X	X

Binary Value (BV)

Table 7 - Binary Value Object Table

ID	Name	Description	W?	Notes	Control Mode					
					Network	External	Internal	TPM	Neptronic Signal	Pneumatic
Integrator										
BV.1	SystemMode	Actual system mode.	Present Value	0 = Heat, 1 = Off	X	X	X	X	X	X
BV.2	Stage1Output	Status of stage 1 output. Number of stages depends on internal configuration.	-	0 = Off, 1 = On	X	X	X	X	X	X
BV.3	Stage2Output	Status of stage 2 output. Number of stages depends on internal configuration.	-	0 = Off, 1 = On	X	X	X	X	X	X
BV.4	Stage3Output	Status of stage 3 output. Number of stages depends on internal configuration.	-	0 = Off, 1 = On	X	X	X	X	X	X
BV.5	Stage4Output	Status of stage 4 output. Number of stages depends on internal configuration.	-	0 = Off, 1 = On	X	X	X	X	X	X
BV.6	Stage5Output	Status of stage 5 output Number of stages depends on internal configuration	-	0 = Off, 1 = On	X	X	X	X	X	X
BV.7	Stage6Output	Status of stage 6 output. Number of stages depends on internal configuration.	-	0 = Off, 1 = On	X	X	X	X	X	X
BV.8	Stage7Output	Status of stage 7 output. Number of stages depends on internal configuration.	-	0 = Off, 1 = On	X	X	X	X	X	X
BV.9	Stage8Output	Status of stage 8 output. Number of stages depends on internal configuration.	-	0 = Off, 1 = On	X	X	X	X	X	X
BV.10	Stage9Output	Status of stage 9 output. Number of stages depends on internal configuration.	-	0 = Off, 1 = On	X	X	X	X	X	X

ID	Name	Description	W?	Notes	Control Mode					
					Network	External	Internal	TPM	Neptronic Signal	Pneumatic
BV.11	Stage10Output	Status of stage 10 output. Number of stages depends on internal configuration.	-	0 = Off, 1 = On	X	X	X	X	X	X
BV.12	Stage11Output	Status of stage 11 output. Number of stages depends on internal configuration	-	0 = Off, 1 = On	X	X	X	X	X	X
BV.13	Stage12Output	Status of stage 12 output. Number of stages depends on internal configuration.	-	0 = Off, 1 = On	X	X	X	X	X	X
BV.14	LimitedByHeaterTemp	Power output limited by temperature inside heater enclosure.	-	0 = Off, 1 = On	X	X	X	X	X	X
BV.15	LimitedBySSRTemp	Power output limited by SSR temperature.	-	0 = Off, 1 = On	X	X	X	X	X	X
BV.16	LimitedByBoardTemp	Power output limited by PCB temperature.	-	0 = Off, 1 = On	X	X	X	X	X	X
BV.17	LimitedByDuctTemp	Power output limited by duct discharge temperature (TS5 input).	-	0 = Off, 1 = On	X	X	X	X	X	X
BV.18	LimitedByChangoverTemp	Power output limited by changeover temperature.	-	0 = Off, 1 = On	X	X	X	X	X	X
Integrator - Alarms										
BV.30	AL_GlobalAlarmMask	Active as soon as one or more alarms are present.	-	0 = Off, 1 = On	X	X	X	X	X	X
BV.31	AL_ThermalCutout	Status of thermal cutout.	-	0 = Off, 1 = On	X	X	X	X	X	X
BV.32	AL_AirflowCutout	Status of air flow cutout.	-	0 = Off, 1 = On	X	X	X	X	X	X
BV.33	AL_InterlockCutout	Status of Interlock.	-	0 = Off, 1 = On	X	X	X	X	X	X
BV.34	AL_HeaterTempCutout	Status of heater temperature cutout.	-	0 = Off, 1 = On	X	X	X	X	X	X
BV.35	AL_BoardTempCutout	Status of board temperature cutout.	-	0 = Off, 1 = On	X	X	X	X	X	X
BV.36	AL_SSRTempCutout	Status of SSR temperature cutout.	-	0 = Off, 1 = On	X	X	X	X	X	X

