Network Integration Guide

ED 19122

Vision®/Skyline® EC Fan Controller Network Protocol Information

BACnet® MS/TP
BACnet IP

Models: CAH, CAC, OAH, OAC

Revision History

ED 19122   Oct 2022   Preliminary release

Product Description

The Vision®/Skyline® EC fan controller is a dedicated supervisory controller for air handler fan array systems. The EC fan controller has onboard BACnet® capability. Used in conjunction with the controller HMI, the EC fan controller can coordinate operation of the fan series over a building automation system (BAS) BACnet network.

Network communication parameters include setpoints, system status, monitoring, and alarm objects. BACnet object data applies to both BACnet MS/TP and BACnet IP.

NOTE: BACnet addressing and commissioning is performed from the controller HMI. This step is required before BAS integration and configuration.

Software Revision

This document supports the following versions of the EC fan controller application and all subsequent versions until otherwise indicated. However, if the EC fan controller software is of a later version, some of the information in this document may not completely describe the application.

The revision of the application software can be determined from the EC fan controller HMI under the 'About This Unit' menu. The software version can also be read from the Application_Software_Version property of the Device Object.

Hazardous Information Messages

⚠ CAUTION
Cautions indicate potentially hazardous situations, which can result in personal injury, serious injury, death, or equipment damage if not avoided.

⚠ WARNING
Warnings indicate potentially hazardous situations, which can result in property damage, severe personal injury, or death if not avoided.

⚠ DANGER
Dangers indicate a hazardous electrical situation which will result in death or serious injury if not avoided.

⚠ DANGER
Dangers indicate a hazardous gas situation which will result in death or serious injury if not avoided.

⚠ NOTICE
Notices give important information concerning a process, procedure, special handling or equipment attributes.

Notice

© 2022 Daikin Applied Americas Inc. d/b/a Daikin Applied, Minneapolis MN. All rights reserved throughout the world. Daikin Applied reserves the right to change any information contained herein without prior notice. The user is responsible for determining whether this product is appropriate for his or her application.

™ ® The following are trademarks or registered trademarks of their respective companies: BACnet from American Society of Heating, Refrigerating and Air-Conditioning Engineers, Inc., Daikin Applied, Vision, and Skyline from Daikin Applied.

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

Title	Number	Company	Source
Vision/Skyline EC Fan Controller	OM 1329	Daikin Applied	www.DaikinApplied.com
BACnet A Data Communication Protocol for Building Automation and Control Networks	ANSI/ASHRAE 135-2014	American Society of Heating, Refrigeration, and Air-Conditioning Engineers	www.ashrae.org

Purpose

This document describes the BACnet parameters available to the network from the EC fan controller. It includes addressing and configuration information in order to establish communication to the BAS. The EC fan controller supports BACnet MS/TP and BACnet IP data link layers.

This document is a reference for BACnet system integrators and engineers using the BACnet protocol. It is assumed that the user is familiar with BACnet integration basics for fan controller configuration. Contact the Daikin Applied Controls Customer Support group at 866-462-7829 or Controls@daikinapplied.com for additional assistance.

BACnet Testing and Agency Conformance

The EC fan controller supports the American National Standards Institute and American Society of Heating, Refrigeration and Air-Conditioning Engineers (ANSI/ASHRAE) standard 135-2014.

The EC fan 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. The PICS is located in Protocol Implementation Conformance Statement (PICS).

EC fan Controller Device Object

BACnet Objects

The EC fan 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 EC fan controller; each occurrence or instance has different properties and controls different unit variables or data points. Each instance is designated with a unique object identifier. Some properties can be adjusted from the network and others can only be interrogated (read-only properties).

The EC fan controller follows the standard BACnet convention for prioritizing data points using the Present_Value property, (current value) of each object and is automatically set to the highest priority level. The Present_Value is writeable if it is commandable or if Out_Of_Service is set to TRUE as determined by each object type (AI, AO, AV, BI, etc). Refer to the table notes included in Protocol Implementation Conformance Statement (PICS).

All BACnet objects available to the network are found in the BACnet Data Points section.

Device Object Properties

Each BACnet compatible device can only have a single BACnet Device Object.

⚠ CAUTION
If another device in the network already has this object identifier, you must change the instance number of one device object, so that all devices in the network have a unique object identifier.

The Device Object contains other informative properties as shown in Table 1.

