



IAQRM Series

Multi Sensor

SETUP GUIDE BACnet® COMMUNICATION



Object Type (BACnet Object Type)	Object Identifier (BACnet Object Identifier)	Object Name (Character String (32))	Notes	Present Value (Default)	Description (Character String(32))	Device Type (Character String(32))	Status Flags (BACnetStatus Flags)	Event State (BACnet EventState)	Reliability (BACnet Reliability)	Out of Service (Boolean)	Units (BACnet EngineeringUnits)	COV increment (Real)	Number of States	Property List (BACnet Array)
Device	381003	MSN-003		381003										
Analog Input	AI 1	VOC Sensor Value	0-500 VOC Index, or 51-13824 PPB, or 233-62208 ug/m3, resolution 1 Sensor Error = -1000	Current Reading	VOC Sensor Value	VOC Sensor	{false, false, false, false} (0000) or (1100) if no sensor	NORMAL (0) or FAULT (1) if no sensor	NO_FAULT_DETECTED (0) or NO_SENSOR (1)	FALSE (0)	no units (95), or parts-per-billion (97), or micro-grams-per-cubic-meter (219)	50		
	AI 2	RH Sensor Value	0-100%RH, Resolution = 0.1%RH Sensor Error = -1000	Current Reading	RH Sensor Value	RH Sensor	{false, false, false, false} (0000) or (1100) if no sensor	NORMAL (0) or FAULT (1) if no sensor	NO_FAULT_DETECTED (0) or NO_SENSOR (1)	FALSE (0)	percent-relative-humidity (29)	10		
	AI 3	Temperature Sensor Value	0 to 50 °C, Resolution = 0.1 °C -32 to122 °F, Resolution = 0.1 °F Sensor Error = -1000	Current Reading	Temperature Sensor Value	Temperature Sensor	{false, false, false, false} (0000) or (1100) if no sensor	NORMAL (0) or FAULT (1) if no sensor	NO_FAULT_DETECTED (0) or NO_SENSOR (1)	FALSE (0)	degrees-Celsius (62) or degrees-Fahrenheit (64)	2/4		
	AI 4	PM 1.0 Particulate Mass	0 to 1000ug/m3, resolution 1ug/m3 Sensor Error = -1000	Current Reading	PM1.0 Particulate Mass	PM Sensor	{false, false, false, false} (0000) or (1100) if no sensor	NORMAL (0) or FAULT (1) if no sensor	NO_FAULT_DETECTED (0) or NO_SENSOR (1)	FALSE (0)	micro-grams-per-cubic-meter (219)	50		
	AI 5	PM 2.5 Particulate Mass	0 to 1000ug/m3, resolution 1ug/m3 Sensor Error = -1000	Current Reading	PM2.5 Particulate Mass	PM Sensor	{false, false, false, false} (0000) or (1100) if no sensor	NORMAL (0) or FAULT (1) if no sensor	NO_FAULT_DETECTED (0) or NO_SENSOR (1)	FALSE (0)	micro-grams-per-cubic-meter (219)	50		
	AI 6	PM 4.0 Particulate Mass	0 to 1000ug/m3, resolution 1ug/m3 Sensor Error = -1000	Current Reading	PM4.0 Particulate Mass	PM Sensor	{false, false, false, false} (0000) or (1100) if no sensor	NORMAL (0) or FAULT (1) if no sensor	NO_FAULT_DETECTED (0) or NO_SENSOR (1)	FALSE (0)	micro-grams-per-cubic-meter (219)	50		
	AI 7	PM 10 Particulate Mass	0 to 1000ug/m3, resolution 1ug/m3 Sensor Error = -1000	Current Reading	PM10.0 Particulate Mass	PM Sensor	{false, false, false, false} (0000) or (1100) if no sensor	NORMAL (0) or FAULT (1) if no sensor	NO_FAULT_DETECTED (0) or NO_SENSOR (1)	FALSE (0)	micro-grams-per-cubic-meter (219)	50		
	AI 8	PM 0.5 Number concentration range	0 to 3000 #/cm3, resolution 1 Sensor Error = -1000	Current Reading	PM0.5 Particulate Count	PM Sensor	{false, false, false, false} (0000) or (1100) if no sensor	NORMAL (0) or FAULT (1) if no sensor	NO_FAULT_DETECTED (0) or NO_SENSOR (1)	FALSE (0)	micro-grams-per-cubic-meter (219)	100		
	AI 9	PM 1.0 Number concentration range	0 to 3000 #/cm3, resolution 1 Sensor Error = -1000	Current Reading	PM1.0 Particulate Count	PM Sensor	{false, false, false, false} (0000) or (1100) if no sensor	NORMAL (0) or FAULT (1) if no sensor	NO_FAULT_DETECTED (0) or NO_SENSOR (1)	FALSE (0)	micro-grams-per-cubic-meter (219)	100		

