Universal Wall-Mount Controller

TUUB Series

BACnet Communication Module User Guide



Contents

Introduction 1
Pre-requisites 1
Advantages of BACnet 1
BACnet Properties Configuration 2
Configuration Options 3
Quick Setup 3
Manual Setup 3
MAC Address and Max_Master 3
Copy Config 4
Network Reset 4
Device Object Properties 5
Object Types Supported 6
Out of Service Property 7
Object Table Information 8
Analog Input (AI) 8
Analog Output (AO) 9
Analog Value (AV) 10
Binary Input (BI) 17
Binary Output (BO) 17
Binary Value (BV) 17
Multi State Value (MSV) 22
Other 29

Introduction

The TUUB Controller BACnet® Communication Module User Guide provides information about using the TUUB 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. The Max_Master and the instances are configured to the device object through **BACnet WriteProperty** service or via the device's Programming Mode. The MAC address and the MS/TP baud rate setting of 9600, 19200, 38400, or 76800 are also set through the **BACnet Write Property** service or via the device's Programming Mode. In Programming mode, the device is configured through the device's keypad. For more information about the WriteProperty, refer to *Table 3 - Object Types Supported*.
- *BIBB Support*. The controller functions the same way as the B-ASC type profile server and supports the specific BIBB as per their relevant definitions.
  - DS-RP-B
  - DS-RPM-B
  - DS-WP-B
  - DS-WPM-B
  - DM-DCC-B
  - DM-DDB-B
  - DM-DOB-B
  - DM-RD-B
  - DM-TS-B
  - DM-UTC-B
  - DS-COV-B
  - DS-COVP-B
  - SCHED-WS-I-B
- *Object Support*. The controller supports a fixed list of BACnet visible values, which appear as Present_Values of various BACnet standard object types in addition to a device object. For more information, refer to *Table 3 - Object Types Supported*.
- *Alarms*. The controller supports indication of various alarm conditions through value changes in properties of several objects. However, it does not generate BACnet event notifications.

BACnet Properties Configuration

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

Table 1 - BACnet Properties Configuration

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

Configuration Options

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

Quick Setup

Configure the controller for BACnet communication without programming.

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

Manual Setup

Configure the controller for BACnet communication with programming.

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

MAC Address and Max_Master

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

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

Examples of MAC Address and Max_Master Configurations

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

Example 1

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

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

Example 2

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

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

Example 3

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

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

Example 4

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

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

Copy Config

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

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

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

Network Reset

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

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

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

Note: The Cold Reset erases the actual configuration during setting MSTP address. So, 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	TUUB, programmable up to 32 Bytes	W
Description	Programmable up to 32 Bytes (default: BACnet Unit Controller)	W
Object_Type	Device	
System_Status	Operational	
Vendor_Identifier	Always 153	
Vendor_Name	Always Neptronic	
Model_Name	Example, TUUB	
Firmware_Revision	currently, 1.14	
Application_Software_Version	currently, 1.06	
Protocol_Version	Always 1	
Protocol_Revision	Always 14	
DataBase_Revision	Default 0; incremented if Object Name and/or device ID change	
Max_APDU_Length_Accepted	Always 480	
Segmentation_Supported	(3) = No Segmentation	
APDU_Timeout	6000	W
Number_of_APDU_Retries	Always 3	
Local_Time	00:00:00	W
Local_Date	01-Jan-2015 (Thu)	W
UtC_Offset	-300 minutes	W
Daylight_Savings_Status	False	W
Backup_Failure_Timeout	300	W
Configuration_Files	File-1	
Last_Restore_Time	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 • subscribeCOVProperty	
Protocol_Object_Types_Supported	• analog-input • analog-output • analog-value • binary-input • binary-output • binary-value • device • file • program	

Property	Value	Writable
	• schedule • multi-state-value	
Object_List	195	
Device_Address_Binding	Always empty	
Max_Master	Programmable in the range of 1-127 (default: 127)	W
Max_Info_Frames	Always 1	
Active_COV_Subscription	Empty by default. COV subscription will be lost on a power cycle.	
Property_List	List of properties that exist within the object.	
Proprietary property #1000	• Programmable (default:0) • Represents the MS/TP MAC address in the range of 0 to 254 • Values 128 to 254 represent MS/TP non-token passing slave devices	W
Proprietary property #1001	• Programmable (default: Auto) • Represents the MS/TP Baud rate (unsigned type) • Values are 0 (Auto), 9600, 19200, 38400, 76800 • Reading this property always returns the actual Baud rate	W
Proprietary property #1002	• Programmable (default: 15 minutes) • Represents the period of time that an object in/out of service will automatically return to normal. Range = 0-120 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. 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.24, AV.35, AV.38, AV.50, AV.60, AV.78, AV.79, AV.87. • Out_of_Service property is writable for AV.1, AV.3, AV.4, AV.70, AV.95. • 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 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. 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.

Object Type	Enabled	Optional Properties Supported	Writable Properties	Notes
Binary Value	☑	• Reliability • Active_Text • Inactive_Text • Description • Priority_Array • Relinquish_Default	Present_Value Out_of_Service	• Present_Value property is writable for every Binary Value object except BV.36 and BV.42. • Out_of_Service property is writable for BV.30. • Some objects are commandable. In such case, the priority-array and relinquish-default properties are available for BV.30. • Object automatically returns to Normal after a programmable time. Refer to Proprietary property #1002 of Device Object in Table 2 - Device Object Properties.
Binary Output	☑	• Description • Reliability • Inactive-text • Active-text	Present_Value	
Device	☑	• Max_Master • Max_Info_Frame • Description • active-cov-subscriptions • #1000 (MSTP addr) • #1001 (Baud rate) • #1002 (Time out) • Local_Time • Local_Date • UTC_Offset • Daylight_Savings_Status • Apdu_Timeout • Backup_Failure_Timeout • Configuration_Files • Last_Restore_Time • Backup_And_Restore_State • Backup_Preparation_Time • Restore_Completion_Time • Restore_Preparation_Time	• Object_Identifier • Object_Name • Max_Master • Description • Local_Time • Local_Date • UTC_Offset • Daylight_Savings_Status • Apdu_Timeout • Backup_Failure_Timeout • #1000 • #1001 • #1002	
Multi-State Value	☑	• Description • Reliability • States_Text • Priority_Array • Relinquish_Default	Present_Value	• Present_Value property is writable for every Multi State Value object except MSV.14, 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 into 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 TUUB 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	Sensor reading value on analog input 1.	Out of Service Cov Increment	• If a 10kΩ type III sensor is used, displays 0V Fault and Out of Service Status Flags are True • If a 0-10V sensor is used, displays 0-10V Resolution 0.01 Volt • If a dry contact is used, displays 0 or 1 No Units 0 = Open, 1 = Close
AI.2	AnalogInput2	Sensor reading value on analog input 2.	Out of Service Cov Increment	• If a 10kΩ type III sensor is used, displays 0V Fault and Out of Service Status Flags are True. • If a 0-10V sensor is used, displays 0-10V Resolution 0.01 Volt • If a dry contact is used, displays 0 or 1 No Units 0 = Open, 1 = Close
AI.3	AnalogInput3	Sensor reading value on analog input 3.	Out of Service Cov Increment	• If a 10kΩ type III sensor is used, displays 0V Fault and Out of Service Status Flags are True. • If a 0-10V sensor is used, displays 0-10V Resolution 0.01 Volt • If a dry contact is used, displays 0 or 1 No Units 0 = Open, 1 = Close
AI.4	AnalogInput4	Sensor reading value on analog input 4.	Out of Service Cov Increment	• If a 10kΩ type III sensor is used, displays 0V Fault and Out of Service Status Flags are True. • If a 0-10V sensor is used, displays 0-10V Resolution 0.01 Volt • If a dry contact is used, displays 0 or 1 No Units 0 = Open, 1 = Close
AI.7	InternTemp	Internal temp sensor value (ITS) of the integrated sensor. Set MSV.21 value to **Internal** to use it as Control Temp.	Out of Service Cov Increment	32°F to 122°F or 0°C to 50°C Resolution 0.02°F/0.01°C
AI.8	InternHumidity	Humidity reading of on board humidity sensor.	Out of Service Cov Increment	5% RH to 100% RH Resolution 0.1% RH

ID	Name	Description	W?	Notes
AI.9	LightIntensity	Internal light sensor reading in Luxes.	Out of Service Cov Increment	0 to 16000 Luxes, Resolution 1 Lux
AI.10	InternVOCSensor	Internal VOC sensor reading in mg/m^3.	Out of Service Cov Increment	0 to 2000 mg/m^3, Resolution 0.1 mg/m^3
AI.11	InternCO2Sensor	Internal CO2 sensor reading in PPM.	Out of Service Cov Increment	0 to 5000 PPM, Resolution 1 PPM

Analog Output (AO)

