Fan Coil Controller

EFCB Series

BACnet Communication Module User Guide

EFCB10TU2	(24Vac / 2 relays)
EFCB10TU4	(24Vac / 4 relays)
EFCB11TU2	(120Vac / 2 relays)
EFCB11TU4	(120Vac /4 relays)
EFCB12TU2	(240Vac / 2 relays)
EFCB12TU4	(240Vac / 4 relays)

Introduction

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

Pre-requisites

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

Advantages of BACnet

BACnet enabled controllers have the following advantages:

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

BACnet Properties Configuration

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

Table 1 - BACnet Properties Configuration

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

Configuration Options

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

Quick Setup

Configure the controller's baud rate and device instance without programming.

1. Set a unique MAC address using the DIP switches located on the controller.
2. Connect the controller to the network and power it up.
3. The controller automatically configures the baud rate and device instance.
4. Repeat the steps for each controller.

Manual Setup

To use a **Device_Instance** other than 153,000, and/or if your site has more than one controller network, go to the menu. The action buttons or the buttons used to access the menus and save changes are different in TFL24 and TDF digital room sensors. The buttons of both TFL24 and TDF have been used in the following instructions. Use the button as applicable to your digital room sensor.

1. Ensure that the digital room sensor jumper is in the RUN position.
2. Press the **[/]** and **[/]** buttons simultaneously for 5 seconds. The *"ENTER PASSWORD"* screen appears.
3. Enter the 637 password within 1 minute by using the arrow keys to increase or decrease the value and the **[/]** and **[/]** buttons to toggle between the digits.
4. Follow the menus to configure the 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.

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

MAC Address and Max_Master

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

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

Examples of MAC Address and Max_Master Configurations

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

Example 1

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

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

Example 2

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

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

Example 3

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

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

Example 4

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

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

Copy Config

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

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

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

Network Reset

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

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

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

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

Device Object Properties

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

Table 2 - Device Object Properties

Property	Value	Writable
Object_Identifier	• Programmable where the instance part of the Object_Identifier is in the range of 0-4194302 • The device instance must be unique system-wide • The default value for the device instance=153003 (Vendor_Identifier*1000)	W
Object_Name	EFCBTU4, programmable up to 32 bytes	W
Description	Programmable up to 32 characters (default: BACnet Fan Coil Controller)	W
Object_Type	Device	
System_Status	Operational	
Vendor_Identifier	Always 153	
Vendor_Name	Always Neptronic	
Model_Name	Example, EFCBTU4	Read Only
Firmware_Revision	currently, 2.17	Read Only
Application_Software_Version	currently, 2.07	Read Only
Protocol_Version	Always 1	Read Only
Protocol_Revision	Always 14	Read Only
DataBase_Revision	Default: 0, incremented if Object Name and/or device ID change	Read Only
Max_APDU_Length_Accepted	Always 480	Read Only
Segmentation_Supported	(3) = No Segmentation	Read Only
APDU_Timeout	6000	W
Number_of_APDU_Retries	Always 3	Read Only
Local_Time	00:00:00	W
Local_Date	01-Jan-2015 (Thu)	W
UtC_Offset	-300 minutes	W
Daylight_Savings_Status	False	W
Backup_Failure_Timeout	300	W
Configuration_Files	File-1	
Last_Restore_Time	2015-01-01 (Thu), 00:00:00:00	
Backup_And_Restore_State	IDLE	
Backup_Preparation_Time	0	
Restore_Completion_Time	0	
Restore_Preparation_Time	0	
Protocol_Services_Supported	• subscribeCOV • atomicReadFile • atomicWriteFile • readProperty • readPropertyMultiple • WriteProperty • writePropertyMultiple • deviceCommunicationControl • reinitializeDevice • unconfirmedPrivateTransfer • timeSynchronization • who-Has • who-Is • UtcTimeSynchronization • subscribeCOVProperty	
Protocol_Object_Types_Supported	• analog-input • analog-output • analog-value • binary-input • binary-output • binary-value • device • file • program • schedule • multi-state-value	
Object_List	208	Read Only
Device_Address_Binding	Always empty	
Max_Master	Programmable in the range of 0-127 (default: 127)	W
Max_Info_Frames	Always 1	
Proprietary property #1000	• Represents the MS/TP MAC address in the range of 0 to 254 (default: 0) • Writable if all MAC address DIP switches are off • Values 128 to 254 represent MS/TP non-token passing slave devices	W

Property	Value	Writable
Proprietary property #1001	• Programmable (default: Auto) • Represents the MS/TP Baud rate (unsigned type) • Values are 0 (auto), 9600, 19200, 38400, 76800 • Reading this property always returns the actual Baud rate	W
Proprietary property #1002	• Programmable (default: 15 minutes) • Represents the period of time that an object in/out of service will automatically return to normal. Range = 0-120 minutes (unsigned type) • Writing 0 means no automatic return to normal	W

Object Types Supported

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

Table 3 - Object Types Supported

Object Type	Enabled	Optional Properties Supported	Writable Properties	Notes
Note: Writable properties are different for some objects. Refer to the respective Object Table information to know the writable property for objects.				
Analog Input	☑	• Reliability • Description • Min_Present_Value • Max_Present_Value • Resolution • COV-Increment	• Out_of_Service • COV-Increment	• If "Out of Service" is true, Present_Value and Status_Flag become writable properties. • Out_of_Service property is writable for objects to which Present_Value is not writable. • Refer to Out of Service Property section on page 7 for more information. • Object will automatically return to Normal after a programmable period of time. Refer to Proprietary property #1002 of Device Object in Table 2 - Device Object Properties.
Analog Value	☑	• Reliability • Description • COV-Increment • Priority_Array • Relinquish_Default	• Present_Value • Out_of_Service • COV-Increment	• Present_Value property is writable for every AV object except AV.20, AV.24, AV.35, AV.50, AV.58, AV.60, AV.70, AV.78, AV.79. • Out_of_Service property is writable for objects indicated in Table 6 - Object Table Information: Analog Value (AV) on page 9. • Refer to Out of Service Property section on page 7 for more information. • Object will automatically return to Normal after a programmable period of time. Refer to Proprietary property #1002 of Device Object in Table 2 - Device Object Properties. Some objects are commandable. In such case, the priority-array and relinquish-default properties are available.
Analog Output	☑	• Description • Reliability • Min-Pres-Value • Max-Pres-Value • Resolution • COV-Increment	• Present_Value • COV-Increment	
Binary Input	☑	• Reliability • Active_Text • Inactive_Text • Description	Out_of_Service	• If "Out of Service" is true, Present_Value and Status_Flag become writable properties. • Out_of_Service property is writable for objects to which Present_Value is not writable. • Refer to Out of Service Property section on page 7 for more information. • Object will automatically return to Normal after a programmable period of time. Refer to Proprietary property #1002 of Device Object in Table 2 - Device Object Properties.

Object Type	Enabled	Optional Properties Supported	Writable Properties	Notes
Binary Value	☑	• Reliability • Active_Text • Inactive_Text • Description • Priority_Array • Relinquish_Default	Present_Value	• Present_Value property is writable for every Binary Value object. • Out_of_Service property is writable for BV.30. • Some objects are commandable. In such case, the priority-array and relinquish-default properties are available for BV.30. • Object automatically returns to Normal after a programmable time. Refer to Proprietary property #1002 of Device Object in Table 2 - Device Object Properties.
Binary Output	☑	• Description • Reliability • Inactive-text • Active-text	Present_Value	
Device	☑	• Max_Master • Max_Info_Frame • Description • Active-COV-subscriptions • #1000 (MSTP addr) • #1001 (Baud rate) • #1002 (Time out) • Local_Time • Local_Date • Uts_Offset • Daylight_Savings_Status • Apdu_Timeout • Backup_Failure_Timeout	• Object_Identifier • Object_Name • Max_Master • Description • Local_Time • Local_Date • Uts_Offset • Daylight_Savings_Status • Apdu_Timeout • Backup_Failure_Timeout • #1000 • #1001 • #1002 • Configuration_Files • Last_Restore_Time • Backup_And_Restore_State • Backup_Preparation_Time • Restore_Completion_Time • Restore_Preparation_Time	Refer to Table 2 - Device Object Properties on page 5.
Multi-State Value	☑	• Description • Reliability • States_Text	Present_Value	• Present_Value property is writable for every Multi State Value object except MSV.14, MSV.15. • Out_of_Service property is not writable for MSV.
Program	☑	• Description • Reliability	Program_Change	• Only LOAD and RESTART are supported for Program Change. • Use LOAD to apply the new firmware.
File	☑	Description	• Archive • File Size	Only 0 is the accepted value to be written to file size.
Schedule	☑	• Description • Weekly Schedule	• Effective Period • Weekly Schedule • Schedule Default • Priority For Writing • Out_of_Service	If "Out of Service" is true, Present_Value becomes writable property.

Out of Service Property

Neptronic controllers offer the use of the Out of Service writable property. When the value of this property is set to True, it disconnects the object from the physical input, enabling you to input other values. This is useful for special applications or while troubleshooting. For example, you can ignore the temperature read from a sensor and input the desired temperature value in order to perform specific tests.

For security reasons, a timeout will set the Out of Service property back to False after 15 minutes. This value can be modified to between 0 and 120 minutes (For more information, see proprietary property #1002 in *Table 2 - Device Object Properties*).

