DAIKIN

Sales and Engineering Data Sheet

ED 15135-6

Group: **Controls**
Part Number: **ED 15135**
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MicroTech® III Fan Coil Unit Controller Protocol Information

LonWorks® Networks
BACnet® Networks (MS/TP)

LONMARK® 3.4

Member of BACnet International

Revision History

ED 15135	August 2013	Initial release.
ED 15135-1	April 2014	Added BACnet BV5 data point. Update to BACnet PIC statement and Daikin branding.
ED 15135-2	September 2015	General formatting improvements.
ED 15135-3	January 2016	Additional formatting changes and creation of Appendices.
ED 15135-4	March 2016	Minor corrections and updates to table formatting.
ED 15135-5	September 2016	Revised description to Application Mode Input. Also added note to data tables that the following variables revert to default Null after reboot: Application Mode Input, Space Temp Input, Temp Setpoint Input, Temp Setpoint Offset Input, Humidistat Remote Input, Compressor Enable Input, Occ Override Input, Occ Scheduler Input, Occ Sensor Input, Aux Heat Enable Input, Energy Hold Off Input.
ED 15135-6	January 2021	Corrected MSV:9 description (6=Economy, 7=Dehumid, 8=Null), and fixed descriptions for the following variables: nviAuxHeatEnable (Disabled and Enabled States/Values), nviClearAlarm (Normal and Clear Alarm States/Values), nviEconEnable (Disabled, Enabled and Null States/Values), nviEnergyHoldOff (Normal, Holdoff and Null States/Values). Updated BACnet PICS release date to 11/4/19 and firmware revision to v1.3.

Notice

Limited Warranty

Consult your local Daikin Applied representative for warranty details. To find your local Daikin Applied representative, go to www.DaikinApplied.com.

Reference Documents

Number	Company	Title	Source
078-0014-01G	LonMark Interoperability Association	LonMark Layers 1-6 Interoperability Guidelines, Version 3.4	www.lonmark.org
078-0120-01G		LonMark Application Layer Interoperability Guidelines, Version 3.4	
8501_		Space Comfort Controller (SCC) – Fan Coil Functional Profile	
078-0156-01G	Echelon® Corporation	LonWorks® FTT-10A Free Topology Transceiver Users Guide	www.echelon.com
IM 1012	Daikin Applied	MicroTech III Unit Controller LonWorks Communication Module Installation Manual	www.DaikinApplied.com
IM 1013		MicroTech III Unit Controller BACnet Communication Module Installation Manual	
OM 1111		MicroTech III Fan Coil Unit Controller Operation and Maintenance	
OM 1095		MicroTech III Fan Coil Unit Software Downloading Procedures and Troubleshooting Guide	

This purpose of this document is to serve as an integration guide for the MicroTech® III Fan Coil Unit (FCU) Controller from Daikin Applied. It provides the necessary information to integrate the fan coil unit controller into a building automation system (BAS). It lists all BACnet® properties, LonWorks® variables, corresponding fan coil unit controller data points and configuration instructions.

How to use this Guide

Refer to the first section for a glossary for common terms and protocol definitions.

Use the primary portion of this protocol document, the BACnet and LonWorks summary tables, for point mapping and addressing details. Some parameters require further explanation or information beyond what is shown in the tables. Those affected parameters are noted within each table, along with the reference to where the additional details can be found.

The BACnet Configuration and Commissioning and LonWorks Device Management section has instructions for using configuration and system commissioning and verification tools for BACnet and LonWorks variables.

The Effective Occupancy Modes section includes two tables for both BACnet and LonWorks Effective Occupancy modes. This is helpful for determining the interaction among the various inputs that ultimately determine the effective occupancy mode of the unit.

The Space Temperature Setpoint Methods section provides the temperature setpoint operation details and diagram.

The PI Loop Control Parameters section gives loop control definitions for the Heating, Cooling, and Economizer Proportional-Integral (PI) control blocks. Where necessary, the references to the supplemental sections described above are identified for those points in the summary tables.

Terminology

Unit Controller Data Points

The fan coil unit controller contains data points or unit variables that are accessible from a BACnet MS/TP (Master Slave/Token Passing) network or a LonWorks network. Not all points are accessible from each interface. This document contains the network details necessary to incorporate the unit controller into the network.

Protocol Definitions

BACnet Protocol

BACnet is a standard communication protocol for Building Automation and Control Networks developed by the American National Standards Institute (ANSI) and American Society of Heating, Refrigeration and Air-conditioning Engineers (ASHRAE) specified in ANSI/ASHRAE standard 135-2004. It addresses all aspects of the various systems that are applied to building control systems. BACnet provides the communication infrastructure needed to integrate products manufactured by different vendors and to integrate building services that are now independent.

BACnet Network Compatibility

The fan coil unit controller is tested according to the BACnet Testing Laboratory (BTL) Test Plan. It is designed to meet the requirements of the BACnet Standard as stated in the Protocol Implementation and Conformance Statement (PICS). However, it is not BTL listed. See Appendix A: Protocol Implementation Conformance Statement (PICS).

BACnet Objects

The fan coil unit controller incorporates standard BACnet object types (i.e., object types defined in the BACnet Standard) that conform to the BACnet Standard. Each object has properties that control unit variables or data points. Some object types occur more than once in the unit controller; each occurrence or instance has different properties and controls different unit variables or data points. Each instance is designated with a unique type and instance index. Some properties can be adjusted (read/write properties, e.g., setpoints) from the network and others can only be interrogated (read-only properties, e.g., status information).

Each data point accessible from a BACnet network is described with a detailed table that gives the Object Identifier, Property Identifier, and other information.

LonWorks Networks

A control network specification for information exchange built upon the use of LonTalk for transmitting data developed by the Echelon Corporation.

LonTalk Protocol

A protocol developed and owned by the Echelon Corporation. It describes how information is transmitted between devices on a control network.

LonMark Certification

LonMark certification is an official acknowledgement by the LonMark Interoperability Association that a product communicates using the LonTalk protocol and transmits and receives data per a standard LonMark functional profile. The LonWorks communication module is in accordance with the LonMark Space Comfort Controller (SCC) – Fan Coil functional profile and is LonMark 3.4 certified. Refer to www.lonmark.org for certification conformance information.

BACnet Network Objects

Table 1 - Table 8 contain the relevant information needed to integrate the MicroTech III fan coil unit controller into the BACnet network.

Refer to the Selected Parameters Information section that follows this table for equipment configuration options that require additional explanation. Additionally, the BACnet Configuration and Commissioning, Effective Occupancy Modes, Space Temperature Setpoint Methods, and PI Loop Control Parameters sections provide helpful information not found in the main data tables.

Refer to the OM 1095 Software Downloading Procedures and Troubleshooting Guide, available on www.DaikinApplied.com, for software part number and compatibility details.

⚠ CAUTION

Please note that anytime a command is written to a configuration property, this information is stored in the unit controller's non-volatile memory. Writing to non-volatile memory is an operation that has a finite limit. For this reason, the number of writes made to BACnet objects linked to configuration properties must be limited to avoid damage to the hardware.

Table 1: Analog Inputs

Point Name	Object Type/ Instance	Read/Write Access[2]	BACnet Object Name	Range/Default (in Units)	Non-volatile Memory[1]	Description
ANALOG INPUTS						
Local Space Temperature Output	AI:1	R	LocalSpaceTemp	0 to 158ºF -17.77 to 70ºC Default: 68ºF / 20ºC	N	The value of the hardwired space temperature sensor installed either in the return air or the space. Writing to Space Temp Input (AV36) does not affect Local Space Temp (AI1) but does affect Effective Space Temp[3] (AV22.)
Local Setpoint Adjust Output	AI:2	R	LocalSetpt	55 to 95ºF 12.78 to 35ºC Default: 32ºF / 0ºC	N	The reference setpoint used to determine the Effective Heating/Cooling setpoints. It is the value of the local, hardwired space temperature setpoint. It is only valid if the unit controller is configured for Long Range Setpoint Adjust and is enabled by MSV12.[3] See Effective Occupancy Modes.
Local Entering Water Temperature	AI:3	R	EWT	32 to 212°F 0 to 100°C Default: 32ºF / 0ºC	N	Displays the value of the entering water temperature sensor. Writing to Remote Entering Water Temperature (AV35) does not affect Local Entering Water Temperature (AI3); however, it does affect the Effective Entering Water Temperature[3] (AV20.)
Discharge Air Temperature	AI:4	R	DischAirTemp	0 to 158°F -17.77 to 70°C Default: 32ºF / 0ºC	N	Indicates the discharge air temperature sensor value.[3]
Outdoor Air Temperature	AI:5	R	OutdoorTemp	-40 to 158°F -40 to 70°C Default: 32ºF / 0ºC	N	Monitors the outdoor air temperature if the unit controller is equipped with a hardwired temperature sensor.[3]

1. Parameter is stored in FLASH / EEPROM (non-volatile memory) in either the communication module or in the unit controller. If Non-volatile Memory = Y, then the value is saved through a power cycle. Writes to this parameter must be limited. If Non-volatile Memory = N, the value is not saved through a power cycle.

2. R = Read Only, W = Writeable, C = Commandable

3. Analog Null is a discrete temperature value of 621.806ºF/327.67ºC. Its purpose is to indicate a sensor failure condition or when the unit controller is not using that particular temperature value.

Table 2: Analog Values

Point Name	Object Type/ Instance	Read/Write Access[2]	BACnet Object Name	Range/Default (in Units)	Non-volatile Memory[1]	Description
ANALOG VALUES						
Occupancy Temperature Setpoint (AV1 to AV6) General Interaction Rules						Defines the Space Temperature Heating and Cooling Setpoints for different occupancy modes. See Effective Occupancy Modes and Space Temperature Setpoint Methods. The occupancy temperature setpoints must be kept in ascending order as follows: AV6 <= AV5 <= AV4 <= AV1 <= AV2 <= AV3
Occupied Cooling Setpoint	AV:1	W	cpOccupied_Cool_ Setpt	50 to 95ºF 10 to 35ºC Default: 75ºF / 23.88ºC	Y	Defines the Space Temperature Setpoint for the Occupied Cooling Setpoint.[3] Interaction Rule AV1 > (AV4 + AV33)
Standby Cool Setpoint	AV:2	W	cpStandby_Cool_ Setpt	50 to 95ºF 10 to 35ºC Default: 77ºF / 25ºC	Y	Defines the Space Temperature Setpoint for the Standby Cool Setpoint.[3] Interaction Rule: AV2 > (AV5 + AV33)

Point Name	Object Type/ Instance	Read/Write Access[2]	BACnet Object Name	Range/Default (in Units)	Non-volatile Memory[1]	Description
ANALOG VALUES						
Unoccupied Cool Setpoint	AV:3	W	cpUnoccupied_ Cool_Setpt	50 to 95ºF 10 to 35ºC Default: 85ºF / 29.44ºC	Y	Defines the Space Temperature setpoint for the Unoccupied Cool Setpoint.[3] Interaction Rule: AV3 > (AV6 + AV39)
Occupied Heat Setpoint	AV:4	W	cpOccupied_Heat_ Setpt	50 to 95ºF 10 to 35ºC Default: 70ºF / 21.11ºC	Y	Defines the Space Temperature Setpoint for the Occupied Heat Setpoint.[3] Interaction Rule: AV4 < (AV1 – AV33)
Standby Heat Setpoint	AV:5	W	cpStandby_Heat_ Setpt	50 to 95ºF 10 to 35ºC Default: 66ºF / 18.88ºC	Y	Defines the Space Temperature Setpoint for the Standby Heat Setpoint.[3] Interaction Rule: AV5 < (AV2 – AV33)
Unoccupied Heat Setpoint	AV:6	W	cpUnoccupied_ Heat_Setpt	50 to 95ºF 10 to 35ºC Default: 60ºF / 15.55ºC	Y	Defines the Space Temperature Setpoint for the Unoccupied Heat Setpoint.[3] Interaction Rule: AV6 < (AV3 – AV39)
Cooling Enable Differential	AV:7	W	cpCoolEnDiff	2 to 10°F 1.11 to 5.56°C Default: 5°F / 2.77°C	Y	The Effective Room Temperature minus the Effective Entering Water Temperature must be greater than this configuration property in order for the cooling valve to operate. Applies to two-pipe systems only.
Cooling Interstage Timer	AV:8	W	cpCoolIntStgTmr	120 to 1200 sec Default: 300 sec	Y	A countdown timer that defines the minimum period of time between turn-on of the cooling stages.
Cooling Valve Deadband	AV:9	W	cpCoolDB	3 to 100% Default: 3%	Y	Adjusts the deadband for the cooling valve control outputs. The outputs remain off as long as the input to the valve control algorithm falls within the deadband.
Cooling Valve Stroke Time	AV:10	W	cpCoolVlvStroke	15 to 600 sec Default: 180 sec	Y	Specifies the time required for the cooling valve to travel from fully open to fully closed or vice-versa.
Economizer Maximum Discharge Air Setpoint	AV:11	W	cpMaxDASpt	50 to 80ºF 10 to 26.67ºC Default: 75ºF / 23.88ºC	Y	Specifies the discharge air setpoint where the economizer DASP (Discharge Air Sensor Position) PI loop output is at 0%. It must be a value greater than or equal to the minimum setting.
Economizer Minimum Discharge Air Setpoint	AV:12	W	cpMinDASpt	50 to 80ºF 10 to 26.67ºC Default: 55ºF / 12.77ºC	Y	Specifies the discharge air setpoint where the economizer DASP PI loop output is at 100%. It must be a value less than or equal to the maximum setting.
Economizer Outdoor Air Enable Differential	AV:13	W	cpEconOaEnDiff	1 to 12ºF 0.55 to 6.67ºC Default: 2ºF / 1.11ºC	Y	The Indoor Air Temp minus the Outdoor Air Temp must be greater than this configuration property value in order for the economizer to be used for free cooling. This ensures outdoor air is cold enough to provide cooling.
Economizer Outdoor Air Enable Setpoint	AV:14	W	cpEconOaEn	40 to 80°F 4.44 to 26.67ºC Default: 50ºF / 10ºC	Y	The Outdoor Air Temperature must be greater than this value in order for economizer to be used for free cooling. This ensures the outdoor air is not too cold to cause freezing.
Economizer Min Position at Fan Low	AV:15	W	cpEconLowMin	0 to 100% Default: 10%	Y	Specifies the economizer minimum position when the fan is running at low speed. This only applies when the economizer is enabled.
Economizer Min Position at Fan Med	AV:16	W	cpEconMedMin	0 to 100% Default: 10%	Y	Specifies the economizer minimum position when the fan is running at medium speed. This only applies when the economizer is enabled.
Economizer Min Position at Fan High	AV:17	W	cpEconHighMin	0 to 100% Default: 10%	Y	Specifies the economizer minimum position when the fan is running at high speed. This only applies when the economizer is enabled.
Economizer Position Deadband	AV:18	W	cpEconDB	3 to 100% Default: 3%	Y	Adjusts the deadband for the economizer position control outputs. The outputs remain off as long as the input to the valve control algorithm falls within the deadband.
Economizer Stroke Time	AV:19	W	cpEconStroke	15 to 600 sec Default: 66 sec	Y	Specifies the time required for the economizer to travel from fully open to fully closed or vice-versa.
Effective Entering Water Temperature	AV:20	R	EffectEWT	32 to 212°F 0 to 100°C Default[6]: 621.806ºF 327.67ºC	N	Monitors the effective Entering Water Temperature that the fan coil uses for control. AV20 uses the AI3 local sensor unless the AV35 network override is a valid value.[6]
Effective Setpoint Output	AV:21	R	EffectSetpt	50 to 95ºF 10 to 35ºC Default[6]: 621.806ºF 327.67ºC	N	Effective Heating or Cooling Setpoint the unit controller is attempting to maintain, which is dependent upon Effective Occupancy (MSV5).[6] See Space Temperature Setpoint Methods.
Effective Space Temperature Output	AV:22	R	EffectSpaceTemp	0 to 158°F -17.77 to 70°C Default[6]: 621.806ºF 327.67ºC	N	Monitors the space temperature that the unit controller uses for control. AV22 uses the AI1 local sensor unless the AV36 network override is a valid value.[6]