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

ID	Name	Description	W?	Notes
AO.1	AnalogOutput1	Percentage value of analog output 1, based on demand. The interpretation ratio is determined by the value selected at BV.59.	Present Value Cov Increment	0 to 100%, Resolution 0.1%
AO.2	AnalogOutput2	Percentage value of analog output 2, based on demand. The interpretation ratio is determined by the value selected at BV.59.	Present Value Cov Increment	0 to 100%, Resolution 0.1%
AO.3	AnalogOutput3	Percentage value of analog output 3, based on demand. The interpretation ratio is determined by the value selected at BV.59.	Present Value Cov Increment	0 to 100%, Resolution 0.1%
AO.4	AnalogOutput4	Percentage value of analog output 4, based on demand. The interpretation ratio is determined by the value selected at BV.59.	Present Value Cov Increment	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	Temperature value that is used to calculate demand. This object is commandable. The relinquish default value will be equal to the Setpoint (AV.9) if MSV.21 is set to **Network**. Otherwise, it will be equal to the internal or external temperature depending on MSV.21 setting.	Present Value Cov Increment	-40°F to 212°F or -40°C to 100°C Resolution 0.02ºF/0.01ºC
AV.2	Cfg_NetworkTimeOut	Configuration time value. If MSV.21 is set to **Network** and no value has been sent via BMS for more than AV.2 time, the TUUB goes to **OFF** mode. AV.1 displays 999°C and object in Fault. If time is set to **0** mins, AV.1 is reset to AV.9 value.	Present Value Cov Increment	0 to 60 minutes, Resolution 1 minute
AV.3	ExternTemp	Status of the extern temperature sensor (ETS). This temperature is the value read by the external temperature sensor when MSV.35, MSV.36, MSV.37 or MSV.38 is set to t10.0, t10V, or t012.	Out of Service Cov Increment	-40°F to 212°F or -40°C to 100°C Resolution 0.02°F/0.01°C
AV.4	ChangeOverTemp	Status of the changeover temperature sensor (SENs). This is the value read by the changeover sensor when MSV.35 or MSV.36 is set to Changeover Sensor.	Out of Service Cov Increment	-40°F to 212°F or -40°C to 100°C Resolution 0.02°F/0.01°C
AV.5	Cfg_InternTempOffset	Configuration value used to calibrate the integrated temp sensor of the TUUB (ITS).	Present Value Cov Increment	±9°F/±5°C, Resolution 0.2ºF/0.1ºC
AV.6	Cfg_ExternTempOffset	Configuration value used to calibrate the external temp sensor (ETS).	Present Value Cov Increment	±9°F/±5°C, Resolution 0.2ºF/0.1ºC
AV.7	Cfg_ExternTempMin	Configuration value that represents the minimum temp read by the sensor (minimum range value).	Present Value Cov Increment	-40ºF to 32ºF or -40ºC to 0ºC Resolution 1ºF/0.5ºC
AV.8	Cfg_ExternTempMax	Configuration value that represents the maximum temp read by the sensor (maximum range value).	Present Value Cov Increment	122°F to 212°F or 50°C to 100°C Resolution 1ºF/0.5ºC
AV.9	TempSetPoint	Configuration value used to set the actual user setpoint of the zone in occupied/day operation mode. This value may be locked to prevent the user from changing the setpoint (BV.2). This object is commendable, relinquish default will be saved to non-volatile memory.	Present Value Relinquish_Default Cov Increment	50°F to 104°F or 10°C to 40°C (AV.10 to AV.11) Resolution 1ºF/0.5ºC
AV.10	Cfg_MinSetPoint	Configuration value used to set the minimum temp setpoint of the zone in occupied/day operation mode, allowed by the user.	Present Value Cov Increment	50ºF to 104ºF or 10ºC to 40ºC (50ºF/10ºC to AV.11) Resolution 1ºF/0.5ºC
AV.11	Cfg_MaxSetPoint	Configuration value used to set the maximum temp setpoint of the zone in occupied/day operation mode, allowed by the user.	Present Value Cov Increment	50ºF to 104ºF or 10ºC to 40ºC (AV.10 to 104ºF or 40ºC), Resolution 1ºF/0.5ºC
AV.12	SetPointCoolNoOccNSB	Configuration value of the cooling setpoint when in night setback or unoccupied mode. Set BV.35 value to setpoint for the value to be active.	Present Value Cov Increment	50ºF to 104ºF or 10ºC to 40ºC (AV.13 to 104ºF or 40ºC), Resolution 1ºF/0.5ºC
AV.13	SetPointHeatNoOccNSB	Configuration value of the heating setpoint when in night setback or unoccupied mode. Set BV.35 value to setpoint for the value to be active.	Present Value Cov Increment	50ºF to 104ºF or 10ºC to 40ºC (50ºF/10ºC to AV.12) Resolution 1ºF/0.5ºC
AV.14	ExternTemp2	Status of the extern temperature sensor 2 (ETS2). This temperature is the value read by the external temperature sensor 2 when any two of the MSV values from MSV.35, MSV.36, MSV.37 or MSV.38 is set to t10.0 or t10V or t012. For example, set t10.0 at MSV.35 and MSV.36	Out of Service Cov Increment	-40°F to 212°F or -40°C to 100°C Resolution 0.02°F/0.01°C
AV.15	Cfg_ExternTemp2Offset	Configuration value used to calibrate the external temp sensor 2 (ETS2).	Present Value Cov Increment	±9°F/±5°C, Resolution 0.2ºF/0.1ºC
AV.16	Cfg_ExternTemp2Min	Configuration value that represents the minimum temp read by the external temp sensor 2 (minimum range value).	Present Value Cov Increment	-40ºF to 32ºF or -40ºC to 0ºC Resolution 1ºF/0.5ºC
AV.17	Cfg_ExternTemp2Max	Configuration value that represents the maximum temp read by the external temp sensor 2 (maximum range value).	Present Value Cov Increment	122°F to 212°F or 50°C to 100°C Resolution 1ºF/0.5ºC
AV.20	Heating1Demand	Status value that represents the heating demand for the Heating Ramp 1. This value is based on zone temp, zone setpoint and values set for the actual ramp.	Cov Increment	0 to 100%, Resolution 0.5%

ID	Name	Description	W?	Notes
AV.21	Cfg_Heating1PropBand	Configuration value that represents the range through which the controller will modulate the heating output from 0 to 100% for Heating Ramp 1.	Present Value Cov Increment	1ºF to 9ºF or 0.5ºC to 5.0ºC Resolution 1ºF/0.5ºC
AV.22	Cfg_Heating1DeadBand	Configuration value that represents the range at which the controller will not take action when temp is below the zone setpoint for Heating Ramp 1.	Present Value Cov Increment	0ºF to 9ºF or 0.0ºC to 5.0ºC Resolution 0.2ºF/0.1ºC
AV.24	Heating2Demand	Status value that represents the heating demand for the Heating Ramp 2. This value is based on zone temp, zone setpoint and values set for the actual ramp.	Cov Increment	0 to 100%, Resolution 0.5%
AV.25	Cfg_Heating2PropBand	Configuration value that represents the range through which the controller will modulate the heating output from 0 to 100% for Heating Ramp 2.	Present Value Cov Increment	1ºF to 9ºF or 0.5ºC to 5.0ºC Resolution 1ºF/0.5ºC
AV.26	Cfg_Heating2DeadBand	Configuration value that represents the range at which the controller will not take action when temp is below the zone setpoint for Heating Ramp 2.	Present Value Cov Increment	0ºF to 9ºF or 0.0ºC to 5.0ºC Resolution 0.2ºF/0.1ºC
AV.32	Cfg_IntegralTimeHeating	Configuration value that represents the reciprocal of the integral time in secs (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 time, the integral value must be bigger.	Present Value Cov Increment	0 to 250 seconds, Resolution 5 seconds
AV.35	Cooling1Demand	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.	Cov Increment	0 to 100%, Resolution 0.5%
AV.36	Cfg_Cooling1PropBand	Configuration value that represents the range through which the controller will modulate the cooling output from 0 to 100% for Cooling Ramp 1.	Present Value Cov Increment	1ºF to 9ºF or 0.5ºC to 5.0ºC Resolution 1ºF/0.5ºC
AV.37	Cfg_Cooling1DeadBand	Configuration value that represents the range at which the controller will not take action when temp is above the zone setpoint for Cooling Ramp 1.	Present Value Cov Increment	0ºF to 9ºF or 0.0ºC to 5.0ºC Resolution 0.2ºF/0.1ºC
AV.38	Cooling2Demand	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.	Cov Increment	0 to 100%, Resolution 0.5%
AV.39	Cfg_Cooling2PropBand	Configuration value that represents the range through which the controller will modulate the cooling output from 0 to 100% for Cooling Ramp 2.	Present Value Cov Increment	1ºF to 9ºF or 0.5ºC to 5.0ºC Resolution 1ºF/0.5ºC
AV.40	Cfg_Cooling2DeadBand	Configuration value that represents the range at which the controller will not take action when temp is above the zone setpoint for Cooling Ramp 2.	Present Value Cov Increment	0ºF to 9ºF or 0.0ºC to 5.0ºC Resolution 0.2ºF/0.1ºC
AV.45	Cfg_IntegralTimeCooling	Configuration value that represents the reciprocal of the integral time in secs (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 time, the integral value must be bigger.	Present Value Cov Increment	0 to 250 seconds, Resolution 5 seconds
AV.46	Cfg_CoolingAntiCycleDelay	Configuration value in mins to prevent the cooling outputs to cycle on and off. This is a protection feature used when cooling is done through compressors.	Present Value Cov Increment	0 to15 minutes, Resolution 1 minute
AV.50	ChangeOverDemand	Status value that represents the changeover demand. This value is based on changeover temp, setpoint, and values set for the actual ramp.	Cov Increment	0 to 100%, Resolution 0.5%
AV.51	Cfg_ChangeOverPropBand	Configuration value that represents the range through which the controller modulates the changeover output from 0 to 100%.	Present Value Cov Increment	1ºF to 9ºF or 0.5ºC to 5.0ºC Resolution 1ºF/0.5ºC
AV.52	Cfg_ChangeOverDeadBand	Configuration value that represents the range at which the controller will not take action on the changeover output when above or below the changeover setpoint.	Present Value Cov Increment	0ºF to 9ºF or 0.0ºC to 5.0ºC Resolution 1ºF/0.5ºC
AV.53	ChangeOverSetPoint	Configuration value of the temp at which the water that enters is considered to be in cooling or heating state.	Present Value Cov Increment	50ºF to 104ºF or 10ºC to 40ºC Resolution 1ºF/0.5ºC
AV.56	Cfg_CL_HT_SwitchTimer	Configuration value of the time required before the changeover is permitted to take place (time in mins).	Present Value Cov Increment	0 to 120 minutes, Resolution 1 minute
AV.58	CL_HT_SwitchTimerCount	Status value of the remaining time before the changeover is authorised. This value counts down from the time set in AV.56.	Cov Increment	0 to 7,200 seconds, Resolution 1 second
AV.60	FanDemand	Status value that represents the fan demand. This value is based on the status value of other demands. Demand is also affected by the number of fan speed configured in MSV.25.	Cov Increment	0 to 100%, Resolution 0.5%

