LENNOX® CORE UNIT CONTROLLERS BACNET SETUP GUIDE

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Table of Contents

1. BACnet Quick Start 2
- 1.1. BACnet Network Connections Types....2
- 1.2. General 2
- 1.3. Lennox® CORE Service App Features 2
- 1.4. Enabling the CORE Unit Controller BACnet Interface....2
- 1.5. Integrating the CORE Unit Controller into a BAS System (Single-Zone) 2
  - 1.5.1. Common Integration Guidelines...2
  - 1.5.2. Examples of Basic Optional Objects 2
  - 1.5.3. Recommended Objects for Reading Unit Status 3
- 1.6. Integrating the CORE Unit Controller into a BAS System (Multi-Zone VAV)....3
  - 1.6.1. Common Integration Guidelines...3
  - 1.6.2. Examples of Basic Optional Objects 3
  - 1.6.3. Recommended Objects for Reading Unit Status 3

2. Network Setup for Common BACnet MS/TP....4
- 2.1. CORE Unit Controller BACnet MS/TP Interface Specifications and Default Settings....4
- 2.2. Configuring BACnet MS/TP 4
- 2.3. Additional Configuration Steps....4
- 2.4. BACnet MS/TP Cabling 5
- 2.5. Connections for BACnet MS/TP 5
- 2.6. BACnet MS/TP Network Bus Termination.5

3. Network Setup for Common BACnet IP 6
- 3.1. CORE Unit Controller BACnet IP Interface Specifications and Default Settings....6
- 3.2. CORE Unit Controller BACnet® IP Cabling....6
- 3.3. Connections for BACnet IP....6
- 3.4. Configuring BACnet IP....6
- 3.5. General BACnet IP Guidelines 7
- 3.6. BACnet IP Troubleshooting....7

4. Control and Backup Sensor Modes....7
- 4.1. Control Mode Options....7
  - 4.1.1. Monitor Only 7
  - 4.1.2. Room Sensor 7
  - 4.1.3. Network Thermostat 7
- 4.2. Backup Sensor Modes....7

5. Controller Defaults and Time-outs....8

6. Troubleshooting 9

7. Object Definitions....18
- 7.1. Analog Output....18
- 7.2. Analog Input....19
- 7.3. Analog Value....21
- 7.4. Character String Values 23
- 7.5. Multi-State Values 24

8. Room Sensor Setpoints....25

9. Application Details 26
- 9.1. Application Modes Specific To Remote Thermostat Operation 28
- 9.2. Object IDs 29
  - 9.2.1. Analog Outputs (AO)....29
  - 9.2.2. Analog Inputs (AI)....38
  - 9.2.3. Analog Values (AV) 47

WARNING

Improper installation, adjustment, alteration, service or maintenance can cause property damage, personal injury or loss of life.
Installation and service must be performed by a licensed professional HVAC installer (or equivalent) or service agency.

1. BACnet Quick Start

This section demonstrates a simple integration with the Lennox® CORE Unit Controller using BACnet MS/TP and BACnet IP (BIP).The contents of this document indicates all available points and functionaries.

NOTE: *The CORE and CORE Red Unit Controllers may be referred to as unit controller throughout this instruction from the point on.*

1.1. BACnet Network Connections Types

- BACnet IP (BIP) to CORE Unit Controller Ethernet connection requires CAT5 or CAT6 cable. (Applies to Lennox® CORE Unit Controller only.)
- BACnet MS/TP to CORE Unit Controller Ethernet connection requires twisted pair with shield, 22AWG min. Belden type 88761 or 8761 cable. Lennox 27M19, 94L63 or 68M25

1.2. General

This document is provided to assist in the integration of the CORE Unit Controller to the building automation system.

- This BACnet interface does not require any Lennox proprietary software or interface in order for the BACnet interface to function with the unit control system.
- CORE Unit Controller: The unit control BACnet Interface allows communication between the CORE Unit Controller and a BACnet MS/TP or IP network. Both MS/TP and BACnet IP (BIP) Interfaces are available directly on the CORE Unit Controller.

NOTE: *See **M4 Unit Controller (A55) and Expansion Port Locations** in the Lennox® CORE Control System (Unit Controller) Application Guide for port locations on the unit controllers.*

- The unit BACnet® interface has been developed to communicate with building automation systems that support the BACnet Application Specific Controller (B-ASC) device profile.

1.3. Lennox® CORE Service App Features

- The mobile application is compatible with the CORE Unit Controller.
- The mobile application can discover the CORE Unit Controller if within 50 feet of the mobile device being used.
- The mobile application will list the units by signal strength.
- The unit friendly name is displayed.
- Select the desire unit from the discovery list. The four digit code desired on the unit will show the code listed in the discovery list.
- Once the unit has been selected, connection should be established to your device within 10 seconds.
- Information displayed once pairing is completed will be RTU name, model number, serial number and firmware version.

1.4. Enabling the CORE Unit Controller BACnet Interface

To enable the BACnet interface using the Lennox® CORE Mobile Service App:

1. Connect to the CORE controller and navigate to the **RTU Menu**.
2. Select **Network Integration**.
3. CORE Unit Controller: Choose **Network Setup Wizard** (beneath Network Setup) to proceed.
   All CORE controllers are BACnet IP/MSTP ready and only require the proper BACnet network setup for operation.

NOTE: *Refer to **CORE Service App Menu Selection Overview, Install Menu Structure,** and **BACnet MS/TP Menu Structure** in the Lennox® CORE Control System (Unit Controller) Application Guide.*

1.5. Integrating the CORE Unit Controller into a BAS System (Single-Zone)

This section discusses how to use the commissioned and wired the CORE Unit Controller in a single zone network discharge air operation. For use in a multi-zone, see “3. Network Setup for Common BACnet IP” on page 6. (This applies to the CORE Unit Controller only).

1.5.1. Common Integration Guidelines

For firmware version 9.01.0144 and later, *Change of Value* (CoV) functionality is available. Any firmware prior to version 9.01.0144 will not support CoV. See “Object Definitions” on page 18 for details on objects that support CoV.

1.5.2. Examples of Basic Optional Objects

Lennox recommends the following objects for writing generic applications:

- AO102 (Outdoor Air Min Pos Control)
- AO104 (Occupancy Scheduler Control)
- AO108 (Space Dehumidification Setpoint)
- AV130 - AV133 (Occ/Unocc Heat/Cool Setpoints)
- AO111 (IAQ 1 Network Input)
- AO112 (Humidity Network Input)
- AO113 (Space Temperature Input)

NOTE: *AO objects do not support CoV.*

How to use these objects:

- Write to the Network Inputs (AO111-113) every 2 minutes
- Write to the Setpoints (AO108 and AO109) every 7 minutes
- Write to AO102 to enable a greater minimum position. This is not an override and will not necessarily close a damper opening.

1.5.3. Recommended Objects for Reading Unit Status

- AI232 (Unit Status)
- AI239 (Space Temperature)
- AI240 (Discharge Air Temperature)
- AI244 (Outside Air Damper)
- AI250 (Supply Fan Status)
- AI252 (Space Temperature Setpoint (Effective))
- AI253 (Current Error Code)
- AI274 (Space CO2 Sensor (Effective)
- AI276 (Space Humidity (Effective))
- AI278 (Dehumidification Setpoint (Effective)
- AI281 (Return Air Temperature)
- MSV310 (Current Operating Mode)

How to use these objects:

These objects are read-only, use them for monitoring, unit graphics, and checking unit statuses.

1.6. Integrating the CORE Unit Controller into a BAS System (Multi-Zone VAV)

This section discusses how to integrate the CORE Unit Controller into a BAS VAV (Multi-zone) configuration. It assumes you have integrated zone boxes and individual zone sensors appropriately.

1.6.1. Common Integration Guidelines

- Device Max_Master = 127
- This device does not support Change of Value (CoV)

1.6.2. Examples of Basic Optional Objects

Lennox recommends the following objects for writing generic applications:

- AO102 (Outdoor Air Min Pos Control)
- AO104 (Occupancy Scheduler Control)
- AO113 (Space Temperature Input)
- AO125 (Discharge Air Cooling Setpoint)
- AO126 (Discharge Air Heating Setpoint)
- AV130 (Heating Occupied Setpoint)
- AV131 (Cooling Occupied Setpoint)
- AV132 (Heating Unoccupied Setpoint)
- AV133 (Cooling Unoccupied Setpoint)

How to use these objects:

The setpoints will provide additional operating setpoints for MZVAV logic and allow staging of compressors, heater, and fan, to meet the discharge temp and static setpoints.

1.6.3. Recommended Objects for Reading Unit Status

- AI232 (Unit Status)
- AI238 (Duct Static Pressure)
- AI240 (Discharge Air Temperature)
- AI244 (Outside Air Damper)
- AI250 (Supply Fan Status)
- AI253 (Current Error Code)
- AI281 (Return Air Temperature)
- MSV310 (Current Operating Mode)

How to use these objects:

These objects are read-only, use them for monitoring, unit graphics, and checking unit statuses.

2. Network Setup for Common BACnet MS/TP

2.1. CORE Unit Controller BACnet MS/TP Interface Specifications and Default Settings

Table 1. CORE Unit Controller BACnet Interface Specifications and Default Settings

Environment	
Operating temperature range	-40°F to 155°F
Storage temperature range	-40°F to 185°F
RH	10-95% RH non-condensing
Field Connections	
Transceiver	RS-485
Connector	Three-position terminal block (+ G –)
Baud Rate	Selectable 9.6, 19.2, 38.4, 76.8K
Cable Type	Twisted pair w/shield, 22AWG min. Belden type 88761 or 8761. Lennox 27M19, 94L63 or 68M25
Max. Cable Length	4000 ft. repeater is required for longer lengths.
Bus Termination	120 ohm resistor on last interface in chain.
Default Values	
Maximum number of addresses on a BACnet IP segment	254
Device Object_Identifier	MAC address
Device Object_Name	“Lennox_M4_" + MAC address for MSTP or last octet of IP address for BIP
RTU Location	“RTU Location"
Device Description	“Lennox RTU HVAC Controller"
Baud Rate	38.4K
Recommended Update Rate	At least once every 12 minutes
Communication Time-out	15 minutes

2.2. Configuring BACnet MS/TP

To configure BACnet MS/TP via the CORE Service App:

1. Go to **RTU MENU > NETWORK INTEGRATION > NETWORK SETUP WIZARD**:
2. Choose **BACnet MS/TP**.
3. Set the **BACnet MAC Address** (the address should be unique for each CORE Unit Controller on the network).
4. Set the **Device Instance** per the Facility Controls Contractor. The Device Instance must be different for every RTU. It is recommended to set each device instance to match the MAC address. The default setting is 2 or the S-Bus address.
5. Set the **BAUD Rate** to your applicable network rate. The Lennox default BAUD is 38.4 kbps.’

NOTE: *Refer to **BACnet MS/TP Menu Structure** in the Lennox® CORE Control System (Unit Controller) Application Guide for further guidance.*

2.3. Additional Configuration Steps

For Single and Multi-Zone Applications:

1. Select **Next** and select **Room Sensor** as the control mode.
2. Select **CO2 Sensor Source** as Network; select **Next**.
3. Select **Relative Humidity Source** as Network; select **Next**.
4. Select **Temperature Sensor Source** as Network; select **Next**.
5. Choose the **Occupied Blower Mode** as **Auto-Cycle**; select **Next**. Choose **On-Continuous** as necessary
6. Select the **Backup Mode** as **Return Air Backup**; select **Next**.
7. Set the **Occupied** and **Unoccupied Backup Setpoints** as necessary; select **Next.**

2.4. BACnet MS/TP Cabling

The CORE Unit Controller BACnet® interface is compatible with MS/TP EIA-485 daisy-chain networks communicating at 9.6, 19.2, 38.4, and 76.8 kbps.

Connect the BACnet® MS/TP network cable to the CORE Unit Controller BACnet® interface.

It is compatible with twisted pair, shielded 22 AWG minimum cable such as Belden 8761, 88761 and Lennox catalog numbers 27M19, 94L63 or 68M25.

A maximum of 32 CORE Unit Controller BACnet® interfaces can be included per network segment. Up to 127 units can be connected per network segment by using repeater for every 32 devices.

The network cable should be routed using best practices to avoid induced noise. Do not route alongside high voltage wiring or in proximity to high-voltage or high-frequency devices, such as ignition controls and variable frequency drives. The BACnet MS/TP recommended maximum total bus length (without repeater) of 4000 ft. (1219m) applies to this device.