Point Name	Object Type/ Instance	Read/Write Access[2]	BACnet Object Name	Range/Default (in Units)	Non-volatile Memory[1]	Description
ANALOG VALUES						
Entering Water Temperature Flow Sample Delay Timer	AV:23	W	cpEWTFlowTmr	60 to 600 sec Default: 120 sec	Y	Specifies the amount of time the unit controller waits after opening the hydronic valve before sampling the Entering Water Temperature to determine if hydronic heating or cooling is allowed. This point only applies to systems requiring EWT sampling.
Entering Water Temperature Sample Interval Timer	AV:24	W	cpEWTSampleTmr	0, 20 to 120 min Default: 120 min	Y	Specifies the time between sampling the Entering Water Temperature. The value of 0 disables the EWT sampling feature. This point only applies to systems requiring EWT sampling.
Fan Minimum OFF Timer	AV:25	W	cpFanMinOffTmr	120 to 1200 sec Default: 180 sec	Y	Sets the minimum amount of time the fan must remain off once it has stopped. The timer counts down from the specified value until it reaches zero, signaling that the fan is available to run.
Fan Minimum ON Timer	AV:26	W	cpFanMinOnTmr	120 to 1200 sec Default: 180 sec	Y	Sets the minimum amount of time the fan must remain on once it has started. The timer counts down from the specified value until it reaches zero, signaling that the fan may be turned off during normal operation. The timer value is ignored in the event of a shutdown alarm.
Heating Enable Differential	AV:27	W	cpHeatEnDiff	2 to 10°F 1.11 to 5.56°C Default: 5°F / 2.77°C	Y	The Effective Entering Water Temperature minus the Effective Room Temperature must be greater than this configuration property in order for the heating valve to operate. Applies to two-pipe systems only.
Heating Interstage Timer	AV:28	W	cpHeatIntStgTmr	120 to 1200 sec Default: 300 sec	Y	A countdown timer that defines the minimum period of time between turn-on of the heating stages.
Heating Valve Deadband	AV:29	W	cpHeatDB	3 to 100% Default: 3%	Y	Adjusts the deadband for the heating valve control outputs. The outputs remain off as long as the input to the valve control algorithm falls within the deadband.
Heating Valve Stroke Time	AV:30	W	cpHeatVlvStroke	15 to 600 sec Default: 180 sec	Y	Specifies the time required for the heating valve to travel from fully open to fully closed or vice-versa.
Local Bypass Time Setpoint	AV:31	W	cpBypassTime	0, 30 to 120 min Default: 120 min	Y	Defines the amount of time that the unit can be in the bypass mode initiated by the timed override button. Pressing the Timed Override button from 4- 9 seconds sets the bypass timer to the maximum AV31 value. The value of 0 disables this feature.
Setpoint Shift Output	AV:32	R	SetpointShift	-5 to 5ºF -2.78 to 2.78ºC Init: 0ºF	N	This value represents the Occupied and Standby as well as Heating and Cooling setpoint offsets. It is valid when configured for Short Range Setpoint Adjust.
Occupied Setpoint Differential	AV:33	W	cpOccDiff	1 to 5°F 0.55 to 2.78°C Default: 1ºF / 0.55ºC	Y	This value represents the Occupied and Standby Setpoint hysteresis to determine the Effective OFF setpoints.
Receive Heartbeat	AV:34	W	cpRcvHrtBt	0 to 6553.4 sec Default: 0 (Disabled)	Y	Specifies the maximum amount of time the supported overrides must be refreshed (i.e. written) before the unit reverts back to the default value. Each point supported by Receive Heartbeat has a separate timer associated with it. Only use this feature in v1.1 BACnet software and newer. The value of 0 disables this feature. The supported Receive Heartbeat points are: • AV 35 • AV 36 • AV 38 • MSV 7 • MSV 8 • MSV 9 • MSV 10 • MSV 11 • MSV 13
Remote Entering Water Temperature	AV:35	C	Network_EWT	32 to 212°F 0 to 100°C Default[6]: 621.806ºF 327.67ºC	N	Provides the Entering Water Temperature value from the network instead of using the local temperature sensor.[6,7] The network override will revert back to its default value upon unit controller reboot.
Space Temperature Input	AV:36	C	Network_ SpaceTemp	14 to 122°F -10 to 50°C Default[6]: 621.806ºF 327.67ºC	N	Provides the Space Temperature value from the network instead of using the local temperature sensor. [6,7] The network override will revert back to its default value upon unit controller reboot.
Temperature Setpoint Input	AV:37	C	Setpoint	50 to 95ºF 10 to 35ºC Default[6]: 621.806ºF 327.67ºC	N	Allows the network to set the reference setpoint in the Occupied and Standby Occupancy modes. Local setpoint operation must be disabled by MSV12. AV37 always retains the last valid value after power-up.[6] The network override will revert back to its default value upon unit controller reboot. See Space Temperature Setpoint Methods.

Point Name	Object Type/ Instance	Read/Write Access[2]	BACnet Object Name	Range/Default (in Units)	Non-volatile Memory[1]	Description
ANALOG VALUES						
Temperature Setpoint Offset Input	AV:38	C	SetptOffset	-18 to +18ºF -10 to +10ºC Default: 0º	N	Shifts the Occupied and Standby Effective Setpoints via the network. The Unoccupied Effective Setpoints are not affected. This is the Short Range Setpoint used when a room sensor Setpoint Adjust is disabled.[7] The network override will revert back to its default value upon unit controller reboot. See Space Temperature Setpoint Methods.
Unoccupied Setpoint Differential	AV:39	W	cpUnoccDiff	2 to 10°F 1.11 to 5.56°C Default: 2ºF / 1.11ºC	Y	Sets the Unoccupied Setpoint hysteresis to determine the Effective OFF setpoints.
Terminal Load Output	AV:40	R	TerminalLoad	-100 to +100%	N	Indicates the current heat/cool energy demand of the unit. Positive values indicate that the unit requires cooling energy. Negative values indicate that the unit requires heating energy.
Long Range Setpoint Adjust Maximum	AV:41	W	cpSptAdjMax	55 to 95ºF 12.78 to 35ºC Default: 95°F / 35°C	Y	Limits the maximum value of the Long Range Setpoint Adjust temperature setting. This setpoint must be greater than or equal to the minimum setting.
Long Range Setpoint Adjust Minimum	AV:42	W	cpSptAdjMin	55 to 95ºF 12.78 to 35ºC Default: 55°F/12.78°C	Y	Limits the minimum value of the Long Range Setpoint Adjust temperature setting. This setpoint must be greater than or equal to the maximum setting.
Air Filter Change Timer	AV:43	W	cpFltrChangeHrs	0, 360 to 4320 hours Default: 1440 hours	Y	Defines the amount of time that the fan can operate before a dirty air filter alarm is generated. This timer is only used when it is set to a non-zero value and the dirty air filter binary input is disabled through the equipment configuration settings. A value of 0 disables this feature.
MAC Address / Address Switch	AV:411	W	MacAddress (S3 Address Switch set to 255 - factory default setting)	1 to 127	Y	The function of AV411 depends on the setting of the BACnet communication module physical Address Switch (S3). When the physical address switch is set to a value of 255, the dynamic MAC addressing algorithm is used to commission the BACnet communication module. This variable represents the unit's MAC Address that can be written through the network or through the configuration serial port. When the physical address switch is not set to a value of 255, it represents the setting of the physical address switch and is read-only.
		R	MacAddressSwitch (S3 Address Switch not physically set to 255)			
System Minimum Instance[4,5]	AV:412	W	SystemMinInstance	0 to 4194302 Default: 3101000	Y	Value of this setting is added to the MAC Address to determine the final BACnet Device Name and Device Instance Number. Example: the default Instance Number = 3101007 when the MAC = 7.

1. Parameter is stored in FLASH / EEPROM (non-volatile memory) in either the communication module or in the unit controller. If Non-volatile Memory = Y, then the value is saved through a power cycle. Writes to this parameter must be limited. If Non-volatile Memory = N, the value is not saved through a power cycle.

2. R = Read Only, W = Writeable, C = Commandable

3. The values of the individual Occupancy Temperature Setpoints (AV1 to AV6) must be kept in ascending order as follows: AV6 <= AV5 <= AV4 <= AV1 <= AV2 <=AV3.

4. AV412 has an ObjectName of SystemMinInstance, the Present Value is writeable, and it has a default value of 3101000. During the commissioning process, the present value of AV412 is added to the MAC Address to determine the Device Instance Number. In order to change the value of AV412 on the BACnet communication module in the unconfigured state, the BAS must broadcast a new present value to AV412 using the BACnet service (BIBB – BACnet Interface Building Block) called "Unconfirmed COV" with a ProcessID value of 1. This prevents unauthorized unconfirmed writes, or changes, to AV412. Note that this change affects the AV412 present value for every fan coil BACnet communication module on the trunk.

5. The auto-addressing feature was designed for units communicating to a MicroTech Integrated System (MIS) controller. However, any BAS can configure a MicroTech III fan coil unit controller with BACnet communication module for auto-addressing. AV412 can be set via the BAS using auto-addressing, but this feature is intended primarily for the MIS controller. See the MicroTech System Manager Operation Manual, OM 1092, and the MicroTech III BACnet MS/TP Communication Module Installation Manual, IM 1013, both available on www.daikinapplied.com, for complete details on using auto-addressing with the MIS controller.

6. Analog Null is a discrete temperature value of 621.806ºF/327.67ºC. Its purpose is to indicate a sensor failure condition or when the unit controller is not using that particular temperature value.

7. When Receive Heartbeat is enabled, this variable reverts to the default (non-override) value if it is not refreshed often enough through a network command or if communication is disabled (i.e. BACnet device communication control = disable).

Table 3: Binary Inputs

Point Name	Object Type/ Instance	Read/ Write Access[2]	BACnet Object Name	Range/Default (in Units)	Non-volatile Memory[1]	Description
BINARY INPUTS						
Binary Input Status	BI:1	R	BinaryIn (Description Property)	16 bits	N	Monitors the digital inputs of the unit controller for diagnostic purposes. Each item is reported as a bit so that multiple inputs can be viewed simultaneously. The Present_Value reflects the first status bit (b0), which is the "Freeze Fault Detection" state. All the status bits are returned in the BI1.description property, high bit on the left and low bit on the right. Ex: 0000000000000001 shows the Freeze Fault input is true. See Selected Parameters Information for bit descriptions.

1. Parameter is stored in FLASH / EEPROM (non-volatile memory) in either the communication module or in the unit controller. If Non-volatile Memory = Y, then the value is saved through a power cycle. Writes to this parameter must be limited. If Non-volatile Memory = N, the value is not saved through a power cycle.
2. R = Read Only, W = Writeable, C = Commandable

Table 4: Binary Values

Point Name	Object Type/ Instance	Read/ Write Access[2]	BACnet Object Name	Range/Default (in Units)	Non-volatile Memory[1]	Description
BINARY VALUES						
Clear Alarm	BV:1	W	ClearAlarm	0 to 1 Default: 0	N	Clears the Current Alarm. The alarm that is cleared moves to the Previous Alarm buffer. Value automatically clears after a clear alarm command is issued. 0 = Normal 1 = Clear Alarm
Binary Output Status	BV:2	R	BinaryOut (Description Property)	16 bits	N	Monitors the digital outputs of the unit controller for diagnostic purposes. Each item is reported as a bit so that multiple outputs can be viewed simultaneously. The Present_Value reflects the first status bit (b0), which is the "Baseboard Fan Low Speed" state. All the status bits are returned in the BV2 description property, high bit on the left and low bit on the right. Ex: 0000000000000001 shows the fan is at low speed. Array index NULL returns Bit Number 0. See Selected Parameters Information for bit descriptions.
Unit Application Status	BV:3	R	UnitAppStatus (Description Property)	16 bits	N	Monitors various application status flags of the unit controller for diagnostic purposes. Each item is reported as a bit so that multiple flags can be viewed simultaneously. The Present_Value reflects the first status bit (b0), which is the "Heating Valve Enabled" state. All the status bits are returned in the BV3 description property, high bit on the left and low bit on the right. Ex: 0000000000000001 shows the Heating Valve is enabled. See Selected Parameters Information for bit descriptions.
Unit Faults	BV:4	R	UnitFaults (Description Property)	16 bits	N	Monitors faults of the unit controller for diagnostic purposes. Each fault is reported as a bit so that multiple faults can be viewed simultaneously. The Present_Value reflects the first status bit (b0), which is the "Invalid Equipment Configuration" state. All the status bits are returned in the BV4 description property, high bit on the left and low bit on the right. Ex: 0000000000000001 shows the Invalid Equipment Configuration is true. See Selected Parameters Information for bit descriptions.
Equipment Configuration (Available in v1.1 and higher)	BV:5	R	SoftJumpers (Description Property)	32 bits	N	Sets unit controller and I/O expansion module configuration. This property is pre-configured, but may need to be changed if field options are installed or if the unit controller is replaced. All 32 configuration status bits are returned in the BV5 description property, high bit on the left and low bit on the right. The equipment configuration must be set using the BACnet configuration menu. It cannot be set through the BAS. See Selected Parameters Information and BACnet Configuration and Commissioning for details.

1. Parameter is stored in FLASH / EEPROM (non-volatile memory) in either the communication module or in the unit controller. If Non-volatile Memory = Y, then the value is saved through a power cycle. Writes to this parameter must be limited. If Non-volatile Memory = N, the value is not saved through a power cycle.
2. R = Read Only, W = Writeable, C = Commandable

Table 5: Multi-State Inputs

Point Name	Object Type/ Instance	Read/ Write Access[2]	BACnet Object Name	Range/Default (in Units)	Non-volatile Memory[1]	Description
MULTI-STATE INPUTS						
Fan Mode/Speed Status	MSI:1	R	FanModeSpdSw	1 to 6	N	Monitors the fan switch that has priority over the continuous/cycling fan option. The option setting is used when the switch is in the Auto position. 1 = Off 2 = Low 3 = Med 4 = High 5 = Auto 6 = Null (no switch present)
System Mode Switch (Heat/Cool/Auto) Status	MSI:2	R	HeatCoolAuto	1 to 5	N	Displays the room sensor System Mode switch (Heat/ Cool/Auto) position. 1 = Off 2 = Heat 3 = Cool 4 = Auto 5 = Null (no switch present)

1. Parameter is stored in FLASH / EEPROM (non-volatile memory) in either the communication module or in the unit controller. If Non-volatile Memory = Y, then the value is saved through a power cycle. Writes to this parameter must be limited. If Non-volatile Memory = N, the value is not saved through a power cycle.
2. R = Read Only, W = Writeable, C = Commandable

Table 6: Multi-State Values

Point Name	Object Type/ Instance	Read/ Write Access[2]	BACnet Object Name	Range/Default (in Units)	Non-volatile Memory[1]	Description
MULTI-STATE VALUES						
Current Alarm	MSV:1	R	CurrentAlarm	1 to 12	N	Displays the current highest active alarm. 1 = No Alarms 2 = Invalid Equipment Configuration 3 = Emergency Shutdown 4 = Freeze Fault 5 = EWT Sensor Failure 6 = Room Temperature Sensor Failure 7 = IO Expansion Board Com Failure 8 = Condensate Overflow 9 = Outdoor Air Temp Sensor Failure 10 = Discharge Air Temp Sensor Failure 11 = Dirty Air Filter 12 = BB Serial EEPROM Corrupted
Previous Alarm	MSV:2	R	PreviousAlarm	1 to 12	N	Indicates the previous unit fault. 1 = No Alarms 2 = Invalid Equipment Configuration 3 = Emergency Shutdown 4 = Freeze Fault 5 = EWT Sensor Failure 6 = Room Temperature Sensor Failure 7 = IO Expansion Board Com Failure 8 = Condensate Overflow 9 = Outdoor Air Temp Sensor Fail 10 = Discharge Air Temp Sensor Fail 11 = Dirty Air Filter 12 = Serial EEPROM Corrupted
Fan Speed Output	MSV:3	R	Fan Speed	1 to 5	N	Displays the commanded fan speed. 1 = Off 2 = Low 3 = Medium 4 = High 5 = On

1. Parameter is stored in FLASH / EEPROM (non-volatile memory) in either the communication module or in the unit controller. If Non-volatile Memory = Y, then the value is saved through a power cycle. Writes to this parameter must be limited. If Non-volatile Memory = N, the value is not saved through a power cycle.
2. R = Read Only, W = Writeable, C = Commandable
3. When Receive Heartbeat is enabled, this variable reverts to the default (non-override) value if it is not refreshed often enough through a network command or if communication is disabled (i.e. BACnet device communication control = disable).