ID	Name	Description	W?	Notes	Control Mode					
					Network	External	Internal	TPM	Neptronic Signal	Pneumatic
BV.37	AL_TRLSensorFailure	TRL thermostat temperature sensor failure.	-	0 = Off, 1 = On	X	X	X	X	X	X
BV.38	AL_TRLTimeout	Alarm in case of a TRL time- out (no communication).	-	0 = Off, 1 = On *(I) = Displayed but not used*	(I)	(I)	(I)	(I)	(I)	(I)
BV.39	AL_NetworkTimeout	Alarm if network does not respond (no communication).	-	0 = Off, 1 = On *(I) = Displayed but not used*	(I)	(I)	(I)	(I)	(I)	(I)
BV.40	AL_MeasuredPowerTooHigh	Measured powered is above target value (as per design).	-	0 = Off, 1 = On	X	X	X	X	X	X
BV.41	AL_MeasuredPowerTooLow	Measured powered is below target value (as per design).	-	0 = Off, 1 = On	X	X	X	X	X	X
BV.42	AL_AirFlowNotDetected	Alarm if no air flow is detected by air flow sensor.	-	0 = Off, 1 = On	X	X	X	X	X	X
BV.44	AL_InvalidConfguration	Invalid configuration. If this is ON, contact Neptronic technical support for assistance.	-	0 = Off, 1 = On	X	X	X	X	X	X
Integrator - Configuration										
BV.100	Cfg_InletTempShutdown	When on, the system turns the unit off whenever the temperature read by the Inlet Temperature Sensor (TS4) AI.7. AV.17 must be ON.	Present Value	0 = Off, 1 = On	X	X	X	X	X	X
BV.101	Cfg_NetworkTempUnits	Available temperature units when viewed via BACnet.	Present Value	0 = Celsius, 1 = Fahrenheit	X	X	X	X	X	X
BV.102	Cfg_NetworkcontrolOverride	Overrides DIP switch value to force network control mode.	Present Value	0 = Off, 1 = On	X	X	X	X	X	X
BV.103	Cfg_TRLTempUnits	Available temperature units when viewed via TRL Thermostat.	Present Value	0 = Celsius, 1 = Fahrenheit	X	X	X	X	X	X
BV.104	Cfg_TRLSetpointLock	If ON, setpoint cannot be modified via TRL thermostat.	Present Value	0 = Off, 1 = On	X	X	X	X	X	X
BV.105	Cfg_TRLSystemStatusLock	If ON, heater cannot be manually turned on or off from the TRL thermostat.	Present Value	0 = Off, 1 = On	X	X	X	X	X	X
BV.106	Cfg_DuctSafety	Duct safety.	Present Value	0 = Off, 1 = On	X	X	X	X	X	X
BV.107	Cfg_AutoPID	Automatic PID.	Present Value	0 = Off, 1 = On	X	X	X	X	X	X

