



GREYSTONE
ENERGY SYSTEMS INC

GH Series

Horticulture Sensor

SETUP GUIDE BACnet® COMMUNICATION



BACnet Protocol

The device has BACnet objects to identify the device, read the sensor value, calibrate the sensors, configure the alarms, etc.

Object Type	Object Identifier	Object Name	Description	Default
Device	381003	GH 003		
Analog Input	AI 1	Temperature	0 to 50.0 °C or 32.0 to 122.0 °F	
	AI 2	Relative Humidity	0 to 100.0 %RH	
	AI 3	CO2	0 to 5000 ppm	
Analog Value	AV 1	Temperature Offset	-5.0 to 5.0 Δ°C or -10 to 10 Δ°F (resolution = 1°)	0 Δ°C / 0 Δ°F
	AV 2	RH Offset	-10 to 10 %RH (resolution = 1 %RH)	0 %RH
	AV 3	CO2 Offset	-300 to 300 ppm (resolution = 50 ppm)	0 ppm
	AV 4	Alarm 1 Setpoint	CO2 High = 600 to 4000 ppm (resolution=100 ppm)	1500 ppm
			CO2 Low = 600 to 4000 ppm (resolution=100 ppm)	800 ppm
			Temp High = 10 to 40 °C / 50 to 104 °F (res=1°)	30°C / 86°F
			Temp Low = 10 to 40 °C / 50 to 104 °F (res=1°)	15°C / 59°F
			RH High = 20 to 90 %RH (resolution = 5 %RH)	70 %RH
	AV 5	Alarm 1 Hysteresis	RH Low = 20 to 90 %RH (resolution = 5 %RH)	40 %RH
			CO2 High or Low = 30 to 250 ppm (res=10 ppm)	100 ppm
			Temp High or Low = 1 to 5°C / 2 to 10°F (res=1°)	2°C / 4°F
	AV 6	Alarm 1 Delay	RH High or Low = 5 to 20 %RH (res=1 %RH)	10 %RH
	AV 7	Alarm 2 Setpoint	0 to 255 seconds (resolution = 1 second)	15 seconds
			CO2 High = 600 to 4000 ppm (resolution=100 ppm)	1800 ppm
			CO2 Low = 600 to 4000 ppm (resolution=100 ppm)	800 ppm
			Temp High = 10 to 40 °C / 50 to 104 °F (res=1°)	30°C / 86°F
			Temp Low = 10 to 40 °C / 50 to 104 °F (res=1°)	15°C / 59°F
			RH High = 20 to 90 %RH (resolution = 5 %RH)	70 %RH
	AV 8	Alarm 2 Hysteresis	RH Low = 20 to 90 %RH (resolution = 5 %RH)	40 %RH
CO2 High or Low = 30 to 250 ppm (res=10 ppm)			100 ppm	
Temp High or Low = 1 to 5°C / 2 to 10°F (res=1°)			2°C / 4°F	
AV 9	Alarm 2 Delay	RH High or Low = 5 to 20 %RH (res=1 %RH)	10 %RH	
Binary Value	BV 1	Temperature Units	0 = °C, 1 = °F	°C
	BV 2	Relay 1 Test	0 = Normal, 1 = Test	0
	BV 3	Relay 2 Test	0 = Normal, 1 = Test	0
Binary Input	BI 1	Alarm 1 Status	0 = Normal, 1 = Alarm	0
	BI 2	Alarm 2 Status	0 = Normal, 1 = Alarm	0
Multi-state Value	MSV 1	LCD Backlight	1 = Auto, 2 = Off, 3 = On	1
	MSV 2	LCD Display	1 = All, 2 = RH, 3 = Temp, 4 = CO2, 5 = RH/Temp 6 =RH/CO2, 7 = Temp/CO2, 8 = None	1
	MSV 3	Alarm 1 Assignment	1=CO2 High, 2=CO2 Low, 3=Temp High 4=Temp Low, 5=RH High, 6=RH Low	CO2 High
	MSV 4	Alarm 2 Assignment	1=CO2 High, 2=CO2 Low, 3=Temp High 4=Temp Low, 5=RH High, 6=RH Low	CO2 High

There are six standard supported BACnet objects as shown below.