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	AI 10	PM 2.5 Number concentration range	0 to 3000 #/cm3, resolution 1 Sensor Error = -1000	Current Reading	PM2.5 Particulate Count	PM Sensor	{false, false, false, false} (0000) or (1100) if no sensor	NORMAL (0) or FAULT (1) if no sensor	NO_FAULT_DETECTED (0) or NO_SENSOR (1)	FALSE (0)	micro-grams-per-cubic-meter (219)	100		
	AI 11	PM 4.0 Number concentration range	0 to 3000 #/cm3, resolution 1 Sensor Error = -1000	Current Reading	PM4.0 Particulate Count	PM Sensor	{false, false, false, false} (0000) or (1100) if no sensor	NORMAL (0) or FAULT (1) if no sensor	NO_FAULT_DETECTED (0) or NO_SENSOR (1)	FALSE (0)	micro-grams-per-cubic-meter (219)	100		
	AI 12	PM10 Number concentration range	0 to 3000 #/cm3, resolution 1 Sensor Error = -1000	Current Reading	PM10 Particulate Count	PM Sensor	{false, false, false, false} (0000) or (1100) if no sensor	NORMAL (0) or FAULT (1) if no sensor	NO_FAULT_DETECTED (0) or NO_SENSOR (1)	FALSE (0)	micro-grams-per-cubic-meter (219)	100		
	AI 13	CO2 Sensor Value	0 to 10,000PPM, resolution 1PPM Sensor Error = -1000	Current Reading	CO2 Level	CO2 Sensor	{false, false, false, false} (0000) or (1100) if no sensor	NORMAL (0) or FAULT (1) if no sensor	NO_FAULT_DETECTED (0) or NO_SENSOR (1)	FALSE (0)	parts-per-million (96)	100		
	AI 14	Formaldehyde Sensor Value	0 to 1230 ug/m3, or 0 to 1000PPB, resolution 1 Sensor Error = -1000	Current Reading	Formaldehyde Level	Formaldehyde Sensor	{false, false, false, false} (0000) or (1100) if no sensor	NORMAL (0) or FAULT (1) if no sensor	NO_FAULT_DETECTED (0) or NO_SENSOR (1)	FALSE (0)	ug/m3 ((219) or ppb (97))	50		
Analog Value	AV 1	Temperature Offset	-5 to 5 Δ°C, Resolution = 0.1 Δ°C -10 to 10 Δ°F, Resolution = 0.1 Δ°F	0	Temperature Offset	NA	{false, false, false, false} (0000) or (1100) if no sensor	NORMAL (0) or FAULT (1) if no sensor	NA	FALSE (0)	Δ °F (120) or Δ °C (121)			
	AV 2	Humidity Offset	+/-10 %RH, Resolution = 1 %RH	0	RH Offset	NA	{false, false, false, false} (0000) or (1100) if no sensor	NORMAL (0) or FAULT (1) if no sensor	NA	FALSE (0)	percent-relative-humidity (29)			
	AV 3	CO2 Offset	+/-200PPM, Resolution = 10PPM	0	CO2 Offset	NA	{false, false, false, false} (0000) or (1100) if no sensor	NORMAL (0) or FAULT (1) if no sensor	NA	FALSE (0)	parts-per-million (96)			
	AV 4	CO2 Altitude Adjustment	0 to 3000meters, Resolution 100m	0	CO2 Altitude	NA	{false, false, false, false} (0000) or (1100) if no sensor	NORMAL (0) or FAULT (1) if no sensor	NA	FALSE (0)	meters (31)			