ID	Name	Description	W?	Notes
AV.61	Cfg_FanAutoTimeOutDelay	Configuration value to prevent the cycling of the fan. If the fan was in operation, the TUUB will countdown from this value before stopping the fan.	Present Value Cov Increment	0 to 255 seconds, Resolution 1 second
AV.62	Cfg_FanDampingFactor	Configuration value in secs that represents the damping factor for changing fan speed.	Present Value Cov Increment	0 to 255 seconds, Resolution 1 second
AV.70	ExternHumidity	External humidity sensor value (Erh).	Out of Service Cov Increment	5% RH to 95% RH, Resolution 0.1% RH
AV.71	Cfg_InternHumidityOffset	Configuration value used to calibrate the internal relative humidity sensor (irH). Only available on models with the humidity sensor.	Present Value Cov Increment	± 5% RH, Resolution 0.1% RH
AV.72	Cfg_ExternHumidityOffset	Configuration value used to calibrate the external relative humidity sensor (Erh).	Present Value Cov Increment	± 5%, Resolution 0.1% RH
AV.73	HumSetPoint	Configuration value used to set the actual user humidity setpoint of the zone in occupied/day operation mode. This value may be locked to prevent the user from changing the setpoint (BV.26). This object is commandable, relinquish default will be saved to non-volatile memory.	Present Value Relinquish_Default Cov Increment	10% RH to 90% RH (AV.74 to AV.75) Resolution 0.5% RH
AV.74	Cfg_HumMinSetPoint	Configuration value used to set the minimum relative humidity setpoint of the zone in occupied/day operation mode allowed by the user.	Present Value Cov Increment	10% RH to 90% RH (10% to AV.75) Resolution 0.5% RH
AV.75	Cfg_HumMaxSetPoint	Configuration value used to set the maximum relative humidity setpoint of the zone in occupied/day operation mode allowed by the user.	Present Value Cov Increment	10% RH to 65% RH (AV.74 to 90%) Resolution 0.5% RH
AV.76	DehumdifySPNoOccNSB	Configuration value of the highest relative humidity allowed when in night setback or unoccupied mode. Set BV.35 value to setpoint for the value to be active.	Present Value Cov Increment	10% RH to 65% RH (AV.77 to 65%) Resolution 0.5% RH
AV.77	HumidifySPNoOccNSB	Configuration value of the lowest relative humidity allowed when in night setback or unoccupied mode. Set BV.35 value to setpoint for the value to be active.	Present Value Cov Increment	10% RH to 65% RH (10% to AV.76) Resolution 0.5% RH
AV.78	HumidifyDemand	Status value that represents the humidifier modulation, based on relative humidity.	Cov Increment	0% RH to 100% RH, Resolution 1% RH
AV.79	DehumidifyDemand	Status value that represents the dehumidification percentage, based on relative humidity.	Cov Increment	0% RH to 100% RH, Resolution 1% RH
AV.80	Cfg_HumPropBand	Configuration value that represents the range through which the controller modulates the humidifier or dehumidification output from 0 to 100%.	Present Value Cov Increment	3% RH to 10% RH, Resolution 0.5% RH
AV.81	Cfg_HumDeadBand	Configuration value that represents the range at which the controller will not take action when below or above the humidity setpoint.	Present Value Cov Increment	0% RH to 5% RH, Resolution 0.5% RH
AV.85	Cfg_NSBOverrideDelay	Maximum configuration time in mins when in night setback mode and an override has been activated on the controller.	Present Value Cov Increment	0 to 180 minutes, Resolution 15 minutes
AV.86	Cfg_NoOccOverrideDelay	Maximum configuration time in mins when in unoccupied mode and an override has been activated on the controller. Each time the user presses the fan button, an increment of 15 mins is added up to this value.	Present Value Cov Increment	0 to 180 minutes, Resolution 15 minutes
AV.87	Cfg_NoOccOvCountDown	Time in mins before the state of the input changes from Occupied to Unoccupied mode. There is no time to change the state from Unoccupied to Occupied.	Cov Increment	0 to 180 minutes (0-AV.86), Resolution 1 minute
AV.88	Cfg_OccupancyMinTime	Time in mins before the state of the input changes from Occupied to Unoccupied mode. Used when motion detector is not equipped with an internal timer.	Present Value Cov Increment	0 to 720 minutes, Resolution 1 minute
AV.90	Cfg_UniversalInput1Delay	Configuration time in secs. Once the time has expired, the controller changes the state of the input.	Present Value Cov Increment	0 to 3,600 seconds, Resolution 10 seconds
AV.91	Cfg_UniversalInput2Delay	See AV.90	Present Value Cov Increment	0 to 3,600 seconds, Resolution 10 seconds
AV.92	Cfg_UniversalInput3Delay	See AV.90	Present Value Cov Increment	0 to 3,600 seconds, Resolution 10 seconds

ID	Name	Description	W?	Notes
AV.93	Cfg_UniversalInput4Delay	See AV.90	Present Value Cov Increment	0 to 3,600 seconds, Resolution 10 seconds
AV.95	ExternalCO2SensorValue	Status of the carbon dioxide sensor (CO2). This is the value read by the CO2 sensor in parts per million (PPM) when MSV.35, MSV.36, MSV.37 or MSV.38 is set to CO2 sensor. AV.97 must be configured for proper reading.	Out of Service Cov Increment	0 to AV.97, Resolution 1 PPM
AV.96	CO2ControlValue	Status value that represents the current value of CO2 (PPM).	Cov Increment	0 to AV.97, Resolution 1 PPM
AV.97	Cfg_CO2Range	Status value that represents the maximum range of the CO2 sensor (PPM).	Cov Increment	100 to 5,000 PPM, Resolution 50 PPM
AV.98	CO2Setpoint	Configuration value that represents the maximum limit of CO2 concentration before the TUUB sends an alarm.	Present Value Cov Increment	100 to AV.97, Resolution 10 PPM
AV.100	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, the 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 Volts to 10 Volts (0 to AV.101) Resolution 0.1 Volt
AV.101	Cfg_AnalogOutput1Max	This value represents the maximum control signal of the controlled element. If 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 controller. 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 Volts to 10 Volts (AV.100 to 10) Resolution 0.1 Volt
AV.103	Cfg_AnalogOutput2Min	See AV.100	Present Value Cov Increment	0 Volts to 10 Volts (0 to AV.104) Resolution 0.1 Volt
AV.104	Cfg_AnalogOutput2Max	See AV.101	Present Value Cov Increment	0 Volts to 10 Volts (AV.103 to 10) Resolution 0.1 Volt
AV.105	Cfg_AnalogOutput3Min	See AV.100	Present Value Cov Increment	0 Volts to 10 Volts (0 to AV.106) Resolution 0.1 Volt
AV.106	Cfg_AnalogOutput3Max	See AV.101	Present Value Cov Increment	0 Volts to 10 Volts (AV.105 to 10) Resolution 0.1 Volt
AV.107	Cfg_AnalogOutput4Min	See AV.100	Present Value Cov Increment	0 Volts to 10 Volts (0 to AV.108) Resolution 0.1 Volt
AV.108	Cfg_AnalogOutput4Max	See AV.101	Present Value Cov Increment	0 Volts to 10 Volts (AV.107 to 10) Resolution 0.1 Volt
AV.109	Cfg_MinCoolHeat1Position	Configuration value in percentage at which the controller sets the CH1 output during heating, provided another output has also been set to heating.	Present Value Cov Increment	0% to 100%, Resolution 1%
AV.115	Cfg_BinaryOutput1ClosePos	Configuration value that indicates the percentage of demand at which the contact closes to energize the controlled element.	Present Value Cov Increment	15% to 80%, Resolution 1%
AV.116	Cfg_BinaryOutput1OpenPos	Configuration value that indicates the percentage of demand at which the contact opens to de-energize the controlled element.	Present Value Cov Increment	0% to 76% (0 to BO1closepos-4%), Resolution 1%
AV.117	Cfg_BinaryOutput1ContactDelay	Configuration value in mins to add a delay before allowing the output to change from inactive to active state.	Present Value Cov Increment	0 to 15 minutes, Resolution 1 minute
AV.120	Cfg_BinaryOutput2ClosePos	See AV.115	Present Value Cov Increment	15% to 80%, Resolution 1%
AV.121	Cfg_BinaryOutput2OpenPos	See AV.116	Present Value Cov Increment	0% to 76% (0 to BO2closepos-4%), Resolution 1%