Object Table Information

The EFCB Controller series use the following BACnet object tables, categorized on the basis of their ID. The type is the BACnet Object type, the instance is the BACnet Object. Together, the type and instance form the **BACnet Object_Identifier** for an object according to the following C-language algorithm:

- object_identifier=(unsigned long)((unsigned long)type<<22)+instance

Analog Input (AI)

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

ID	Name	Description	W?	EFCB1xTU2	EFCB1xTU4	Notes
AI.1	ExternTemp	External temperature sensor value (ETS) when AI.1 is wired or AI.3 is configured to Extern Temp Sensor.	Out of service COV Increment (0.5)	x	x	32ºF to 122ºF or 0ºC to 50ºC, ± 5ºC Resolution 0.02ºF/0.01ºC
AI.2	ChangeOverTemp	Changeover temperature value (SENS) when AI.2 is wired.	Out of service COV Increment (0.5)	x	x	32ºF to 122ºF or 0ºC to 50ºC, ± 5ºC Resolution 0.02ºF/0.01ºC
AI.3	AnalogInput3	Temperature or humidity sensor value. For accurate reading, set the corresponding DIP switch and configurations properly.	Out of service COV Increment (0.5)	x	x	-40ºF to 212ºF or -40ºC to 100ºC, ± 5% Resolution 0.02ºF/0.01ºC
AI.4	AnalogInput4	Temperature or humidity sensor value. For accurate reading, set the corresponding DIP switch and configurations properly.	Out of service COV Increment (0.5)	x	x	-40ºF to 212ºF or -40ºC to 100ºC, ± 5% Resolution 0.02ºF/0.01ºC
AI.5	AnalogInput5	Temperature or humidity sensor value. For accurate reading, set the corresponding DIP switch and configurations properly.	Out of service COV Increment (0.5)	x	x	-40ºF to 212ºF or -40ºC to 100ºC, ± 5% Resolution 0.02ºF/0.01ºC
AI.6	AnalogInput6	Temperature or humidity sensor value. For accurate reading, set the corresponding DIP switch and configurations properly.	Out of service COV Increment (0.5)	x	x	-40ºF to 212ºF or -40ºC to 100ºC, ± 5% Resolution 0.02ºF/0.01ºC
AI.7	InternTemp	Internal temperature sensor value (ITS) of the integrated sensor in the TFL/TDF. Set MSV.21 value to **Internal** to use it as Control Temp.	Out of service COV Increment (0.5)	x	x	32ºF to 122ºF or 0ºC to 50ºC, ± 5% Resolution 0.02ºF/0.01ºC
AI.8	InternHumidity	Internal humidity sensor value (Irh) of the integrated sensor in the TFLH/TDF. Set BV.25 value to **Internal** to use it as reference.	Out of service COV Increment (0.5)	x	x	5% RH to 95% RH, ± 5%, Resolution 0.1% RH
AI.9	Trlg_CO2	Internal CO_2 sensor value of the integrated sensor in the TFL/TDF.	Out of service COV Increment (0.5)	x	x	0 to 2000 PPM, Resolution 1 PPM
AI.10	InternLightSensor	Internal light sensor reading in Luxes.	Out of service COV Increment (0.5)	x	x	0 to 16000 Luxes Resolution 1 Lux
AI.11	InterVOCSensor	Internal VOC sensor reading in ppb.	Out of service COV Increment (0.5)	x	x	1 to 60000 ppb Resolution 1 ppb

Analog Output (AO)

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

ID	Name	Description	W?	EFCB1xTU2	EFCB1xTU4	Notes
AO.1	AnalogOutput1	Percentage value of analog output 1, based on demand.	Present Value COV Increment (0.5)	x	x	0 to 100%, Resolution 0.1%
AO.2	AnalogOutput2	Percentage value of analog output 2, based on demand.	Present Value COV Increment (0.5)	x	x	0 to 100%, Resolution 0.1%
AO.3	AnalogOutput3	Percentage value of analog output 3, based on demand.	Present Value COV Increment (0.5)	x	x	0 to 100%, Resolution 0.1%
AO.4	AnalogOutput4	Percentage value of analog output 4, based on demand.	Present Value COV Increment (0.5)	x	x	0 to 100%, Resolution 0.1%

Analog Value (AV)

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

ID	Name	Description	W?	EFCB1xTU2	EFCB1xTU4	Notes
AV.1	ControlTemp	Temperature value that is used to calculate demand. The value is configured with MSV.21 Temp Control Source.	Out of service (writable if MSV.21 = remote) COV Increment (0.5)	x	x	-40ºF to 212ºF or -40ºC to 100ºC, Resolution 0.02ºF/0.01ºC
AV.2	Cfg_NetworkTimeOut	Configuration time value. If MSV.21 is set to **Remote** and no value has been sent via BMS for more than AV.2 time, the EFC goes to **Off** mode. AV.1 displays 999°C and object in Fault. If time is set to **0** mins, AV.1 is reset to AV.9 value.	Present Value COV Increment (1)	x	x	0 to 60 Minutes, Resolution 1 minute
AV.5	Cfg_InternTempOffset	Configuration value used to calibrate the integrated temperature sensor of the TFL/TDF (ITS).	Present Value COV Increment (0.1)	x	x	±9°F/±5°C, Resolution 0.2ºF/0.1ºC
AV.6	Cfg_ ExternTempOffset	Configuration value used to calibrate the 10kΩ external temperature sensor (ETS) wired to AI.1. Cannot be used to calibrate the temperature sensor wired to AI.3.	Present Value COV Increment (0.1)	x	x	±9°F/±5°C, Resolution 0.2ºF/0.1ºC
AV.7	Cfg_AIExtern Temp Min	Configuration value that represents the minimum temperature read by the sensor (minimum range value).	Present Value COV Increment (5)	x	x	-40ºF to 32ºF or -40ºC to 0ºC Resolution 1ºF/0.5ºC

ID	Name	Description	W?	EFCB1xTU2	EFCB1xTU4	Notes
AV.8	Cfg_AIExtern Temp Max	Configuration value that represents the maximum temperature read by the sensor (maximum range value).	Present Value COV Increment (5)	x	x	122°F to 212°F or 50ºC to 100ºC Resolution 1ºF/0.5ºC
AV.9	TempSetPoint	Configuration value used to set the actual user setpoint of the zone in occupied/day operation mode. This value may be locked to prevent the user from changing the setpoint (BV.2).	Present Value COV Increment (0.5)	x	x	50°F to 104°F or 10°C to 40°C (AV.10 to AV.11), ±5ºC, Resolution 1ºF/0.5ºC
AV.10	Cfg_MinSetPoint	Configuration value used to set the minimum temperature setpoint of the zone in occupied/day operation mode, allowed by the user.	Present Value COV Increment (0.5)	x	x	50ºF to 104ºF or 10ºC to 40ºC (0 to AV.11), Resolution 1ºF/0.5ºC
AV.11	Cfg_MaxSetPoint	Configuration value used to set the maximum temperature setpoint of the zone in occupied/day operation mode, allowed by the user.	Present Value COV Increment (0.5)	x	x	50ºF to 104ºF or 10ºC to 40ºC (AV.10 to 104ºF or 40ºC), Resolution 1ºF/0.5ºC
AV.12	SetPointCoolNoOccNSB	Configuration value of the cooling setpoint when in night setback or unoccupied mode. Set BV.35 value to **setpoint** for the value to be active.	Present Value COV Increment (0.5)	x	x	50ºF to 104ºF or 10ºC to 40ºC (AV.13 to 104ºF or 40ºC), Resolution 1ºF/0.5ºC
AV.13	SetPointHeatNoOccNSB	Configuration value of the heating setpoint when in night setback or unoccupied mode. Set BV.35 value to **setpoint** for the value to be active.	Present Value COV Increment (0.5)	x	x	50ºF to 104ºF or 10ºC to 40ºC Resolution 1ºF/0.5ºC
AV.20	HeatingDemand	Status value that represents the heating demand for the Heating Ramp. This value is based on zone temperature, zone setpoint and values set for the actual ramp.	Read only COV Increment (5)	x	x	0 to 100%, Resolution 0.5%, Writable
AV.21	Cfg_HeatingPropBand	Configuration value that represents the range through which the controller will modulate the heating output from 0 to 100%.	Present Value COV Increment (0.5)	x	x	1ºF to 9ºF or 0.5ºC to 5.0ºC Resolution 1ºF/0.5ºC
AV.22	Cfg_HeatingDeadBand	Configuration value that represents the range at which the controller will not take action when temperature is below the zone setpoint.	Present Value COV Increment (0.1)	x	x	0ºF to 9ºF or 0.0ºC to 5.0ºC Resolution 0.2ºF/0.1ºC
AV.24	ReHeatDemand	Status value that represents the heating demand for the Reheat Ramp. This value is based on zone temperature, zone setpoint and values set for the actual ramp.	Read only COV Increment (5)	x	x	0 to 100%, Resolution 1ºF/0.5ºC
AV.25	Cfg_ReHeatPropBand	Configuration value that represents the range through which the controller will modulate the reheat output from 0 to 100%.	Present Value COV Increment (0.5)	x	x	1ºF to 9ºF or 0.5ºC to 5.0ºC Resolution 1ºF/0.5ºC
AV.26	Cfg_ReHeatDeadBand	Configuration value that represents the range at which the controller will not take action when temperature is below the zone setpoint.	Present Value COV Increment (0.1)	x	x	0ºF to 9ºF or 0.0ºC to 5.0ºC Resolution 0.2ºF/0.1ºC
AV.32	Cfg_IntegralTimeHeating	Configuration value that represents the reciprocal of the integral time in secs (1/I or repeats per second). To obtain a slower reaction time, the value of the integral must be small. To obtain a quicker reaction time, the integral value must be bigger.	Present Value COV Increment (5)	x	x	0 to 250 seconds, Resolution 5 seconds
AV.35	CoolingDemand	Status value that represents the cooling demand for the Cooling Ramp. This value is based on zone temperature, zone setpoint and values set for the actual ramp.	Read only COV Increment (5)	x	x	0 to 100%, Resolution 0.5%, Writable
AV.36	Cfg_ CoolingPropBand	Configuration value that represents the range through which the controller will modulate the cooling output from 0 to 100%.	Present Value COV Increment (0.5)	x	x	1ºF to 9ºF or 0.5ºC to 5.0ºC Resolution 1ºF/0.5ºC
AV.37	Cfg_ CoolingDeadBand	Configuration value that represents the range at which the controller will not take action when temperature is above the zone setpoint.	Present Value COV Increment (0.1)	x	x	0ºF to 9ºF or 0.0ºC to 5.0ºC Resolution 0.2ºF/0.1ºC
AV.45	Cfg_IntegralTimeCooling	Configuration value represents the reciprocal of the integral time in secs (1/I or repeats per second). For a slower reaction time, the value of the integral must be small. To obtain a quicker reaction time, the integral value must be bigger.	Present Value COV Increment (5)	x	x	0 to 250 seconds, Resolution 5 seconds
AV.46	Cfg_ CoolingAntiCycleDelay	Configuration value in mins to prevent the cooling outputs to cycle on and off. This a protection feature used when cooling is done through compressors.	Present Value COV Increment (1)	x	x	0 to15 minutes, Resolution 1 minute

