SKE4 Steam Humidifier

BACnet Communication Module User Guide

Contents

Introduction

The SKE4 Steam Humidifier BACnet Communication Module User Guide provides information about using the humidifiers with BACnet communications feature. The BACnet communication protocol for building automation and control networks enables communication between client devices within a network. The humidifier provides a BACnet network interface between BACnet client devices and Neptronic humidifiers. It uses the BACnet Master Slave/Token Passing (MS/TP) protocol and BACnet IP 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 humidifiers have the following advantages:

- *Quick Message Transmission.* The humidifier 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 humidifier supports a Full Master Node state machine for MS/TP. The Max_Master and the instances are configured to the device object through **BACnet WriteProperty** service or via the device's Programming Mode. The MAC address and the MS/TP baud rate setting of 9600, 19200, 38400, and 76800 are also set through the **BACnet Write Property** service or via the device's Programming Mode. In Programming mode, the device is configured through the device's keypad. For more information about the WriteProperty, refer to Table 3 - Object Types Supported.
- *BIBB Support*. The humidifier 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 humidifier 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 humidifier 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	001	• Set to a unique address on the network between 000 and 254. • The value can be set manually via the menu. • The values from 128-254 represent MS/TP non-token passing slave devices.
Device Instance	Auto	• The humidifier automatically configures its device instance to 153,000 + MAC address. • The value can be set manually via the menu. • The value can be set manually through the **WriteProperty** service to **Device Object.Object_Identifier**. • The device's **Object_Identifier** is a combination of the **Device Object_Type** (8) and the **Device_Instance** (0-4194302), therefore its decimal or hexadecimal representation tends to be incomprehensible. • For example, the **Device_Instance**=1000 has an equivalent **Object_Identifier** of 0x020003E8 hexadecimal or 33555432 decimal.
Baud Rate	0 = Auto	• The humidifier configures its baud rate automatically by detecting the network upon connection. • The value can be set manually from the available values of (0) Auto, 9600, 19200, 38400, and 76800.
Max_Master	127	• Configure **Max_Master** value to increase network efficiency when there are less than 127 devices on the network. • The **Max_Master** value can be changed through the **WriteProperty** service to **Device Object.Max_Master**. For more information, refer to the MAC Address and Max_Master section.
Device Object.Object_Name	Name of the device	• Configure the name of the device through the **WriteProperty** service to **Device Object.Object_Name**. For example, SKE4.

Configuration Options

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

Quick Setup

Configure the humidifier for BACnet communication without programming.

1. Ensure that no other device on the network has a MAC address of 1 (the humidifier's default address).
2. Connect the humidifier to the network and power it up.
3. The humidifier 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 humidifier.

Manual Setup

Configure the humidifier for BACnet communication using the SKE4 controller, by using the following steps:

1. Press the Enter key.
2. Enter the Integration menu password: **5544**.
3. Select the Network or Communication sub-menus to set appropriate values.
4. Follow the instructions to configure the Device, BACnet Server, BACnet MSTP/IP and so on, manually.
5. Disconnect the power to the humidifier, connect the humidifier 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 humidifier 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 humidifier. The Max_Master default value of 127 was selected to ensure that any master, specifically a BACnet client can be found when the humidifier 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.

IP Port

For IP communication, a port number of **47808 (0xBAC0)** is used by default. Ensure that the BMS accesses the port with which the humidifier communicates. Generally, in situations with multiple networks, different ports may be used such as 47809 (0xBAC1) or 47810 (0xBAC2) to separate traffic.

Network Reset

Reset the humidifier 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 changes the humidifier to its initial state.
- *Cold Reset.* The Cold Reset restarts the humidifier.

Device Object Properties

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

Table 2 - Device Object Properties

Property	Value	Writable
Object_Identifier	• Programmable where the instance part of the Object_Identifier is in the range of 0-4194302 • The device instance must be unique system-wide • The default value for the device instance= 153001 (Vendor_Identifier*1000 + MAC)	W
Object_Name	SKE4, programmable up to 32 Bytes	W
Description	Programmable up to 32 Bytes (default: SKE4 Controller)	W
Object_Type	Device	
System_Status	Operational	
Vendor_Identifier	Always 153	
Vendor_Name	Always Neptronic	
Model_Name	Example, SKE4	
Firmware_Revision	Currently, 1.00.00b	
Application_Software_Version	Currently, 1.00.00b	
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	3,000	W
Number_of_APDU_Retries	Always 3	
Local_Time	00:00:00	W
Local_Date	01-Jan-2015 (Thu)	W
UtC_Offset	-300 minutes	W
Daylight_Savings_Status	False	W
Backup_Failure_Timeout	10	W
Configuration_Files	File-1 through File-17	
Last_Restore_Time	2015-01-01 (Thu), 00:00:00:00	
Backup_And_Restore_State	IDLE	
Backup_Preparation_Time	0	
Restore_Completion_Time	0	
Restore_Preparation_Time	0	
Protocol_Services_Supported	• confirmedCOVNotification • subscribeCOV • atomicReadFile • atomicWriteFile • readProperty • readPropertyMultiple • WriteProperty • writePropertyMultiple • deviceCommunicationControl • reinitializeDevice • i-Am • i-Have • unconfirmedCOVNotification • unconfirmedPrivateTransfer • timeSynchronization • who-Has • who-Is • utcTimeSynchronization • subscribeCOVProperty	
Protocol_Object_Types_Supported	• analog-input • analog-output • analog-value • binary-input • binary-output • binary-value • device • file • group • multi-state-input • multi-state-output • program • Schedule • multi-state-value • characterstring-value • date-value • datetime-value • positive-integer-value • time-value	
Object_List	132	
Device_Address_Binding	Depends on configuration	
Max_Master	Programmable in the range of 1 to 127 (default: 127)	W
Max_Info_Frames	Always 1	

