# Universal Room Controller

## AROB Series

## BACnet Communication Module User Guide

**AROB24T (Temperature sensor)**

**AROB24TH (Temperature and Humidity sensors)**

**AROB24TGH (Temperature, Humidity, and CO2 sensors)**

**AROB24TGVH (Temperature, Humidity, VOC, and CO2 sensors)**

# Contents

# Introduction

The AROB Series Controller BACnet Communication Module User Guide provides information about using the 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 quickly 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 the device's Programming Mode. The MAC address and the MS/TP baud rate setting of 9600, 19200, 38400, 57600, and 76800 are also set through the **BACnet Write Property** service or the device's Programming Mode. In the 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

- 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 the 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.<br>• The value can be set manually using the menu.<br>• The value can be set manually through the **WriteProperty** service to **Device Object.proprietary-property#1000 MSTP-Address**.<br>• 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.<br>• The value can be set manually using the menu.<br>• The value can be set manually through the **WriteProperty** service to **Device Object.Object_Identifier**.<br>• 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.<br>• 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.<br>• The value can be set manually from the available values of (0) Auto, 9600, 19200, 38400, 57600, and 76800. |
| Max_Master | 127 | • Configure **Max_Master** value to increase network efficiency when there are less than 127 devices on the network.<br>• The **Max_Master** value can be changed through the **WriteProperty** service to **Device Object.Max_Master**.<br>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, ARO24TGVH. |

# 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.

# Network Reset

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

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

- Warm Reset: The Warm Reset restarts the controller with actual configuration.

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

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

# Device Object Properties

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

**Table 2 - Device Object Properties**

| Property | Value | Writable |
|---|---|---|
| Object_Identifier | • Programmable where the instance part of the Object_Identifier is in the range of 0-4194302 <br>• The device instance must be unique system-wide <br>• The default value for the device instance=153000 (Vendor_Identifier*1000) | W |
| Object_Name | AROB24TGVH, 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, ARBGVH | |
| Firmware_Revision | currently, 1.06 | |
| Application_Software_Version | currently, 1.27 | |
| Protocol_Version | Always 1 | |
| Protocol_Revision | Always 14 | |
| DataBase_Revision | Default 0; incremented if Object Name, Object List, and/or device ID change | |
| Max_APDU_Length_Accepted | Always 480 | |
| Segmentation_Supported | (3) = No Segmentation | |
| APDU_Timeout | 3000 | W |
| Number_of_APDU_Retries | Always 3 | |
| Protocol_Services_Supported | • readProperty  • writePropertyMultiple  • who-Has <br>• readPropertyMultiple  • deviceCommunicationControl  • who-Is <br>• WriteProperty  • reinitializeDevice | |
| Protocol_Object_Types_Supported | • analog-input  • binary-input  • device <br>• analog-output  • binary-output  • multi-state-value <br>• analog-value  • binary-value | |
| Object_List | 167 | |
| 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 is not supported by the AROB Series Controllers | |
| Property_List | List of properties that exist within the object | |
| Proprietary property #1000 | • Programmable (default:0) <br>• Represents the MS/TP MAC address in the range of 0 to 254 <br>• Values 128 to 254 represent MS/TP non-token passing slave devices | W |
| Proprietary property #1001 | • Programmable (default: Auto) <br>• Represents the MS/TP Baud rate (unsigned type) <br>• Values are 0 (Auto), 9600, 19200, 38400, 57600, and 76800 | W |
| Proprietary property #1002 | • Programmable (default: 15 minutes) <br>• Represents the period that an object in/out of service will automatically return to normal. Range = 0-120 minutes (unsigned type) <br>• 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<br>• Description<br>• Min_Present_Value<br>• Max_Present_Value<br>• Resolution | 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 6 for more information.<br>• The object will automatically return to Normal after a programmable period. Refer to Proprietary property #1002 of Device Object in Table 2 - Device Object Properties. |
| Analog Value | ☑ | • Reliability<br>• Description | • Present_Value<br>• Out_of_Service | • Refer to Out_of_Service Property section on page 6 for more information.<br>• The object will automatically return to Normal after a programmable period. Refer to Proprietary property #1002 of Device Object in Table 2 - Device Object Properties. |
| Analog Output | ☑ | • Description<br>• Reliability<br>• Min-Pres-Value<br>• Max-Pres-Value<br>• Resolution | Present_Value | |
| Binary Input | ☑ | • Reliability<br>• Active_Text<br>• Inactive_Text<br>• 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 6 for more information.<br>• The object will automatically return to Normal after a programmable period. Refer to Proprietary property #1002 of Device Object in Table 2 - Device Object Properties. |
| Binary Value | ☑ | • Reliability<br>• Active_Text<br>• Inactive_Text<br>• Description | Present_Value | . |
| Binary Output | ☑ | • Description<br>• Reliability<br>• Inactive-text<br>• Active-text | Present_Value | |
| Device | ☑ | • Max_Master<br>• Max_Info_Frame<br>• Description<br>• active-cov-subscriptions<br>• #1000 (MSTP addr)<br>• #1001 (Baud rate)<br>• #1002 (Time out)<br>• Apdu_Timeout | • Object_Identifier<br>• Object_Name<br>• Max_Master<br>• Description<br>• Apdu_Timeout<br>• #1000<br>• #1001<br>• #1002 | |
| Multi-State Value | ☑ | • Description<br>• Reliability<br>• State_Text | Present_Value | |

# 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 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 AROB Series controllers use the following BACnet object tables, categorized by 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

> The object ids are available based on the App Profile (Application Profile) selected.
>
> All object ids are available for App Profile, 0 = No Profile (manual configuration).

## Analog Input (AI)

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

| ID | Name | Description | W? | Notes |
|----|------|-------------|----|----|
| **Factory** | | | | |
| AI.3 | Status AI 1 m V | Represents the sensor reading value on analog input 1 in millivolts. **Status AI 1 m V** is only available for App Profile, **0 = No Profile** (manual configuration). | Read Only | 0 to 10,000 millivolts, Resolution 1mV |
| AI.4 | Status PCB Temp m V | Represents the temperature of the printed circuit board in millivolts. | Read Only | 0 to 3,300 millivolts, Resolution 1mV |
| AI.5 | Status Micro Temp m V | Represents the measured temperature of the on-board microprocessor in millivolts. | Read Only | 0 to 3,300 millivolts, Resolution 1mV |

## Analog Output (AO)

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

| ID | Name | Description | W? | Notes |
|----|------|-------------|----|----|
| **Integrator** | | | | |
| AO.1 | Status AO.1 | Status value that represents the modulation percentage of analog output 1 based on demand. | Present Value Relinquish Default | 0% to 100%, Resolution 1% |
| AO.2 | Status AO.2 | Status value that represents the modulation percentage of analog output 2 based on demand. **Status AO.2** is only available for App Profile, **0 = No Profile** (manual configuration). | Present Value Relinquish Default | 0% to 100%, Resolution 1% |