ID	Name	Description	W?	EFCB1xTU2	EFCB1xTU4	Notes
AV.50	ChangeOverDemand	Status value that represents the changeover demand for the fan coil. This value is based on zone temperature, zone setpoint and values set for the actual ramp. Available only if a 2-pipe system is configured.	Read only COV Increment (5)	x	x	0 to 100%, Resolution 0.5%
AV.51	Cfg_ ChangeOverPropBand	Configuration value that represents the range through which the controller modulates the cooling and heating output from 0 to 100%. The heating and cooling proportional band will be set by this value.	Present Value COV Increment (0.5)	x	x	1ºF to 9ºF or 0.5ºC to 5.0ºC Resolution 1ºF/0.5ºC
AV.52	Cfg_ChangeOverDeadBand	Configuration value that represents the range at which the controller will not take action when above or below the zone setpoint. The heating and cooling dead band will be set by this value.	Present Value COV Increment (1)	x	x	0ºF to 9ºF or 0.0ºC to 5.0ºC Resolution 0.2ºF/0.1ºC
AV.53	ChangeOverSetPoint	Configuration value of the temperature at which the water that enters is considered to be in cooling or heating state. Note that there is a 1.5°C (2.7°F) dead band on each side of the setpoint.	Present Value COV Increment (0.5)	x	x	50ºF to 104ºF or 10ºC to 40ºC Resolution 1ºF/0.5ºC
AV.56	Cfg_ CL_HT_SwitchTimer	Configuration value of the time required before the changeover is permitted to take place (time in mins).	Present Value COV Increment (5)	x	x	0 to 120 minutes, Resolution 1 minute
AV.58	CL_HT_SwitchTimerCount	Status value of the remaining time before the changeover is authorised. This value counts down from the time set in AV.56.	Read only COV Increment (5)	x	x	0 to 7,200 seconds, Resolution 1 second, Writable
AV.60	FanDemand	Status value that represents the fan demand for the fan coil. This value is based on zone temperature and setpoint. Demand is also affected by the number of fan speed configured in MSV.25.	Read only COV Increment (5)	x	x	0 to 100%, Resolution 0.5%
AV.61	Cfg_ FanAutoTimeOutDelay	Configuration value to prevent the cycling of the fan. If the fan was in operation and stopped, the EFC will countdown from this value before reactivating the fan again.	Present Value COV Increment (1)	x	x	0 to 255 seconds, Resolution 1 second
AV.62	Cfg_FanDampingFactor	Configuration value in secs that represents the delay before changing fan speed.	Present Value COV Increment (1)	x	x	0 to 255 seconds, Resolution 1 second
AV.70	ExternHumidity	External humidity sensor value (Erh). Set BV.25 value to **external** to use it as the reference.	Out of Service COV Increment (0.5)	x	x	5% RH to 95% RH, ± 5%, Resolution 0.1% RH
AV.71	Cfg_InternHumidityOffset	Configuration value used to calibrate the integrated relative humidity sensor of the TFLH/TDF (Irh).	Present Value COV Increment (0.5)	x	x	± 5%, Resolution 0.1% RH
AV.72	Cfg_ ExternHumidityOffset	Configuration value used to calibrate the external relative humidity sensor (Erh).	Present Value COV Increment (0.5)	x	x	± 5%, Resolution 0.1% RH
AV.73	HumSetPoint	Configuration value used to set the actual user humidity setpoint of the zone in occupied/day operation mode. This value may be locked to prevent the user from changing the setpoint (BV.26).	Present Value COV Increment (5)	x	x	10% RH to 90% RH (AV.74 to AV.75) Resolution 0.5% RH
AV.74	Cfg_HumMinSetPoint	Configuration value used to set the minimum relative humidity setpoint of the zone in occupied/day operation mode allowed by the user.	Present Value COV Increment (5)	x	x	10% RH to 90% RH (10% to AV.75) Resolution 0.5% RH
AV.75	Cfg_HumMaxSetPoint	Configuration value used to set the maximum relative humidity setpoint of the zone in occupied/day operation mode allowed by the user.	Present Value COV Increment (5)	x	x	10% RH to 90% RH (AV.74 to 90%) Resolution 0.5% RH
AV.76	DehumSPNoOccNSB	Configuration value of the highest relative humidity allowed when in night setback or unoccupied mode. Set BV.35 value to **setpoint** for the value to be active.	Present Value COV Increment (0.1)	x	x	10% RH to 65% RH (10% to AV.77) Resolution 0.5% RH

ID	Name	Description	W?	EFCB1xTU2	EFCB1xTU4	Notes
AV.77	HumidifySPNoOccNSB	Configuration value of the lowest relative humidity allowed when in night setback or unoccupied mode. Set BV.35 value to **setpoint** for the value to be active.	Present Value COV Increment (0.1)	x	x	10% RH to 65% RH (AV.76 to 90%) Resolution 0.5% RH
AV.78	HumidifDemand	Status value that represents the humidifier modulation, based on demand.	Read only COV Increment (5)	x	x	0% RH to 100% RH, Resolution 1% RH
AV.79	DehumidifyDemand	Status value that represents the dehumidification percentage, based on demand.	Read only COV Increment (5)	x	x	0% RH to 100% RH, Resolution 1% RH
AV.80	Cfg_HumPropBand	Configuration value that represents the range through which the controller modulates the humidifier or dehumidification output from 0 to 100%.	Present Value COV Increment (0.5)	x	x	3% RH to 10% RH, Resolution 0.5% RH
AV.81	Cfg_HumDeadBand	Configuration value that represents the range at which the controller will not take action when below or above the humidity setpoint.	Present Value COV Increment (0.1)	x	x	0% RH to 5% RH, Resolution 0.5% RH
AV.85	Cfg_NSBOverrideDelay	Maximum configuration time in mins when in night setback mode and an override has been activated on the TFL/TDF. Each time the user presses the fan button, an increment of 15 mins is added to this value.	Present Value COV Increment (5)	x	x	0 to 180 minutes, Resolution 5 minutes
AV.86	Cfg_NoOccOverrideDelay	Maximum configuration time in mins when in unoccupied mode and an override has been activated on the TFL/TDF. Each time the user presses the fan button, an increment of 15 mins is added to this value.	Present Value COV Increment (1)	x	x	0 to 180 minutes, Resolution 5 minutes
AV.87	Cfg_NoOccOvCountDown	Time in mins before the state of the input changes from Occupied to Unoccupied mode. There is no time to change the state from Unoccupied to Occupied.	Read only COV Increment (1)	x	x	0 to 180 minutes (0-AV.86) Resolution 1 minute
AV.88	Cfg_OccupancyMinTime	Time in mins before the state of the input changes from Occupied to Unoccupied mode. Used when motion detector is not equipped with an internal timer.	Present Value COV Increment (1)	x	x	0 to 240 minutes, Resolution 1 minute
AV.90	Cfg_DigitalInput1Delay	Configuration time in secs. When DI1 is activated, AV.90 will countdown from the set value. Once the time has expired, the EFC changes the state of the input.	Present Value COV Increment (1)	x	x	0 to 3,600 seconds, Resolution 10 seconds
AV.91	Cfg_DigitalInput2Delay	Configuration time in secs. When DI2 is activated, AV.90 will countdown from the set value. Once the time has expired, the EFC changes the state of the input.	Present Value COV Increment (1)	x	x	0 to 3,600 seconds, Resolution 10 seconds
AV.93	Cfg_ DigitalInput4Delay	Configuration time in secs. When DI4 is activated, AV.90 will countdown from the set value. Once the time has expired, the EFC changes the state of the input.	Present Value COV Increment (1)	x	x	0 to 3,600 seconds, Resolution 10 seconds
AV.100	Cfg_ AnalogOutput1Min	This value represents the minimum control signal of the controlled element. If the signal is 0-10Vdc, then the minimum value is 0 Volts and if the signal is 2-10 Vdc, the minimum value is 2 Volts. This value is the 0 position at 0% demand. If set at 2 Volts, a 2 Volt is applied continuously even when there is no demand. It is not used to set the minimum starting activation position.	Present Value COV Increment (0.5)	x	x	0 Volts to 10 Volts (0 to AV.101) Resolution 0.1 Volt
AV.101	Cfg_ AnalogOutput1Max	This value represents the maximum control signal of the controlled element. If signal is 0-10Vdc or 2-10Vdc, then the maximum value is 10 Volts. It can also be used to limit the maximum output of the EFC. If the control signal is 0-10Vdc and the maximum voltage value is set to 8 Volts, the controlled element will never go over 80% of its total capacity.	Present Value COV Increment (0.5)	x	x	0 Volts to 10 Volts (AV.100 to 10) Resolution 0.1 Volt
AV.103	Cfg_ AnalogOutput2Min	Same description as AV.100	Present Value COV Increment (0.5)	x	x	0 Volts to 10 Volts (0 to AV.104) Resolution 0.1 Volt