Property	Value	Writable
Active_COV_Subscription	Empty by default. COV subscription will be lost on a power cycle.	
Property_List	List of properties that exist within the object.	

Object Types Supported

The following table lists all the BACnet properties supported for each object type. Most of the properties are locked. The exception is **Present_Value**, which represents the dynamic operating values of the device, and the Status_Flag, Event_State**,** and Reliability properties, which reflect the availability of the **Present_Value**. Unless otherwise specified, properties are not changeable.

Table 3 - Object Types Supported

Object Type	Enabled	Optional Properties Supported	Writable Properties	Notes
Note: Writable properties are different for some objects. Refer to the respective Object Table information to know the writable property for objects.				
Analog Input	☑	• Reliability • Description • Min_Present_Value • Max_Present_Value • Resolution • COV_Increment	• Out_of_Service • COV_Increment • Units	If "Out_of_Service" is true, Present_Value becomes a writable property. Refer to Out_of_Service Property section on page 7 for more information.
Analog Value	☑	• Reliability • Description • Min_Present_Value • Max_Present_Value • Resolution • COV_Increment • Priority_Array • Relinquish_Default	• Present_Value • Out_of_Service • COV_Increment • Relinquish_Default • Units	Refer to Out_of_Service Property section on page 7 for more information.
Analog Output	☑	• Description • Reliability • Min-Pres-Value • Max-Pres-Value • Resolution • COV_Increment	• Present_Value • COV_Increment • Out_of_Service • Relinquish_Default • Units	
Binary Input	☑	• Reliability • Active_Text • Inactive_Text • Description	• Out_of_Service • Polarity	• If "Out_of_Service" is true, Present_Value becomes a writable property. Refer to Out_of_Service Property section on page 7 for more information.
Binary Value	☑	• Reliability • Active_Text • Inactive_Text • Description • Priority_Array • Relinquish_Default • Minimum_Off_Time • Minimum_On_Time	• Present_Value • Out_of_Service • Relinquish_Default • Minimum_Off_Time • Minimum_On_Time	Refer to Out_of_Service Property section on page 7 for more information.
Binary Output	☑	• Description • Reliability • Inactive-text • Active-text • Minimum_Off_Time • Minimum_On_Time	• Present_Value • Out_of_Service • Polarity • Relinquish_Default • Minimum_Off_Time • Minimum_On_Time	
Device	☑	• Max_Master • Max_Info_Frame • Description • active-COV-subscriptions • Local_Time • Local_Date • UTC_Offset • Daylight_Savings_Status • Backup_Failure_Timeout • Configuration_Files • Last_Restore_Time • Backup_And_Restore_State • Backup_Preparation_Time • Restore_Completion_Time • Restore_Preparation_Time	• Object_Identifier • Object_Name • Max_Master • Description • Local_Time • Local_Date • UTC_Offset • Daylight_Savings_Status • Apdu_Timeout • Backup_Failure_Timeout • Location	

Object Type	Enabled	Optional Properties Supported	Writable Properties	Notes
		• Location • Serial_Number • Profile_Name		
File	☑	• Description	File_Size	Only 0 is the accepted value to be written to the file size.
Group	☐	• Description		
Multi-State Input	☐	• Description • Reliability • State_Text	• Out_of_Service	
Multi-State Output	☐	• Description • Reliability • State_Text	• Present_Value • Out_of_Service • Relinquish_Default	
Program	☑	• Description • Reliability	• Program_Change • Out_of_Service	Only LOAD and RESTART are supported for program change. Use LOAD to apply the new firmware.
Schedule	☑	• Description • Weekly_Schedule	• Effective_Period • Schedule_Default • List_of_Object_Property _References • Priority_for_Writing • Out_of_Service • Weekly_Schedule	If Out_of_Service is True, Present_Value becomes writable.
Multi-State Value	☑	• Description • Reliability • States_Text • Priority_Array • Relinquish_Default	• Present_Value • Relinquish_Default • Out_of_Service	
Character String Value	☑	• Description	• Present_Value	
Date	☐	• Description • Reliability • Event_State • Out_of_Service	• Present_Value • Out_of_Service	
DateTime	☐	• Description • Reliability • Event_State • Out_of_Service	• Present_Value • Out_of_Service	
Positive-Integer Value	☐	• Description • Reliability • Event_State • Out_of_Service • Priority_Array • Relinquish_Default • Minimum_Present_Value • Maximum_Present_Value	• Present_Value • Units • Out_of_Service • Relinquish_Default	
Time	☐	• Description • Reliability • Event_State • Out_of_Service	• Present_Value • Out_of_Service	