BACnet Device object

Property	Default Value	Property Data Type	Access
Object Identifier	381003	BACnetObjectIdentifier(numeric)	Read / Write
Object Name	GH 003	CharacterString (32)	Read / Write
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	GH	CharacterString	Read
Firmware Revision	1.4	CharacterString	Read
Application Software Version	V1.0	CharacterString	Read
Location	150 English Drive, Moncton, NB	CharacterString (32)	Read / Write
Description	Greystone Greenhouse Sensor	CharacterString (32)	Read / Write
Protocol Version	1	Unsigned	Read
Protocol Revision	14	Unsigned	Read
Protocol Services Supported	See description below	BACnetServicesSupported	Read
Protocol Object Types Supported	See description below	BACnetObjectTypesSupported	Read
Object List	See description below	BACnetArray	Read
Maximum APDU Length Accepted	50, B'0000'	Unsigned	Read
Segmentation Supported	NO_SEGMENTATION (3)	BACnetSegmentation	Read
APDU Timeout	6,000	Unsigned	Read / Write
Number of APDU Retries	3	Unsigned	Read / Write
Max Master	127	Unsigned	Read / Write
Max Info Frames	1	Unsigned	Read
Device Address Binding	empty	BACnetAddressBinding	Read
Database Revision	0	Unsigned	Read
Active_COV_Subscriptions	empty	ListOfBACnetCOVSubscriptions	Read
Property List		BACnetArray	Read

Object Identifier	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	Initial string is “GH 003” where GH is the device model name and 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.
Protocol Services Supported	readProperty, readPropertyMultiple, writeProperty, deviceCommunicationControl, who-Has, who-Is, subscribeCOV, subscribeCOVProperty Binary bit string = {00000100 00001011 01000000 00000000 01100010 0}
Protocol Object Types Supported	Analog_Input, Analog_Value, Binary_Value, Binary_Input, Device, Multi-State_Value Binary bit string = {10110100 10000000 00010000 00000000 00000000 00000000 00000000}
Object List	((Device, Instance 1), (AI1..AI3), (AV1..AV9), (BV1..BV3), (BI1..BI2), (MSV1..MSV4))
APDU Timeout	Value is 6,000. Can be modified from 1 to 10,000.
Number Of APDU Retries	Value is 3. Can be modified from 1 to 10.
Max Master	Value is 127. Can be modified from 1 to 127.
Database Revision	Value is 0 to 255.

Analog Input Object: AI1 Temperature

Property	Default Value	Property Data Type	Access
Object Identifier	AI1	BACnetObjectIdentifier	Read
Object Name	Temperature	CharacterString (32)	Read
Object Type	ANALOG_INPUT (0)	BACnetObjectType	Read
Present Value	current reading	Real	Read
Description	Temperature	CharacterString (32)	Read
Device Type	Temperature Sensor	CharacterString (32)	Read
Status Flags	{false, false, false, false} (0000) or (1100) if no sensor	BACnetStatusFlags	Read
Event State	NORMAL (0) or FAULT (1) if no sensor	BACnetEventState	Read
Reliability	NO_FAULT_DETECTED (0) or NO_SENSOR (1)	BACnetReliability	Read
Out of Service	FALSE (0)	Boolean	Read
Units	degrees-Celsius (62) or degrees-Fahrenheit (64)	BACnetEngineeringUnits	Read
COV Increment	2	Real	Read / Write
Property List		BACnetArray	Read

Rules Enforced: 0.0 °C <= Present Value <= 50.0 °C, Resolution = 0.1 °C
 32.0 °F <= Present Value <= 122.0 °F, Resolution = 0.1 °F
 Units default to °C but can be changed to °F using BV1