Table 1: Device Object Properties

Property	Identifier	Default Value	Data Type
Object Identifier	75	device	BACnetObjectIdentifier
Object Name	77	MT4_DFA_#### (variable)	Character String
Object Type	79	8	BACnetObjectType
System Status	112		BACnetDeviceStatus
Vendor Name	121	Daikin Applied	Character String
Vendor Identifier	120	3	Unsigned 16
Model Name	70	MT4_DFA	Character String
Firmware Revision	44	variable	Character String
Application Software Version	12	variable	Character String
Location	58		Character String
Description	28	Daikin MT4	Character String
Protocol Version	98	1	Unsigned
Protocol Services Supported	97		BACnetServicesSupported
Protocol Object Types Supported[1]	96	AI, AO, AV, BI, BO, BV, CSV, Device, MSI, MSO, MSV, DateTime Pattern Value	BACnetObjectTypes Supported
Object List	76		Sequence of BACnetObjectIdentifer
Max APDU Length Accepted	62	480	Unsigned 16
Segmentation Supported	107	none	BACnetSegmentation
Max Segments Accepted	167	4	Unsigned
Local Time	57	variable	Time
Local Date	56	variable	Date
UTC Offset	119	-60 (Range: -780...780)	Integer
Daylight Savings Status	24	variable	Boolean
APDU Segment Timeout	10	5000	Unsigned
APDU Timeout	11	6000	Unsigned
Number of APDU Retries	73	3	Unsigned
Device Address Binding	30		Sequence of BACnetAddressBinding
Database Revision	115	1	Unsigned
Active COV Subscriptions	152		List of BACnetCOVSubscriptions

[1]While the EC fan controller supports the entire set of object types, not all object types are used.

Device Object Identifier

The Device Object_Identifier uniquely specifies the unit within the network. The initial device object instance number is calculated depending on the either the production code (IP) or the MAC Address (MS/TP). This number must be unique on the entire BACnet network. The device instance number can be changed via the keypad display. Select Apply Changes under the BACnet MSTP or BACnet IP Set Up Menu for the change to take effect.

Device Object_Name

Each device has a unique Object_Name by default. The Object_Name is MT4_DFA_#####. The ##### represents the Device Instance. If the Device Instance changes, and the "MT4_DFA_" portion of the Object_Name is retained, the Device Name is updated as well.

Setting BAS Communication Parameters

There are certain parameters involved in setting up the EC fan controller for either BACnet MS/TP or BACnet IP communications (Table 2.) The bold parameters can be changed using the HMI display menu. See Vision/Skyline EC Fan Unit Controller, OM 1329 (www.DaikinApplied.com) for additional details.

Table 2: Communication Parameter Settings

Parameter Name	BACnet MS/TP	BACnet IP
Device Object Name	MT4_DFA_####[4] '####' is the instance ID	MT4_DFA_####[3] '####' is the instance ID
Device Instance Number	####, default is the last 4 digits of the serial number	####, default is the last 4 digits of the serial number
DHCP	NA	**On**
Actual IP Address	NA	DHCP Enabled
Actual IP Subnet Mask	NA	DHCP Enabled
Actual Gateway Address	NA	DHCP Enabled
Given IP Address[1]	NA	127.0.0.1
Given IP Subnet Mask[1]	NA	255.255.255.0
Given Gateway Address[1]	NA	127.0.0.1
UDP Port Number	NA	47808
MS/TP MAC Address[2]	18	NA
MS/TP Baud Rate	76800	NA
Max APDU Length	480	1476
Receive Heartbeat	NA	NA
Max Master	127	NA
Max Info Frames	1	NA
BACnet IP (Enable)	NA	Passive
BACnet Over RS485	Passive	NA

Note that the parameters in boldface can be changed using the EC fan controller HMI.

[1]These addresses are used if DHCP (Dynamic Host Configuration Property) is set to Off. For changes to take effect, use the EC fan controller HMI and set Apply Changes on the BACnet IP Setup menu to Yes. This causes the power on the EC fan controller to reset.

[2]The MS/TP MAC Address is set via the EC fan controller HMI. Set Apply Changes to Yes for changes to take effect.

[3] The last 6 digits are the last 6 digits of the MAC address. The MAC address is a printed sticker affixed to the BACnet communication module.

[4]The last 8 digits are computed from the production number and date code.

Network Addressing and Configuration

BACnet MS/TP

The BACnet MS/TP device address is set using the EC fan controller HMI keypad display menu.

From the HMI main menu, navigate to the BMS Communications\BACnet MS/TP Set-Up menu to change this value. Set Apply MSTP Chgs to Save Config in order for the new address to take effect. This causes the power on the fan controller to reset.

BACnet IP

The BACnet/Internet Protocol (BACnet/IP) address consists of the four-octet Internet Protocol address followed by the two-octet UDP (User Datagram Protocol) port number. The BACnet/IP address is a six-octet value analogous to a MAC address. The IP address portion of the BACnet/IP address must be unique in the BACnet/IP network segment. The default UDP port number is 47808 (BAC0 in hexadecimal).

The device object contains a Given Internet Protocol Subnet Mask (Default is 255.255.255.0) and a default Given IP address of 127.0.0.1. The EC fan controller supports DHCP (Dynamic Host Configuration Protocol) IP addressing which is enabled by default.

From the HMI main menu, navigate to the BMS Communications\BACnet IP Set-Up menu to change the Device Object Name, Device Instance Number and disable DHCP, if applicable.

BACnet Device Management

The following functions are specific to the internal BACnet device. These functions are used for maintenance and testing. A network management tool such as VTS is typically used to issue the network commands.