Out_of_Service Property

Neptronic humidifiers 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.

Warning: *If the Out_of_Service property is set to* ***True****, Out_of_Service remains true until set to* ***False****.*

Object Table Information

The SKE4 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.9	Water Level Signal	Factory	Value of the measured input frequency of the water level sensor.	Out_of_Service COV_Increment	0 to 30,000Hz, Resolution 1Hz
AI.25	Main Power Supply	Integrator	Value of the main power supply voltage.	Out_of_Service COV_Increment	0V to 40V, Resolution 0.1V

Analog Output (AO)

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

ID	Name	List	Description	W?	Notes
AO.16	Heater SSR Stage	Integrator	Displays the heater SSR stage output value.	Out_of_Service Present_Value Relinquish_Default COV_Increment	0% to 100%, Resolution 0.01%

Analog Value (AV)

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

ID	Name	List	Description	W?	Notes
AV.10	MCU Load	Integrator	Value of the current microcontroller load.	Out_of_Service COV_Increment	0% to 100%, Resolution 0.1%
AV.11	Memory Load	Integrator	Value of the current memory load.	Out_of_Service COV_Increment	0% to 100%, Resolution 0.1%
AV.41	Control Input	Integrator	Value of the current control input reading.	Out_of_Service COV_Increment	0% to 100%, Resolution 0.01%
AV.49	Room RH	Integrator	Value of the room humidity reading.	Out_of_Service COV_Increment	0% RH to 100% RH, Resolution 0.01% RH
AV.57	Supply High Limit RH	Integrator	Value of the supply high limit humidity reading.	Out_of_Service COV_Increment	0% RH to 100% RH, Resolution 0.01% RH
AV.69	Water Temperature	Integrator	Value of temperature of water in the evaporation chamber.	Out_of_Service COV_Increment Units	32°F to 257°F or 0°C to 125°C Resolution 0.02°F or 0.01°C
AV.75	SSR Temperature	Integrator	Value of the temperature measured on the solid-state relay.	Out_of_Service COV_Increment Units	-4°F to 212°F or -20°C to 100°C Resolution 0.02°F or 0.01°C
AV.88	Power Output Feedback	Integrator	Value of the feedback value of power output analog output.	Present_Value Out_of_Service COV_Increment Relinquish_Default	0% to 100%, Resolution 0.01%
AV.97	Water Level	Integrator	Value of the percentage of water remaining in the evaporation chamber.	Out_of_Service COV_Increment	0% to 120%, Resolution 0.1%
AV.106	Room RH Network Reading	Integrator	Value of room's relative humidity reading received from the network.	Present_Value Out_of_Service COV_Increment Relinquish_Default	0% RH to 100% RH, Resolution 0.01% RH
AV.107	Room RH Setpoint	Integrator	Value of room's relative humidity setpoint received from the network.	Present_Value Out_of_Service COV_Increment	0% RH to 100% RH, Resolution 0.01% RH
AV.108	Room RH Unoccupied Setpoint	Integrator	Value of room's relative humidity reading during no occupancy, received from the network.	Present_Value Out_of_Service COV_Increment	0% RH to 100% RH, Resolution 0.01% RH
AV.109	Room RH Vacant Setpoint	Integrator	Value of room's relative humidity reading during vacancy, received from the network.	Present_Value Out_of_Service COV_Increment	0% RH to 100% RH, Resolution 0.01% RH