ID	Name	Description	W?	Notes
AV.122	Cfg_BinaryOutput2ContactDelay	See AV.117	Present Value Cov Increment	0 to 15 minutes, Resolution 1 minute
AV.125	Cfg_BinaryOutput3ClosePos	See AV.115	Present Value Cov Increment	15% to 80%, Resolution 1%
AV.126	Cfg_BinaryOutput3OpenPos	See AV.116	Present Value Cov Increment	0% to 76% (0 to BO3closepos-4%), Resolution 1%
AV.127	Cfg_BinaryOutput3ContactDelay	See AV.117	Present Value Cov Increment	0 to 15 minutes, Resolution 1 minute
AV.130	Cfg_BinaryOutput4ClosePos	See AV.115	Present Value Cov Increment	15% to 80%, Resolution 1%
AV.131	Cfg_BinaryOutput4OpenPos	See AV.116	Present Value Cov Increment	0% to 76% (0 to BO4closepos-4%), Resolution 1%
AV.132	Cfg_BinaryOutput4ContactDelay	See AV.117	Present Value Cov Increment	0 to 15 minutes, Resolution 1 minute
AV.133	Cfg_BinaryOutput5ClosePos	See AV.115	Present Value Cov Increment	15% to 80%, Resolution 1%
AV.134	Cfg_BinaryOutput5OpenPos	See AV.116	Present Value Cov Increment	0% to 76% (0 to BO5closepos-4%), Resolution 1%
AV.135	Cfg_BinaryOutput5ContactDelay	See AV.117	Present Value Cov Increment	0 to 15 minutes, Resolution 1 minute
AV.136	Cfg_BinaryOutput6ClosePos	See AV.115	Present Value Cov Increment	15% to 80%, Resolution 1%
AV.137	Cfg_BinaryOutput6OpenPos	See AV.116	Present Value Cov Increment	0% to 76% (0 to BO6closepos-4%), Resolution 1%
AV.138	Cfg_BinaryOutput6ContactDelay	See AV.117	Present Value Cov Increment	0 to 15 minutes, Resolution 1 minute
AV.139	Cfg_BinaryOutput7ClosePos	See AV.115	Present Value Cov Increment	15% to 80%, Resolution 1%
AV.140	Cfg_BinaryOutput7OpenPos	See AV.116	Present Value Cov Increment	0% to 76% (0 to BO7closepos-4%), Resolution 1%
AV.141	Cfg_BinaryOutput7ConatctDelay	See AV.117	Present Value Cov Increment	0 to 15 minutes, Resolution 1 minute
AV.150	Cfg_FloatingBO1/BO2 Timer	Configuration value that represents the time required by the valve actuator to complete a stroke. Value required only when MSV.77 BO1 Signal Type is set to floating.	Present Value Cov Increment	15 to 250 seconds, Resolution 5 seconds
AV.151	Cfg_FloatingBO3/BO7 Timer	Configuration value that represents the time required by the valve actuator to complete a stroke. Value required only when MSV.79 BO3 Signal Type is set to floating.	Present Value Cov Increment	15 to 250 seconds, Resolution 5 seconds
AV.155	FloatingOutputBO1/BO2	Status value to show the floating signal demand. This value may be overridden. Activated only if BO1 Signal Type MSV.77 is set to floating.	Present Value Cov Increment	0% to 100%, Resolution 0.1%
AV.156	FloatingOutputBO3/BO7	Status value to show the floating signal demand. This value may be overridden. Activated only if BO3 Signal Type MSV.79 is set to floating.	Present Value Cov Increment	0% to 100%, Resolution 0.1%
AV.165	CopyCfgStartAddress	Represents the first address in the range of copied controllers while using the Copy Config option.	Present Value Cov Increment	0 to 254, Resolution 1 No unit

ID	Name	Description	W?	Notes
AV.166	CopyCfgEndAddress	Represents the last address in the range of copied controllers while using the Copy Config option.	Present Value Cov Increment	0 to 254, Resolution 1 No unit
AV.167	CopyCfgResult	Value is used to verify whether the copy to the controller's operation was successful or has failed while using the Copy Config option.	Present Value Cov Increment	0 to 254, Resolution 1 No unit
AV.185	PressureSensorValue	Pressure sensor value in Pascals. If the value is higher than 10,000, the value will be divided by 100 and shows a decimal point. For example, 10,000 will be 100.0 and 10050 will be 100.5.	Present Value Cov Increment	0 to AV.186, Resolution 1 or 0.1 (if value > 10000) Pa
AV.186	Cfg_PressureSensorRange	The maximum range for pressure. If the value is higher than 10,000, the value will be divided by 100 and shows a decimal point. For example, 10,000 will be 100.0 and 10050 will be 100.5.	Present Value Cov Increment	200 to 200.0 Pa, Resolution 1 or 0.1 (if value > 10000) Pa
AV.190	VFDPressureLoop	Actual VFD Pressure loop.	Present Value Cov Increment	0% to 100%, Resolution 1%
AV.191	Cfg_VFDPressureSetPoint	Setpoint value for VFD pressure. If the value is higher than 10,000, the value will be divided by100 and shows a decimal point. For example, 10,000 will be 100.0 and 10050 will be 100.5.	Present Value Cov Increment	100 to AV.186, Resolution 1 or 0.1 (if value > 10000) Pa
AV.192	Cfg_VFDPressureDeadBand	Dead band value for VFD pressure.	Present Value Cov Increment	0 to 100 Pa, Resolution 1 Pa
AV.193	Cfg_VFDPressurePropBand	Proportional band value for VFD pressure.	Present Value Cov Increment	100 to 500 Pa, Resolution 1 Pa
AV.194	Cfg_VFDPressureIntegralTime	VFD pressure integral seconds.	Present Value Cov Increment	0 to 250 seconds, Resolution 5 seconds
AV.200	VFDTempCoolLoop	Actual VFD temperature loop while cooling.	Present Value Cov Increment	0% to 100%, Resolution 1%
AV.201	VFDTempHeatLoop	Actual VFD temperature loop while heating.	Present Value Cov Increment	0% to 100%, Resolution 1%
AV.202	Cfg_VFDTempSetPoint	Configuration value of VFD temperature setpoint.	Present Value Cov Increment	50ºF to 104ºF or 10.0ºC to 40.0ºC Resolution 1ºF/ 0.5ºC
AV.203	Cfg_VFDTempDeadBand	VFD temperature dead band value.	Present Value Cov Increment	0ºF to 9ºF or 0.0ºC to 5.0ºC Resolution 0.2ºF/ 0.1ºC
AV.204	Cfg_VFDTempPropBand	VFD temperature proportional band value.	Present Value Cov Increment	1ºF to 9ºF or 0.5ºC to 5.0ºC Resolution 0.2ºF/ 0.1ºC
AV.205	Cfg_VFDTempIntegralTime	VFD temperature integral seconds.	Present Value Cov Increment	0 to 250 seconds, Resolution 5 seconds
AV.206	CloseOffVoltage	Configuration value of the voltage required in order to close the 6-way valve.	Present Value Cov Increment	0 to 11V, Resolution 0.1 V
AV.207	MinCoolingVoltage	Configuration value of the voltage required for the 6-way valve to start cooling.	Present Value Cov Increment	0 to 11V, Resolution 0.1 V
AV.208	MinHeatingVoltage	Configuration value of the voltage required for the 6-way valve to start heating.	Present Value Cov Increment	0 to 11V, Resolution 0.1 V
AV.210	DeltaTemperature	Status value of the difference between the inlet and outlet temperature. The inlet temperature will be set to the value defined by AV.1 if none of the AIs are set to Delta Temp Inlet 10K or Delta Temp Inlet 0-10. If none of the AIs are set to Delta Temp Outlet 10K, Delta Temp Outlet 0-10 or if a Delta Temperature Input is in fault, the present value of AV.210 will be set to the value defined by AV.211.	Out of Service	10.4°F to 53.6°F or -12°C to 12°C, Resolution 0.018°F or 0.01°C
AV.211	DeltaTempSetPoint	Configuration value of the setpoint for the delta temperature control mode.	Present Value	10.4°F to 53.6°F or -12°C to 12°C, Resolution 0.018°F or 0.01°C

ID	Name	Description	W?	Notes
AV.212	DeltaTempInlet	Status value of the delta inlet temperature.	Out of Service	-40°F to 212°F or -40°C to 100°C Resolution 0.018°F or 0.01°C
AV.213	DeltaTempOutlet	Status value of the delta outlet temperature.	Out of Service	-40°F to 212°F or -40°C to 100°C Resolution 0.018°F or 0.01°C
AV.215	LightIntensityRange	Configuration value that represents the maximum range of the Light Intensity sensor (Luxes).	Present Value Cov Increment	1000 to 16000 Luxes, Resolution 1 Luxes
AV.225	PulseOutput1	Status value to show the pulse signal demand. This value may be overridden. Activated only if BO1 Signal Type MSV.77 is set to pulsing.	Present Value Cov Increment	0% to 100%, Resolution 0.1%
AV.226	PulseOutput2	Status value to show the pulse signal demand. This value may be overridden. Activated only if BO2 Signal Type MSV.78 is set to pulsing.	Present Value Cov Increment	0% to 100%, Resolution 0.1%
AV.227	PulseOutput3	Status value to show the pulse signal demand. This value may be overridden. Activated only if BO3 Signal Type is set to pulsing.	Present Value Cov Increment	0% to 100%, Resolution 0.1%
AV.228	PulseOutput4	Status value to show the pulse signal demand. This value may be overridden. Activated only if BO4 Signal Type is set to pulsing.	Present Value Cov Increment	0% to 100%, Resolution 0.1%
AV.229	PulseOutput5	Status value to show the pulse signal demand. This value may be overridden. Activated only if BO5 Signal Type is set to pulsing.	Present Value Cov Increment	0% to 100%, Resolution 0.1%
AV.230	PulseOutput6	Status value to show the pulse signal demand. This value may be overridden. Activated only if BO6 Signal Type is set to pulsing.	Present Value Cov Increment	0% to 100%, Resolution 0.1%
AV.231	PulseOutput7	Status value to show the pulse signal demand. This value may be overridden. Activated only if BO7 Signal Type is set to pulsing.	Present Value Cov Increment	0% to 100%, Resolution 0.1%
AV.232	AO1Voltage	Status value to show the voltage for AO1 ramp.	Out of Service	0.00V to 10.50V, Resolution 0.01V
AV.233	AO2Voltage	Status value to show the voltage for AO2 ramp.	Out of Service	0.00V to 10.50V, Resolution 0.01V
AV.234	AO3Voltage	Status value to show the voltage for AO3 ramp.	Out of Service	0.00V to 10.50V, Resolution 0.01V
AV.235	AO4Voltage	Status value to show the voltage for AO4 ramp.	Out of Service	0.00V to 10.50V, Resolution 0.01V
AV.240	UserBacklightSetPoint	Setpoint for backlight setting in the user mode. In this mode, the TUUB unit is in operation.	Present Value	0% to 100%, Resolution 1%
AV.241	OccupancyBacklightSetPoint	Setpoint for the backlight setting in the occupied mode. In this mode, the TUUB unit is idle but the occupancy state is active.	Present Value	0% to 100%, Resolution 1%
AV.242	UnoccupancyBacklightSetPoint	Setpoint for the backlight setting in the unoccupied mode. In this mode, the TUUB unit is idle but the occupancy state is inactive.	Present Value	0% to 100%, Resolution 1%