ID	Name	Description	W?	EFCB1xTU2	EFCB1xTU4	Notes
AV.104	Cfg_ AnalogOutput2Max	Same description as AV.101	Present Value COV Increment (0.5)	x	x	0 Volts to 10 Volts (AV.104 to 10) Resolution 0.1 Volt
AV.106	Cfg_ AnalogOutput3Min	Same description as AV.100	Present Value COV Increment (0.5)	x	x	0 Volts to AV.106, Resolution 0.1 Volt
AV.107	Cfg_ AnalogOutput3Max	Same description as AV.101	Present Value COV Increment (0.5)	x	x	0 Volts to 10 Volts (AV.107 to 10) Resolution 0.1 Volt
AV.109	Cfg_ AnalogOutput4Min	Same description as AV.100	Present Value COV Increment (0.5)	x	x	0 Volts to 10 Volts (0 to AV.109) Resolution 0.1 Volt
AV.110	Cfg_ AnalogOutput4Max	Same description as AV.101	Present Value COV Increment (0.5)	x	x	0 Volts to 10 Volts (AV.109 to 10), Resolution 0.1 Volt
AV.115	Cfg_ DigitalOutput1ClosePos	Configuration value that indicates the percentage of demand at which the contact closes to energize the controlled element.	Present Value COV Increment (1)	x	x	15% to 80%, Resolution 1%
AV.116	Cfg_ DigitalOutput1OpenPos	Configuration value that indicates the percentage of demand at which the contact opens to de-energize the controlled element.	Present Value COV Increment (1)	x	x	0% to 76% (0 to DO1closepos-4%), Resolution 1%
AV.117	Cfg_DigitalOutput1ContactDelay	Configuration value in mins to add a delay before changing DO1 from inactive to active state.	Present Value COV Increment (1)	x	x	0 to 15 minutes, Resolution 1 minute
AV.120	Cfg_ DigitalOutput2ClosePos	Same description as AV.115	Present Value COV Increment (1)	x	x	15% to 80%, Resolution 1%
AV.121	Cfg_ DigitalOutput2OpenPos	Same description as AV.116	Present Value COV Increment (1)	x	x	0% to 76% (0 to DO2closepos-4%), Resolution 1%
AV.122	Cfg_DigitalOutput2ContactDelay	Configuration value in mins to add a delay before changing DO2 from inactive to active state.	Present Value COV Increment (1)	x	x	0 to 15 minutes, Resolution 1 minute
AV.125	Cfg_ DigitalOutput3ClosePos	Same description as AV.115	Present Value COV Increment (1)		x	15% to 80%, Resolution 1%
AV.126	Cfg_ DigitalOutput3OpenPos	Same description as AV.116	Present Value COV Increment (1)		x	0% to 76% (0 to DO3closepos-4%), Resolution 1%
AV.127	Cfg_DigitalOutput3ContactDelay	Configuration value in mins to add a delay before changing DO3 from inactive to active state.	Present Value COV Increment (1)		x	0 to 15 minutes, Resolution 1 minute
AV.130	Cfg_ DigitalOutput4ClosePos	Same description as AV.115	Present Value COV Increment (1)		x	15% to 80%, Resolution 1%
AV.131	Cfg_ DigitalOutput4OpenPos	Same description as AV.116	Present Value COV Increment (1)		x	0% to 76% (0 to DO4closepos-4%), Resolution 1%
AV.132	Cfg_DigitalOutput4ContactDelay	Configuration value in mins to add a delay before changing DO4 from inactive to active state.	Present Value COV Increment (1)		x	0 to 15 minutes, Resolution 1 minute
AV.135	Cfg_TO1ClosePos	Configuration value that indicates the percentage of the demand at which the contact closes to energize the controlled element.	Present Value COV Increment (1)	x	x	15% to 80%, Resolution 1%
AV.136	Cfg_TO1OpenPos	Configuration value that indicates the percentage of the demand at which the contact opens to de-energize the controlled element.	Present Value COV Increment (1)	x	x	0% to 76% (0 to TO1closepos-4%) Resolution 1%

ID	Name	Description	W?	EFCB1xTU2	EFCB1xTU4	Notes
AV.137	Cfg_TO2ClosePos	Same description as AV.135	Present Value COV Increment (1)	x	x	15% to 80%, Resolution 1%
AV.138	Cfg_TO2OpenPos	Same description as AV.136	Present Value COV Increment (1)	x	x	0% to 76% (0 to TO2closepos-4%) Resolution 1%
AV.139	Cfg_TO3ClosePos	Same description as AV.135	Present Value COV Increment (1)	x	x	15% to 80%, Resolution 1%
AV.140	Cfg_TO3OpenPos	Same description as AV.136	Present Value COV Increment (1)	x	x	0% to 76% (0 to TO3closepos-4%) Resolution 1%
AV.141	Cfg_TO4ClosePos	Same description as AV.135	Present Value COV Increment (1)	x	x	15% to 80%, Resolution 1%
AV.142	Cfg_TO4OpenPos	Same description as AV.136	Present Value COV Increment (1)	x	x	0% to 76% (0 to TO4closepos-4%) Resolution 1%,
AV.145	FloatingTO1/TO2	Status value to show the floating signal demand. This value may be overridden. Activated only if TO1 signal type MSV.81 is set to **floating**.	Present Value COV Increment (0.5)	x	x	0 to 100%, Resolution 0.5%
AV.146	Cfg_FloatingTO1/TO2Timer	Configuration value of the time required by the actuator to complete a 90° run. Value required only when MSV.81 TO1 Signal Type is set to **floating**.	Present Value COV Increment (5)	x	x	15-250 seconds, Resolution 5 seconds
AV.150	FloatingTO3/TO4	Status value to show the floating signal demand. This value may be overridden. Activated only if TO3 signal type MSV.85 is set to **floating**.	Present Value COV Increment (0.5)	x	x	0 to 100%, Resolution 0.5%
AV.151	Cfg_FloatingTO3/TO4Timer	Configuration value of the time required by the actuator to complete a 90° run. Value required only when MSV.85 TO3 Signal Type is set to **floating**.	Present Value COV Increment (10)	x	x	15-250 seconds, Resolution 5 seconds
AV.155	TO1Pulsing	Status value to show the pulse signal demand. This value may be overridden. Activated only if TO1 signal type MSV.81 is set to **pulsing**.	Present Value (if MSV.81 = Pulse) COV Increment (0.5)	x	x	0 to 100%, Resolution 0.5%
AV.156	TO2Pulsing	Status value to show the pulse signal demand. This value may be overridden. Activated only if TO2 signal type MSV.83 is set to **pulsing**.	Present Value (if MSV.83 = Pulse) COV Increment (0.5)	x	x	0 to 100%, Resolution 0.5%
AV.157	TO3Pulsing	Status value to show the pulse signal demand. This value may be overridden. Activated only if TO3 signal type MSV.85 is set to **pulsing**.	Present Value (if MSV.85 = Pulse) COV Increment (0.5)	x	x	0 to 100%, Resolution 0.5%
AV.158	TO4Pulsing	Status value to show the pulse signal demand. This value may be overridden. Activated only if TO4 signal type MSV.87 is set to **pulsing**.	Present Value (if MSV.87 = Pulse) COV Increment (0.5)	x	x	0 to 100%, Resolution 0.5%
AV.159	CO2SetPoint	Configuration value that represents the maximum limit of CO_2 concentration before the EFCB sends an alarm.	Present Value COV Increment (1)	x	x	100 to CO2RangePPM, Resolution 1 PPM
AV.160	Cfg_CO2 Range	Configuration value that represents the maximum range of the CO_2 sensor (PPM) or the external sensor if CO_2 enabled on AI3, AI4, AI5 or AI6.	Present Value COV Increment (1)	x	x	100 to 5000PPM, Resolution 1 PPM
AV.161	CO2_SensorValue	External CO_2 sensor reading in PPM.	Present Value COV Increment (1)	x	x	1 to CO2RangePPM, Resolution 1 PPM

ID	Name	Description	W?	EFCB1xTU2	EFCB1xTU4	Notes
AV.165	CopyCfgStartAddress	Represents the first address in the range of copied controllers while using the Copy Config option.	Present Value	x	x	0 to 254, Resolution 1 No unit
AV.166	CopyCfgEndAddress	Represents the last address in the range of copied controllers while using the Copy Config option.	Present Value	x	x	0 to 254, Resolution 1 No unit
AV.167	CopyCfgResult	Value is used to verify whether the copy to the controllers operation was successful or has failed while using the Copy Config option.	Present Value	x	x	0 to 254, Resolution 1 No unit

Binary Input (BI)

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

ID	Name	Description	W?	EFCB1xTU2	EFCB1xTU4	Notes
BI.1	DigitalInput1	Contact status of the input: (0) Open, (1) Close.	Out of service	x	x	0 = Open, 1 = Close
BI.2	DigitalInput2	Contact status of the input: (0) Open, (1) Close.	Out of service	x	x	0 = Open, 1 = Close
BI.3	DigitalInput3	Contact status of the input: (0) Open, (1) Close.	Out of service	x	x	0 = Open, 1 = Close
BI.4	DigitalInput4	Contact status of the input: (0) Open, (1) Close.	Out of service	x	x	0 = Open, 1 = Close
BI.5	AI3DigitalInput	Status of AI3 digital input: (0) Open, (1) Close.	Out of service	x	x	0 = Open, 1 = Close
BI.6	AI4DigitalInput	Status of AI4 digital input: (0) Open, (1) Close.	Out of service	x	x	0 = Open, 1 = Close
BI.7	AI5DigitalInput	Status of AI5 digital input: (0) Open, (1) Close.	Out of service	x	x	0 = Open, 1 = Close
BI.8	AI6DigitalInput	Status of AI6 digital input: (0) Open, (1) Close.	Out of service	x	x	0 = Open, 1 = Close
BI.9	InternPIR	Status of the internal PIR sensor value: (0) No Occupancy, (1) Occupancy.	Out of service	x	x	0 = No Occupancy, 1 = Occupancy

Binary Output (BO)

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

ID	Name	Description	W?	EFCB1xTU2	EFCB1xTU4	Notes
BO.1	FanContactHigh	Contact status of the output: (0) Open, (1) Close.	Present Value	x	x	0 = Open, 1 = Close
BO.2	FanContactMed	Contact status of the output: (0) Open, (1) Close.	Present Value	x	x	0 = Open, 1 = Close
BO.3	FanContactLow	Contact status of the output: (0) Open, (1) Close.	Present Value	x	x	0 = Open, 1 = Close
BO.4	DigitalOutput1	Contact status of the output: (0) Open, (1) Close.	Present Value	x	x	0 = Open, 1 = Close
BO.5	DigitalOutput2	Contact status of the output: (0) Open, (1) Close.	Present Value	x	x	0 = Open, 1 = Close
BO.6	DigitalOutput3	Contact status of the output: (0) Open, (1) Close.	Present Value		x	0 = Open, 1 = Close
BO.7	DigitalOutput4	Contact status of the output: (0) Open, (1) Close.	Present Value		x	0 = Open, 1 = Close
BO.8	TO1OnOff	Contact status of the output. Set MSV.81 to **On/Off** for the value to be active.	Present Value	x	x	0 = Off, 1 = On
BO.9	TO2OnOff	Contact status of the output. Set MSV.83 to **On/Off** for the value to be active.	Present Value	x	x	0 = Off, 1 = On
BO.10	TO3OnOff	Contact status of the output. Set MSV.85 to **On/Off** for the value to be active.	Present Value	x	x	0 = Off, 1 = On
BO.11	TO4OnOff	Contact status of the output. Set MSV.87 to **On/Off** for the value to be active.	Present Value	x	x	0 = Off, 1 = On

Binary Value (BV)

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

ID	Name	Description	W?	EFCB1xTU2	EFCB1xTU4	Notes
BV.1	Cfg_TempUnitBACnet	Configuration of the temperature units used in BACnet. If set to (0), the temperature will be in Celsius scale. If set to (1), the temperature will be in Fahrenheit scale.	Present Value	x	x	0 = Celsius,1 = Fahrenheit
BV.2	Cfg_TempSetPointLock	Configuration to lock the zone setpoint and prevent users to change the value. (0) Disable setpoint lock, (1) Enable setpoint lock.	Present Value	x	x	0 = Disable, 1 = Enable
BV.3	Cfg_UserSysOffMode	Configuration to allow users to turn off the EFC. (0) Enable - user can turn off the EFC, (1) Disable - prevents the user from turning off the EFC.	Present Value	x	x	0 = Enable, 1 = Disable