The guidelines provided were established with setting the baud rate no higher than 9.6K. When using higher baud rates we recommend that no more than 20 Lennox BACnet units and 30 devices per router. Since CORE Unit Controller BACnet interface provides access to many objects, Lennox does not recommend use of repeaters in any BACnet network because of the amplified noise they tend to propagate on the network.

2.5. Connections for BACnet MS/TP

1. Connect the BACnet SmartWire connector to the CORE Controller.
2. Do not adjust the the BACnet plug unless the interface is at the end of a daisy-chained configuration. Check with the Controls Contractor to determine the end of line requirements.

NOTE: *Lennox suggests end of line termination resistors of 120 ohms at the beginning and end of the BACnet MS/TP network.*

Upon powering up the CORE Unit Controller, the BACnet interface must be configured. To configure the CORE Unit Controller BACnet MS/TP Interface:

1. Install the CORE Service App on your mobile device.
2. Pair to the CORE Unit Controller.
3. See the CORE Unit Controller Setup Guide for instructions on how to pair your mobile device to the CORE Unit Controller.

2.6. BACnet MS/TP Network Bus Termination

When the CORE Unit Controller BACnet® Interface is at the end of a daisy chain, connect a 120 ohm resistor across the + and - terminals. Every BACnet® MS/TP chain should have a termination at each end of the chain (exactly two terminations).

⚠ IMPORTANT

A qualified systems integrator with adequate training and experience is required to integrate and commission the CORE Unit Controller BACnet Interface into a third party BACnet building automation system. A BACnet configuration software tool is required to commission the BACnet network.

General BACnet MS/TP Guidelines

1. Set all BACnet® devices on an MS/TP network to consecutive MAC addresses, starting at 1, so that there are no gaps between MAC address values.
2. Set Max_Master device property on all devices to match the largest MAC address on the network. Note, this could be larger than existing network to allow for adding devices to the network without the need to adjust the Max_Master property in the future. (Contact Lennox Technical Support for more detailed information).
3. Use ReadPropertyMultiple service instead of Read Property service when reading multiple analog inputs or values.
4. Do not exceed the maximum recommended length (1200 M / 4000 ft.) for any MS/TP segment.
5. Terminate all MS/TP network segment ends per control provider instructions

These guidelines were established with setting the baud rate no higher than 9.6K. When using higher baud rates we recommend that no more than 20 Lennox BACnet units and 30 devices per router. Since the CORE Unit Controller BACnet units provides access to many objects, Lennox does not recommend use of repeaters in any BACnet network because of the amplified noise they tend to propagate on the network.

3. Network Setup for Common BACnet IP

This section (3.0) applies to the CORE Unit Controller only.

3.1. CORE Unit Controller BACnet IP Interface Specifications and Default Settings

Table 2. CORE Unit Controller BACnet® IP Interface Specifications and Default Settings

Environment	
Operating temperature range	-40°F to 155°F
Storage temperature range	-40°F to 185°F
RH	10-95% RH non-condensing
Field Connections	
Transceiver	10/100MBPS
Connector	RJ-45
Cable Type	CAT-5
Max. Cable Length	100 Meters (Between Segments)
Bus Termination	Surge protection recommended
Default Values	
UDP Port	BACnet UDP port is non-configurable and is always set to default 0xBAC0 i.e. 47808
BACnet IP Device ID	By default will be the last octet of the W4 IP address unless set by user using BACnet interface. Range 1 to 4194302.
Device Object_Identifier	Last octet of IP address
Device Object_Name	"Lennox_M4_" + MAC address
Device Location	"RTU Location"
Device Description	"Lennox RTU HVAC Controller"
UDP Port Address	Default 0xBAC0
Recommended update rate	At least every 12 minutes

3.2. CORE Unit Controller BACnet® IP Cabling

- The CORE Unit Controller BACnet IP Interface is a set of two RJ-45 plugs connected by an IP switch.
- The network cable should be routed using best practices to avoid induced noise. Do not route alongside high voltage wiring or in proximity to high-voltage or high-frequency devices, such as ignition controls and variable frequency drives. Surge protection is recommended at the CORE Unit Controller level.

NOTE: *BACnet/IP will work with BACnet Broadcast Management Devices (BBMD) within same Ethernet network subnet.*

NOTE: *Please ensure that "Ping" service is enabled on the Ethernet router for BACnet/IP operation.*

3.3. Connections for BACnet IP

Connect a CAT5E or CAT6 cable to one of the RJ-45 ports (1 or 2) of the unit controller.

3.4. Configuring BACnet IP

After powering up the CORE Unit Controller, the CORE Unit Controller BACnet IP interface must be enabled and configured. Use the following procedures to complete both tasks:

1. Launch the Lennox® CORE Service App.
2. Go to **RTU MENU > NETWORK INTEGRATION > NETWORK SETUP WIZARD** and run the setup wizard.

To configure the CORE Unit Controller BACnet IP Interface

1. Connect to the CORE Unit Controller with your mobile device (phone or tablet).
2. Go to **RTU MENU > NETWORK INTEGRATION > NETWORK SETUP WIZARD** and select **BACnet IP**.
3. Follow the prompts on the screen to complete BACnet setup.

NOTE: *Refer to **BACnet IP Menu Structure** in the Lennox® CORE Control System (Unit Controller) Application Guide for further guidance.*

NOTE: *All configurable network addresses must be assigned by your Integrator or IT Team.*

3.5. General BACnet IP Guidelines

Go to the following address for more information:

http://www.bacnet.org/Tutorial/BACnetIP/index.htm

A BACnet/IP network can be composed of more than one IP subnet.

- Generally UDP broadcast packets are stopped by routers from transmitting to another subnet. In such scenario BACnet Broadcast Management Device (BBMD) devices are to be used. Otherwise BIP will not work.
- For details refer: http://www.bacnet.org/Tutorial/BACnetIP/sld007.html

3.6. BACnet IP Troubleshooting

- Verify that the IP address subnet is the same on both device and BACnet client computer.
- Verify that the default gateway is same for both device and BACnet client computer.
- Verify that ping is working between device and BACnet client computer.
- Verify that User Datagram Protocol (UDP) broadcast (Who-Is and I-Am) packets are being exchanged. Try capturing BACnet packets on the BACnet client computer.
- Verify Windows Firewall or/and anti-virus program running on the BACnet client computer (for example, Window Defender) are configured to allow UDP packets.

4. Control and Backup Sensor Modes

4.1. Control Mode Options

There are three Primary Control Modes available on the CORE Unit Controller. The primary control mode can be set using the Network Setup Wizard on the CORE Service app.

4.1.1. Monitor Only

The unit is under control from another device such as a thermostat or local sensor. The CORE Unit Controller will not respond to setpoints or application mode demands related to heating/cooling sent over the network. Use this mode if you only wish to monitor the operation of the RTU.

4.1.2. Room Sensor

In this mode, the rooftop unit is controlled by room temperature setpoints (AO109, AV130 - AV133) and occupancy state (AO104). Room temperature is monitored and compared to the appropriate room temperature setpoints. Room temperature can be provided by local sensor or network value (AO113). Control for Humidity and Ventilation (Co2) is also supported. This is the recommended mode for control via BACnet.

4.1.3. Network Thermostat

In this mode, the rooftop unit is controlled by network demands for heating/cooling in the form of application mode commands (AO101). This mode assumes a network thermostat sending remote demands AO101 values 208, 209 and 224 - 236. This mode is not recommended.

4.2. Backup Sensor Modes

Under certain conditions such as sensor failure, the CORE Unit Controller will go into one of the backup modes of operation as described in the CORE Unit Controller setup guide.

When backup sensor mode is entered, a code 93 will be broadcast over BACnet as well as displayed at the controller display. Backup mode options available are:

- **Return Air Temperature** - Unit will use the pre-configured backup setpoints and the local RAT sensor to heat / cool
- **Thermostat** - Unit will run off a local thermostat. The CORE Unit Controller will require a reset to move back to primary operation in this mode.
- **Room Sensor-** Unit will use local sensors and pre-configured setpoints to run. This mode is only available when Network Thermostat is selected as the Primary Control Mode.
- **None** - Unit will cease to operate until the primary control mode can be restored.

5. Controller Defaults and Time-outs

The CORE Unit Controller does not store commands after a reset. Commands will need to be resent after every reset.

The CORE Unit Controller device must be written to at least every 15 minutes, or it will consider the network to be offline.

The following points (if used) MUST be updated at least every 5 minutes:

- Network Space Temperature (AO113)
- Network Space Humidity
- Network Space CO2
- Network Thermostat Demands (AO101)
- Network Occupancy (AO104)
- Network Setpoints (AO109, AV130-133)

Lennox recommends that the above points (if used) are updated every 2 minutes to ensure a retry is possible within the 5-minute window.

Change of Value (CoV) is not supported on the CORE Unit Controller interface.

6. Troubleshooting

Use table 2 as a guide once the BACnet network is set up and operating.

Table 3. BACnet Communication Check (MSTP and IP)
(IP only applies to the CORE Unit Controller)

LED	Action
MSTP	
BACnet communication transmit and receive LEDs flash back and forth rapidly.	None. Indicates normal communication.
BACnet communication LEDs are off or intermittently go off for periods of 1 second or longer.	• Check BACnet network connections. • Make sure BACnet network is commissioned. • Make sure each unit has a unique MAC address in the range of 0 to 127. • Verify same baud rate on all devices.
GREEN only	ON BACNET NETWORK NO SEND/RECEIVE = Action - none
YELLOW only	NOT ON NETWORK - 1. Check BACnet network connections.
BIP (applies to CORE Unit Controller only)	
• Check whether the UDP port number is unique for the device. • Is standard ping working between devices? • Device assigned with IP address, which does not have any conflict. • Verify default gateway is correctly configured for BIP.	

Control following a connection failure depends on where the failure occurs, and which input device has been used.

Table 4. Device Objects and Property Ranges

Property name	Property Value	Data type	Access
Description	“Lennox RTU HVAC Controller"	Char String	RW
Object_Identifier*	The default identifier is: • Two for MSTP • Last octet of IP address for BIP (applies to CORE Unit Controller) ***NOTE:*** *Values can be changed using the CORE Service App*	Integer (1-4194302)	RW
Object_Name	Lennox_CORE_2 (default value)	Char String (32 char. max.)	RW
Vendor name	Lennox	Char String	R
Model name	“M4 CORE”	Char String	RW
Firmware revision	Firmware version dependent	Char String	R
Application software revision	Firmware version dependent	Char String	R

Table 4. Device Objects and Property Ranges

Property name	Property Value	Data type	Access
Location	Location	Char String (32 char. max.)	RW
Vendor identifier	255	Integer	R
Max APDU length accepted	Max length is: • 480 for MS/TP • 1476 for BIP (applies to CORE Unit Controller only)	Integer	R
Max Master	127	Integer (1-127)	RW
Segmentation supported	FALSE	Boolean	R
Max Info frames	1	Integer (1-65535)	RW
Unit serial number	Factory set	Integer	R
* The default Object_Identifier is the MSTP MAC address which is set locally. To set it to a different value, it must be changed by the front end software.			