Analog Input Object: AI2 Relative Humidity

Property	Default Value	Property Data Type	Access
Object Identifier	AI2	BACnetObjectIdentifier	Read
Object Name	Relative Humidity	CharacterString (32)	Read
Object Type	ANALOG_INPUT (0)	BACnetObjectType	Read
Present Value	current reading	Real	Read
Description	Relative Humidity	CharacterString (32)	Read
Device Type	RH Sensor	CharacterString (32)	Read
Status Flags	{false, false, false, false} (0000) or (1100) if no sensor	BACnetStatusFlags	Read
Event State	NORMAL (0) or FAULT (1) if no sensor	BACnetEventState	Read
Reliability	NO_FAULT_DETECTED (0) or NO_SENSOR (1)	BACnetReliability	Read
Out of Service	FALSE (0)	Boolean	Read
Units	percent-relative-humidity (29)	BACnetEngineeringUnits	Read
COV Increment	10	Real	Read / Write
Property List		BACnetArray	Read

Rules Enforced: 0.0 %RH <= Present Value <= 100.0 %RH, Resolution = 0.1 %RH

Analog Input Object: AI3 CO2

Property	Default Value	Property Data Type	Access
Object Identifier	AI3	BACnetObjectIdentifier	Read
Object Name	CO2	CharacterString (32)	Read
Object Type	ANALOG_INPUT (0)	BACnetObjectType	Read
Present Value	current reading	Real	Read
Description	Carbon Dioxide	CharacterString (32)	Read
Device Type	CO2 Sensor	CharacterString (32)	Read
Status Flags	{false, false, false, false} (0000) or (1100) if no sensor	BACnetStatusFlags	Read
Event State	NORMAL (0) or FAULT (1) if no sensor	BACnetEventState	Read
Reliability	NO_FAULT_DETECTED (0) or NO_SENSOR (1)	BACnetReliability	Read
Out of Service	FALSE (0)	Boolean	Read
Units	parts-per-million (96)	BACnetEngineeringUnits	Read
COV Increment	100	Real	Read / Write
Property List		BACnetArray	Read

Rules Enforced: 0 ppm <= Present Value <= 5000 ppm, Resolution = 1 ppm

Analog Value Object: AV1 Temperature Offset

Property	Default Value	Property Data Type	Access
Object Identifier	AV1	BACnetObjectIdentifier	Read
Object Name	Temperature Offset	CharacterString (32)	Read
Object Type	ANALOG_VALUE (2)	BACnetObjectType	Read
Present Value	0	Real	Read/Write
Description	Temperature Offset	CharacterString (32)	Read
Status Flags	{false, false, false, false} (0000)	BACnetStatusFlags	Read
Event State	NORMAL (0)	BACnetEventState	Read
Out of Service	FALSE (0)	Boolean	Read
Units	delta-degrees-Fahrenheit (120) or Δ°C (121)	BACnetEngineeringUnits	Read
Property List		BACnetArray	Read

Rules Enforced: -5 Δ°C ≤ Present Value ≤ +5 Δ°C, resolution = 1 Δ°C
 -10 Δ°F ≤ Present Value ≤ +10 Δ°F, resolution = 1 Δ°F

Units depend on the device units, either °C or °F
 Changing units always resets Present Value to 0

Analog Value Object: AV2 RH Offset

Property	Default Value	Property Data Type	Access
Object Identifier	AV2	BACnetObjectIdentifier	Read
Object Name	RH Offset	CharacterString (32)	Read
Object Type	ANALOG_VALUE (2)	BACnetObjectType	Read
Present Value	0	Real	Read/Write
Description	RH Offset	CharacterString (32)	Read
Status Flags	{false, false, false, false} (0000)	BACnetStatusFlags	Read
Event State	NORMAL (0)	BACnetEventState	Read
Out of Service	FALSE (0)	Boolean	Read
Units	percent-relative-humidity (29)	BACnetEngineeringUnits	Read
Property List		BACnetArray	Read

Rules Enforced: -10 %RH ≤ Present Value ≤ +10 %RH, resolution = 1 %RH

Analog Value Object: AV3 CO2 Offset

Property	Default Value	Property Data Type	Access
Object Identifier	AV3	BACnetObjectIdentifier	Read
Object Name	CO2 Offset	CharacterString (32)	Read
Object Type	ANALOG_VALUE (2)	BACnetObjectType	Read
Present Value	0	Real	Read/Write
Description	CO2 Offset	CharacterString (32)	Read
Status Flags	{false, false, false, false} (0000) or (1100) if no sensor	BACnetStatusFlags	Read
Event State	NORMAL (0) or FAULT (1) if no sensor	BACnetEventState	Read
Out of Service	FALSE (0)	Boolean	Read
Units	parts-per-million (96)	BACnetEngineeringUnits	Read
Property List		BACnetArray	Read