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	AV5	Relay Setpoint	Setpoint to activate Relay, VOC Index, range 100-500, resolution 10 TVOC, 500-10000 PPB, resolution 50, or 2500-60000ug/m3, resolution 250 RH range 20 to 90%RH 1%RH. Temperature 5 to 40 °C, Resolution = 1 °C 40 to 100 °F, Resolution = 1 °F CO2 range 500 to 9000ppm, Resolution=100ppm PM_MASS 50 to 900ug/m3, resolution 10ug/m3 PM_NUMBER 50 to 2 900#/Cm3, resolution 25#/cm3 CH2O 50 to 900 ug/m3 or PPB, resolution 10 No Relay = 0	26°C	VOC: 100-500 VOC Index, TVOC: 500-10000 PPB, or 2500-60000ug/m3 RH: 20 to 90%RH TEMP: 5-40 °C, 40-100 °F PM_MASS: 50 to 900ug/m3 PM_NUMER: 50 to 2900#/cm3 CO2: 500 to 9000ppm CH2O: 50 to 900 ug/m3 or PPB	NA	{false, false, false, false} (0000) or (1100) if no relay	NORMAL (0) or FAULT (1) if no relay	NA	FALSE (0)	VOC Index - no units (95) TVOC - ppb (97), or ug/m3 (219) RH - %RH (29) Temperature - C (62) or F (64) parts-per-million (96) ug/m3 or #/cm3 (219) ug/m3 ((219) or ppb (97)			
	AV6	Relay Hysteresis	Hysteresis for relay activation, VOC Index, range 10-50 resolution 1 TVOC, 10-100 PPB resolution 10, or 500-2000ug/m3, resolution =50 1%RH, range 5 to 20%RH, 1 °C/F, range 1 to 5 °C, or 2-10°F, CO2: 25 to 500PPM, Resolution=25ppm PM_MASS 10 to 40ug/m3, resolution 5ug/m3, PM_NUMBER 10 to 120#/cm3, resolution 25#/cm3 CH2O 10 to 40 ug/m3 or PPB, resolution 5 No Relay = 0	2°C	VOC: 10-50 VOC Index TVOC: 10-100 PPB, or 500-2000ug/m3 RH: 5 to 20%RH TEMP: 1 to 5 C or 2-10/F PM_MASS: 10 to 40ug/m3, PM_NUMER: 10 to 120#/cm3 CO2: 25 to 500PPM CH2O: 10 to 40 ug/m3 or PPB	NA	{false, false, false, false} (0000) or (1100) if no relay	NORMAL (0) or FAULT (1) if no relay	NA	FALSE (0)	VOC Index - no units (95) TVOC - ppb (97), or ug/m3 (219) RH - %RH (29) Temperature - C (62) or F (64) parts-per-million (96) ug/m3 or #/cm3 (219) ug/m3 ((219) or ppb (97)			
	AV7	Relay On Time	Delay time before relay activated/deactivated, resolution 1second, range 255 seconds	15	0 to 255 Seconds	NA	{false, false, false, false} (0000) or (1100) if no relay	NORMAL (0) or FAULT (1) if no relay	NA	FALSE (0)	seconds (73)			