Point Name	Object Type/ Instance	Read/ Write Access[2]	BACnet Object Name	Range/Default (in Units)	Non-volatile Memory[1]	Description
MULTI-STATE VALUES						
McQuay FCU Status	MSV:4	R	McQFcuStatus	1 to 9	N	Indicates the unit's operating state. 1 = Off Alarm 2 = Off 3 = Start 4 = Fan Only 5 = Heating 6 = Economizer 7 = Cooling 8 = Dehumid 9 = Null
Effective Occupancy Output	MSV:5	R	EffectOccup	1 to 5	N	The Occupancy mode being used by the unit controller. The mode depends on Occupancy Schedule, Occupancy Schedule Override and/or an Occupancy Sensor. MSV5 uses the local sensor unless the MSV6, MSV7, or MSV8 network overrides are not in a Null state. See Effective Occupancy Modes. 1 = Occupied 2 = Unoccupied 3 = Bypass 4 = Standby 5 = Null
Occupancy Override Input	MSV:6	C	OccManCmd	1 to 5 Default: 5	N	Overrides the Occupancy Schedule. Occupancy Schedule Override has priority over the Occupancy Schedule and Remote Occupancy Sensor. It is also where a local timed override hardwired input is monitored and used to place the unit in the Occupied mode during the amount of time declared in Timed Override Setpoint using Schedule Override and/or an Occupancy Sensor. The network override will revert back to its default value upon unit controller reboot. See Effective Occupancy Modes. 1 = Occupied 2 = Unoccupied 3 = Bypass 4 = Standby 5 = Null
Occupancy Scheduler Input	MSV:7	C	OccSchedule	1 to 4 Default: 4	N	Commands the fan coil unit into different occupancy modes. A scheduler or a supervisory controller typically sends the command using Schedule Override.[3] The network override will revert back to its default value upon unit controller reboot. See Effective Occupancy Modes. 1 = Occupied 2 = Unoccupied 3 = Standby 4 = Null
Occupancy Sensor Input	MSV:8	C	OccSensor	1 to 3 Default: 3	N	Indicates the presence of occupants in the space (motion detection).[3] The network override will revert back to its default value upon unit controller reboot. See Effective Occupancy Modes. 1 = Occupied 2 = Unoccupied 3 = Null

1. Parameter is stored in FLASH / EEPROM (non-volatile memory) in either the communication module or in the unit controller. If Non-volatile Memory = Y, then the value is saved through a power cycle. Writes to this parameter must be limited. If Non-volatile Memory = N, the value is not saved through a power cycle.

2. R = Read Only, W = Writeable, C = Commandable

3. When Receive Heartbeat is enabled, this variable reverts to the default (non-override) value if it is not refreshed often enough through a network command or if communication is disabled (i.e. BACnet device communication control = disable).

Point Name	Object Type/ Instance	Read/ Write Access[2]	BACnet Object Name	Range/Default (in Units)	Non-volatile Memory[1]	Description
MULTI-STATE VALUES						
Application Mode Input	MSV:9	C	ApplicMode	1 to 8 Default: 8	N	Sets the unit in an application mode (Auto, Off, Heat, Cool, Dehumidification, or Fan Only). Application Mode does not "force" the unit into any state. However, it does disable certain unit operations. Examples: 1) Application Mode of Cool disables heating, 2) Heat disables cooling and dehumidification, and 3) Fan Only disables heating, cooling, and dehumidification.[3] MSV9 overrides the local room sensor's System Mode Switch (Heat/Cool/Auto). The local System Mode Switch is only used when MSV9 is set to 7 (Null). The network override will revert back to its default value upon unit controller reboot. 1 = Auto 2 = Heat 3 = Cool 4 = Off 5 = Fan Only 6 = Economy 7 = Dehumid 8 = Null
Auxiliary Heat Enable Input	MSV:10	C	AuxHeatEnable	1 to 3 Default: 3	N	Enables or disables auxiliary heat for units with electric heat. Electric heat is always enabled when it is the only source of heating, and is unaffected by this variable. The default state is Null, in which case auxiliary heat is enabled.[3] The network override will revert back to its default value upon unit controller reboot. 1 = Disabled 2 = Enabled 3 = Null
Energy Hold Off Input	MSV:11	C	EnergyHoldOff	1 to 3 Default: 3	N	When the unit is in the Energy Hold Off mode, the unit uses Standby setpoints. This command has priority over Effective Occupancy.[3] The network override will revert back to its default value upon unit controller reboot. 1 = Normal 2 = Energy Hold Off 3 = Null
Room Sensor Setpoint Adjust Enable/Disable	MSV:12	W	cpLocSpEnable	1 to 2 Default: 2	Y	Enables or disables the local hardwired setpoint adjustment. If the value of MSV12 is set to 1, this disables the setpoint control from a room sensor and enables the setpoint control from the network. 1 = Disabled 2 = Enabled
Economizer Enable Input	MSV:13	C	EconEnable	1 to 3 Default: 3	N	Enables or disables the economizer for cooling purposes, and only applies to models with an economizer. The default state is Null, in which case the economizer is enabled.[3] The network override will revert back to its default value upon unit controller reboot. 1 = Disabled 2 = Enabled 3 = Null
Units (English / Metric)	MSV:14	W	Units	1 to 2 Default: 1	Y	Both English and Metric units of measure for temperature conversion are supported. This menu selection changes the units for all the appropriate properties in the device. From the network MSV14. presentvalue changes it. Select either "E" for English; or "M" for Metric units from the BACnet configuration menu. See BACnet Configuration and Commissioning. 1 = English (E) 2 = Metric (M)

1. Parameter is stored in FLASH / EEPROM (non-volatile memory) in either the communication module or in the unit controller. If Non-volatile Memory = Y, then the value is saved through a power cycle. Writes to this parameter must be limited. If Non-volatile Memory = N, the value is not saved through a power cycle.

2. R = Read Only, W = Writeable, C = Commandable

3. When Receive Heartbeat is enabled, this variable reverts to the default (non-override) value if it is not refreshed often enough through a network command or if communication is disabled (i.e. BACnet device communication control = disable).

Table 7: Loop Objects

Point Name	Object Type/ Instance	Read/ Write Access[2]	BACnet Object Name	Range/Default (in Units)	Non-volatile Memory[1]	Description
LOOP OBJECTS						
Heating Valve PI Loop - See PI Loop Control Parameters section and OM 1111						
Present Value (Heating Valve Position Output)	Loop:1	R	Heat Valve Loop (Present_Value)	0 to 100%	N	Monitors the hydronic heating valve commanded position.
Proportional Constant	Loop:1	W	Heat Valve Loop (Proportional_ Constant)	5 to 160% Default: 25%	Y	The proportional gain (Kp) value of the loop algorithm used to control heating valve.
Integral Constant	Loop:1	W	Heat Valve Loop (Integral_ Constant)	0 to 1200 sec Default: 20	Y	The integral offset (Ki) value of the loop algorithm used to control the heating valve. The value of 0 disables this feature.
Cooling Valve PI Loop - See PI Loop Control Parameters section and OM 1111						
Present Value (Cooling Valve Position)	Loop:2	R	Cool Valve Loop (Present_Value)	0 to 100%	N	Monitors the hydronic cooling valve commanded position.
Proportional Constant	Loop:2	W	Cool Valve Loop (Proportional_ Constant)	5 to 160% Default: 40%	Y	The proportional gain (Kp) value of the loop algorithm used to control the cooling valve.
Integral Constant	Loop:2	W	Cool Valve Loop (Integral_ Constant)	0 to 1200 sec Default: 30	Y	The integral offset (Ki) value of the loop algorithm used to control the cooling valve. The value of 0 disables this feature.
Economizer DASP PI Loop - See PI Loop Control Parameters section and OM 1111						
Present Value (Economizer Position Output)	Loop:3	R	DASP_Loop (Present_Value)	0 to 100%	N	Monitors the economizer commanded position. It shares the same value as Economizer Actuator Position Output.
Proportional Constant	Loop:3	W	DASP_Loop (Proportional_ Constant)	5 to 160% Default: 40%	Y	The proportional gain (Kp) value of the loop algorithm used to control the Economizer DASP.
Integral Constant	Loop:3	W	DASP_Loop (Integral_ Constant)	0 to 1200 sec Default: 20 sec	Y	The integral offset (Ki) value of the loop algorithm used to control the Economizer DASP. The value of 0 disables this feature.
Economizer Position PI Loop - See PI Loop Control Parameters section and OM 1111						
Present Value (Economizer Actuator Position Output)	Loop:4	R	EconPos_Loop (Present_Value)	0 to 100%	N	Monitors the economizer commanded position.
Proportional Constant	Loop:4	W	EconPos_Loop (Proportional_ Constant)	5 to 160% Default: 90%	Y	The proportional gain (Kp) value of the loop algorithm used to control the Economizer position.
Integral Constant	Loop:4	W	EconPos_Loop (Integral_ Constant)	0 to 1200 sec Default: 10	Y	The integral offset (Ki) of the loop algorithm used to control the Economizer position. The value of 0 disables this feature.

1. Parameter is stored in FLASH / EEPROM (non-volatile memory) in either the communication module or in the unit controller. If Non-volatile Memory = Y, then the value is saved through a power cycle. Writes to this parameter must be limited. If Non-volatile Memory = N, the value is not saved through a power cycle.

2. R = Read Only, W = Writeable, C = Commandable

Table 8: Device Objects

Point Name	Object Type/ Instance	Read/ Write Access[2]	BACnet Object Name	Range/Default (in Units)	Non-volatile Memory[1]	Description
DEVICE						
Description	Device	W	Description	32 Characters	Y	Text string; can be changed through BACnet configuration menu or BAS. See BACnet Configuration.
Instance	Device	W	Object_Identifier	1 to 4194302	Y	Unique instance number or object-identifier assigned by integrator. See BACnet Configuration.
Location	Device	W	Location	32 Characters	Y	Text string that can be changed through BACnet configuration menu or BAS. See BACnet Configuration.

1. Parameter is stored in FLASH / EEPROM (non-volatile memory) in either the communication module or in the unit controller. If Non-volatile Memory = Y, then the value is saved through a power cycle. Writes to this parameter must be limited. If Non-volatile Memory = N, the value is not saved through a power cycle.

2. R = Read Only, W = Writeable, C = Commandable

Point Name	Object Type/ Instance	Read/ Write Access[2]	BACnet Object Name	Range/Default (in Units)	Non-volatile Memory[1]	Description
DEVICE						
Name	Device	W	Object_Name	32 Characters	Y	The following applies when changes are made through the BACnet configuration menu: If a period "." is entered as the first character then the name is set to "MTIIIUC_FCU_0000000" and the zeros are set to the device instance. If a space character is entered as the first character, then the Device Instance is automatically filled in at the first 0 (zero) character in the name. For example: Assume the Instance has been changed to 321. If the name was previously "FCU_0000300" and a space is entered at the name prompt, the new name automatically fills in as "FCU_0000321". If a period is entered at the name prompt, the new name changes to "MTIIIUC_FCU_0000321."
Software Identification	Device	R	Firmware_ Revision	32 Characters	N	The software version of the communication module firmware.
Unit Application Version	Device	R	Application_ Software_Version	32 Characters	N	The software version of the unit controller.
MaxMasters	Device	W	Max_Master	1 to 127 Default: 127	Y	MaxMasters should be set to the highest address of a MS/TP master on the network segment. The default value is 127 for maximum compatibility. Setting this to the highest address of an MS/TP master device on the network reduces the MS/TP token traffic and decreases the response time of the unit controller. MaxMasters can be set from the BAS or from the BACnet configuration menu. See BACnet Configuration.
MS/TP Baud Rate	NA	NA	NA	9600, 19200, 38400, 76800 Default: 38400	Y	Set the baud rate to match the speed of the BACnet network. Speeds above 38400 should be avoided unless the network wiring has been tested and verified to meet the required speed. The baud rate must be set using the BACnet configuration menu. See BACnet Configuration.

1. Parameter is stored in FLASH / EEPROM (non-volatile memory) in either the communication module or in the unit controller. If Non-volatile Memory = Y, then the value is saved through a power cycle. Writes to this parameter must be limited. If Non-volatile Memory = N, the value is not saved through a power cycle.

2. R = Read Only, W = Writeable, C = Commandable

LONWORKS Network Variables

Table 9 - Table 11 contain the relevant information needed to integrate the MicroTech III fan coil unit controller into the LONWORKS network.

Refer to the Selected Parameters Information section that follows this table for equipment configuration options that require additional explanation. Additionally, the LonWorks Device Management, Effective Occupancy Modes, Space Temperature Setpoint Methods, and PI Loop Control Parameters sections provide helpful information not found in the main data tables. Refer to OM 1095 Software Downloading Procedures and Troubleshooting Guide, available on www.DaikinApplied.com, for software part number and compatibility details.

⚠ CAUTION

Please note that anytime a command is written to a configuration property input (nci), this information is stored in the unit controller's non-volatile memory. Writing to non-volatile memory is an operation that has a finite limit. For this reason, the number of writes made to configuration properties must be limited in order to avoid damage to the hardware.

Table 9: Network Variable Inputs (NVIs)

Point Name	LONWORKS Variable (NV Index[2])	SNVT Type (SNVT Index)	Range/ Default (in Units)	Heartbeat	Description
NETWORK VARIABLE INPUTS					
Application Mode Input	nviApplicMode -13	SNVT_hvac_ mode -108	Default: HVAC_ NUL	Recv	Sets the unit in an application mode (Auto, Off, Heat Only, Cool Only, Fan Only, or Dehumidification). Application Mode does not "force" the unit into any state. However, it disables certain unit operation. Examples: 1) an Application Mode of Cool Only disables heating, 2) Heat Only disables cooling, and 3) Fan Only disables heating and cooling.[3] nviApplicMode overrides the local room sensor's System Mode Switch (Heat/Cool/Auto). The local System Mode Switch is only used when nviApplicMode is set to HVAC_NUL. The network override will revert back to its default value upon unit controller reboot. **Supported Values** • 0 = HVAC_AUTO • 1 = HVAC_HEAT • 3 = HVAC_COOL • 6 = HVAC_OFF • 9 = HVAC_FAN_ONLY • 13 = HVAC_ECONOMY • 14 = HVAC_DEHUMID • -1 (0xFF) = HVAC_NUL
Auxiliary Heat Enable Input	nviAuxHeatEnable -14	SNVT_switch -95	Default: Null	Recv	Enables or disables auxiliary heat for units with electric heat. Electric heat is always enabled when it is the only source of heating, and is unaffected by this variable. The default state is Null, in which case auxiliary heat is enabled.[3] The network override will revert back to its default value upon unit controller reboot. **Selection / State / Value** Disabled / 0 / 0 to 100% Disabled / 1 / 0% Enabled / 1 / 0.5 to 100% Null / -1 / 0 to 100% (Enabled)
Clear Alarm	nviClearAlarm -15	SNVT_switch -95	Default: Normal	No	Clears the Current Alarm. The alarm that is cleared moves to the Previous Alarm buffer. Value automatically clears after a clear alarm command is issued. The controller automatically returns both the state and value parameters to 0 once the alarm is cleared. **Selection / State / Value** Normal / 0 / 0% Clear Alarm / - 1 or 0 / 0.5 to 100% Clear Alarm / 1 / 0 to 100%
Economizer Enable Input	nviEconEnable -23	SNVT_switch -95	Default: Null	Recv	Enables or disables the economizer for cooling purposes, and only applies to models with the economizer. The default state is Null, in which case the economizer is enabled.[3] The network override will revert back to its default value upon unit controller reboot. **Selection / State / Value** Disabled / 0 / 0 to 100% Disabled / 1 / 0% Enabled / 1 / 0.5 to 100% Null / -1 / 0 to 100% (Enabled)

1.Analog Null (0x7FFF) is a discrete temperature value of 621.806ºF/327.67ºC. Its purpose is to indicate a sensor failure condition or when the unit controller is not using that temperature value.

