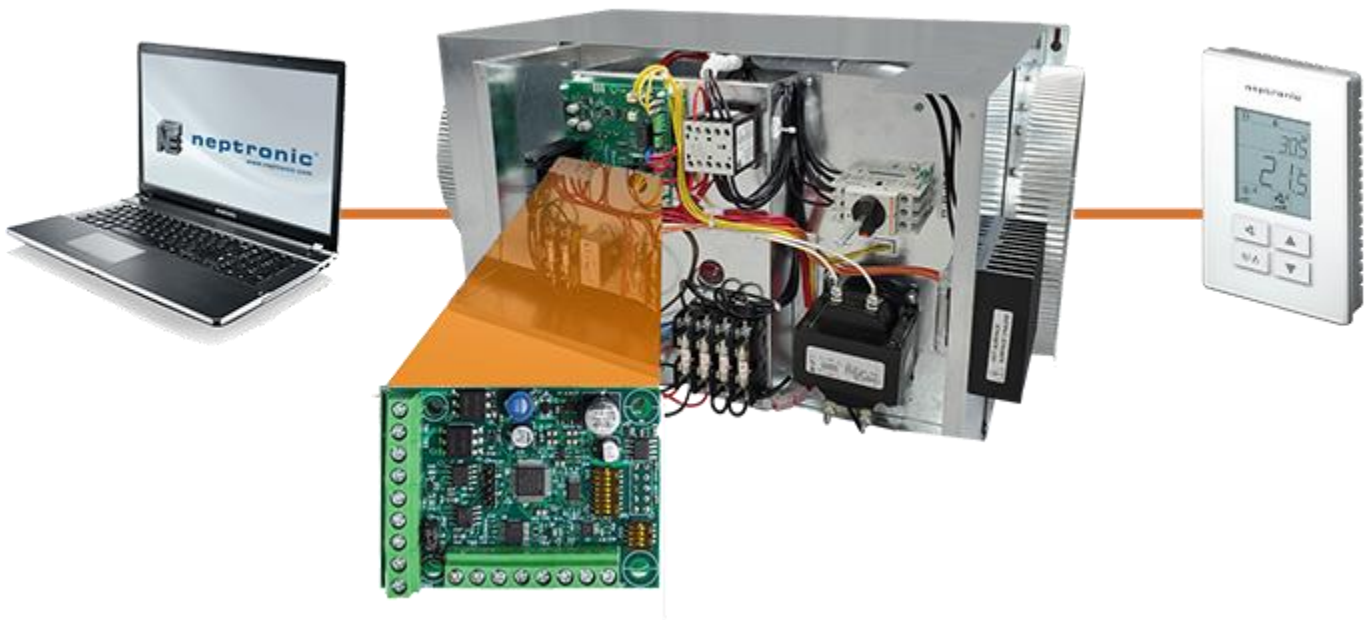




neptronic®

Compact Make-up Air Unit

BACnet Communication Module User Guide



Introduction

The CMU Compact Make-up Air Unit BACnet Communication Module User Guide provides information about using the CMU Compact Make-up Air Unit with BACnet communications feature. The BACnet communication protocol for building automation and control networks enables communication between client devices within a network. The controller provides a BACnet network interface between BACnet client devices and Neptronic Controller series devices. It uses the BACnet Master Slave/Token Passing (MS/TP) protocol at the BACnet MAC layer.

Pre-requisites

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

Advantages of BACnet

BACnet enabled controllers have the following advantages:

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

BACnet Properties Configuration

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

Table 1 - BACnet Properties Configuration

Property	Default Value	Configuration
MAC Address	000	Set to a value between 000 and 127 via DIP switches. Can also be set to a value between 000 and 254 via menu. The values from 128-254 represent MS/TP non-token passing slave devices.
Device Instance	Auto	<ul style="list-style-type: none"> 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	<ul style="list-style-type: none"> 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	<ul style="list-style-type: none"> Configure Max_Master value to increase network efficiency when there are less than 127 devices on the network. The Max_Master value can be changed via menu or through the WriteProperty service to the Device Object.Max_Master. <p>For more information, refer to the MAC Address and Max_Master section.</p>
Device Object.Object_Name	Name of the device	<ul style="list-style-type: none"> Configure the name of the device through WriteProperty service to the Device Object.Object_Name. For example, CMU.

Configuration Options

The following Configuration 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 menu using the TDF digital room sensor.

1. Ensure that the TDF digital room sensor 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 Baud Rate, MAC address, Max Master, and Device Instance manually.
5. Disconnect the power to the controller, connect the controller to the network, and connect the power again.

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

MAC Address and Max_Master

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

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

Examples of MAC Address and Max_Master Configurations

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

Example 1

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

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

Example 2

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

This configuration is better than Example 1 but it is still slower. The Max_Master is set to the most efficient value but the gap between the two MAC addresses is high. Therefore, each unit must poll four units until it finds the right one to pass the token.