NOTE: *The Lennox CORE Unit Controller BACnet interface does not support CoV (Change of Value).*

Table 5. Lennox Proprietary Objects

NOTE: *Lennox proprietary objects are obsolete and are maintained solely for backward compatibility. They are expected to be fully removed in a future release. Accordingly, these objects shall not be used in any new BACnet installations going forward.*

Property	Description	Device Objects						
		Compressor	Heating	Blower	Economizer	Space Air	Discharge Air	Outdoor Air
Object_Identifier	Object_Identifier is a Read Only (RO) property, used to identify the Object and it is unique within Lennox BACnet Device.	*	*	*	*	*	*	*
Object_Name	Object_Name is a Read Only (RO) property use to name the Object and is unique within the BACnet Device. The minimum length of the string is one character.	*	*	*	*	*	*	*
Object_Type	Object_Type is a Read Only (RO) property and is one of the following: OBJECT_LNX_COMPRESSOR, OBJECT_LNX_HEATING, OBJECT_LNX_BLOWER, OBJECT_LNX_ECONOMIZER, OBJECT_LNX_INDOOR_AIR, OBJECT_LNX_DISCHARGE_AIR, OBJECT_LNX_OUDOOR_AIR.	*	*	*	*	*	*	*
Out_Of_Service	Out_Of_Service is a Read Only (RO) property that indicates whether the physical component that the object represents is in service or not.	*	*	*	*			
Lennox_Object_Installed	Lennox_Object_Installed is a Read Only (RO) property that indicates whether the physical component that the object represents is installed in the RTU or not. Unless the value of this property is TRUE, all other properties of the Compressor, Heat Stage, or Economizer object instance are invalid.	*	*		*			

Table 5. Lennox Proprietary Objects

NOTE: *Lennox proprietary objects are obsolete and are maintained solely for backward compatibility. They are expected to be fully removed in a future release. Accordingly, these objects shall not be used in any new BACnet installations going forward.*

Property	Description	Device Objects						
		Compressor	Heating	Blower	Economizer	Space Air	Discharge Air	Outdoor Air
Lennox_Object_Running	Lennox_Object_Running is a Read Only (RO) property that indicates that the component is not running if the value is zero and that the component is running if a value greater than zero (range: 0, 100). Components capable of reporting values of more granular detail, i.e. all the integer values in the range of 0 – 100, as percent capacity utilization, then that value is reported by this property. Other components will only show ON or OFF.	*	*	*	*			
Lennox_Object_Run_ Time	Lennox_Object_Run_Time is a Read Only (RO) property that indicates in minutes the time the corresponding component has been running (range: 0, 4294967295). Internally the time that the compressor has been running is stored into EEPROM once every hour. Therefore, in the event power turns off, the value returned when power turns back on will be the last stored value. This can result in a loss of run-time value up to an hour for each power cycle event.	*	*	*	*			
Lennox_Object_Min_ Cycle_ Time	Lennox_Object_Min_Cycle_Time is a Read Only (RO) property that indicates in seconds the minimum time the corresponding component must run in any given cycle (range: 0, 4294967295). This prevents short cycles to help protect the component. (This property does not apply to Electric Heat Stage components.)	*	*					
Lennox_Object_Cycle_ Count	Lennox_Object_Cycle_Count is a Read Only (RO) property that indicates the number of cycles the corresponding component has been running (range: 0, 4294967295).	*	*	*	*			
Lennox_Object_Error	Lennox_Object_Error is a Read Only (RO) property that reports any error code the corresponding component may have encountered (range: 0, 255). A value of 0 means no error while any non-zero value represent an error.	*	*	*	*			
Lennox_Object_Heat_ Type	Lennox_Object_Heat_Type is a Read Only (RO) property that indicates the source of power used to run the component (range: 0, 255). The interpreted values are: 1-Gas; 2-Electric; 3-Heat Pump mode.		*					
Object_Temperature	Object_Temperature is a Read Write (RW) property that Indicates the temperature. The units of measurement for this property are Degrees Fahrenheit.					*	*	*
Object_Relative_Humidity	Object_Relative_Humidity is a Read Write (RW) property that represents relative humidity of space air, measured as a percentage.					*		
Object_CO2_Level	Object_CO2_Level is a Read Write (RW) property that indicates the CO2 levels in the space air, measured in PPM.					*		
Object_Duct_Static_ Pressure_ Setpoint	Object_Duct_Static_Pressure_Setpoint is a Read Only (RO) property that represents the Duct Static Pressure Setpoint of Discharge Air, measured in inches of water column (range: 0, 5).					*		

Table 6. Lennox Proprietary Objects - Compressor (Object ID: 136)

NOTE: *Lennox proprietary objects are obsolete and are maintained solely for backward compatibility. They are expected to be fully removed in a future release. Accordingly, these objects shall not be used in any new BACnet installations going forward.*

Property	Property ID	Data type and range	Access	Description
Object_Identifier	75	Integer (0-4194302)	Read Only	Numeric code that identifies the object (unique within Lennox BACnet Device).
Object_Name	77	Character string of 1 character (min.) to 32 characters (max.)	Read Only	Identifies the Object and is unique within the BACnet Device.
Object_Type	79	136 (OBJECT_LNX_ COMPRESSOR)	Read Only	Indicates membership in a particular object type class.
Out_Of_Service	81	TRUE or FALSE	Read Only	Indicates whether the compressor is in service or not.
Lennox_Object_ Installed	513	TRUE or FALSE	Read Only	Indicates whether the compressor is installed or not. Unless the value of this property is TRUE, all other properties of the Compressor object instance are invalid.
Lennox_Object_ Running	514	Integer (0 - 100)	Read Only	Indicates that the compressor is not running if the value is zero and that the compressor is running if a value greater than zero (range: 0, 100).
Lennox_Object_ Run_Time	515	Integer (0 - 4294967295) minutes	Read Only	Indicates the time the compressor has been running. Internally, the time that the compressor has been running is stored into EEPROM once every hour. Therefore, in the event power turns off, the value returned when power turns back on will be the last stored value. This can result in a loss of run-time value up to an hour for each power cycle event.
Lennox_Object_Min_ Cycle_Time	516	Integer (0 - 4294967295) seconds	Read Only	Indicates the minimum time the compressor must run in any given cycle. This prevents short cycles to help protect the compressor.
Lennox_Object_ Cycle_Count	517	Integer (0 - 4294967295) cycles	Read Only	Indicates the number of cycles the compressor has been running.
Lennox_Object_Error	518	Integer (0 - 255)	Read Only	Reports any error code the compressor may have encountered. A value of 0 means no error while any non-zero value represent an error.

Table 7. Lennox Proprietary Objects - Blower (Object ID: 129)

NOTE: *Lennox proprietary objects are obsolete and are maintained solely for backward compatibility. They are expected to be fully removed in a future release. Accordingly, these objects shall not be used in any new BACnet installations going forward.*

Property	Property ID	Data type and range	Access	Description
Object_Identifier	75	Integer (0-4194302)	Read Only	Numeric code that identifies the object (unique within Lennox BACnet Device)
Object_Name	77	Character string of 1 character (min.) to 32 characters (max.)	Read Only	Identifies the Object and is unique within the BACnet Device.
Object_Type	79	129 (OBJECT_LNX_ BLOWER)	Read Only	Indicates membership in a particular object type class.

Table 7. Lennox Proprietary Objects - Blower (Object ID: 129)

NOTE: *Lennox proprietary objects are obsolete and are maintained solely for backward compatibility. They are expected to be fully removed in a future release. Accordingly, these objects shall not be used in any new BACnet installations going forward.*

Property	Property ID	Data type and range	Access	Description
Out_Of_Service	81	TRUE or FALSE	Read Only	Indicates whether the blower is in service or not.
Lennox_Object_Installed:	513	TRUE or FALSE	Read Only	Indicates whether the economizer is installed or not. Unless the value of this property is TRUE, all other properties of the economizer object instance are invalid.
Lennox_Object_ Running	514	Integer (0 - 100)	Read Only	Indicates that the blower is not running if the value is zero and that the blower is running if a value greater than zero (range: 0, 100 or possible values).
Lennox_Object_ Run_Time	515	Integer (0 - 4294967295) minutes	Read Only	Indicates the time the blower has been running. Internally, the time that the blower has been running is stored into EEPROM once every hour. Therefore, in the event power turns off, the value returned when power turns back on will be the last stored value. This can result in a loss of run-time value up to an hour for each power cycle event.
Lennox_Object_ Cycle_Count	517	Integer (0 - 4294967295) cycles	Read Only	Indicates the number of cycles the blower has been running
Lennox_Object_Error	518	Integer (0 - 255)	Read Only	Reports any error code the blower may have encountered. A value of 0 means no error while any non-zero value represent an error.

Table 8. Lennox Proprietary Objects - Heating (Object ID 130)

NOTE: *Lennox proprietary objects are obsolete and are maintained solely for backward compatibility. They are expected to be fully removed in a future release. Accordingly, these objects shall not be used in any new BACnet installations going forward.*

Property	Property ID	Data type and range	Access	Description
Object_Identifier	75	Integer (0-4194302)	Read Only	Numeric code that identifies the object (unique within Lennox BACnet Device).
Object_Name	77	Character string of 1 character (min.) to 32 characters (max.)	Read Only	Identifies the Object and is unique within the BACnet Device.
Object_Type	79	130 (OBJECT_LNX_ HEATING)	Read Only	Indicates membership in a particular object type class.
Out_Of_Service	81	TRUE or FALSE	Read Only	Indicates whether the heating device is in service or not.
Lennox_Object_ Installed	513	TRUE or FALSE	Read Only	Indicates whether the heating device is installed or not. Unless the value of this property is TRUE, all other properties of the heating object instance are invalid.
Lennox_Object_ Running	514	Integer (0 - 100)	Read Only	Indicates that heating is not running if the value is zero and that heating is running if a value greater than zero (range: 0, 100 or possible values).

Table 8. Lennox Proprietary Objects - Heating (Object ID 130)

NOTE: *Lennox proprietary objects are obsolete and are maintained solely for backward compatibility. They are expected to be fully removed in a future release. Accordingly, these objects shall not be used in any new BACnet installations going forward.*

Property	Property ID	Data type and range	Access	Description
Lennox_Object_ Run_Time	515	Integer (0 - 4294967295) minutes	Read Only	Indicates the time heating has been running. Internally, the time that heating has been running is stored into EEPROM once every hour. Therefore, in the event power turns off, the value returned when power turns back on will be the last stored value. This can result in a loss of run-time value up to an hour for each power cycle event.
Lennox_Object_Min_ Cycle_Time	516	Integer (0 - 4294967295) seconds	Read Only	Indicates the minimum time heating must run in any given cycle. This prevents short cycles to help protect the compressor (This property does not apply to Electric Heat Stage components).
Lennox_Object_ Cycle_Count	517	Integer (0 - 4294967295) cycles	Read Only	Indicates the number of cycles heating has been running.
Lennox_Object_Error	518	Integer (0 - 255)	Read Only	Reports any error code heating may have encountered. A value of 0 means no error while any non-zero value represent an error.
Lennox_Object_ HeatType	533	Integer: Values are: • 1-Gas • 2-Electric • 3-Heat Pump mode	Read Only	Indicates the source of power used for heating (range: 0, 255).

Table 9. Lennox Proprietary Objects - Economizer (Object ID: 131)

NOTE: *Lennox proprietary objects are obsolete and are maintained solely for backward compatibility. They are expected to be fully removed in a future release. Accordingly, these objects shall not be used in any new BACnet installations going forward.*

Property	Property ID	Data type and range	Access	Description
Object_Identifier	75	Integer (0-4194302)	Read Only	Numeric code that identifies the object (unique within Lennox BACnet Device).
Object_Name	77	Character string of 1 character (min.) to 32 characters (max.)	Read Only	Identifies the Object and is unique within the BACnet Device.
Object_Type	79	131 (OBJECT_LNX_ ECONOMIZER)	Read Only	Indicates membership in a particular object type class.
Out_Of_Service	81	TRUE or FALSE	Read Only	Indicates whether the economizer is in service or not.
Lennox_Object_ Installed	513	TRUE or FALSE	Read Only	Indicates whether the economizer is installed or not. Unless the value of this property is TRUE, all other properties of the economizer object instance are invalid.
Lennox_Object_ Running	514	Integer (0 - 100)	Read Only	Indicates that the economizer is not running if the value is zero and that the economizer is running if a value greater than zero (range: 0, 100 or possible values).

Table 9. Lennox Proprietary Objects - Economizer (Object ID: 131)

NOTE: *Lennox proprietary objects are obsolete and are maintained solely for backward compatibility. They are expected to be fully removed in a future release. Accordingly, these objects shall not be used in any new BACnet installations going forward.*

Property	Property ID	Data type and range	Access	Description
Lennox_Object_ Run_Time	515	Integer (0 - 4294967295) minutes	Read Only	Indicates the time the economizer has been running. Internally, the time that the economizer has been running is stored into EEPROM once every hour. Therefore, in the event power turns off, the value returned when power turns back on will be the last stored value. This can result in a loss of run-time value up to an hour for each power cycle event.
Lennox_Object_ Cycle_Count	517	Integer (0 - 4294967295) cycles	Read Only	Indicates the number of cycles the economizer has been running.
Lennox_Object_Error	518	Integer (0 - 255)	Read Only	Reports any error code the compressor may have encountered. A value of 0 means no error while any non-zero value represent an error.
Lennox_Object_ECON_FREE_COOL_ RUN_TIME	530	0 - 4294967295 minutes	Read Only	Indicates the runtime of Free Cooling
Lennox_Object_ECON_FREE_COOL_ CYCLE_COUNT	531	0 - 4294967295 cycles	Read Only	Indicates the amount of cycles that have occurred on Free Cooling.
Lennox_Object_PROP_ECON_FREE_ COOL_SET_POINT	532	0 - 70 Degrees Fahrenheit	Read Only	Indicates the Free Cooling setpoint Supply Air temperature for the economizer. This setpoint used to determine if Outdoor Air is Suitable (OAS) for free cooling. It will be either the temperature setpoint or temperature offset for a ‘T’ type economizer, enthalpy setpoint for an ‘S’ type single enthalpy economizer, or enthalpy offset for a ‘D’ type dual enthalpy economizer.