ID	Name	Description	W?	Notes	Control Mode					
					Network	External	Internal	TPM	Neptronic Signal	Pneumatic
BV.108	Cfg_TRLDisplayTime	Display time on TRL thermostat.	Present Value	0 = Off, 1 = On	X	X	X	X	X	X
BV.109	Cfg_TRLTimeFormat	Time format.	Present Value	0 = 24h, 1 = 12h	X	X	X	X	X	X
Advanced - Alarms *(displayed only if MSV.103 = 2)*										
BV.230	AL_HeaterSensor1Failure	Heater temperatures sensor 1 for EAS patent failure status.	-	0 = Off, 1 = On	X	X	X	X	X	X
BV.231	AL_HeaterSensor2Failure	Heater temperatures sensor 2 for EAS patent failure status.	-	0 = Off, 1 = On	X	X	X	X	X	X
BV.232	AL_BoardSensorFailure	PCB sensor failure.	-	0 = Off, 1 = On	X	X	X	X	X	X
BV.233	AL_SSRSensorFailure	SSR sensor failure.	-	0 = Off, 1 = On	X	X	X	X	X	X
BV.234	AL_InputSensorFailure	Input sensor failure.	-	0 = Off, 1 = On	X	X	X	X	X	X
BV.235	AL_ReturnSensorFailure	Return temperature sensor failure (TS5).	-	0 = Off, 1 = On	X	X	X	X	X	X
BV.236	AL_SupplySensorFailure	Supply temperature sensor failure (TS4).	-	0 = Off, 1 = On	X	X	X	X	X	X
BV.237	AL_CurrentSensor0Failure	Phase1 current transducer failure.	-	0 = Off, 1 = On	X	X	X	X	X	X
BV.238	AL_CurrentSensor1Failure	Phase2 current transducer failure.	-	0 = Off, 1 = On	X	X	X	X	X	X
BV.239	AL_CurrentSensor2Failure	Phase3 current transducer failure.	-	0 = Off, 1 = On	X	X	X	X	X	X

Multi State Value (MSV)

Table 8 - Multi State Value Object Table

ID	Name	Description	W?	Notes	Control Mode					
					Network	External	Internal	TPM	Neptronic Signal	Pneumatic
Integrator										
MSV.1	AirFlowStatus	Status of airflow detected at the heater by the patented EAS (Electronic Air Flow Sensors). Only available for models with the patented EAS.	-	1 = NoHeat 2 = NoFlow 3 = LowFlow 4 = RegularFlow	X	X	X	X	X	X
MSV.2	Occupancy	Defines setpoint to be used based on set occupancy mode.	Present Value	1 = Occupied 2 = Unoccupied 3 = Vacant	X	X	X	X	X	X
MSV.100	Cfg_ControlMode	System control mode as per dip switches, factory configuration and user parameters.	-	1 = External 2 = Internal 3 = Neptronic Signal 4 = Network 5 = Pneumatic 6 = TPM 7 = Network	X	X	X	X	X	X
MSV.101	Cfg_ControlTempSource	Internal control temperature input source.	Present Value	1 = Analog Input 2 = Network Temp 3 = TRL Temp 4 = Supply Temp 5 = Discharge Temp	X	X	X	X	X	X
MSV.102	Cfg_ControlSetpointSource	Internal control setpoint source.	Present Value	1 = On board setpoint 2 = Network setpoint 3 = TRL setpoint			X			
MSV.103	Cfg_ObjectListMode	Determines which BACnet objects can be viewed.	Present Value	1 = Integrator 2 = Advanced 3 = Factory	X	X	X	X	X	X

Program Value (PRG)

ID	Name	Description	W?	Notes
PRG.1	FirmwareUpdate	Represents the firmware upgrade process available for the controller. **Read to program_status** • PS_LOADING: Firmware update request is pending. • PS_WAITING: Firmware update is available and firmware update request is not pending. • PS_HALTED: Firmware update is not available. **Read to program_change** • PR_READY: Ready to update. • PR_HALT: Not ready to update, you can run a firmware file validation (PR_RUN). **Write to program_change** • PR_LOAD: If firmware update is ready (validated), request an update. • PR_RUN: Request firmware file validation. • PR_RESTART: Reboot controller.	Program Change	**program_state:** PS_IDLE = 0 PS_LOADING = 1 PS_RUNNING = 2 PS_WAITING = 3 PS_HALTED = 4 PS_UNLOADING = 5 **program_change:** PR_READY = 0 PR_LOAD = 1 PR_RUN = 2 PR_HALT = 3 PR_RESTART = 4 PR_UNLOAD = 5

File (File)

ID	Name	Description	W?	Notes
File.1	FirmwareUpdate	File object of the controller firmware upgrade.	File Size	Stream access method via atomicWriteFile and atomicReadFile
File.2	BootloaderUpdate	File object of the controller boot loader firmware upgrade.	File Size	Stream access method via atomicWriteFile and atomicReadFile

Schedule (SCH)

ID	Name	Description	W?	Notes
SCH.1	OccupancySchedule	Weekly occupancy schedule to specify which occupancy state is active during specific periods of day.	Effective_Period Priority_For_Writing Schedule_Default	Result is written to OccupancyState's present value (MSV.5). See OccupancyState for the list of valid event values.

