BAScontrol20C – 20-point BACnet/IP Client Sedona Unitary Controller

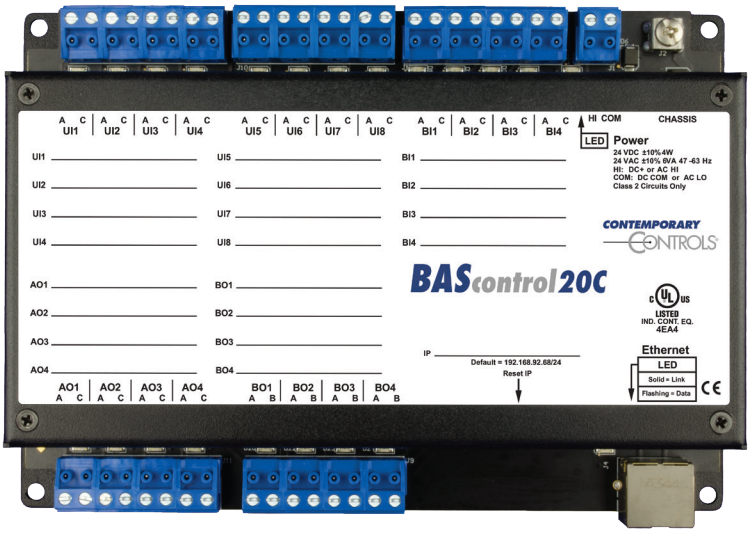
Most BACnet devices are BACnet servers which do not initiate requests to other devices other than an initial "I-Am" request when first joining the network. BACnet client devices do initiate requests and expect BACnet servers to respond to requests and data is exchanged. The BAScontrol20C is a BACnet/IP server and also provides BACnet/IP client capability which allows the user to read and/or write points served up by devices on the BACnet internetwork. The BAScontrol20C is a 20-point unitary controller which supports BACnet/IP and Sedona Framework using an Ethernet connection. The controller complies with the B-ASC device profile having a convenient mix of 8 universal inputs, 4 binary inputs, 4 analog outputs and 4 relay outputs. Unique to the unit are 48 web components which link Sedona wire sheet readable/writeable data to web pages, and 24 virtual points which link Sedona wire sheet readable/writeable data to a BACnet client. The device is fully web page-configurable, and freely programmable using Sedona's drag-and-drop programming methodology of assembling components onto a wire sheet to create applications. The unit can be programmed using Niagara Workbench AX or a third-party Sedona programming tool such as Sedona Application Editor (SAE). Rugged design, low profile, and wide temperature operation make it suitable for indoor or outdoor use. To download the free Sedona Application Editor, visit: www.ccontrols.com/sae. For more information about Sedona, SAE, kits, components and programming download the Sedona Reference Manual at: www.ccontrols.com/sedona

Versatile Control Device — unitary controller or remote Ethernet I/O

- BACnet/IP compliant with a B-ASC device profile
- Resident BACnet Client can read/write BACnet objects from other BACnet devices on the network
- Resident Sedona Virtual Machine (SVM)
- Programmable via Workbench AX or Sedona Editor
- Configurable with a common web browser
- Direct connection to Ethernet network
- NTP or manually-settable real-time clock
- COV subscriptions – 14 binary and 2 analog
- Outdoor temperature operation -40°C to +75°C

Flexible Input/Output — 20-points of physical I/O

- Eight configurable universal inputs:
  Thermistor, resistance, analog voltage, binary input, pulse inputs (4 max)
- Four contact closure inputs
- Four analog voltage outputs
- Four relay outputs



BASC-20CR has four relay outputs

BASautomation® **Sedona**

BAScontrol20C – Overview

The BAScontrol20C utilizes a powerful 32-bit ARM7 processor with 512 kB of flash memory plus a 16 Mbit serial flash file system for storing configuration data and an application program.