Table 10. Lennox Proprietary Objects - Discharge Air (Object ID: 133)

NOTE: *Lennox proprietary objects are obsolete and are maintained solely for backward compatibility. They are expected to be fully removed in a future release. Accordingly, these objects shall not be used in any new BACnet installations going forward.*

Property	Property ID	Data type and range	Access	Description
Object_Identifier	75	Integer (0-4194302)	Read Only	Numeric code that identifies the object (unique within Lennox BACnet Device)
Object_Name	77	Character string of 1 character (min.) to 32 characters (max.)	Read Only	Identifies the Object and is unique within the BACnet Device.
Object_Type	79	133 (OBJECT_LNX_DISCHARGE_ AIR)	Read Only	Indicates membership in a particular object type class.
Object_Temperature	534	Real: Degrees Fahrenheit (-8.75 to 164.45)	Read Only	Indicates the temperature of the discharge air.
Object_Duct_Static_Pressure_Setpoint	535	Integer: Values are 0 - 5 (inches of water column)	Read Only	Represents the Duct Static Pressure Setpoint of discharge air.
Object_Relative_ Humidity	536	Real: Values are 0 to 100 (%RH)	Read Write	Represents relative humidity of space air.
Object_CO2_Level	537	Real: Values are 300 to 2000 (PPM)	Read Write	Indicates the CO2 levels in the space air.

Table 11. Lennox Proprietary Objects - Space Air (Object ID: 133)

NOTE: *Lennox proprietary objects are obsolete and are maintained solely for backward compatibility. They are expected to be fully removed in a future release. Accordingly, these objects shall not be used in any new BACnet installations going forward.*

Property	Property ID	Data type and range	Access	Description
Object_Identifier	75	Integer (0-4194302)	Read Only	Numeric code that identifies the object (unique within Lennox BACnet Device)
Object_Name	77	Character string of 1 character (min.) to 32 characters (max.)	Read Only	Identifies the Object and is unique within the BACnet Device.
Object_Type	79	133 (OBJECT_LNX_INDOOR_ AIR)	Read Only	Indicates membership in a particular object type class.
Object_Temperature	534	Real: Degrees Fahrenheit (36.25 to 100)	Read Write	Indicates the temperature of the space air.
Object_Duct_Static_Pressure_Setpoint	535	Integer: Values are 0 - 5 (inches of water column)	Read Only	Represents the Duct Static Pressure Setpoint of discharge air.
Object_Relative_ Humidity	536	Real: Values are 0 to 100 (%RH)	Read Write	Represents relative humidity of space air.
Object_CO2_Level	537	Real: Values are 300 to 2000 (PPM)	Read Write	Indicates the CO2 levels in the space air.

Table 12. Lennox Proprietary Objects - Outdoor Air (Object ID: 133)

Property	Property ID	Data type and range	Access	Description
Object_Identifier	75	Integer (0-4194302)	Read Only	Numeric code that identifies the object (unique within Lennox BACnet Device)
Object_Name	77	Character string of 1 character (min.) to 32 characters (max.)	Read Only	Identifies the Object and is unique within the BACnet Device.
Object_Type	79	133 (OBJECT_LNX_OUDOOR_ AIR)	Read Only	Indicates membership in a particular object type class.
Object_Temperature	534	Real: Degrees Fahrenheit (-30.62 to 131.56)	Read Write	Indicates the temperature of the outdoor air.
Object_Duct_Static_Pressure_Setpoint	535	Integer: Values are 0 - 5 (inches of water column)	Read Only	Represents the Duct Static Pressure Setpoint of discharge air.
Object_Relative_ Humidity	536	Real: Values are 0 to 100 (%RH)	Read Write	Represents relative humidity of space air.
Object_CO2_Level	537	Real: Values are 300 to 2000 (PPM)	Read Write	Indicates the CO2 levels in the space air.

7. Object Definitions

7.1. Analog Output

Optional Properties Supported: Min_Pres_Value, Max_Pres_Value

Optional Writable Properties: Out_Of_Service

Analog output object's Overridden status flag set if the equivalent setpoint in the CORE Unit Controller is written to by some S-Bus device.

Table 13. Analog Output (AO) Objects List

Object ID	Object Name	Units	Min. Value	Max. Value	Valid Values within Range	CoV♦	CoV Increment†
101	Application Mode Control*	None	0	255	0, 1,3,6,9,208,209,216,217,218, 219, 220, 221, 222, 224, 225, 226, 227, 228, 229, 230, 232, 233, 234, 236, 254, 255	N/A	N/A
102	Outdoor Air Min Pos Control	Percent	0	255	all	N/A	N/A
103	Occupancy Override Control	None	0	255	all	N/A	N/A
104	Occupancy Scheduler Control	None	0	255	all	N/A	N/A
105	Device Instance Input	None	1	4194302	all	N/A	N/A
107	Occupancy Sensor Input	None	0	255	all	N/A	N/A
108	Space Dehumidification Setpoint	Percent	0	100	all	N/A	N/A
109	Temperature Setpoint (abs)	Deg. F	36.25	100	all	N/A	N/A
110	Temperature Setpoint Offset	Deg. F	-32	31.75	all	N/A	N/A
111	IAQ 1 Network Input	PPM	300	2000	all	N/A	N/A
112	Humidity Network Input	Percent	0	100	all	N/A	N/A
113	Space Temperature Input	Deg. F	36.25	100	all	N/A	N/A
114	Emergency Override Control	None	0	255	all	N/A	N/A
115	Compressor Enable Control	Percent	0	255	all	N/A	N/A
117	Primary Heat Enable Control	Percent	0	255	all	N/A	N/A
119	Auxiliary Heat Enable Control	Percent	0	255	all	N/A	N/A
123	Duct Static Setpoint	In. of water	0	5	all	N/A	N/A
124	Building Static Setpoint	In. of water	-0.5	0.5	all	N/A	N/A
125	Discharge Air Cooling Setpoint	Deg. F	40	100	-9,40-100*	N/A	N/A
126	Discharge Air Heating Setpoint	Deg. F	60	140	-9,60-140*	N/A	N/A
127	Supply Fan Capacity Input	Percent	33	255	all*	N/A	N/A
128	Exhaust Fan Capacity Input	Percent	25	255	all	N/A	N/A
129	Set Economizer Outdoor Air Suitable	None	0	255	all	N/A	N/A

* See "Application Details" on page 26 for limitations on data ranges.

♦ CoV - "Available" indicates this functionality is supported for Analog Output Objects. When these objects are subscribed and values are changed, the CORE Unit Controller will issue a notification to the subscriber.

† CoV Increment - "N/A" (not available) indicates this property is not supported for the object.

7.2. Analog Input

Optional Properties Supported: None

Optional Writable Properties: Out_Of_Service (AI239 - AI252, AI274 - AI285 only)

Table 14. Analog Input (AI) Objects List

Object ID	Object Name	Units	Data Range	CoV♦	CoV Increment†
198	Mac Address	None	0 - 127	N/A	N/A
199	IMC Address	None	1-31	N/A	N/A
200	IMC Version[4]	None	0, 46, 48 - 57	N/A	N/A
201	IMC Version[5]	None	0, 46, 48 - 57	N/A	N/A
202	IMC Version[6]	None	0, 46, 48 - 57	N/A	N/A
203	IMC Version[7]	None	0, 46, 48 - 57	N/A	N/A
204	IMC Version[8]	None	0, 46, 48 - 57	N/A	N/A
205	IMC Version[9]	None	0, 46, 48 - 57	N/A	N/A
206	IMC Version[10]	None	0, 46, 48 - 57	N/A	N/A
207	IMC Version[11]	None	0, 46, 48 - 57	N/A	N/A
208	IMC Version[12]	None	0, 46, 48 - 57	N/A	N/A
209	IMC Version[13]	None	0, 46, 48 - 57	N/A	N/A
210	IMC Version[14]	None	0, 46, 48 - 57	N/A	N/A
231	Unit ID	None	0 - 255	N/A	N/A
232	Unit Status	None	0 - 255	Available	Available
238	Mixed Air Temperature	Deg. F	-8.7 - 164.4	Available	Available
239	Space Temperature	Deg. F	63.75 - 100.0	Available	Available
240	Discharge Air Temperature	Deg. F	-8.7 – 164.4	Available	Available
241	Effective Occupancy	None	0 - 2	Available	Available
242	Local Outside Air Temperature	Deg. F	-30.6 – 131.6	Available	Available
243	Local Space Temperature	Deg. F	63.75 – 100.00	Available	Available
244	Outside Air Damper	Percent	0 - 100, 255	Available	Available
245	Heat Primary	Percent	0 – 100	Available	Available
246	Heat Secondary	Percent	0 – 100	Available	Available
247	Cool Primary	Percent	0 – 100	Available	Available
248	Economizer Enabled	None	0, 1, 255	Available	Available
250	Supply Fan Status	Percent	0 - 100	Available	Available
252	Space Temperature Setpoint (Eff)	Deg. F	40.0 – 95.0	Available	Available

♦ CoV - “Available” indicates this functionality is supported for Analog Output Objects. When these objects are subscribed and values are changed, the CORE Unit Controller will issue a notification to the subscriber.

† CoV Increment - “N/A” (not available) indicates this property is not supported for the object.

Table 14. Analog Input (AI) Objects List

Object ID	Object Name	Units	Data Range	CoV♦	CoV Increment †
253	Current Error	These legacy alarm reporting objects are obsolete. These obsolete objects are replaced with the new CSV 302 object, which lists the same alarm list information. All new BACnet installations should use the new CSV 302 object instead of the obsolete legacy objects for retrieving alarming information.			
254	Error Pointer				
255	Most recent Error 1				
256	Most recent Error 2				
257	Most recent Error 3				
258	Most recent Error 4				
259	Most recent Error 5				
260	Most recent Error 6				
261	Most recent Error 7				
262	Most recent Error 8				
263	Most recent Error 9				
264	Most recent Error 10				
273	IAQ 2 Effective Value	Volt	0 - 10	Available	Available
274	Space CO2 Sensor (Eff)	Parts-per-million	0 - 2000	Available	Available
275	Space CO2 Sensor (Local)	Parts-per-million	0 - 2000	Available	Available
276	Space Humidity (Eff)	Percent	0 - 100	Available	Available
277	Space Humidity (Local)	Percent	0 - 100	Available	Available
278	Dehumidification Setpoint (Eff)	Percent	0 - 100	Available	Available
279	Dehumidification Status	None	0 - 2	Available	Available
281	Return Air Temperature	Deg. F	-8.7 – 164.4	Available	Available
282	Building Static Pressure	Inches-of-water	-0.5 - 0.5	Available	Available
283	Duct Static Pressure	Inches-of-water	0 – 5.00	Available	Available
285	Exhaust Fan Status	Percent	0 - 100, 255	Available	Available
290 (applies to CORE Unit Controller only)	Filter Efficiency	No Unit	[1]-1 - 100	Available	Available
293	Modulating Compressor Demand	No Unit	[1]-1 - 100	Available	Available

* Not recommended for new installations; legacy support only

** Multiply the tonnage of the RTU with the value in CFM/ton to derive the value in CFM units.

1. A value of -1 indicates that a filter efficiency sensor is not installed or the reading is unavailable.

♦ CoV - "Available" indicates this functionality is supported for Analog Input Objects. When these objects are subscribed and values are changed, the CORE Unit Controller will issue a notification to the subscriber.

† CoV Increment - "N/A" (not available) indicates this property is not supported for the object.