Example 3

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

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

Example 4

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

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

Copy Config

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

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



*Note: A **Copy Config** can also be executed via BACnet. See AV.165, AV.166, AV.167, and BV.90 in Table 6 - Object Table Information: Analog Value (AV) and Table 9 - Object Table Information: Binary Value (BV) for details. However, the BACnet Schedule is not copied during a **Copy Config** operation.*

Network Reset

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

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

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



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

Device Object Properties

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

Table 2 - Device Object Properties

Property	Value	Writable
Object_Identifier	<ul style="list-style-type: none"> 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=153003 (Vendor_Identifier*1000) 	W
Object_Name	MU@irCOM, programmable up to 32 bytes	W
Description	Programmable up to 32 characters	W
Object_Type	Device	
System_Status	Operational	
Vendor_Identifier	Always 153	
Vendor_Name	Always Neptronic	
Model_Name	Example, CMU-COM	Read Only
Firmware_Revision	currently, 1.02	Read Only
Application_Software_Version	currently, 1.77	Read Only
Protocol_Version	Always 1	Read Only
Protocol_Revision	Always 14	Read Only
DataBase_Revision	Default: 77, incremented if Object Name and/or device ID change	Read Only
Max_APDU_Length_Accepted	Always 480	Read Only
Segmentation_Supported	(3) = No Segmentation	Read Only
APDU_Timeout	6000	W
Number_of_APDU_Retries	Always 3	Read Only
Local_Time	00:00:00	W
Local_Date	01-Jan-2020 (Thu)	W
Utc_Offset	-300 minutes	W
Daylight_Savings_Status	False	W
Backup_Failure_Timeout	300	W
Configuration_Files	File-1	
Last_Restore_Time	2020-01-01 (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	<ul style="list-style-type: none"> subscribeCOV atomicReadFile atomicWriteFile readProperty readPropertyMultiple WriteProperty writePropertyMultiple deviceCommunicationControl reinitializeDevice unconfirmedPrivateTransfer timeSynchronization who-Has who-Is UtcTimeSynchronization subscribeCOVProperty 	
Protocol_Object_Types_Supported	<ul style="list-style-type: none"> analog-input analog-output analog-value binary-input binary-output binary-value device file program schedule multi-state-value 	
Object_List	134	Read Only
Device_Address_Binding	Always empty	
Max_Master	Programmable in the range of 1-127 (default: 127)	W
Max_Info_Frames	Always 1	
Proprietary property #1000	<ul style="list-style-type: none"> Represents the MS/TP MAC address in the range of 0 to 254 (default: 0) Writable if all MAC address DIP switches are off Values 128 to 254 represent MS/TP non-token passing slave devices 	W



