LENNOX
Service Literature™

UNIT INFORMATION

Corp. 0808-L6
04/09 Supersedes 06/08

IMC BACnet® Module

General

The IMC BACnet® Module (BP1) allows communication between the Lennox IMC M1-8 controller and a BACnet® MS/TP network. This module is mounted directly to the M1-8 Integrated Modular Controller and is not compatible with M1-7 IMC and earlier versions. Replacement for earlier remote mounted IMC BACnet® modules requires replacing existing parts with the M1-8 IMC and the new IMC BACnet Module.

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

A Lennox zone sensor, a BACnet® network zone sensor, or a BACnet® thermostat may be used to send the zone temperature or thermostat demands to the IMC.

Table of Contents

Table 1. IMC BACnet® Module Hardware Specifications

Environment	
Operating Temperature Range	-40F to 155F
Storage temperature Range	-40F to 185F
RH	10-95% RH non-condensing
Field Connections	
BACnet® MS/TP	See PIC statement on Page 24.
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 ohms on last module in chain. (Set jumper S1 on BP1 board if it is the last module in the chain.)
Physical	
Dimensions	1.25 x 2 x 1.25 in. (WxDxH)
Weight	0.7 oz. (400 grams)
PCB Material	FR4 Conformal coated (blue)
Mounting	Snap-in using four nylon standoffs

Network Limitations

The Lennox IMC BACnet® module does not support the COV (change of value) service.

A BACnet® gateway should not be used with the L Connection network if using the IMC BACnet® module.

Network Cable

The IMC BACnet® Module 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 IMC BACnet® module. It is compatible with twisted pair, shielded 22AWG minimum cable such as Belden 8761, 88761 and Lennox catalog numbers 27M19, 94L63 or 68M25. A maximum of 32 IMC BACnet® modules can be included per network. Up to 127 units can be connected using repeaters between networks.

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) is 4000 ft. (1219m) applies to this device. Daisy-chain each module to the network and connect the network cable shield to the earth ground at the control panel, and at the G terminal of each BACnet module in the chain.

Network Bus Termination

When the IMC BACnet® Module is at the end of a daisy chain, connect the jumper across the pins of S1 for bus termination (see figure 1, Detail A). Every BACnet® MS/TP chain must have a termination at each end of the chain (exactly two terminations; see figure 2).

⚠ IMPORTANT

Install S1 jumper on the END module only. Do not add a resistor to each module.

⚠ IMPORTANT

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

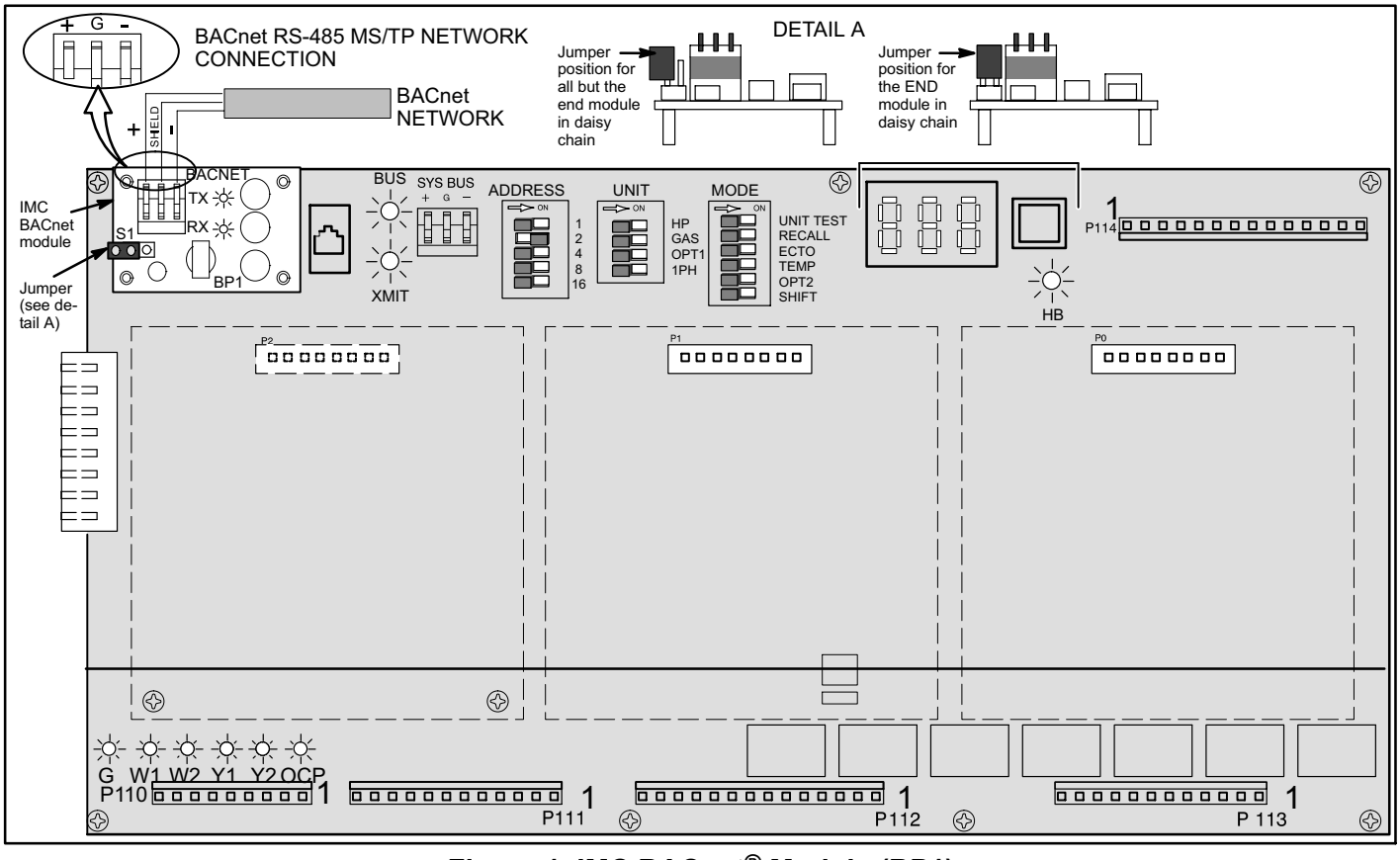

Figure 1. IMC BACnet® Module (BP1)