ID	Name	Description	W?	EFCB1xTU2	EFCB1xTU4	Notes
BV.4	Cfg_TempUnitTstat	Configuration of the user temperature units used on TFL/TDF. If set to (0), the temperature will be in Celsius scale. If set to (1), the temperature will be in Fahrenheit scale.	Present Value	x	x	0 = Celsius,1 = Fahrenheit
BV.5	AL_FreezeProtection	When option is configured, the controller will activate the heating outputs when zone temperature is at 4°C (39.2°F) and will deactivate when zone temperature is at 5°C (41°F).	Present Value	x	x	0 = Off, 1 = On
BV.10	Cfg_HeatingRampLock	Configuration value used to lock the heating ramp when a heating demand is active.	Present Value	x	x	0 = Off, 1 = On
BV.11	Cfg_ReHeatRampLock	Configuration value used to lock the reheat ramp when a reheat demand is active.	Present Value	x	x	0 = Off, 1 = On
BV.13	Cfg_ CoolingRampLock	Configuration value used to lock the cooling ramp when a cooling demand is active.	Present Value	x	x	0 = Off, 1 = On
BV.16	AL_ Condensation	Use to link a digital input to the condensation alarm. When active, the controller will deactivate cooling and fan outputs. Heating outputs are not affected by this state. Writable object via BACnet only.	Present Value	x	x	0 = Off, 1 = On
BV.17	Cfg_ChangeOverRampLock	Configuration value used to lock the changeover ramp even when a cooling or heating demand is active.	Present Value	x	x	0 = Off, 1 = On
BV.20	Cfg_UserFanAutoMode	Configuration value to enable or disable the automatic fan option. If set to (0) Enabled, the user has the option to let the EFC decide the fan speed automatically. If set to (1) Disable, the user must set the fan coil fan speed manually.	Present Value	x	x	0 = Enable, 1 = Disable
BV.25	Cfg_HumControlSource	Configuration value to indicate which relative humidity sensor is to be used by the EFC.	Present Value	x	x	0 = Intern Sensor, 1 = Extern Sensor
BV.26	Cfg_HumSetPointLock	Configuration value to prevent the user to change the relative humidity setpoint.	Present Value	x	x	0 = Disable, 1 = Enable
BV.27	Cfg_HumidifyRampLock	Configuration value used to lock the humidification ramp even when a humidification demand is active.	Present Value	x	x	0 = Off, 1 = On
BV.28	Cfg_DehumidifyRampLock	Configuration value used to lock the dehumidification ramp even when a dehumidification demand is active.	Present Value	x	x	0 = Off, 1 = On
BV.30	ChangeOverMode	Status value of the actual mode (0) Cooling, (1) Heating. Note that this value can be set via BACnet or locally with MSV.10. If locally is required, see configurations available for AI.2 dedicated input.	Present Value	x	x	0 = Cooling, 1 = Heating
BV.34	Cfg_OccControlSource	Determines the source of occupancy control to be used by the EFC.	Present Value	x	x	0 = DigitalInput3, 1 = InternSensor
BV.35	Cfg_NightSetBackMode	Configuration to determine the action of the EFC when in night setback mode. When set to (0) setpoint, the EFC will maintain the setpoint values of AV.12 & AV.13. If set to (1) Off, the EFC will turn off and will not consider the setpoint values for cooling and heating.	Present Value	x	x	0 = Setpoint, 1 = OFF
BV.36	AL_ DirtyFilter	Status value to inform if a filter change is required. (0) No, (1) Yes	Read only	x	x	0 = No, 1 = Yes

ID	Name	Description	W?	EFCB1xTU2	EFCB1xTU4	Notes
BV.37	AL_FlowSwitch	Status value to inform if an airflow alarm is active. (0) No, (1) Yes	Read only	x	x	0 = No, 1 = Yes
BV.38	AL_Override	Status value to inform if an override is active. (0) No, (1) Yes	Read only	x	x	0 = No, 1 = Yes
BV.39	AL_WindowOpened	Status value to inform that a window has been opened. (0) No, (1) Yes	Read only	x	x	0 = No, 1 = Yes
BV.40	AL_DoorOpened	Status value to inform that a door has been opened. (0) No, (1) Yes	Read only	x	x	0 = No, 1 = Yes
BV.41	AL_OverHeat	Status value to inform if a heat/reheat with fan override is active. (0) No, (1) Yes	Read only	x	x	0 = No, 1 = Yes
BV.45	Cfg_ DigitalInput1Contact	Configuration to change the contact's normal position. Input can be set to (0) Normally Opened or (1) Normally Closed.	Present Value	x	x	0 = Norm Open, 1 = Norm Close
BV.46	Cfg_ DigitalInput2Contact	Configuration to change the contact's normal position. Input can be set to (0) Normally Opened or (1) Normally Closed.	Present Value	x	x	0 = Norm Open, 1 = Norm Close
BV.48	Cfg_ DigitalInput4Contact	Configuration to change the contact's normal position. Input can be set to (0) Normally Opened or (1) Normally Closed.	Present Value	x	x	0 = Norm Open, 1 = Norm Close
BV.50	Cfg_AnalogOutput1Direction	Configuration of the analog output direction. When set to (0) Direct, the signal ramp is configured from 0-10Vdc. When set to (1) Reverse, the signal ramp is configured from 10-0Vdc.	Present Value	x	x	0 = Direct, 1 = Reverse
BV.51	Cfg_AnalogOutput2Direction	Same description as BV.50	Present Value	x	x	0 = Direct, 1 = Reverse
BV.52	Cfg_AnalogOutput3Direction	Same description as BV.50	Present Value	x	x	0 = Direct, 1 = Reverse
BV.53	Cfg_AnalogOutput4Direction	Same description as BV.50	Present Value	x	x	0 = Direct, 1 = Reverse
BV.60	Cfg_ DigitalOutput1Direction	Configuration of the digital outputs' contact normal state. When set to (0) Direct, the contact is considered Normally Opened. When set to (1) Reverse, the contact is considered Normally Closed.	Present Value	x	x	0 = Direct, 1 = Reverse
BV.61	Cfg_ DigitalOutput2Direction	Same description as BV.60	Present Value	x	x	0 = Direct, 1 = Reverse
BV.62	Cfg_ DigitalOutput3Direction	Same description as BV.60	Present Value		x	0 = Direct, 1 = Reverse
BV.63	Cfg_ DigitalOutput4Direction	Same description as BV.60	Present Value		x	0 = Direct, 1 = Reverse
BV.70	Cfg_TO1Direction	Configuration of the TRIAC output's contact normal state. When set to (0) Direct, the contact is considered Normally Opened. When set to (1) Reverse, the contact is considered Normally Closed. If MSV.81 is set to pulse, it will reverse the pulse signal from 0 to 100% to 100% to 0%.	Present Value	x	x	0 = Direct, 1 = Reverse
BV.71	Cfg_TO2Direction	Same description as BV.70	Present Value	x	x	0 = Direct, 1 = Reverse
BV.72	Cfg_TO3Direction	Same description as BV.70	Present Value	x	x	0 = Direct, 1 = Reverse
BV.73	Cfg_TO4Direction	Same description as BV.70	Present Value	x	x	0 = Direct, 1 = Reverse

ID	Name	Description	W?	EFCB1xTU2	EFCB1xTU4	Notes
BV.74	Cfg_FloatingTO1/TO2Direction	Configuration value to set the rotation direction. When set to **Direct**, TO1 output closes and TO2 output opens the valve. When set to **Reverse**, TO1 output opens and TO2 output closes the valve.	Present Value	**x**	**x**	0 = Direct, 1 = Reverse
BV.75	Cfg_ FloatingTO3/TO4Direction	Configuration value to set the rotation direction. When set to **Direct**, TO3 output closes and TO4 output opens the valve. When set to **Reverse**, TO3 output opens and TO4 output closes the valve.	Present Value	**x**	**x**	0 = Direct, 1 = Reverse
BV.85	Cfg_ServiceDisplayAddress	When activated, the TFL/TDF lights up and displays the MSTP address. It remains active until deactivated via BACnet. Useful when troubleshooting and/or servicing the controller.	Present Value	**x**	**x**	0 = Off, 1 = On
BV.86	Cfg_KeyPadUpperLeftLock	If object is **ON**, the button is inactive in **RUN** mode but is active in the **PRG** mode via the TFL/TDF. Button is used to change the fan speed.	Present Value	**x**	**x**	0 = Off, 1 = On If set to “On”, functionality of these buttons will not be available.
BV.87	Cfg_KeyPadBottomLeftLock	If object is **ON**, the button is inactive in **RUN** mode but is active in the **PRG** mode via the TFL/TDF. Button is used to change temperature control modes.	Present Value	**x**	**x**	0 = Off, 1 = On If set to “On”, functionality of these buttons will not be available.
BV.88	Cfg_KeyPadArrowsLock	If object is **ON**, the button is inactive in **RUN** mode but is active in the **PRG** mode via the TFL/TDF. Buttons are used to change the setpoint.	Present Value	**x**	**x**	0 = Off, 1 = On If set to “On”, functionality of these buttons will not be available.
BV.89	Cfg_ProgramModeLock	If object is **ON**, all buttons are inactive and **PRG** mode is not accessible via the TFL/TDF.	Present Value	**x**	**x**	0 = Off, 1 = On
BV.90	CopyCfgExecute	When using Copy Config, this value is used to start the copy to other controllers.	Present Value	**x**	**x**	0 = No, 1 = Yes
BV.91	Cfg_ActivateSchedule	Configuration to activate the schedule. The schedule is configurable via BACnet. If no schedule is configured, the mode will always be occupied. The time and day will be displayed on the TFL/TDF.	Present Value	**x**	**x**	0 = No, 1 = Yes
BV.92	Cfg_DisplayCO2	Configuration to display CO_2 reading.	Present Value	**x**	**x**	0 = Off, 1 = On
BV.93	CO2_Source_Select	Determines the source of the CO2 reading. TFL = Onboard sensor of TFL/TDF (models with CO_2 sensor) unit. Analog = external sensor on AI.	Present Value	**x**	**x**	0 = TFL, 1 = Analog
BV.98	Cfg_DOEnable	Configuration value to select whether to enable or disable the digital output for the ECM motor.	Present Value	**x**	**x**	0 = Off, 1 = On