2. The Network Variable index number is a unique identifier for certain LONWORKS variables. Some BAS companies use this numeric value instead of text to reference these variables. The NV index number can also be found in the XIF file.

3. When Receive Heartbeat is enabled, this variable reverts to the default (non-override) value if it is not refreshed often enough through a network command or if communication is disabled (i.e. the device is disabled or is offline).

Point Name	LonWorks Variable (NV Index[2])	SNVT Type (SNVT Index)	Range/ Default (in Units)	Heartbeat	Description
NETWORK VARIABLE INPUTS					
Energy Hold Off Input	nviEnergyHoldOff -16	SNVT_switch -95	Default: Null	Recv	When the unit is in the Energy Hold Off mode, the Standby setpoints are used. This command has priority over Effective Occupancy.[3] The network override will revert back to its default value upon unit controller reboot. **Selection / State / Value** Normal / 0 / 0 to 100% Normal / 1 / 0% HoldOff / -1 or 1 / 0.5 to 100% Null / -1 / 0% (Normal)
Occupancy Override Input	nviOccManCmd -17	SNVT_occupancy -109	Default: OC_NUL	No	Overrides the Occupancy Schedule. Occupancy Schedule Override has priority over the Occupancy Schedule and Remote Occupancy Sensor. It is also where a local timed override hardwired input is monitored and used to place the unit in the Occupied mode during the amount of time declared in Timed Override Setpoint using Schedule Override or an occupancy sensor. The network override will revert back to its default value upon unit controller reboot. See Effective Occupancy Modes. **Supported Values** 0 = OC_OCCUPIED 1 = OC_UNOCCUPIED 2 = OC_BYPASS 3 = OC_STANDBY -1 (0xFF) = OC_NUL
Occupancy Scheduler Input	nviOccSchedule -18	SNVT_tod_event -128	Default: OC_NUL	Recv	Commands the unit into different occupancy modes. A scheduler or a supervisory controller typically sends the command using Schedule Override and/or an Occupancy Sensor.[3] The network override will revert back to its default value upon unit controller reboot. See Effective Occupancy Modes. **Supported Current_state Values** 0 = OC_OCCUPIED 1 = OC_UNOCCUPIED 3 = OC_STANDBY -1 (0xFF) = OC_NUL • Next_state is not used • Time_to_next_state is not used
Occupancy Sensor Input	nviOccSensor -19	SNVT_occupancy -109	Default: OC_NUL	Recv	Indicates the presence of occupants in the space (motion detection.)[3] The network override will revert back to its default value upon unit controller reboot. See Effective Occupancy Modes. **Supported Values** 0 = OC_OCCUPIED 1 = OC_UNOCCUPIED -1 (0xFF) = OC_NUL
Temperature Setpoint Offset Input	nviSetptOffset -20	SNVT_temp_p -105	-18 to +18ºF -10 to +10ºC Default: 0ºF	Recv	Shifts the Occupied and Standby Effective Setpoints via the network. The Unoccupied Effective Setpoints are not affected. This is the Short Range Setpoint used when a remote room sensor setpoint adjust is disabled.[3] The network override will revert back to its default value upon unit controller reboot. See Space Temperature Setpoint Methods. LonMark requires nviSetptOffset to be a SNVT_temp_p type, which includes the 32°F offset. The network usable range is 14 to 50°F, which is converted to a differential temperature (SNVT_temp_p_diff) by subtracting 32°F in the communication module, resulting in an effective offset range of -18 to +18°F.
Space Temperature Input	nviSpaceTemp -12	SNVT_temp_p -105	14 to 122°F -10 to 50ºC Default[1]: 621.806ºF 327.67ºC	Recv	Provides space temperature from the network instead of using the local temperature sensor.[1,3] The network override will revert back to its default value upon unit controller reboot.
Temperature Setpoint Input	nviSetpoint -21	SNVT_temp_p -105	50 to 95ºF 10 to 35ºC Default[1]: 621.806ºF 327.67ºC	No	Allows the network to set the reference setpoint in the Occupied and Standby Occupancy modes. Local setpoint operation must be disabled by nciLocSptEnable. nviSetpoint always retains the last valid value after power-up.[1] The network override will revert back to its default value upon unit controller reboot. See Space Temperature Setpoint Methods.
Remote Entering Water Temperature	nviEWT -22	SNVT_temp_p -105	32 to 212°F 0 to 100°C Default[1]: 621.806ºF 327.67ºC	Recv	Provides entering water temperature from the network instead of using the local temperature sensor.[1] The network override will revert back to its default value upon unit controller reboot.

1.Analog Null (0x7FFF) is a discrete temperature value of 621.806ºF/327.67ºC. Its purpose is to indicate a sensor failure condition or when the unit controller is not using that temperature value.

2. The Network Variable index number is a unique identifier for certain LonWorks variables. Some BAS companies use this numeric value instead of text to reference these variables. The NV index number can also be found in the XIF file.

3. When Receive Heartbeat is enabled, this variable reverts to the default (non-override) value if it is not refreshed often enough through a network command or if communication is disabled (i.e. the device is disabled or is offline).

Point Name	LonWorks Variable (NV Index[2])	SNVT Type (SNVT Index)	Range/ Default (in Units)	Heartbeat	Description
NETWORK VARIABLE INPUTS					
Request	nviRequest 0	SNVT_obj_ request	Default: 0, RQ_NORMAL	No	Requests mode status information or sets operating mode for a specific function block. The response is indicated in nvoStatus. **Fields** • object_id: 0=Node Obj, 1=McQuaySCC_FCU • object_request: (See Supported Requests) **Supported Requests** 0 = RQ_NORMAL 2 = RQ_UPDATE_STATUS 5 = RQ_REPORT_MASK

1.Analog Null (0x7FFF) is a discrete temperature value of 621.806ºF/327.67ºC. Its purpose is to indicate a sensor failure condition or when the unit controller is not using that temperature value.

2. The Network Variable index number is a unique identifier for certain LonWorks variables. Some BAS companies use this numeric value instead of text to reference these variables. The NV index number can also be found in the XIF file.

3. When Receive Heartbeat is enabled, this variable reverts to the default (non-override) value if it is not refreshed often enough through a network command or if communication is disabled (i.e. the device is disabled or is offline).

Table 10: Network Variable Outputs (NVOs)

Point Name	LonWorks Variable (NV Index[2])	SNVT Type (SNVT Index)	Range/ Default (in Units)	Heartbeat	Description
NETWORK VARIABLE OUTPUTS					
Binary Input Status	nvoBinaryIn -26	SNVT_state -83	16 bits Init: All bits = 0	No	Monitors the digital inputs of the unit controller for diagnostic purposes. Each item is reported as a bit so that multiple inputs can be viewed simultaneously. Physical input status bits. See Selected Parameters Information for bit descriptions.
Binary Output Status	nvoBinaryOut -27	SNVT_state -83	16 bits Init: All bits = 0	No	Monitors the digital outputs of the unit controller for diagnostic purposes. Each item is reported as a bit so that multiple outputs can be viewed simultaneously. Physical output status bits. See Selected Parameters Information for bit description and output settings for valves and electric heat options.
Current Alarm	nvoCurrentAlarm -28	SNVT_str_asc -36	Init: No Alarms	No	Displays the current highest active alarm. **Alarm Strings** • No Alarms • Invalid Equipment Config • Emergency Shutdown • Freeze Fault • EWT Sensor Fail • Room Temp Sensor Fail • IO Expansion Board Com Fail • Condensate Overflow • Outdoor Air Temp Sensor Fail • DAT Sensor Fail • Dirty Air Filter • BB Serial EEPROM Corrupted
Discharge Air Temperature	nvoDischAirTemp -29	SNVT_temp_p -105	0 to 158ºF 17.77 to 70ºC Default[1]: 621.806ºF 327.67ºC	Send	Indicates the discharge air temperature sensor value.[1]
Effective Entering Water Temperature	nvoEffectEWT -30	SNVT_temp_p -105	32 to 212°F 0 to 100°C Default[1]: 621.806ºF 327.67ºC	No	Monitors the effective Entering Water Temperature used by the unit. nvoEffectEWT uses the nvoEWT local sensor unless the nviEWT network override is a valid value.[1]

1.Analog Null (0x7FFF) is a discrete temperature value of 621.806ºF/327.67ºC. Its purpose is to indicate a sensor failure condition or when the unit controller is not using that temperature value.

2. The Network Variable index number is a unique identifier for certain LonWorks variables. Some BAS companies use this numeric value instead of text to reference these variables. The NV index number can also be found in the XIF file.

3. When Receive Heartbeat is enabled, this variable reverts to the default (non-override) value if it is not refreshed often enough through a network command or if communication is disabled (i.e. the device is disabled or is offline).

Point Name	LonWorks Variable (NV Index[2])	SNVT Type (SNVT Index)	Range/ Default (in Units)	Heartbeat	Description
NETWORK VARIABLE OUTPUTS					
Effective Occupancy Output	nvoEffectOccup -31	SNVT_occupancy -109	Init: OC_NUL	Send	The occupancy mode being used by the unit controller. The mode depends on Occupancy Schedule, Occupancy Schedule Override and/or an Occupancy Sensor. nvoEffectOccup uses the local sensor unless nviOccManCmd, nviOccSchedule or nviOccSensor network overrides are not in a "OC_NUL" state. See Effective Occupancy Modes **Supported Values** 0 = OC_OCCUPIED 1 = OC_UNOCCUPIED 2 = OC_BYPASS 3 = OC_STANDBY -1 (0xFF) = OC_NUL
Effective Setpoint Output	nvoEffectSetpt -32	SNVT_temp_p -105	50 to 95ºF 10 to 35ºC Default[1]: 621.806ºF 327.67ºC	Send	Effective Heating or Cooling Setpoint the unit is attempting to maintain, which depends upon Effective Occupancy (nvoEffectOccup).[1] See Space Temperature Setpoint Methods.
Local Entering Water Temperature	nvoEWT -33	SNVT_temp_p -105	32 to 212°F 0 to 100°C Default[1]: 621.806ºF 327.67ºC	No	Displays the value of the entering water temperature sensor. Writing to Remote Entering Water Temperature (nviEWT) does not affect Local Entering Water Temperature (nvoEWT); however, it does affect the Effective Entering Water Temperature (nvoEffectEWT.)[1]
Fan Mode/Speed Status	nvoFanModeSpdSw -34	UNVTfanModeSpdSw	Init: FANSW_NULL	No	Monitors the fan switch that has priority over the continuous/cycling fan option. The option setting is used when the switch is in the Auto position. **Supported Values** 0 = FANSW_OFF 1 = FANSW_LOW 2 = FANSW_MED 3 = FANSW_HIGH 4 = FANSW_AUTO -1 (0xFF) = FANSW_NULL (no switch present)
Fan Speed Output	nvoFanSpeed -35	SNVT_switch -95	Init: OFF	Send	Displays the commanded fan speed. **Fan Speed / State / Value** OFF 0 0% Low 1 33% Medium 1 66% High 1 95% ON 1 100%
System Mode Switch (Heat/Cool/Auto) Status	nvoHeatCoolAuto -36	UNVTheatCoolAuto	Init: HCA_NUL	No	Displays the room sensor System Mode switch (Heat/Cool/Auto) position. **Supported Values** 0 = HCA_OFF 1 = HCA_HEAT 2 = HCA_COOL 3 = HCA_AUTO -1 (0xFF) = HCA_NUL (no switch present)
Local Space Temperature Output	nvoLocalSpaceTmp -37	SNVT_temp_p -105	0 to 158°F -17.77 to 70°C Default[1]: 621.806ºF 327.67ºC	Send	The value of the hardwired space temperature sensor installed either in the return air or the space. Writing to Space Temp Input (nviSpaceTemp) does not affect Local Space Temp (nvoLocalSpaceTmp) but does affect Effective Space Temp (nvoSpaceTemp).[1]
McQuay FCU Status	nvoMcqFcUnitStat -38	UNVTmcqFcUnitStat	Init: UNIT_NULL	No	Indicates the unit's operating state. **Supported Values** 0 = UNIT_OFF_ALARM 1 = UNIT_OFF 2 = UNIT_START 3 = UNIT_FAN ONLY 4 = UNIT_HEATING 5 = UNIT_ECONOMIZER 6 = UNIT_COOLING 7 = UNIT_DEHUMID -1 (0xFF) = UNIT_NULL
Outdoor Air Temperature	nvoOutdoorTemp -39	SNVT_temp_p -105	-40 to 158°F -40 to 70°C Default[1]: 621.806ºF 327.67ºC	Send	Monitors the outdoor air temperature if the unit controller is equipped with a hardwired temperature sensor.[1]

1.Analog Null (0x7FFF) is a discrete temperature value of 621.806ºF/327.67ºC. Its purpose is to indicate a sensor failure condition or when the unit controller is not using that temperature value.

2. The Network Variable index number is a unique identifier for certain LonWorks variables. Some BAS companies use this numeric value instead of text to reference these variables. The NV index number can also be found in the XIF file.

3. When Receive Heartbeat is enabled, this variable reverts to the default (non-override) value if it is not refreshed often enough through a network command or if communication is disabled (i.e. the device is disabled or is offline).

Point Name	LonWorks Variable (NV Index[2])	SNVT Type (SNVT Index)	Range/ Default (in Units)	Heartbeat	Description
NETWORK VARIABLE OUTPUTS					
Cooling Valve Actuator Position Output	nvoCoolVlvOut -40	SNVT_lev_percent -81	0 to 100% Init: 0%	No	Monitors the hydronic cooling valve commanded position.
Economizer Position Output	nvoDASptOut -41	SNVT_lev_percent -81	0 to 100% Init: 0%	No	Monitors the economizer commanded position. It shares the same value as Economizer Actuator Position Output.
Economizer Actuator Position Output	nvoEconOut -42	SNVT_lev_percent -81	0 to 100% Init: 0%	No	Monitors the economizer commanded position.
Heating Valve Actuator Position Output	nvoHeatVlvOut -43	SNVT_lev_percent -81	0 to 100% Init: 0%	No	Monitors the hydronic heating valve commanded position.
Previous Alarm	nvoPreviousAlarm -44	SNVT_str_asc -36	Init: No Alarms	No	Indicates the previous unit fault. **Alarm Strings** • No Alarms • Invalid Equipment Config • Emergency Shutdown • Freeze Fault • EWT Sensor Fail • Room Temp Sensor Fail • IO Expansion Board Com Fail • Condensate Overflow • Outdoor Air Temp Sensor Fail • DAT Sensor Fail • Dirty Air Filter • BB Serial EEPROM Corrupted
Local Setpoint Adjust Output	nvoSetpoint -45	SNVT_temp_p -105	55 to 95ºF 12.78 to 35ºC Default[1]: 621.806ºF 327.67ºC	Send	The reference setpoint used to determine the Effective Heating/Cooling setpoints. It is the value of the local, hardwired Space Temperature setpoint. Only valid if the unit controller is configured for Long Range Setpoint Adjust and is enabled by nciLocSptEnable.[1] See Effective Occupancy Modes.
Setpoint Shift Output	nvoSetptShift -46	SNVT_temp_setpt -106	-5 to 5ºF -2.78 to 2.78ºC Init: All Setpts 0ºF	Send	This value represents the Occupied/Standby and Heating/ Cooling Setpoint Offsets. It is valid when configured for Short Range Setpoint Adjust. **Supported Fields** • occupied_cool • standby_cool • unoccupied_cool (always 0) • occupied_heat • standby_heat • unoccupied_heat (always 0)
Effective Space Temperature Output	nvoSpaceTemp -24	SNVT_temp_p -105	0 to 158°F -17.77 to 70°C Default[1]: 621.806ºF 327.67ºC	Send	Monitors the space temperature that the unit uses for control. nvoSpaceTemp uses the nvoLocalSpaceTmp local sensor unless the nviSpaceTemp network override is a valid value.[1]
Status	nvoStatus	SNVT_obj_status -93	Init: All structure elements = 0	No	Reports the status of the requested functional block in the device as commanded from nviRequest. **Supported Fields** • object_id: 0=Node Obj, 1=McQuaySCC_FCU • invalid_id: 0=Normal ID, 1=Invalid ID • invalid_request: 0=Valid Req, 1=Invalid Req • report_mask: 0=Not Supported, 1=Supported
Unit Faults	nvoUnitFaults -49	SNVT_state -83	16 bits Init: All bits = 0	No	Monitors faults of the unit controller for diagnostic purposes. Each fault is reported as a bit so that multiple faults can be viewed simultaneously. See Selected Parameters Information for bit descriptions.
Unit Application Status	nvoUnitAppStatus -47	SNVT_state -83	16 bits Init: All bits = 0	No	Monitors various application status flags of the unit controller for diagnostic purposes. Each item is reported as a bit so that multiple flags can be viewed simultaneously. See Selected Parameters Information for bit descriptions.