Factory BACnet Objects Table

The EVCB controller provides the possibility to view different BACnet Object lists depending on the user's needs.
MSV.103 = **1**: Displays only objects identified as **"Integrator"** (blue headings).
MSV.103 = **2**: Displays objects identified as **"Integrator"** and **"Advanced"** (red headings: objects xx.200 or higher).
MSV.103 = **3**: Displays all BACnet objects including **"Integrator"**, **"Advanced"** and **"Factory"** (red headings: objects xx.1000 or higher).

Factory BACnet Objects

Please note that "Factory" objects are for troubleshooting or for special applications and should not be modified in typical installations.

Table 9 – Factory BACnet Objects

ID	Name	Description	W?	Notes	Control Mode					
					Network	External	Internal	TPM	Neptronic Signal	Pneumatic
Factory – Analog Inputs (AI) *(displayed only if MSV.103 = 3)*										
AI.1001	ISens0	Reading of current transducer on phase 1.	-	Range as per design Resolution 0.1A	X	X	X	X	X	X
AI.1002	ISens1	Reading of current transducer on phase 2. If current sensors are available.	-	Range as per design Resolution 0.1A	X	X	X	X	X	X
AI.1003	ISens2	Reading of current transducer on phase 3.	-	Range as per design Resolution 0.1A	X	X	X	X	X	X
AI.1004	MeasuredLineVoltage	Measured line voltage.	-	0 to 65,535 volts, Resolution 1 volt	X	X	X	X	X	X
AI.1005	HeaterSensor1Input	Measured input voltage of EAS heater sensor 1. Only if AI.3 is available.	-	0 to 3,300 millivolts Resolution 1 mv	X	X	X	X	X	X
AI.1006	HeaterSensor2Input	Measured input voltage of EAS heater sensor 2. Only if AI.4 is available.	-	0 to 3,300 millivolts Resolution 1 mv	X	X	X	X	X	X
AI.1007	SSRSensorInput	Measured input voltage of solid-state relay sensor. Only if AI.5 is available.	-	0 to 3,300 millivolts Resolution 1 mv	X	X	X	X	X	X

ID	Name	Description	W?	Notes	Control Mode					
					Network	External	Internal	TPM	Neptronic Signal	Pneumatic
AI.1008	SupplySensorInput	Measured input voltage of the duct sensor connected to TS5 input of HEC board. Only if AI.6 is available.	-	0 to 3,300 millivolts Resolution 1 mv	X	X	X	X	X	X
AI.1009	ReturnSensorInput	Measured input voltage of the duct sensor connected to TS4 input of HEC board. Only if AI.7 is available	-	0 to 3,300 millivolts Resolution 1 mv	X	X	X	X	X	X
AI.1010	OnBoardSetpointInput	Measured input voltage of the control board's potentiometer. With HECFxxxP models only. Only if AI.9 is available.	-	0 to 3,300 millivolts Resolution 1 mv			X			
AI.1011	BoardSensorInput	Measured input voltage of the PCB's temperature sensor.	-	0 to 3,300 millivolts Resolution 1 mv	X	X	X	X	X	X
AI.1012	MicroTemp	Measured temperature of the on-board microprocessor.	-	-40ºF to 392ºF or -40ºC to 200ºC Resolution 0.1ºF/ºC	X	X	X	X	X	X
Factory – Analog Value (AV) *(displayed only if MSV.103 = 3)*										
AV.1000	HeatOutputRampAuto	Heat output ramp.								
AV.1001	HeatValidDowncntr	Heat valid countdown.	-	0 to 10 secs, Resolution 1 sec	X	X	X	X	X	X
AV.1002	LastFanActionDowncntr	Last fan action countdown.	-	0 to 255 secs, Resolution 1 sec	X	X	X	X	X	X
AV.1003	LastStageActionDowncntr	Last stage action countdown. If fan is available as per design.	-	0 to 255 secs, Resolution 1 sec	X	X	X	X	X	X
AV.1004	TRLtimeoutDowncntr	TRL timeout countdown. If TRL is available.	-	0 to 900 secs, Resolution 1 sec	X	X	X	X	X	X
AV.1005	HeaterSensor1IdleTemp	Idle temperature of EAS heater sensor 1. If AI.3 is available.	-	-40ºF to 212ºF or -40ºC to 100ºC Resolution 0.1ºF/0.1ºC	X	X	X	X	X	X
AV.1006	HeaterSensor2IdleTemp	Idle temperature of EAS heater sensor 2. If AI.4 is available.	-	-40ºF to 212ºF or -40ºC to 100ºC Resolution 0.1ºF/0.1ºC	X	X	X	X	X	X
Factory – Analog Value (AV) - Configuration *(displayed only if MSV.103 = 3)*										