ID	Name	List	Description	W?	Notes
AV.120	Room Demand	Integrator	Humidity demand value of the room.	Present_Value Out_of_Service COV_Increment Relinquish_Default	0% to 100%, Resolution 0.01%
AV.122	Supply High Limit Network Reading	Integrator	Value of supply high limit reading received from the network.	Present_Value Out_of_Service COV_Increment Relinquish_Default	0% RH to 100% RH, Resolution 0.01% RH
AV.123	Supply High Limit Setpoint	Integrator	Value of supply high limit setpoint received from the network.	Present_Value Out_of_Service COV_Increment	0% RH to 100% RH, Resolution 0.01% RH
AV.136	Supply High Limit Demand	Integrator	Supply high limit humidity demand value.	Present_Value Out_of_Service COV_Increment Relinquish_Default	0% to 100%, Resolution 0.01%
AV.138	Humidity Control Network Demand	Integrator	Value of humidity control demand received from the network.	Present_Value Out_of_Service COV_Increment Relinquish_Default	0% to 100%, Resolution 0.01%
AV.139	Humidity Control Network High Limit	Integrator	Value of humidity control high limit received from the network.	Present_Value Out_of_Service COV_Increment Relinquish_Default	0% to 100%, Resolution 0.01%
AV.143	Humidity Demand	Integrator	Value of the current humidity demand.	Out_of_Service COV_Increment Relinquish_Default	0% to 100%, Resolution 0.01%
AV.144	SDU Fan Off Delay	Integrator	Configuration value of the delay time after which the SDU fan will close once the fan is no longer required.	Present_Value Out_of_Service COV_Increment	5 to 20 minutes, Resolution 1 minute
AV.145	System Power Output	Integrator	Value of the measured power output of the system.	Out_of_Service COV_Increment	0% to 100%, Resolution 0.01%
AV.147	Boiler Demand	Integrator	Value of the measured humidity demand of the humidifier.	Present_Value Out_of_Service COV_Increment Relinquish_Default	0% to 100%, Resolution 0.01%
AV.148	Boiler Capacity	Factory	Value of the steam production capacity of the humidifier.	Present_Value Out_of_Service COV_Increment Units	0 lbs H_2O/hour to 6614 lb s H_2O/hour or 0kg H_2O/hour to 3000kg H_2O/hour, Resolution 0.2 lbs H_2O/hour or 0.1 kg H_2O/hour
AV.149	Boiler Power Output	Integrator	Value of the measured power output of the humidifier.	Out_of_Service COV_Increment	0% to 100%, Resolution 0.01%

ID	Name	List	Description	W?	Notes
AV.150	Boiler Run Time	Integrator	Value of the total runtime of the humidifier.	Out_of_Service COV_Increment	0 to 21474836.47 hours, Resolution 0.01 hours
AV.151	Boiler On Time	Integrator	Value of the total operating time of the humidifier.	Out_of_Service COV_Increment	0 to 21474836.47 hours, Resolution 0.01 hours
AV.152	Boiler Service Run Time	Integrator	Value of the run time of the humidifier since the last servicing.	Present_Value Out_of_Service COV_Increment	0 to 21474836.47 hours, Resolution 0.01 hours
AV.153	Boiler Service On Time	Integrator	Value of the operating time of the humidifier since the last servicing.	Out_of_Service COV_Increment	0 to 21474836.47 hours, Resolution 0.01 hours
AV.162	Boiler Minimum Steam Ouput	Integrator	Configuration value of the minimum steam production demand value, below which no steam will be produced	Present_Value Out_of_Service COV_Increment	1% to 25%, Resolution 1%
AV.163	Boiler Drain Interval	Integrator	Configuration value to define the drain cycle. The drain frequency is dependent on the hardness of the water. As the hardness of water increases, the drain interval frequency has to be increased. The drain cycle setting does not affect the AFEC system.	Present_Value Out_of_Service COV_Increment	0 to 24 hours, Resolution 1 hour
AV.164	Boiler Drain Volume	Integrator	Configuration value to define the volume of water that is drained from the chamber, relative to the total capacity of the chamber.	Present_Value Out_of_Service COV_Increment	25% to 100%, Resolution 5%
AV.165	Boiler Max Steam Output	Integrator	Configuration value of the maximum steam output of the humidifier relative to its total capacity. Only applicable for modulating humidifiers.	Present_Value Out_of_Service COV_Increment	0% to 100%, Resolution 5%
AV.166	Boiler Idle Time Drain	Integrator	Configuration value of the amount of time the humidifier can remain in standby mode until an automatic drain cycle is performed.	Present_Value Out_of_Service COV_Increment	24 to 72 hours, Resolution 1 hour
AV.167	Boiler Idle Temperature Setpoint	Integrator	Configuration value of the idle temperature setpoint value for the evaporation chamber when there is no demand.	Present_Value Out_of_Service COV_Increment Units	32°F to 104°F or 0°C to 40°C, Resolution 2°F or 1°C
AV.168	Boiler Anti Freeze Setpoint	Integrator	Configuration value of the evaporation chamber antifreeze temperature.	Present_Value Out_of_Service COV_Increment Units	41°F to 59°F or 5°C to 15°C, Resolution 2°F or 1°C
AV.173	Boiler Blowdown Rate	Integrator	Configuration value of the boiler's blowdown or water dilution in order to minimize water impurities.	Present_Value Out_of_Service COV_Increment	0% to 100%, Resolution 1%
AV.174	Boiler Service Interval	Integrator	Configuration value to define the time of operation before the humidifier calls for servicing.	Present_Value Out_of_Service COV_Increment	1000 to 3000 hours, Resolution 100 hours
AV.182	Boiler Tank Rinse Interval	Integrator	Configuration value to define amount of time the humidifier stays in "Idle" or "Off" mode, before the evaporation chamber undergoes an automatic rinse cycle.	Present_Value Out_of_Service COV_Increment	1 to 7 days, Resolution 1 day