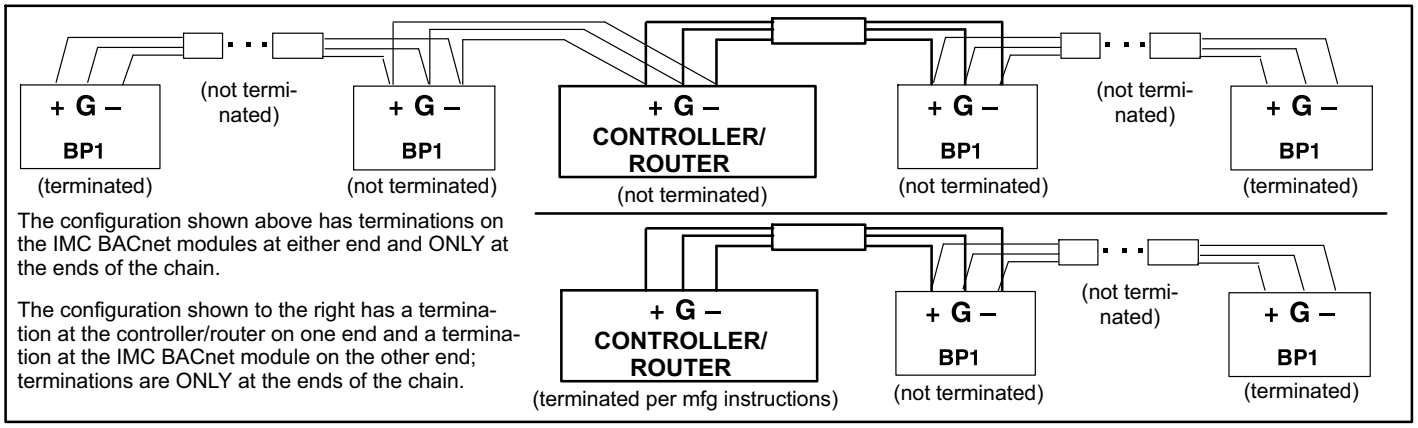

Figure 2. Terminating ends of daisy-chained networks

Recommendations

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 with out the need to adjust the Max_Master property.
3. Use ReadPropertyMultiple service instead of ReadProperty service when reading multiple analog inputs or values

Configuring the IMC Unit Controller

ECTO Settings

Use the IMC pushbutton and DIP switches to manually adjust the following control parameters (see IMC manual). A PC can also be used with Unit Controller software and a PC converter.

Lennox Zone Sensor Installed:

1. Set ECTO 6.01 to option 3 (zone sensor system mode with return air sensor back-up).
2. Set ECTO 6.17 to option 1 (continuous blower during occupied).
3. Set ECTO 6.02-6.05 as specified (back-up occupied and unoccupied heating and cooling setpoints).

BACnet® Zone Sensor Installed:

1. Set ECTO 6.01 to option 3 (zone sensor system mode with return air temperature back-up).
2. Set ECTO 6.17 to option 1 (continuous blower during occupied).
3. Set ECTO 5.27 to option 2 (network zone sensor option).

BACnet Thermostat Installed:

Set ECTO 6.01 to option 6 (remote demand system mode with return air sensor back-up).

IMC Settings

1. Be sure the occupied 24 VAC input is energized by adding a jumper wire between TB1-8 and 9. In the event that communication is lost between the IMC BACnet module and the IMC, the IMC will operate in the occupied mode and use the occupied backup setpoints.
2. By default, the IMC BACnet MAC address is set by the address DIP switches (see figure 3). This can be any value between 1 - 31. Note that a value of zero will disable all IMC BACnet communications including the MS/TP layer.

   A second option for setting the IMC BACnet MAC address is ECTO 7.26. This has the entire range of 0 - 127 for possible MAC addresses. A value of 128 indicates that the address DIP switches are used for setting the MAC address.
3. The baud rate setting (38.4 kbps by default) can be changed locally by using the mode DIP switches and pushbutton (see IMC manual).

The value of the five switches on the address DIP switch are labeled on the printed circuit board (1, 2, 4, 8, or 16). Add the values of the five switches set to the ON position. See figure 3.

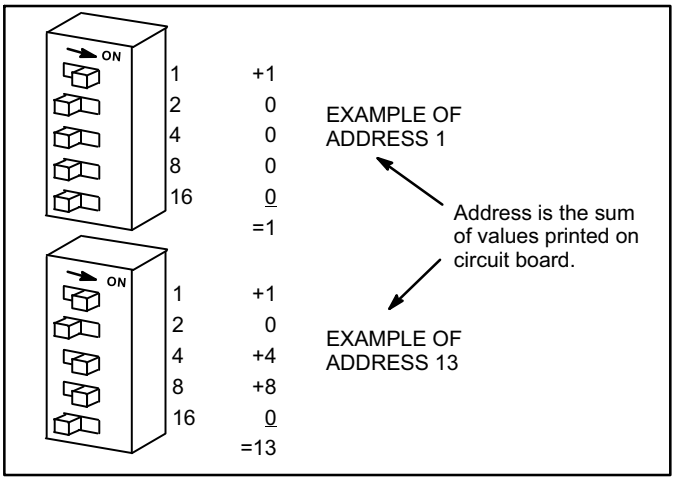

Figure 3. Address DIP Switch

IMC Version

This module requires a M1-8 controller board. M1-7 and earlier controller boards are not compatible and parts will not assemble together. Lennox recommends replacing previous IMCs and BACnet modules using the latest M1-8 IMC and BACnet module. For additional information, contact Lennox Technical Support at 800-453-6669.