Binary Input (BI)

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

ID	Name	Description	W?	Notes
BI.1	PIR_Relay	Status of the internal PIR sensor value: (0) Relay was not activated, (1) Relay was activated.	Out of Service	0 = Relay was not activated 1 = Relay was activated

Binary Output (BO)

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

ID	Name	Description	W?	Notes
BO.1	BinaryOutput1	Contact status of the output: (0) Open, (1) Close.	Present Value	0 = Open 1 = Close
BO.2	BinaryOutput2	Contact status of the output: (0) Open, (1) Close.	Present Value	0 = Open 1 = Close
BO.3	BinaryOutput3	Contact status of the output: (0) Open, (1) Close.	Present Value	0 = Open 1 = Close
BO.4	BinaryOutput4	Contact status of the output: (0) Open, (1) Close.	Present Value	0 = Open 1 = Close
BO.5	BinaryOutput5	Contact status of the output: (0) Open, (1) Close.	Present Value	0 = Open 1 = Close
BO.6	BinaryOutput6	Contact status of the output: (0) Open, (1) Close.	Present Value	0 = Open 1 = Close
BO.7	BinaryOutput7	Contact status of the output: (0) Open, (1) Close.	Present Value	0 = Open 1 = Close

Binary Value (BV)

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

ID	Name	Description	W?	Notes
BV.1	Cfg_TempUnitBACnet	Configuration of the temp units used in BACnet. If set to (0), the temp will be in Celsius scale. If set to (1), the temp will be in Fahrenheit scale.	Present Value	0 = Celsius 1 = Fahrenheit
BV.2	Cfg_TempSetPointLock	Configuration to lock the zone setpoint and prevent users from changing the value. (0) Disable setpoint lock, (1) Enable setpoint lock.	Present Value	0 = Disable 1 = Enable

ID	Name	Description	W?	Notes
BV.3	Cfg_UserSysOffMode	Configuration to allow users to turn off the controller. (0) Enable - user can turn off the controller, (1) Disable - prevents the user from turning off the controller.	Present Value	0 = Enable 1 = Disable
BV.4	Cfg_TempUnitTstat	Configuration of the temp units used on TUUB. If set to (0), the temp will be in Celsius scale. If set to (1), the temp will be in Fahrenheit scale.	Present Value	0 = Celsius 1 = Fahrenheit
BV.5	Cfg _FreezeProtection	Configuration value to enable or disable the automatic activation of the heating outputs when zone temp is at 4°C (39.2°F) and will deactivate when zone temp is at 5°C (41°F).	Present Value	0 = Off 1 = On
BV.10	Cfg_Heating1RampLock	Configuration value used to lock the heating ramp 1 even when a heating demand is active.	Present Value	0 = Off 1 = On
BV.11	Cfg_Heating2RampLock	Configuration value used to lock the heating ramp 2 even when a heating demand is active.	Present Value	0 = Off 1 = On
BV.13	Cfg_CoolingRampLock	Configuration value used to lock the cooling ramp even when a cooling demand is active.	Present Value	0 = Off 1 = On
BV.17	Cfg_ChangeOverRampLock	Configuration value used to lock the changeover ramp even when a cooling or heating demand is active.	Present Value	0 = Off 1 = On
BV.20	Cfg_UserFanAutoMode	Configuration value to enable or disable the automatic fan option. If set to (0) Enabled, the user has the option to let the TUUB decide the fan speed automatically. If set to (1) Disable, the user must set the fan speed manually.	Present Value	0 = Enable 1 = Disable
BV.21	Cfg_FanSpeedOption	Configuration value to select between the Standard (Neptronic) and Advanced (OE1) fan speed specifications.	Present Value	0 = Standard 1 = Advanced
BV.22	Cfg_UserSysFanMode	Configuration value to enable or disable the fan option in MSV.1. If set to (1) Enable and BV.21 is set to (1) Advanced, the fan option will appear in MSV.1. If set to (0) Disable, the MSV.1 will not have fan option.	Present Value	0 = Disable 1 = Enable
BV.23	Cfg_HideFanDisplay	Configuration value to hide or show the fan symbol displayed on the controller.	Present Value	0 = Yes 1 = No
BV.25	Cfg_HumControlSource	Configuration value that controls the humidity source, either internal or external. Only available on models with the humidity sensor.	Present Value	0 = Intern Sensor 1 = Extern Sensor
BV.26	Cfg_HumSetPointLock	Configuration value to prevent the user from changing the relative humidity setpoint.	Present Value	0 = Disable 1 = Enable
BV.27	Cfg_HumidifyRampLock	Configuration value used to lock the humidification ramp even when a humidification demand is active.	Present Value	0 = Off 1 = On
BV.28	Cfg_DehumidifyRampLock	Configuration value used to lock the dehumidification ramp even when a dehumidification demand is active.	Present Value	0 = Off 1 = On
BV.30	ChangeOverMode	Status value of the actual changeover mode (0) Cooling, (1) Heating. Note that this value can be set via BACnet or locally with MSV.10.	Present Value Out of Service	0 = Cooling 1 = Heating
BV.31	Cfg_CO2ControlSource	Configuration value used to select the source for CO_2 control. When set to (0) Internal Sensor, the controller will be controlled by its internal CO_2 sensor. When set to (1) External Sensor, the controller will be controlled by an external CO_2 sensor.	Present Value	0 = Internal Sensor 1 = External Sensor
BV.35	Cfg_NightorNoOccMode	Configuration to determine the action of the TUUB when in night setback or no occupancy mode. When set to (0) setpoint, the TUUB will maintain the setpoint values of AV.12 & AV.13. If set to (1) OFF, the TUUB will turn off and will not consider any setpoints.	Present Value	0 = Setpoint 1 = OFF
BV.36	AL_ DirtyFilter	Status value to inform if a filter change is required. (0) No, (1) Yes	Read Only	0 = No 1 = Yes
BV.37	AL_FlowSwitch	Status value to inform if an airflow alarm is active. (0) No, (1) Yes	Read Only	0 = No 1 = Yes

ID	Name	Description	W?	Notes
BV.38	AL_Override	Status value to inform if an override is active. (0) No, (1) Yes	Read Only	0 = No 1 = Yes
BV.39	AL_WindowOpened	Status value to inform that a window has been opened. (0) No, (1) Yes	Read Only	0 = No 1 = Yes
BV.40	AL_DoorOpened	Status value to inform that a door has been opened. (0) No, (1) Yes	Read Only	0 = No 1 = Yes
BV.41	AL_OverHeat	Status value to inform if a heat/reheat with fan override is active. (0) No, (1) Yes	Read Only	0 = No 1 = Yes
BV.42	AL_SelectorSwitchStatus	Status value to inform if the selector switch is in (0) Remote mode, (1) Local mode.	Read Only	0 = Remote mode 1 = Local mode
BV.45	Cfg_AnalogInput1Contact	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
BV.46	Cfg_AnalogInput2Contact	See BV.45	Present Value	0 = Norm Open 1 = Norm Close
BV.47	Cfg_AnalogInput3Contact	See BV.45	Present Value	0 = Norm Open 1 = Norm Close
BV.48	Cfg_AnalogInput4Contact	See BV.45	Present Value	0 = Norm Open 1 = Norm Close
BV.49	Cfg_WindowOpenedMode	Configuration to determine the action of the TUUB when window is open. When set to (0) setpoint, the TUUB will maintain the setpoint values of AV.12 & AV.13. If set to (1) OFF, the TUUB will turn off and will not consider any setpoints.	Present Value	0 = Setpoint 1 = OFF
BV.50	Cfg_DoorOpenedMode	Configuration to determine the action of the TUUB when door is open. When set to (0) setpoint, the TUUB will maintain the setpoint values of AV.12 & AV.13. If set to (1) OFF, the TUUB will turn off and will not consider any setpoints.	Present Value	0 = Setpoint 1 = OFF
BV.55	Cfg_AnalogOutput1Direction	Configuration of the analog output direction. When set to (0) Direct, the signal ramp is configured from 0-10Vdc. When set to (1) Reverse, the signal ramp is configured from 10-0Vdc.	Present Value	0 = Direct 1 = Reverse
BV.56	Cfg_AnalogOutput2Direction	See BV.55	Present Value	0 = Direct 1 = Reverse
BV.57	Cfg_AnalogOutput3Direction	See BV.55	Present Value	0 = Direct 1 = Reverse
BV.58	Cfg_AnalogOutput4Direction	See BV.55	Present Value	0 = Direct 1 = Reverse
BV.59	Cfg_AnalogOutputRatio	Configuration value to determine analog output AO1 to AO4 percentage ratio representation. • When set to (0) Control Range, the present-value is the relative control demand (0-100% = Output Min to Output Max, see AV.103 to AV.108). • When set to (1) Electrical Range, the present-value is the ratio of the absolute voltage applied on the output (0-100% = 0-10Vdc). Absolute voltage values are always available from AV.232 to AV.235. * This option is only available via the networks.	Present Value	0 = Control Range 1 = Electrical Range
BV.60	Cfg_BinaryOutput1Direction	Configuration of the binary output direction. When set to (0) Direct, the contact is considered Normally Opened. When set to (1) Reverse, the contact is considered Normally Closed.	Present Value	0 = Direct 1 = Reverse
BV.61	Cfg_BinaryOutput2Direction	See BV.60	Present Value	0 = Direct 1 = Reverse