DeviceCommunicationControl - Disable

The purpose of this command is to reduce network traffic for diagnostic testing of the BACnet network. When the EC fan controller receives a network command to disable communications, it stops passing information to the network. It is possible to specify an optional length of time that communication is suspended. The unit continues to operate during the disabled state.

DeviceCommunicationControl - Enable

When the EC fan controller receives a network command to Enable communications, fan controller communication to the BACnet network is restored.

BACnet Data Points

This section describes the EC fan controller network parameters (Table 3 - Table 6). See the Alarms section for alarm objects (Table 7), notification, and clearing.

All data points apply to BACnet MS/TP and BACnet IP protocols. Also refer to the Protocol Implementation Conformance Statement (PICS).

BACnet parameters available to the BAS remain at the last valid value upon loss of communications. If the network input value is invalid, the EC fan controller reverts to a default value. In the case of network sensor inputs, it reverts to the corresponding local sensor input when installed.

Additionally, see the Vision/Skyline EC Fan Array Controller, OM 1329 for the HMI menu display structure. The HMI keypad is used to set BACnet addressing parameters to establish network communication. See Main Menu\BMS Communications\BACnet MSTP (or BACnet IP) screens (www.DaikinApplied.com).

Table 3: BACnet Analog I/O Points

Parameter	BACnet Object Name	Object Type/ Instance	Read/ Write Access	Range (In Units)	Default	Description
Fan Speed Demand	Demand Input	AI:1	R	0-100%	NA	Displays the fan speed commanded input value.
Duct Static Pressure Sensor	DSP Pressure	AI:2	R	0-40 inch wc^2	NA	Displays the duct static pressure sensor input value used to control the supply air fan. See Duct Static Pressure Setpoint, AV:9. An alarm is generated if the duct static pressure input is not within the acceptable range. See Pressure Alarm, BV:2.
CFM Pressure Sensor	CFM Pressure	AI:3	R	0-40 inch wc^2	NA	Displays the CFM pressure sensor input value.
Fan Speed Setpoint	DmdSp	AV:1	R/W	0-100%	0	Sets the fan speed. The controller modulates all fans in the array to maintain this setpoint. When it is configured for BACnet, fan speed can also reflect the RPM value. Changes made to either the Fan Speed Demand Setpoint or Fan Speed RPM Command (AV:10) synchronize automatically.
Fan Speed Output	FanSpd	AO:1	R	0-100%	NA	Displays the fan speed command output being sent from the fan controller to the fan array.
Fan Tracking Speed Output	AO1 RPM	AO:2	R	0-100%	NA	Displays the fan tracking speed output command (RPM) sent to the secondary controller in fan tracking applications. Applies when unit is configured for a primary fan array from the HMI keypad.

Table 4: BACnet Digital I/O Points

Parameter	BACnet Object Name	Object Type/ Instance	Read/ Write Access	Range (In Units)	Default	Description
Fire Alarm Input	Fire Mode	BI:1	R	0=Off 1=On	Off	Displays the fire alarm input status. 0=Off indicates no fire alarm present 1=On indicates a fire alarm Applies when an optional fire sensor is installed and when Fire Alarm Enable, *FireEn* is configured to Yes = enabled from the HMI keypad. Also see Unit Alarm Info (CSV:2).
Interlock Switch Input	Interlock Input	BI:2	R	0=Off 1=On	Off	Displays the interlock switch status. Disables fan array operation until the circuit is closed (On). 0=Off indicates interlock switch is in open position. Fans are disabled 1=On indicates interlock switch is in closed position. Fans are enabled, and allowed to run Applies when Interlock Enable, *IntLckEn* is configured to Yes = enabled from the HMI keypad. Also see Unit Alarm Info (CSV:2).
Safety Alarm Input	Safety Input	BI:3	R	0=Off 1=On	Off	Displays the external safety alarm input status. An alarm is generated and fan array operation is disabled when an external safety device (fire safety, high static, freeze stat, etc.) opens the circuit. Applies when Safety Input Enable, *AlmInEn* is configured to Yes = enabled from the HMI keypad. Also see Unit Alarm Info (CSV:2).

Table 4: BACnet Digital I/O Points, Continued

Parameter	BACnet Object Name	Object Type/ Instance	Read/ Write Access	Range (In Units)	Default	Description
Fan Array On/Off	Array ON/OFF	BI:4	R	0=Off 1=On	Off	Displays the current state of the fan array on/off digital input. When the fan array is on, it reflects the input from Fan Speed Demand Setpoint (AV:1). Applies when On/Off Input Enable, *StrtSgnlEn* is configured to Yes = enabled from the HMI keypad, and when Demand Source is a 0-10 VDC or 4-20mA signal. Also see Unit Alarm Info (CSV:2).
Fan Run Command	FanOnCmd	BO:1	R	0=Off 1=On	Off	Displays the fan array run command output status.
Fan Array Running	RO2 Running	BO:3	R	0=Off 1=On	Off	Displays the fan array run output state. The fan array is currently in operation when 1=On.
Fan Array Alarm Output	RO3 Alarm	BO:4	R	0=Off 1=On	Off	Displays the fan array alarm relay output state. 1=On indicates an alarm condition.
Fan Array Ready Output	RO1 Ready	BO:5	R	0=Off 1=On	Off	Displays the fan ready output state. The fan array is ready for operation when 1=On.