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Binary Value	BV 1	Temperature Units	0 = °C, 1 = °F	0	Celsius (0) or Fahrenheit (1)	NA	{false, false, false, false} (0000)	NORMAL (0)	NA	FALSE (0)	NA			
	BV 2	CH2O Units	0 = ug/m3, 1 = ppb	0	Set CH2O Units	NA	{false, false, false, false} (0000) or (1100) if no relay	NORMAL (0)	NA	FALSE (0)	NA			
	BV 3	Relay Test	0 = Inactive, 1 = Test	0	Normal (0) or Test (1)	NA	{false, false, false, false} (0000) or (1100) if no sensor	NORMAL (0) or FAULT (1) if no relay	NA	FALSE (0)	NA			
	BV 4	LCD Backlight	0= Enabled 1 = Disabled	0	Enable (0) or Disable (1)	NA	{false, false, false, false} (0000)	NORMAL (0)	NA	FALSE (0)	NA			
	BV 5	CO2 ASC	0= Enabled 1 = Disabled	0	Enable (0) or Disable (1)	NA	{false, false, false, false} (0000) or (1100) if no sensor	NORMAL (0) or FAULT (1) if no sensor	NA	FALSE (0)	NA			
	BV6	CO2 Availability	0= Enabled 1 = Disabled	0	Enable (0) or Disable (1)	NA	{false, false, false, false} (0000)	NORMAL (0)	NA	FALSE (0)	NA			
	BV 7	VOC Availability	0= Enabled 1 = Disabled	0	Enable (0) or Disable (1)	NA	{false, false, false, false} (0000)	NORMAL (0)	NA	FALSE (0)	NA			
	BV8	PM Availability	0= Enabled 1 = Disabled	0	Enable (0) or Disable (1)	NA	{false, false, false, false} (0000)	NORMAL (0)	NA	FALSE (0)	NA			
	BV 9	CH2O Availability	0= Enabled 1 = Disabled	0	Enable (0) or Disable (1)	NA	{false, false, false, false} (0000) or (1100) if no relay	NORMAL (0)	NA	FALSE (0)	NA			
	BV 10	LED Availability	0= Enabled 1 = Disabled	0	Enable (0) or Disable (1)	NA	{false, false, false, false} (0000)	NORMAL (0)	NA	FALSE (0)	NA			
	BV 11	Status Bars Availability	0= Enabled 1 = Disabled	0	Enable (0) or Disable (1)	NA	{false, false, false, false} (0000)	NORMAL (0)	NA	FALSE (0)	NA			
	BV 12	Touch Screen Availability	0= Enabled 1 = Disabled	0	Enable (0) or Disable (1)	NA	{false, false, false, false} (0000)	NORMAL (0)	NA	FALSE (0)	NA			
Binary Input	BI 1	Relay Status	0 = Normal, 1 = Alarm	Current Reading	Normal (0) or Alarm (1)	NA	{false, false, false, false} (0000) or (1100) if no relay	NORMAL (0) or FAULT (1) if no relay	NA	FALSE (0)	NA			

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Multi-State Value	MSV 1	Relay Assignment	1 = VOC 2 = RH 3 = Temperature 4= CO2 5= PM_MASS, 6= PM_NUMBER 7= CH2O 0 = No Relay	3	Relay Assignment	NA	{false, false, false, false} (0000)	NORMAL (0)	NA	FALSE (0)	NA		8	
	MSV2	Set VOC Units	1 = VOICI 2 = PPB 3 = ug/m3	1	Set VOC Units	NA	{false, false, false, false} (0000) or (1100) if no sensor	NORMAL (0) or FAULT (1) if no sensor	NA	FALSE (0)	NA		3	