Property	Value	Writable
Proprietary property #1001	<ul style="list-style-type: none"> • Programmable (default: Auto) • Represents the MS/TP Baud rate (unsigned type) • Values are 0 (auto), 9600, 19200, 38400, 57600, 76800 • Reading this property always returns the actual Baud rate 	W
Proprietary property #1002	<ul style="list-style-type: none"> • 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
<i>Note: Writable properties are different for some objects. Refer to the respective Object Table information to know the writable property for objects.</i>				
Analog Input	<input checked="" type="checkbox"/>	<ul style="list-style-type: none"> • Reliability • Description • Min_Present_Value • Max_Present_Value • Resolution • COV-Increment 	<ul style="list-style-type: none"> • Out_of_Service • COV-Increment 	<ul style="list-style-type: none"> • If "Out of Service" is true, Present_Value and Status_Flag become writable properties. • Out_of_Service property is writable for objects to which Present_Value is not writable. • Refer to Out of Service Property section on page 7 for more information. • Object will automatically return to Normal after a programmable period of time. Refer to Proprietary property #1002 of Device Object in Table 2 - Device Object Properties.
Analog Value	<input checked="" type="checkbox"/>	<ul style="list-style-type: none"> • Reliability • Description • COV-Increment • Priority_Array • Relinquish_Default 	<ul style="list-style-type: none"> • Present_Value • Out_of_Service • COV-Increment 	<ul style="list-style-type: none"> • Present_Value property is writable for every AV object unless indicated. • Out_of_Service property is writable for objects indicated in Table 6 - Object Table Information: Analog Value (AV) on page 9. • Refer to Out of Service Property section on page 7 for more information. • Object will automatically return to Normal after a programmable period of time. Refer to Proprietary property #1002 of Device Object in Table 2 - Device Object Properties. Some objects are commandable. In such case, the priority-array and relinquish-default properties are available.
Analog Output	<input checked="" type="checkbox"/>	<ul style="list-style-type: none"> • Description • Reliability • Min-Pres-Value • Max-Pres-Value • Resolution • COV-Increment 	<ul style="list-style-type: none"> • Present_Value • COV-Increment 	
Binary Input	<input checked="" type="checkbox"/>	<ul style="list-style-type: none"> • Reliability • Active_Text • Inactive_Text • Description 	Out_of_Service	<ul style="list-style-type: none"> • If "Out of Service" is true, Present_Value and Status_Flag become writable properties. • Out_of_Service property is writable for objects to which Present_Value is not writable. • Refer to Out of Service Property section on page 7 for more information. • Object will automatically return to Normal after a programmable period of time. Refer to Proprietary property #1002 of Device Object in Table 2 - Device Object Properties.
Binary Value	<input checked="" type="checkbox"/>	<ul style="list-style-type: none"> • Reliability • Active_Text • Inactive_Text • Description • Priority_Array • Relinquish_Default 	Present_Value	<ul style="list-style-type: none"> • Present_Value property is writable for every Binary Value object. • Object automatically returns to Normal after a programmable 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 Output	<input checked="" type="checkbox"/>	<ul style="list-style-type: none"> Description Reliability Inactive-text Active-text 	Present_Value	
Device	<input checked="" type="checkbox"/>	<ul style="list-style-type: none"> Max_Master Max_Info_Frame Description Active-COV-subscriptions #1000 (MSTP addr) #1001 (Baud rate) #1002 (Time out) Local_Time Local_Date Uts_Offset Daylight_Savings_Status Apdu_Timeout Backup_Failure_Timeout 	<ul style="list-style-type: none"> Object_Identifier Object_Name Max_Master Description Local_Time Local_Date Uts_Offset Daylight_Savings_Status Apdu_Timeout Backup_Failure_Timeout #1000 #1001 #1002 Configuration_Files Last_Restore_Time Backup_And_Restore_State Backup_Preparation_Time Restore_Completion_Time Restore_Preparation_Time 	Refer to Table 2 - Device Object Properties on page 5.
Multi-State Value	<input checked="" type="checkbox"/>	<ul style="list-style-type: none"> Description Reliability States_Text 	Present_Value	<ul style="list-style-type: none"> Present_Value property is writable for every Multi State Value object unless indicated. Out_of_Service property is not writable for MSV.
Program	<input checked="" type="checkbox"/>	<ul style="list-style-type: none"> Description Reliability 	Program_Change	<ul style="list-style-type: none"> Only LOAD and RESTART are supported for Program Change. Use LOAD to apply the new firmware.
File	<input checked="" type="checkbox"/>	Description	<ul style="list-style-type: none"> Archive File Size 	Only 0 is the accepted value to be written to file size.
Schedule	<input checked="" type="checkbox"/>	<ul style="list-style-type: none"> Description Weekly Schedule 	<ul style="list-style-type: none"> 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 CMU uses 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	List	Description	W?	Notes
AI.1	AI1_Voltage	Integrator	Displays the actual voltage of analog input 1 in Vdc.	Out of service COV Increment	0 to 10V, Resolution: 0.001V
AI.2	AI2_Voltage	Integrator	Displays the actual voltage of analog input 2 in Vdc.	Out of service COV Increment	0 to 10V, Resolution: 0.001V
AI.3	AI3_Temperature	Integrator	Displays the actual temperature read by the sensor on analog input 3.	Out of service COV Increment	-40°C to 85°C or -40°F to 185°F, Resolution: 0.01°C or 0.018°F
AI.4	AI4_Temperature	Integrator	Displays the actual temperature read by the sensor on analog input 4.	Out of service COV Increment	-40°C to 85°C or -40°F to 185°F, Resolution: 0.01°C or 0.018°F
AI.5	Room Air Temperature	Integrator	Displays the room temperature reading value.	Read only COV Increment	0°C to 50°C or 32°F to 122°F, Resolution: 0.01°C or 0.018°F
AI.6	Room Air Relative Humidity	Integrator	Displays the room relative humidity reading value.	Read only COV Increment	0 to 100%RH, Resolution: 0.1%RH
AI.7	CO2Level	Integrator	Displays the reading of the CO ₂ sensor.	Read only COV Increment	0 to 2000 PPM, Resolution: 1 PPM
AI.8	VOCIndex	Integrator	Displays the reading of the VOC sensor.	Read only COV Increment	0 to 65535, Resolution: 1
AI.9	LuminousFlux	Integrator	Displays the reading of the light sensor.	Read only COV Increment	0 to 16000 Lux, Resolution: 1 Lux
AI.10	CMUOnBoardTempSetpoint	Integrator	Displays the temperature setpoint value from the CMU on-board potentiometer. Only available when MSV.17 is set to (1) OnBoard.	Read only COV Increment	0°C to 35°C or 32°F to 95°F, Resolution: 0.01°C or 0.018°F
AI.11	CMUIntake	Integrator	Displays the CMU air intake temperature.	Read only COV Increment	-40°C to 85°C or -40°F to 185°F, Resolution: 0.01°C or 0.018°F
AI.12	CMUOuttake	Integrator	Displays the CMU air outtake temperature.	Read only COV Increment	-40°C to 85°C or -40°F to 185°F, Resolution: 0.01°C or 0.018°F
AI.13	CMUBoardTempeature	Integrator	Displays the temperature value of the CMU main printed circuit board.	Read only COV Increment	-40°C to 85°C or -40°F to 185°F, Resolution: 0.01°C or 0.018°F
AI.14	CMUSSRTemp	Integrator	Displays the temperature value measured on the solid-state relay.	Read only COV Increment	-40°C to 85°C or -40°F to 185°F, Resolution: 0.01°C or 0.018°F

Analog Output (AO)