Rules Enforced: -300 ppm ≤ Present Value ≤ +300 ppm, resolution = 50 ppm

Analog Value Object: AV4 Alarm 1 Setpoint

Property	Default Value	Property Data Type	Access
Object Identifier	AV4	BACnetObjectIdentifier	Read
Object Name	Alarm 1 Setpoint	CharacterString (32)	Read
Object Type	ANALOG_VALUE (2)	BACnetObjectType	Read
Present Value	1500	Real	Read/Write
Description	600 to 4000 ppm	CharacterString (32)	Read
Status Flags	{false, false, false, false} (0000)	BACnetStatusFlags	Read
Event State	NORMAL (0)	BACnetEventState	Read
Out of Service	FALSE (0)	Boolean	Read
Units	parts-per-million (96)	BACnetEngineeringUnits	Read
Property List		BACnetArray	Read

Used to set the desired Alarm 1 setpoint.

Present Value default depends on the MSV3 assignment.

The CO2 setpoints are only available if the product model includes the CO2 sensor.

If there is no CO2 sensor the default alarm type is Temp High.

The Description property changes depending on the MSV3 assignment.

The Units property changes depending on the MSV3 assignment.

Rules Enforced:	CO2 High	600 ppm <= Present Value <= 4000 ppm, resolution = 100 ppm (default = 1500 ppm)
	CO2 Low	600 ppm <= Present Value <= 4000 ppm, resolution = 100 ppm (default = 800 ppm)
	Temp High	10 °C <= Present Value <= 40 °C, resolution = 1 °C (default = 30 °C) 50 °F <= Present Value <= 104 °F, resolution = 1 °F (default = 86 °F)
	Temp Low	10 °C <= Present Value <= 40 °C, resolution = 1 °C (default = 15 °C) 50 °F <= Present Value <= 104 °F, resolution = 1 °F (default = 59 °F)
	RH High	20 %RH <= Present Value <= 90 %RH, resolution = 5 %RH (default = 70 %RH)
	RH Low	20 %RH <= Present Value <= 90 %RH, resolution = 5 %RH (default = 40 %RH)

Analog Value Object: AV5 Alarm 1 Hysteresis

Property	Default Value	Property Data Type	Access
Object Identifier	AV5	BACnetObjectIdentifier	Read
Object Name	Alarm 1 Hysteresis	CharacterString (32)	Read
Object Type	ANALOG_VALUE (2)	BACnetObjectType	Read
Present Value	100	Real	Read/Write
Description	30 to 250 ppm	CharacterString (32)	Read
Status Flags	{false, false, false, false} (0000)	BACnetStatusFlags	Read
Event State	NORMAL (0)	BACnetEventState	Read
Out of Service	FALSE (0)	Boolean	Read
Units	parts-per-million (96)	BACnetEngineeringUnits	Read
Property List		BACnetArray	Read

Used to set the desired Alarm 1 hysteresis.

Present Value default depends on the MSV3 assignment.

The CO2 hysteresis is only available if the product model includes the CO2 sensor.

If there is no CO2 sensor the default alarm type is Temp High.

The Description property changes depending on the MSV3 assignment.

The Units property changes depending on the MSV3 assignment.