ID	Name	Description	W?	Notes	Control Mode					
					Network	External	Internal	TPM	Neptronic Signal	Pneumatic
AV.1500	Cfg_HeaterTempPropBand	PID controller proportional band value for temperature inside the heater enclosure. (P term gain Kp = 100/band). Only if AI.5 is available and BV.1504 = ON.	Present Value	32.9°F to 122ºF or 0.5ºC to 50ºC Resolution 0.1ºF/ºC	X	X	X	X	X	X
AV.1501	Cfg_HeaterTempIntegralTime	PID controller integral time for temperature inside the heater enclosure. (I term gain Ki = 1/Ti). Only if AI.3 and AI.4 available and BV.1502 = ON.	Present Value	0 (Ki = 0) to 500 secs Resolution 1 sec	X	X	X	X	X	X
AV.1502	Cfg_HeaterTempDerivativeTime	PID controller derivative time for temperature inside the heater enclosure. (D term gain Kd = Td). Only if AI.5 is available and BV.1504 = ON.	Present Value	0 (Kd = 0) to 60 secs Resolution 0.1 sec	X	X	X	X	X	X
AV.1503	Cfg_SSRTempPropBand	PID controller proportional band value for SSR temperature. (P term gain Kp = 100/band). Only if AI.5 is available and BV.1504 = ON.	Present Value	32.9°F to 122ºF or 0.5ºC to 50ºC Resolution 0.1ºF/ºC	X	X	X	X	X	X
AV.1504	Cfg_SSRTempIntegralTime	PID controller integral time for SSR temperature. (I term gain Ki = 1/Ti). Only if AI.5 is available and BV.1504 = ON.	Present Value	0 (Ki = 0) to 720 secs Resolution 1 sec	X	X	X	X	X	X
AV.1505	Cfg_SSRTempDerivativeTime	PID controller derivative time for SSR temperature. (D term gain Kd = Td). Only if AI.5 is available and BV.1504 = ON.	Present Value	0 (Kd = 0) to 10 secs Resolution 0.1 sec	X	X	X	X	X	X
AV.1506	Cfg_BoardTempPropBand	PID controller proportional band value for board temperature. (P term gain Kp = 100/band). Only if BV.1505 = ON.	Present Value	32.9°F to 122ºF or 0.5ºC to 50ºC Resolution 0.1ºF/ºC	X	X	X	X	X	X
AV.1507	Cfg_BoardTempIntegralTime	PID controller integral time for board temperature. (I term gain Ki = 1/Ti). Only if BV.1505 = ON.	Present Value	0 (Ki = 0) to 720 secs Resolution 1 sec	X	X	X	X	X	X
AV.1508	Cfg_BoardTempDerivativeTime	PID controller derivative time for board temperature. (D term gain Kd = Td). Only if BV.1505 = ON.	Present Value	0 (Kd = 0) to 10 secs Resolution 0.1 sec	X	X	X	X	X	X
AV.1509	Cfg_SystemOutputDeadbandLow	Demand low limit dead band range inside which system output is 0%.	Present Value	0.0% to 10.0%, Resolution 0.1%	X	X	X	X	X	X