The BACnet Device object

Property	Default Value	Property Data Type	Access	Notes
Object Identifier	381003	BACnetObjectIdentifier(numeric)	Read / Write	Initial default number is 381003, where 381 is the vendor ID and 003 is the default network MAC address. When the MAC address is initially changed the value is updated and saved. For example, if the MAC address is set to 50 via the menu for startup, then the device instance will be set to 381050. This property is also writable via BACnet. If the Device:Object_Identifier is written to via BACnet then the MAC address is no longer appended to the vendor ID to create this value.
Object Name	MSN-001	CharacterString (32)	Read / Write	Initial string is "MSN-003" where 003 is the default network address. Can be written with a new string of maximum length of 32 characters and the value is saved. The "003" is the MAC address and is automatically changed if the MAC address is changed. Once written to via BACnet, the MAC address no longer gets appended to the value.
Object Type	DEVICE (8)	BACnetObjectType	Read	
System Status	OPERATIONAL (0)	BACnetDeviceStatus	Read	
Vendor Name	Greystone Energy Systems	CharacterString	Read	
Vendor Identifier	381	Unsigned16	Read	
Model Name	MSN	CharacterString	Read	
Firmware Revision	1	CharacterString	Read	
Application Software Version	V1.0	CharacterString	Read	
Location	150 English Drive, Moncton, NB	CharacterString (32)	Read / Write	
Description	Multi Sensor	CharacterString (32)	Read / Write	
Protocol Version	1	Unsigned	Read	
Protocol Revision	14	Unsigned	Read	
Protocol Services Supported	See Notes	BACnetServicesSupported	Read	readProperty, readPropertyMultiple, writeProperty, deviceCommunicationControl, who-Has, who-Is, subscribeCOV, subscribeCOVProperty, Binary bit string = {00000100 00001011 01000000 00000000 01100010 0}
Protocol Object Types Supported	See Notes	BACnetObjectTypesSupported	Read	Analog_Input, Analog_Value, Binary_Value, Binary_Input, Multistate_Value, Device Binary bit string = {10110100 10000000 00010000 00000000 00000000 00000000 00000000}
Object List	See Notes	BACnetArray	Read	((Device, Instance 3), (AI1..AI4), (AV1..AV7), (BV1..BV12), (BI1), (MSV1...2))
Maximum APDU Length Accepted	50, B'0000'	Unsigned	Read	
Segmentation Supported	NO_SEGMENTATION (3)	BACnetSegmentation	Read	
APDU Timeout	6,000	Unsigned	Read / Write	Value is 6,000. Can be modified from 1 to 10,000.
Number of APDU Retries	3	Unsigned	Read / Write	Value is 3. Can be modified from 1 to 10.
Max Master	127	Unsigned	Read / Write	Value is 127. Can be modified from 1 to 127.
Max Info Frames	1	Unsigned	Read	
Device Address Binding	Empty	BACnetAddressBinding	Read	
Database Revision	0	Unsigned	Read	Value is 0 to 255.
Property List		BACnetArray	Read	

BACnet Protocol Implementation Conformance Statement (PICS)

Date : March 15, 2023
Vendor Name : Greystone Energy Systems
Product Name : Multi Sensor
Product Model Number : MSN
Application Software Version : 1.0
Firmware Revision : 1.0
BACnet Protocol Revision : 14

Product Description : The Greystone Multi Sensor is a sensor with native BACnet MS/TP protocol for network communication. It measures Air Quality levels and reports values back to a building automation system (BAS).

BACnet Standardized Device Profile (Annex L) : BACnet Application Specific Controller (B-ASC)

BACnet Interoperability Building Blocks Supported (Annex K) : DS-RP-B, DS-RPM-B, DS-WP-B, DS-COV-B, DS-COVP-B, DM-DDB-B, DM-DOB-B, DM-DCC-B

Segmentation Capability: Not supported

Standard Object Types Supported

Object	Dynamically	Dynamically	Optional	Writable Properties
Type	Creatable	Deletable	Properties Supported	
Device	No	No	Location, Description,	Object_Identifier, Object_Name, Location,
			Max_Master,	Description, APDU_Timeout, Max_Master,
			Max_Info_Frames	Number_Of_APDU_Retries
Analog Input	No	No	Description, Reliability, Device Type,	Units
			COV_Increment	
Analog Value	No	No	Description	Present_Value
Binary Value	No	No	Description	Present_Value
Binary Input	No	No	Description, Reliability	
Multi-State Value	No	No	Description	Present_Value

Data Link Layer Options: MS/TP master (Clause 9), Baud rates: 9600, 19200, 38400, 57600, 76800, 115200

Device Address Binding : Not supported

Networking Options : None

Character Set Supported : ISO 10646 (UTF-8)