Rules Enforced:	CO2 High	30 ppm <= Present Value <= 250 ppm, resolution = 10 ppm (default = 100 ppm)
	CO2 Low	30 ppm <= Present Value <= 250 ppm, resolution = 10 ppm (default = 100 ppm)
	Temp High	1 °C <= Present Value <= 5 °C, resolution = 1 °C (default = 2 °C) 2 °F <= Present Value <= 10 °F, resolution = 1 °F (default = 4 °F)
	Temp Low	1 °C <= Present Value <= 5 °C, resolution = 1 °C (default = 2 °C) 2 °F <= Present Value <= 10 °F, resolution = 1 °F (default = 4 °F)

RH High 5 %RH <= Present Value <= 20 %RH, resolution = 1 %RH (default = 10 %RH)
 RH Low 5 %RH <= Present Value <= 20 %RH, resolution = 1 %RH (default = 10 %RH)

Analog Value Object: AV6 Alarm 1 Delay

Property	Default Value	Property Data Type	Access
Object Identifier	AV6	BACnetObjectIdentifier	Read
Object Name	Alarm 1 Delay	CharacterString (32)	Read
Object Type	ANALOG_VALUE (2)	BACnetObjectType	Read
Present Value	15	Real	Read/Write
Description	0 to 255 seconds	CharacterString (32)	Read
Status Flags	{false, false, false, false} (0000)	BACnetStatusFlags	Read
Event State	NORMAL (0)	BACnetEventState	Read
Out of Service	FALSE (0)	Boolean	Read
Units	seconds (73)	BACnetEngineeringUnits	Read
Property List		BACnetArray	Read

Used to set the desired alarm 1 delay.

Rules Enforced: 0 seconds <= Present Value <= 255 seconds, Resolution = 1 seconds (default = 15 seconds)

Analog Value Object: AV7 Alarm 2 Setpoint

Property	Default Value	Property Data Type	Access
Object Identifier	AV7	BACnetObjectIdentifier	Read
Object Name	Alarm 2 Setpoint	CharacterString (32)	Read
Object Type	ANALOG_VALUE (2)	BACnetObjectType	Read
Present Value	1800	Real	Read/Write
Description	600 to 4000 ppm	CharacterString (32)	Read
Status Flags	{false, false, false, false} (0000)	BACnetStatusFlags	Read
Event State	NORMAL (0)	BACnetEventState	Read
Out of Service	FALSE (0)	Boolean	Read
Units	parts-per-million (96)	BACnetEngineeringUnits	Read
Property List		BACnetArray	Read

Used to set the desired Alarm 2 setpoint.

Present Value default depends on the MSV4 assignment.

The CO2 setpoints are only available if the product model includes the CO2 sensor.

If there is no CO2 sensor the default alarm type is Temp High.

The Description property changes depending on the MSV4 assignment.

The Units property changes depending on the MSV4 assignment.

Rules Enforced: CO2 High 600 ppm <= Present Value <= 4000 ppm, resolution = 100 ppm (default = 1800 ppm)

CO2 Low 600 ppm <= Present Value <= 4000 ppm, resolution = 100 ppm (default = 800 ppm)

Temp High 10 °C <= Present Value <= 40 °C, resolution = 1 °C (default = 30 °C)

50 °F <= Present Value <= 104 °F, resolution = 1 °F (default = 86 °F)

Temp Low 10 °C <= Present Value <= 40 °C, resolution = 1 °C (default = 15 °C)

50 °F <= Present Value <= 104 °F, resolution = 1 °F (default = 59 °F)

RH High 20 %RH <= Present Value <= 90 %RH, resolution = 5 %RH (default = 70 %RH)

RH Low 20 %RH <= Present Value <= 90 %RH, resolution = 5 %RH (default = 40 %RH)

Analog Value Object: AV8 Alarm 2 Hysteresis

Property	Default Value	Property Data Type	Access
Object Identifier	AV8	BACnetObjectIdentifier	Read
Object Name	Alarm 2 Hysteresis	CharacterString (32)	Read
Object Type	ANALOG_VALUE (2)	BACnetObjectType	Read
Present Value	100	Real	Read/Write
Description	30 to 250 ppm	CharacterString (32)	Read
Status Flags	{false, false, false, false} (0000)	BACnetStatusFlags	Read
Event State	NORMAL (0)	BACnetEventState	Read
Out of Service	FALSE (0)	Boolean	Read
Units	parts-per-million (96)	BACnetEngineeringUnits	Read
Property List		BACnetArray	Read

Used to set the desired Alarm 2 hysteresis.

Present Value default depends on the MSV4 assignment.

The CO2 hysteresis is only available if the product model includes the CO2 sensor.