# Analog Value (AV)

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

| ID | Name | Description | W? | Notes |
|---|---|---|---|---|
| **Integrator** | | | | |
| AV.1 | User Cooling Setpoint | Configuration value used to set the actual user cooling setpoint of the zone in the operation mode. The cooling setpoint values are restricted by the temperature deadband and the heating setpoint. | Present Value | 32°F to 257°F or 0°C to 125°C (AV.2 + AV.91 to 257°F/125°C), Resolution 0.2°F/0.1°C |
| AV.2 | User Heating Setpoint | Configuration value used to set the actual user heating setpoint of the zone in the operation mode. The heating setpoint values are restricted by the temperature deadband and the cooling setpoint. | Present Value | 32°F to 257°F or 0°C to 125°C (32°F/0°C to AV.1 - AV.91), Resolution 0.2°F/0.1°C |
| AV.3 | User Dehumidification Setpoint | Configuration value that represents the dehumidification setpoint of the zone in the operation mode set by the user, based on relative humidity. The dehumidification setpoint value is restricted by the humidity deadband and the humidification setpoint. The **User Dehumidification Setpoint** requires a functioning humidity sensor installed. | Present Value | 0% RH to 100% RH (AV.4 + AV.92 to 100% RH), Resolution 0.1% RH |
| AV.4 | User Humidification Setpoint | Configuration value used to set the actual user humidification setpoint of the zone in operation mode. The humidification setpoint values are restricted by the humidity deadband and the dehumidification setpoint. The **User Humidification Setpoint** requires a functioning humidity sensor installed. | Present Value | 0% RH to 100% RH (0% RH to AV.3 - AV.92), Resolution 0.1% RH |
| AV.5 | User Cooling Unocc Setpoint | Configuration value used to set the actual user cooling setpoint of the zone in unoccupied operation mode. The unoccupied cooling setpoint values are restricted by the temperature deadband and unoccupied heating setpoint. Only appears if MSV.18 or MSV.19 is set to **OCC** or **NSB**. | Present Value | 32°F to 257°F or 0°C to 125°C (AV.6 + AV.91 to 257°F/125°C), Resolution 0.2°F/0.1°C |
| AV.6 | User Heating Unocc Setpoint | Configuration value used to set the actual user heating setpoint of the zone in unoccupied operation mode. The unoccupied heating setpoint values are restricted by the temperature deadband and unoccupied cooling setpoint. Only appears if MSV.18 or MSV.19 is set to **OCC** or **NSB**. | Present Value | 32°F to 257°F or 0°C to 125°C (32°F/0°C to AV.5 - AV.91), Resolution 0.2°F/0.1°C |
| AV.7 | User CO2 Setpoint | Configuration value that represents the user CO2 setpoint in parts per million (PPM) at which the outside air damper opens or shuts proportionally to allow the fresh air into the zone. The **User CO2 Setpoint** requires a functioning CO2 sensor installed. | Present Value | 0 to 2,000 PPM, Resolution 1 PPM |
| AV.8 | User VOC Setpoint | Configuration value that represents the setpoint value that is compared with the concentrations of odorous substances and gases in the room air measured by the Volatile Organic Compounds (VOC) sensor in parts per billion (PPB). The fan or the air damper actuator is activated or deactivated to improve the air quality. The **User VOC Setpoint** requires a functioning VOC sensor installed. | Present Value | 0 to 1,000 PPB, Resolution 1 PPB |
| AV.9 | Status CO2 level | Represents the status of the carbon dioxide sensor (CO2). This is the value read by the CO2 sensor in parts per million (PPM). The **Status CO2 level** requires a functioning CO2 sensor installed. | Out_of_Service | 0 to 2,000 PPM, Resolution 1 PPM |
| AV.10 | Status Temp level | Represents the internal temperature sensor reading. | Out_of_Service | -40°F to 257°F or -40°C to 125°C, Resolution 0.2°F/0.1°C |
| AV.11 | Status Humidity level | Represents the humidity sensor reading. The **Status Humidity level** requires a functioning humidity sensor installed. | Out_of_Service | 0% RH to 100% RH, Resolution 0.1% |
| AV.13 | Status VOC Level | Represents the VOC sensor reading. The **Status VOC Level** requires a functioning VOC sensor installed. | Out_of_Service | 0 to 1,000 PPB, Resolution 1 PPB |
| AV.14 | Status Outdoor Temp level | Represents the outdoor temperature. Only appears if MSV.18 is set to **OAT Sensor**. | Out_of_Service | -40°F to 257°F or -40°C to 125°C, Resolution 0.2°F/0.1°C |

| ID | Name | Description | W? | Notes |
|---|---|---|---|---|
| AV.15 | Status Enthalpy | Represents the calculated enthalpy. The **Status Enthalpy** requires a functioning humidity sensor installed. | Read Only | -133.19 to 148.56 BTU/lb or -327.68 to 327.67 kJ/kg, Resolution 0.02 BTU/lb/0.01 kJ/kg |
| AV.16 | Status Dew Point | Represents the calculated dew point. The **Status Dew Point** requires a functioning humidity sensor installed. | Read Only | -40°F to 257°F or -40°C to 125°C, Resolution 0.2°F/0.1°C |
| AV.17 | Status Cooling Demand | Represents the status value of the cooling demand. The **Status Cooling Demand** value is based on zone temperature and setpoint. | Read Only | 0% to 100%, Resolution 1% |
| AV.18 | Status Heating Demand | Status value that represents the heating demand. The **Status Heating Demand** value is based on zone temperature and setpoint. | Read Only | 0% to 100%, Resolution 1% |
| AV.19 | Status Dehumidification Demand | Status value that represents the dehumidification percentage based on relative humidity. The **Status Dehumidification Demand** requires a functioning humidity sensor installed. | Read Only | 0% to 100%, Resolution 1% |
| AV.20 | Status Humidification Demand | Status value that represents the humidifier modulation based on relative humidity. The **Status Humidification Demand** requires a functioning humidity sensor installed. | Read Only | 0% to 100%, Resolution 1% |
| AV.21 | Status CO2 Demand | Status value that represents the CO2 demand based on CO2 level. The **Status CO2 Demand** requires a functioning CO2 sensor installed. | Read Only | 0% to 100%, Resolution 1% |
| AV.22 | Status VOC Demand | Status value that represents the VOC demand based on VOC level. The **Status VOC Demand** requires a functioning VOC sensor installed. | Read Only | 0% to 100%, Resolution 1% |
| AV.23 | Status AO 1 Demand | Represents the status of the value of analog output 1 value in percentage based on demand. | Read Only | 0% to 100%, Resolution 1% |
| AV.24 | Status AO 2 Demand | Represents the status of the value of analog output 2 value in percentage based on demand. The **Status AO 2 Demand** is available only when App Profile **0 = No Profile** (manual configuration) is selected. | Read Only | 0% to 100%, Resolution 1% |
| AV.25 | Status BO 1 Demand | Represents the status of the value of binary output 1 value in percentage based on demand. | Read Only | 0% to 100%, Resolution 1% |
| AV.26 | Status BO 2 Demand | Represents the status of the value of binary output 2 value in percentage based on demand. The **Status BO 2 Demand** is available only when App Profile **0 = No Profile** (manual configuration) is selected. | Read Only | 0% to 100%, Resolution 1% |
| AV.27 | Cfg CO2 calibration | Configuration value applied to the displayed CO2 level reading that is used to calibrate against a known value from a CO2 sensing device. The **Cfg CO2 calibration** requires a functioning CO2 sensor installed. | Present Value | -200 to 200 PPM, Resolution 1 PPM |
| AV.28 | Cfg VOC calibration | Configuration value applied to the displayed VOC level reading that is used to calibrate against a known value from a VOC sensing device. The **Cfg VOC calibration** requires a functioning VOC sensor installed. | Present Value | -100 to 100 PPB, Resolution 1 PPB |
| AV.29 | Cfg Temp calibration | Configuration value applied to the displayed temperature level reading that is used to calibrate against a known value from a thermometer or other temperature sensing device. | Present Value | -18°F to 18°F or -10°C to 10°C, Resolution 0.2°F/0.1°C |
| AV.30 | Cfg Humidity calibration | Configuration value applied to the displayed humidity level reading that is used to calibrate against a known value from a humidistat or other humidity sensing device. The **Cfg Humidity calibration** requires a functioning humidity sensor installed. | Present Value | -10% RH to 10% RH, Resolution 1% RH |
| AV.32 | Cfg Outdoor Temp calibration | Configuration value applied to the displayed outdoor air temperature level reading that is used to calibrate against a known value from a thermometer and/or other temperature sensing device. Only appears if MSV.18 is set to **OAT Sensor**. | Present Value | -18°F to 18°F or -10°C to 10°C, Resolution 0.2°F/0.1°C |
| AV.33 | Cfg AO 1 Min Value | Represents the desired minimum voltage ("zero" value) for analog output 1. The minimum value is restricted by the maximum value. In other words, the minimum value should be less than the maximum value configured in AV.34. | Present Value | 0 Volts to 10 Volts (0 Volts to AV.34), Resolution 0.1 Volt |