ID	Name	Description	W?	Notes	Control Mode					
					Network	External	Internal	TPM	Neptronic Signal	Pneumatic
AV.1510	Cfg_SystemOutputDeadbandHigh	Demand high limit dead band range value inside which system output is 100%.	Present Value	0.0% to 10.0%, Resolution 0.1%	X	X	X	X	X	X
AV.1511	Cfg_ISens0offset	Current transducer on phase 1.	Present Value	±10.0ºC, Resolution 0.1A	X	X	X	X	X	X
AV.1512	Cfg_ISens1offset	Current transducer on phase 2, if sensors are available.	Present Value	±10.0ºC, Resolution 0.1A	X	X	X	X	X	X
AV.1513	Cfg_ISens2offset	Current transducer on phase 3.	Present Value	±10.0ºC, Resolution 0.1A	X	X	X	X	X	X
AV.1514	Cfg_Sens0Sensitivity	Sensitivity of current transducer on phase 1.	Present Value	0 to 4,294,967 Resolution 0.001 µOhm/Hz	X	X	X	X	X	X
AV.1515	Cfg_Sens1Sensitivity	Sensitivity of current transducer on phase 2. If sensors are available.	Present Value	0 to 4,294,967 Resolution 0.001 µOhm/Hz	X	X	X	X	X	X
AV.1516	Cfg_Sens2Sensitivity	Sensitivity of current transducer on phase 3.	Present Value	0 to 4,294,967 Resolution 0.001 µOhm/Hz	X	X	X	X	X	X
AV.1517	Cfg_AutoControlPbandMin	Minimum proportional band for automatic PID of control ramp.	Present Value	0.5 to AV.1518 (max). Resolution 0.1ºC	X	X	X	X	X	X
AV.1518	Cfg_AutoControlPbandMax	Maximum proportional band for automatic PID of control ramp. INTERNAL control mode ONLY and BV.107 = ON.	Present Value	AV.1517 (min) to 50 Resolution 0.1ºC	X	X	X	X	X	X
AV.1519	Cfg_AutoControlItimeMin	Minimum integral time for automatic PID of control ramp.	Present Value	1 to AV.1520 (max) Resolution 1 sec	X	X	X	X	X	X
AV.1520	Cfg_AutoControlItimeMax	Maximum integral time for automatic PID of control ramp. INTERNAL control mode ONLY and BV.107 = ON.	Present Value	AV.1519 to 3,600 Resolution 1 sec	X	X	X	X	X	X
AV.1521	Cfg_HeaterTempSetpoint	Heater temperature setpoint.	Present Value	104ºF to 176ºF or 40ºC to 80ºC Resolution 0.5ºF/ºC	X	X	X	X	X	X
AV.1522	Cfg_HeaterTempCutout	Heater temperature cutout. If AI.3 and AI.4 are available and BV.1502 = ON.	Present Value	122ºF to 194ºF or 50ºC to 90ºC Resolution 0.5ºF/ºC	X	X	X	X	X	X
AV.1523	Cfg_AutoHeaterTempPbandMin	Minimum proportional band for automatic PID of temperature inside the heater.	Present Value	0.5 to AV.1524 (max) Resolution 0.1ºC	X	X	X	X	X	X