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3. When Receive Heartbeat is enabled, this variable reverts to the default (non-override) value if it is not refreshed often enough through a network command or if communication is disabled (i.e. the device is disabled or is offline).

Point Name	LonWorks Variable (NV Index[2])	SNVT Type (SNVT Index)	Range/ Default (in Units)	Heartbeat	Description
NETWORK VARIABLE OUTPUTS					
Unit Status Output	nvoUnitStatus -25	SNVT_hvac_status -112		Send	Reports the unit status. It combines the operating mode, the capacity of heating and cooling, and any alarms that are present in the object. The in_alarm member reports the current alarm index. See nvoCurrentAlarm for the alarm index definition. **Unit Status Fields** • mode: (see supported modes below) • heat_output_primary: 0 to 100% • heat_output_secondary: 0 to 100% • cool_output: 0 to 100% • econ_output: 0 to 100% • fan_output: 0 to 100% • in_alarm: (see alarm identifiers below) **Supported Modes** 1 = HVAC_HEAT (Heating Mode) 3 = HVAC_COOL (Cooling Mode) 6 = HVAC_OFF (Inactive Control) 9 = HVAC_FAN_ONLY (Fan Only Mode) 13 = HVAC_ECONOMY (Economizer Mode) 14 = HVAC_DEHUMID (Dehumidification Mode) **Alarm Identifiers (listed in order of priority)** 0 = No Alarms 1 = Invalid Equipment Config 2 = Emergency Shutdown 3 = Freeze Fault 4 = EWT Sensor Fail 5 = Room Temp Sensor Fail 6 = IO Expansion Board Com Fail 7 = Condensate Overflow 8 = Outdoor Air Temp Sensor Fail 9 = DAT Sensor Fail 10 = Dirty Air Filter 11 = BB Serial EEPROM Corrupted
Terminal Load Output	nvoTerminalLoad -48	SNVT_lev_percent -81	-100 to 100% Init: 0%	Send	Indicates the current heat/cool energy demand of the unit. Positive values indicate that the unit requires cooling energy. Negative values indicate that the unit requires heating energy.

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3. When Receive Heartbeat is enabled, this variable reverts to the default (non-override) value if it is not refreshed often enough through a network command or if communication is disabled (i.e. the device is disabled or is offline).

Table 11: Network Configuration Properties (NCIs)

Point Name	LonWorks Variable (NV Index[2])	SNVT Type (SNVT Index)	Range/ Default (in Units)	Heartbeat	Description
NETWORK CONFIGURATION PROPERTY INPUTS					
Air Filter Change Timer	nciFltrChangeHrs -11	UCPTfltrChangeHrs	0, 360 to 4320 hours Default:1440 hours	No	Defines the amount of time that the fan can operate before a dirty air filter alarm is generated. This timer is only used when it is set to a non-zero value and the dirty air filter binary input is disabled through the equipment configuration settings. A value of 0 disables this feature.
Cooling Enable Differential	nciCoolEnDiff	UCPTcoolEnDiff	2 to 10ºF 1.11 to 5.56ºC Default: 5ºF / 2.77ºC	No	The Effective Room Temperature minus the Effective Entering Water Temperature must be greater than this value in order for the cooling valve to operate. Applies to two-pipe systems only.
Cooling Interstage Timer	nciCoolIntStgTmr	UCPTcoolIntStgTmr	120 to 1200 sec Default: 300 sec	No	The countdown timer that defines the minimum period of time between turn-on of the cooling stages.
Cooling Valve Proportional Constant	nciCoolKp	UCPTcoolKp	5 to 160% Default: 40%	No	The proportional gain (Kp) value of the loop algorithm used to control the cooling valve.
Cooling Valve Integral Constant	nciCoolKi	UCPTcoolKi	0 to 1200 sec Default: 30 sec	No	The integral offset (Ki) value of the loop algorithm used to control the cooling valve. The value of 0 disables this feature.

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3. When Receive Heartbeat is enabled, this variable reverts to the default (non-override) value if it is not refreshed often enough through a network command or if communication is disabled (i.e. the device is disabled or is offline).

Point Name	LonWorks Variable (NV Index[2])	SNVT Type (SNVT Index)	Range/ Default (in Units)	Heartbeat	Description
NETWORK CONFIGURATION PROPERTY INPUTS					
Cooling Valve Deadband	nciCoolDB	UCPTcoolDB	3 to 100% Default: 3%	No	Adjusts the deadband for the cooling valve control outputs. The outputs remain off as long as the input to the valve control algorithm falls within the deadband.
Cooling Valve Stroke Time	nciCoolVlvStroke	UCPTcoolVlvStroke	15 to 600 sec Default: 180 sec	No	Specifies the time required for the cooling valve to travel from fully open to fully closed or vice-versa.
Device Software Identification (Major Version)	nciDevMajVer	SCPTdevMajVer	0 to 255	No	The software major version of the communication module firmware. Note: Do not modify this configuration property.
Device Software Identification (Minor Version)	nciDevMinVer	SCPTdevMinVer	0 to 255	No	The software minor version of the communication module firmware. Note: Do not modify this configuration property.
Economizer Outdoor Air Enable Differential	nciEconOaEnDiff	UCPTeconOaEnDiff	1 to 12ºF 0.55 to 6.67ºC Default: 2ºF / 1.11ºC	No	The Indoor Air Temp minus the Outdoor Air Temp must be greater than this configuration property value in order for the economizer to be used for free cooling. This ensures outdoor air is cold enough to provide cooling.
Economizer Outdoor Air Enable Setpoint	nciEconOaEnSpt	UCPTeconOaEnSpt	40 to 80°F 4.44 to 26.67ºC Default: 50ºF / 10ºC	No	The Outdoor Air Temperature must be greater than this configuration property value in order for economizer to be used for free cooling. This ensures the outdoor air is not too cold to cause freezing.
Economizer DASP Proportional Constant	nciDASptKp	UCPTdaSptKp	5 to 160% Default: 40%	No	The proportional gain (Kp) value of the loop algorithm used to control the Economizer DASP.
Economizer DASP Integral Constant	nciDASptKi	UCPTdaSptKi	0 to 1200 sec Default: 20 sec	No	The integral offset (Ki) value of the loop algorithm used to control the Economizer DASP. The value of 0 disables this feature.
Economizer Maximum DA Setpoint	nciMaxDaSpt -7	UCPTmaxDaSpt	50 to 80ºF 10 to 26.67ºC Default: 75ºF / 23.88ºC	No	Specifies the discharge air setpoint where the economizer DASP (Discharge Air Sensor Position) PI loop output is at 0%. It must be a value greater than or equal to the minimum setting.
Economizer Minimum DA Setpoint	nciMinDaSpt -8	UCPTminDaSpt	50 to 80ºF 10 to 26.67ºC Default: 55ºF / 12.77ºC	No	Specifies the discharge air setpoint where the economizer DASP PI loop output is at 100%. It must be a value less than or equal to the maximum setting.
Economizer Position Proportional Gain	nciEconPosKp	UCPTeconPosKp	5 to 160% Default: 90%	No	The proportional gain (Kp) value of the loop algorithm used to control the Economizer position.
Economizer Position Integral Constant	nciEconPosKi	UCPTeconPosKi	0 to 1200 sec Default: 10 sec	No	The integral offset (Ki) value of the loop algorithm used to control the Economizer position. The value of 0 disables this feature.
Economizer Position Deadband	nciEconDB	UCPTeconDB	3 to 100% Default: 3%	No	Adjusts the deadband for the economizer position control outputs. The outputs remain off as long as the input to the valve control algorithm falls within the deadband.
Economizer Stroke Time	nciEconStroke	UCPTeconStroke	15 to 600 sec Default: 66 sec	No	Specifies the time required for the economizer to travel from fully open to fully closed or vice-versa.
Economizer Minimum Position at Fan Low Speed	nciEconLowMin	UCPTeconLowMin	0 to 100% Default: 10%	No	Specifies the economizer minimum position when the fan is running at low speed. This only applies when the economizer is enabled.
Economizer Minimum Position at Fan Medium Speed	nciEconMedMin	UCPTeconMedMin	0 to 100% Default: 10%	No	Specifies the economizer minimum position when the fan is running at medium speed. This only applies when the economizer is enabled.
Economizer Minimum Position at Fan High Speed	nciEconHighMin	UCPTeconHighMin	0 to 100% Default: 10%	No	Specifies the economizer minimum position when the fan is running at high speed. This only applies when the economizer is enabled.
Entering Water Temperature Flow Sample Delay Timer	nciEwtFlowTmr	UCPTewtFlowTmr	60 to 600 sec Default: 120	No	Specifies the amount of time the unit controller waits after opening the hydronic valve before sampling the Entering Water Temperature to determine if hydronic heating or cooling is allowed. This point only applies to systems requiring EWT sampling.
Entering Water Temperature Sample Interval Timer	nciEwtSampleTmr	UCPTewtSampleTmr	0, 20 to 120 min Default: 120	No	Specifies the time between sampling the Entering Water Temperature. The value of 0 disables the EWT sampling feature. This point only applies to systems requiring EWT sampling.

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Point Name	LonWorks Variable (NV Index[2])	SNVT Type (SNVT Index)	Range/ Default (in Units)	Heartbeat	Description
NETWORK CONFIGURATION PROPERTY INPUTS					
Equipment Configuration (Software Jumpers)	nciSoftJumpers -6	UCPTsoftJumpers	32 Characters	No	Sets unit controller and I/O expansion module configuration. This property is pre-configured, but may need to be changed if field options are installed or if the unit controller is replaced. See Selected Parameters Information for details.
Fan Minimum OFF Timer	nciFanMinOffTmr	UCPTfanMinOffTmr	120 to 1200 sec Default: 180 sec	No	Sets the minimum amount of time the fan must remain off once it has stopped. The timer counts down from the specified value until it reaches zero, signaling that the fan is available to run.
Fan Minimum ON Timer	nciFanMinOnTmr	UCPTfanMinOnTmr	120 to 1200 sec Default: 180 sec	No	Sets the minimum amount of time the fan must remain on once it has started. The timer counts down from the specified value until it reaches zero, signaling that the fan may be turned off during normal operation. The timer value is ignored in the event of a shutdown alarm.
Heating Enable Differential	nciHeatEnDiff	UCPTheatEnDiff	2 to 10ºF 1.11 to 5.56ºC Default: 5ºF / 2.77ºC	No	The Effective Entering Water Temperature minus the Effective Room Temperature must be greater than this configuration property in order for the heating valve to operate. Applies to two-pipe systems only.
Heating Interstage Timer	nciHeatIntStgTmr	UCPTheatIntStgTmr	120 to 1200 sec Default: 300 sec	No	A countdown timer that defines the minimum period of time between heating stages.
Heating Valve Proportional Constant	nciHeatKp	UCPTheatKp	5 to 160% Default: 25%	No	The proportional gain (Kp) value of the loop algorithm used to control heating valve.
Heating Valve Integral Constant	nciHeatKi	UCPTheatKi	0 to 1200 sec Default: 20 sec	No	The integral offset (Ki) value of the loop algorithm used to control the heating valve. The value of 0 disables this feature.
Heating Valve Deadband	nciHeatDB	UCPTheatDB	3 to 100% Default: 3%	No	Adjusts the deadband for the heating valve control outputs. The outputs remain off as long as the input to the valve control algorithm falls within the deadband.
Heating Valve Stroke Time	nciHeatVlvStroke	UCPTheatVlvStroke	15 to 600 sec Default: 180 sec	No	Specifies the time required for the heating valve to travel from fully open to fully closed or vice-versa.
HVAC Unit Type Identifier	nciHVACType	SCPThvacType	0 to 9 Default: 1	No	Defines the primary application and equipment type for the unit controller. Note: Do not modify this configuration property. **Supported Values** 0 = HVT_GENERIC 1 = HVT_FAN_COIL (Default) 2 = HVT_VAV 3 = HVT_HEAT_PUMP 4 = HVT_ROOFTOP 5 = HVT_UNIT_VENT 6 = HVT_CHILL_CEIL 7 = HVT_RADIATOR 8 = HVT_AHU 9 = HVT_SELF_CONT
Local Bypass Time Setpoint	nciBypassTime -4	SCPTbypassTime	0, 30 to 120 min Default: 120 min	No	Defines the amount of time that the unit can be in the bypass mode initiated by the Timed Override button. Pressing the Timed Override button 4-9 seconds sets the bypass timer to the maximum nciBypassTime value. The value of 0 disables this feature.
Location	nciLocation	SCPTlocation	32 Characters	No	Provides descriptive physical location information for the unit.
Long Range Setpoint Adjust Maximum	nciSptAdjMax -10	UCPTsptAdjMax	55 to 95ºF 12.77 to 35ºC Default: 95°F / 35°C	No	Limits the maximum value of the Long Range Setpoint Adjust temperature setting. This setpoint must be greater than or equal to the minimum setting.
Long Range Setpoint Adjust Minimum	nciSptAdjMin -9	UCPTsptAdjMin	55 to 95ºF 12.77 to 35ºC Default: 55°F / 12.78°C	No	Limits the minimum value of the Long Range Setpoint Adjust temperature setting. This setpoint must be greater than or equal to the maximum setting.