| ID | Name | Description | W? | Notes |
|---|---|---|---|---|
| AV.34 | Cfg AO 1 Max Value | Represents the desired maximum voltage ("span" value) for analog output 1. The maximum value is restricted by the minimum value. In other words, the maximum value should not be less than the minimum value configured in AV.33. | Present Value | 0 Volts to 10 Volts (AV.33 to 10 Volts), Resolution 0.1 Volt |
| AV.35 | Cfg AO 2 Min Value | Select the desired minimum voltage ("zero" value) for analog output 2. The minimum value is restricted by the maximum value. In other words, the minimum value should be less than the maximum value configured in AV.36. The **Cfg AO 2 Min Value** is only available for App Profile, **0 = No Profile** (manual configuration). | Present Value | 0 Volts to 10 Volts (0 Volts to AV.36), Resolution 0.1 Volt |
| AV.36 | Cfg AO 2 Max Value | Select the desired maximum voltage ("span" value) for analog output 2. The maximum value is restricted by the minimum value. In other words, the maximum value should not be less than the minimum value configured in AV.35. The **Cfg AO 2 Max Value** is only available for App Profile, **0 = No Profile** (manual configuration). | Present Value | 0 Volts to 10 Volts (AV.35 to 10 Volts), Resolution 0.1 Volt |
| AV.37 | Cfg AO1 Hi OAT Lockout | Select the desired high temperature limit for outside air temperature on analog output 1. If the temperature read from the Outside Air Temperature sensor connected to AI1 is higher than the value set here, the AO1 output will no longer modulate and remain at its minimum voltage (default: 0Vdc). Only appears if MSV.18 is set to **OAT Sensor**. | Present Value | -40°F to 257°F or -40°C to 125°C (AV.38 to 257°F/125°C), Resolution 0.2°F/0.1°C |
| AV.38 | Cfg AO1 Low OAT Lockout | Select the desired low teperature limit for outside air temperature on analog output 1. If the temperature read from the Outside Air Temperature sensor connected to AI1 is lower than the value set here, the AO1 output will no longer modulate and remain at its minimum voltage (default: 0Vdc). Only appears if MSV.18 is set to **OAT Sensor**. | Present Value | -40°F to 257°F or -40°C to 125°C (-40°F/-40°C to AV.37), Resolution 0.2°F/0.1°C |
| AV.39 | Cfg AO2 Hi OAT Lockout | Select the desired high temperature limit for outside air temperature on analog output 2. If the temperature read from the Outside Air Temperature sensor connected to AI1 is higher than the value set here, the AO2 output will no longer modulate and remain at its minimum voltage (default: 0Vdc). The **Cfg AO2 Hi OAT Lockout**:<br>• Only available for App Profile, **0 = No Profile** (manual configuration).<br>• Only appears if MSV.18 is set to **OAT Sensor**. | Present Value | -40°F to 257°F or -40°C to 125°C (AV.40 to 257°F/125°C), Resolution 0.2°F/0.1°C |
| AV.40 | Cfg AO2 Low OAT Lockout | Select the desired low teperature limit for outside air temperature on analog output 2. If the temperature read from the Outside Air Temperature sensor connected to AI1 is lower than the value set here, the AO2 output will no longer modulate and remain at its minimum voltage (default: 0Vdc). The **Cfg AO2 Low OAT Lockout**:<br>• Only available for App Profile, **0 = No Profile** (manual configuration).<br>• Only appears if MSV.18 is set to **OAT Sensor**. | Present Value | -40°F to 257°F or -40°C to 125°C (-40°F/-40°C to AV.39), Resolution 0.2°F/0.1°C |
| AV.41 | Cfg BO1 Hi OAT Lockout | Select the desired high temperature limit for outside air temperature on binary output 1. If the temperature read from the Outside Air Temperature sensor connected to AI1 is higher than the value set here, the output will remain at its normal state (default: open). Only appears if MSV.18 is set to **OAT Sensor**. | Present Value | -40°F to 257°F or -40°C to 125°C (AV.42 to 257°F/125°C), Resolution 0.2°F/0.1°C |
| AV.42 | Cfg BO1 Low OAT Lockout | Select the desired low teperature limit for outside air temperature on binary output 1. If the temperature read from the Outside Air Temperature sensor connected to AI1 is lower than the value set here, the output will remain at its normal state (default: open). Only appears if MSV.18 is set to **OAT Sensor**. | Present Value | -40°F to 257°F or -40°C to 125°C (-40°F/-40°C to AV.41), Resolution 0.2°F/0.1°C |

| ID | Name | Description | W? | Notes |
|---|---|---|---|---|
| AV.43 | Cfg BO2 Hi OAT Lockout | Select the desired high temperature limit for outside air temperature on binary output 2. If the temperature read from the Outside Air Temperature sensor connected to AI1 is higher than the value set here, the output will remain at its normal state (default: open).<br>The **Cfg BO2 Hi OAT Lockout**:<br>• Only available for App Profile, **0 = No Profile** (manual configuration).<br>• Only appears if MSV.18 is set to **OAT Sensor**. | Present Value | -40°F to 257°F or -40°C to 125°C (AV.44 to 257°F/125°C), Resolution 0.2°F/0.1°C |
| AV.44 | Cfg BO2 Low OAT Lockout | Select the desired low teperature limit for outside air temperature on binary output 2. If the temperature read from the Outside Air Temperature sensor connected to AI1 is lower than the value set here, the output will remain at its normal state (default: open).<br>The **Cfg BO2 Low OAT Lockout:**<br>• Only available for App Profile, **0 = No Profile** (manual configuration).<br>• Only appears if MSV.18 is set to **OAT Sensor**. | Present Value | -40°F to 257°F or -40°C to 125°C (-40°F/-40°C to AV.43), Resolution 0.2°F/0.1°C |
| AV45 | Cfg BO 1 Anti Cycle Timer | Configuration value that represents the binary output 1 anti-cycle delay in seconds before activating or reactivating the cooling contact to protect the compressor. | Present Value | 0 to 300 seconds, Resolution 1 second |
| AV.46 | Cfg BO 2 Anti Cycle Timer | Configuration value that represents the binary output 2 anti-cycle delay in seconds before activating or reactivating the cooling contact to protect the compressor. The **Cfg BO 2 Anti Cycle Timer** is only available for App Profile, **0 = No Profile** (manual configuration). | Present Value | 0 to 300 seconds, Resolution 1 second |
| AV.53 | Cfg FAN ON Speed | Configuration value that represents the minimum fan speed when the fan system mode is on. | Present Value | 0% to 100%, Resolution 1% |
| AV.54 | Cfg BO 1 Hysteresis Low Limit | Configuration value that represents the desired binary output 1 hysteresis low percentage. The low limit value is restricted by the high limit value. The **Cfg BO 1 Hysteresis Low Limit** only appears if MSV.24 is set to **Hysteresis Mode**. | Present Value | 0% to 100% (0% to AV.55), Resolution 1% |
| AV.55 | Cfg BO 1 Hysteresis Hi Limit | Configuration value that represents the desired binary output 1 hysteresis high percentage. The high limit value is restricted by the low limit value. The **Cfg BO 1 Hysteresis Hi Limit** only appears if MSV.24 is set to **Hysteresis Mode**. | Present Value | 0% to 100% (AV.54 to 100%), Resolution 1% |
| AV.56 | Cfg BO 2 Hysteresis Low Limit | Configuration value that represents the desired binary output 2 hysteresis low percentage. The low limit value is restricted by the high limit value. The **Cfg BO 2 Hysteresis Low Limit** is:<br><br>Available for App Profile, **0 = No Profile** (manual configuration).<br>Only appears if MSV.25 is set to **Hysteresis Mode**. | Present Value | 0% to 100% (0% to AV.57), Resolution 1% |
| AV.57 | Cfg BO 2 Hysteresis Hi Limit | Configuration value that represents the desired binary output 2 hysteresis high percentage. The high limit value is restricted by the low limit value. The **Cfg BO 2 Hysteresis Hi Limit** is:<br><br>Available for App Profile, **0 = No Profile** (manual configuration).<br>Only appears if MSV.25 is set to **Hysteresis Mode**. | Present Value | 0% to 100% (AV.56 to 100%), Resolution 1% |
| **Factory** | | | | |
| AV.58 | Status Board Temp level | Represents the temperature of printed circuit board. | Out_of_Service | 32°F to 122°F or 0°C to 50°C, Resolution 0.2°F/0.1°C |
| AV.59 | Status Micro Temp level | Represents the measured temperature of the on-board microprocessor. | Out_of_Service | -40°F to 185°F or -40°C to 85°C, Resolution 0.2°F/0.1°C |
| AV.60 | Cfg Cooling P Band | Configuration value that represents the desired proportional band value for the cooling ramp. | Present Value | 3.6°F to 90°F or 2°C to 50°C, Resolution 0.2°F/0.1°C |
| AV.61 | Cfg Cooling I Time | Configuration value that represents the time for cooling integral factor compensation. | Present Value | 1 to 120 seconds, Resolution 1 second |