7.3. Analog Value

Optional Properties Supported: None
Optional Writable Properties: Present_Value

Table 15. Analog Value (AV) Objects List

Object ID	Object Name	Units	Min. Value	Max. Value	Valid Values within Range	Note	CoV♦	CoV Increment†
1	Baud Rate Setting	None	9600	76800	9600, 19200, 38400, 76800	Only used for BACnet MS/TP configurations.	N/A	N/A
130	Heating Occupied Setpoint	Deg. F	40	95	all	For occupied and unoccupied setpoints considered separately, the heating setpoint must be lower than the cooling setpoint by at least the auto-changeover dead-band value set in CORE Unit Controller P153 (default 3°F).	Available	Available
131	Cooling Occupied Setpoint	Deg. F	40	95	all			
132	Heating Unoccupied Setpoint	Deg. F	40	95	all			
133	Cooling Unoccupied Setpoint	Deg. F	40	95	all			
142	IAQ Setpoint Start Open	PPM	0	2000	all	This object's value must be less than Object ID 143.	Available	Available
143	IAQ Setpoint Full Open	PPM	0	2000	all	This value must be greater than Object ID 142.	Available	Available
144	Free Cooling Temperature Sensible Setpoint	Deg. F	40	75	all	Unit must be configured for Dual Sensible Free Cooling.	Available	Available
145	Free Cooling Temperature Offset Setpoint	Deg. F	0	40	all	Unit must be configured for single sensible free cooling.	Available	Available
146	Free Cooling Enthalpy Setpoint	mA	10	19	all	Unit must be configured for single Enthalpy free cooling.	Available	Available
147	Free Cooling Enthalpy Offset Setpoint	mA	1	5	all	Allows Configuration of the Enthalpy Offset for Free Cooling.	Available	Available
148	After Hours Override Delay Setpoint	Minutes	0	480	all	Allows a custom override delay timer.	Available	Available
149	Heat Pump Dual Fuel Balance Point	Deg. F	-20	65	all	Dual Fuel Balance setpoint for switching to gas heat from mechanical compressor heating below this value. Default value following reset is local	Available	Available
150	Heat Pump Compressor Lockout Low Setpoint	Deg. F	-50	0	all	Low Ambient Heating Compressor Lockout Temperature Low setpoint for locking out mechanical compressor heating below this value. Default value following reset is local.	Available	Available

Table 15. Analog Value (AV) Objects List

Object ID	Object Name	Units	Min. Value	Max. Value	Valid Values within Range	Note	CoV♦	CoV Increment†
151	Heat Pump Compressor Lockout High Setpoint	Deg. F	-50	0	all	Low Ambient Heating Compressor Lockout Temperature High setpoint for re-enabling mechanical compressor heating above this value. Default value following reset is local.	Available	Available

♦ CoV - "Available" indicates this functionality is supported for Analog Value Objects. When these objects are subscribed and values are changed, the CORE Unit Controller will issue a notification to the subscriber.

† CoV Increment - "N/A" (not available) indicates this property is not supported for the object.

7.4. Character String Values

Optional Properties Supported: None

Optional Writable Properties: Present_Value

Table 16. Character String Values (CSV) Objects List

Object ID	Object Name	Units	Valid Values within Range	CoV♦	CoV Increment†
300	Unit Model String	String	String with unit model number.	N/A	N/A
301	Board Firmware Version	String	String with firmware version. Format of FW Version is XX.YY.ZZZZ.	N/A	N/A
302	Alarm Log	String	All Valid Alarm Values. Display string is a "," (comma) separated alarm codes. Last entry in the list is most recent error and first one is oldest.	Available	N/A
303 (applies to CORE Unit Controller only)	Unit Subcooling	String	Provides the unit circuit subcooling values for the unit. -9: Not Available 0 - 100: Subcooling for the circuit referenced.	Available	N/A
304 (applies to CORE Unit Controller only)	Unit Superheat	String	Provides the unit circuit Superheat values for the unit. -9: Not Available 0 - 100: Superheat for the circuit referenced.	Available	N/A
305	Compressor Runtime Hours	String	Provides the unit compressor runtime values for the unit. -1: Not Available (Does not have this compressor) 0 - XXXXXX: Hours the compressor has run.	Available	N/A

♦ CoV - "Available" indicates this functionality is supported for Character String Values Objects. When these objects are subscribed and values are changed, the CORE Unit Controller will issue a notification to the subscriber.

† CoV Increment - "N/A" (not available) indicates this property is not supported for the object.

7.5. Multi-State Values

Optional Properties Supported: None
Optional Writable Properties: Present_Value

Table 17. Multi-State Value (MSV) Objects List

Object ID	Object Name	Units	Valid Values	CoV♦	CoV Increment †
310	Mode of Operation	Multi-state value	1 : wired thermostat 2 : remote thermostat 3 : discharge air control 4 : room sensor operation 5 : unit has gone into backup operation	Available	N/A
311	Remote Handset Connection	Multi-state value	1: No Handset Connected 2: Handset Connected	Available	N/A
312	RTU Status	Multi-state value	1 – HVAC heat 2 – HVAC morning warmup 3 – HVAC cool 5 – HVAC pre-cool 6 – HVAC off 7 – HVAC test 8 – HVAC emergency heat 9 – HVAC fan only 12 – HVAC max heat 14 – HVAC dehumidification 30 – HVAC idle 31 – HVAC fresh air heating 32 – HVAC fresh air cooling 33 – HVAC defrost compressor 1 34 – HVAC defrost compressor 2 35 – HVAC defrost compressor 1 & 2	Available	N/A

♦ CoV - "Available" indicates this functionality is supported for Multi-State Value Objects. When these objects are subscribed and state values are changed, the CORE Unit Controller will issue a notification to the subscriber.

† CoV Increment - "N/A" (not available) indicates this property is not supported for the object.

8. Room Sensor Setpoints

- The CORE Unit Controller typically uses four setpoints and the zone temperature to operate the unit when a zone sensor is installed.
- When using the AO:109 single setpoint input, the CORE Unit Controller will use the zone temperature setpoint and Parameter 152 to determine the heat / cool setpoint in the occupied mode. During the unoccupied mode, the CORE Unit Controller will use the zone temperature setpoint and the difference between Parameter 140 and Parameter 138.
- See “Figure 1. CORE Unit Controller Default Setpoint Example (Room Sensor Installed)” for an example of setpoints when the CORE Unit Controller is operating using parameter default values.
- As an alternative, the individual setpoints AV:130-133 may be used. The CORE Unit Controller uses whatever were the last setpoints received, whether from AO:109-110, or AV:130-133.

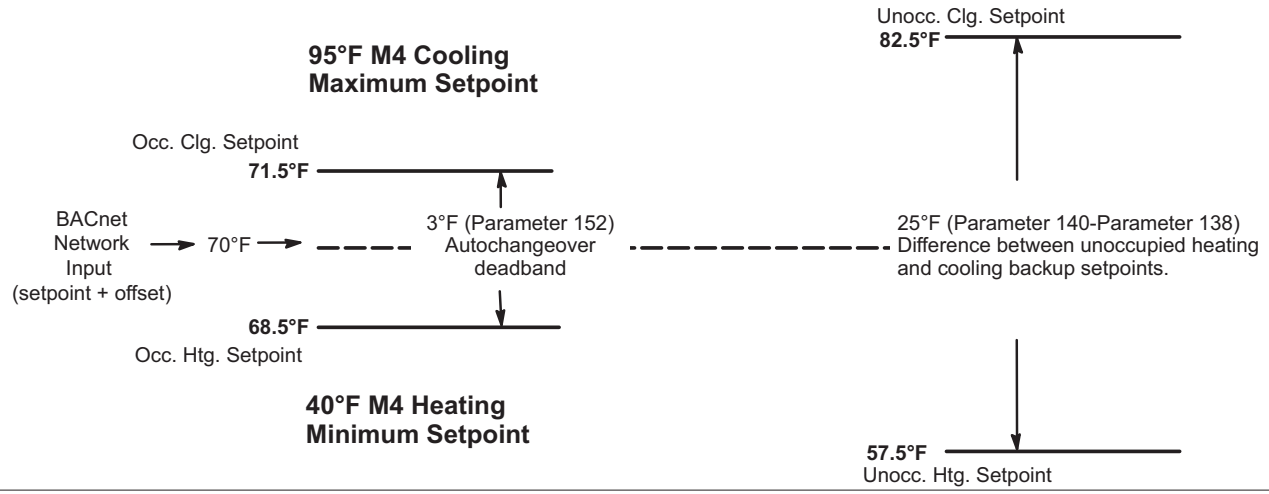


Figure 1. CORE Unit Controller Default Setpoint Example (Room Sensor Installed)

9. Application Details

Object Name: **Application Mode Control**
Object Type: AO (Analog Output)
Object ID: 101
Object Units: (95) No_Units
Value = (See tables below). Set the application mode input to Value.

The CORE Unit Controller can be set locally during commissioning to operate in either of two modes: remote zone sensor control mode (with local or remote zone sensor), or remote thermostat control mode. Several application mode command values are recognized by either room sensor mode, while some can only be used when the CORE Unit Controller is in the remote thermostat control mode.

Table 18. Common Application Mode Values

Value	Mode	Description
0 $00	AUTO	Heating or cooling. AUTO is the default application mode after RTU comes out of reset/power cycle.
1 $01	HEAT	Heating only.
3 $03	COOL	Cooling only.
6 $06	OFF	Unit off.
9 $09	FAN ONLY	No heating or cooling allowed.
255 $FF	NUL	Same as AUTO.
208 $D0	FAN AUTO	Default after reset. Blower is controlled by CORE as configured in Parameter 154.
209 $D1	FAN ON	Blower On. CORE disregards configuration set in Parameter 154.
216 $D8	EXHAUST AUTO	Power exhaust fan auto. Default after reset.
217 $D9	EXHAUST1 ON	First stage power exhaust fan on.
218 $DA	EXHAUST1 OFF	1st stage power exhaust fan off.
219 $DB	EXHAUST2 ON	2nd stage power exhaust fan on.
220 $DC	EXHAUST2 OFF	2nd stage power exhaust fan off.
221 $DD	EXHAUST ON	Both stages of power exhaust fan on.
222 $DE	EXHAUST OFF	Both stages of power exhaust fan off.
254 $FE	RESET	Force controller reset.

- The four command groups (0-9), (208-209), (216-222), and (224-236, see below) are independent of each other. Selecting a command from one group does not affect any previously sent command from another group. Except for OFF and RESET, which also set FAN AUTO, EXHAUST AUTO, and heat/cool demand IDLE.
- AUTO is the default application mode input. When in a remote zone sensor mode, AUTO allows the CORE Unit Controller to generate heating and cooling demands based on zone temperature and zone temperature setpoint. Auxiliary functions such as dehumidification or emergency override (i.e. smoke mode) will still operate as needed. Also the blower and exhaust fan functions operate.
- HEAT and COOL allow the servicing of only heating or cooling demands. These set a mode only, and do not generate a demand.
- Application mode OFF is a unit-disable state, causing the controller to become idle, and clearing all outputs and timers. All outputs are kept off while application mode is OFF. Since this is a complete unit-disable command, it should not be used to turn off heating and cooling demands as part of remote thermostat operation - use 224 IDLE for that purpose. See below.
- Application mode FAN ONLY disables heating and cooling operation. No effect on fan operation. Return to normal operation with AUTO, HEAT, or COOL.
- Application modes FAN ON and FAN AUTO are used to turn on the main unit fan (blower), or return it to automatic operation.
- Application modes for EXHAUST ON are used to turn on/off a power exhaust fan, or to return it to automatic operation. The CORE Unit Controller may delay up to 30 seconds before responding to an exhaust command. These commands apply to single-, two-, and variable-speed power exhausts. A variable-speed exhaust is enabled here, while the speed is adjusted using AO:128, the Exhaust Fan Capacity Input.
- Application mode RESET causes the system to reset itself and go through the controller start-up and initialization routines. This takes about 8 seconds in an CORE Unit Controller, during which time the analog and digital inputs are settling to correct values. The controller will return to AUTO operation.
- AUTO and EXHAUST AUTO are the defaults after reset.
- Fan mode operation will default to CORE Unit Controller Parameter 154 unless FAN AUTO or FAN ON are written to.

9.1. Application Modes Specific To Remote Thermostat Operation

These values are only recognized if the CORE Unit Controller is placed in a remote thermostat mode of operation (set locally during commissioning).

Table 19. Remote Thermostat Mode

Value	Mode	Y2	Y1	W2	W1	D	Description
224 $E0	IDLE	0	0	0	0	0	Heat / Cool off. Default after reset.
228 $E4	COOL1	0	1	0	0	0	Cool 1.
232 $E8	COOL2	1	0	0	0	0	Cool 2.
233 $E9	DEHUM	0	0	0	0	1	Dehum
234 $EA	DHUM + COOL	0	1	0	0	1	Dehum + Cool
236 $EC	COOL3	1	1	0	0	0	Cool 3. Full cooling.
225 $E1	HEAT1	0	0	0	1	0	Heat 1.
226 $E2	HEAT2	0	0	1	0	0	Heat 2.
227 $E3	HEAT3	0	0	1	1	0	Heat 3. Full heating.
229 $E5	REHEAT LO	0	1	0	1	0	Supermarket Reheat (lo)
230 $E6	REHEAT HI	0	1	1	1	0	Supermarket Reheat (hi)

- For all $E(x) values the fan runs if it is already on, otherwise the fan turns on after a fan on-delay. For $E0 the fan turns off after a fan off-delay.
- COOL2 and COOL3 are equivalent unless 3-stage cooling has been selected locally at the controller during commissioning.
- HEAT2 and HEAT3 are equivalent except in heat pump equipment types, when HEAT2 acts as “emergency heat”, running auxiliary strip heat and turning off the compressor(s). So in a heat pump, normal heating is commanded using HEAT1 or HEAT3. REHEAT LO and REHEAT HI can only be used if Supermarket Reheat is enabled for the CORE Unit Controller using Parameter 105.
- If a mode not defined in the above list is sent, then the application mode is not changed.
- When an CORE Unit Controller is commissioned for BACnet® gateway remote thermostat operation, it will wait for five minutes following start-up to receive application mode data. The CORE Unit Controller will remain in AUTO mode until data is received, or until the 5-minute period has expired.
- If five minutes passes without data being received, then the CORE Unit Controller will enter the backup mode of operation (set locally during commissioning).
- It is recommended that the application mode data be updated at intervals of no more than two minutes to be sure that a single missed-data event will not constitute an application mode data failure. Any application mode data will serve as a valid update; either common or remote thermostat values.
- If application mode data appears while the CORE Unit Controller is in a backup mode, then the CORE Unit Controller will reset and normal operation will resume.