The BAScontrol20C is a BACnet/IP server and also provides some BACnet/IP client capability which allows the user to read and/or write points served up by devices on the BACnet internetwork. By operating at the BACnet/IP level, the BAScontrol20C can share the same Ethernet network with supervisory controllers and operator workstations. The unit can be configured for a fixed IP address or can operate as a DHCP client receiving its IP address from a DHCP server. A real-time clock with a super-cap backup allows for creating local schedules.

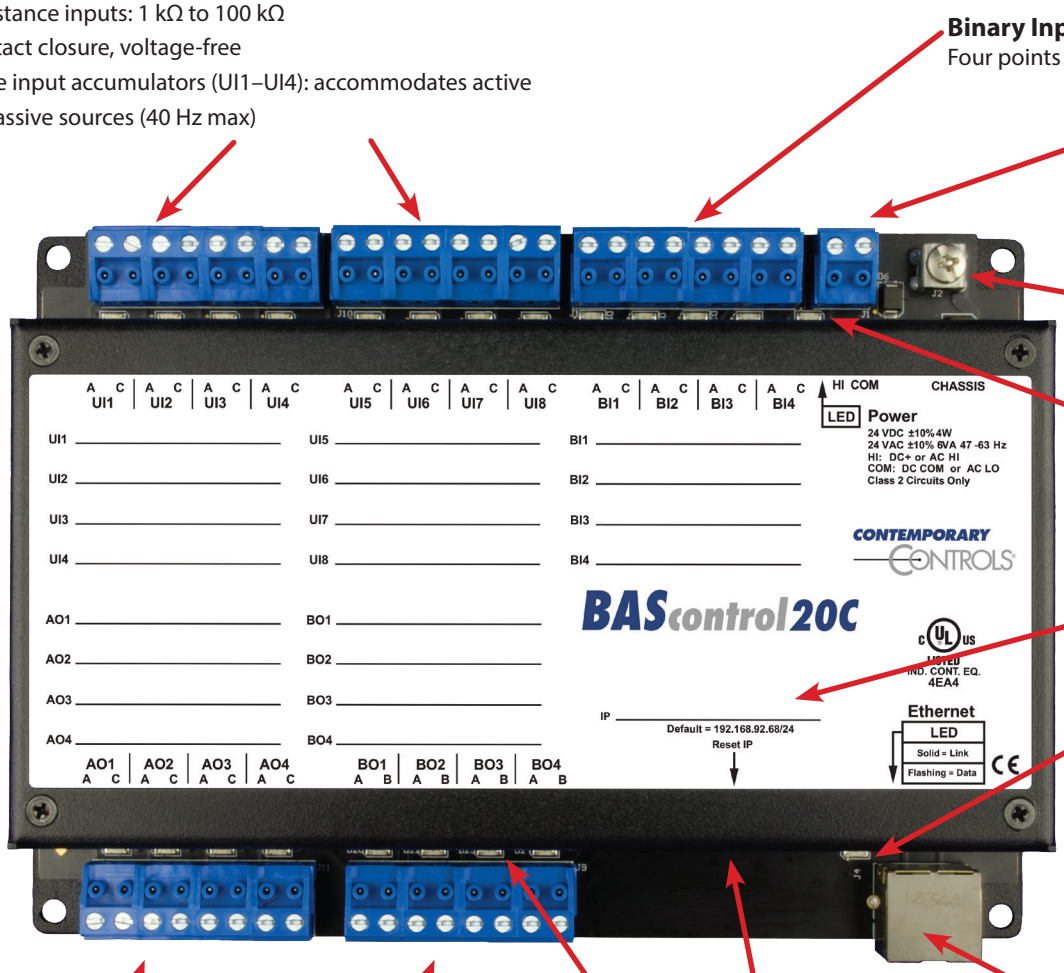
Via a 10/100 Mbps Ethernet port, the BAScontrol supports protocols such as BACnet/IP, Sedona SOX, HTTP and FTP. Configuration of universal inputs and virtual points can be accomplished using web pages. Type II and type III 10 kΩ thermistor curves and a 20 kΩ thermistor curve are resident in the unit. Current inputs can be measured using external resistors. Contact closures require a voltage-free source. Binary inputs and outputs as well as analog outputs require no configuration. The unit is powered from either a 24VAC/VDC source.