| ID | Name | Description | W? | Notes |
|---|---|---|---|---|
| AV.62 | Cfg Heating P Band | Configuration value that represents the desired proportional band value of the heating ramp. | Present Value | 3.6°F to 90°F or 2°C to 50°C, Resolution 0.2°F/0.1°C |
| AV.63 | Cfg Heating I Time | Configuration value that represents the desired time for heating integral factor compensation. | Present Value | 1 to 120 seconds, Resolution 1 second |
| AV.64 | Cfg Humidity P Band | Configuration value that represents the desired proportional band value of the dehumidification and humidification ramps. The **Cfg Humidity P Band** requires a functioning humidity sensor installed. | Present Value | 2% RH to 50% RH, Resolution 0.1% RH |
| AV.65 | Cfg Humidity I Time | Configuration value that represents the desired value for humidification integral factor compensation of the dehumidification and humidification ramps. The **Cfg Humidity I Time** requires a functioning humidity sensor installed. | Present Value | 1 to 120 seconds, Resolution 1 second |
| AV.66 | Cfg CO2 P Band | Configuration value that represents the desired proportional band value of the CO2 ramp. The **Cfg CO2 P Band** requires a functioning CO2 sensor installed. | Present Value | 10 to 2,000 PPM, Resolution 1 PPM |
| AV.67 | Cfg CO2 I Time | Configuration value that represents the desired value for CO2 integral factor compensation. The **Cfg CO2 I Time** requires a functioning CO2 sensor installed. | Present Value | 1 to 120 seconds, Resolution 1 second |
| AV.68 | Cfg VOC P Band | Configuration value that represents the desired proportional band value of the VOC ramp. The **Cfg VOC P Band** requires a functioning VOC sensor installed. | Present Value | 10 to 1,000 PPB, Resolution 1 PPB |
| AV.69 | Cfg VOC I Time | Configuration value that represents the desired value for VOC integral factor compensation. The **Cfg VOC I Time** requires a functioning VOC sensor installed. | Present Value | 1 to 120 seconds, Resolution 1 second |
| AV.70 | Cfg Cooling setpoint min | Configuration value that represents the minimum cooling setpoint. The minimum cooling setpoint value is restricted by the maximum cooling setpoint. | Present Value | 32°F to 257°F or 0°C to 125°C (32°F/0°C to AV.71), Resolution 0.2°F/0.1°C |
| AV.71 | Cfg Cooling setpoint max | Configuration value that represents the maximum cooling setpoint. The maximum cooling setpoint value is restricted by minimum cooling setpoint value. | Present Value | 32°F to 257°F or 0°C to 125°C (AV.70 to 257°F/125°C), Resolution 0.2°F/0.1°C |
| AV.72 | Cfg Cooling Unocc setpoint min | Configuration value that represents the minimum cooling setpoint value used during no occupancy. The minimum cooling setpoint during no occupancy value is restricted by the maximum cooling setpoint during no occupancy value. Only appears if MSV.18 or MSV.19 is set to **OCC** or **NSB**. | Present Value | 32°F to 257°F or 0°C to 125°C (32°F/0°C to AV.73), Resolution 0.2°F/0.1°C |
| AV.73 | Cfg Cooling Unocc setpoint max | Configuration value that represents the maximum cooling setpoint value used during no occupancy. The maximum cooling setpoint during no occupancy value is restricted by the minimum cooling setpoint during no occupancy value. Only appears if MSV.18 or MSV.19 is set to **OCC** or **NSB**. | Present Value | 32°F to 257°F or 0°C to 125°C (AV.72 to 257°F/125°C), Resolution 0.2°F/0.1°C |
| AV.74 | Cfg Heating Setpoint min | Configuration value that represents the minimum heating setpoint. The minimum heating setpoint value is restricted by the maximum heating setpoint value. | Present Value | 32°F to 257°F or 0°C to 125°C (32°F/0°C to AV.75), Resolution 0.2°F/0.1°C |
| AV.75 | Cfg Heating Setpoint max | Configuration value that represents the maximum heating setpoint. The maximum heating setpoint is restricted by the minimum heating setpoint value. | Present Value | 32°F to 257°F or 0°C to 125°C (AV.74 to 257°F/125°C), Resolution 0.2°F/0.1°C |
| AV.76 | Cfg Heating Unocc Setpoint min | Configuration value that represents the minimum heating setpoint value used during no occupancy. The minimum heating setpoint during no occupancy value is restricted by the maximum heating setpoint during no occupancy value. Only appears if MSV.18 or MSV.19 is set to **OCC** or **NSB**. | Present Value | 32°F to 257°F or 0°C to 125°C (32°F/0°C to AV.77), Resolution 0.2°F/0.1°C |
| AV.77 | Cfg Heating Unocc Setpoint max | Configuration value that represents the maximum heating setpoint value used during no occupancy. The maximum heating setpoint during no occupancy value is restricted by the minimum heating setpoint during no occupancy value. Only appears if MSV.18 or MSV.19 is set to **OCC** or **NSB**. | Present Value | 32°F to 257°F or 0°C to 125°C (AV.76 to 257°F/125°C), Resolution 0.2°F/0.1°C |
| AV.78 | Cfg Dehumidification Setpoint min | Configuration value that represents the value set as the minimum dehumidification setpoint. The minimum dehumidification setpoint value is restricted by the maximum dehumidification setpoint value. The **Cfg Dehumidification Setpoint min** requires a functioning humidity sensor installed. | Present Value | 0% RH to 100% RH (0% RH to AV.79), Resolution 0.1% |