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Point Name	LonWorks Variable (NV Index[2])	SNVT Type (SNVT Index)	Range/ Default (in Units)	Heartbeat	Description
NETWORK CONFIGURATION PROPERTY INPUTS					
Minimum Send Time	nciMinOutTm	SCPTminSendTime	0 to 6553.4 sec Default: 0 (Disabled)	No	Minimum period of time between automatic network variable output transmissions. It limits network traffic when output network variables are frequently changing. The value of 0 disables the timer. **Supported Variables** • nvoCurrentAlarm • nvoDischAirTemp • nvoEffectEWT • nvoEffectOccup • nvoEffectSetpt • nvoEWT • nvoFanModeSpdSw • nvoFanSpeed • nvoHeatCoolAuto • nvoLocalSpaceTmp • nvoMcqFcUnitStat • nvoOutdoorTemp • nvoPreviousAlarm • nvoSetpoint • nvoSetptShift • nvoSpaceTemp • nvoTerminalLoad • nvoUnitStatus
Occupancy Temperature Setpoints	nciSetpoints -3	SCPTsetPnts	50 to 95ºF 10 to 35ºC Defaults: See Description	No	Defines the space temperature heating and cooling setpoints for different occupancy modes. See Effective Occupancy Modes. The occupancy temperature setpoints must be kept in ascending order as follows: unoccupied_heat <= standby_heat <= occupied_heat <= occupied_cool <= standby_cool <= unoccupied_cool **Additional interaction rules** • occupied_cool > (occupied_heat + nciOccDiff) • standby_cool > (standby_heat + nciOccDiff) • unoccupied_cool >(unoccupied_heat+nciUnoccDiff) • occupied_heat < (occupied_cool – nciOccDiff) • standby_heat < (standby_cool – nciOccDiff) • unoccupied_heat < (unoccupied_cool–nciUnoccDiff) **Default Values** • Occupied_cool = 75ºF, 23.88ºC • Standby_cool = 77ºF, 25.00ºC • Unoccupied_cool = 85ºF, 29.44ºC • Occupied_heat = 70ºF, 21.11ºC • Standby_heat = 66ºF, 18.88ºC • Unoccupied_heat = 60ºF, 15.55ºC
Occupied Setpoint Differential	nciOccDiff	UCPToccDiff	1 to 5°F 0.55 to 2.78°C Default: 1ºF / 0.55ºC	No	Sets the Occupied and Standby Setpoint hysteresis to determine the Effective OFF setpoints. **Interaction Rule** nciOccDiff < (occupied_cool – occupied_heat)
Receive Heartbeat	nciRcvHrtBt	SCPTmaxRcvTime	0 to 6553.4 sec Default: 0 sec (Disabled)	No	Specifies the maximum amount of time the supported overrides must be refreshed (i.e. written) before the unit reverts back to the default value. Each point supported by Receive Heartbeat has a separate timer associated with it. The value of 0 disables this feature. **Supported Variables** • nviApplicMode • nviAuxHeatEnable • nviEconEnable • nviEnergyHoldOff • nviEWT • nviOccSchedule • nviOccSensor • nviSetptOffset • nviSpaceTemp

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Point Name	LonWorks Variable (NV Index[2])	SNVT Type (SNVT Index)	Range/ Default (in Units)	Heartbeat	Description
NETWORK CONFIGURATION PROPERTY INPUTS					
Send Heartbeat	nciSndHrtBt	SCPTmaxSendTime	0 to 6553.4 sec Default: 0 (Disabled)	No	Defines the maximum period of time that elapses before the network variable outputs (NVOs) shown below are automatically updated. Each NVO supported has a separate timer associated with it. The BAS may be able to detect a missing heartbeat from the unit controller to determine that communication is lost and take corrective action. The value of 0 disables the auto update feature. **Supported Variables** • nvoDischAirTemp • nvoEffectOccup • nvoEffectSetpt • nvoFanSpeed • nvoLocalSpaceTmp • nvoSetpoint • nvoSetptShift • nvoSpaceTemp • nvoTerminalLoad • nvoUnitStatus
Setpoint Adjust Enable/Disable (Room Sensor)	nciLocSptEnable -5	UCPTlocSptEnable	0 to 1 Default: Enabled	No	Enables or disables the local hardwired setpoint adjustment. If the value of nciLocSptEnable is set to 0, this disables the setpoint control from a room sensor and enables the setpoint control from the network. **Supported Values** 0 = Disabled 1 = Enabled
Unit Application Identification Version	nciUnitAppVer	UCPTunitAppVer	32 Characters	No	The software version of the unit controller. Note: Do not modify this configuration property.
Unoccupied Setpoint Differential	nciUnoccDiff	UCPTunOccDiff	2 to 10ºF 1.11 to 5.56ºC Default: 2ºF / 1.11ºC	No	Sets the Unoccupied setpoint hysteresis to determine the Effective OFF setpoints. **Interaction Rule** nciUnoccDiff < (unoccupied_cool – unoccupied_heat)

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The following section provides greater detail for certain parameters noted in the BACnet or LONWORKS comprehensive data tables. *The equipment configuration settings and bit descriptions apply to both protocols.*

Binary Input Status

Table 12: Binary Input Status Bit Descriptions

Bit Number	Bit Description	Description
0 (LSB)	Freeze Fault Detection	0 = Normal, 1 = Freeze Fault
1	Occupancy Sensor	0 = Unoccupied, 1 = Occupied
2	Condensate Overflow	0 = Dry, 1 = Wet
3	Emergency Shutdown	0 = Normal, 1 = Shutdown
4	Dirty Air Filter	0 = Normal, 1 = Dirty
5	Humidistat	0 = Normal, 1 = Dehumidification Required
6 to 15 (MSB)	Not Used	

LSB = Least Significant Bit; MSB = Most Significant Bit

Binary Output Status

Table 13: Binary Output Status Bit Descriptions

Bit Number	Bit Description	Description
0 (LSB)	Baseboard Fan Low Speed	1 = On
1	Baseboard Fan Medium Speed	1 = On
2	Baseboard Fan High Speed	1 = On
3	Multi Purpose Control Output #4	See Table 14
4	Multi Purpose Control Output #5	See Table 14
5	Multi Purpose Control Output #6	See Table 14
6	Multi Purpose Control Output #7	See Table 14
7	Damper Command	0 = Close, 1 = Open
8	Economizer Open Command	0 = Stop Opening, 1 = Open
9	Economizer Close Command	0 = Stop Closing, 1 = Close
10	Expansion Board Fan Low Speed	1 = On
11	Expansion Board Fan Medium Speed	1 = On
12	Expansion Board Fan High Speed	1 = On
13 to 15 (MSB)	Not Used	

LSB = Least Significant Bit; MSB = Most Significant Bit

Multi-Purpose Output Table for Valves and Electric Heat

See Equipment Configuration Software Jumpers (nciSoftJumpers) for configuration bit definitions.

Table 14: Multi-purpose Control Outputs

Multipurpose Control Outputs	
Model Description	**Output Definition**
2 Pipe Hydronic Cooling with 2 Position Valve	Binary Out #4 = Cooling Valve On/Off Binary Out #5 = Not Used Binary Out #6 = Not Used Binary Out #7 = Not Used
2 Pipe Hydronic Cooling with Modulating Valve	Binary Out #4 = Cooling Valve Open Binary Out #5 = Cooling Valve Close Binary Out #6 = Not Used Binary Out #7 = Not Used
2 Pipe Hydronic Cooling with 2 Position Valve and Electric Heat	Binary Out #4 = Cooling Valve On/Off Binary Out #5 = Not Used Binary Out #6 = Electric Heat Stage #1 On Binary Out #7 = Electric Heat Stage #2 On
2 Pipe Hydronic Cooling with Modulating Valve and Electric Heat	Binary Out #4 = Cooling Valve Open Binary Out #5 = Cooling Valve Close Binary Out #6 = Electric Heat Stage #1 On Binary Out #7 = Electric Heat Stage #2 On
2 Pipe Hydronic Heating with 2 Position Valve	Binary Out #4 = Not Used Binary Out #5 = Not Used Binary Out #6 = Heating Valve On/Off Binary Out #7 = Not Used
2 Pipe Hydronic Heating with Modulating Valve	Binary Out #4 = Not Used Binary Out #5 = Not Used Binary Out #6 = Heating Valve Open Binary Out #7 = Heating Valve Close
2 Pipe Hydronic Heating with 2 Position Valve and Electric Heat	Binary Out #4 = Heating Valve On/Off Binary Out #5 = Not Used Binary Out #6 = Electric Heat Stage #1 On Binary Out #7 = Electric Heat Stage #2 On
2 Pipe Hydronic Heating with Modulating Valve and Electric Heat	Binary Out #4 = Heating Valve Open Binary Out #5 = Heating Valve Close Binary Out #6 = Electric Heat Stage #1 On Binary Out #7 = Electric Heat Stage #2 On
2 Pipe Hydronic Heating & Cooling Changeover with 2 Position Valve	Binary Out #4 = Heat/Cool Valve On/Off Binary Out #5 = Not Used Binary Out #6 = Not Used Binary Out #7 = Not Used
2 Pipe Hydronic Heating & Cooling Changeover with Modulating Valve	Binary Out #4 = Heat/Cool Valve Open Binary Out #5 = Heat/Cool Valve Close Binary Out #6 = Not Used Binary Out #7 = Not Used
2 Pipe Hydronic Heating & Cooling Changeover with 2 Position Valve and Electric Heat	Binary Out #4 = Heat/Cool Valve On/Off Binary Out #5 = Not Used Binary Out #6 = Electric Heat Stage #1 On Binary Out #7 = Electric Heat Stage #2 On
2 Pipe Hydronic Heating & Cooling Changeover with Modulating Valve and Electric Heat	Binary Out #4 = Heat/Cool Valve Open Binary Out #5 = Heat/Cool Valve Close Binary Out #6 = Electric Heat Stage #1 On Binary Out #7 = Electric Heat Stage #2 On
4 Pipe Hydronic Heating & Cooling with 2 Position Valves	Binary Out #4 = Cooling Valve On/Off Binary Out #5 = Not Used Binary Out #6 = Heating Valve On/Off Binary Out #7 = Not Used
4 Pipe Hydronic Heating & Cooling with Modulating Valves	Binary Out #4 = Cooling Valve Open Binary Out #5 = Cooling Valve Close Binary Out #6 = Heating Valve Open Binary Out #7 = Heating Valve Close
Electric Heat Only	Binary Out #4 = Not Used Binary Out #5 = Not Used Binary Out #6 = Electric Heat Stage #1 On Binary Out #7 = Electric Heat Stage #2 On

LSB = Least Significant Bit; MSB = Most Significant Bit

Unit Application Status

Table 15: Unit Application Status Bit Descriptions

Bit Number	Bit Description	Description
0 (LSB)	Heating Valve Enabled	0=Disabled, 1=Enabled
1	Cooling Valve Enabled	0=Disabled, 1=Enabled
2	Economizer Enabled	0=Disabled, 1=Enabled
3	Dehumidification Enabled	0=Disabled, 1=Enabled
4	Electric Heat Stage #1 Enabled	0=Disabled, 1=Enabled
5	Electric Heat Stage #2 Enabled	0=Disabled, 1=Enabled
6	Heating Valve Calibration Active	0=Normal Operation, 1=Heat Valve Calibration Is Active
7	Cooling Valve Calibration Active	0=Normal Operation, 1=Cool Valve Calibration Is Active
8	Economizer Calibration Active	0=Normal Operation, 1=Economizer Calibration Is Active
9	EWT Sampling Active	0=Normal Operation, 1=EWT Sampling Process Is Active
10	EWT Sampling Heating Error	0=Normal Operation, 1=EWT Heating Error
11	EWT Sampling Cooling Error	0=Normal Operation, 1=EWT Cooling Error
12	Not Used	
13	Not Used	
14	Economizer Option	0=Economizer Not Supported, 1=Economizer Is Supported
15 (MSB)	Previous Operation Mode	0=Heating, 1=Others (Cooling, Economizer, Dehumidification)

LSB = Least Significant Bit; MSB = Most Significant Bit

Unit Faults

Table 16: Unit Faults Bit Descriptions

Bit Number	Bit Description	Fault Description
0 (LSB)	Invalid Equipment Configuration	1 = Invalid Equipment Configuration
1	Emergency Shutdown	1 = Emergency Shutdown
2	Freeze Fault	1 = Freeze Fault
3	Entering Water Temp Sensor Fail	1 = EWT Sensor Failed
4	Room Temp Sensor Fail	1 = Room Temp Sensor Failed
5	IO Expansion Board Com Fail	1 = IO Expansion Board Communications is Failed
6	Condensate Overflow	1 = Condensate Overflow
7	Outdoor Air Temp Sensor Fail	1 = OAT Sensor Failed
8	Discharge Air Temp Sensor Fail	1 = DAT Sensor Failed
9	Dirty Air Filter	1 = Dirty Air Filter
10	Serial EEPROM Corrupted	1 = Serial EEPROM Corrupted
11	Condensation Present	1 = Condensation is Present
12	Communications Module Com Fail	1 = Communication Module Communications is Failed
13	Invalid Comm Module Software	1 = Invalid Comm Module Software
14	Invalid IO Expansion Software	1 = Invalid IO Expansion Software
15 (MSB)	SPI Table Size Error	1 = SPI Table Size Error

LSB = Least Significant Bit; MSB = Most Significant Bit

Equipment Configuration Settings

This configuration property is used to set configuration of the fan coil unit controller and I/O expansion module. This property is pre-configured, but may need to be changed if field options are installed or if the unit controller is replaced. The equipment configuration is write-protected by software jumper bits 24 to 31.

To change the configuration, perform the following steps:

1. Set soft jumper bits 0 to 23 to the desired settings.
2. Set soft jumper bits 24 to 31 to the value of 80 hexadecimal to unlock the configuration for writing.
3. Soft jumper bits 24 to 31 will automatically return to zero after the controller accepts the new configuration.

Table 17: Equipment Configuration Bit Descriptions

Bit Number	Definition	Description
b0 (LSB)	Service Test Mode	0 = Normal Operation
		1 = Service Test Mode
b1	Continuous / Cycling Fan	0 = Continuous Fan
		1 = Cycling Fan
b2	Setpoint Adjust Temperature Range	0 = Short Range (-5º to + 5º F)
		1 = Long Range (55º to 95º F)
b3	I/O Expansion Board Selection	1 = Enable I/O Expansion Board
b4	Economizer Selection	1 = Enable Economizer
b5	Heating Valve Action	0 = Normally Open
	(Two Position Valves Only)	1 = Normally Closed
b6	Cooling Valve Action	0 = Normally Open
	(Two Position Valves Only)	1 = Normally Closed
b7	Hydronic Valve Type	0 = Two position Hydronic Valves
		1 = Modulating Hydronic Valves
b9=0, b8=0	Electric Heat Selection	00 = No Electric Heat
b9=0, b8=1		01 = One Stage Electric Heat
b9=1, b8=0		10 = Two Stage Electric Heat
b12=0, b11=0, b10=0	Hydronic Valve Selection	000 = No Hydronic Valves
b12=0, b11=0, b10=1		001 = 2 Pipe Heating Only
b12=0, b11=1, b10=0		010 = 2 Pipe Cooling Only
b12=0, b11=1, b10=1		011 = 2 Pipe Heating & Cooling Changeover
b12=1, b11=0, b10=0		100 = 4 Pipe Heating & Cooling
b14=0, b13=0	Fan Speed Selection	00 = Single Speed Fan
b14=0, b13=1		01 = Two Speed Fan
b14=1, b13=0		10 = Three Speed Fan
b15	Freeze Fault Detect	1 = Enable Binary Input
b16	Emergency Shutdown	1 = Enable Binary Input
b17	Dirty Air Filter	1 = Enable Binary Input
b18 to b23	Not Used	
b24 to b31 (MSB)	Allow Jumpers Command	A value of 80 hexadecimal causes the unit to accept the new jumper settings.

LSB = Least Significant Bit; MSB = Most Significant Bit

BACnet Configuration

This section describes how to set BACnet parameters using the BACnet communication module's built-in configuration menu (Figure 1). The BACnet configuration menu is accessed using Microsoft Windows® HyperTerminal® or PuTTY. It is assumed that the user is familiar with such an application. Certain parameters are can also be configured via the BACnet network (BAS). Parameters that can only be accessed using the BACnet configuration menu are noted below. The second part of this section, BACnet Commissioning and Device Management, describes optional network testing and verification tools available for the communication module.

The parameters listed below require configuration in order for the communication module to properly integrate to the BACnet network.

BACnet Device Properties

- Device Instance - must be set to a unique value on the BACnet network
- Device Name - must be set to a unique value on the BACnet network
- Location
- Units
- Description
- Unit Controller Configuration Settings – must be set using the BACnet configuration menu. See Unit Controller Configuration Settings section below for details.

BACnet MS/TP Settings

- MS/TP Baud Rate - must be set to match the speed of the BACnet network. Valid values are 9600, 19200, 38400, or 76800. The baud rate must be set using the BACnet configuration menu.
- MaxMasters - set to the highest address of a MS/TP master on the network segment to reduce the MS/TP token traffic and increase response time of the unit controller. MaxMasters can be set from the BAS or from the BACnet configuration menu.
- MAC Address / Address Switch - must be set according to the BACnet network requirements. The MS/TP MAC address can be set from the building automation system or from the BACnet configuration menu only when the physical address switch (S3) is set to 255.