If there is no CO2 sensor the default alarm type is Temp High.

The Description property changes depending on the MSV4 assignment.

The Units property changes depending on the MSV4 assignment.

Rules Enforced: CO2 High	30 ppm <= Present Value <= 250 ppm, resolution = 10 ppm (default = 100 ppm)
CO2 Low	30 ppm <= Present Value <= 250 ppm, resolution = 10 ppm (default = 100 ppm)
Temp High	1 °C <= Present Value <= 5 °C, resolution = 1 °C (default = 2 °C) 2 °F <= Present Value <= 10 °F, resolution = 1 °F (default = 4 °F)
Temp Low	1 °C <= Present Value <= 5 °C, resolution = 1 °C (default = 2 °C) 2 °F <= Present Value <= 10 °F, resolution = 1 °F (default = 4 °F)
RH High	5 %RH <= Present Value <= 20 %RH, resolution = 1 %RH (default = 10 %RH)
RH Low	5 %RH <= Present Value <= 20 %RH, resolution = 1 %RH (default = 10 %RH)

Analog Value Object: AV9 Alarm 2 Delay

Property	Default Value	Property Data Type	Access
Object Identifier	AV9	BACnetObjectIdentifier	Read
Object Name	Alarm 2 Delay	CharacterString (32)	Read
Object Type	ANALOG_VALUE (2)	BACnetObjectType	Read
Present Value	15	Real	Read/Write
Description	0 to 255 seconds	CharacterString (32)	Read
Status Flags	{false, false, false, false} (0000)	BACnetStatusFlags	Read
Event State	NORMAL (0)	BACnetEventState	Read
Out of Service	FALSE (0)	Boolean	Read
Units	seconds (73)	BACnetEngineeringUnits	Read
Property List		BACnetArray	Read

Used to set the desired alarm 2 delay.

Rules Enforced: 0 seconds <= Present Value <= 255 seconds, Resolution = 1 seconds (default = 15 seconds)

Binary Value Object: BV1 Temperature Units

Property	Default Value	Property Data Type	Access
Object Identifier	BV1	BACnetObjectIdentifier	Read
Object Name	Temperature Units	CharacterString (32)	Read
Object Type	BINARY_VALUE (5)	BACnetObjectType	Read
Present Value	INACTIVE (0)	BACnetBinaryPV	Read / Write
Description	Celsius (0) or Fahrenheit (1)	CharacterString (32)	Read
Status Flags	{false, false, false, false} (0000)	BACnetStatusFlags	Read
Event State	NORMAL (0)	BACnetEventState	Read
Reliability	NO_FAULT_DETECTED (0)	BACnetReliability	Read
Out of Service	FALSE (0)	Boolean	Read
Property List		BACnetArray	Read

Binary Value Object: BV2 Relay 1 Test

Property	Default Value	Property Data Type	Access
Object Identifier	BV2	BACnetObjectIdentifier	Read
Object Name	Relay 1 Test	CharacterString (32)	Read
Object Type	BINARY_VALUE (5)	BACnetObjectType	Read
Present Value	INACTIVE (0)	BACnetBinaryPV	Read / Write
Description	Normal (0) or Test (1)	CharacterString (32)	Read
Status Flags	{false, false, false, false} (0000) or (1100) if no relay	BACnetStatusFlags	Read
Event State	NORMAL (0) or FAULT (1) if no relay	BACnetEventState	Read
Reliability	NO_FAULT_DETECTED (0) or NO-SENSOR (1)	BACnetReliability	Read
Out of Service	FALSE (0)	Boolean	Read
Property List		BACnetArray	Read

This object manually controls Relay 1 if it is installed. The default is Normal (0). If the value is set to Test (1), then Relay 1 is forced to activate. This function is useful for testing the relay but must be manually set back to 0 after the test.