| ID | Name | Description | W? | Notes |
|---|---|---|---|---|
| AV.79 | Cfg Dehumidification Setpoint max | Configuration value that represents the value set as the maximum dehumidification setpoint. The maximum dehumidification setpoint is restricted by the minimum dehumidification setpoint value. The **Cfg Dehumidification Setpoint max** requires a functioning humidity sensor installed. | Present Value | 0% RH to 100% RH (AV.78 to 100% RH), Resolution 0.1% |
| AV.80 | Cfg Humidification Setpoint min | Configuration value that represents the value set as the minimum humidification setpoint. The minimum humidification setpoint is restricted by the maximum humidification setpoint. The **Cfg Humidification Setpoint min** requires a functioning humidity sensor installed. | Present Value | 0% RH to 100% RH (0% RH to AV.81), Resolution 0.1% |
| AV.81 | Cfg Humidification Setpoint max | Configuration value that represents the value set as the maximum humidification setpoint. The maximum humidification setpoint is restricted by the minimum humidification setpoint. The **Cfg Humidification Setpoint max** requires a functioning humidity sensor installed. | Present Value | 0% RH to 100% RH (AV.80 to 100% RH), Resolution 0.1% |
| AV.82 | Cfg CO2 Setpoint min | Configuration value that represents the value set as the minimum CO2 setpoint. The minimum CO2 setpoint is restricted by the maximum CO2 setpoint. The **Cfg CO2 Setpoint min** requires a functioning CO2 sensor installed. | Present Value | 0 to 2,000 PPM (0 PPM to AV.83), Resolution 1 PPM |
| AV.83 | Cfg CO2 Setpoint max | Configuration value that represents the value set as the maximum CO2 setpoint. The maximum CO2 setpoint is restricted by the minimum CO2 setpoint. The **Cfg CO2 Setpoint max** requires a functioning CO2 sensor installed. | Present Value | 0 to 2,000 PPM (AV.82 to 2,000 PPM), Resolution 1 PPM |
| AV.84 | Cfg VOC Setpoint min | Configuration value that represents the value set as the minimum VOC setpoint. The minimum VOC setpoint is restricted by the maximum VOC setpoint. The **Cfg VOC Setpoint min** requires a functioning VOC sensor installed. | Present Value | 0 to 1,000 PPB (0 PPB to AV.85), Resolution 1 PPB |
| AV.85 | Cfg VOC Setpoint max | Configuration value that represents the value set as the maximum VOC setpoint. The maximum VOC setpoint is restricted by the minimum VOC setpoint. The **Cfg VOC Setpoint max** requires a functioning VOC sensor installed. | Present Value | 0 to 1,000 PPB (AV.84 to 1,000 PPB), Resolution 1 PPB |
| AV.88 | Cfg CO2 Sensor Calibration Period | Configuration value that represents the CO2 sensor calibration period in hours. The **Cfg CO2 Sensor Calibration Period** requires a functioning CO2 sensor installed. | Present Value | 0 to 2,160 hours, Resolution 1 hour |
| AV.89 | Cfg Board Temp calibration | Configuration value applied to the displayed board temperature reading that is used to calibrate against a known value from a thermometer or other temperature sensing device. | Present Value | -18°F to 18°F or -10°C to 10°C, Resolution 0.2°F/0.1°C |
| AV.90 | Cfg Micro Temp calibration | Configuration value applied to the displayed microcontroller temperature reading that is used to calibrate against a known value from a thermometer or other temperature sensing device. | Present Value | -18°F to 18°F or -10°C to 10°C, Resolution 0.2°F/0.1°C |
| AV.91 | Cfg Temp Deadband | Configuration value that represents the temperature deadband. This is the minimum range between the cooling and heating setpoint within which the controller will not take action for the temperature reading. | Present Value | 0°F to 36°F or 0°C to 20°C, Resolution 0.2°F/0.1°C |
| AV.92 | Cfg Humidity Deadband | Configuration value that represents the humidity deadband. This is the minimum range between the dehumidification and humidification setpoint within which the controller will not take action for the humidity reading. The **Cfg Humidity Deadband** requires a functioning humidity sensor installed. | Present Value | 0% RH to 20% RH, Resolution 0.1% RH |
| AV.93 | Status AO 1 m V | Status value that represents the analog output 1 in millivolts. | Read Only | 0 to 10,000 millivolts, Resolution 1mV |
| AV.94 | Status AO 2 m V | Status value that represents the analog output 2 in millivolts. **Status AO 2 m V** is only available for App Profile, **0 = No Profile** (manual configuration). | Read Only | 0 to 10,000 millivolts, Resolution 1mV |

# Binary Input (BI)

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

| ID | Name | Description | W? | Notes |
|----|------|-------------|-----|-------|
| **Integrator** | | | | |
| BI.1 | Status BI 1 | Represents the status of the binary input 1 reading. (0) Open, (1) Close | Out_of_Service | 0 = Open, 1 = Close |
| **Factory** | | | | |
| BI.2 | Status Programing Mode | Represents the status of the programming mode, jumper JP3 (B and C). (0) Open, (1) Close | Read Only | 0 = Open, 1 = Close |
| BI.3 | Status Production Mode | Represents the status of the production mode jumper J4 (3 and 4). (0) Open, (1) Close | Read Only | 0 = Open, 1 = Close |

# Binary Output (BO)

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

| ID | Name | Description | W? | Notes |
|----|------|-------------|-----|-------|
| **Integrator** | | | | |
| BO.1 | Status BO 1 | Represents the contact status of the binary output 1. (0) Open, (1) Close | Present Value Relinquish Default | 0 = Open, 1 = Close |
| BO.2 | Status BO 2 | Represents the contact status of the binary output 2. (0) Open, (1) Close The **Status BO 2** is only available for App Profile, **0 = No Profile** (manual configuration). | Present Value Relinquish Default | 0 = Open, 1 = Close |

# Binary Value (BV)

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

| ID | Name | Description | W? | Notes |
|----|------|-------------|-----|-------|
| **Integrator** | | | | |
| BV.1 | Status Occupancy Status | Represents the occupancy status based on AI1 or BI1 set to **Occupancy** or **Night Setback**. (0) No, (1) Yes | Read Only | 0 = No, 1 = Yes |
| BV.2 | Status AO 1 OAT Lockout | Represents the status value to inform if the OAT lockout alarm is active for the analog output 1. (0) No, (1) Yes Only appears if MSV.18 is set to **OAT Sensor**. | Read Only | 0 = No, 1 = Yes |
| BV.3 | Status AO 2 OAT Lockout | Represents the status value to inform if the OAT lockout alarm is active for the analog output 2. (0) No, (1) Yes The **Status AO 2 OAT Lockout**: • Only available for App Profile, **0 = No Profile** (manual configuration). • Only appears if MSV.18 is set to **OAT Sensor**. | Read Only | 0 = No, 1 = Yes |
| BV.4 | Status BO 1 OAT Lockout | Represents the status value to inform if the OAT lockout alarm is active for the binary output 1. (0) No, (1) Yes Only appears if MSV.18 is set to **OAT Sensor**. | Read Only | 0 = No, 1 = Yes |

| ID | Name | Description | W? | Notes |
|---|---|---|---|---|
| BV.5 | Status BO 2 OAT Lockout | Represents the status value to inform if the OAT lockout alarm is active for the binary output 2. (0) No, (1) Yes<br>The **Status BO 2 OAT Lockout**:<br>• Only available for App Profile, **0 = No Profile** (manual configuration).<br>• Only appears if MSV.18 is set to **OAT Sensor**. | Read Only | 0 = No, 1 = Yes |
| BV.6 | Status Dirty filter Status | Represents the status value to inform if a filter change is required.<br>(0) No, (1) Yes<br>The **Status Dirty filter Status** only appears if MSV.18 or MSV.19 is set to Dirty Filter. | Read Only | 0 = No, 1 = Yes |
| BV.7 | Status Air Flow Switch Status | Represents the status value to inform if an airflow alarm is active.<br>(0) No, (1) Yes<br>The **Status Air Flow Switch Status** only appears if MSV.18 or MSV.19 is set to Air Flow Switch. | Read Only | 0 = No, 1 = Yes |
| BV.8 | Status Air Flow Lockout Status | Represents the status value to inform if an airflow lockout alarm is active.<br>(0) No, (1) Yes<br>The **Status Air Flow Lockout Status** only appears if MSV.18 or MSV.19 is set to Air Flow Lockout. | Read Only | 0 = No, 1 = Yes |
| BV.9 | CfgDisplayCO2Level | Display CO2 in RUN mode. (0) No, (1) Yes<br>The **CfgDisplayCO2Level** requires a functioning CO2 sensor installed. | Present Value | 0 = No, 1 = Yes |
| BV.10 | CfgDisplay VOCLevel | Display VOC in RUN mode. (0) No, (1) Yes<br>The **CfgDisplay VOCLevel** requires a functioning VOC sensor installed. | Present Value | 0 = No, 1 = Yes |
| BV.11 | CfgDisplayTempLevel | Display Temp in RUN mode. (0) No, (1) Yes | Present Value | 0 = No, 1 = Yes |
| BV.12 | CfgDisplayHumidityLevel | Display %RH in RUN mode. (0) No, (1) Yes<br>The **CfgDisplayHumidityLevel** requires a functioning humidity sensor installed. | Present Value | 0 = No, 1 = Yes |
| BV.16 | Cfg Enable Backlight | Represents the desired status of LCD backlight. (0) Off, (1) On | Present Value | 0 = Off, 1 = On |
| BV.17 | Cfg Enable Auto- Scroll | Represents the desired status of the auto-scroll of sensor readings in the RUN mode. (0) Off, (1) On | Present Value | 0 = Off, 1 = On |
| BV.18 | Cfg Key Pad Upper Left Lock | Lock the star (*) button. (0) Off, (1) On | Present Value | 0 = Off, 1 = On<br>If set to **On**, the functionality of these buttons will not be available. |
| BV.19 | Cfg Key Pad Bottom Left Lock | Lock the enter/return button. (0) Off, (1) On | Present Value | 0 = Off, 1 = On<br>If set to **On**, functionality of these buttons will not be available. |
| BV.20 | Cfg Key Pad Arrows Lock | Lock the arrow buttons. (0) Off, (1) On | Present Value | 0 = Off, 1 = On<br>If set to **On**, functionality of these buttons will not be available. |
| BV.21 | Cfg Program Mode Lock | Locks the Program Mode when the jumper JP3 is set to PGM. (0) Off, (1) On | Present Value | 0 = Off, 1 = On<br>If set to **On**, Program Mode will not be available. |
| **Advanced** | | | | |
| BV.22 | Cfg Cooling Command AO 1 | Represents the status of the cooling command for Analog Output 1.<br>If you select **No Profile** as the App Profile, the **Cfg Cooling Command AO 1** becomes writable. (0) No, (1) Yes | Present Value | 0 = No, 1 = Yes |
| BV.23 | Cfg Heating Command AO 1 | Represents the status of the heating command for Analog Output 1. (0) No, (1) Yes If you select **No Profile** as the App Profile, the **Cfg Heating Command AO 1** becomes writable. | Present Value | 0 = No, 1 = Yes |