BACnet servers serve up their points to BACnet clients. Writable BACnet server device points can also be written to by BACnet clients. The BAScontrol20C is capable of directly reading from and writing to BACnet/IP devices on the network connected to one of its Ethernet ports by the use of NetV (Network Variable) Sedona components. NetV components allow the BAScontrol20C to read and/or write Analog Input (AI), Binary Input (BI), Analog Value (AV), Binary Value (BV), Analog Output (AO), and Binary Output (BO) BACnet object types in its wire sheet. In addition, with a BACnet router in place (such as BASRT-B or BASRTLX-B), the BAScontrol20C is capable of reading from and/or writing to BACnet MS/TP devices which are being routed to BACnet/IP. The points obtained over the BACnet network can be used in the BAScontrol20C's Sedona wire sheet application logic, become scaled, calculated, and/or converted to different data types, written to other BACnet devices, served up to BACnet supervisory controllers and operator workstations by using Virtual Components, as well as be monitored, displayed, or exposed for configuration on BAScontrol20C's web page by the use of Web Components.

Universal Inputs

Eight input points can be configured — all discoverable as BACnet objects.

- Analog inputs: 0–10 VDC, 12-bit resolution, 0–20 mA (with external resistor)
- Temperature inputs: Type II or Type III 10 kΩ thermistors; 20 kΩ thermistor
- Resistance inputs: 1 kΩ to 100 kΩ
- Contact closure, voltage-free
- Pulse input accumulators (UI1–UI4): accommodates active or passive sources (40 Hz max)



Binary Inputs
Four points of voltage-free contact closure

Power Input
24 VAC/VDC 6 VA half-wave rectified allows power sharing with other half-wave devices.

Earth
Optional Earth Connection

Power LED
Indicates power applied

IP Address
fixed or DHCP client

Ethernet LED
Lights on link and flashes with data

Analog Outputs
0–10 V, 10-bit resolution

Binary Outputs
Four form "A" relays for 30 VAC/VDC 2 A loads. Class 2 circuits only.