Multi State Value (MSV)

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

ID	Name	Description	W?	EFCB1xTU2	EFCB1xTU4	Notes
MSV.1	SystemMode	Status of the actual mode selected. This value may be changed via TFL/TDF and/or BACnet. **Auto**: Fan coil mode changes automatically between heating and cooling in operation when there is a cooling or heating demand. **Heat**: Fan coil mode is in heating (in operation only when there is a heating demand). **Cool**: Fan coil mode is in cooling (in operation only when there is a cooling demand). **Off**: Fan coil mode is off.	Present Value	x	x	The available options vary based on selection of other objects. Auto (All modes available) Heat Cool Off (if BV.3 is enabled)
MSV.2	UserFanSpeedSelect	Status of the actual fan speed. This value may be changed via the TFL/TDF and/or BACnet. **Auto**: Fan coil automatically changes speed, based on demand. **Low**: Fan coil is limited to low fan speed. **Medium**: Fan coil is limited to medium fan speed. **High**: Fan coil is limited to high fan speed.	Present Value	x	x	The available options vary based on selection of other objects. Auto Low Medium High
MSV.5	HumControlMode	Configuration value to authorize humidification and/or dehumidification in order to maintain relative humidity setpoints. **Auto**: The EFC will operate automatically to humidify or dehumidify, according to the demand. **Dehumidification**: The EFC is authorized only to dehumidify. **Humidification**: The EFC is authorized only to humidify. **Off**: Relative humidity setpoints are not considered and no action will be taken.	Present Value	x	x	The available options vary based on selection of other objects. Auto Dehumidification Humidification Off
MSV.10	Cfg_ChangeOverControlMode	Configuration that indicates the source of the changeover value. **Locally**: Analog or digital input is configured in the EFC and will execute the changeover with the set parameters. **Cooling**: Changeover is sent and controlled by the BMS. No changeover will occur unless the BMS sends the signal to do so. **Heating**: Changeover is sent and controlled by the BMS. No changeover will occur unless the BMS sends the signal to do so.	Present Value	x	x	The available options vary based on selection of other objects. Locally Cooling Heating
MSV.13	NsbOccCommand	Configuration to set the occupancy or night setback mode. **Locally**: Occupancy or Night setback is activated via a configured input wired to a timer or an occupancy sensor. **Off**: Forces the EFC Off. Signal sent via BMS. **Occupancy**: Forces the EFC to occupied or day mode. Signal sent via BMS. **No Occupancy**: Forces the EFC to unoccupied or night setback mode. Signal sent via BMS.	Present Value	x	x	The available options vary based on selection of other objects. Locally Off Occupancy/Day No Occupancy/Night

ID	Name	Description	W?	EFCB1xTU2	EFCB1xTU4	Notes
MSV.14	OccupancyStatus	Status that indicates the actual occupancy. **Unoccupied**: Zone is not occupied. **Occupied**: Zone is occupied. **Override**: Zone is unoccupied but put back to occupied mode for a maximum pre-determined time set at AV.86.	Read only	x	x	The available options vary based on selection of other objects. NoOccupancy Occupancy Override
MSV.15	NightSetBackStatus	Status that indicates the actual mode of the zone. **Day**: Zone is in day operation mode. **Night**: Zone is in night setback mode. **Override**: Zone is in night setback mode but put back to day operation for a maximum pre-determined time set at AV.85.	Read only	x	x	The available options vary based on selection of other objects. Day Night Override
MSV.20	Cfg_Sequence Select	Selected user temperature control mode (according to MSV.1). **Auto**: All modes available. **Heating**: Only Heating. **Cooling**: Only Cooling. **ON**: Heating or Cooling.	Present Value	x	x	The available options vary based on selection of other objects. Auto Heating Cooling HeatingOrCooling
MSV.21	Cfg_ TempControlSource	Configuration value to set the control temperature to be used by the EFC. **Remote Temp**: AV.1 will use temperature value sent via the BMS. See AV.2 for timeout safety feature. **Intern Temp**: AV.1 will use the integrated temperature sensor of the TFL/TDF (ITS). **Extern Temp**: AV.1 will use the external temperature sensor configured (ETS).	Present Value	x	x	The available options vary based on selection of other objects. Network (Net) Internal (ItS) External (EtS)
MSV.25	Cfg_FanOperationType	Configuration value to set the number of fan speed available on the fan coil. **1 Speed**: Fan coil has a one speed fan (wired to Low). **2 Speed**: Fan coil has a two speed fan (wired to Medium). **3 Speed**: Fan coil has a three speed fan (wired to High).	Present Value	x	x	The available options vary based on selection of other objects. 1Speed 2Speeds 3Speeds
MSV.36	Cfg_ ChangeOverInputSignal	Configuration value of Analog Input 2. This value will only affect the 2 pipe application. **Changeover Sensor**: A 10kΩ Thermistor is used to determine the changeover state. **Changeover Normally Cool**: A digital temperature switch is used to determine the changeover state. When contact is opened, the water that enters is in cooling mode. When contact is closed, the water that enters is in heating mode. **Changeover Normally Heat**: A digital temperature switch is used to determine the changeover state. When contact is opened, the water that enters is in heating mode. When contact is closed, the water that enters is in cooling mode.	Present Value	x	x	The available options vary based on selection of other objects. ChangeOverSensor (Sens) ChOvContactNormCool (NoCl) ChOvContactNormHeat (NoHt)

ID	Name	Description	W?	EFCB1xTU2	EFCB1xTU4	Notes
MSV.38	Cfg_AIExtern Temp Type	Configuration value that represents the type of signal used for an external temperature sensor wired to AI. Set MSV.21 to Extern Temp (EtS). For this input, the DIP switch has no impact and is overridden with this configuration. **Off**: AI is not used as an external temperature sensor. **2-10V**: AI signal type is a 2-10Vdc temperature sensor. **0-10V**: AI signal type is a 0-10Vdc temperature sensor.	Present Value	x	x	The available options vary based on selection of other objects. Off 2 to 10V 0 to 10V
MSV.39	Cfg_ExternHumidityInput	Configuration value that represents the input used for an external relative humidity sensor. Set BV.25 to external (Erh) and the appropriate DIP switch for the input to 0-10Vdc. **Off**: No external relative humidity sensor used. **AI3**: Analog Input 3 is used as an external relative humidity sensor. **AI4**: Analog Input 4 is used as an external relative humidity sensor. **AI5**: Analog Input 5 is used as an external relative humidity sensor. **AI6**: Analog Input 6 is used as an external relative humidity sensor.	Present Value	x	x	The available options vary based on selection of other objects. Off Analog Input3 Analog Input4 Analog Input5 Analog Input6
MSV.45	Cfg_NsbOccContact	Configuration of DI1 mode. The mode will determine the action taken by the EFC when DI.1 is activated or deactivated. **Off**: Digital Input is not used. **OCC Norm Open**: Occupancy Normally Opened contact. If the value of BI.3 is (0), then the zone is occupied. If the value of BI.3 is (1), then the zone is unoccupied. **OCC Norm Close**: Occupancy Normally Closed contact. If the value of BI.3 is (0), then the zone is unoccupied. If the value of BI.3 is (1), then the zone is occupied. **NSB Norm Open**: Night Setback Normally Opened contact. If the value of BI.3 is (0), then the zone is in day operation. If the value of BI.3 is (1), then the zone is in night setback. **NSB Norm Close**: Night Setback Normally Closed contact. If the value of BI.3 is (0), then the zone is in night setback mode. If the value of BI.3 is (1), then the zone is in day operation.	Present Value	x	x	The available options vary based on selection of other objects. 1 = Off 2 = OccNorm.Open (OCC.o) 3 = OccNorm.Close (OCC.c) 4 = NSBNorm.Open (nSb.o) 5 = NSBNorm.Close (nSb.c)
MSV.46	Cfg_ DigitalInput1Type	Configuration of Digital Input 1. Description based on Normally Opened Contact (see BV.45). **Off**: Digital Input not used. **Override**: When active, BV.38 indicates alarm state and TFL/TDF displays alarm icon. The controller overrides all outputs. **Window**: When active, BV.39 indicates alarm state and TFL/TDF displays **WINDOW**. The controller deactivates all outputs. **Door**: When active, BV.40 indicates alarm state and TFL/TDF displays **DOOR**. The controller deactivates all outputs. **Dirty Filter**: When active, BV.36 indicates alarm state and TFL/TDF displays alarm icon. The controller remains in operation. **Flow Switch**: When active, BV.37 indicates alarm state and TFL/TDF displays an alarm icon. The controller deactivates all outputs except the fan. **Overheat**: When active, BV.41 indicates alarm state and TFL/TDF displays alarm icon. The controller overrides heat and reheat with fan outputs (not reheat without fan).	Present Value	x	x	The available options vary based on selection of other objects. Off Override Window Door Dirty Filter Flow Switch Overheat

ID	Name	Description	W?	EFCB1xTU2	EFCB1xTU4	Notes
MSV.47	Cfg_DigitalInput2Type	Configuration of Digital Input 2. Description based on Normally Opened Contact (see BV.46). **Off**: Digital Input not used. **Override**: When active, BV.38 indicates alarm state and TFL/TDF displays an alarm icon. The controller overrides all outputs. **Window**: When active, BV.39 indicates alarm state and TFL/TDF displays **WINDOW**. The controller deactivates all outputs. **Door**: When active, BV.40 indicates alarm state and TFL/TDF displays **DOOR**. The controller deactivates all outputs. **Dirty Filter**: When active, BV.36 indicates alarm state and TFL/TDF displays an alarm icon. The controller remains in operation. **Flow Switch**: When active, BV.37 indicates alarm state and TFL/TDF displays an alarm icon. The controller deactivates all outputs except the fan. **Overheat**: When active, BV.41 indicates alarm state and TFL /TDF displays alarm icon. The controller overrides heat and reheat with fan outputs (not reheat without fan).	Present Value	x	x	The available options vary based on selection of other objects. Off Override Window Door Dirty Filter Flow Switch Overheat
MSV.49	Cfg_DigitalInput4Type	Configuration of Digital Input 4. Description based on Normally Opened Contact (see BV.48). **Off**: Digital Input not used. **Override**: When active, BV.38 indicates alarm state and TFL/TDF displays an alarm icon. The controller overrides all outputs. **Window**: When active, BV.39 indicates alarm state and TFL/TDF displays **WINDOW**. The controller deactivates all outputs. **Door**: When active, BV.40 indicates alarm state and TFL/TDF displays **DOOR**. The controller deactivates all outputs. **Dirty Filter**: When active, BV.36 indicates alarm state and TFL/TDF displays an alarm icon. The controller remains in operation. **Flow Switch**: When active, BV.37 indicates alarm state and TFL/TDF displays an alarm icon. The controller deactivates all outputs except the fan. **Overheat**: When active, BV.41 indicates alarm state and TFL /TDF displays alarm icon. The controller overrides heat and reheat with fan outputs (not reheat without fan).	Present Value	x	x	The available options vary based on selection of other objects. Off Override Window Door Dirty Filter Flow Switch Overheat