Binary Value Object: BV3 Relay 2 Test

Property	Default Value	Property Data Type	Access
Object Identifier	BV3	BACnetObjectIdentifier	Read
Object Name	Relay 2 Test	CharacterString (32)	Read
Object Type	BINARY_VALUE (5)	BACnetObjectType	Read
Present Value	INACTIVE (0)	BACnetBinaryPV	Read / Write
Description	Normal (0) or Test (1)	CharacterString (32)	Read
Status Flags	{false, false, false, false} (0000) or (1100) if no relay	BACnetStatusFlags	Read
Event State	NORMAL (0) or FAULT (1) if no relay	BACnetEventState	Read
Reliability	NO_FAULT_DETECTED (0) or NO-SENSOR (1)	BACnetReliability	Read
Out of Service	FALSE (0)	Boolean	Read
Property List		BACnetArray	Read

This object manually controls Relay 2 if it is installed. The default is Normal (0). If the value is set to Test (1), then Relay 2 is forced to activate. This function is useful for testing the relay but must be manually set back to 0 after the test.

Binary Input Object: BI1 Alarm 1 Status

Property	Default Value	Property Data Type	Access
Object Identifier	BI1	BACnetObjectIdentifier	Read
Object Name	Alarm 1 Status	CharacterString (32)	Read
Object Type	BINARY_INPUT (3)	BACnetObjectType	Read
Present Value	INACTIVE (0)	BACnetBinaryPV	Read
Description	Normal (0) or Alarm (1)	CharacterString (32)	Read
Device Type	Indicates Alarm1 Status	CharacterString (32)	Read
Status Flags	{false, false, false, false} (0000)	BACnetStatusFlags	Read
Event State	NORMAL (0)	BACnetEventState	Read
Reliability	NO_FAULT_DETECTED (0)	BACnetReliability	Read
Out of Service	FALSE (0)	Boolean	Read
Polarity	NORMAL (0)	BACnetPolarity	Read
Property List		BACnetArray	Read

This object holds the Alarm 1 Status. The default is Normal (0). Will change to Alarm (1) if an alarm 1 condition is set AND the Alarm 1 Delay time has expired. The Alarm 1 Status will automatically reset to 0 when the measurement value goes below the Alarm 1 Setpoint - Alarm 1 Hysteresis value.

Binary Input Object: BI1 Alarm 2 Status

Property	Default Value	Property Data Type	Access
Object Identifier	BI2	BACnetObjectIdentifier	Read
Object Name	Alarm 2 Status	CharacterString (32)	Read
Object Type	BINARY_INPUT (3)	BACnetObjectType	Read
Present Value	INACTIVE (0)	BACnetBinaryPV	Read
Description	Normal (0) or Alarm (1)	CharacterString (32)	Read
Device Type	Indicates Alarm1 Status	CharacterString (32)	Read
Status Flags	{false, false, false, false} (0000)	BACnetStatusFlags	Read
Event State	NORMAL (0)	BACnetEventState	Read
Reliability	NO_FAULT_DETECTED (0)	BACnetReliability	Read
Out of Service	FALSE (0)	Boolean	Read
Polarity	NORMAL (0)	BACnetPolarity	Read
Property List		BACnetArray	Read

This object holds the Alarm 2 Status. The default is Normal (0). Will change to Alarm (1) if an alarm 2 condition is set AND the Alarm 2 Delay time has expired. The Alarm 2 Status will automatically reset to 0 when the measurement value goes below the Alarm 2 Setpoint - Alarm 2 Hysteresis value.

Multi-state Value Object: MSV1 LCD Backlight

Property	Default Value	Property Data Type	Access
Object Identifier	MSV1	BACnetObjectIdentifier	Read
Object Name	LCD Backlight	CharacterString (32)	Read
Object Type	MULTISTATE_VALUE (19)	BACnetObjectType	Read
Present Value	See Description Below	Unsigned	Read / Write
Description	1 = Auto, 2 = Off, 3 = On	CharacterString (32)	Read
Status Flags	{false, false, false, false} (0000)	BACnetStatusFlags	Read
Event State	NORMAL (0)	BACnetEventState	Read
Out of Service	FALSE (0)	Boolean	Read
Number of States	3	Unsigned	Read
Property List		BACnetArray	Read

This object sets the LCD backlight operating mode. The default value is Auto (1).