Point LEDs
for all 20 points

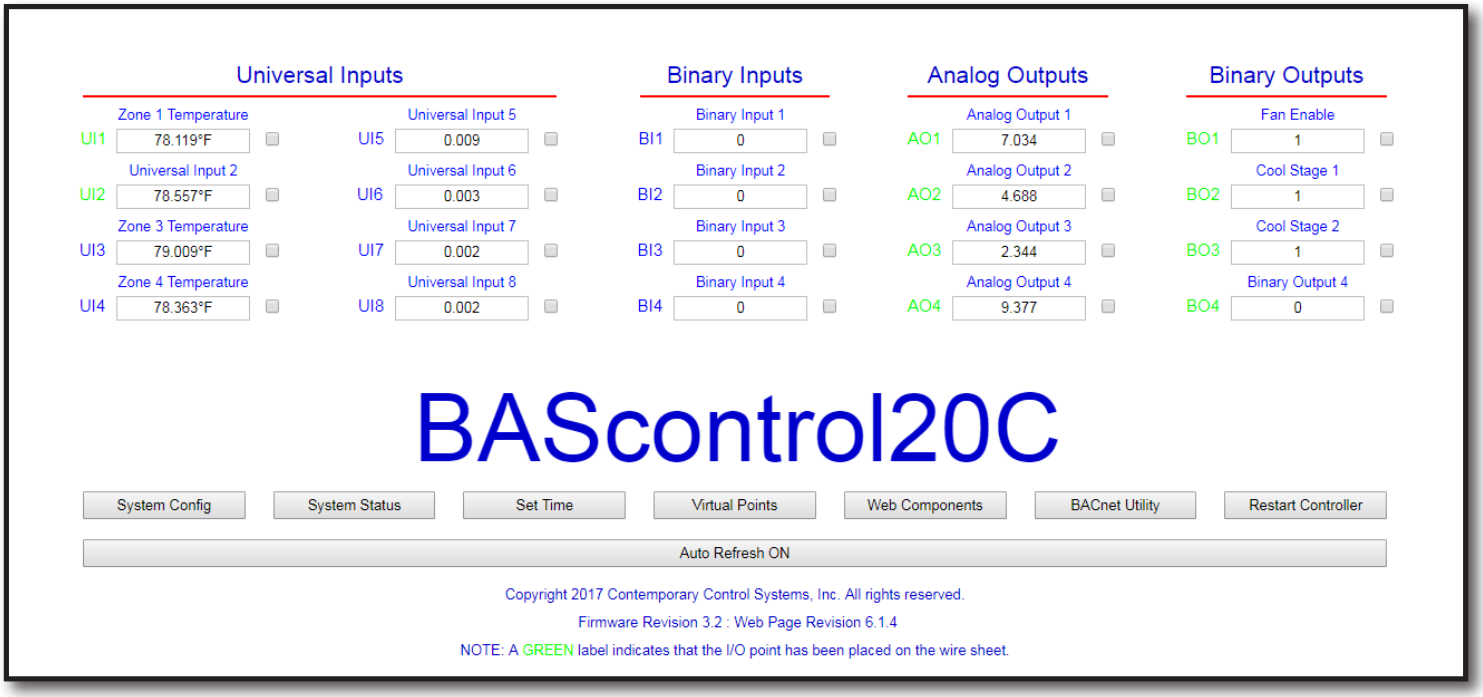
Reset
to factory IP defaults

Ethernet Port
10/100 Mbps Ethernet with auto-negotiation and Auto-MDIX. Protocols supported include HTTP, IP, UDP, TCP, BACnet/IP, NTP, DNS, DHCP, FTP, and Sedona SOX.

Web Page Configuration – Main Page and System

Access to the web pages is intended for the installer or skilled technicians. In order to access any of the web pages authentication is required. The default IP address is 192.68.92.68 and the default User Name and Password is admin/admin. Once on the main page, the System Configuration button can be clicked.

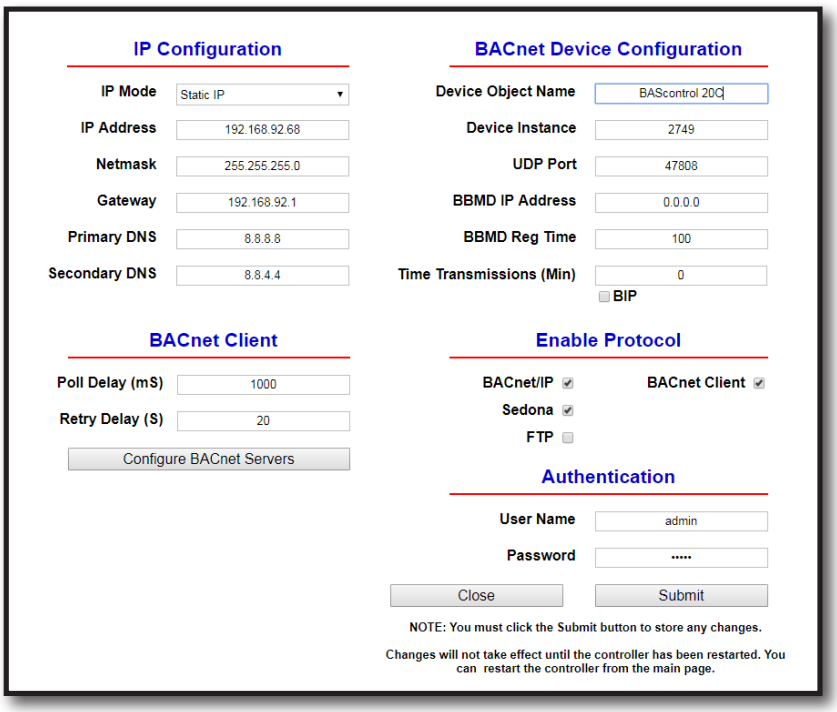
The main web page provides an overview of all real points plus access to other web pages. To configure a point, click on the point and a configuration page will appear. To observe the updated data for each point, click Auto Refresh button to ON. Point values can be temporarily forced by checking the box adjacent to the point and entering a value into the point's text box (make sure Auto Refresh button is OFF). The value will remain forced until the box is unchecked or the unit power cycled. Care must be exercised when forcing values into points.