Binary Input (BI)

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

ID	Name	List	Description	W?	Notes
BI.1	Air Flow	Integrator	Status of the airflow switch. If the switch is Open, it indicates that the airflow is not detected by the air pressure switch. (0) Closed, (1) Open	Out_of_Service Polarity	0 = Closed, 1 = Open
BI.2	Supply High Limit	Integrator	Status of the high limit contact. If the switch is Open, it indicates that the humidity level has exceeded the setpoint on the high limit humidistat. (0) Closed, (1) Open	Out_of_Service Polarity	0 = Closed, 1 = Open
BI.3	Interlock	Integrator	Status of the interlock. If the switch is Open, it indicates that the humidifier is stopped as a result of the interlock safety being open. (0) Closed, (1) Open	Out_of_Service Polarity	0 = Closed, 1 = Open
BI.4	Binary External Demand	Integrator	Displays whether there is currently a humidity demand, when an On/Off humidifier is used. (0) 0%, 1 (100%)	Out_of_Service Polarity	0 = 0%, 1 = 100%
BI.8	Water Leak Detection	Integrator	Displays whether there is a water leak detection. (0) OK, (1) Leak	Out_of_Service Polarity	0 = OK, 1 = Leak
BI.14	Thermal Cutout	Integrator	Displays the status of the high temperature switch. If the switch is Open, it indicates that an abnormal temperature has been detected. (0) Closed, (1) Open	Out_of_Service Polarity	0 = Closed, 1 = Open
BI.20	RS485 Interface	Integrator	Displays whether the RS485 interface is available or not. (0) No, (1) Yes	Out_of_Service Polarity	0 = No, 1 = Yes
BI.21	Ethernet Interface	Integrator	Displays whether the Ethernet interface is available or not. (0) No, (1) Yes	Out_of_Service Polarity	0 = No, 1 = Yes
BI.22	Contactors PCB Fuse	Integrator	Displays the current status of the contactors PCB fuse. If Blown Fuse is displayed, the fuse must be replaced. (0) Normal, (1) Blown Fuse	Out_of_Service Polarity	0 = Normal, 1 = Blown Fuse
BI.23	Control PCB Fuse	Integrator	Displays the current status of the control PCB fuse. If Blown Fuse is displayed, the fuse must be replaced. (0) Normal, (1) Open Fuse	Out_of_Service Polarity	0 = Normal, 1 = Open Fuse

Binary Output (BO)

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

ID	Name	List	Description	W?	Notes
BO.2	Alarm Warning Relay	Integrator	Displays the status of the alarm warning relay. (0) Off, (1) On	Present_Value Out_of_Service Polarity Relinquish_Default Minimum_Off_Time Minimum_On_Time	0 = Off, 1 = On
BO.3	Service Warning Relay	Integrator	Displays the status of the service warning relay. (0) Off, (1) On	Present_Value Out_of_Service Polarity Relinquish_Default Minimum_Off_Time Minimum_On_Time	0 = Off, 1 = On
BO.4	Water Level Valve	Integrator	Displays the status of the water level sensor supply valve. (0) Off, (1) On	Present_Value Out_of_Service Polarity Relinquish_Default Minimum_Off_Time Minimum_On_Time	0 = Off, 1 = On
BO.5	Tank Water Valve	Integrator	Displays the status of the evaporation chamber water supply valve. (0) Off, (1) On	Present_Value Out_of_Service Polarity Relinquish_Default Minimum_Off_Time Minimum_On_Time	0 = Off, 1 = On
BO.6	Drain Cooler Valve	Integrator	Displays the status of the internal drain cooler valve. (0) Off, (1) On	Present_Value Out_of_Service Polarity Relinquish_Default Minimum_Off_Time Minimum_On_Time	0 = Off, 1 = On
BO.7	Drain Pump	Integrator	Displays the status of the drain pump. (0) Off, (1) On	Present_Value Out_of_Service Polarity Relinquish_Default Minimum_Off_Time Minimum_On_Time	0 = Off, 1 = On
BO.11	Main Contactor	Integrator	Displays the status of the main contactor. (0) Off, (1) On	Present_Value Out_of_Service Polarity Relinquish_Default Minimum_Off_Time Minimum_On_Time	0 = Off, 1 = On