| ID | Name | Description | W? | Notes |
|---|---|---|---|---|
| BV.24 | Cfg Dehumidification Command AO 1 | Represents the status of the dehumidification command for Analog Output 1. (0) No, (1) Yes <br>• If you select **No Profile** as the App Profile, the **Cfg Dehumidification Command AO 1** becomes writable. <br>• The **Cfg Dehumidification Command AO 1** requires a functioning humidity sensor installed. | Present Value | 0 = No, 1 = Yes |
| BV.25 | Cfg Humidification Command AO 1 | Represents the status of the humidification command for Analog Output 1. (0) No, (1) Yes <br>• If you select **No Profile** as the App Profile, the **Cfg Humidification Command AO 1** becomes writable. <br>• The **Cfg Humidification Command AO 1** requires a functioning humidity sensor installed. | Present Value | 0 = No, 1 = Yes |
| BV.26 | Cfg CO 2 Command AO 1 | Represents the status of the CO2 command for Analog Output 1. (0) No, (1) Yes <br>• If you select **No Profile** as the App Profile, the **Cfg CO 2 Command AO 1** becomes writable. <br>• The **Cfg CO 2 Command AO 1** requires a functioning CO2 sensor installed. | Present Value | 0 = No, 1 = Yes |
| BV.27 | Cfg VOC Command AO 1 | Represents the status of the VOC command for Analog Output 1. (0) No, (1) Yes <br>• If you select **No Profile** as the App Profile, the **Cfg VOC Command AO 1** becomes writable. <br>• The **Cfg VOC Command AO 1** requires a functioning VOC sensor installed. | Present Value | 0 = No, 1 = Yes |
| BV.28 | Cfg FAN Command AO 1 | Represents the status of the fan command for Analog Output 1. (0) No, (1) Yes <br>If you select **No Profile** as the App Profile, the **Cfg FAN Command AO 1** becomes writable. | Present Value | 0 = No, 1 = Yes |
| BV.29 | Cfg Cooling Command AO 2 | Represents the status of the cooling command for Analog Output 2. (0) No, (1) Yes <br>The **Cfg Cooling Command AO 2** is only available for App Profile, **0 = No Profile** (manual configuration). | Present Value | 0 = No, 1 = Yes |
| BV.30 | Cfg Heating Command AO 2 | Represents the status of the heating command for Analog Output 2. <br>The **Cfg Heating Command AO 2** is only available for App Profile, **0 = No Profile** (manual configuration). | Present Value | 0 = No, 1 = Yes |
| BV.31 | Cfg Dehumidification Command AO 2 | Represents the status of the dehumidification command for Analog Output 2. (0) No, (1) Yes <br>The **Cfg Dehumidification Command AO 2**: <br>• Only available for App Profile, **0 = No Profile** (manual configuration). <br>• Requires a functioning humidity sensor installed. | Present Value | 0 = No, 1 = Yes |
| BV.32 | Cfg Humidification Command AO 2 | Represents the status of the humidification command for Analog Output 2. (0) No, (1) Yes <br>The **Cfg Humidification Command AO 2**: <br>• Only available for App Profile, **0 = No Profile** (manual configuration). <br>• Requires a functioning humidity sensor installed. | Present Value | 0 = No, 1 = Yes |
| BV.33 | Cfg CO 2 Command AO 2 | Represents the status of the CO2 command for Analog Output 2. (0) No, (1) Yes <br>The **Cfg CO 2 Command AO 2**: <br>• Only available for App Profile, **0 = No Profile** (manual configuration). <br>• Requires a functioning CO2 sensor installed. | Present Value | 0 = No, 1 = Yes |

| ID | Name | Description | W? | Notes |
|---|---|---|---|---|
| BV.34 | Cfg VOC Command AO 2 | Represents the status of the VOC command for Analog Output 2.<br>(0) No, (1) Yes<br>The **Cfg VOC Command AO 2**:<br>• Only available for App Profile, **0 = No Profile** (manual configuration).<br>• Requires a functioning VOC sensor installed. | Present Value | 0 = No, 1 = Yes |
| BV.35 | Cfg FAN Command AO 2 | Represents the status of the fan command for Analog Output 2. (0) No, (1) Yes<br>The **Cfg FAN Command AO 2** is only available for App Profile, **0 = No Profile** (manual configuration). | Present Value | 0 = No, 1 = Yes |
| BV.36 | Cfg Cooling Command BO 1 | Represents the status of the cooling command for Binary Output 1.<br>(0) No, (1) Yes<br>If you select **No Profile** as the App Profile, the **Cfg Cooling Command BO 1** becomes writable. | Present Value | 0 = No, 1 = Yes |
| BV.37 | Cfg Heating Command BO 1 | Represents the status of the heating command for Binary Output 1.<br>(0) No, (1) Yes<br>If you select **No Profile** as the App Profile, the **Cfg Heating Command BO 1** becomes writable. | Present Value | 0 = No, 1 = Yes |
| BV.38 | Cfg Dehumidification Command BO 1 | Represents the status of the dehumidification command for Binary Output 1.<br>(0) No, (1) Yes<br>• If you select **No Profile** as the App Profile, the **Cfg Dehumidification Command BO 1** becomes writable.<br>• The **Cfg Dehumidification Command BO 1** requires a functioning humidity sensor installed. | Present Value | 0 = No, 1 = Yes |
| BV.39 | Cfg Humidification Command BO 1 | Represents the status of the humidification command for Binary Output 1.<br>(0) No, (1) Yes<br>• If you select **No Profile** as the App Profile, the **Cfg Humidification Command BO 1** becomes writable.<br>• The **Cfg Humidification Command BO 1** requires a functioning humidity sensor installed. | Present Value | 0 = No, 1 = Yes |
| BV.40 | Cfg CO 2 Command BO 1 | Represents the status of the CO2 command for Binary Output 1. (0) No, (1) Yes<br>• If you select **No Profile** as the App Profile, the **Cfg CO 2 Command BO 1** becomes writable.<br>• The **Cfg CO 2 Command BO 1** requires a functioning CO2 sensor installed. | Present Value | 0 = No, 1 = Yes |
| BV.41 | Cfg VOC Command BO 1 | Represents the status of the VOC command for Binary Output 1.<br>(0) No, (1) Yes<br>• If you select **No Profile** as the App Profile, the **Cfg VOC Command BO 1** becomes writable.<br>• The **Cfg VOC Command BO 1** requires a functioning VOC sensor installed. | Present Value | 0 = No, 1 = Yes |
| BV.42 | Cfg FAN Command BO 1 | Represents the status of the fan command for Binary Output 1. (0) No, (1) Yes<br>If you select **No Profile** as the App Profile, the **Cfg FAN Command BO 1** becomes writable. | Present Value | 0 = No, 1 = Yes |
| BV.43 | Cfg Cooling Command BO 2 | Represents the status of the cooling command for Binary Output 2.<br>(0) No, (1) Yes<br>The **Cfg Cooling Command BO 2** is only available for App Profile, **0 = No Profile** (manual configuration). | Present Value | 0 = No, 1 = Yes |
| BV.44 | Cfg Heating Command BO 2 | Represents the status of the heating command for Binary Output 2.<br>(0) No, (1) Yes<br>The **Cfg Heating Command BO 2** is only available for App Profile, **0 = No Profile** (manual configuration). | Present Value | 0 = No, 1 = Yes |
| BV.45 | Cfg Dehumidification Command BO 2 | Represents the status of the dehumidification command for Binary Output 2. (0) No, (1) Yes<br>• The **Cfg Dehumidification Command BO 2** is only available for App Profile, | Present Value | 0 = No, 1 = Yes |