Accessing the BACnet Configuration Menu

The BACnet communication module's configuration menu is accessed through the DB-9 serial connector on the module itself. Any serial terminal device or application (such as Windows HyperTerminal) can be used to view the menu and change the configuration parameters.

Follow these steps to connect to the BACnet configuration menu (Figure 1):

1. Verify that the terminal application communication settings are set to: 19200 bps, 8-data bits, 1-stop bit, no parity, and no flow control.
2. Use a null modem serial cross over cable to connect the computer to the BACnet communication module.
3. Once connected, press the 'Enter' key to display the menu shown in Figure 1.
4. Change the terminal EIA-232 baud rate, if necessary. If a change is required, the baud rate must be set first using the BACnet configuration menu, and then the terminal device application.
5. Change the following parameters, if desired: Instance, Name, Location, Description, MS/TP Baud Rate, and Units.
6. Press 'S' to save the BACnet configuration settings.
7. Verify "Flash write – success" is shown for configuration pages 1 and 2. Otherwise, save the settings again.
8. Change any unit or equipment configuration settings as necessary as described in the next section.

Unit Controller Configuration Settings

⚠ CAUTION

Before modifying the Unit Controller Equipment Configuration settings, please consult with the Controls Customer Support group at 866-462-7829.

NOTE: The fan coil equipment configuration settings must be set using the BACnet configuration menu, and are not writeable through the building automation system.

Four bytes of configuration data is entered using hexadecimal pairs. See the Equipment Configuration Settings network variable section for details on the bit level encoding of the options.

Follow these steps to set the Unit Controller Equipment Configuration:

1. Press the '6' key to be prompted for the equipment configuration settings.
2. Enter three hexadecimal pairs as determined by the desired equipment configuration options, and always set the fourth byte pair to "80" and then press Enter to set the values in the unit controller.
3. Press Enter again to display the BACnet Configuration Menu.
4. Verify the first three bytes have transmitted back correctly from the communication module in the "Config Settings" message display. The fourth byte is automatically cleared to zero.

5. Wait ten seconds to allow the unit controller to receive the new configuration settings and write the values to the serial EEPROM integrated circuit.
6. Restart the unit controller.
7. Verify that new equipment configuration options are being used by viewing the “Config Settings” diagnostic message.
8. Verify that “Invalid Equipment Configuration” alarm is not annunciated by the unit controller as indicated on the room sensor LED or building automation system.

Figure 1: BACnet Configuration Menu

```
=================== Configuration Menu ====================
 Daikin Applied – MTIIIUC_FCU
 BACnet  FW  FC0  v1.1       UnitApp  FC0  vUC-1.1  IO-1.0
======= SW PN 2506908 ======================================
   DEVICE
1) Instance .....      3101127
2) Name .............  MTIIIUC_FCU_3101127
3) Location ...........
4) Description .......
5) Units .............  English
6) Config Settings ..  EA D0 01 00

   MS/TP
7) Baudrate .....      38400
8) MaxMasters .....    127
M) MAC Address ...     127

   TERMINAL
9) EIA-232 Baudrate ... 19200

B) Backup or R) Restore Configuration
S) Save settings
-------------------------------------------------------------
   Enter Selection:
```

BACnet Commissioning and Device Management

The Network “Wink” Command

The BACnet communication module implements a unit identification mode command to the unit controller by using the BACnet “ReinitializeDevice” request, with a Cold or Warm Start request handle, and a password of “wink” (all lower case). The “wink” unit identification function allows verification of an individual unit network address without opening the unit access panels. The Wink command can be used during all operating and non-operating (ex. Alarm) modes except for the following conditions:

- Invalid Equipment Configuration Alarm
- Emergency Shutdown Alarm
- Actuator Calibration Process

Upon receiving a wink command from a network management node, the unit controller exhibits the following identification sequence (all occur simultaneously):

- Room Sensor LED: flashes ON 3 seconds, then OFF 3 seconds for 15 total seconds, unless an alarm condition exists.
- Fan: the fan turns off for 5 seconds then on 5 seconds, then off again for 5 seconds.

Several parameters are used only for maintenance and testing. A network management tool such as VTS is typically used to issue the network commands. This section describes the use of these network parameters that apply to the fan coil:

- DeviceCommunicationControl – Disable
- DeviceCommunicationControl - Enable
- ReinitializeDevice (Reset)
- Network “Wink” Command

DeviceCommunicationControl - Disable

The purpose of this command is to reduce network traffic for diagnostic testing of the MS/TP network. When the communication module receives a network command to disable communication, it stops communicating fan coil unit information to the network. An optional time may be specified for how long to suspend communications. The unit continues to operate during the Disabled state.

DeviceCommunicationControl - Enable

When the communication module receives a network command to enable communication, unit controller network communication is restored.

ReinitializeDevice (Reset)

When the communication module receives a network ReinitializeDevice command, it performs the following:

1. Sends a command to the unit controller to perform a warm reset, maintaining non-volatile memory.
2. Resets the communication module.

If a warm reset is requested, the communication module’s non-volatile memory is maintained. If a cold reset is requested, then the communication module’s non-volatile memory is set to the factory default values.

NOTE: The password required to Reinitialize Device is “McQuay” or “MicroTech”.

A cold reset can also be performed by the following button sequence on the BACnet communication module.

1. Press and hold the button labeled “Default.”
2. Momentarily press the “Reset” button.
3. The four LED indicators flash briefly and then begin sequencing on starting with LED D1.
4. Release the “Default” button when all four LED indicators are on.
5. The communication module will then clear the memory to default settings and reset.

The following functions are specific to the LonWorks device (in this case, the LonWorks communication module). These functions are used for maintenance and testing. A network management tool such as Echelon's LonMaker® software is typically used to issue the network commands.

The Network "Wink" Command

A wink command is initiated by the BAS or through the LonWorks commissioning software. The "wink" identification function allows verification of an individual unit controller network address without having to physically open the unit's access panels. The Wink command can be used during all operating and non-operating (ex. Alarm) modes except for the following conditions:

- Invalid Equipment Configuration Alarm
- Emergency Shutdown Alarm
- Actuator Calibration Process

Upon receiving a wink command from a network management node, the unit controller exhibits the following identification sequence (all occur simultaneously):

- Room Sensor LED: flashes ON for 3.0 sec, OFF for 3.0 sec for 15 total seconds, unless an alarm condition exists.
- Fan: The fan turns off for 5 seconds, turns on for 5 seconds, then off again for 5 seconds.

Offline

When the LonWorks communication module receives a network command to go Offline, the unit controller continues to operate but communication is suspended except for network management messages.

Online

When the LonWorks communication module receives a network command to go Online, network messaging is restored.

Reset

When the LonWorks communication module receives a network command Reset command, it performs the following:

1. Sends a command to the unit controller to perform a warm reset, maintaining non-volatile memory.
2. Resets the Neuron processor.

This section describes the relationship among the three network occupancy inputs that determine the resulting effective occupancy of the unit. Refer to Table 18 for BACnet and Table 19 for LONWORKS networks.

Table 18: Effective Occupancy Mode - BACnet

Local Sensor	Occupancy Override Input (MSV6) Range: 1-5	Occupancy Scheduler Input (MSV7) Range: 1–4	Occupancy Sensor Input (MSV8) Range: 1–3	Effective Occupancy Output (MSV5) Range: 1–5
NA	1 (Occ)	NA	NA	1 (Occ)
NA	2 (Unoc)	NA	NA	2 (Unoc)
NA	3 (Bypass)	1 (Occ)	NA	1 (Occ)
		2 (Unoc)	NA	3 (Bypass)
		3 (Standby)	NA	3 (Bypass)
		4 (Null)	1 (Occ)	1 (Occ)
			2 (Unoc)	2 (Unoc)
NA	4 (Standby)	NA	NA	4 (Standby)
NA	5 (Null)	1 (Occ)	1 (Occ)	1 (Occ)
			2 (Unoc)	4 (Standby)
		2 (Unoc)	NA	2 (Unoc)
		3 (Standby)	NA	4 (Standby)
		4 (Null)	1 (Occ)	1 (Occ)
			2 (Unoc)	2 (Unoc)
Occ	5 (Null)	4 (Null)	3 (Null)	1 (Occ)
Unoc	5 (Null)	4 (Null)	3 (Null)	2 (Unoc)

Note: Refer to the BACnet Network Objects section for full BACnet name and descriptions.

Table 19: Effective Occupancy Mode - LONWORKS

Local Sensor	nviOccManCmd	nviOccSchedule	nviOccSensor	nvoEffectOccup
NA	OC_OCCUPIED	NA	NA	OC_OCCUPIED
NA	OC_ UNOCCUPIED	NA	NA	OC_ UNOCCUPIED
NA	OC_BYPASS	OC_OCCUPIED	NA	OC_OCCUPIED
		OC_ UNOCCUPIED	NA	OC_BYPASS
		OC_STANDBY	NA	OC_BYPASS
		OC_NUL	OC_OCCUPIED	OC_OCCUPIED
			OC_ UNOCCUPIED	OC_ UNOCCUPIED
NA	OC_STANDBY	NA	NA	OC_STANDBY
NA	OC_NUL	OC_OCCUPIED	OC_OCCUPIED	OC_OCCUPIED
			OC_ UNOCCUPIED	OC_STANDBY
		OC_ UNOCCUPIED	NA	OC_ UNOCCUPIED
		OC_STANDBY	NA	OC_STANDBY
		OC_NUL	OC_OCCUPIED	OC_OCCUPIED
			OC_ UNOCCUPIED	OC_ UNOCCUPIED
OCC	OC_NUL	OC_NUL	OC_NUL	OC_OCCUPIED
UNOCC	OC_NUL	OC_NUL	OC_NUL	OC_ UNOCCUPIED

Notes:
1. OC_BYPASS can be initiated by either nviOccManCmd or a local input. nvoEffectOccup will only be OC_BYPASS for the duration of the Local Bypass Time (nciBypassTime), until reinitiated by either a transition of the local input or an update to nviOccManCmd.
2. The occupancy sensor can be either a local input or a network input. If a valid value for the network input is present, it has precedence over a local input.
3. For the occupancy sensor, OC_NUL (and no local input) is interpreted as OC_ OCCUPIED.
4. For nviOccSchedule, this refers to the “current state” field.
5. “Any State” = Any State.

This section details the calculations used for setting space temperature setpoints. The calculations depend on unit status (if it is occupied, unoccupied, or in standby mode) and whether a local or long range setpoint adjust is enabled. BACnet and LONWORKS methods are the shown separately. A space temperature setpoint operation diagram illustrates the relationship among the inputs and their default values (Figure 2). The last section includes examples of common applications using default values.

Table 20 is the set of default values for each parameter. Refer to these defaults for the example applications (Table 21).

Setpoint Methods - BACnet

1. **The unit is operating in Unoccupied mode**.
   - EffCoolOnSP = AV3
   - EffCoolOffSP = (EffCoolOnSP – AV39)
   - EffHeatOnSP = AV6
   - EffHeatOffSP = (EffHeatOnSP + AV39)
2. **The unit is operating in Occupied or Standby mode with Local Setpoint Adjust disabled by MSV12=1.** This calculation then depends on whether or not there is a valid AV37 value. The DeadBandFactor used in this calculation is shown here for both Occupied and Standby modes (and applies to both a valid and invalid AV37 value):

   Occupied: DeadBandFactor = ((AV1 – AV4) / 2)

   Standby: DeadBandFactor = ((AV2 – AV5) / 2)

Valid AV37 value:

- ReferenceSP = (AV37 + AV38)
- EffCoolOnSP = (ReferenceSP + DeadBandFactor)
- EffCoolOffSP = (EffCoolOnSP – AV33)
- EffHeatOnSP = (ReferenceSP – DeadBandFactor)
- EffHeatOffSP = (EffHeatOnSP + AV33)

Invalid AV37 value: (Analog Null)

The Reference setpoint used in this calculation is shown here for both Occupied and Standby modes:

Occupied: ReferenceSP = (AV1 – DeadBandFactor + AV38)

Standby: ReferenceSP = (AV2 – DeadBandFactor + AV38)

- EffCoolOnSP = (ReferenceSP + DeadBandFactor)
- EffCoolOffSP = (EffCoolOnSP – AV33)
- EffHeatOnSP = (ReferenceSP – DeadBandFactor)
- EffHeatOffSP = (EffHeatOnSP + AV33)

3. **The unit is operating In Occupied or Standby mode with Long Range Local Setpoint Adjust selected and MSV12=2.** The DeadBandFactor used in this calculation is shown here for both Occupied and Standby modes.

   Occupied: DeadBandFactor = ((AV1 – AV4) / 2)

   Standby: DeadBandFactor = ((AV2 – AV5) / 2)

- ReferenceSP = AI2
- EffCoolOnSP = (ReferenceSP + DeadBandFactor)
- EffCoolOffSP = (EffCoolOnSP – AV33)
- EffHeatOnSP = (ReferenceSP – DeadBandFactor)
- EffHeatOffSP = (EffHeatOnSP + AV33)

4. **The unit is operating in Occupied mode with Short Range Local Setpoint Adjust selected and MSV12=2.**

- EffCoolOnSP = (AV1 + AV32)
- EffCoolOffSP = (EffCoolOnSP – AV33)
- EffHeatOnSP = (AV4 + AV32)
- EffHeatOffSP = (EffHeatOnSP + AV33)

5. **The unit is operating in Standby mode with Short Range Local Setpoint Adjust selected and MSV12=2.**

- EffCoolOnSP = (AV2 + AV32)
- EffCoolOffSP = (EffCoolOnSP – AV33)
- EffHeatOnSP = (AV5 + AV32)
- EffHeatOffSP = (EffHeatOnSP + AV33)

Setpoint Methods – LONWORKS

1. **The unit is operating in Unoccupied mode.**

- EffCoolOnSP = nciSetpoints.unoccupied_cool
- EffCoolOffSP = (EffCoolOnSP – nciUnoccDiff)
- EffHeatOnSP = nciSetpoints.unoccupied_heat
- EffHeatOffSP = (EffHeatOnSP + nciUnoccDiff)

2. **The unit is operating in Occupied or Standby mode with Local Setpoint Adjust disabled by nciLocSptEnable=0.** This calculation then depends on whether or not there is a valid nviSetpoint value. The DeadBandFactor used in this calculation is shown here for both Occupied and Standby modes (and applies to both a valid and invalid nviSetpoint value):

   Occupied: DeadBandFactor = ((nciSetpoints.occupied_cool – nciSetpoints.occupied_heat) / 2)

   Standby: DeadBandFactor = ((nciSetpoints.standby_cool – nciSetpoints.standby_heat) / 2)

Valid nviSetpoint value:

- ReferenceSP = (nviSetpoint + nviSetptOffset)
- EffCoolOnSP = (ReferenceSP + DeadBandFactor)
- EffCoolOffSP = (EffCoolOnSP – nciOccDiff)
- EffHeatOnSP = (ReferenceSP – DeadBandFactor)
- EffHeatOffSP = (EffHeatOnSP + nciOccDiff)

Invalid nviSetpoint value: (Analog Null)

The Reference setpoint used in this calculation is shown here for both Occupied and Standby modes:

Occupied: ReferenceSP = (nciSetpoints.occupied_cool - DeadBandFactor+nviSetptOffset)

Standby: ReferenceSP = (nciSetpoints.standby_cool – DeadBandFactor + nviSetptOffset)

- EffCoolOnSP = (ReferenceSP + DeadBandFactor)
- EffCoolOffSP = (EffCoolOnSP – nciOccDiff)
- EffHeatOnSP = (ReferenceSP – DeadBandFactor)
- EffHeatOffSP = (EffHeatOnSP + nciOccDiff)

3. **The unit is operating In Occupied or Standby mode with Long Range Local Setpoint Adjust selected and nciLocSptEnable=1.** The DeadBandFactor used in this calculation is shown here for both Occupied and Standby modes.