9.2. Object IDs

9.2.1. Analog Outputs (AO)

Table 20. Object ID 101

Object Name:	Application Mode Control
Object Type:	AO (Analog Output)
Object Units:	(95) No_Units
Value:	0, 1,3,6,9,208,209,216,217,218, 219, 220, 221, 222, 224, 225, 226, 227, 228, 229, 230, 232, 233, 234, 236, 254, 255
Details:	See “Application Details” on page 26 and “Application Modes Specific To Remote Thermostat Operation” on page 28.

Table 21. Object ID 102

Object Name:	Outdoor Air Min Pos Control
Object Type:	AO (Analog Output)
Object Units:	(98) Percent
Value:	0 - 255
Details:	0 -100: Set the minimum position of the outdoor air economizer damper; % open. 101 - 255: Relinquish to local control. Min damper position depends on the setting in CORE Unit Controller Parameter 132: Parameter 132 = 101: Min damper position set by Parameter 132. A value written to AO102 will take priority over any locally set damper positions. A minimum damper position, either locally set or set via AO102, is only valid when the unit is occupied and the blower is operating. The damper will be closed if the unit is not occupied and the blower is not operating. The default value after reset is the locally configured value.

Table 22. Object ID 103

Object Name:	Occupancy Override Control
Object Type:	AO (Analog Output)
Object Units:	(95) No_Units
Value:	0 - 255
Details:	0: space occupied 1: space unoccupied 2: refresh space occupied timer defined at local controller 3 - 255: auto; clear timer and return to occupancy scheduler state Default value following reset is 255 (auto).

Table 23. Object ID 104

Object Name:	Occupancy Scheduler Control
Object Type:	AO (Analog Output)
Object Units:	(95) No_Units
Value:	0 - 255
Details:	0: space occupied 1-255: space unoccupied Default value following reset is determined by Parameter 225. Once a value for AO:104 is received, the Parameter 225 value is ignored.

Table 24. Object ID 105

Object Name:	BACnet Device Instance
Object Type:	AO (Analog Output)
Object Units:	(95) No_Units
Value:	1 - 4194302
Details:	Device ID, it must be unique in the BACnet network. For MS/TP , 2 is the default value.

Table 25. Object ID 107

Object Name:	Occupancy Sensor Input
Object Type:	AO (Analog Output)
Object Units:	(95) No_Units
Value:	0 - 255
Details:	0: occupancy sensor indicates space occupied 1: occupancy sensor indicates space unoccupied 2-255: auto; return to occupancy scheduler state Default value following reset is 255 (auto).

Table 26. Object ID 108

Object Name:	Space Dehumidification Setpoint
Object Type:	AO (Analog Output)
Object Units:	(99) Percent
Value:	0 - 100
Details:	0 - 100: % relative humidity setpoint Dehumidification begins when the effective space relative humidity rises to this setpoint value. The default following reset is local control. Once an executive controller has sent a setpoint for AO:108, there is no way to return to the local setpoint except by controller reset. Dehumidification ends when the effective space relative humidity falls below this setpoint value minus a dehumidification dead-band that is typically 3%. The dead-band value is set locally during commissioning.

Table 27. Object ID 109

Object Name:	Temperature Setpoint (abs)
Object Type:	AO (Analog Output)
Object Units:	(64) Degrees-Fahrenheit
Value:	36.25 – 100.00°F, in 0.25°F increments
Details:	The single-point temperature setpoint (abs) (including offset; see below) is converted locally to occupied and unoccupied heating and cooling setpoints. The occupied and unoccupied heating and cooling setpoints are computed to be centered (if possible) on the effective single-point setpoint. This is done while preserving the occupied and unoccupied dead-bands, as well as any local restrictions on minimum or maximum values. The default following reset is 70°F, but local values are used for the heating and cooling (occupied and unoccupied) setpoints until a value is received for AO:109. As an alternative method of establishing setpoints, the individual setpoints AV:130-133 may be used. The CORE Unit Controller uses whatever were the last setpoints received, whether from AO:109-110, or AV:130-133. The occupied heat/cool auto-changeover dead-band value is set locally during commissioning. The unoccupied heat/cool auto-changeover dead-band value is set locally during commissioning by adjusting the backup unoccupied heating and cooling setpoints. The difference between these setpoints will be used as the unoccupied heat/cool auto-changeover dead-band value.

Table 28. Object ID 110

Object Name:	Temperature Setpoint Offset
Object Type:	AO (Analog Output)
Object Units:	(64) Degrees-Fahrenheit
Value:	-32.00 – 31.75°F, in 0.25°F increments
Details:	A signed value added to the temperature setpoint (abs) value to provide an effective temperature setpoint. See above regarding dead-bands and limits. The default following reset is 0°F.

Table 29. Object ID 111

Object Name:	IAQ 1 Network Input
Object Type:	AO (Analog Output)
Object Units:	(96) PPM
Value:	300 - 2000
Details:	A network value for the space IAQ 1 (CO_2 Sensor) input. If configured correctly, the CORE Unit Controller will utilize this value as the effective CO_2 value for Demand Control Ventilation. It is recommended that network data be updated at intervals of no more than 2 minutes to be sure that a single missed-data event will not constitute a data update failure. If data appears after a sensor failure is processed, it will be treated as an intermittent sensor. Normal operation will resume.

Table 30. Object ID 112

Object Name:	Humidity Network Input
Object Type:	AO (Analog Output)
Object Units:	(98) Percent
Value:	0 - 100
Details:	A network value for the space humidity input. If configured correctly, the CORE Unit Controller will utilize this value as the effective Humidity value for dehumidification. It is recommended that network data be updated at intervals of no more than 2 minutes to be sure that a single missed-data event will not constitute a data update failure. If data appears after a sensor failure is processed, it will be treated as an intermittent sensor. Normal operation will resume.

Table 31. Object ID 113

Object Name:	Space Temperature Input
Object Type:	AO (Analog Output)
Object Units:	(64) Degrees-Fahrenheit
Value:	36.25 – 100.00°F, in 0.25°F increments
Details:	A network value for the space temperature. Heating and cooling demands are generated based on the space temperature Input, and the Temperature Setpoint (abs) and Temperature Setpoint Offset values. The default following reset is 72.5°F. • When a CORE Unit Controller is commissioned for BACnet® gateway remote room sensor operation, it will wait for 5 minutes following start-up to receive space temperature data. The CORE Unit Controller will remain in a no-run mode until data is received, or until the 5 minute period has expired. • If 5 minutes passes without data being received, then the CORE Unit Controller begins to use local data for the space temperature. If a local sensor is connected then it will be used. If not, then a failed-sensor error is recorded and the CORE Unit Controller will enter the backup mode of operation (set locally during commissioning). • It is recommended that network data be updated at intervals of no more than 2 minutes to be sure that a single missed-data event will not constitute a data update failure. • If data appears after a sensor failure is processed, it will be treated as an intermittent sensor. Normal operation will resume. If the CORE Unit Controller is in a backup mode, then it will reset before resuming.

Table 32. Object ID 114

Object Name:	Emergency Override Control
Object Type:	AO (Analog Output)
Object Units:	(95) No_Units
Value:	0 - 255
Details:	Set the emergency mode defined by value, decoded as:

Value	Mode	Supply Fan	Exhaust Fan	Outdoor Damper
0	NORMAL	auto	auto	auto
1	PRESSURIZE	on	off	open
2	DEPRESSURIZE	off	on (speed)	closed
3	PURGE	on	on (speed)	open
4	SHUTDOWN	off	off	closed
5	FIRE			
6	DEPRESSURIZE	off	on (pressure)	closed
7	PURGE	on	on (pressure)	open
>7	NUL (normal)	auto	auto	auto

- (auto) - normal operation
- (speed) - exhaust fan runs at speed pre-selected at equipment
- (pressure) - exhaust fan runs to maintain building press setpoint; local or remote

Mode 5, FIRE, is a locally defined operation (set at commissioning). For units without VFD exhaust fans, modes 6-7 are the same as 2-3. The default following reset is 0 (NORMAL).

Table 33. Object ID 115

Object Name:	Compressor Enable Control
Object Type:	AO
Object Units:	(98) Percent
Value:	0 - 255
Details:	0: output disabled 1-100: output limited to 1 – 100% of maximum 101-255: maximum output permitted

The following table shows the value where the indicated compressor stage is disabled, for equipment having the indicated maximum number of compressor stages:

Number of Stages on Unit	Stage is Disabled when Value < X			
	Stage 1	**Stage 2**	**Stage 3**	**Stage 4**
1	Value < 50			
2	Value < 33	Value < 66		
3	Value < 25	Value < 50	Value < 75	
4	Value < 20	Value < 40	Value < 60	Value < 80

Free cooling using an economizer with outdoor air is not considered a stage. Only compressors are considered to be stages. All compressors installed are included, however they are being used; sensible cooling, condenser reheat (latent cooling), or heat pump heating. The default following reset is 100%.

Disabled stages are re-enabled at the above values plus 3% hysteresis.

Ultra-High Efficiency 3 - 6 ton units behave as a single stage unit with respect to AO115. A value less than 50 disables compressor operation. A value greater than or equal to 53 enables compressor operation. Compressor speed is determined locally.

For 3 - 6 ton (LGM/LCM) units, values less than 40% will disable the compressor. Values between 40 and 100 will limit the max compressor Hz to the written % of max Hz.

3 - 6 Ton (LGM/LCM) Units	
Value	Compressor
0 - 40%	Disabled
40 - 100%	Max Hz limited to given value

Table 34. Object ID 117

Object Name:	Primary Heat Enable Control
Object Type:	AO (Analog Output)
Object Units:	(98) Percent
Value:	0 - 255
Details:	0: output disabled 1-100: output limited to 1 – 100% of maximum 101-255: maximum output permitted The table shown above for Compressor Enable Control can also be applied here to the Primary Heat Enable Control. It shows the value where the indicated primary heating stage is disabled, for equipment having the indicated maximum number of primary heating stages. The default following reset is 100%.

Table 35. Object ID 119

Object Name:	Auxiliary Heat Enable Control
Object Type:	AO (Analog Output)
Object Units:	(98) Percent
Value:	0 - 255
Details:	0: output disabled 1-100: output limited to 1 – 100% of maximum 101-255: maximum output permitted It shows the value where the indicated auxiliary heating stage is disabled, for equipment having the indicated maximum number of auxiliary heating stages. The default following reset is 100%.

Table 36. Object ID 123

Object Name:	Duct Static Setpoint
Object Type:	AO (Analog Output)
Object Units:	(58) Inches-of-water
Value:	0.0 - 5.0 inWC
Details:	The setpoint for control of duct static pressure, in inches of water column. The main blower speed or bypass damper setting is varied to maintain this value. The setpoint can be selected from the range of 0.0 to 5.0 inches of water column. The default following reset is local control. Once an executive controller has sent a setpoint for AO:123, there is no way to return to the local setpoint except by controller reset. AO123 is supported by: • Units with CAV (with bypass damper) blower • Multi-Zone VAV Configured Units

Table 37. Object ID 124

Object Name:	Building Static Setpoint
Object Type:	AO (Analog Output)
Object Units:	(58) Inches-of-water
Value:	-0.5 - 0.5 inWC
Details:	The setpoint for control of building static pressure, in inches of water column for power exhaust operation with building pressure control. The exhaust blower is cycled or, if a VFD is used, its speed is varied to maintain this value. For VFD power exhaust operation with a 2-stage power exhaust, the first stage is enabled based on the AO124 setpoint and stage two will be enabled based on the Exhaust Fan Stage 2 Pressure Setpoint (parameter 221) in the CORE controller. For details on power exhaust staging, refer to the Power Exhaust Operations section in the Lennox® CORE Control System (Unit Controller) Application Guide. The setpoint can be selected from the range of -0.5 to +0.5 inches of water column. The default following reset is local control. Once an executive controller has sent a setpoint for AO:124, there is no way to return to the local setpoint except by controller reset.