Table 5: BACnet Points for Setpoint and Feedback Variables

Parameter	BACnet Object Name	Object Type/ Instance	Read/ Write Access	Range (In Units)	Default	Description
Total Airflow	TotalAirFl	AV:3	R	0-200000 CFM	NA	Displays the total airflow of the fan array.
Average Fan Speed	AvgFanSpd	AV:4	R	0-3300 RPM	NA	Displays the average speed of all fans in the array. Applies to constant fan applications.
Total Fan Power	TotalFanPwr	AV:5	R	1.4-6.3 kW^2	1.9 kW	Displays the total power usage (in kW) of all fans in the array. Full range includes: 1.4, 1.8, 1.9, 2.9, 3.1, 3.8, 5.9, 6.0, 6.3 kW.
Airflow Setpoint	CFMSp	AV:8	R/W	0-240000 CFM^2	0	Sets the airflow setpoint when configured for CFM control. The controller capacity modulates to maintain this value when the unit is equipped with a fan airflow measuring system and when Control Mode (MSV:4) is configured for CFM. If the value is set beyond the allowable range from the network, it is ignored and the controller continues to control to the last valid value. Changes made to either the CFM Pressure Setpoint or Fan Speed Demand Setpoint (AV:1) synchronize automatically.
Duct Static Pressure Setpoint	PressSp	AV:9	R/W	0-40 inch wc^2	0	Sets the duct static pressure setpoint that the controller is attempting to maintain. Applies when Control Mode is set to DSP and when a DSP sensor is installed and functioning properly. If the value is set beyond the allowable range from the network, it is ignored and the controller continues to control to the last valid value. Changes made to the Duct Static Pressure Setpoint or Fan Speed Demand Setpoint (AV:1) synchronize automatically.
Fan Speed Command	RPMCmd	AV:10	R/W	0-3230 RPM	0	Sets the fan speed setpoint that the controller is attempting to maintain. Applies to fixed speed fan applications, when Control Mode is set to RPM, and Demand Source is set to BACnet. Note the HMI keypad RPM input reflects a percentage of range (0-100%). Changes made to the Fan Speed RPM Command or Fan Speed Demand Setpoint (AV:1) synchronize automatically.
Secondary Fan Speed Offset	SpdOfst	AV:11	R/W	0-100%	0	Sets the secondary fan speed offset value. It is used to modulate capacity in fan tracking applications in order to maintain the desired offset between the primary and secondary fan arrays. Applies only when fan tracking is configured for Primary from the HMI keypad.

Table 5: BACnet Points for Setpoint and Feedback Variables, Continued

Parameter	BACnet Object Name	Object Type/ Instance	Read/ Write Access	Range (In Units)	Default	Description
Fan 1 Speed ↕ Fan 20 Speed	Fan1Spd ↕ Fan20Spd	AV:101 ↕ AV:120	R	0=3300 RPM	NA	Displays the current speed of individual fans in the array #1-20. Fans are controlled to the same speed by the internal Modbus communication protocol. Applies when Control Mode is configured to RPM (MSV:4).