The IMC scrolling display will show software version, L Connection address, and BACnet MAC address.

Data Update Rate

If the following BACnet® variables are not updated for a period of 5 minutes, the IMC will go into the back up modes described in the BACnet Connection Failure Section.

Application Mode Control AO:101 (when ECTO 6.01=4-7)
Space Temperature Input AO:113 (when ECTO 5.27=2)

When either of these ECTO selections are made, it is highly recommended the IMC get updated in less than 2 minutes.

Start Up Unit Operation - Before BACnet Network is Commissioned

Lennox Zone Sensor Installed:

Prior to commissioning, no BACnet setpoint is available. The unit will be off.

Two minutes after power-up (ECTO 5.25), the IMC will operate the unit based on the IMC ECTO unoccupied backup setpoints (heating = 60°F, cooling = 85°F) and current zone temperature read by the Lennox zone sensor.

BACnet Zone Sensor Installed:

Prior to commissioning, neither BACnet setpoint nor sensor data are available. The unit will be off.

Five minutes after power-up, the IMC will operate the unit based on the IMC ECTO unoccupied backup setpoints (heating = 60°F, cooling = 85°F) and the current zone temperature read by an additional Lennox zone sensor if installed. If the Lennox zone sensor is not installed, the IMC return air temperature sensor is used as backup (ECTO 6.01).

BACnet Thermostat Installed:

Prior to commissioning, no BACnet thermostat command is available. The unit will be off.

Five minutes after power-up, if no application mode command has been received, the IMC will operate the unit based on the IMC ECTO unoccupied backup setpoints (heating = 60°F, cooling = 85°F) and the current zone temperature read by the Lennox zone sensor or the IMC return air temperature sensor depending on the choice of backup (ECTO 6.01).

Normal Unit Operation - After BACnet Network Is Commissioned

The occupancy of the space can be determined using any combination of the following control points:

- BACnet Network scheduling
- Manual override
- Space occupancy sensor

Lennox Zone Sensor Installed:

The unit is off for up to two minutes after power-up (ECTO 5.25) unless the BACnet Network sends a setpoint. The unit will operate based on this setpoint and the temperature from the Lennox zone sensor.

In addition to control points, space occupancy can be manually overridden using a Lennox zone sensor equipped with an optional after hours switch.

BACnet Zone Sensor Installed:

The unit is off for up to five minutes after power-up unless the BACnet Network sends a setpoint and BACnet zone sensor data. The unit will operate based on this setpoint and temperature data.

BACnet Thermostat Installed:

The unit remains off for up to five minutes after power-up unless the BACnet Network sends a thermostat command. The unit will operate based on the most recently received thermostat command.

Communication Check

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

LED	Action
BACnet communication transmit and receive LEDs flash.	None. Indicates normal communication.
BACnet communication LEDs are off or intermittently go off for periods of 1 second or longer.	1. Check BACnet network connections. 2. Make sure BACnet network is commissioned. 3. Make sure IMC address DIP switches are not set to zero. 4. Make sure each unit has a unique MAC address in the range of 0 to 127. 5. Verify same baud rate on all devices.

Connection Failure

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

Lennox Zone Sensor	1- During the 5 minutes following a failure, the IMC cycles on last setpoint. 2- IMC resets. No heating or cooling during 2 minutes (ECTO 5.25) following reset. 3 - IMC cycles based on ECTO backup setpoints. 4- Occupancy is determined by hardware input at TB1.
BACnet Zone Sensor	1- During 5 minutes following failure, IMC continues current operation: heat, cool, or off. 2- IMC resets. No heating or cooling during 5 minutes following reset. 3- IMC uses ECTO backup setpoints. 4- IMC attempts to use Lennox zone sensor as backup. If this fails, IMC uses return air sensor backup. 5- Occupancy is determined by hardware input at TB1.
BACnet Thermostat	1- During 5 minutes following failure, IMC continues current operation: heat, cool, or off. 2- IMC changes mode to use return air sensor as backup control method. 3- IMC uses ECTO backup setpoints. 4- IMC uses return-air-sensor backup. 5- Occupancy is determined by hardware input at TB1.

Default Settings

device Max_Master = 127

device Max_Info_Frames = 1

device Object_Identifier = MAC address

device Object_Name = “Lennox_IMC” + MAC address

device Location = “US”

device Description = “Lennox HVAC Controller”

baud rate = 38.4k

Device Object

Optional Properties Supported:
- Location
- Description

Optional Writable Properties:
- Object_Identifier
- Object_Name
- Max_Master
- Max_Info_Frames
- Location
- Description

Property Range Restrictions:
- Object_Identifier:0-4194302
- Object_Name: up to max. 32 characters (ANSI X3.4)
- Max_Master: 1-127
- Max_Info_Frames: 1-65535
- Location: up to max. 32 characters
- Description: up to max. characters

Analog Output Objects

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 IMC is written to by some Sbus device.

Table 2. Analog Output Objects List

Object ID	Object Name	Units	Min. Value	Max. Value	Valid Values within Range
101	Application Mode Control	None	0	255	0,1,3,6,9,208,209,216,217,218,224-254,255*
102	Outdoor Air Min Pos Control	Percent	0	255	all
103	Occupancy Override Control	None	0	255	all
104	Occupancy Scheduler Control	None	0	255	all
107	Occupancy Sensor Input	None	0	255	all
108	Space Dehumidification Setpoint	Percent	0	100	all
109	Temperature Setpoint (abs)	Deg. F	36.25	100	all
110	Temperature Setpoint Offset	Deg. F	-32	31.75	all
113	Space Temperature Input	Deg. F	36.25	100	all
114	Emergency Override Control	None	0	255	all
115	Compressor Enable Control	None	0	255	all
117	Primary Heat Enable Control	None	0	255	all
119	Auxiliary Heat Enable Control	None	0	255	all
123	Duct Static Setpoint	In. of water	0	5	all
124	Building Static Setpoint	In. of water	-0.5	0.5	all
125	Discharge Air Cooling Setpoint	Deg. F	40	80	-9,40-80*
126	Discharge Air Heating Setpoint	Deg. F	80	140	-9,80-140*
127	Supply Fan Capacity Input	Percent	33	255	all*
128	Exhaust Fan Capacity Input	Percent	33	255	all
129	Set Economizer Outdoor Air Suitable	None	0	255	all
* see Application Details section for limitations on data ranges.					