ID	Name	List	Description	W?	Notes
BO.12	Heater Stage 1	Integrator	Displays the status of the first stage contactor. (0) Off, (1) On	Present_Value Out_of_Service Polarity Relinquish_Default Minimum_Off_Time Minimum_On_Time	0 = Off, 1 = On
BO.13	Heater Stage2	Integrator	Displays the status of the second stage contactor. (0) Off, (1) On	Present_Value Out_of_Service Polarity Relinquish_Default Minimum_Off_Time Minimum_On_Time	0 = Off, 1 = On
BO.14	Heater Stage 3	Integrator	Displays the status of the third stage contactor. (0) Off, (1) On	Present_Value Out_of_Service Polarity Relinquish_Default Minimum_Off_Time Minimum_On_Time	0 = Off, 1 = On
BO.15	SDU Fan	Integrator	Displays the status of the SDU fan. (0) Off, (1) On	Present_Value Out_of_Service Polarity Relinquish_Default Minimum_Off_Time Minimum_On_Time	0 = Off, 1 = On
BO.18	Alarm LED	Integrator	Displays the status of the alarm LED. (0) Off, (1) On	Present_Value Out_of_Service Polarity Relinquish_Default Minimum_Off_Time Minimum_On_Time	0 = Off, 1 = On
BO.19	Power LED	Integrator	Displays the status of the power LED. (0) Off, (1) On	Present_Value Out_of_Service Polarity Relinquish_Default Minimum_Off_Time Minimum_On_Time	0 = Off, 1 = On
BO.20	Buzzer	Integrator	Displays the status of the buzzer. (0) Off, (1) On	Present_Value Out_of_Service Polarity Relinquish_Default Minimum_Off_Time Minimum_On_Time	0 = Off, 1 = On

Binary Value (BV)

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

ID	Name	List	Description	W?	Notes
BV.3	Alarm Buzzer	Integrator	Configuration value that enables or disables the alarm buzzer sound when there is a system warning. The alarm buzzer does not affect the Status Display LED. (0) Normal, (1) Disabled	Present_Value Out_of_Service Minimum_Off_Time Minimum_On_Time	0 = Normal, 1 = Disabled
BV.14	Water Level Low	Integrator	Status value of the resistive low water level sensor.	Out_of_Service Minimum_Off_Time Minimum_On_Time	0 = Inactive, 1 = Active
BV.15	Water Level High	Integrator	Status value of the resistive high water level sensor.	Out_of_Service Minimum_Off_Time Minimum_On_Time	0 = Inactive, 1 = Active
BV.16	Foam Sensor	Integrator	Displays whether foam has been detected within the evaporation chamber. If Foam is displayed, it indicates that the Anti-Foaming Energy Conservation (AFEC) system has detected foam. The humidifier will drain for a few minutes and return to normal operation. (0) No Foam, (1) Foam	Out_of_Service Minimum_Off_Time Minimum_On_Time	0 = No Foam, 1 = Foam
BV.28	SDU Fan Fault	Integrator	Displays if there is a problem with the SDU fan. (0) Off, (1) On Only appears for humidifiers with SDU option.	Out_of_Service Minimum_Off_Time Minimum_On_Time	0 = Off, 1 = On
BV.30	Boiler Service Operation	Integrator	Select whether to enable the humidifier to continue producing steam, even when it is due for servicing. When set to Allowed, the humidifier continues operating even when a service alarm is active. (0) Not Allowed (1) Allowed	Present_Value Out_of_Service Minimum_Off_Time Minimum_On_Time	0 = Not Allowed, 1 = Allowed
BV.32	Boiler Service Due	Integrator	Status value that indicates whether the humidifier is due for servicing. (0) Off, (1) On	Out_of_Service Minimum_Off_Time Minimum_On_Time	0 = Off, 1 = On

Character String Value (CV)

Table 10 - Object Table Information: Character String Value (CV)

ID	Name	List	Description	W?	Notes
CV.10	HmiOverwrite	Integrator	Value to show on the local display and prevent menu access.	Present_Value	Current value
CV.37	EthernetMacAdd	Integrator	Value of the MAC address of the Ethernet interface. Only applicable if using an Ethernet connection.	Present_Value	Current value

Multi State Value (MSV)

Table 11 - Object Table Information: Multi State Value (MSV)

ID	Name	List	Description	W?	Notes
MSV.5	System Log Verbose Level	Integrator	Configuration value to select the type of information to be stored on the log file. None Emergency Alert Critical Error Warning Notice Info Debug	Present_Value Out_of_Service	None Emergency Alert Critical Error Warning Notice Info Debug
MSV.9	BACnet Server Language	Integrator	Value of the BACnet server language. English	Present_Value Out_of_Service	English
MSV.10	BACnet Server List Mode	Integrator	Configuration value to select the category of BACnet objects to display. Integrator Advanced Factory	Present_Value Out_of_Service	Integrator Advanced Factory
MSV.11	BACnet Server Units	Integrator	Configuration value to select the display units for BACnet server. Metric Imperial	Present_Value Out_of_Service	Metric Imperial
MSV.28	Control Profile	Integrator	Configuration value to select a preconfigured control mode profile for the modulating humidity demand. Select the Custom option to configure individual settings. ExternAnalog ExternNetwork InternAnalog InternNetwork InternTBD Custom	Present_Value Out_of_Service	ExternAnalog ExternNetwork InternAnalog InternNetwork InternTBD Custom
MSV.29	Modulating High Limit Profile	Integrator	Configuration value to select a preconfigured control mode profile for the modulating high limit demand. Select the Custom option to configure individual settings. Disabled ExternAnalog ExternNetwork InternAnalog InternNetwork Custom	Present_Value Out_of_Service	Disabled ExternAnalog ExternNetwork InternAnalog InternNetwork Custom