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

ID	Name	List	Description	W?	Notes
AO.1	AO1_Voltage	Integrator	Commands the voltage on analog output 1 in Vdc. This object is commandable with priority array.	Present Value COV Increment	0 to 10V, Resolution: 0.001V
AO.2	AO2_Voltage	Integrator	Commands the voltage on analog output 2 in Vdc. This object is commandable with priority array.	Present Value COV Increment	0 to 10V, Resolution: 0.001V

Analog Value (AV)

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

ID	Name	List	Description	W?	Notes
AV.1	SAT	Integrator	Displays the Supply Air Temperature (SAT) reading.	Read only COV Increment	0°C to 100°C or 32°F to 212°F, Resolution: 0.01°C or 0.018°F
AV.2	SARH	Integrator	Displays the Supply Air Relative Humidity (SARH) reading.	Read only COV Increment	0 to 100%RH, Resolution: 0.01%RH
AV.3	OAT	Integrator	Displays the Outside Air Temperature (OAT) reading. Available when any of the analog inputs on the add-on board are configured as an outside air temperature sensor.	Read only COV Increment	0°C to 100°C or 32°F to 212°F, Resolution: 0.01°C or 0.018°F
AV.4	OARH	Integrator	Displays the Outside Air Relative Humidity (OARH) reading. Available when any of the analog inputs on the add-on board are configured as an outside air humidity sensor.	Read only COV Increment	0 to 100%RH, Resolution: 0.01%RH
AV.5	DuctStaticPressure	Integrator	Displays the static pressure value in the duct. Available when any of the analog inputs on the add-on board are configured as a static pressure sensor and connected to the Neptronic SPD sensor.	Read only COV Increment	0 to 1250Pa, Resolution: 0.1Pa
AV.6	ModulatingDamperFeedback	Integrator	Displays the feedback value corresponding to the modulating damper position. Available when any of the analog inputs on the add-on board are configured as damper feedback. When configured as damper feedback, the CMU waits for the feedback before turning on the fan or heating, as a safety interlock.	Read only COV Increment	0 to 100%, Resolution: 1%
AV.7	CurrentAirflowSetpoint	Integrator	Configuration value of the airflow setpoint value as a percentage of the maximum capacity (fan speed setpoint). This object is commandable with priority array.	Present Value COV Increment	0 to 100%, Resolution: 1%
AV.8	CMUFanRPM	Integrator	Displays the ECM fan speed RPM value. Only available for units with an ECM fan.	Read only COV Increment	0 to 10000 PPM, Resolution: 1 PPM
AV.9	CMUHeaterStage1DutyCycle	Integrator	Displays the duty cycle of the heater vernier stage 1 when there is a demand for heating, provided there are no alarms that prevent the unit from heating or operating normally.	Read only COV Increment	0 to 100%, Resolution: 0.1%
AV.10	NetworkTempSetpoint	Integrator	Configuration value of the temperature setpoint set over the network.	Present Value COV Increment	0°C to 35°C or 32°F to 212°F, Resolution: 0.01°C or 0.018°F
AV.11	TstatTempSetpoint	Integrator	Configuration value of the temperature setpoint set using the TDF.	Present Value COV Increment	0°C to 35°C or 32°F to 212°F, Resolution: 0.01°C or 0.018°F