Analog Input Objects

Optional Properties Supported: None

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

Table 3. Analog Input Objects List

Object ID	Object Name	Units	Data Range
198	Mac Address	None	0 – 127
199	IMC Address	None	1–31
200*	IMC Version[4]	None	0 – 127
201*	IMC Version[5]	None	0 – 127
202*	IMC Version[6]	None	0 – 127
203*	IMC Version[7]	None	0 – 127
204*	IMC Version[8]	None	0 – 127
205*	IMC Version[9]	None	0 – 127
206*	IMC Version[10]	None	0 – 127
207*	IMC Version[11]	None	0 – 127
231	Unit ID	None	0 – 127
232	Unit Status	None	0 – 255
239	Space Temperature	Deg. F	63.75 – 100.00
240	Discharge Air Temperature	Deg. F	–8.7 – 164.4
241	Effective Occupancy	None	0 – 2
242	Local Outside Air Temperature	Deg. F	–30.6 – 131.6
243	Local Space Temperature	Deg. F	63.75 – 100.00
244	Outside Air Damper	Percent	0 – 100, 255
245	Heat Primary	Percent	0 – 100
246	Heat Secondary	Percent	0 – 100
247	Cool Primary	Percent	0 – 100
248	Economizer Enabled	Percent	0, 1, 255
250	Supply Fan Status	Percent	0 – 100
252	Space Temperature Set Point (Eff)	Deg. F	40.0 – 95.0
253	Current Error	None	0 – 255
254	Error Pointer	None	0 – 83
255	Most recent Error 1	None	1 – 255
256	Most recent Error 2	None	1 – 255
257	Most recent Error 3	None	1 – 255
258	Most recent Error 4	None	1 – 255
259	Most recent Error 5	None	1 – 255
260	Most recent Error 6	None	1 – 255
261	Most recent Error 7	None	1 – 255
262	Most recent Error 8	None	1 – 255
263	Most recent Error 9	None	1 – 255
264	Most recent Error 10	None	1 – 255
274	Space CO2 Sensor (Eff)	Parts–per–million	0 – 2000
275	Space CO2 Sensor (Local)	Parts–per–million	0 – 2000
276	Space Humidity (Eff)	Percent	0 – 100
277	Space Humidity (Local)	Percent	0 – 100
278	Dehumidification Set Point (Eff)	Percent	0 – 100
279	Dehumidification Status	None	0 – 2
281	Return Air Temperature	Deg. F	–8.7 – 164.4
282	Building Static Pressure	Inches of water	–0.5 – 0.5
283	Duct Static Pressure	Inches of water	0 – 5.00
285	Exhaust Fan Status	Percent	0 – 100
* Not recommended for new installations; legacy support only			

Analog Value Objects

Optional Properties Supported: None

Optional Writable Properties: Present_Value

Table 4. Analog Value Objects List

Object ID	Object Name	Units	Min. Value	Max. Value	Valid Values within Range	Note
1	Baud Rate Setting	None	9600	76800	9600, 19200, 38400, 76800	
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 deadband value set in IMC ECTO 6.15 (default 3 degF).
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	

Zone Sensor Setpoints

The IMC 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 IMC will use the zone temperature setpoint and ECTO 6.15 to determine the heat / cool setpoint in the occupied mode. During the unoccupied mode, the IMC will use the zone temperature setpoint and the difference between ECTO 6.05 and 6.03.

See figure 4 for an example of setpoints when the IMC is operating using ECTO default values.

As an alternative, the individual setpoints AV:130-133 may be used. The IMC uses whatever were the last setpoints received, whether from AO:109-110, or AV:130-133.

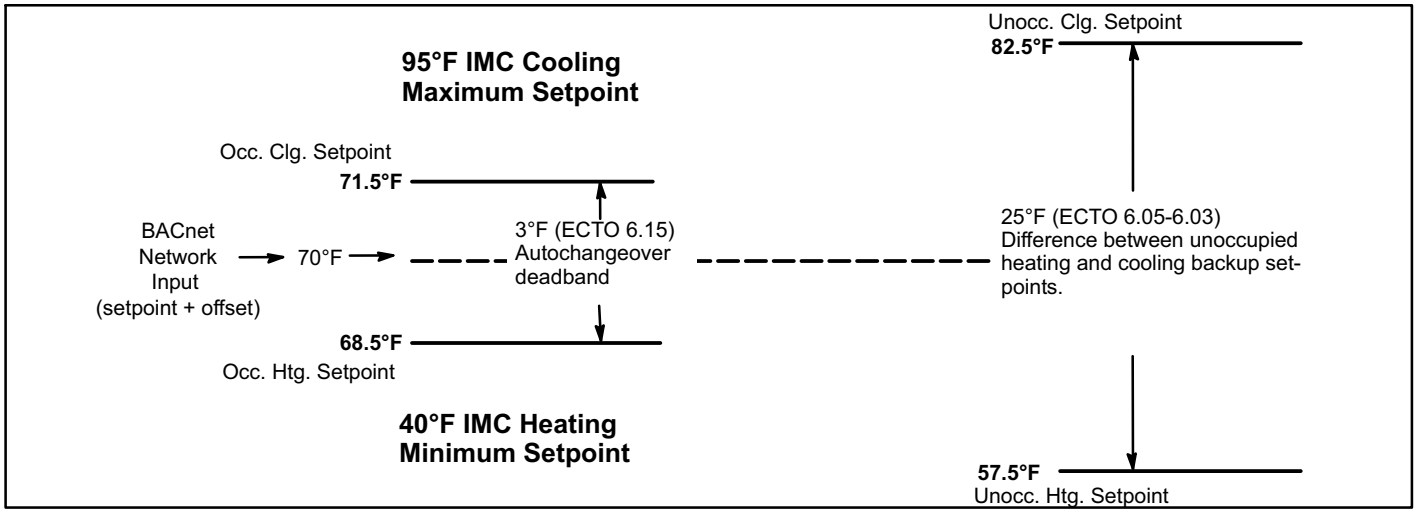

Figure 4. IMC Default Setpoint Example (Zone Sensor Installed)

IMC Alarm Codes See the IMC user guide for a list of alarm codes.