MSV1 State	Description
1	Auto - the backlight only lights during startup, during Menu operation or on a key press
2	Off - the backlight is disabled and never lights except during start-up
3	On - the backlight is always on (highest power consumption)

Multi-state Value Object: MSV2 LCD Display

Property	Default Value	Property Data Type	Access
Object Identifier	MSV2	BACnetObjectIdentifier	Read
Object Name	LCD Display	CharacterString (32)	Read
Object Type	MULTISTATE_VALUE (19)	BACnetObjectType	Read
Present Value	See Description Below	Unsigned	Read / Write
Description	Set the display info	CharacterString (32)	Read
Status Flags	{false, false, false, false} (0000)	BACnetStatusFlags	Read
Event State	NORMAL (0)	BACnetEventState	Read
Out of Service	FALSE (0)	Boolean	Read
Number of States	8	Unsigned	Read
Property List		BACnetArray	Read

This object sets the LCD information for the normal operating mode. The default value is All (1).
Note, CO2 display is only available if the CO2 sensor is installed.

MSV2 State	Description
1	All - RH, temperature and CO2 measurements are displayed simultaneously
2	RH - Only RH measurement is displayed
3	Temp - Only temperature measurement is displayed
4	CO2 - Only CO2 measurement is displayed
5	RH/Temp - RH and temperature measurements are displayed
6	RH/CO2 - RH and CO2 measurements are displayed
7	Temp/CO2 - Temperature and CO2 measurements are displayed
8	None - No measurements are displayed

Multi-state Value Object: MSV3 Alarm 1 Assignment

Property	Default Value	Property Data Type	Access
Object Identifier	MSV3	BACnetObjectIdentifier	Read
Object Name	Alarm 1 Assignment	CharacterString (32)	Read
Object Type	MULTISTATE_VALUE (19)	BACnetObjectType	Read
Present Value	See Description Below	Unsigned	Read / Write
Description	Set the Alarm 1 operation	CharacterString (32)	Read
Status Flags	{false, false, false, false} (0000)	BACnetStatusFlags	Read
Event State	NORMAL (0)	BACnetEventState	Read
Out of Service	FALSE (0)	Boolean	Read
Number of States	6	Unsigned	Read
Property List		BACnetArray	Read

This object sets the Alarm 1 operating mode. The default value is CO2 High (1).

MSV3 State	Description
1	CO2 High - high CO2 alarm
2	CO2 Low - low CO2 alarm
3	Temp High - high temperature alarm
4	Temp Low - low temperature alarm
5	RH High - high RH alarm
6	RH Low - low RH alarm

Multi-state Value Object: MSV4 Alarm 2 Assignment

Property	Default Value	Property Data Type	Access
Object Identifier	MSV4	BACnetObjectIdentifier	Read
Object Name	Alarm 2 Assignment	CharacterString (32)	Read
Object Type	MULTISTATE_VALUE (19)	BACnetObjectType	Read
Present Value	See Description Below	Unsigned	Read / Write
Description	Set the Alarm 2 operation	CharacterString (32)	Read
Status Flags	{false, false, false, false} (0000)	BACnetStatusFlags	Read
Event State	NORMAL (0)	BACnetEventState	Read
Out of Service	FALSE (0)	Boolean	Read
Number of States	6	Unsigned	Read
Property List		BACnetArray	Read

This object sets the Alarm 2 operating mode. The default value is CO2 High (1).

MSV4 State	Description
1	CO2 High - high CO2 alarm
2	CO2 Low - low CO2 alarm
3	Temp High - high temperature alarm
4	Temp Low - low temperature alarm
5	RH High - high RH alarm
6	RH Low - low RH alarm

BACnet Protocol Implementation Conformance Statement (PICS)

Date : March 6, 2019
Vendor Name : Greystone Energy Systems
Product Name : Greenhouse Sensor
Product Model Number : GH Series
Application Software Version : 1.0
Firmware Revision : 1.4
BACnet Protocol Revision : 14

Product Description : The Greystone Greenhouse Sensor is a smart sensor with native BACnet MS/TP protocol for network communication. It measures temperature, relative humidity and carbon dioxide levels and reports values back to a building automation system (BAS). The device features an LCD to display measured values and for setup.

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