Table 6: BACnet Points for Operating Modes and Configuration

Parameter	BACnet Object Name	Object Type/ Instance	Read/ Write Access	Range (In Units)	Default	Description
Unit Mode	UnitMode	MSV:1	R	1=Off 2=Normal 3=Manual 4=Emergency	Normal	Unit Mode. Displays the current operating state of the fan array. 1 = Off: The controller is not powered up 2 = Normal: The controller is operating as expected 3 = Manual: The controller is in an override condition. See Manual Mode (MSV:3) 4 = Emergency: The fan array is shut off due to a fire alarm condition
Clear Alarms	ClearAlarms	MSV:2	R/W	1=Off 2=On	Off	Clears all active alarms when set to On.
Manual Mode	ManualMode	MSV:3	R/W	1=Off 2=Normal 3=Manual[1]	Normal	Initiates manual control of the fan array independently of the fan controller sequence. Manual mode is used during initial start-up or for troubleshooting. After 60 minutes, the timer expires and the controller resumes normal operation.
Control Mode	CtrlMode	MSV:4	R	1= RPM 2= CFM 3= DSP 4=Tracking	RPM	Control Mode. Displays the control strategy selected for the supply fan. 1=RPM: Modulates the fan array capacity based on a fan speed command. The demand signal is defined by the Control Source. When configured for BACnet, the fan speed value can also be set as a percent (%). See Fan Speed Demand Setpoint (AV:1) and Fan Speed RPM Command (AV:10). 2=CFM: Modulates the fan array capacity to maintain the airflow speed (CFM) setpoint. See CFM Pressure Setpoint AV:8. 3=DSP: Modulates the fan array to maintain a duct static pressure setpoint based on an external pressure sensor. 4=Tracking: Fan tracking allows the speed of a secondary fan array to be controlled based on the output of the primary fan array.
Demand Source	SigSrc	MSV:5	R	1=0-10 VDC 2=4-20mA 3=Bacnet 4=HMI	0-10 VDC	Control Source. Displays the demand input signal used for modulating fan speed control. Applies when Control Mode is set to RPM from the HMI keypad.
Fire Alarm Enable	FireAlmEnable	MSV:7	R	1=Disabled 2=Enabled	Disabled	Indicates if the fire alarm input is enabled.[2] Applies when an optional fire sensor is installed. Also see Unit Alarm Info (CSV:2).
Interlock Enable	InterlockEnable	MSV:8	R	1=Disabled 2=Enabled	Disabled	Indicates if the interlock switch input is available. When enabled, the interlock delays fan operation until an external contact is closed.[2] Applies when Interlock Input, IntLck (BI:2) is configured from the HMI keypad.
Alarm Input Enable	SafetyInputEnable	MSV:9	R	1=Disabled 2=Enabled	Disabled	Indicates if external alarm signal is available. Fan operation stops when this input is in the open (On) position.[2]
On/Off Input Enable	ON/OFFInputEnable	MSV:10	R	1=Disabled 2=Enabled	Disabled	Indicates if the on/off input is available. When enabled from the HMI keypad, this input allows fan array operation to be controlled on or off with an external contact closure.[2] Applies when Control Source is a 0-10 VDC or 4-20mA signal. Also see Unit Alarm Info (CSV:2).
Reboot	Reboot	MSV:11	R/W	1=Off 2=On	Off	Controller restart enables the fan controller to initiate a power cycle sequence. When configured to 2=On from the network, the controller performs a reset and then returns the fans to Off.

Table 6: BACnet Points for Operating Modes and Configuration, Continued

Parameter	BACnet Object Name	Object Type/ Instance	Read/ Write Access	Range (In Units)	Default	Description
Units of Measurement	UnitSystem	MSV:12	R/W	1=SI 2=US 3=CA	US	Units of Measurement. Selects the units of measure used to pass fan controller data to the BACnet network. 1=SI (International System of Units/Metric) 2=US (English) 3=CA (Canadian)
Unit State	Unit State	MSV:13	R	1=Off 2=Ready 3=Running 4=Manual 5=Alarm 6=Emergency	NA	Displays the operating state of the fan array. 1=Off: The fan array is not operating. The controller may not be energized 2=Ready: The ready relay output contact on the controller is closed, indicating that the fan array is ready to run 3= Running: The fan array running relay output is closed; indicating it is currently in operation 4=Manual: The fan array is configured for manual (direct) control from the HMI keypad.[1] 5=Alarm: The alarm output contact on the controller is closed, indicating there are one or more active alarms 6=Emergency: The fan array has been shut down due to an active fire alarm. The controller alarm relay output is in the open (On) position which then triggers the Emergency mode

[1]Manual mode is not intended for extended operation beyond initial start-up and troubleshooting. After 60 minutes, the controller automatically resumes normal operation.
[2]Open (On) = Enabled. The contact is in the closed position. Closed (Off) = Disabled. The contact is in the open position.

Alarm Handling

Alarm Notification

There are 21 alarm object alarms supported by the EC fan controller (Table 7.) These include one unit alarm object (CSV:2) and 20 individual fan alarm objects (MSV:101-MSV:120.) The fan controller follows the standard BACnet method for alarm notification. Alarms are displayed by the highest priority active alarm based on the Present_Value property of the alarm object.

Alarm Clearing

To clear all active alarms from the network, change the Present_Value property of BACnet MSV:2 *ClearAlarm* multistate object to a 2 = On. After three seconds and the alarms are cleared, this object returns to 1 = Off. All active alarms are cleared automatically when power is cycled to the controller. This can be done manually or by Present_Value property the BACnet multistate value *Reboot*, MSV:11. If the conditions that triggered the alarm are still present after a power cycle, these active alarms are re-initiated with new date/time stamp.

NOTE: Alarms can also be cleared either through the fan controller HMI or a local sensor input, if available.