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 IMC 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 IMC mode, while some can only be used when the IMC is in the remote thermostat control mode.

Common Application Mode Values

Value		Mode	Description
0	$00	AUTO	Heating or cooling. Default after reset.
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	Main fan (blower) auto. Default after reset.
209	$D1	FAN ON	Main fan (blower) on.
216	$D8	EXHAUST AUTO	Power exhaust fan auto. Default after reset.
217	$D9	EXHAUST1 ON	1st 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 IMC control 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 IMC 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's startup and initialization routines. This takes about 8 seconds in an IMC controller, during which time the analog and digital inputs are settling to correct values. The controller will return to AUTO operation.

AUTO, FAN AUTO and EXHAUST AUTO are the defaults after reset.

Application Modes Specific To Remote Thermostat Operation

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

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

For all $Ex 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 IMC using ECTO 4.24.

If a mode not defined in the above list is sent, then the application mode is not changed.

When an IMC is commissioned for BACnet® gateway remote thermostat operation, it will wait for 5 minutes following startup to receive application mode data. The IMC will remain in AUTO mode until data is received, or until the 5 minute period has expired.

If 5 minutes passes without data being received, then the IMC 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 2 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 IMC is in a backup mode, then the IMC will reset and normal operation will resume.

Object Name: **Outdoor Air Min Pos Control**
Object Type: AO (Analog Output)
Object ID: 102
Object Units: (98) Percent

Value = 0 - 255

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 IMC ECTO 5.24:
ECTO 5.24
=101: Min damper position set by potentiometer on economizer control.
<101: Min damper position set by ECTO 5.24.

The minimum damper position is only effective when the system is occupied and the main blower is running. Otherwise the damper remains closed. Default value following reset is 101 (local).

Object Name: **Occupancy Override Control**
Object Type: AO (Analog Output)
Object ID: 103
Object Units: (95) No_Units

Value = 0-255

0: space occupied
1: space unoccupied (IMC does not support; gives auto operation)
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).

Object Name: **Occupancy Scheduler Control**
Object Type: AO (Analog Output)
Object ID: 104
Object Units: (95) No_Units

Value = 0 - 255

0: space occupied
1-255: space unoccupied

Default value following reset is determined by a 24VAC input at the controller (signal present = occupied).

Once a value for AO:104 is received, the 24VAC input is ignored.

Object Name: **Occupancy Sensor Input**
Object Type: AO (Analog Output)
Object ID: 107
Object Units: (95) No_Units

Value = 0 - 255

0: occupancy sensor indicates space occupied
1: occupancy sensor indicates space unoccupied (IMC does not support; gives auto operation)
2-255: auto; return to occupancy scheduler state

Default value following reset is 255 (auto).

The occupancy inputs are logically “OR”; if any one is “OCCUPIED” then the space is occupied, otherwise the space is “UNOCCUPIED”. No single input can force the space “UNOCCUPIED”.

Object Name: **Space Dehumidification Setpoint**
Object Type: AO (Analog Output)
Object ID: 108
Object Units: (98) Percent

Value = 0 - 100

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 deadband that is typically 3%. The deadband value is set locally during commissioning.

Object Name: **Temperature Setpoint (abs)**
Object Type: AO (Analog Output)
Object ID: 109
Object Units: (64) Degrees-Fahrenheit

Value = 36.25 – 100.00 degF, in 0.25 degF increments

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 deadbands, as well as any local restrictions on minimum or maximum values. The default following reset is 70 degF, but local values are used for the heating and cooling (occupied and unoocupied) 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 IMC uses whatever were the last setpoints received, whether from AO:109-110, or AV:130-133.

The occupied heat/cool auto-changeover deadband value is set locally during commissioning.

The unoccupied heat/cool auto-changeover deadband value is set locally during commissioning by adjusting the back-up unoccupied heating and cooling setpoints. The difference between these setpoints will be used as the unoccupied heat/cool auto-changeover deadband value.

Object Name: **Temperature Setpoint Offset**
Object Type: AO (Analog Output)
Object ID: 110
Object Units: (64) Degrees-Fahrenheit

Value = -32.00 – 31.75 degF, in 0.25 degF increments

A signed value added to the Temperature Setpoint (abs) value to provide an effective temperature setpoint. See above regarding deadbands and limits. The default following reset is 0.

Object Name: **Space Temperature Input**
Object Type: AO (Analog Output)
Object ID: 113
Object Units: (64) Degrees-Fahrenheit

Value = 36.25 – 100.00 degF, in 0.25 degF increments

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. See above. The default following reset is 72.5 degF.

When an IMC is commissioned for BACnet® gateway remote room sensor operation, it will wait for 5 minutes following startup to receive space temperature data. The IMC 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 IMC 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 IMC 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 IMC is in a backup mode, then it will reset before resuming.

Object Name: **Emergency Override Control**
Object Type: AO (Analog Output)
Object ID: 114
Object Units: (95) No_Units

Value = 0 - 255

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.

“Emergency Override Control” input takes precedence over local smoke input. The default following reset is 0 (NORMAL).

Object Name: **Compressor Enable Control**
Object Type: AO (Analog Output)
Object ID: 115
Object Units: (98) Percent

Value = 0 - 255

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:

Maximum Stages	Stage Disabled When Value < x			
	1	2	3	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.