ID	Name	List	Description	W?	Notes
AV.12	Cfg_CMUAntiFreezeSetpoint	Advanced	Configuration value of the CMU anti-freeze temperature setpoint. This object is commandable with priority array.	Present Value COV Increment	0°C to 35°C or 32°F to 212°F, Resolution: 0.01°C or 0.018°F
AV.13	Cfg_OccAirflowSetpoint	Advanced	Configuration value of the airflow setpoint in percentage of the maximum capacity when in Occupied mode.	Present Value COV Increment	0 to 100%, Resolution: 1%
AV.14	Cfg_UnoccAirflowSetpoint	Advanced	Configuration value of the airflow setpoint in percentage of the maximum capacity when in Unoccupied mode.	Present Value COV Increment	0 to 100%, Resolution: 1%
AV.15	Cfg_BI3_StageWeight	Advanced	Configuration value of the signal stage weight for binary input 3 in percentage of the full range.	Present Value COV Increment	0 to 100%, Resolution: 1%
AV.16	Cfg_BI4_StageWeight	Advanced	Configuration value of the signal stage weight for binary input 4 in percentage of the full range.	Present Value COV Increment	0 to 100%, Resolution: 1%
AV.17	Cfg_ExhaustFanDelay	Advanced	Configuration value of the exhaust fan start time delay.	Present Value COV Increment	1 to 255 seconds, Resolution: 1 second
AV.18	Cfg_ExhaustFanMinRange	Advanced	Configuration of the minimum value of the exhaust fan control signal.	Present Value COV Increment	0 to 10V, Resolution: 0.001V
AV.19	Cfg_ExhaustFanMaxRange	Advanced	Configuration of the maximum value of the exhaust fan control signal.	Present Value COV Increment	0 to 10V, Resolution: 0.001V
AV.20	Cfg_DamperDelay	Advanced	Configuration value of the damper stroke time delay.	Present Value COV Increment	0 to 255 seconds, Resolution: 1 second
AV.21	Cfg_OccupanyInputMinTime	Advanced	Configuration value of the occupancy input minimum time.	Present Value COV Increment	0 to 240 minutes, Resolution: 1 minute
AV.22	Cfg_TstatTempSetpointMin	Advanced	Configuration of the minimum value of the temperature setpoint set using the TDF.	Present Value COV Increment	0°C to 35°C or 32°F to 212°F, Resolution: 0.01°C/0.018°F
AV.23	Cfg_TstatTempSetpointMax	Advanced	Configuration of the maximum value of the temperature setpoint set using the TDF.	Present Value COV Increment	0°C to 35°C or 32°F to 212°F, Resolution: 0.01°C/0.018°F
AV.24	Cfg_DryModeSetpoint	Advanced	Configuration value of the relative humidity setpoint in dry mode.	Present Value COV Increment	10 to 90%RH, Resolution: 0.1%RH
AV.25	Cfg_DryModeDeadBand	Advanced	Configuration value of the deadband for the relative humidity setpoint in dry mode.	Present Value COV Increment	1 to 10%RH, Resolution: 0.1%RH
AV.26	Cfg_DryModeAntiCycleDelay	Advanced	Configuration value of the anti-cycle time delay in dry mode.	Present Value COV Increment	0 to 720 minutes, Resolution: 1 minute
AV.27	Cfg_DuctOccStaticPressureSetpoint	Advanced	Configuration value of the static pressure control loop setpoint in the duct when in occupied mode.	Present Value COV Increment	0 to 1250Pa, Resolution: 0.1Pa
AV.28	Cfg_DuctUnoccStaticPressureSetPoint	Advanced	Configuration value of the static pressure control loop setpoint in the duct when in unoccupied mode.	Present Value COV Increment	0 to 1250Pa, Resolution: 0.1Pa
AV.29	Cfg_CO2Setpoint	Advanced	Configuration value of the maximum limit of CO ₂ concentration before the unit sends an alarm.	Present Value COV Increment	0 to 1000 PPM, Resolution: 1 PPM
AV.30	Cfg_CO2DeadBand	Advanced	Configuration value of the deadband for the maximum limit of CO ₂ concentration.	Present Value COV Increment	0 to 200 PPM, Resolution: 1 PPM
AV.31	Cfg_SATOffset	Advanced	Configuration value of the Supply Air Temperature offset.	Present Value COV Increment	-5°C to 5°C or -9°F to 9°F, Resolution: 0.01°C or 0.018°F
AV.32	Cfg_SARHOffset	Advanced	Configuration value of the Supply Air Relative Humidity offset.	Present Value COV Increment	-5 to 5%RH, Resolution: 0.1%RH

ID	Name	List	Description	W?	Notes
AV.33	Cfg_OATOffset	Advanced	Configuration value of the Outside Air Temperature offset.	Present Value COV Increment	-5°C to 5°C or -9°F to 9°F, Resolution: 0.01°C or 0.018°F
AV.34	Cfg_OARHOffset	Advanced	Configuration value of the Outside Air Relative Humidity offset.	Present Value COV Increment	-5 to 5%RH, Resolution: 0.1%RH
AV.35	Cfg_RATOffset	Advanced	Configuration value of the Room Air Temperature offset.	Present Value COV Increment	-10°C to 10°C or -18°F to 18°F, Resolution: 0.01°C or 0.018°F
AV.36	Cfg_RARHOffset	Advanced	Configuration value of the Room Air Relative Humidity offset.	Present Value COV Increment	-5 to 5%RH, Resolution: 0.1%RH
AV.37	Cfg_DuctStaticPressureOffset	Advanced	Configuration value of the duct static pressure offset.	Present Value COV Increment	-125 to 125Pa, Resolution: 0.1Pa
AV.38	Cfg_FactoryMinFanSpeed	Factory	Configuration value of the minimum fan speed.	Present Value COV Increment	0 to 100%, Resolution: 1%
AV.39	Cfg_TempControlPropBand	Factory	Configuration value of the temperature control proportional band.	Present Value COV Increment	0.5°C to 20°C or 33°F to 68°F, Resolution: 0.1°C or 0.18°F
AV.40	Cfg_TempControlIntTime	Factory	Configuration value of the temperature control integral time.	Present Value COV Increment	0 to 255 seconds, Resolution: 1 second
AV.41	Cfg_TempControlDerivTime	Factory	Configuration value of the temperature control derivative time.	Present Value COV Increment	0 to 255 seconds, Resolution: 1 second
AV.42	Cfg_StaticPressurePropBand	Factory	Configuration value of the static pressure control proportional band.	Present Value COV Increment	0 to 250Pa, Resolution: 1Pa
AV.43	Cfg_StaticPressureIntTime	Factory	Configuration value of the static pressure control integral time.	Present Value COV Increment	0 to 255 seconds, Resolution: 1 second
AV.44	Cfg_StaticPressureDerivTime	Factory	Configuration value of the static pressure control derivative time.	Present Value COV Increment	0 to 255 seconds, Resolution: 1 second
AV.45	Cfg_SATControlBand	Integrator	Configuration value of the Supply Air Temperature control band.	Present Value COV Increment	2°C to 10°C or 36°F to 50°F, Resolution: 0.01°C or 0.018°F
AV.46	SynchroTimeoutCount	Factory	Configuration value of the synchronization timeout counter.	Present Value COV Increment	0 to 65535, Resolution: 1
AV.47	NoHeatDetectionDeadband	Integrator	Configuration value of the No Heat Detection deadband.	Present Value COV Increment	2°C to 8°C or 36°F to 46°F, Resolution: 0.01°C or 0.018°F
AV.48	NoHeatDetectionDelay	Integrator	Configuration value of the No Heat Detection time delay.	Present Value COV Increment	30 to 240 seconds, Resolution: 1 second