Table 38. Object ID 125

Object Name:	Discharge Air Cooling Setpoint
Object Type:	AO (Analog Output)
Object Units:	(64) Degrees-Fahrenheit
Value:	40 - 100°F, and -9°F
Details:	The setpoint for control of discharge (or supply) air temperature during cooling. When the controller is in the correct mode of operation, sending this setpoint will cause cooling components to cycle, or vary their output, in order to maintain this temperature in the leaving air stream. The setpoint can be selected from the range of 40°F to 100°F. Selecting a value of -9°F causes the control to revert to the use of its locally programmed setpoint. Default value following reset is -9 (local). This Object will control the setpoint in both Discharge Air Control Cooling (DACC) and Single-Zone Variable Air Volume (SZVAV) Standard Cooling.

Table 39. Object ID 126

Object Name:	Discharge Air Heating Setpoint
Object Type:	AO (Analog Output)
Object Units:	(64) Degrees-Fahrenheit
Value:	60 - 140°F, and -9°F
Details:	The setpoint for control of discharge (or supply) air temperature during heating. When the controller is in the correct mode of operation, sending this setpoint will cause heating components to cycle, or vary their output, in order to maintain this temperature in the leaving air stream. The setpoint can be selected from the range of 60°F to 140°F. Selecting a value of -9°F causes the control to revert to the use of its locally programmed setpoint. Default value following reset is -9 (local). This Object will control the setpoint only in Discharge Air Control Heating (DACH) operation.

Table 40. Object ID 127

Object Name:	Supply Fan Capacity Input
Object Type:	AO (Analog Output)
Object Units:	(98) Percent
Value:	33 - 255
Details:	33 - 100: Set the supply fan capacity as a % of maximum speed. 101-255: Relinquish to local control. Supply fan capacity depends on CORE Unit Controller parameter values. Supply fan capacity is only effective when the main blower is running. Minimum value is limited by parameter 28 (if heating) or parameter 27 (if cooling/ventilation/smoke). Use of this object is not recommended while the unit is in a discharge control mode of operation (cooling or DACH).

Table 41. Object ID 128

Object Name:	Exhaust Fan Capacity Input
Object Type:	AO (Analog Output)
Object Units:	(98) Percent
Value:	25-255
Details:	Exhaust fan capacity is only effective when the exhaust fan is running. Default value following reset is 255 (local).

Table 42. Object ID 129

Object Name:	Set Economizer Outdoor Air Suitable
Object Type:	AO (Analog Output)
Object Units:	(95) No_Units
Value:	0 - 255
Details:	0: Economizer disable 1: Economizer enable >1: Economizer to auto When outdoor air is determined to be suitable for free cooling, the economizer feature will operate (if installed) on a first stage cooling call to use outdoor air instead of mechanical cooling. AO:129 is used to allow an executive controller to set the state of outdoor air suitability (OAS). It can be enabled, disabled, or left for the local controller to determine. BACnet control of the economizer requires the CORE Unit Controller is configured for Economizer temperature Mode. Run the CORE Unit Controller install wizard to verify that Configuration ID 1, position 2 is set to T for Temperature. Default value following reset is 255 (auto).

9.2.2. Analog Inputs (AI)

Table 43. Object ID 198

Object Name:	MAC Address
Object Type:	AI (Analog Input)
Object Units:	(95) No_Units
Value:	0 - 127
Details:	Selectable BACnet MAC address. By default, this value equals the L Connection address.

Table 44. Object ID 199

Object Name:	IMC Address
Object Type:	AI (Analog Input)
Object Units:	(95) No_Units
Value:	1 - 31
Details:	Selectable L Connection address (1-31). This address is used for L Connection network.

Table 45. Object ID 200, 201, 202, 203, 204, 205, 206, 207, 208, 209, 210

Object Name:	IMC Version[04], IMC Version[05],..., IMC Version[14]
Object Type:	AI (Analog Input)
Object Units:	(95) No_Units
Value:	0, 46, 48 - 57
Details:	0: end of string 46: “.” 48: “0” … 57: “9” Each value is the ASCII code of a character in the CORE Unit Controller version number. The version number is found in a null-terminated string, most-significant-character first, beginning in IMC Version[04]. Maximum length is 11 characters, including null i.e. (XX.YY.ZZZZ + null) ***NOTE:*** *Not recommended for new installations. Read device object property Application_Software_Version instead. For BACnet version read device object property Firmware_Revision.*

Table 46. Object ID 231

Object Name:	Unit ID
Object Type:	AI (Analog Input)
Object Units:	(95) No_Units
Value:	0 - 255
Details:	48-63: gas heat, electric cool 64-79: electric heat, electric cool 80-95: electric heat pump, with or without electric resistive heat

Table 47. Object ID 232

Object Name:	Unit Status
Object Type:	AI (Analog Input)
Object Units:	(95) No_Units
Value:	0 - 255
Details:	0 – HVAC idle 1 – HVAC heat 2 – HVAC morning warmup 3 – HVAC cool 5 – HVAC pre-cool 6 – HVAC off 7 – HVAC test 8 – HVAC emergency heat 9 – HVAC fan only 12 – HVAC max heat 14 – HVAC dehumidification 129 – HVAC fresh air heating 131 – HVAC fresh air cooling 177 – HVAC defrost compressor 1 & 2 145 – HVAC defrost compressor 1 161 – HVAC defrost compressor 2

Table 48. Object ID 239

Object Name:	Space Temperature
Object Type:	AI (Analog Input)
Object Units:	(64) Degrees-Fahrenheit
Value:	63.75 – 100.00 °F, in 0.25 °F increments
Details:	Space temperature from local CORE Unit Controller sensor, or from Space Temperature Input. This is the actual value being used by the CORE Unit Controller. Its source is either a locally wired temperature sensor (see “Local Space Temperature) or the network input (see Space Temperature Input).

Table 49. Object ID 240

Object Name:	Discharge Air Temperature
Object Type:	AI (Analog Input)
Object Units:	(64) Degrees-Fahrenheit
Value:	-8.7 – 164.4 °F, in 0.7 °F increments
Details:	Discharge air temperature measurement from the local sensor.

Table 50. Object ID 241

Object Name:	Effective Occupancy
Object Type:	AI (Analog Input)
Object Units:	(95) No_Units
Value:	0 - 2
Details:	0: space occupied 1: space unoccupied 2: space occupied (timed override) The occupancy override timer is established locally for each controller during system commissioning. The Effective Occupancy depends on the Occupancy Scheduler Control, the Occupancy Override Control, and the “Occupancy Sensor Input. The local CORE Unit Controller occupied input is ignored when a BACnet® interface is used.

Table 51. Object ID 242

Object Name:	Local Outside Air Temperature
Object Type:	AI (Analog Input)
Object Units:	(64) Degrees-Fahrenheit
Value:	-30.6 – 131.6 °F, in 0.6 °F increments
Details:	Outdoor air temperature measurement from the local sensor.

Table 52. Object ID 243

Object Name:	Local Space Temperature
Object Type:	AI (Analog Input)
Object Units:	(64) Degrees-Fahrenheit
Value:	63.75 – 100.00 °F, in 0.25 °F increments
Details:	Space temperature from the local temperature sensor.

Table 53. Object ID 244

Object Name:	Outside Air Damper
Object Type:	AI (Analog Input)
Object Units:	(98) Percent
Value:	0 – 100, 255
Details:	0 - 100: Outdoor air damper position. Percent-open. 255: No damper. This is a measure of the feedback voltage from the damper motor. The 2-10V feedback signal is converted to 0-100% open damper position provided by AI:244. There is frequently some offset between the indicated damper position given by AI:244 and the physical damper position.

Table 54. Object ID 245

Object Name:	Heat Primary
Object Type:	AI (Analog Input)
Object Units:	(98) Percent
Value:	0 – 100
Details:	0 - 100: Current level of the primary heating capacity. This is based on the number of gas stages operating in a gas/electric unit, or compressors operating in a heat pump, or electric resistance stages operating in an electric/electric unit.

Table 55. Object ID 246

Object Name:	Heat Secondary
Object Type:	AI (Analog Input)
Object Units:	(98) Percent
Value:	0 – 100
Details:	0 - 100: Current level of the secondary heating capacity. This is auxiliary (electric resistance “strip”) heat in a heat pump. Whether it is on in addition to the primary heat (compressor), or as emergency heat while the compressor is locked-out.

Table 56. Object ID 247

Object Name:	Cool Primary
Object Type:	AI (Analog Input)
Object Units:	(98) Percent
Value:	0 – 100
Details:	0 - 100: Current level of the primary cooling capacity. This is based on the number of compressors operating. There is no secondary cooling.

Table 57. Object ID 248

Object Name:	Economizer Enabled
Object Type:	AI (Analog Input)
Object Units:	(95) No_Unit
Value:	0 – 1, 255
Details:	0: Economizer is disabled. 1: Economizer is enabled (outdoor air is suitable for free cooling). 255: No economizer. The enabled state only indicates that the CORE Unit Controller has determined that the outdoor air is suitable for free cooling. The unit is actually executing free cooling operation if “Economizer Enabled” is 1, and “Unit Status” is 3, 5, or 131.

Table 58. Object ID 250

Object Name:	Supply Fan Status
Object Type:	AI (Analog Input)
Object Units:	(98) Percent
Value:	0 – 100
Details:	0: Supply fan off. 1: Supply fan on (single-speed fan). 2 - 100: Supply fan on (variable-speed fan; percent of full speed).

Table 59. Object ID 252

Object Name:	Space Temperature Setpoint (Eff)
Object Type:	AI (Analog Input)
Object Units:	(64) Degrees-Fahrenheit
Value:	40.0 – 95.0°F, in 0.25°F increments
Details:	The effective space temperature setpoint, which depends on: • Current “Temperature Setpoint (abs)” • Current “Temperature Setpoint Offset” • Current “Effective Occupancy” • Most recent heating or cooling demand indicated by “Unit Status” • Any local setpoint adjustment • Heating and cooling deadbands and differentials set at system commissioning Most recent heating or cooling demand indicated by “Unit Status”, any local setpoint adjustment, and heating and cooling dead-bands and differentials set at system commissioning.

Table 60. Object ID 253

Object Name:	Current Error
Object Type:	AI (Analog Input)
Object Units:	(95) No_Units
Value:	0 - 1024 0: If no alarm is active.
Details:	***NOTE: Use CSV 302 for all new installations.*** • This is the code for the currently occurring alarm condition, if any. If no alarm is currently in progress, then the value is 0. If the value is not zero, then “Current Error” and “Most Recent Error 1” will be equal. Refer to the CORE Unit Controller Setup Guide for alarm code descriptions. • CoV and CoV increment is available for this object.

Table 61. Object ID 254

Object Name:	Error Pointer
Object Type:	AI (Analog Input)
Object Units:	(95) No_Units
Value:	0 - 1024
Details:	***NOTE: Use CSV 302 for all new installations.*** Provide total number of Active alarms present in the RTU at the time of read.

Table 62. Object ID 255, 256, 257, 258, 259, 260, 261, 262, 263 and 264

Object Name:	Most recent Error 1 Most recent Error 2 • • • Most recent Error 10
Object Type:	AI (Analog Input)
Object Units:	(95) No_Units
Value:	0 - 1024 0: If no alarm is active.
Details:	***NOTE: Use CSV 302 for all new installations.*** • These are the ten most recently occurring diagnostic codes; “Most recent Error 1” is the most recent. • This is a first-in first-out buffer. Error codes are stored as they occur, and no filtering is done with respect to duplication or error code severity or priority. • When another error code is logged at “Most recent Error 1”, the value in “Most recent Error 10” is lost, being replaced by “Most recent Error 9”. • Refer to the CORE Unit Controller setup guide for alarm code descriptions. • Refer to object CSV 302 for the alarm log condensed into one object. This object is maintained for legacy support.

Table 63. Object ID 273

Object Name:	IAQ 2 Effective Value
Object Type:	AI (Analog Input)
Object Units:	(5) Volts
Value:	0 - 10
Details:	This is the actual value being used by the CORE Unit Controller and is the value measured at the CORE Unit Controller..