Object Name: **Primary Heat Enable Control**
Object Type: AO (Analog Output)
Object ID: 117
Object Units: (98) Percent

Value = 0 - 255

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%.

In heat pump systems during heating operation, the lower value of “Compressor Enable Control” and “Primary Heat Enable Control” is used to establish the compressors that can run.

Object Name: **Auxiliary Heat Enable Control**
Object Type: AO (Analog Output)
Object ID: 119
Object Units: (98) Percent

Value = 0 - 255

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 “Auxiliary Heat Enable Control”. 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%.

The “Auxiliary Heat Enable Control” is only used in heat pump systems.

Object Name: **Duct Static Setpoint**
Object Type: AO (Analog Output)
Object ID: 123
Object Units: (58) Inches-of-water

Value = 0.0 - 5.0 inWC

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.

Object Name: **Building Static Setpoint**
Object Type: AO (Analog Output)
Object ID: 124
Object Units: (58) Inches-of-water

Value = -0.5 - 0.5 inWC

The setpoint for control of building static pressure, in inches of water column. The exhaust blower is cycled or, if a VFD is used, its speed is varied to maintain this value. 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.

Object Name: **Discharge Air Cooling Setpoint**
Object Type: AO (Analog Output)
Object ID: 125
Object Units: (64) Degrees-Fahrenheit

Value = 40 - 80 degF, and -9 degF

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 to 80 degrees Fahrenheit. Selecting a value of -9 degF causes the control to revert to the use of its locally programmed setpoint. Default value following reset is -9 (local).

Object Name: **Discharge Air Heating Setpoint**
Object Type: AO (Analog Output)
Object ID: 126
Object Units: (64) Degrees-Fahrenheit

Value = 80 - 140 degF, and -9 degF

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 80 to 140 degrees Fahrenheit. Selecting a value of -9 degF causes the control to revert to the use of its locally programmed setpoint. Default value following reset is -9 (local).

Object Name: **Supply Fan Capacity Input**
Object Type: AO (Analog Output)
Object ID: 127
Object Units: (98) Percent

Value = 33 - 255

33 - 100: Set the supply fan capacity as a % of maximum speed.
101 - 255: Relinquish to local control. Supply fan capacity depends on IMC ECTO values.

Supply fan capacity is only effective when the main blower is running.

if compressor(s) are on or heat is on, min. value is limited to ECTO 0.06 or ECTO 0.07, respectively.

Maximum supply air is limited by IMC ECTO value 0.08, although the relinquish default range of 101-255 is always available. Default value following reset is 255 (local).

Object Name: **Exhaust Fan Capacity Input**
Object Type: AO (Analog Output)
Object ID: 128
Object Units: (98) Percent

Value = 33 - 255

33 - 100: Set the exhaust fan capacity as a % of maximum speed.
101 - 255: Relinquish to local control. Exhaust fan capacity depends on IMC ECTO values.

Exhaust fan capacity is only effective when the exhaust fan is running. Default value following reset is 255 (local).

Object Name: **Set Economizer Outdoor Air Suitable**
Object Type: AO (Analog Output)
Object ID: 129
Object Units: (95) No_Units

Value = 0-255

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 economizer board A56 (EM1) to have switches selected to TMP temperature mode. See the IMC manual for additional information on economizer operation. Default value following reset is 255 (auto).

Object Name: **MAC Address**
Object Type: AI (Analog Input)
Object ID: 198
Object Units: (95) No_Units

Value = 0-127

Selectable BACnet address. Also shown on IMC scrolling display. By default, this is set using IMC DIP switches, and is equal to the IMC address. The address can also be selected using ECTO 7.26 of the IMC.

Object Name: **IMC Address**
Object Type: AI (Analog Input)
Object ID: 199
Object Units: (95) No_Units

Value = 1-31

Selectable through IMC address DIP switches (1-31). This is the address for L Connection network.

Object Name: **IMC Version[04], IMC Version[05], …, IMC Version[11]**
Object Type: AI (Analog Input)
Object ID: 200, 201, …, 207
Object Units: (95) No_Units

Value = 0, 46, 48 - 57

0: end of string
46: “.”
48: “0”
…
57: “9”

Each value is the ASCII code of a character in the IMC version number. The version number is found in a null-terminated string, most-significant-character first, beginning in IMC Version[04]. Maximum length is 8 chars, including null.

NOTE - Not recommended for new installations. Read device object property Application_Software_Version instead. For BACnet version read device object property Firmware_Revision.

Object Name: **Unit ID**
Object Type: AI (Analog Input)
Object ID: 231
Object Units: (95) No_Units
Value = 0 - 255
48-63: gas heat, electric cool
64-79: electric heat, electric cool
80-95: electric heat pump, with or without electric resistive heat

These are the currently defined IMC unit types.

Object Name: **Unit Status**
Object Type: AI (Analog Input)
Object ID: 232
Object Units: (95) No_Units

Value = 0 - 255

0 – HVAC off
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.
145 – HVAC defrost compressor 1.
161 – HVAC defrost compressor 2.
177 – HVAC defrost compressor 1 & 2.

These are the currently defined IMC unit status.

Object Name: **Space Temperature**
Object Type: AI (Analog Input)
Object ID: 239
Object Units: (64) Degrees-Fahrenheit

Value = 63.75 – 100.00 degF, in 0.25 degF increments

Space temperature from local IMC sensor, or from “Space Temperature Input”.

This is the actual value being used by the IMC. Its source is either a locally wired temperature sensor (see “Local Space Temperature”) or the network input (see “Space Temperature Input”).

Object Name: **Discharge Air Temperature**
Object Type: AI (Analog Input)
Object ID: 240
Object Units: (64) Degrees-Fahrenheit

Value = -8.7 – 164.4 degF, in 0.7 degF increments

Discharge air temperature measurement from IMC sensor.