Binary Input (BI)

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

ID	Name	List	Description	W?	Notes
BI.1	BI3_State	Integrator	Contact status of analog input 3/binary input 3: (0) Open, (1) Close.	Out of service	0 = Open, 1 = Close
BI.2	BI4_State	Integrator	Contact status of analog input 4/binary input 4: (0) Open, (1) Close.	Out of service	0 = Open, 1 = Close
BI.3	OccupancySensor	Integrator	Status value on whether the occupancy sensor has detected movement.	Read only	0 = No, 1 = Yes
BI.4	CMUOnOffInput	Integrator	Status value of the state of the CMU on/off input contact.	Read only	0 = Off, 1 = On

Binary Output (BO)

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

ID	Name	List	Description	W?	Notes
BO.1	BO1_State	Integrator	Contact status of binary output 1: (0) Open, (1) Close. This object is commandable with priority array.	Present Value	0 = Open, 1 = Close
BO.2	BO2_State	Integrator	Contact status of binary output 2: (0) Open, (1) Close. This object is commandable with priority array.	Present Value	0 = Open, 1 = Close

Binary Value (BV)

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

ID	Name	List	Description	W?	Notes
BV.1	ExhaustFanState	Integrator	Status value for the state of the exhaust fan.	Read only	0 = Off, 1 = On
BV.2	OnOffDamperState	Integrator	Status value for the state of the on/off damper.	Read only	0 = Closed, 1 = Open
BV.3	OnOffDamperFeedback	Integrator	Status value for the state of the on/off damper feedback.	Read only	0 = Closed, 1 = Open
BV.4	CMUFanEnable	Integrator	Status value to indicate whether the CMU fan has been enabled.	Read only	0 = No, 1 = Yes
BV.5	CMUHeaterStage2State	Integrator	Status value for the state of the second heater stage.	Read only	0 = Off, 1 = On
BV.6	Cfg_BI3ContactType	Advanced	Configuration to change the contact's normal position for binary input 3. Input can be set to (0) Normally Opened or (1) Normally Closed.	Present Value	0 = NO, 1 = NC

ID	Name	List	Description	W?	Notes
BV.7	Cfg_BI4ContactType	Advanced	Configuration to change the contact's normal position for binary input 4. Input can be set to (0) Normally Opened or (1) Normally Closed.	Present Value	0 = NO, 1 = NC
BV.8	Cfg_BO1ContactType	Advanced	Configuration to change the contact's normal position for binary output 1. Output can be set to (0) Normally Opened or (1) Normally Closed.	Present Value	0 = NO, 1 = NC
BV.9	Cfg_BO2ContactType	Advanced	Configuration to change the contact's normal position for binary output 2. Output can be set to (0) Normally Opened or (1) Normally Closed.	Present Value	0 = NO, 1 = NC
BV.10	Cfg_TstatTempSetpointLock	Advanced	Configuration value to lock the temperature setpoint on the TDF.	Present Value	0 = No, 1 = Yes
BV.11	Cfg_ScheduleEnable	Advanced	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 unit.	Present Value	0 = No, 1 = Yes
BV.12	Cfg_UnitSelection	Advanced	Configuration value to select between the metric and imperial unit system.	Present Value	0 = Metric, 1 = Imperial
BV.13	Cfg_OccupancyInputsEnable	Advanced	Configuration value to enable or disable the occupancy inputs.	Present Value	0 = No, 1 = Yes
BV.14	Cfg_DryMode	Advanced	Configuration value to enable or disable the dry mode.	Present Value	0 = Disable, 1 = Enable
BV.15	Cfg_CO2ExtractMode	Advanced	Configuration value to enable or disable the CO ₂ extract mode.	Present Value	0 = Disable, 1 = Enable
BV.16	Cfg_StaticPressureLoop	Advanced	Configuration value to enable or disable the static pressure loop.	Present Value	0 = Disable, 1 = Enable
BV.17	Cfg_OccupanyInputsInactiveMode	Advanced	Configuration value to set the occupancy mode when inactive to either the (0) Unoccupied or (1) Off state.	Present Value	0 = Unoccupied, 1 = Off
BV.18	SystemOnOff	Integrator	Configuration value to turn the system on or off.	Present Value	0 = Off, 1 = On
BV.19	HostThermalCutoutAlarm	Integrator	Status value to indicate whether the Thermal Cutout alarm has been triggered.	Read only	0 = Off, 1 = On
BV.20	HostCommTimeoutAlarm	Integrator	Status value to indicate whether the Communication Timeout alarm has been triggered, indicating that the CMU main board is not receiving any communication from the add-on board.	Read only	0 = Off, 1 = On
BV.21	HostSSRCutoutAlarm	Integrator	Status value to indicate whether the SSR Cutout alarm has been triggered.	Read only	0 = Off, 1 = On
BV.22	HostBoardCutoutAlarm	Integrator	Status value to indicate whether the Board Cutout alarm has been triggered.	Read only	0 = Off, 1 = On
BV.23	HostSSOR1Alarm	Integrator	Status value to indicate whether the SSOR1 Sensor alarm has been triggered.	Read only	0 = Off, 1 = On
BV.24	HostSSOR2Alarm	Integrator	Status value to indicate whether the SSOR2 Sensor alarm has been triggered.	Read only	0 = Off, 1 = On
BV.25	HostBoardTempAlarm	Integrator	Status value to indicate whether the Board Temperature Sensor alarm has been triggered.	Read only	0 = Off, 1 = On
BV.26	HostSSRTempAlarm	Integrator	Status value to indicate whether the SSR Temperature Sensor alarm has been triggered.	Read only	0 = Off, 1 = On
BV.27	HostFanTempAlarm	Integrator	Status value to indicate whether the Fan Temperature Sensor alarm has been triggered.	Read only	0 = Off, 1 = On
BV.28	HostAirFlowDetectAlarm	Integrator	Status value to indicate whether the Airflow Sensor alarm has been triggered.	Read only	0 = Off, 1 = On