ID	Name	Description	W?	EFCB1xTU2	EFCB1xTU4	Notes
MSV.55	Cfg_ AnalogOutput1Ramp	Configuration of the ramp used to modulate AO1 based on demand. **Off**: Output not used. **Alarm:** This ramp is used for alarms. If any of the BV object alarms are triggered, there will be a 10V signal output on AO1. **Changeover Ramp (Cor)**: This ramp is used when the water that enters at the coil does both heating and cooling (2 pipe application). It requires a changeover sensor to operate. The ramp is configured with AV.51 Changeover Proportional Band and AV.52 Changeover Dead Band. When the zone is in cooling demand and the water that enters is in cooling mode, the EFC will modulate the valve actuator between the minimum and maximum position. When the zone is in heating demand and the water that enters is in heating mode, the EFC will modulate the valve actuator between the minimum and maximum position. When the demand and the incoming water are not in the same mode, the valve actuator remains closed. **Cooling Ramp (Cool)**: This ramp is used for cooling. The ramp is configured with AV.36 Cooling Proportional Band and AV.37 Cooling Dead Band. Pulse signal type is not available for cooling. **Heating Ramp (Heat)**: This ramp is used for heating. The ramp is configured with AV.21 Heating Proportional Band and AV.22 Heating Dead Band. **Reheat with fan Ramp (Reheat)**: This ramp is used for a reheat coil. The ramp is configured with AV.25 Reheat Proportional Band and AV.26 Reheat Dead Band. **Reheat without fan Ramp (Reheat)**: This ramp is used for a reheat element that does not require the fan to operate such as baseboard heaters. The ramp is configured with AV.25 Reheat Proportional Band and AV.26 Reheat Dead Band. **Humidity with fan**: Option available with the TFLH/TDF (models with humidity sensor only). This ramp is used to modulate a humidifier based on demand. The ramp is configured with AV.73 Hum setpoint, AV.80 Hum Prop Band and AV.81 Hum Dead Band. **Cooling or Heating:** This ramp is used for cooling or heating, when MSV.20 Sequence Select is set to ON (Cooling or Heating). The output will alternate between the cooling and heating ramps based on the mode selected in MSV.1 SystemMode and the current demand value. The ramp is configured with AV.36 Cooling Proportional Band and AV.37 Cooling Dead Band, or AV.21 Heating Proportional Band and AV.22 Heating Dead Band.	Present Value	x	x	The available options vary based on selection of other objects. Off Alarm Changeover with Fan Cooling with Fan Heating with Fan ReHeat with fan ReHeat Humidity with Fan Cooling or Heating

ID	Name	Description	W?	EFCB1xTU2	EFCB1xTU4	Notes
MSV.57	Cfg_ AnalogOutput2Ramp	Same description as MSV.55	Present Value	x	x	The available options vary based on selection of other objects. Off Alarm Changeover with Fan Cooling with Fan Heating with Fan ReHeat with fan ReHeat Humidity with Fan Cooling or Heating
MSV.59	Cfg_ AnalogOutput3Ramp	Same description as MSV.55	Present Value	x	x	The available options vary based on selection of other objects. Off Alarm Changeover with Fan Cooling with Fan Heating with Fan ReHeat with fan ReHeat Humidity with Fan Cooling or Heating
MSV.61	Cfg_ AnalogOutput4Ramp	Same description as MSV.55 **Fan:** This ramp is used to modulate the fan demand based on the difference between the actual temperature and the setpoint value when set to auto fan speed. The ramp is configured using AV.9 TempSetPoint.	Present Value	x	x	The available options vary based on selection of other objects. Off Alarm Changeover with Fan Cooling with Fan Heating with Fan ReHeat with fan ReHeat Humidity with Fan Fan Cooling or Heating

ID	Name	Description	W?	EFCB1xTU2	EFCB1xTU4	Notes
MSV.70	Cfg_ DigitalOutput1Ramp	Configuration of the ramp used to activate/deactivate DO1 based on demand. Configuration includes AV.115 DO1 Close Position and AV.116 DO1 Open Position. **Off**: Output not used. **Alarm:** This ramp is used for alarms. If any of the BV object alarms are triggered, there will be a 10V signal output on DO1. **Changeover Ramp (Cor)**: This ramp is used when the water that enters at the coil does both heating and cooling (2 pipe application). It requires a changeover sensor to operate. The ramp is configured with AV.51 Changeover Proportional Band and AV.52 Changeover Dead Band. When the zone is in cooling demand and the water that enters is in cooling mode, the EFC will modulate the valve actuator between the minimum and maximum position. When the zone is in heating demand and the incoming water is in heating mode, the EFC will modulate the valve actuator between the minimum and maximum position. When the demand and the incoming water are not in the same mode, the valve actuator remains closed. **Cooling Ramp (Cool)**: This ramp is used for cooling. The ramp is configured with AV.36 Cooling Proportional Band and AV.37 Cooling Dead Band. Pulse signal type is not available for cooling. **Heating Ramp (Heat)**: This ramp is used for heating. The ramp is configured with AV.21 Heating Proportional Band and AV.22 Heating Dead Band. **Reheat with fan Ramp (Reheat)**: This ramp is used for a reheat coil. The ramp is configured with AV.25 Reheat Proportional Band and AV.26 Reheat Dead Band. **Reheat without fan Ramp (Reheat)**: This ramp is used for a reheat element that does not require the fan to operate such as baseboard heaters. The ramp is configured with AV.25 Reheat Proportional Band and AV.26 Reheat Dead Band. **Humidity with fan**: Option available with the TFLH/TDF (models with humidity sensor only). This ramp is used to activate/deactivate a humidifier based on demand. The ramp is configured with AV.73 Hum setpoint, AV.80 Hum Prop Band and AV.81 Hum Dead Band.	Present Value	x	x	The available options vary based on selection of other objects. Off Alarm Changeover with Fan Cooling with Fan Heating with Fan ReHeat with fan ReHeat Humidity with Fan
MSV.71	Cfg_DigitalOutput2Ramp	Configuration of the ramp used to activate/deactivate DO2 based on demand. Configuration includes AV.120 DO2 Close Position and AV.121 DO2 Open Position. See MSV.70.	Present Value	x	x	The available options vary based on selection of other objects. Off Alarm Changeover with Fan Cooling with Fan Heating with Fan ReHeat with fan ReHeat, Humidity with Fan

ID	Name	Description	W?	EFCB1xTU2	EFCB1xTU4	Notes
MSV.72	Cfg_ DigitalOutput3Ramp	Configuration of the ramp used to activate/deactivate DO3 based on demand. Configuration includes AV.125 DO3 Close Position and AV.126 DO3 Open Position. See MSV.70.	Present Value		x	The available options vary based on selection of other objects. Off Alarm Changeover with Fan Cooling with Fan Heating with Fan ReHeat with fan ReHeat Humidity with Fan
MSV.73	Cfg_ DigitalOutput4Ramp	Configuration of the ramp used to activate/deactivate DO4 based on demand. Configuration includes AV.130 DO4 Close Position and AV.131 DO4 Open Position. See MSV.70.	Present Value		x	The available options vary based on selection of other objects. Off Alarm Changeover with Fan Cooling with Fan Heating with Fan ReHeat with fan ReHeat Humidity with Fan

ID	Name	Description	W?	EFCB1xTU2	EFCB1xTU4	Notes
MSV.80	Cfg_TO1Ramp	Configuration of the ramp used to modulate (pulse or floating) or activate/deactivate (On/Off) TO1 based on demand. When set to On/Off, configuration includes AV.135 TO1 Open Position and AV.136 TO1 Close Position. **Off**: Output not used. **Alarm:** This ramp is used for alarms. If any of the BV object alarms are triggered, there will be a 10V signal output on TO1. **Changeover Ramp (Cor)**: This ramp is used when the water that enters at the coil does both heating and cooling (2 pipe application). It requires a changeover sensor to operate. The ramp is configured with AV.51 Changeover Proportional Band and AV.52 Changeover Dead Band. When the zone is in cooling demand and the water that enters is in cooling mode, the EFC will modulate the valve actuator between the minimum and maximum position. When the zone is in heating demand and the water that enters is in heating mode, the EFC will modulate the valve actuator between the minimum and maximum position. When the demand and the incoming water are not in the same mode, the valve actuator remains closed. **Cooling Ramp (Cool)**: This ramp is used for cooling. The ramp is configured with AV.36 Cooling Proportional Band and AV.37 Cooling Dead Band. Pulse signal type is not available for cooling. **Heating Ramp (Heat)**: This ramp is used for heating. The ramp is configured with AV.21 Heating Proportional Band and AV.22 Heating Dead Band. **Reheat with fan Ramp (Reheat)**: This ramp is used for a reheat coil. The ramp is configured with AV.25 Reheat Proportional Band and AV.26 Reheat Dead Band. **Reheat without fan Ramp (Reheat)**: This ramp is used for a reheat element that does not require the fan to operate such as baseboard heaters. The ramp is configured with AV.25 Reheat Proportional Band and AV.26 Reheat Dead Band.	Present Value	x	x	The available options vary based on selection of other objects. Off Alarm Changeover with Fan Cooling with Fan Heating with Fan ReHeat with fan ReHeat
MSV.81	Cfg_TO1SignalType	Configuration of TO1 output signal type. **Pulse**: Modulating output affected by BV.70. Pulse is available for heating ramp and reheat ramp only. **On/Off**: Digital output affected by AV.135, AV.136 and BV.70. **Floating**: Modulating output affected by AV.146 and BV.74. When TO1 is set to (3) floating, it automatically changes MSV.82 TO2 Ramp and MSV.83 TO2 Signal Type settings to match the configuration of TO1.	Present Value	x	x	The available options vary based on selection of other objects. Pulse (if heat or reheat is selected) On_Off Floating
MSV.82	Cfg_TO2Ramp	Configuration of the ramp used to modulate (pulse or floating) or activate/deactivate (On/Off) TO2 based on demand. When set to On/Off, configuration includes AV.137 TO2 Open Position and AV.138 TO2 Close Position. See MSV.80.	Present Value	x	x	The available options vary based on selection of other objects. Off Alarm Changeover with Fan Cooling with Fan Heating with Fan ReHeat with fan ReHeat