Object Name: **Effective Occupancy**
Object Type: AI (Analog Input)
Object ID: 241
Object Units: (95) No_Units

Value = 0 - 2

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 “Effective Occupancy” is occupied if any of these inputs are in the occupied state. Otherwise “Effective Occupancy” is unoccupied.

The local IMC occupied input is ignored when a BACnet® module is used.

Object Name: **Local Outside Air Temperature**
Object Type: AI (Analog Input)
Object ID: 242
Object Units: (64) Degrees-Fahrenheit

Value = -30.6 – 131.6 degF, in 0.6 degF increments

Outdoor air temperature measurement from IMC sensor.

Object Name: **Local Space Temperature**
Object Type: AI (Analog Input)
Object ID: 243
Object Units: (64) Degrees-Fahrenheit

Value = 63.75 – 100.00 degF, in 0.25 degF increments

Space temperature from IMC sensor.

Object Name: **Outdoor Air Damper**
Object Type: AI (Analog Input)
Object ID: 244
Object Units: (98) Percent

Value = 0 – 100, 255

0 - 100: Outdoor air damper position. Percent-open.
255: No damper.

Object Name: **Heat Primary**
Object Type: AI (Analog Input)
Object ID: 245
Object Units: (98) Percent

Value = 0 – 100

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.

Object Name: **Heat Secondary**
Object Type: AI (Analog Input)
Object ID: 246
Object Units: (98) Percent

Value = 0 – 100

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.

Object Name: **Cool Primary**
Object Type: AI (Analog Input)
Object ID: 247
Object Units: (98) Percent

Value = 0 – 100

0 - 100: Current level of the primary cooling capacity.

This is based on the number of compressors operating.

There is no secondary cooling.

Object Name: **Economizer Enabled**
Object Type: AI (Analog Input)
Object ID: 248
Object Units: (95) No_Units

Value = 0 – 1, 255

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 IMC 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.

Object Name: **Supply Fan Status**
Object Type: AI (Analog Input)
Object ID: 250
Object Units: (98) Percent

Value = 0 – 100

0: Supply fan off.
1: Supply fan on (single-speed fan).
2 - 100: Supply fan on (variable-speed fan; percent of full speed).

Object Name: **Space Temperature Setpt (Eff)**
Object Type: AI (Analog Input)
Object ID: 252
Object Units: (64) Degrees-Fahrenheit

Value = 40.0 – 95.0 degF, in 0.25 degF increments

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,
and heating and cooling deadbands and differentials set at system commissioning.

Object Name: **Current Error**
Object Type: AI (Analog Input)
Object ID: 253
Object Units: (95) No_Units

Value = 0 - 255

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” (see below) will be equal.

Refer to the IMC User’s Guide for alarm code descriptions.

Object Name: **Error Pointer**
Object Type: AI (Analog Input)
Object ID: 254
Object Units: (95) No_Units

Value = 0 - 83

This value points to the next available alarm code location. It runs from 0 to 83, and then rolls-over to 0. Tracking this value and using the ten-most-recent-error-codes (see below) allows an application to determine when new errors are logged by the IMC, what those errors are, and if any errors have been missed due to network delays or for any other reason.

To correct for an error in some early versions, if the reported value is in the range of 164-247 then it is necessary to subtract it from 247 in order to get the 0-83 value described above.

Object Name: **Most recent Error 1,**
Most recent Error 2
Most recent Error 10
Object Type: AI (Analog Input)
Object ID: 255, 256, …, 264
Object Units: (95) No_Units

Value = 1 - 255

These are the ten most recently occurring diagnostic codes; “Most recent Error 1” is the most recent.

The IMC does not time-stamp error codes. This must be done by the master controller.

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 IMC User’s Guide for alarm code descriptions.

Object Name: **Space CO2 Sensor (Eff)**
Object Type: AI (Analog Input)
Object ID: 274
Object Units: (96) Parts-per-million

Value = 0 - 2000

0 - 6: no sensor
7 - 1992: valid CO_2 measurement
1993 - 2000: sensor error

This is the actual value being used by the IMC, and is the value measured at the IMC.

Object Name: **Space CO2 Sensor (Local)**
Object Type: AI (Analog Input)
Object ID: 275
Object Units: (96) Parts-per-million

Value = 0 - 2000

0 - 6: no sensor
7 - 1992: valid CO_2 measurement
1993 - 2000: sensor error

This is the actual value being used by the IMC, and is the value measured at the IMC.

Object Name: **Space Humidity (Eff)**
Object Type: AI (Analog Input)
Object ID: 276
Object Units: (98) Percent

Value = 0 - 100

0: no sensor
1 - 99: valid relative humidity measurement
100: sensor error

This is the actual value being used by the IMC, and is the value measured at the IMC.

Object Name: **Space Humidity (Local)**
Object Type: AI (Analog Input)
Object ID: 277
Object Units: (98) Percent

Value = 0 - 100

0: no sensor
1 - 99: valid relative humidity measurement
100: sensor error

This is the actual value being used by the IMC, and is the value measured at the IMC.

Object Name: **Dehumidification Set Point (Eff)**
Object Type: AI (Analog Input)
Object ID: 278
Object Units: (98) Percent

Value = 0 - 100

Relative humidity setpoint for dehumidification operation.

Deadband is set locally during commissioning.

Object Name: **Dehumidification Status**
Object Type: AI (Analog Input)
Object ID: 279
Object Units: (95) No_Units

Value = 0 – 2

0: No dehumidification installed.
1: Dehumidification installed but not running.
2: Dehumidification installed and running.

Object Name: **Return Air Temperature**
Object Type: AI (Analog Input)
Object ID: 281
Object Units: (64) Degrees-Fahrenheit

Value = -8.7 – 164.4 degF, in 0.7 degF increments

Unit return air temperature measurement from IMC sensor.

Object Name: **Building Static Pressure**
Object Type: AI (Analog Input)
Object ID: 282
Object Units: (58) Inches-of-water

Value = -0.500 – 0.500 inWC, in 0.004 inWC increments

Building (space) static pressure measurement from IMC sensor.