Table 7: BACnet Alarms

Parameter	BACnet Object Name	Object Type/ Instance	Read/ Write Access	Range (In Units)	Default	Description
Fan 1 Alarm Code ↕ Fan 20 Alarm Code	Fan1AlmCode ↕ Fan20AlmCode	MSV:101 ↕ MSV:120	R	1=Offline 2=Hall Sensor Error 3=Earth Ground Fault 4=Supply Voltage High 5=Supply Voltage Low 6=IGBT Fault 7=Peak Current 8=Line Fault 9=DC Link Voltage High 10=DC Link Voltage Low 11=Motor Blocked 12=High Temp 13=RPM Error 14=Online	NA	Reflects the alarms generated by individual fans in the array. Applies when the fan is configured with a unique BACnet identifier (CSV:1) alarm object for each fan. Only the enumeration value is displayed via BACnet or HMI. Alarms are displayed by highest to lowest priority. Also refer to the Alarms section. 1=Offline: The fan is not communicating to the controller 2=Hall Sensor Error: The hall sensor for EBM fans is in alarm condition; it is not functioning as expected and is attempting to reset itself 3=Earth Ground Fault: The fan is not grounded properly 4=Supply Voltage High: Incoming voltage to the controller has exceeded the maximum value allowed 5=Supply Voltage Low: Incoming voltage to the controller is below the minimum value allowed 6=IGBT Fault: The IGBT (insulated gate bipolar transistor) current switch is not functioning and the fan is shut down 7=Peak Current: The current load has exceeded the maximum threshold, shutting down the fan 8=Line Fault: The fan is not running due to power line disruption; voltage lines are not connected properly or possible power surges 9=DC Link Voltage High: The internal fan voltage has exceeded the threshold. A power cycle may be necessary 10=DC Link Voltage Low: The internal fan voltage is lower than the threshold. A power cycle may be necessary 11=Motor Blocked: The fan motor impeller has a physical obstruction that requires removal and controller restart 12=High Temp: The internal fan temperature has exceeded the maximum threshold of 104 ˚F 13=RPM Error: The difference between the fan speed setpoint command and actual fan speed has exceeded the threshold value (300 RPM) 14=Online: Fan is communicating to the controller as expected

Table 7: BACnet Alarms, Continued

Parameter	BACnet Object Name	Object Type/ Instance	Read/ Write Access	Range (In Units)	Default	Description
BACnet Alarm Object	Unit Alarm Info	CSV:2	R	Dynamically changing string value. See Description		Reflects the alarms generated by the fan controller alarm object. Alarms are displayed by highest to lowest priority. Also refer to the Alarms section. • Fire Alarm: Indicates if the fan array is operating in fire mode. When a fire alarm sensor is installed and the Fire Alarm relay output is in the open (On) position, the fan array is shut down immediately, the unit is placed in Emergency mode, and the alarm generated. • External Safety Alarm: Indicates if the safety input is On (in alarm.) The fan does not operate under any condition. • Fan #x Alarm: Indicates the fan (#1-20) currently in alarm condition. The "x" refers to the fan ID that fails first in case of a multi-fan failure event.) • Sensor Error: Indicates if one of sensors is not functioning as expected. • InterLock Alarm: Indicates that the fan interlock signal has not been received within the allowable time range and the start/stop input is in the open (On) position. Applies when both the fan array interlock switch and start/stop inputs are available and enabled. • Duct Static pressure alarm: Indicates that the DSP sensor is not functioning properly or is out of range. • No Alarm
BACnet Object Identifier	UnitName	CSV:1	R/W	Character string	NA	Assigns a unique BACnet identifier (device name) for each fan in the array. Up to 10 alpha-numeric characters are supported.
Duct Static Pressure Alarm	PressureAlm	BV:2	R	0=Off 1=On	Off	Pressure Alarm. Displays the duct static pressure alarm status. An alarm is generated when the difference between actual duct pressure and pressure setpoint has exceeded the allowable threshold. Applies when a DSP sensor is installed and Control Mode (MSV:4) is set to DSP from the HMI keypad. Also see BACnet Alarm Object (CSV:2).

BACnet PICS for EC fan Controller

This section contains the Protocol Implementation Conformance Statement (PICS) for the EC fan Controller from Daikin Applied as required by ANSI/ASHRAE Standard 135-2014, BACnet: A Data Communication Protocol for Building Automation and Control Networks.

Date	May 2019
Vendor Name	Daikin Applied
Product Name	MT4 Daikin Fan Array
Product Model Number	MT4_DFA
Application Software Version	2506990
Firmware Revision	11.48
BACnet Protocol Version	1.15

Product Description

The EC fan controller is a dedicated, programmable device designed to operate the Vision/Skyline air handling system fan array and integrate it into a BACnet BAS.

BACnet Standardized Device Profile (Annex L)

☐	BACnet Advanced Workstation	(B-AWS)
☐	BACnet Operator Workstation	(B-OWS)
☐	BACnet Operator Display	(B-OD)
☐	BACnet Building Controller	(B-BC)
☐	BACnet Advanced Application Controller	(B-AAC)
☒	BACnet Application Specific Controller	(B-ASC)
☐	BACnet Smart Sensor	(B-SS)
☐	BACnet Smart Actuator	(B-SA)

BACnet Interoperability Building Blocks Supported (Annex L)

Data Sharing

Data Sharing – Read Property-B	DS-RP-B
Data Sharing – Write Property-B	DS-WP-B

Device management

Device Management – Dynamic Device Binding-A	DM-DDB-A
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 – UTC Time Synchronization-B	DM-UTC-B
Device Management – Reinitialize Device-B	DM-RD-B
Device Management – Backup and Restore-B	DM-BR-B
Device Management – Object Creation and Deletion-B	DM-OCD-B