Table 64. Object ID 274

Object Name:	Space CO2 Sensor (Eff)
Object Type:	AI (Analog Input)
Object Units:	(96) Parts-per-million
Value:	0 - 2000
Details:	0 - 6: no sensor 7 - 1992: valid CO_2 measurement 1993 - 2000: sensor error This is the effective CO_2 (IAQ1) measurement being used by the CORE Unit Controller based on its configuration. See AI275 and AO111 for the sources of this measurement.

Table 65. Object ID 275

Object Name:	Space CO2 Sensor (Local)
Object Type:	AI (Analog Input)
Object Units:	(96) Parts-per-million
Value:	0 - 2000
Details:	0 - 6: no sensor 7 - 1992: valid CO_2 measurement 1993 - 2000: sensor error This is the current value of the local sensor (if attached) to the CORE Unit Controller's SmartWire terminals.

Table 66. Object ID 276

Object Name:	Space Humidity (Eff)
Object Type:	AI (Analog Input)
Object Units:	(98) Percent
Value:	0 - 100
Details:	0: no sensor 1 - 99: valid relative humidity measurement 100: sensor error This is the effective humidity measurement being used by the CORE Unit Controller based on its configuration. See AI277 and AO112 for the sources of this measurement.

Table 67. Object ID 277

Object Name:	Space Humidity (Local)
Object Type:	AI (Analog Input)
Object Units:	(98) Percent
Value:	0 - 100
Details:	0: no sensor 1 - 99: valid relative humidity measurement 100: sensor error This is the current value of the local sensor (if attached) to the CORE Unit Controller's SmartWire terminals.

Table 68. Object ID 278

Object Name:	Dehumidification Setpoint (Eff)
Object Type:	AI (Analog Input)
Object Units:	(98) Percent
Value:	0 - 100
Details:	Relative humidity setpoint for dehumidification operation. Deadband is set locally during commissioning.

Table 69. Object ID 279

Object Name:	Dehumidification Status
Object Type:	AI (Analog Input)
Object Units:	(95) No_Units
Value:	0 - 2
Details:	0: No dehumidification installed. 1: Dehumidification installed but not running. 2: Dehumidification installed and running.

Table 70. Object ID 281

Object Name:	Return Air Temperature
Object Type:	AI (Analog Input)
Object Units:	(64) Degrees-Fahrenheit
Value:	-8.7 – 164.4°F, in 0.7°F increments
Details:	Unit return air temperature measurement from an attached CORE Unit Controller sensor.

Table 71. Object ID 282

Object Name:	Building Static Pressure
Object Type:	AI (Analog Input)
Object Units:	(58) Inches-of-water
Value:	-0.500 – 0.500 inWC, in 0.004 inWC increments
Details:	Building (space) static pressure measurement from and attached CORE Unit Controller sensor.

Table 72. Object ID 283

Object Name:	Duct Static Pressure
Object Type:	AI (Analog Input)
Object Units:	(58) Inches-of-water
Value:	0.00 – 5.00 inWC, in 0.02 inWC increments
Details:	Duct (supply) static pressure measurement from an attached CORE Unit Controller sensor.

Table 73. Object ID 285

Object Name:	Exhaust Fan Status
Object Type:	AI (Analog Input)
Object Units:	(98) Percent
Value:	0 - 100
Details:	

Table 74. Object ID 293

Object Name:	Modulating Compressor Demand
Object Type:	AI (Analog Input)
Object Units:	(95) No_Units
Value:	-1 to 100
Details:	0-100 indicates current operating percentage for Model L equipment. Exception: 092 model numbers with AI247 @ 100%; this AI293 will be 68%, which indicates equipment is at max cooling.

9.2.3. Analog Values (AV)

Table 75. Object ID 1

Object Name:	Baud Rate Setting
Object Type:	AV (Analog Value)
Object Units:	(95) No Units
Value:	9600, 19200, 38400, 76800
Details:	Only applicable when setup for MS/TP operation. Default value following reset/power cycle is 38400, but this can be changed by other means, see the CORE Unit Controller setup guide for details.

Table 76. Object ID 130

Object Name:	Heating Occupied Setpoint
Object Type:	AV (Analog Value)
Object Units:	(64) Degrees-Fahrenheit
Value:	40 - 95
Details:	Occupied heating setpoint. Default value following reset is local. As an alternative method of establishing setpoints, the single setpoint AO:109 and offset AO:110 may be used. The CORE Unit Controller uses whatever were the last setpoints received, whether from AO:109-110, or AV:130-133. To be considered in range the values for AV:130, 131, 132, and 133 must be in the range 40-95, and the heating setpoint must be less than the corresponding (occupied or unoccupied) cooling setpoint by at least the auto-changeover dead-band value set in the CORE Unit Controller Parameter 152 (default 3°F, 2-10°F range). If any of these condition is are violated, BACnet will return an out of range message. The AVs 130-133 can be used instead of the single setpoint and offset AO:109 and AO:110.

Table 77. Object ID 131

Object Name:	Cooling Occupied Setpoint
Object Type:	AV (Analog Value)
Object Units:	(64) Degrees-Fahrenheit
Value:	40 - 95
Details:	Occupied cooling setpoint. Default value following reset is local. See description for AV:130 for details on valid range.

Table 78. Object ID 132

Object Name:	Heating Unoccupied Setpoint
Object Type:	AV (Analog Value)
Object Units:	(64) Degrees-Fahrenheit
Value:	40 - 95
Details:	Unoccupied heating setpoint. Default value following reset is local. See description for AV:130 for details on valid range.

Table 79. Object ID 133

Object Name:	Cooling Unoccupied Setpoint
Object Type:	AV (Analog Value)
Object Units:	(64) Degrees-Fahrenheit
Value:	40 - 95
Details:	Unoccupied cooling setpoint. Default value following reset is local. See description for AV:130 for details on valid range.

Table 80. Object ID 142

Object Name:	IAQ Setpoint Start Open
Object Type:	AV (Analog Value)
Object Units:	(96) PPM

Value:	0 - 2000
Details:	IAQ Setpoint for start open behavior for DCV Operation.

Table 81. Object ID 143

Object Name:	IAQ Setpoint Full Open
Object Type:	AV (Analog Value)
Object Units:	(96) PPM
Value:	0 - 2000
Details:	IAQ Setpoint for full open behavior.

Table 82. Object ID 144

Object Name:	Free Cooling Temperature Sensible Setpoint
Object Type:	AV (Analog Value)
Object Units:	(64) Degrees-Fahrenheit
Value:	40 - 75
Details:	Economizer free cooling setpoint for temperature sensible setpoint operation.

Table 83. Object ID 145

Object Name:	Free Cooling Temperature Offset Setpoint
Object Type:	AV (Analog Value)
Object Units:	(64) Degrees-Fahrenheit
Value:	0 - 40
Details:	Economizer free cooling offset setpoint for temperature offset operation.

Table 84. Object ID 146

Object Name:	Free Cooling Enthalpy Setpoint
Object Type:	AV (Analog Value)
Object Units:	(2) mA
Value:	10 - 19
Details:	Economizer free cooling setpoint for single enthalpy operation.

Table 85. Object ID 147

Object Name:	Free Cooling Enthalpy Offset Setpoint
Object Type:	AV (Analog Value)
Object Units:	(2) mA
Value:	1 - 5
Details:	Economizer free cooling setpoint for dual enthalpy operation.

Table 86. Object ID 148

Object Name:	After Hours Override Delay Set
Object Type:	AV (Analog Value)
Object Units:	(72) Minutes
Value:	0 - 480
Details:	After hours delay setpoint. Used in override conditions.

Table 87. Object ID 149

Object Name:	Heat Pump Dual Fuel Balance Point
Object Type:	AV (Analog Value)
Object Units:	(64) Degrees - Fahrenheit
Value:	-20 - 65
Details:	Dual Fuel Balance setpoint for switching to gas heat from mechanical compressor heating below this value. Default value following reset is local.

Table 88. Object ID 150

Object Name:	Heat Pump Compressor Lockout Low Setpoint
Object Type:	AV (Analog Value)
Object Units:	(64) Degrees - Fahrenheit
Value:	-50 - 0
Details:	Low Ambient Heating Compressor Lockout Temperature Low setpoint for locking out mechanical compressor heating below this value. Default value following reset is local.

Table 89. Object ID 151

Object Name:	Heat Pump Compressor Lockout High Setpoint
Object Type:	AV (Analog Value)
Object Units:	(64) Degrees - Fahrenheit
Value:	-50 - 0
Details:	Low Ambient Heating Compressor Lockout Temperature High setpoint for re-enabling mechanical compressor heating above this value. Default value following reset is local.

Appendix A — Blower Operations and Effective Occupancy

This section describes how BACnet® occupancy signals are combined to produce effective occupancy.

The blower runs to service heat and cool demands, regardless of the space occupancy. However when there is no heating or cooling demand there are options for how the blower should operate in conjunction with occupancy signals to keep the space ventilated, or the air stirred.

1. **California Energy Commission Title 24 -** The legacy option settings for **OCC Blower Mode** are **AUTO CYCLES** or **ON-CONTINUOUS 1**. These settings govern whether the blower runs continuously when the space is considered occupied, or cycles on/off with the heating and cooling demand. To comply with the California Energy Commission Title 24 standard there are two additional values for **OCC Blower Mode** which are **ON-CONTINUOUS 2** and **ON-CONTINUOUS 3**.

Table 90. Blower Operation Description

OCC Blower Mode	Description
AUTO CYCLES	Blower cycles on/off with demand. (Legacy usage.)
ON-CONTINUOUS 1	Blower runs when either the occupancy sensor or schedule, or both, indicates occupied. (Legacy usage.)
ON-CONTINUOUS 2	Blower runs when both the occupancy sensor and schedule indicate occupied.
ON-CONTINUOUS 3	The same as option 2, but blower runs for 30 minutes and is off for 90 minutes when schedule is occupied but the occupancy sensor is not occupied.

2. Menu Setup Procedure Method for OCC Blower Mode
   These blower control options are handled by the OCC Blower Mode. These settings can be changed using the following menu path:
   Go to **RTU MENU > NETWORK INTEGRATION > NETWORK SETUP WIZARD > CONTROL MODE = ROOM SENSOR >(**additional prompts concerning network configuration and sensor types will be asked**) CONTROL MODE = ROOM SENSOR > ROOM SENSOR OCC BLOWER MODE** = (see “Table 14. Analog Input (AI) Objects List” on page 19)

NOTE: *Refer to **CORE Service App Menu Selection Overview, Install Menu Structure,** and **BACnet MS/TP Menu Structure** in the Lennox® CORE Control System (Unit Controller) Application Guide for further guidance.*

Table 91. BACnet Occupancy Points

Mode	BACnet	Value
Manual	Occupancy Override Control AO 103	0: space occupied
		1: space unoccupied
		2: refresh space occupied override timer
		3255: auto; clear timer and return to scheduler
Schedule	Occupancy Scheduler Control AO 104	0: space occupied
		1255: space unoccupied
Sensor	Occupancy Sensor Input AO 107	0: space occupied
		1: space unoccupied
		2255: auto; return to occupancy scheduler state
Effective Occupancy	Effective Occupancy AI 241	0: space occupied
		1: space unoccupied
		2: space occupied (timed override)

Table 92. Blower Operation Description

Blower Operation	Description
On	Blower runs continuously.
Cycles	Blower cycles on/off with demand.
Cycles w/Stir	Blower cycles on/off with demand; during off cycle blower is on 30 minutes of 120.

Table 93. Blower Operation Schedule

Manual	Schedule	Sensor	Effective Occupancy	OCC BLOWER MODE	Blower Operation
0, 2	n/a	n/a	OCCUPIED	AUTO-CYCLES	Cycles
				ON-CONTINUOUS 1	On
				ON-CONTINUOUS 2	On
				ON-CONTINUOUS 3	On
1	n/a	n/a	UNOCCUPIED	AUTO-CYCLES	Cycles
				ON-CONTINUOUS 1	Cycles
				ON-CONTINUOUS 2	Cycles
				ON-CONTINUOUS 3	Cycles
3255	0	0, 2-225	OCCUPIED	AUTO-CYCLES	Cycles
				ON-CONTINUOUS 1	On
				ON-CONTINUOUS 2	On
				ON-CONTINUOUS 3	On
3255	0	1	OCCUPIED	AUTO-CYCLES	Cycles
				ON-CONTINUOUS 1	On
				ON-CONTINUOUS 2	Cycles
				ON-CONTINUOUS 3	Cycles w/Stir
3255	1255	n/a	UNOCCUPIED	AUTO-CYCLES	Cycles
				ON-CONTINUOUS 1	Cycles
				ON-CONTINUOUS 2	Cycles
				ON-CONTINUOUS 3	Cycles


PFAS