ID	Name	Description	W?	Notes
BV.62	Cfg_BinaryOutput3Direction	See BV.60	Present Value	0 = Direct 1 = Reverse
BV.63	Cfg_BinaryOutput4Direction	See BV.60	Present Value	0 = Direct 1 = Reverse
BV.64	Cfg_BinaryOutput5Direction	See BV.60	Present Value	0 = Direct 1 = Reverse
BV.65	Cfg_BinaryOutput6Direction	See BV.60	Present Value	0 = Direct 1 = Reverse
BV.66	Cfg_BinaryOutput7Direction	See BV.60	Present Value	0 = Direct 1 = Reverse
BV.74	Cfg_FloatingBO1/BO2Direction	Configuration of the binary contact normal state (Normally Open, Normally Close) when MSV.77 BO1 Signal Type is set to floating. This object affects the valve actuator rotation. When set to (0) Direct, BO1 closes the valve and BO2 opens the valve. When set to (1) Reverse, BO1 opens the valve and BO2 closes the valve.	Present Value	0 = Direct 1 = Reverse
BV.75	Cfg_FloatingBO3/BO7Direction	Configuration of the binary contact normally state (Normally Open, Normally Close) when MSV.79 VO3 Signal Type is set to floating. This object affects the valve actuator rotation. When set to (0) Direct, BO3 closes the valve and BO4 opens the valve. When set to (1) Reverse, BO3 opens the valve and BO4 closes the valve.	Present Value	0 = Direct 1 = Reverse
BV.85	Cfg_ServiceDisplayAddress	When activated, the TUUB lights up and displays the MSTP address. It remains active until deactivated via BACnet or upon cycling power to the controller. Useful when troubleshooting and/or servicing the controller.	Present Value	0 = Off 1 = On
BV.86	Cfg_KeyPadUpperLeftLock	If object is ON, the button is inactive in RUN mode but is active in the PRG mode via the TUUB. Button is used to change the fan speed.	Present Value	0 = Off 1 = On If set to “On”, functionality of these buttons will not be available.
BV.87	Cfg_KeyPadBottomLeftLock	If object is ON, the button is inactive in RUN mode but is active in the PRG mode via the TUUB. Button is used to change temp control modes.	Present Value	0 = Off 1 = On If set to “On”, functionality of these buttons will not be available.
BV.88	Cfg_KeyPadArrowsLock	If object is ON, the button is inactive in RUN mode but is active in the PRG mode via the TUUB. Buttons are used to change the setpoint.	Present Value	0 = Off 1 = On If set to “On”, functionality of these buttons will not be available.
BV.89	Cfg_ProgramModeLock	If object is ON, all buttons are inactive and PRG mode is not accessible via the TUUB.	Present Value	0 = Off 1 = On
BV.90	CopyCfgExecute	When using Copy Config, this value is used to start the copy to other controllers.	Present Value	0 = No 1 = Yes
BV.91	Cfg_ActivateSchedule	Configuration to activate the schedule. The schedule is configurable via BACnet or Modbus. If no schedule is configured, the mode will always be occupied. The time and day will be displayed on the TUUB.	Present Value	0 = No 1 = Yes
BV.95	Cfg_HeatPumpOption	Configuration to enable or disable the heat pump option.	Present Value	0 = Off 1 = On
BV.96	Cfg_ReversingValve	Configuration to set the mode in which the reversing valve is energized; cooling mode (o) or heating mode (b).	Present Value	0 = O 1 = B
BV.97	Cfg_EMHAutoMode	Configuration value to enable or disable the EMH Auto mode. If set to (0) No, the emergency heat (EMH) will not be operational in Automatic mode. If set to (1) Yes, the emergency heat (EMH) will be operational in Automatic mode.	Present Value	0 = No 1 = Yes

ID	Name	Description	W?	Notes
BV.98	Cfg_EMHOutput	Configuration value to enable or disable emergency heat (EMH). If set to (0) Disable, the EMH outputs are disabled. If set to (1) Enable, EMH outputs W1 and W2, and the EMH option will be operational.	Present Value	0 = Disable 1 = Enable
BV.99	Cfg_Y2Output	Configuration value to enable or disable compressor Y2 output. If set to (0) Disable, the compressor Y2 output is disabled. If set to (1) Enable, the compressor Y2 output is enabled.	Present Value	0 = Disable 1 = Enable
BV.105	Cfg_AnalogInput1MinVolt	Minimum voltage for Analog Input 1.	Present Value	0 = 0 Volt 1 = 2 Volt
BV.106	Cfg_AnalogInput2MinVolt	Minimum voltage for Analog Input 2.	Present Value	0 = 0 Volt 1 = 2 Volt
BV.107	Cfg_AnalogInput3MinVolt	Minimum voltage for Analog Input 3.	Present Value	0 = 0 Volt 1 = 2 Volt
BV.108	Cfg_AnalogInput4MinVolt	Minimum voltage for Analog Input 4.	Present Value	0 = 0 Volt 1 = 2 Volt
BV.111	Cfg_DeltaTempLogic	Configuration value to enable or disable the delta temperature control mode.	Present Value	0 = Off 1= On
BV.112	Cfg_DisplayHumidity	Configuration value to display or hide the humidity value.	Present Value	0 = No 1 = Yes
BV.113	Cfg_DisplayCO2	Configuration value to display or hide the CO_2 value.	Present Value	0 = No 1 = Yes
BV.114	Cfg_VFDTempSetpointSource	Configuration value for the source for the VFD temperature setpoint. When set to (0) VFDTempSetPoint, the setpoint defined by AV.202 will be used. When set to (1) TempSetPoint, the setpoint defined by AV.9 will be used.	Present Value	0 = VFDTempSetPoint 1 = TempSetPoint
BV.115	Cfg_AnalogOutput1OffVoltage	Configuration value to set the analog output 1 voltage to either 0V or the minimum voltage set by AV.100 when MSV.1 is set to Off.	Present Value	0 = Min 1 = Off
BV.116	Cfg_AnalogOutput2OffVoltage	Configuration value to set the analog output 2 voltage to either 0V or the minimum voltage set by AV.103 when MSV.1 is set to Off.	Present Value	0 = Min 1 = Off
BV.117	Cfg_AnalogOutput3OffVoltage	Configuration value to set the analog output 3 voltage to either 0V or the minimum voltage set by AV.105 when MSV.1 is set to Off.	Present Value	0 = Min 1 = Off
BV.118	Cfg_AnalogOutput4OffVoltage	Configuration value to set the analog output 4 voltage to either 0V or the minimum voltage set by AV.107 when MSV.1 is set to Off.	Present Value	0 = Min 1 = Off
BV.119	Cfg_CO2AutoSelfCalib	Configuration value to enable or disable the automatic self-calibration of the CO_2 sensor.	Present Value	0 = Off 1 = On
BV.120	Cfg_FailsafeTempSource	Configuration value to select the fail-safe temperature source when MSV.21 is = Network (Net) and the configuration time value set at AV.2 has elapsed. The TUUB will use the temperature reading from the sensor selected as the fail safe source.	Present Value	0 = Internal (ItS) 1 = External (EtS)
BV.121	Cfg_DisplaySetpoint	Configuration value to display the user temperature setpoint. If set to yES, the controller displays the temperature setpoint on the text line above the reading, alternating with the time and CO2 reading.	Present Value	0 = No (Disable) 1 = Yes (Enable)

Multi State Value (MSV)

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

ID	Name	Description	W?	Notes
MSV.1	SystemMode	Status of the actual mode selected. This value may be changed via TUUB and/or BACnet. The options may vary based on the selection at BV.3, BV.21, BV.98, and MSV.20. Auto: Controller mode changes automatically between heating and cooling in operation when there is a cooling or heating demand. Heating: Controller is in heating (in operation only when there is a heating demand). EMH: In this mode, the controller enables only the emergency heat output, the compressor output is disabled. Cooling: Controller is in cooling (in operation only when there is a cooling demand). Fan: In this mode, the control mode is OFF (no heat, no cool) and the fan operates at the speed selected by the user on the thermostat or via MSV.2. Off: Controller does not respond to any demand. Note: Use the text provided by the STATE TEXT property to find the appropriate option available in your configuration.	Present Value	Auto [MSV.20 allows Auto Mode (1 or 5)] Heating [MSV.20 allows Heating Mode (1, 2, or 4)] EMH [BV.95 and BV.98 = On and Enable (1) and MSV.20 allows Heating Mode (1, 2, or 4)] Cooling [MSV.20 allows Cooling Mode (1, 3, or 4)] Fan [BV.21 = Advanced (1) and BV.22 = Enable (1)] Off [BV.3 = Enable (0)]
MSV.2	UserFanSpeedSelect	Status of the actual fan speed. This value may be changed via the TUUB and/or BACnet. (1) Auto: Fan automatically changes speed, based on demand. (2) Low: Fan is limited to low fan speed. (3) Medium: Fan is limited to medium fan speed. (4) High: Fan is limited to high fan speed.	Present Value	1 = Auto 2 = Low 3 = Medium 4 = High
MSV.5	HumControlMode	Configuration value to authorize humidification and/or dehumidification in order to maintain relative humidity setpoints. (1) Auto: The TUUB will operate automatically to humidify or dehumidify, according to the demand. (2) Dehumidification: The TUUB is authorized only to dehumidify. (3) Humidification: The TUUB is authorized only to humidify. (4) OFF: The TUUB will not consider relative humidity setpoints and no action will be taken.	Present Value	1 = Auto 2 = Dehumidification 3 = Humidification 4 = OFF
MSV.10	Cfg_ChangeOverControlMode	Configuration that indicates the source of the changeover value. (1) Locally: Analog or binary input is configured in the TUUB and will execute the changeover with the set parameters. (2) Cooling: Changeover is sent and controlled by the BMS. No changeover will occur unless the BMS sends the signal to do so. (3) Heating: Changeover is sent and controlled by the BMS. No changeover will occur unless the BMS sends the signal to do so.	Present Value	1= Locally 2= Cooling 3= Heating
MSV.13	NsbOccCommand	Configuration to set the occupancy or night setback mode. This object is commendable, relinquish default will be saved to non-volatile memory. (1) Locally: Occupancy or Night setback is activated via a configured input wired to a timer or an occupancy sensor. (2) OFF: Forces the TUUB Off. Signal sent via BMS. (3) Occupancy: Forces the TUUB to occupied or day mode. Signal sent via BMS. (4) No Occupancy: Forces the TUUB to unoccupied or night setback mode. Signal sent via BMS.	Present Value Relinquish_Default	If BI = Occupancy or Night Setback at MSV.35, MSV.36, MSV.37 and/or MSV.38 1 = Locally 2 = Off 3 = Occupancy/Day 4 = No Occupancy/Night If BI = any option except Occupancy or Night Setback at MSV.35, MSV.36, MSV.37 and/or MSV.38 1 = Off 2 = Occupancy/Day 3 = No Occupancy/Night