ID	Name	Description	W?	EFCB1xTU2	EFCB1xTU4	Notes
MSV.83	Cfg_TO2SignalType	Configuration of TO2 output signal type. **Pulse**: Modulating output affected by BV.71. Pulse is available for heating and reheat ramps only. **On/Off**: Digital output affected by AV.137, AV.138 and BV.71. **Floating**: See MSV.81 floating option.	Present Value	x	x	The available options vary based on selection of other objects. Pulse (if heat or reheat is selected) On_Off Floating
MSV.84	Cfg_TO3Ramp	Configuration of the ramp used to modulate (pulse or floating) or activate/deactivate (On/Off) TO3 based on demand. When set to On/Off, configuration includes AV.139 TO3 Open Position and AV.140 TO3 Close Position. See MSV.80.	Present Value	x	x	The available options vary based on selection of other objects. Off Alarm Changeover with Fan Cooling with Fan Heating with Fan ReHeat with fan ReHeat
MSV.85	Cfg_TO3SignalType	Configuration of TO3 output signal type. **Pulse**: Modulating output affected by BV.72. Pulse is available for heating and reheat ramps only. **On/Off**: Digital output affected by AV.139, AV.140 and BV.72. **Floating**: Modulating output affected by AV.151 and BV.75. When TO3 is set to (3) floating, it automatically changes MSV.86 TO4 Ramp and MSV.87 TO4 Signal Type settings to match the configuration of TO3.	Present Value	x	x	The available options vary based on selection of other objects. Pulse (if heat or reheat is selected) On_Off Floating
MSV.86	Cfg_TO4Ramp	Configuration of the ramp used to modulate (pulse or floating) or activate/deactivate (On/Off) TO4 based on demand. When set to On/Off, configuration includes AV.141 TO4 Open Position and AV.142 TO4 Close Position. See MSV.80.	Present Value	x	x	The available options vary based on selection of other objects. Off Alarm Changeover with Fan Cooling with Fan Heating with Fan ReHeat with fan, ReHeat
MSV.87	Cfg_TO4SignalType	Configuration of TO4 output signal type. **Pulse**: Modulating output affected by BV.73. Pulse is available for heating and reheat ramps only. **On/Off**: Digital output affected by AV.141, AV.142 and BV.73. **Floating**: See MSV.85 floating option.	Present Value	x	x	The available options vary based on selection of other objects. Pulse (if heat or reheat is selected) On_Off Floating
MSV.95	Cfg_ DisplayInfo	Configuration value of the information displayed on the TFL/TDF. **Display Temp Demand**: The TFL/TDF will display the actual temperature and cooling/heating demand. **Display Setpoint Demand**: TFL/TDF will display the actual setpoint and cooling/heating demand. **Display Temp**: TFL/TDF will display the actual temperature but no demand. **Display Setpoint**: TFL/TDF will display the actual setpoint but no demand. **Display Off**: TFL /TDF display will be off (no display).	Present Value	x	x	The available options vary based on selection of other objects. Temp and demand Setpoint and demand Temp only Setpoint only Off

ID	Name	Description	W?	EFCB1xTU2	EFCB1xTU4	Notes
MSV.100	Cfg_universalInputAI3	Configuration of Analog Input 3. **Off:** No logic. The input is monitored as an analog input (0-10VDC) or a dry contact based on the type of input connected. **Temperature:** AI3 is used as an external temperature sensor of 0-10VDC or 10K Type 3 based on the dip switch configuration. **CO2:** AI3 is used as an external CO_2 sensor. **Humidity:** AI3 is used as an external humidity sensor.	Present Value	x	x	The available options vary based on selection of other objects. Off Temperature CO2 Humidity
MSV.101	Cfg_universalInputAI4	Same description as MSV.100	Present Value	x	x	The available options vary based on selection of other objects. Off Temperature CO2 Humidity
MSV.102	Cfg_universalInputAI5	Same description as MSV.100	Present Value	x	x	The available options vary based on selection of other objects. Off Temperature CO2 Humidity
MSV.103	Cfg_universalInputAI6	Same description as MSV.100	Present Value	x	x	The available options vary based on selection of other objects. Off Temperature CO2 Humidity
MSV.104	Cfg_TO1AlarmSource	Configuration of TO1 alarm source. **Alarm Override:** When BV.38 is in alarm state, TO1 is triggered. **Alarm Overheat:** When BV.41 is in alarm state, TO1 is triggered. **Alarm Door:** When BV.40 is in alarm state, TO1 is triggered. **Alarm Window Contact:** When BV.39 is in alarm state, TO1 is triggered. **Alarm FlowSwitch:** When BV.37 is in alarm state, TO1 is triggered. **Alarm CO2:** When the CO_2 value exceeds the setpoint and it is in alarm state, TO1 is triggered.	Present Value	x	x	The available options vary based on selection of other objects. Alarm Override Alarm Overheat Alarm Door Alarm Window Contact Alarm FlowSwitch Alarm CO2
MSV.105	Cfg_TO2AlarmSource	Same description as MSV.104	Present Value	x	x	The available options vary based on selection of other objects. Alarm Override Alarm Overheat Alarm Door Alarm Window Contact Alarm FlowSwitch Alarm CO2

ID	Name	Description	W?	EFCB1xTU2	EFCB1xTU4	Notes
MSV.106	Cfg_TO3AlarmSource	Same description as MSV.104	Present Value	x	x	The available options vary based on selection of other objects. Alarm Override Alarm Overheat Alarm Door Alarm Window Contact Alarm FlowSwitch Alarm CO2
MSV.107	Cfg_TO4AlarmSource	Same description as MSV.104	Present Value	x	x	The available options vary based on selection of other objects. Alarm Override Alarm Overheat Alarm Door Alarm Window Contact Alarm FlowSwitch Alarm CO2
MSV.108	Cfg_AnalogOutput1AlarmSource	Configuration of AO1 alarm source. **Alarm Override:** When BV.38 is in alarm state, AO1 is triggered. **Alarm Overheat:** When BV.41 is in alarm state, AO1 is triggered. **Alarm Door:** When BV.40 is in alarm state, AO1 is triggered. **Alarm Window Contact:** When BV.39 is in alarm state, AO1 is triggered. **Alarm FlowSwitch:** When BV.37 is in alarm state, AO1 is triggered. **Alarm CO2:** When the CO_2 value exceeds the setpoint and it is in alarm state, AO1 is triggered.	Present Value	x	x	The available options vary based on selection of other objects. Alarm Override Alarm Overheat Alarm Door Alarm Window Contact Alarm FlowSwitch Alarm CO2
MSV.109	Cfg_AnalogOutput2AlarmSource	Same description as MSV.108	Present Value	x	x	The available options vary based on selection of other objects. Alarm Override Alarm Overheat Alarm Door Alarm Window Contact Alarm FlowSwitch Alarm CO2
MSV.110	Cfg_AnalogOutput3AlarmSource	Same description as MSV.108	Present Value	x	x	The available options vary based on selection of other objects. Alarm Override Alarm Overheat Alarm Door Alarm Window Contact Alarm FlowSwitch Alarm CO2

ID	Name	Description	W?	EFCB1xTU2	EFCB1xTU4	Notes
MSV.111	Cfg_AnalogOutput4AlarmSource	Same description as MSV.108	Present Value	x	x	The available options vary based on selection of other objects. Alarm Override Alarm Overheat Alarm Door Alarm Window Contact Alarm FlowSwitch Alarm CO2
MSV.112	Cfg_DigitalOutput1AlarmSource	Configuration of DO1 alarm source. **Alarm Override:** When BV.38 is in alarm state, DO1 is triggered. **Alarm Overheat:** When BV.41 is in alarm state, DO1 is triggered. **Alarm Door:** When BV.40 is in alarm state, DO1 is triggered. **Alarm Window Contact:** When BV.39 is in alarm state, DO1 is triggered. **Alarm FlowSwitch:** When BV.37 is in alarm state, DO1 is triggered. **Alarm CO2:** When the CO_2 value exceeds the setpoint and it is in alarm state, DO1 is triggered.	Present Value	x	x	The available options vary based on selection of other objects. Alarm Override Alarm Overheat Alarm Door Alarm Window Contact Alarm FlowSwitch Alarm CO2
MSV.113	Cfg_DigitalOutput2AlarmSource	Same description as MSV.112	Present Value	x	x	The available options vary based on selection of other objects. Alarm Override Alarm Overheat Alarm Door Alarm Window Contact Alarm FlowSwitch Alarm CO2
MSV.114	Cfg_DigitalOutput3AlarmSource	Same description as MSV.112	Present Value		x	The available options vary based on selection of other objects. Alarm Override Alarm Overheat Alarm Door Alarm Window Contact Alarm FlowSwitch Alarm CO2
MSV.115	Cfg_DigitalOutput4AlarmSource	Same description as MSV.112	Present Value		x	The available options vary based on selection of other objects. Alarm Override Alarm Overheat Alarm Door Alarm Window Contact Alarm FlowSwitch Alarm CO2

Other

Table 11 - Object Table Information: Other

ID	Name	Description	W?	EFCB1xTU2	EFCB1xTU4	Notes
FIL.1	FirmwareBinaryFile	Firmware binary file. Set the File Size to 0 to erase the previous binary file before uploading a new one. Use only the binary file provided by Neptronic.	File Size Archive	x	x	File Size is accepted for 0 value only.
PGM.1	ProgramFirmware	Program firmware. Set to LOAD to program the file in application memory. The controller will be reset and the firmware will be LOADED into the memory. Use only the binary file provided by Neptronic.	Program Change	x	x	Program Change, only LOAD (1) and RESTART (4) are supported.
SCH.1	OccupancySchedule	Weekly occupancy schedule to specify which occupancy state is active during specific periods of day.	Weekly Schedule Schedule Default Priority for Writing Effective Period Out of Service	x	x	

Notes

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