ID	Name	List	Description	W?	Notes
MSV.32	Occupancy State	Integrator	Displays the current occupancy state. Occupied Unoccupied Vacant Off	Out_of_Service	Occupied Unoccupied Vacant Off
MSV.33	Room RH Source	Integrator	Configuration value to select the reading source for the room demand. None RoomRH Network	Present_Value Out_of_Service	None RoomRH Network
MSV.34	Room RH Setpoint Source	Integrator	Configuration value to select the room demand setpoint source. None Internal ControlInput	Present_Value Out_of_Service	None Internal ControlInput
MSV.38	Supply High Limit Reading Source	Integrator	Configuration value to select the reading source for the supply high limit demand. None SupplyHLRH Network	Present_Value Out_of_Service	None SupplyHLRH Network
MSV.39	Supply High Limit Setpoint Source	Integrator	Configuration value to select the supply high limit demand setpoint source. None Internal ControlInput	Present_Value Out_of_Service	None Internal ControlInput
MSV.43	Humidity Control Demand Source	Integrator	Configuration value to select the humidity control demand source. None ControlInput RoomDemand Network	Present_Value Out_of_Service	None ControlInput RoomDemand Network
MSV.44	Humidity Control High Limit Source	Integrator	Configuration value to select the humidity control high limit source. None ControlInput SupplyHLDemand Network	Present_Value Out_of_Service	None ControlInput SupplyHLDemand Network
MSV.51	Humidity Control Cutout State	Integrator	Configuration value to select the humidity control cutout state. Off Normal LowLimit HighLimit NoAirFlow Interlock	Out_of_Service	Off Normal LowLimit HighLimit NoAirFlow Interlock
MSV.52	SDU Fan Target	Integrator	Configuration value to select SDU fan target. None SDU Fan	Present_Value Out_of_Service	None SDU Fan

ID	Name	List	Description	W?	Notes
MSV.58	Boiler Power State	Integrator	Displays whether the humidifier is powered on or off. Off On	Present_Value Out_of_Service	Off On
MSV.59	Boiler Request	Integrator	Select whether to perform one of the following actions: None Reset Alarms Drain Reset Counters	Present_Value Out_of_Service	None Reset Alarms Drain Reset Counters
MSV.60	Boiler State	Integrator	Displays the current state of operation of the humidifier. Off Idle LineRinse TankRinse Filling Draining Heating Boiling Alarm	Out_of_Service	Off Idle LineRinse TankRinse Filling Draining Heating Boiling Alarm
MSV.63	Boiler Fill Mode	Integrator	Configuration value to select the water filling method for the fill valve: When set to OneShot, water will continuously flow. When set to Pulsed, water will flow in short bursts.	Present_Value Out_of_Service	OneShot Pulsed
MSV.64	Boiler Alarm	Integrator	Displays the current status of the humidifier alarm. Normal FailedPump FillTimeout BlockedPiping HeatTimeout Overheat WaterLeak Service Foaming	Out_of_Service	Normal FailedPump FillTimeout BlockedPiping HeatTimeout Overheat WaterLeak Service Foaming
MSV.65	Boiler Tank Rinse Idle	Integrator	Configuration value to define whether to enable automatic rinse cycles while the humidifier is in “Idle” mode. When set to Off, the Boiler Tank Rinse Interval setting is disabled if the humidifier is turned on. Off On	Present_Value Out_of_Service	Off On
MSV.66	Boiler Tank Rinse Off	Integrator	Configuration value to define whether to enable automatic rinse cycles while the humidifier is turned off. When set to Off, the Boiler Tank Rinse Interval setting is disabled if the humidifier is turned off. Off On	Present_Value Out_of_Service	Off On
MSV.67	Water Probe Auto Calib	Integrator	Configuration value to define frequency of water probe auto-calibration. None Once Always	Present_Value Out_of_Service	None Once Always