ID	Name	Description	W?	Notes
MSV.14	OccupancyStatus	Status that indicates the actual occupancy. (1) Unoccupied: Zone is not occupied. (2) Occupied: Zone is occupied. (3) Override: Zone is unoccupied but put back to occupied mode for a maximum pre-determined time set at AV.86.	Read Only	1 = NoOccupancy 2 = Occupancy 3 = Override
MSV.15	NightSetBackStatus	Status that indicates the actual mode of the zone. (1) Day: Zone is in day operation mode. (2) Night: Zone is in night setback mode. (3) Override: Zone is in night setback mode but put back to day operation for a maximum pre-determined time set at AV.85.	Read Only	1 = Day 2 = Night 3 = Override
MSV.20	Cfg_Sequence Select	Configuration value to limit available options at MSV.1. (1) Auto: All modes available. (2) Heating: Only Heating. (3) Cooling: Only Cooling. (4) ON: Heating or Cooling. (5) Auto Lock: Only Auto.	Present Value	1 = Auto 2 = Heating 3 = Cooling 4 = HeatingOrCooling 5 = Auto Lock
MSV.21	Cfg_ TempControlSource	Configuration value to set the control temp to be used by the TUUB. (1) Network Sensor: AV.1 will use temp value sent via the BMS. See AV.2 for timeout safety feature (Net). (2) Intern Sensor: AV.1 will use the integrated temp sensor of the TUUB (ITS). (3) Extern Sensor: AV.1 will use the external temp sensor configured (ETS).	Present Value	1 = Network (Net) 2 = Internal (ItS) 3 = External (EtS)
MSV.22	Cfd_VFDTempInput	Configuration value to select the source for VFD temperature control. (1) InternSensor(ItS): Controller will be controlled by its internal temperature sensor. (2) ExternSensor(EtS): Controller will be controlled by the external temperature sensor 1. (3) ExternSensor2(EtS2): Controller will be controlled by the external temperature sensor 2.	Present Value	1 = InternSensor(ItS) 2 = ExternSensor(EtS) 3 = ExternSensor2(EtS2)
MSV.25	Cfg_FanOperationType	Configuration value to set the number of fan speed available on the fan coil. (1) 1 Speed: Fan coil has a one speed fan (wired to Low). (2) 2 Speed: Fan coil has a two speed fan (wired to Medium). (3) 3 Speed: Fan coil has a three speed fan (wired to High). (4) AnalogOutput: If MSV.57 is set to Fan (5) VFD: if MSV.55 or MSV.57 is set to VFD/ECMTempLoopEnable or VFD Pressure Loop	Present Value	1= 1Speed 2= 2Speeds 3= 3Speeds 4= AnalogOutput 5= VFD
MSV.26	Cfg_FanModeNoOccNight	Configuration value to set the fan speed for no occupancy or night setback mode. (1) Low: Fan is limited to low speed. (2) Medium: Fan is limited to medium speed. (3) High: Fan is limited to high speed. (4) Auto: Fan automatically changes speed, based on demand.	Present Value	1= Low 2= Medium 3= High 4 = Auto
MSV.27	Cfg_FanModeWindowOpened	Configuration value to set the fan speed mode when the window is open. (1) Low: Fan is limited to low speed. (2) Medium: Fan is limited to medium speed. (3) High: Fan is limited to high speed. (4) Auto: Fan automatically changes speed, based on demand.	Present Value	1= Low 2= Medium 3= High 4 = Auto
MSV.28	Cfg_FanModeDoorOpened	Configuration value to set the fan speed mode when the door is open. (1) Low: Fan is limited to low speed. (2) Medium: Fan is limited to medium speed. (3) High: Fan is limited to high speed. (4) Auto: Fan automatically changes speed, based on demand.	Present Value	1= Low 2= Medium 3= High 4 = Auto

ID	Name	Description	W?	Notes
MSV.35	Cfg_AnalogInput1Type	Configuration value to select the input signal type for Analog Input 1 (AI1). (1) OFF: Controller does not use the input. (2) Extern Sensor 10k: Controller uses a 10kΩ type III external temperature sensor. (3) Change Over Sensor: Heating mode activates when the temperature read by the external sensor is above the Changeover Setpoint and cooling mode activates when the temperature read by the external sensor is below the Changeover Setpoint. (4) Ch Ov Contact Norm Cool: Heating mode activates when the contact is closed and cooling mode activates when the contact is opened. (5) Ch Ov Contact Norm Heat: Cooling mode activates when the contact is closed and heating mode activates when the contact is opened. (6) Outside Air Sensor: Controller uses a 10kΩ type III outside air sensor. (7) Extern Sensor 0-10V: Controller uses a 0 to 10 Vdc external temperature sensor. (8) CO2 0-10V: Controller uses a 0 to 10 Vdc CO2 sensor. (9) Occupancy: Controller activates the Occupancy mode. (10) Night Set Back: Controller activates the night set back mode. (11) Override: Controller activates an alarm to indicate that there has been an override and the controller is forced into OFF mode. (12) Window: Controller activates an alarm to indicate that the window is open. If this value is selected, BV.49 and MSV.27 will be available. (13) Door: Controller activates an alarm to indicate that the door is open. If this value is selected, BV.50 and MSV.28 will be available. (14) Dirty Filter: Controller activates an alarm to indicate that the filter is dirty. (15) Flow Switch: Controller activates an alarm to indicate that there is no airflow. (16) Overheat: Controller activates an alarm to indicate that the heating equipment has overheated. The controller shuts off the heating outputs. (17) Selector Switch: Controller activates the Local mode. The controller shuts off fan outputs. (18) Fan Feedback: Controller senses the pulse feedback of the ECM motor. (19) Humidity Sensor 0-10V: Controller modulates the output based on the humidify demand. (20) Pressure Sensor 0-10V: Controller uses a 0 to 10Vdc pressure static sensor. (21) Extern Sensor TT012: Controller uses a 10kΩ type 24 external temperature sensor. (22) Delta Temp Inlet 10K: Controller uses a 10K type 3 temperature sensor and selects it as the inlet temperature in the ΔT control mode. (23) Delta Temp Inlet 0-10: Controller uses a 0 to 10 Vdc temperature sensor and selects it as the inlet temperature in the ΔT control mode. (24) Delta Temp Outlet 10K: Controller uses a 10K type 3 temperature sensor and selects it as the outlet temperature in the ΔT control mode. (25) Delta Temp Outlet 0-10: Controller uses a 0 to 10 Vdc temperature sensor and selects it as the outlet temperature in the ΔT control mode.	Present Value	1 = OFF 2 = Extern Sensor 10k 3 = Change Over Sensor 4 = Ch Ov Contact Norm Cool 5 = Ch Ov Contact Norm Heat 6 = Outside Air Sensor 7 = Extern Sensor 0-10V 8 = CO2 0-10V 9 = Occupancy 10 = Night Set Back 11 = Override 12 = Window 13 = Door 14 = Dirty Filter 15 = Flow Switch 16 = Overheat 17 = Selector Switch 18 = Fan Feedback 19 = Humidity Sensor 0-10V 20 = Pressure Sensor 0-10V 21 = Extern Sensor TT012 22 = Delta Temp Inlet 10K 23 = Delta Temp Inlet 0-10 24 = Delta Temp Outlet 10K 25 = Delta Temp Outlet 0-10
MSV.36	Cfg_AnalogInput2Type	See MSV.35	Present Value	
MSV.37	Cfg_AnalogInput3Type	See MSV.35	Present Value	
MSV.38	Cfg_AnalogInput4Type	See MSV.35	Present Value	