ID	Name	Description	W?	Notes	Control Mode					
					Network	External	Internal	TPM	Neptronic Signal	Pneumatic
AV.1524	Cfg_AutoHeaterTempPbandMax	Maximum proportional band for automatic PID of temperature inside the heater.	Present Value	AV.1523 to 50.0 Resolution 0.1ºC						
AV.1525	Cfg_AutoHeaterTempItimeMin	Minimum integral time for automatic PID of temperature inside the heater.	Present Value	1 to AV.1526 Resolution 1 second						
AV.1526	Cfg_AutoHeaterTempItimeMax	Maximum integral time for automatic PID of temperature inside the heater.	Present Value	AV.1525 to 3600 Resolution 1 second						
AV.1527	Cfg_SSRTempSetpoint	SSR temperature setpoint.	Present Value	140ºF to 167ºF or 60ºC to 75ºC Resolution 0.5ºF/ºC	X	X	X	X	X	X
AV.1528	Cfg_SSRTempCutout	SSR temperature cutout. If AI.5 is available and BV.1504 = ON.	Present Value	158ºF to 176ºF or 70ºC to 80ºC Resolution 0.5ºF/ºC	X	X	X	X	X	X
AV.1529	Cfg_AutoSSRTempPbandMin	Minimum proportional band for automatic PID of SSR temperature.	Present Value	0.5 to AV.1530 (max) Resolution 0.1ºC						
AV.1530	Cfg_AutoSSRTempPbandMax	Maximum proportional band for automatic PID of SSR temperature.	Present Value	AV.1529 to 50.0 Resolution 0.1ºC						
AV.1531	Cfg_ AutoSSRTempItimeMin	Minimum integral time for automatic PID of SSR temperature.	Present Value	1 to AV.1532 Resolution 1 second						
AV.1532	Cfg_ AutoSSRTempItimeMax	Maximum integral time for automatic PID of SSR temperature.	Present Value	AV.1531 to 3600 Resolution 1 second						
AV.1533	Cfg_BoardTempSetpoint	PC board temperature setpoint.	Present Value	140ºF to 167ºF or 60ºC to 75ºC Resolution 0.5ºF/ºC	X	X	X	X	X	X
AV.1534	Cfg_BoardTempCutout	PC board temperature cutout. If BV.1505 = ON.	Present Value	158ºF to 176ºF or 70ºC to 80ºC Resolution 0.5ºF/ºC	X	X	X	X	X	X
AV.1535	Cfg_AutoBoardTempPbandMin	Minimum proportional band for automatic PID of PC board temperature.	Present Value	0.5 to AV.1536 (max) Resolution 0.1ºC						
AV.1536	Cfg_AutoBoardTempPbandMax	Maximum proportional band for automatic PID of PC board temperature.	Present Value	AV.1535 to 50.0 Resolution 0.1ºC						
AV.1537	Cfg_AutoBoardTempItimedMin	Minimum integral time for automatic PID of PC board temperature.	Present Value	1 to AV.1538 Resolution 1 second						
AV.1538	Cfg_AutoBoardTempItimeMax	Maximum integral time for automatic PID of PC board temperature.	Present Value	AV.1537 to 3600 Resolution 1 second						