Standard Object Types Supported

Object type	Can be Created Dynamically	Can be Deleted Dynamically
Accumulator	☐	☐
Analog Input	☐	☐
Analog Output	☐	☐
Analog Value	☐	☐
Binary Input	☐	☐
Binary Output	☐	☐
Binary Value	☐	☐
Device	☐	☐
Multi-State Input	☐	☐
Multi-State Output	☐	☐
Multi-State Value	☐	☐
Characterstring Value	☐	☐
Datetime Pattern Value	☐	☐
Positive Integer Value	☐	☐

Segmentation Capability

☒	Able to transmit segmented messages	Window size	1 for MS/TP 2..8 for IP
☒	Able to receive segmented messages	Window size	1 for MS/TP 2..8 for IP

Data Link Layer Options

☒	BACnet IP, (Annex J)	-
☒	BACnet IP, (Annex J), Foreign Device	-
☐	ISO 8802-3, Ethernet (Clause 7)	-
☐	ANSI/ATA 878.1, 2.5 Mb. ARCNET (Clause 8)	-
☐	ANSI/ATA 878.1, RS-485 ARCNET (Clause 8), baud rate(s)	-
☒	MS/TP master (Clause 9), baud rate(s)	9600 19200 38400 57600 76800 115000
☒	MS/TP slave (Clause 9), baud rate(s)	9600 19200 38400 57600 76800 115000
☐	Point-To-Point, EIA 232 (Clause 10), baud rate(s)	-
☐	Point-To-Point, modem, (Clause 10), baud rate(s)	-
☐	LonTalk, (Clause 11), medium	-
☐	Other	-

Device Address Binding

Is static device binding supported?	☐ Yes	☒ No

Networking Options

☐	Router, Clause 6 (remote management functionality/BACnet PTP)		
☐	Annex H, BACnet Tunneling Router over IP		
☐	BACnet/IP Broadcast Management Device (BBMD) Number of BDT entries: 10 Number of FDT entries: 10		
-	Does the BBMD support registrations by foreign devices?	oo Yes	☐ No

Character Sets Supported

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

☒ UTF-8	☐ IBM / Microsoft DBCS	☒ ISO 8859-1
☒ ISO 10646 (UCS-2)	☐ ISO 10646 (UCS-4)	☐ JIS C 6226

Standard Object Types Descriptions

Analog Inputs

Properties	Readable / Writable	Range restrictions
Object_Identifier	R	-
Object_Name	R	-
Object_Type	R	-
Present_Value	R[2]	-
Description	R	-
Status_Flags	R	-
Event_State	R	-
Reliability	R[1]	-
Out_Of_Service	W	-
Units	R	-
Min_Pres_Value	R	-
Max_Pres_Value	R	-
Property_List	R	-

[1] Object is writeable when Out_Of_Service is set to TRUE.

Analog Outputs

Properties	Readable / Writable	Range restrictions
Object_Identifier	R	-
Object_Name	R	-
Object_Type	R	-
Present_Value	W	-
Description	R	-
Status_Flags	R	-
Event_State	R	-
Reliability	R[1]	-
Out_Of_Service	W	-
Units	R	-
Min_Pres_Value	R	-
Max_Pres_Value	R	-
Priority_Array	R	-
Relinquish_Default	W	-
Property_List	R	-

[1] Object is writeable when Out_Of_Service is set to TRUE.

Analog Values

Properties	Readable / Writable	Range restrictions
Object_Identifier	R	-
Object_Name	R	-
Object_Type	R	-
Present_Value	W[1]	-
Status_Flags	R	-
Event_State	R	-
Reliability	R[1]	-
Out_Of_Service	W	-
Units	R	-
Priority_Array	R	-
Relinquish_Default	W	-
Property_List	R	-
Analog Value (Variant 2)		
Object_Identifier	R	-
Object_Name	R	-
Object_Type	R	-
Present_Value	R[1]	-
Description	R	-
Status_Flags	R	-
Event_State	R	-
Out_Of_Service	W	-
Units	R	-
Property_List	R	-

[1] Object is writeable when Out_Of_Service is set to TRUE.

Binary Inputs

Properties	Readable / Writable	Range restrictions
Object_Identifier	R	-
Object_Name	R	-
Object_Type	R	-
Present_Value	R[1]	-
Description	R	-
Status_Flags	R	-
Event_State	R	-
Reliability	R	-
Out_Of_Service	R	-
Polarity	R	-
Inactive_Text	R	-
Active_Text	R	-
Elapsed_Active_Time	W	Only 0
Time_Of_Active_Time_Reset	R	-
Property_List	R	-
Event_Time_Stamps	R	-
Property_List	R	-
Event_Detection_Enable	R	-

[1] Object is writeable when Out_Of_Service is set to TRUE.