ID	Name	List	Description	W?	Notes
BV.29	HostInvalidConfigAlarm	Integrator	Status value to indicate whether the Invalid Board Configuration alarm has been triggered.	Read only	0 = Off, 1 = On
BV.30	HostNoHeatDetectionAlarm	Integrator	Status value to indicate whether the No Heat Detection alarm has been triggered by the CMU main board, indicating that the heater is not working properly.	Read only	0 = Off, 1 = On
BV.31	HostFrequencySynchronisationError	Integrator	Status value to indicate whether there is a frequency synchronisation error, indicating that the heater is not working properly.	Read only	0 = Off, 1 = On
BV.32	DamperBlockedAlarm	Integrator	Status value to indicate whether the Damper Blocked alarm has been triggered.	Read only	0 = Off, 1 = On
BV.33	SATNotDetectedAlarm	Integrator	Status value to indicate whether the No Supply Air Temperature Input alarm has been triggered.	Read only	0 = Off, 1 = On
BV.34	RATNotDetectedAlarm	Integrator	Status value to indicate whether the No Room Air Temperature Input alarm has been triggered.	Read only	0 = Off, 1 = On
BV.35	TimeoutCommAlarm	Integrator	Status value to indicate whether the Timeout Communication alarm has been triggered, indicating that the add-on board is not receiving any communication from the CMU main board.	Read only	0 = Off, 1 = On
BV.36	AI1NotConnected	Integrator	Status value to indicate whether analog input 1 is connected or not, which would otherwise trigger an alarm.	Read only	0 = Off, 1 = On
BV.37	AI2NotConnected	Integrator	Status value to indicate whether analog input 2 is connected or not, which would otherwise trigger an alarm.	Read only	0 = Off, 1 = On
BV.38	NoHeatDetectionAlarm	Integrator	Status value to indicate whether the No Heat Detection alarm has been triggered by the CMU add-on board, indicating that the heater is not working properly.	Read only	0 = Off, 1 = On
BV.39	ECMFanFeedbackHostAlarm	Integrator	Status value to indicate whether the ECM Fan Feedback alarm has been triggered, indicating that the feedback value does not correspond to the setpoint.	Read only	0 = Off, 1 = On
BV.40	Cfg_AutoPID	Factory	Configuration value to enable or disable Auto PID.	Present Value	0 = No, 1 = Yes

Multi State Value (MSV)

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

ID	Name	List	Description	W?	Notes
MSV.1	OccupancyState	Integrator	Status that indicates the state of actual occupancy. Occupied: Zone is occupied. Unoccupied: Zone is not occupied. Off: Occupancy mode is turned off.	Read only	Occupied Unoccupied Off
MSV.2	Cfg_ObjectListMode	Integrator	Configuration value to select the category of BACnet objects to display.	Present Value	Integrator Advanced Factory