| ID | Name | Description | W? | Notes |
|---|---|---|---|---|
| | | **0 = No Profile** (manual configuration).<br>• The **Cfg Dehumidification Command BO 2** requires a functioning humidity sensor installed. | | |
| BV.46 | Cfg Humidification Command BO 2 | Represents the status of the humidification command for Binary Output 2. (0) No, (1) Yes<br>• The **Cfg Humidification Command BO 2** is only available for App Profile, **0 = No Profile** (manual configuration).<br>• The **Cfg Humidification Command BO 2** requires a functioning humidity sensor installed. | Present Value | 0 = No, 1 = Yes |
| BV.47 | Cfg CO 2 Command BO 2 | Represents the status of the CO2 command for Binary Output 2. (0) No, (1) Yes<br>• The **Cfg CO 2 Command BO 2** is only available for App Profile, **0 = No Profile** (manual configuration).<br>• The **Cfg CO 2 Command BO 2** requires a functioning CO2 sensor installed. | Present Value | 0 = No, 1 = Yes |
| BV.48 | Cfg VOC Command BO 2 | Represents the status of the VOC command for Binary Output 2.<br>(0) No, (1) Yes<br>• The **Cfg VOC Command BO 2** is only available for App Profile, **0 = No Profile** (manual configuration).<br>• The **Cfg VOC Command BO 2** requires a functioning VOC sensor installed. | Present Value | 0 = No, 1 = Yes |
| BV.49 | Cfg FAN Command BO 2 | Represents the status of the fan command for Binary Output 2.<br>(0) No, (1) Yes<br>The **Cfg FAN Command BO 2** is only available for App Profile, **0 = No Profile** (manual configuration). | Present Value | 0 = No, 1 = Yes |

# Multi State Value (MSV)

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

| ID | Name | Description | W? | Notes |
|---|---|---|---|---|
| **Integrator** | | | | |
| MSV.1 | User main system mode | Status of the actual mode selected. This value can be changed via AROB and/or BACnet.<br>**Off**: Controller does not respond to any demand.<br>**On**: Controller turns the system mode on. | Present Value | Off<br>On |
| MSV.2 | User Temp system mode | Represents the status of the actual temperature system mode. This value can be changed via AROB and/or BACnet.<br>**Off**: Controller does not respond to any demand.<br>**Cool**: Controller activates the cooling mode.<br>**Auto**: Controller activates the Auto mode, enabling heating and cooling as per demand.<br>**Heat**: Controller activates the heating mode. | Present Value | Off<br>Cool<br>Auto<br>Heat |
| MSV.3 | User Humidity system mode | Represents the status of the actual humidity system mode. This value can be changed via AROB and/or BACnet. The **User Humidity system mode** requires a functioning humidity sensor installed.<br>**Off**: Controller does not respond to any demand.<br>**Dehumidification**: Controller activates dehumidification.<br>**Auto**: Controller activates the Auto mode, enabling dehumidification and humidification as per demand.<br>**Humidification**: Controller activates humidification. | Present Value | Off<br>Dehumidification<br>Auto<br>Humidification |

| ID | Name | Description | W? | Notes |
|---|---|---|---|---|
| MSV.4 | User CO 2 system mode | Represents the status of the actual CO2 system mode. This value can be changed via AROB and/or BACnet. The **User CO 2 system mode** requires a functioning CO2 sensor installed.<br>**Off**: Controller disables CO2 mode.<br>**On**: Controller enables CO2 mode. | Present Value | Off<br>On |
| MSV.5 | User VOC system mode | Represents the status of the actual VOC system mode. This value can be changed via AROB and/or BACnet. The **User VOC system mode** requires a functioning VOC sensor installed.<br>**Off**: Controller disables VOC mode.<br>**On**: Controller enables VOC mode. | Present Value | Off<br>On |
| MSV.6 | User FAN system mode | Represents the status of the actual FAN system mode. This value can be changed via AROB and/or BACnet.<br>**Off**: Controller disables fan mode.<br>**Auto**: Fan automatically changes speed, based on demand.<br>**On**: Controller enables fan mode. | Present Value | Off<br>Auto<br>On |
| MSV.7 | Cfg Object list mode | Configuration value used to set the Object list mode.<br>**Integrator**: Controller uses the Integrator object list mode.<br>**Advanced**: Controller uses the Advanced object list mode.<br>**Factory**: Controller uses the Factory object list mode. | Present Value | Integrator<br>Advanced<br>Factory |
| MSV.8 | Cfg AO 1 Control Mode | Configuration value used to set the Analog Output 1 control mode.<br>**Highest**: Controller compares all the assigned input values and uses the highest value to calculate the AO1 ramp output value.<br>**Average**: Controller compares all the assigned input values and uses the average value to calculate the AO1 ramp output value.<br>Note: The AO1 ramp value is 0 to 10 Vdc unless the minimum and maximum values were changed at AV.33 and AV.34. | Present Value | Highest<br>Average |
| MSV.9 | Cfg AO 2 Control Mode | Configuration value used to set the Analog Output 2 control mode.<br>**Highest**: Controller compares all the assigned input values and uses the highest value to calculate the AO2 ramp output value.<br>**Average**: Controller compares all the assigned input values and uses the average value to calculate the AO2 ramp output value.<br>Note: The AO2 ramp value is 0 to 10 Vdc unless the minimum and maximum values were changed at AV.35 and AV.36.<br>Only available for App Profile, **0 = No Profile** (manual configuration). | Present Value | Highest<br>Average |
| MSV.12 | Cfg BO 1 Control Mode | Configuration value used to set the Binary Output 1 control mode.<br>**Highest**: Controller compares all the assigned input values and uses the highest value to calculate the BO1 ramp output value.<br>**Average**: Controller compares all the assigned input values and uses the average value to calculate the BO1 ramp output value. | Present Value | Highest<br>Average |
| MSV.13 | Cfg BO 2 Control Mode | Configuration value used to set the Binary Output 2 control mode.<br>**Highest**: Controller compares all the assigned input values and uses the highest value to calculate the BO2 ramp output value.<br>**Average**: Controller compares all the assigned input values and uses the average value to calculate the BO2 ramp output value.<br>Only available for App Profile, **0 = No Profile** (manual configuration). | Present Value | Highest<br>Average |
| MSV.14 | Cfg AO 1 DA/RA Mode | Configuration value used to set the directions from 'Direct Mode' and 'Reverse Mode' for Analog Output 1.<br>**Direct Mode**: The signal ramp is configured from minimum to maximum, for example 0 to 10Vdc.<br>**Reverse Mode**: The signal ramp is configured from maximum to minimum, for example 10 to 0Vdc. | Present Value | Direct mode<br>Reverse Mode |