ID	Name	Description	W?	Notes	Control Mode					
					Network	External	Internal	TPM	Neptronic Signal	Pneumatic
AV.1539	Cfg_AutoDuctTempPbandMin	Minimum proportional band for automatic PID of duct temperature. Only if AI.6 DischargeTemp is available, BV.106 = ON, BV.107 = ON.	Present Value	0.5 to AV.1540 (max) Resolution 0.1ºC	X	X	X	X	X	X
AV.1540	Cfg_AutoDuctTempPbandMax	Maximum proportional band for automatic PID of duct temperature.	Present Value	AV.1539 (min) to 50 Resolution 0.1ºC	X	X	X	X	X	X
AV.1541	Cfg_AutoDuctTempItimeMin	Minimum integral time for automatic PID of duct temperature. Only if AI.6 DischargeTemp available, BV.106 = ON, BV.107 = ON.	Present Value	1 to AV.1542 (max) Resolution 1 sec	X	X	X	X	X	X
AV.1542	Cfg_AutoDuctTempItimeMax	Maximum integral time for automatic PID of duct temperature. Only if AI.6 DischargeTemp available, BV.106 = ON, BV.107 = ON.	Present Value	AV.1541 to 3,600 Resolution 1 sec	X	X	X	X	X	X
AV.1543	Cfg_HeatOutputRampMin	Minimum value of heat ramp output.	Present Value	0 to AV.1544 (max) Resolution 0.01% per second						
AV.1544	Cfg_HeatOutputRampMax	Maximum value of heat ramp output.	Present Value	AV.1543 (min) to 100 Resolution 0.01% per second						
AV.1545	Cfg_HeatOutputRampMinReturnTemp	Minimum value of heat ramp output measured by the duct sensor connected to TS4 input of HEC board.	Present Value	-40ºF to 212ºF or -40ºC to 100ºC Resolution 0.1ºF/0.1ºC						
AV.1546	Cfg_HeatOutputRampMaxReturnTemp	Maximum value of heat ramp output measured by the duct sensor connected to TS4 input of HEC board.	Present Value	-40ºF to 212ºF or -40ºC to 100ºC Resolution 0.1ºF/0.1ºC						
AV.1547	Cfg_FlowDeltaTempThreshold If AI.3 AND AI.4 are available	Airflow Delta temperature threshold	Present Value	30ºF to 36.5ºF or 0ºC to 2.5ºC Resolution 0.1ºF/0.1ºC	X	X	X	X	X	X
Factory – Binary Value (BV) - Configuration *(displayed only if MSV.103 = 3)*										
BV.1500	Cfg_AirFlowCutoutDeactivation	Air flow cutout deactivation.	Present Value	0 = Off, 1 = On	X	X	X	X	X	X
BV.1501	Cfg_HeaterSensorsAvail	Heater sensors available.	Present Value	0 = Off, 1 = On	X	X	X	X	X	X
BV.1502	Cfg_HeaterSafety	Heater safety.	Present Value	0 = Off, 1 = On	X	X	X	X	X	X
BV.1503	Cfg_SSRSensorAvail	SSR sensor available.	Present Value	0 = Off, 1 = On	X	X	X	X	X	X

ID	Name	Description	W?	Notes	Control Mode					
					Network	External	Internal	TPM	Neptronic Signal	Pneumatic
BV.1504	Cfg_SSRSafety	SSR safety.	Present Value	0 = Off, 1 = On	X	X	X	X	X	X
BV.1505	Cfg_BoardSafety	Board safety.	Present Value	0 = Off, 1 = On	X	X	X	X	X	X
BV.1506	Cfg_CurrentSensor0Detected	Current sensor phase 1 detected.	Present Value	0 = Off, 1 = On	X	X	X	X	X	X
BV.1507	Cfg_CurrentSensor1Detected	Current sensor phase 2 detected.	Present Value	0 = Off, 1 = On	X	X	X	X	X	X
BV.1508	Cfg_CurrentSensor2Detected	Current sensor phase 2 detected.	Present Value	0 = Off, 1 = On	X	X	X	X	X	X
BV.1509	Cfg_ReturnSensorDetected	Return sensor detected.	Present Value	0 = Off, 1 = On	X	X	X	X	X	X
BV.1510	Cfg_SupplySensorDetected	Supply/Inlet sensor detected.	Present Value	0 = Off, 1 = On	X	X	X	X	X	X
Factory – Multi State Value (BV) - Configuration *(displayed only if MSV.103 = 3)*										
MSV.1500	Cfg_GainSelect	Gain selection.	Present Value	1 = 88.496 2 = 44.742 3 = 16.176 4 = 8.118 5 = 2.035	X	X	X	X	X	X

Notes

	Recycling at end of life: please return this product to your Neptronic local distributor for recycling. If you need to find the nearest Neptronic authorized distributor, please consult **www.neptronic.com**.

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