Object Name: **Duct Static Pressure**
Object Type: AI (Analog Input)
Object ID: 283
Object Units: (58) Inches-of-water

Value = 0.00 – 5.00 inWC, in 0.02 inWC increments

Duct (supply) static pressure measurement from IMC sensor.

Object Name: **Exhaust Fan Status**
Object Type: AI (Analog Input)
Object ID: 285
Object Units: (98) Percent

Value = 0 – 100

0:	Exhaust fan off.
1:	Exhaust stage 1 on.
2:	Exhasut stage 2 on.
33-100:	Exhaust variable speed %on.
255:	No exhaust.

Object Name: **Baud Rate Setting**
Object Type: AV (Analog Value)
Object ID: 1
Object Units: (95) No Units

Value = 9600, 19200, 38400, 76800

Baud rate change only takes affect after IMC resets. Default value following reset is 38400, but this can be changed at the unit. See IMC manual for details.

Object Name: **Heating Occupied Setpoint**
Object Type: AV (Analog Value)
Object ID: 130
Object Units: (64) Degrees-Fahrenheit

Value = 40 - 95

Occupied heating setpoint. Default value following reset is local (ECTO 6.02).

As an alternative method of establishing setpoints, the single setpoint AO:109 and offset AO:110 may be used. The IMC 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 deadband value set in IMC ECTO 6.15 (default 3 degF, 2-10 degF range). If any of these conditionis are violated, BACnet will return an out of range message.

The AV's 130-133 can be used instead of the single setpoint and offset AO:109 and AO:110.

Object Name: **Cooling Occupied Setpoint**
Object Type: AV (Analog Value)
Object ID: 131
Object Units: (64) Degrees-Fahrenheit

Value = 40 - 95

Occupied cooling setpoint. Default value following reset is local (ECTO 6.04). See description for AV:130 for details on valid range.

Object Name: **Heating Unoccupied Setpoint**
Object Type: AV (Analog Value)
Object ID: 132
Object Units: (64) Degrees-Fahrenheit

Value = 40 - 95

Unoccupied heating setpoint. Default value following reset is local (ECTO 6.03). See description for AV:130 for details on valid range.

Object Name: **Cooling Unoccupied Setpoint**
Object Type: AV (Analog Value)
Object ID: 133
Object Units: (64) Degrees-Fahrenheit

Value = 40 - 95

Unoccupied cooling setpoint. Default value following reset is local (ECTO 6.05). See description for AV:130 for details on valid range.

BACnet® Protocol Implementation Conformance (PIC) Statement

Date . . . . . April 16, 2009
Vendor Name . . . . . Lennox Industries, Inc.
Product Name . . . . . IMC (Integrated Modular Controller)
Product Model Number M1-8
Firmware Revision . . . . . BACnet v1.0xx
Application Software Version . IMC v6.xx
BACnet Protocol Revision . . . 4

Product Description

The Integrated Modular Control (IMC) with optional IMC BACnet Module is a microprocessor-based unit controller designed to control Lennox' commercial rooftop units.

BACnet® Standardized Device Profile (Annex L)

- [ ] BACnet Operator Workstation (B-OWS)
- [ ] BACnet Building Controller (B-BC)
- [ ] BACnet Advanced Application Controller (B-AAC)
- [x] BACnet Application Specific Controller (B-ASC)
- [ ] BACnet Smart Sensor (B-SS)
- [ ] BACnet Smart Actuator (B-SA)

BACnet® Interoperability Building Blocks (BIBBs) Supported (Annex K)

Data Sharing: DS-RP-B(ReadProperty), DS-RPM-B(ReadPropertyMultiple), DS-WP-B(WriteProperty)
Device Management: DM-DDB-B(Dynamic Device Binding), DM-DOB-B(Dynamic Object Binding), DM-DCC-B(DeviceCommunicationControl), DM-RD-B(ReinitializeDevice)

Which of the following device binding methods does the product support? (check one or more)

- [ ] Send Who-Is, receive I-Am (BIBB DM-DDB-A)
- [x] Receive Who-Is, send I-Am (BIBB DM-DDB-B)
- [ ] Send Who-Has, receive I-Have (BIBB DM-DOB-A)
- [x] Receive Who-Has, send I-Have (BIBB DM-DOB-B)
- [ ] Manual configuration of recipient device's network number and MAC address
- [ ] None of the above

Standard Object Types Supported

- [x] Device Object
- [x] Analog Input
- [x] Analog Output
- [x] Analog Value
- [ ] Binary Input
- [ ] Binary Output
- [ ] Binary Value
- [ ] File
- [ ] Multi-State Input
- [ ] Multi-State Output

Data Link Layer Options

- [ ] BACnet® IP, (Annex J)
- [ ] BACnet IP, (Annex J), Foreign Device
- [ ] ISO 8802-3, Ethernet (Clause 7)
- [ ] ANSI/ATA 878.1, 2.5 Mb. ARCNET (Clause 8)
- [ ] ANSI/ATA 878.1, RS-485 ARCNET (Clause 8), baud rate(s) _____
- [x] MS/TP master (Clause 9), baud rate(s): 9.6K, 19.2K, 38.4K, 76.8K
- [ ] MS/TP slave (Clause 9), baud rate(s): _____
- [ ] Point-To-Point, EIA 232 (Clause 10), baud rate(s):_____
- [ ] Point-To-Point, modem, (Clause 10), baud rate(s): _____
- [ ] LonTalk, (Clause 11), medium: _____
- [ ] Other: _____

Dynamically Creatable Objects: None
Dynamically Deletable Objects: None
Proprietary Properties: None
Networking Options: None
Segmentation Capability: None

Character Sets Supported:

- [x] ANSI X3.4
- [ ] IBM™/Microsoft™ DBCS
- [ ] ISO 8859-1
- [ ] ISO 10646 (UCS-2)
- [ ] ISO 10646 (UCS-4)
- [ ] JIS C 6226