Binary Outputs

Properties	Readable / Writable	Range restrictions
Object_Identifier	R	-
Object_Name	R	-
Object_Type	R	-
Present_Value	W	-
Description	R	-
Status_Flags	R	-
Event_State	R	-
Reliability	R[1]	-
Out_Of_Service	W	-
Polarity	R	-
Inactive_Text	R	-
Active_Text	R	-
Elapsed_Active_Time	W	Only 0
Time_Of_Active_Time_Reset	R	-
Priority_Array	R	-
Relinquish_Default	W	-
Property_List	R	-

[1]Object is writeable when Out_Of_Service is set to TRUE.

Binary Values

Properties	Readable / Writable	Range restrictions
Object_Identifier	R	-
Object_Name	R	-
Object_Type	R	-
Present_Value	W[2]	-
Description	R	-
Status_Flags	R	-
Event_State	R	-
Reliability	R[1]	-
Out_Of_Service	R	-
Inactive_Text	R	-
Active_Text	R	-
Elapsed_Active_Time	W[1]	Only 0
Time_Of_Active_Time_Reset	R	-
Priority_Array	R	-
Relinquish_Default	W	-
Property_List	R	-

[1] Object is writeable when Out_Of_Service is set to TRUE.

[2] Priority 5 is reserved for the commandable objects application. BACnet writes at priority 5 will fail.

Device

Properties	Readable/Writable	Range restrictions
Object_Identifier	R	-
Object_Name	R	-
Object_Type	R	-
System_Status	R	-
Vendor_Name	R	-
Vendor_Identifier	R	-
Model_Name	R	-
Firmware_Revision	R	-
Application_Software_Version	R	-
Description	R	-
Protocol_Version	R	1
Protocol_Revision	R	10
Protocol_Services_Supported	R	-
Protocol_Object_Types_Supported	R	-
Object_List	R	-
Max_APDU_Length_Accepted	W	MS/TP: 50..480 IP: 50..1024
Segmentation_Supported	W	-
Max_Segments_Accepted	W	2..8
Local_Time	R	-
Local_Date	R	-
UTC_Offset	W	-
Daylight_Savings_Status	R	-
APDU_Segment_Timeout	W	0..65535
APDU_Timeout	W	0..65535
Number_Of_APDU_Retries	W	0..65535
Max_Master (MS/TP only)	W	1..127
Max_Info_Frames (MS/TP only)	W	1..32
Device_Address_Binding	R	-
Database_Revision	R	-
Property_List	R	-

Multistate Inputs

Properties	Readable / Writable	Range restrictions
Object_Identifier	R	-
Object_Name	R	-
Object_Type	R	-
Present_Value	R[1]	-
Description	R	-
Status_Flags	R	-
Event_State	R	-
Reliability	R[1]	-
Out_Of_Service	W	-
Number_Of_States	R	-
State_Text	R	-
Property_List	R	-

[1] Object is writeable when Out_Of_Service is set to TRUE.

Multistate Outputs

Properties	Readable / Writable	Range restrictions
Object_Identifier	R	-
Object_Name	R	-
Object_Type	R	-
Present_Value	W	1..number of states?
Description	R	-
Status_Flags	R	-
Event_State	R	-
Reliability	R[1]	-
Out_Of_Service	W	-
Number_Of_States	R	-
State_Text	R	-
Priority_Array	R	-
Relinquish_Default	W	-
Property_List	R	-

[1] Object is writeable when Out_Of_Service is set to TRUE.

Multistate Values

Properties	Readable / Writable	Range restrictions
Object_Identifier	R	-
Object_Name	R	-
Object_Type	R	-
Present_Value	W[1]	-
Description	R	-
Status_Flags	R	-
Event_State	R	-
Reliability	R[1]	-
Out_Of_Service	R	-
Number_Of_States	R	-
State_Text	R	-
Priority_Array	R	-
Relinquish_Default	W	-
Property_List	R	-
Multistate Value (Variant 2)		
Object_Identifier	R	-
Object_Name	R	-
Object_Type	R	-
Present_Value	R[1]	1..number of states
Description	R	-
Status_Flags	R	-
Event_State	R	-
Out_Of_Service	R	-
Number_Of_States	R	-
State_Text	R	-
Property_List	R	-

[1] Object is writeable when Out_Of_Service is set to TRUE.

Characterstring Values

Properties	Readable / Writable	Range restrictions
Object_Identifier	R	-
Object_Name	R	-
Object_Type	R	-
Present_Value	W	-
Out_Of_Service	W	-
Description	R	-
Status_Flags	R	-
Property_List	R	-

Positive Integer Values

Properties	Readable / Writable	Range restrictions
Object_Identifier	R	-
Object_Name	R	-
Object_Type	R	-
Present_Value	W	-
Out_Of_Service	W	-
Description	R	-
Units	R	-
Status_Flags	R	-
Property_List	R	-

Datetime Pattern Values

Properties	Readable / Writable	Range restrictions
Object_Identifier	R	-
Object_Name	R	-
Object_Type	R	-
Present_Value	W	-
Description	R	-
Status_Flags	R	-
Property_List	R	-

DAIKIN

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.

This document contains the most current product information as of this printing. For the most up-to-date product information, please go to www.DaikinApplied.com.

Products manufactured in an ISO Certified Facility.