   Occupied: DeadBandFactor = ((nciSetpoints.occupied_cool – nciSetpoints.occupied_heat) / 2)

   Standby: DeadBandFactor = ((nciSetpoints.standby_cool – nciSetpoints.standby_heat) / 2)

- ReferenceSP = nvoSetpoint
- EffCoolOnSP = (ReferenceSP + DeadBandFactor)
- EffCoolOffSP = (EffCoolOnSP – nciOccDiff)
- EffHeatOnSP = (ReferenceSP – DeadBandFactor)
- EffHeatOffSP = (EffHeatOnSP + nciOccDiff)

4. **The unit is operating in Occupied mode with Short Range Local Setpoint Adjust selected and nciLocSptEnable=1**.

- EffCoolOnSP = (nciSetpoints.occupied_cool + nvoSetptShift)
- EffCoolOffSP = (EffCoolOnSP – nciOccDiff)
- EffHeatOnSP = (nciSetpoints.occupied_heat + nvoSetptShift)
- EffHeatOffSP = (EffHeatOnSP + nciOccDiff)

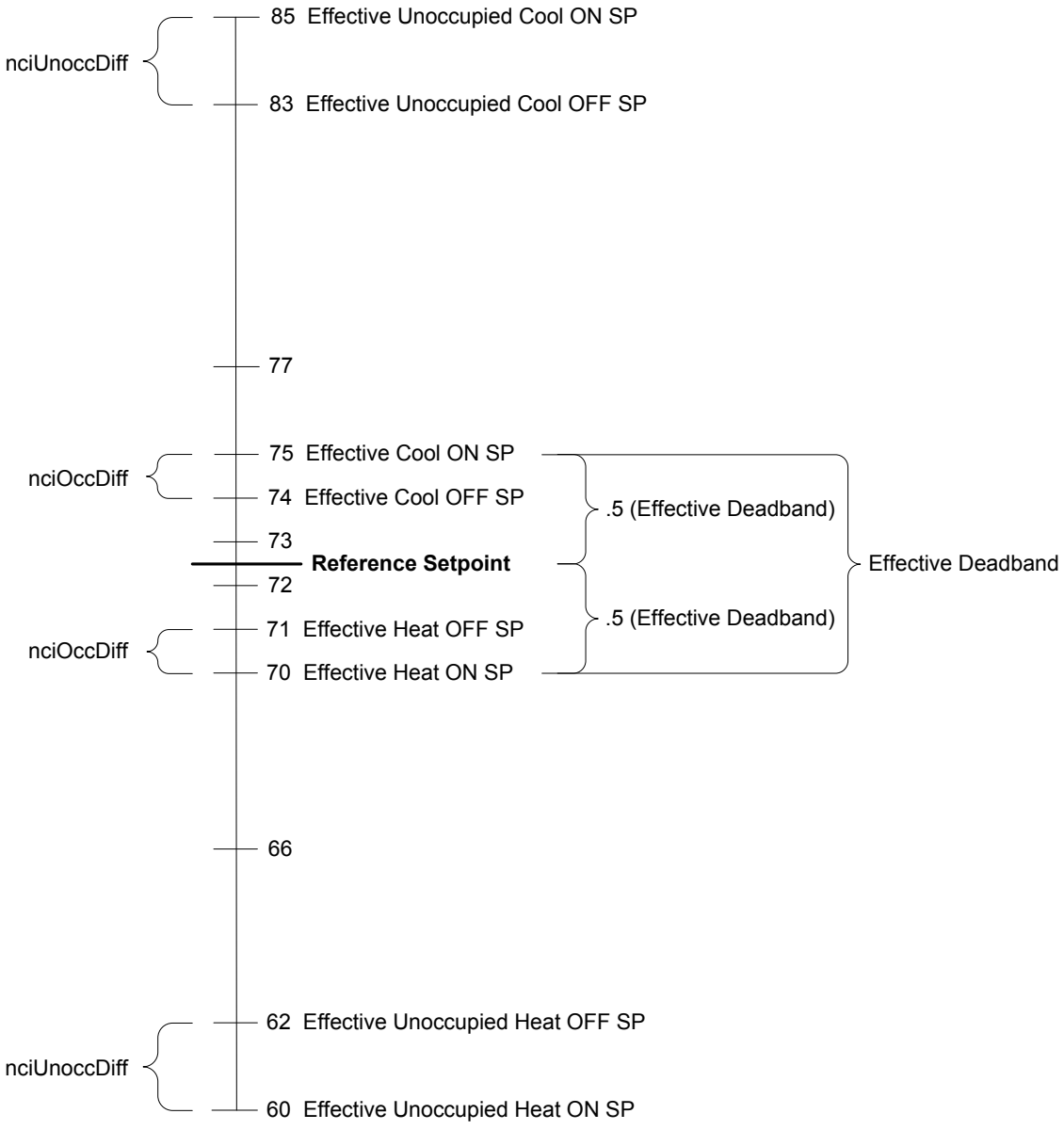
5. **The unit is operating in Standby mode with Short Range Local Setpoint Adjust selected and nciLocSptEnable=1.**

- EffCoolOnSP = (nciSetpoints.standby_cool + nvoSetptShift)
- EffCoolOffSP = (EffCoolOnSP – nciOccDiff)
- EffHeatOnSP = (nciSetpoints.standby_heat + nvoSetptShift)
- EffHeatOffSP = (EffHeatOnSP + nciOccDiff)

Important Notes

1. The Long/Short Range equipment configuration selection does not affect network setpoint operation.
2. Effective deadband does not apply to units in Unoccupied mode.
3. The LonMark organization provides a detailed description of the symmetrical method used to determine the effective setpoint calculation. Refer to the Wall Unit Functional Profile, available at: http://www.lonmark.org/technical_resources/guidelines/docs/profiles/8540_10.pdf.

Figure 2: Space Temperature Setpoint Operation



Example Setpoint Calculations

The following tables show how to apply the formulas from the preceding section. Each mode (Occupied, Unoccupied, or Standby) uses the default values shown in Table 20, while Table 21 provides common setpoint scenarios as a helpful reference when working with temperature setpoint parameters.

Table 20: Temperature Setpoint Defaults

AV1 (nciSetpoints.occupied_cool) = 75°F	AV5 (nciSetpoints.standby_heat) = 66°F
AV2 (nciSetpoints.standby_cool) = 77°F	AV6 (nciSetpoints.unoccupied_heat) = 60°F
AV3 (nciSetpoints.unoccupied_cool) = 85°F	AV33 (nciOccDiff) = 1°F
AV4 (nciSetpoints.occupied_heat) = 70°F	AV39 (uciUnoccDiff) = 2°F

Table 21: Example Calculations

Unoccupied Mode	Occupied Mode using Network Setpoints	Occupied Mode using Long Range Setpoint Adjust	Standby Mode using Short Range Setpoint Adjust
Effective Cool ON SP = 85°F	MSV12 (nciLocSptEnable) = Disabled	MSV12 (nciLocSptEnable) = Enabled	MSV12 (nciLocSptEnable) = Enabled
Effective Cool OFF SP = (85 – 2) = 83°F	AV37 (nviSetpoint) = 72°F	Reference SP = AI2 (nvoSetpoint) = 72.5°F	AV32 (nvoSetptShift) = 3°F
Effective Heat ON SP = 60°F	AV38 (nviSetptOffset) = 0.5°F	Deadband Factor = ((75 – 70) / 2) = 2.5	Effective Cool ON SP = (77 + 3) = 80°F
Effective Heat OFF SP	Reference SP = (72 + 0.5) = 72.5°F	Effective Cool ON SP = (72.5 + 2.5) = 75°F	Effective Cool OFF SP = (80 – 1) = 79°F
	Deadband Factor = ((75 – 70) / 2) = 2.5	Effective Cool OFF SP = (75 – 1) = 74°F	Effective Heat ON SP = (66 + 3) = 69°F
	Effective Cool ON SP = (72.5 + 2.5) = 75°F	Effective Heat ON SP = (72.5 – 2.5) = 70°F	Effective Heat OFF SP = (69 + 1) = 70°F
	Effective Cool OFF SP = (75 – 1) = 74°F	Effective Heat OFF SP = (70 + 1) = 71°F	
	Effective Heat ON SP = (72.5 – 2.5) = 70°F		
	Effective Heat OFF SP = (70 + 1) = 71°F		

Three adjustable parameters are associated with each Proportional – Integral (PI) control loop: Proportional Gain (Kp), Integral Time (Ki), and Deadband (DB). When the fan coil unit is properly sized for the space, the default settings for these parameters provide the best control action for all the various operating conditions. The following section describes the terminology and calculations used to determine these parameters. In the event of a field issue, these parameters must be set back to the original default settings.

PI Control Algorithm

The PI control algorithm calculates the desired actuator output, and ranges from 0 to 100%.

Definitions

- **Process Variable (PV)**: Measured analog input reading.
- **Setpoint (SP)**: Desired target value.
- **Error**: Value is calculated one of two ways depending on the PI blocks fixed action type.
- **Direct Acting PI (Cooling)**: Error = PV – SP
- **Reverse Acting PI (Heating)**: Error = SP – PV
- **Sample Time (ST)**: Scan rate of the PI control blocks, which is an internally fixed value of 10 seconds.
- **Sum of Errors:** Summation of all past errors. To prevent integral wind-up, the integral error summation is suspended when PI output reaches 100%.
- **Proportional Gain (Kp)**: Or proportional action, causes the controlled output to change in proportion to the magnitude of the present error amount. Error is the difference between the sensors present value and the set point. When the Kp setting is too low, the process variable (PV) response will change too slowly. When the Kp setting is too high, the process variable response will excessively overshoot and possibly oscillate around the setpoint (SP). If faster system response is desired, increase the Kp setting. Make small, incremental adjustments to the proportional gain setting to avoid system instability.
- **Integral Time (Ki)**: Or integral action, accumulates the error amounts and causes the controlled output to approach the setpoint over time in an attempt to eliminate any system offset. The smaller the integral (Ki) setting, the more the integral effects the process under control. When the Ki setting is too low, the process variable (PV) oscillates around the setpoint. When the Ki setting is too high, the process variable does not reach the setpoint.
- **Deadband (DB):** The deadband parameter serves two main purposes: 1) deadband prevents the actuator from constantly hunting or over-correcting, and 2) ensures the actuator physically moves every time a new positioning command is given. Deadband prevents small output changes from modifying the actuator position. When the deadband configuration property is set to 3%, the PI control output adjustment must exceed plus or minus 1.5%, or the actuator position will not be changed.

Output Formula

Output % = (Kp x Error) + ((Sample Time x Sum of Errors) / Ki)

Fan Coil PI Control Blocks

- Loop #1: Modulating Hydronic Heating Valve
- Loop #2: Modulating Hydronic Cooling Valve
- Loop #3: Economizer Discharge Air Temperature (DAT) Setpoint
- Loop #4: Economizer Position

BACnet PICS - Fan Coil Unit Controller

This section contains the Protocol Implementation Conformance Statement (PICS) for the MicroTech III Fan Coil Unit Controller as required by ANSI/ASHRAE (American National Standards Institute/American Society of Heating, Refrigeration, and Air Conditioning Engineers) Standard 135-2004, BACnet; A Data Communication Protocol for Building Automation and Control Networks.

Protocol Implementation Conformance Statement

Date:	November 4, 2019
Vendor Name:	Daikin Applied
Product Name:	MTIIIUC_FCU
Product Model Number:	FCU
Application Software Version:	1.1
Firmware Revision:	1.3
BACnet Protocol Revision:	Version 1
	Revision 4

Product Description

The MicroTech III fan coil unit controller with optional BACnet communication module is a microprocessor designed to operate the coil unit and integrate it into a BACnet building automation system.

BACnet Standardized Device Profile

The MicroTech III fan coil unit controller supports the BACnet Interoperability Building Blocks (BIBBS) included in the BACnet Advanced Application Controller (B-AAC) profile. The following section provides a complete listing of BIBBS.

- ☐ **BACnet Standardized Device Profile**
- ☐ **BACnet Operator Workstation (B-OWS)**
- ☐ **BACnet Building Controller (B-BC)**
- ☐ **BACnet Advanced Application Specific Controller (B-AAC)**
- ☒ **BACnet Application Specific Controller (B-ASC)**
- ☐ **BACnet Smart Sensor (B-SS)**
- ☐ **BACnet Smart Actuator (B-SA)**

BACnet Interoperability Building Blocks (BIBBS) Supported

BIBB Name	Designation
Data Sharing – Read Property – B	DS-RP-B
Data Sharing – Read Property Multiple – B	DS-RPM-B
Data Sharing – Write Property – B	DS-WP-B
Data Sharing – Write Property Multiple – B	DS-WPM-B
Data Sharing – COV – B (15 Maximum Objects Supported)	DS-COV-B
Device Management – Dynamic Device Binding – B	DM-DDB-B
Device Management – Dynamic Object Binding – B	DM-DOB-B
Device Management – Device Communication Control – B	DM-DCC-B
Device Management – Time Synchronization – B	DM-TS-B
Device Management – Reinitialize Device – B	DM-RD-B

Standard Object Types Supported

Object-Type	Creatable	Deleteable	Optional	Writeable
Analog Input	☐	☐		COV_Increment, Out_of_Service, Present_ Value, Units
Analog Value	☐	☐		COV_Increment, Present_Value, Priority_Array, Relinquish_Default, Units
Binary Input	☐	☐	Active_Text, Description, Inactive_Text	
Binary Value	☐	☐	Active_Text, Description, Inactive_Text	Present_Value
Loop	☐	☐	Proportional_Constant, Proportional_ Constant_Units, Integral_Constant, Integral_Constant_Units, Derivative_Constant, Derivative_Constant_Units, Maximum_Output, Minimum_Output	COV_Increment
Multi-state Input	☐	☐	State_Text	
Multi-state Value	☐	☐	State_Text	Present_Value, Priority_Array, Relinquish_ Default, MSV14 = Device Units (English – Metric)
Device	☐	☐	Description Location Max_Master	Description Location (Limit 32 Chars) Max_Master

Data Link Layer Options

- ☐ BACnet IP, (Annex J)
- ☐ BACnet IP, (Annex J), Foreign Device
- ☒ MS/TP master (Clause 9), baud rate(s): 9600, 19200, 38400 & 76800
- ☐ MS/TP slave (Clause 9), baud rate(s): 9600, 19200, 38400 & 76800

Segmentation Capability

- ☐ Segmented requests supported — Window Size: 4 for IP and 1 for MS/TP
- ☐ Segmented responses supported — Window Size: 4 for IP and 1 for MS/TP

Device Address Binding

- ☐ Yes Static Device Binding
- ☒ No

Networking Options

- ☐ Router, Clause 6
  Routing Configurations:
- ☐ Annex H, BACnet Tunneling Router over IP
- ☐ BACnet/IP Broadcast Management Device (BBMD)

Number of BDT entries

Registrations by Foreign Devices? ☐ Yes ☐ No

Character Sets Supported

- ☒ ANSI X3.4
- ☐ IBM®/Microsoft® DBCS
- ☐ ISO 8859-1
- ☐ ISO 10646 (UCS-2)
- ☐ ISO 10646 (UCS-4)
- ☐ JIS C 6226

NOTE: Support for multiple character sets does not imply they can be supported simultaneously.

Daikin Applied Training and Development

Now that you have made an investment in modern, efficient Daikin equipment, its care should be a high priority. For training information on all Daikin HVAC products, please visit us at www.DaikinApplied.com and click on Training, or call 540-248-9646 and ask for the Training Department.

Warranty

All Daikin equipment is sold pursuant to its standard terms and conditions of sale, including Limited Product Warranty. Consult your local Daikin Applied representative for warranty details. To find your local Daikin Applied representative, go to www.DaikinApplied.com.

Aftermarket Services

To find your local parts office, visit www.DaikinApplied.com or call 800-37PARTS (800-377-2787). To find your local service office, visit www.DaikinApplied.com or call 800-432-1342.

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