Other

Table 12 - Object Table Information: Other

ID	Name	List	Description	W?	Notes
PGM.1	NSDF Core Program	Advanced	NSDF Core Program.	Program_Change Out_of_Service	Program Change, only LOAD (1) and RESTART (4) are supported
PGM.2	LCD_Display Program	Advanced	LCD_Display Program.	Program_Change Out_of_Service	Program Change, only LOAD (1) and RESTART (4) are supported
PGM.3	Water Level Probe Program	Advanced	Water Level Probe Program.	Program_Change Out_of_Service	Program Change, only LOAD (1) and RESTART (4) are supported
PGM.4	Universal User Control Program	Advanced	Universal User Control Program.	Program_Change Out_of_Service	Program Change, only LOAD (1) and RESTART (4) are supported
PGM.5	Universal Humidifier Manager Program	Advanced	Universal Humidifier Manager Program.	Program_Change Out_of_Service	Program Change, only LOAD (1) and RESTART (4) are supported
PGM.6	SKE Program	Advanced	SKE Program.	Program_Change Out_of_Service	Program Change, only LOAD (1) and RESTART (4) are supported
PGM.7	Modbus Server Program	Advanced	Modbus Server Program.	Program_Change Out_of_Service	Program Change, only LOAD (1) and RESTART (4) are supported
PGM.8	BACnet Server Program	Advanced	BACnet Server Program.	Program_Change Out_of_Service	Program Change, only LOAD (1) and RESTART (4) are supported
PGM.9	Web Server Program	Advanced	Web Server Program.	Program_Change Out_of_Service	Program Change, only LOAD (1) and RESTART (4) are supported
PGM.10	Module 9	Advanced	Module 9 file.	Program_Change Out_of_Service	Program Change, only LOAD (1) and RESTART (4) are supported
PGM.11	Module 10	Advanced	Module 10 file.	Program_Change Out_of_Service	Program Change, only LOAD (1) and RESTART (4) are supported
PGM.12	Module 11	Advanced	Module 11 file.	Program_Change Out_of_Service	Program Change, only LOAD (1) and RESTART (4) are supported
PGM.13	Module 12	Advanced	Module 12 file.	Program_Change Out_of_Service	Program Change, only LOAD (1) and RESTART (4) are supported
PGM.14	Module 13	Advanced	Module 13 file.	Program_Change Out_of_Service	Program Change, only LOAD (1) and RESTART (4) are supported
PGM.15	Database Program	Advanced	Database Program.	Program_Change Out_of_Service	Program Change, only LOAD (1) and RESTART (4) are supported
FIL.1	NSDF Core File	Advanced	Core file.	File_Size	File size is accepted for 0 value only
FIL.2	LCD_Display File	Advanced	LCD display file.	File_Size	File size is accepted for 0 value only
FIL.3	Water Level Probe File	Advanced	Water level probe file.	File_Size	File size is accepted for 0 value only
FIL.4	Universal User Control File	Advanced	Universal user control file.	File_Size	File size is accepted for 0 value only

ID	Name	List	Description	W?	Notes
FIL.5	Universal Humidifier Manager File	Advanced	Universal humidifier manager file.	File_Size	File size is accepted for 0 value only
FIL.6	SKE File	Advanced	SKE file.	File_Size	File size is accepted for 0 value only
FIL.7	Modbus Server File	Advanced	Modbus server file.	File_Size	File size is accepted for 0 value only
FIL.8	BACnet Server File	Advanced	BACnet server file.	File_Size	File size is accepted for 0 value only
FIL.9	Web Server File	Advanced	Web server file.	File_Size	File size is accepted for 0 value only
FIL.10	Module 9 File	Advanced	Module 9 file.	File_Size	File size is accepted for 0 value only
FIL.11	Module 10 File	Advanced	Module 10 file.	File_Size	File size is accepted for 0 value only
FIL.12	Module 11 File	Advanced	Module 11 file.	File_Size	File size is accepted for 0 value only
FIL.13	Module 12 File	Advanced	Module 12 file.	File_Size	File size is accepted for 0 value only
FIL.14	Module 13 File	Advanced	Module 13 file.	File_Size	File size is accepted for 0 value only
FIL.15	Database File	Advanced	Database file.	File_Size	File size is accepted for 0 value only
FIL.16	System Log File	Integrator	System log file.	File_Size	File size is accepted for 0 value only
FIL.17	WebData File	Advanced	WebData file.	File_Size	File size is accepted for 0 value only
SCH.1	Occupancy Schedule	Integrator	Weekly occupancy schedule to specify which occupancy state is active during specific periods of day. Create a customized occupancy schedule with up to six events per day. Only appears if ControlProfile is set to an internal control mode or HumCntrlDemandSrc is set to RoomDemand.	Effective_Period Schedule_Default List_of_Object_Property_References Priority_for_Writing Out_of_Service Weekly_Schedule	Monday to Sunday, Event 1 to Event 6
SCH.2	Boiler Drain Schedule	Integrator	Customized draining schedule with up to six events per day.	Effective_Period Schedule_Default List_of_Object_Property_References Priority_for_Writing Out_of_Service Weekly_Schedule	Monday to Sunday, Event 1 to Event 6

Notes

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