| ID | Name | Description | W? | Notes |
|---|---|---|---|---|
| MSV.15 | Cfg AO 2 DA/RA Mode | Configuration value used to set the directions from 'Direct Mode' and 'Reverse Mode' for Analog Output 2. **Cfg AO 2 DA/RA Mode** is only available for App Profile, **0 = No Profile** (manual configuration).<br>**Direct Mode**: The signal ramp is configured from minimum to maximum, for example 0 to 10Vdc.<br>**Reverse Mode**: The signal ramp is configured from maximum to minimum, for example 10 to 0Vdc. | Present Value | Direct mode<br>Reverse Mode |
| MSV.16 | Cfg BO 1 NO/NC Mode | Configuration value used to set the direction 'Normally Close (NC)' and 'Normally Open (NO)' for Binary Output 1.<br>**NC Mode**: The contact is considered Normally Closed.<br>**NO Mode**: The contact is considered Normally Open. | Present Value | NC mode<br>NO Mode |
| MSV.17 | Cfg BO 2 NO/NC Mode | Configuration value used to set the direction 'Normally Close (NC)' and 'Normally Open (NO)' for Binary Output 2. The **Cfg BO 2 NO/NC Mode** is only available for App Profile, **0 = No Profile** (manual configuration).<br>**NC Mode**: The contact is considered Normally Closed.<br>**NO Mode**: The contact is considered Normally Open. | Present Value | NC mode<br>NO Mode |
| MSV.18 | Cfg AI 1 config | Configuration value to select the input signal type for Analog Input 1 (AI1). The **Cfg AI 1 config** is only available for App Profile, **0 = No Profile** (manual configuration).<br>**OFF:** Controller does not use the input.<br>**OAT Sensor:** Controller uses a 10kΩ type III outside air temperature sensor.<br>**Occupancy:** Controller activates the Occupancy mode.<br>**Night Set Back:** Controller activates the night set back mode.<br>**Dirty Filter:** Controller activates an alarm to indicate that the filter is dirty.<br>**Air Flow Switch:** Controller activates an alarm to indicate that there is no airflow.<br>**Air Flow Lockout:** Controller activates an alarm to indicate that there is no airflow. The controller shuts off all outputs. | Present Value | Off<br>OAT Sensor<br>Occupancy<br>Night Setback<br>Dirty Filter<br>Air Flow Switch<br>Air Flow Lockout |
| MSV.19 | Cfg BI 1 config | Configuration value to select the input signal type for Binary Input 1 (BI1).<br>**OFF:** Controller does not use the input.<br>**Occupancy:** Controller activates the Occupancy mode.<br>**Night Set Back:** Controller activates the night set back mode.<br>**Dirty Filter:** Controller activates an alarm to indicate that the filter is dirty.<br>**Air Flow Switch:** Controller activates an alarm to indicate that there is no airflow.<br>**Air Flow Lockout:** Controller activates an alarm to indicate that there is no airflow. The controller shuts off all outputs. | Present Value | Off<br>Occupancy<br>Night Setback<br>Dirty Filter<br>Air Flow Switch<br>Air Flow Lockout |
| MSV.21 | Cfg Local unit | Configuration value used to set the desired unit of the displayed value on the device.<br>**Metric**: Controller uses the Metric system of measurement.<br>**Imperial**: Controller uses the Imperial system of measurement. | Present Value | Metric<br>Imperial |
| MSV.22 | Cfg Network unit | Configuration value used to set the displayed value on BACnet.<br>**Metric**: Controller uses the Metric system of measurement.<br>**Imperial**: Controller uses the Imperial system of measurement. | Present Value | Metric<br>Imperial |
| MSV.23 | Cfg Application Profile | Configuration value used to set the desired application profile. Each profile requires the availability of a specific sensor or a combination of sensors.<br>For more information regarding Application Profiles, see the Appendix in the Installation and Operation Manual.<br>**No Profile**: Controller allows manual configuration (For advanced users).<br>**Temp Only**: Outside Air Applications<br>**Temp, RH, and CO2**: Conference Room Application | Present Value | No Profile<br>Temp Only<br>Temp, RH, and CO2 |

| ID | Name | Description | W? | Notes |
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| **Advanced** | | | | |
| MSV.24 | Cfg BO 1 TPM/Hysteresis Mode | Configuration value used to set the binary output 1 type from the options: Hysteresis and TPM (Time Proportional Modulation). The **Cfg BO 1 TPM/Hysteresis Mode** is writable only if App Profile, **0 = No Profile** (manual configuration) is selected.<br>**TPM Mode**: The contact operates using Time Proportional Modulation.<br>**Hysteresis Mode**: The contact operates using Hysteresis. | Present Value | TPM Mode<br>Hysteresis Mode |
| MSV.25 | Cfg BO 2 TPM/Hysteresis Mode | Configuration value used to set the desired binary output 2 type from the options: Hysteresis and TPM (Time Proportional Modulation). The **Cfg BO 2 TPM/Hysteresis Mode** is only available for App Profile, **0 = No Profile** (manual configuration).<br>**TPM Mode**: The contact operates using Time Proportional Modulation.<br>**Hysteresis Mode**: The contact operates using Hysteresis. | Present Value | TPM Mode<br>Hysteresis Mode |
| MSV.26 | Cfg BO 1 TPM CPH | Configuration value used to set the desired binary output 1 TPM cycles per hour from the options: 3, 4, or 8. The **Cfg BO 1 TPM CPH** is:<br>Only available for App Profile, **0 = No Profile** (manual configuration).<br>Only appears if MSV.25 is set to TPM Mode.<br>**TPM CPH 8**: The Time Proportional Modulation is achieved with 8 cycles per hour, such that 1 cycle = 7.5 minutes.<br>**TPM CPH 4**: The Time Proportional Modulation is achieved with 4 cycles per hour, such that 1 cycle = 15 minutes.<br>**TPM CPH 3**: The Time Proportional Modulation is achieved with 3 cycles per hour, such that 1 cycle = 20 minutes. | Present Value | TPM CPH 8<br>TPM CPH 4<br>TPM CPH 3 |
| MSV.27 | Cfg BO 2 TPM CPH | Configuration value used to set the desired binary output 2 TPM cycles per hour from the options: 3, 4, or 8. The **Cfg BO 2 TPM CPH** is:<br>Only available for App Profile, **0 = No Profile** (manual configuration).<br>Only appears if MSV.25 is set to TPM Mode.<br>**TPM CPH 8**: The Time Proportional Modulation is achieved with 8 cycles per hour, such that 1 cycle = 7.5 minutes.<br>**TPM CPH 4**: The Time Proportional Modulation is achieved with 4 cycles per hour, such that 1 cycle = 15 minutes.<br>**TPM CPH 3**: The Time Proportional Modulation is achieved with 3 cycles per hour, such that 1 cycle = 20 minutes. | Present Value | TPM CPH 8<br>TPM CPH 4<br>TPM CPH 3 |
| **Factory** | | | | |
| MSV.28 | Status Relay 1 | Status value that represents the actual relay state of Binary Output 1.<br>**Off**: The contact state has not been initialized.<br>**Set**: The contact of the relay is closed.<br>**Reset**: The contact of the relay is open. | Read Only | Off<br>Set<br>Reset |
| MSV.29 | Status Relay 2 | Status value that represents the actual relay state of Binary Output 2. The Status Relay 2 is only available for App Profile, **0 = No Profile** (manual configuration).<br>**Off**: The contact state has not been initialized.<br>**Set**: The contact of the relay is closed.<br>**Reset**: The contact of the relay is open. | Read Only | Off<br>Set<br>Reset |

# Notes



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