ID	Name	Description	W?	Notes
MSV.55	Cfg_AnalogOutput1Ramp	Configuration of the ramp used to modulate AO1 based on demand. (1) Off: The controller does not use the output. (2) Change Over With Fan: The controller modulates heating and cooling, as appropriate. (3) Cooling1With Fan: This ramp is used for cooling. The controller performs cooling based on the cooling proportional, integral, and dead band values. (4) Cooling2 With Fan: This ramp is used for cooling. The controller performs cooling based on the cooling proportional, integral, and dead band values. (5) Heating1 With Fan: This ramp is used for heating. The controller performs heating based on the heating proportional, integral, and dead band values. (6) Heating2 With Fan: This ramp is used for heating. The controller performs heating based on the heating proportional, integral, and dead band values. (7) Heating2: This ramp is used for heating. The controller performs heating based on the heating proportional, integral, and dead band values. (8) Cooling1Heating1 With Fan: The controller performs cooling regularly. If another output is set to heat, it performs heating regularly. (9) HumidifyWithFan: The controller modulates the output based on the humidify demand. (10) CO2 Alarm: Carbon dioxide (CO2) alarm. The controller activates or deactivates the output based on carbon dioxide levels. (11) 6 Way valve: The controller will modulate the 6-way valve based on the cooling or heating demand. (12) Delta Temperature: The controller will modulate the ΔT control based on the inlet and outlet temperature of the water inside the fan coil unit. (13) VFD/ECMTempLoopEnable: The controller will modulate the VFD or ECM fan based on the selected temperature input. (14) VFD Pressure Loop: The controller will modulate the static pressure based on the reading and the pressure setpoint.	Present Value	1 = Off 2 = Change Over With Fan 3 = Cooling1 With Fan 4 = Cooling2 With Fan 5 = Heating1 With Fan 6 = Heating2 With Fan 7 = Heating2 8 = Cooling1 Heating1 With Fan 9 = HumidifyWithFan 10 = CO2 Alarm 11= 6 Way valve 12 = Delta Temperature 13 = VFD/ECMTempLoopEnable 14= VFD Pressure Loop
MSV.56	Cfg_AnalogOutput1SignalType	Configuration of the analog output signal type. (1) Analog: Modulating signal based on the demand, scaled between the minimum and maximum control signal. It is affected by AV.100, AV.101 and BV.55. (2) On/Off: On/Off signal based on the demand, scaled between the minimum and maximum control signal. It is affected by AV.100, AV.101 and BV.55. (3) Pulsing: TPM signal based on the demand, scaled between the minimum and maximum control signal. It is affected by AV.100, AV.101 and BV.55.	Present Value	1 = Analog 2 = On-Off 3 = Pulsing

ID	Name	Description	W?	Notes
MSV.57	Cfg_AnalogOutput2Ramp	See MSV.55 If BV.95 Cfg_HeatPumpOption is set to Off, AO2 has an additional option: (15) Fan: The controller modulates the output according to AV. 60 Fan Demand.	Present Value	1 = Off 2 = Change Over With Fan 3 = Cooling1 With Fan 4 = Cooling2 With Fan 5 = Heating1 With Fan 6 = Heating2 With Fan 7 = Heating2 8 = Cooling1 Heating1 With Fan 9 = HumidifyWithFan 10 = CO2 Alarm 11 = 6 Way valve 12 = Delta Temperature 13 = VFD/ECMTempLoopEnable 14 = VFD Pressure Loop 15 = FAN
MSV.58	Cfg_AnalogOutput2SignalType	See MSV.56	Present Value	1 = Analog 2 = On-Off 3 = Pulsing
MSV.59	Cfg_AnalogOutput3Ramp	See MSV.55	Present Value	1 = Off 2 = Change Over With Fan 3 = Cooling1 With Fan 4 = Cooling2 With Fan 5 = Heating1 With Fan 6 = Heating2 With Fan 7 = Heating2 8 = Cooling1 Heating1 With Fan 9 = HumidifyWithFan 10 = CO2 Alarm 11 = 6 Way valve 12 = Delta Temperature
MSV.60	Cfg_AnalogOutput3SignalType	See MSV.56	Present Value	1 = Analog 2 = On-Off 3 = Pulsing
MSV.61	Cfg_AnalogOutput4Ramp	See MSV.55	Present Value	1 = Off 2 = Change Over With Fan 3 = Cooling1 With Fan 4 = Cooling2 With Fan 5 = Heating1 With Fan 6 = Heating2 With Fan 7 = Heating 8 = Cooling 1 Heating 1 With Fan 9 = HumidifyWithFan 10 = CO2 Alarm 11 = 6 Way valve 12 = Delta Temperature
MSV.62	Cfg_AnalogOutput4SignalType	See MSV.56	Present Value	1 = Analog 2 = On-Off 3 = Pulsing

ID	Name	Description	W?	Notes
MSV.70	Cfg_BinaryOutput1Ramp	Configuration of the ramp used to modulate BO1 based on demand. The ramp is fixed if BV.95 Cfg_HeatPumpOption is set to On. (1) Off: The controller does not use the output. (2) Change Over With Fan: The controller modulates heating and cooling, as appropriate. (3) Cooling1 With Fan: This ramp is used for cooling. The controller performs cooling based on the cooling proportional, integral, and dead band values. (4) Cooling2 With Fan: This ramp is used for cooling. The controller performs cooling based on the cooling proportional, integral, and dead band values. (5) Heating1 With Fan: This ramp is used for heating. The controller performs heating based on the heating proportional, integral, and dead band values. (6) Heating2 With Fan: This ramp is used for heating. The controller performs heating based on the heating proportional, integral, and dead band values. (7) Heating2: This ramp is used for heating. The controller performs heating based on the heating proportional, integral, and dead band values. (8) Cooling1Heating1 With Fan: The controller performs cooling regularly. If another output is set to heat, it performs heating regularly. (9) HumidifyWithFan: The controller modulates the output based on the humidify demand. (10) CO2 Alarm: Carbon dioxide (CO2) alarm. The controller activates or deactivates the output based on carbon dioxide levels.	Present Value	1 = Off 2 = Change Over With Fan 3 = Cooling1 With Fan 4 = Cooling2 With Fan 5 = Heating1 With Fan 6 = Heating2 With Fan 7 = Heating2 8 = Cooling1Heating1 With Fan 9 = HumidifyWithFan 10 = CO2 Alarm
MSV.71	Cfg_BinaryOutput2Ramp	See MSV.70	Present Value	
MSV.72	Cfg_BinaryOutput3Ramp	See MSV.70	Present Value	
MSV.73	Cfg_BinaryOutput4Ramp	If MSV.25 Cfg_FanOperationType is set to 3 speeds, (1) Fan: High speed contact. Else, see MSV.70.	Present Value	
MSV.74	Cfg_BinaryOutput5Ramp	If MSV.25 Cfg_FanOperationType is set to 3 speeds, (1) Fan: Medium speed contact. If MSV.25 Cfg_FanOperationType is set to 2 speeds, (1) Fan: High speed contact. Else, see MSV.70.	Present Value	
MSV.75	Cfg_BinaryOutput6Ramp	If MSV.25 Cfg_FanOperationType is set to 3 speeds, (1) Fan: Low speed contact. If MSV.25 Cfg_FanOperationType is set to 2 speeds, (1) Fan: Medium speed contact. If MSV.25 Cfg_FanOperationType is set to 1 speed, (1) Fan: High speed contact. If MSV.57 Cfg_AnalogOutput2Ramp is set to Fan, see MSV.70. (11) 6 Way Valve: The controller will modulate the 6-way valve based on the cooling or heating demand. (12) Delta Temperature: The controller will modulate the ΔT control based on the inlet and outlet temperature of the water inside the fan coil unit. (13) VFD/ECMTempLoopEnable: The controller will modulate the VFD or ECM fan based on the selected temperature input. (14) VFD Pressure Loop: The controller will modulate the static pressure based on the reading and the pressure setpoint.	Present Value	1 = Off 2 = Change Over With Fan 3 = Cooling1 With Fan 4 = Cooling2 With Fan 5 = Heating1 With Fan 6 = Heating2 With Fan 7 = Heating2 8 = Cooling1Heating1 With Fan 9 = HumidityWithFan 10 = CO2 Alarm 11 = 6 Way valve 12 = Delta Temperature 13 = VFD/ECMTempLoopEnable 14 = VFD Pressure Loop
MSV.76	Cfg_BinaryOutput7Ramp	See MSV.70	Present Value	

ID	Name	Description	W?	Notes
MSV.77	Cfg_BinaryOutput1SignalType	Configuration of the output signal type. (1) Pulsing: TPM signal affected by MSV.70. Pulse is available for heating ramp 1 and 2 only. (2) On/Off: Digital output affected by AV.115, AV.116 and BV.60. (3) Floating: Modulating output affected by AV.150 and BV.74. Floating is available for cooling ramps and heating ramps. Option available for BO1 and BO3 only. When BO1 is set to (3) floating, it automatically changes MSV.71 BinaryOutput2Ramp and MSV.78 BinaryOutput2SignalType to match the configuration of BO1.	Present Value	1 = Pulsing 2 = On-Off 3 = Floating
MSV.78	Cfg_BinaryOutput2SignalType	See MSV.77	Present Value	1 = Pulsing 2 = On-Off
MSV.79	Cfg_BinaryOutput3SignalType	See MSV.77	Present Value	1 = Pulsing 2 = On-Off 3 = Floating
MSV.80	Cfg_BinaryOutput4SignalType	See MSV.77	Present Value	1 = Pulsing 2 = On-Off
MSV.81	Cfg_BinaryOutput5SignalType	See MSV.77	Present Value	1 = Pulsing 2 = On-Off
MSV.82	Cfg_BinaryOutput6SignalType	See MSV.77	Present Value	1 = Pulsing 2 = On-Off
MSV.83	Cfg_BinaryOutput7SignalType	See MSV.77	Present Value	1 = Pulsing 2 = On-Off
MSV.95	Cfg_DisplayInfo	Configuration value of the information displayed on the TUUB. (1) Display Temp Demand: The TUUB will display the actual temp and cooling/heating demand. (2) Display Setpoint Demand: TUUB will display the actual setpoint and cooling/heating demand. (3) Display Temp: TUUB will display the actual temp but no demand. (4) Display Setpoint: TUUB will display the actual setpoint, time and CO_2 reading. (5) Display Off: TUUB display will be off (no display).	Present Value	1 = Temp and demand 2 = Setpoint and demand 3 = Temp only 4 = Setpoint, time and CO^2 reading 5 = Off
MSV.96	Cfg_ValveSize	Configuration value of the valve size in inches for the 6-way valve.	Present Value	1 = 1/2 2 = 3/4 3 = 1

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 to LOAD to program the file in application memory. The controller will be reset and the firmware will be LOADED into the memory. Use only the binary file provided by Neptronic.	File Size Archive	File Size is accepted for 0 value only
SCH.1	OccupancySchedule	Weekly occupancy schedule to specify which occupancy state is active during specific periods of day. Write to Present Value of MSV.13.	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)