ID	Name	List	Description	W?	Notes
MSV.3	Cfg_AI1_Mode	Advanced	<p>Configuration value for the mode of Analog Input 1. This input accepts a 0-10Vdc signal.</p> <p>Off: The input is not used.</p> <p>SAT: The input is used for the supply air temperature sensor.</p> <p>SARH: The input is used for the supply air relative humidity sensor.</p> <p>OAT: The input is used for the outside air temperature sensor.</p> <p>OARH: The input is used for the outside air relative humidity sensor.</p> <p>StaticPressure: The input is used for a static pressure sensor meant to control the unit and maintain the setpoint.</p> <p>FanSetpoint: The input is used as an external 0-10Vdc control setpoint for the fan speed. This option is applicable only for ECM fans.</p> <p>DamperFeedback: The input is used as feedback to monitor a modulating damper connected to the unit.</p>	Present Value	Off SAT SARH OAT OARH StaticPressure FanSetpoint DamperFeedback
MSV.4	Cfg_AI2_Mode	Advanced	Same description as MSV.3	Present Value	Off SAT SARH OAT OARH StaticPressure FanSetpoint DamperFeedback
MSV.5	Cfg_AI3_BI3_Mode	Advanced	<p>Configuration value for the mode of Analog input 3/Binary input 3. This input accepts a 10K Type 3 or dry contact signal.</p> <p>Off: The input is not used.</p> <p>SAT: The input is used for the supply air temperature sensor.</p> <p>OAT: The input is used for the outside air temperature sensor.</p> <p>DamperFeedback: is used as feedback to monitor an on/off damper connected to the unit.</p> <p>Occupancy: The input is used for occupancy detection.</p> <p>FanSpeedStage: The input is used to change the stage of the CMU fan speed when used with multiple exhaust fans. It requires the SIH-150 to be connected with the exhaust fan and wired back to the unit.</p>	Present Value	Off SAT OAT DamperFeedback Occupancy FanSpeedStage
MSV.6	Cfg_AI4_BI4_Mode	Advanced	Same description as MSV.5	Present Value	Off SAT OAT DamperFeedback Occupancy FanSpeedStage
MSV.7	Cfg_AO1_Mode	Advanced	<p>Configuration value for the mode of Analog output 1. Provides a 0-10Vdc signal.</p> <p>Off: The output is not used.</p> <p>ExhaustFan: The output is used for an exhaust fan proportional to the CMU fan speed.</p> <p>Damper: The output is used for modulating inlet dampers which will open or close based on the CMU run status.</p>	Present Value	Off ExhaustFan Damper
MSV.8	Cfg_AO2_Mode	Advanced	Same description as MSV.7	Present Value	Off ExhaustFan Damper

ID	Name	List	Description	W?	Notes
MSV.9	Cfg_BO1_Mode	Advanced	Configuration value for the mode of Binary output 1. Provides a dry contact signal. Off: The output is not used. ExhaustFan: The output is used to initiate the exhaust fan when the CMU starts. Damper: The output is used to open or close an inlet damper based on the command to enable or turn on/off the CMU.	Present Value	Off ExhaustFan Damper
MSV.10	Cfg_BO2_Mode	Advanced	Same description as MSV.9	Present Value	Off ExhaustFan Damper
MSV.11	Cfg_StaticPressureSensorRange	Advanced	Select the range of the static pressure sensor in Pascal.	Present Value	250 500 1250
MSV.12	Cfg_AI1_SignalRange	Advanced	Configuration value to select the signal type range for analog input 1.	Present Value	2-10Vdc 0-10Vdc
MSV.13	Cfg_AI2_SignalRange	Advanced	Configuration value to select the signal type range for analog input 2.	Present Value	2-10Vdc 0-10Vdc
MSV.14	Cfg_AO1_SignalRange	Advanced	Configuration value to select the signal type range for analog output 1.	Present Value	2-10Vdc 0-10Vdc
MSV.15	Cfg_AO2_SignalRange	Advanced	Configuration value to select the signal type range for analog output 2.	Present Value	2-10Vdc 0-10Vdc
MSV.16	Cfg_TempControlSource	Advanced	Configuration value of the temperature control source. SAT: The source will be provided from the supply air temperature sensor connected to the AI on the add-on board. RAT: The source will be provided from the room temperature sensor (TDF).	Present Value	SAT RAT
MSV.17	Cfg_TempSetpointSource	Integrator	Configuration value of the temperature setpoint source. OnBoard: The source will be provided from the on-board potentiometer. Tstat: The source will be provided from the TDF. Network: The source will be provided from the value written over the network.	Present Value	OnBoard Tstat Network
MSV.18	Cfg_AdditionalDisplay	Advanced	Configuration value of the second line of display on the TDF. None: No value is displayed. Time: It displays the current time in the machine. CO2: It displays the CO ₂ reading (only applicable if TDF with CO ₂ sensor is used). SARH: It displays the supply air relative humidity (if connected and configured). RAT: It displays the room temperature value.	Present Value	None Time CO2 SARH RAT

ID	Name	List	Description	W?	Notes
MSV.19	Cfg_TemperatureDisplayed	Integrator	Configuration value of the temperature value to display. Default: Defaults to the sensor selected for control. Alternate: The value displayed alternates between the value on the TDF and the duct sensor (CMU outtake). SAT: The value displayed is the supply air temperature reading configured on the add-on board. Tstat: The value displayed is the room temperature reading measured on the TDF.	Present Value	Default Alternate SAT Tstat
MSV.20	Reset_reason	Advanced	Displays the reason for the previous system reset.	Read only	noReason independentWatchdog windowWatchdog softwareReset powerDown

Other

Table 11 - Object Table Information: Other

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



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