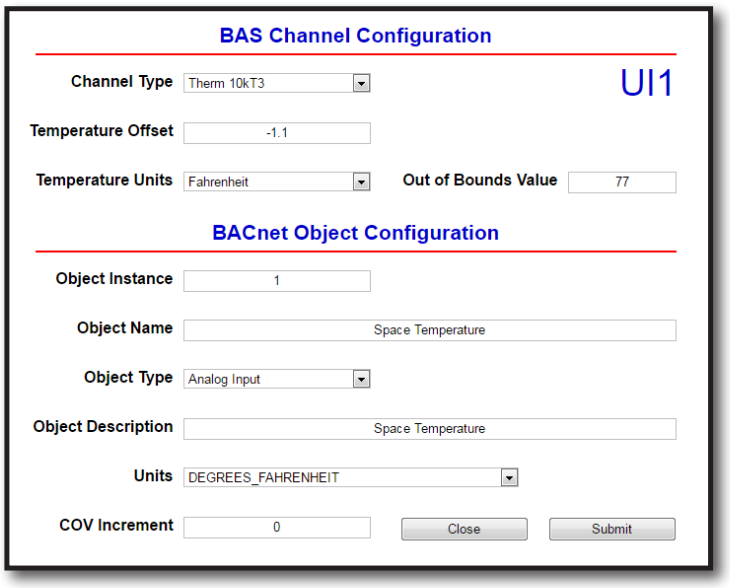
The IP settings can be changed to the desired values. Either DHCP or a static IP address can be selected. If a static address is desired, enter the value along with the network mask and gateway address. If domain address is required, enter in the Primary and Secondary DNS addresses.

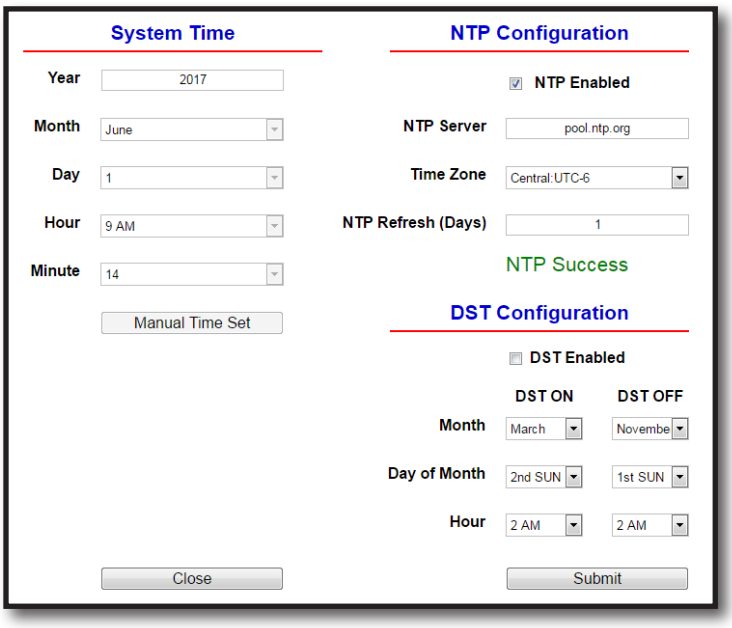
BACnet device data must be entered when using BACnet. Make sure the Device Instance and Device Object Name are both unique over the complete BACnet Internetwork.

Either BACnet or Sedona protocols or both can be selected.



Web Page Configuration – Channel, Time and Web Components

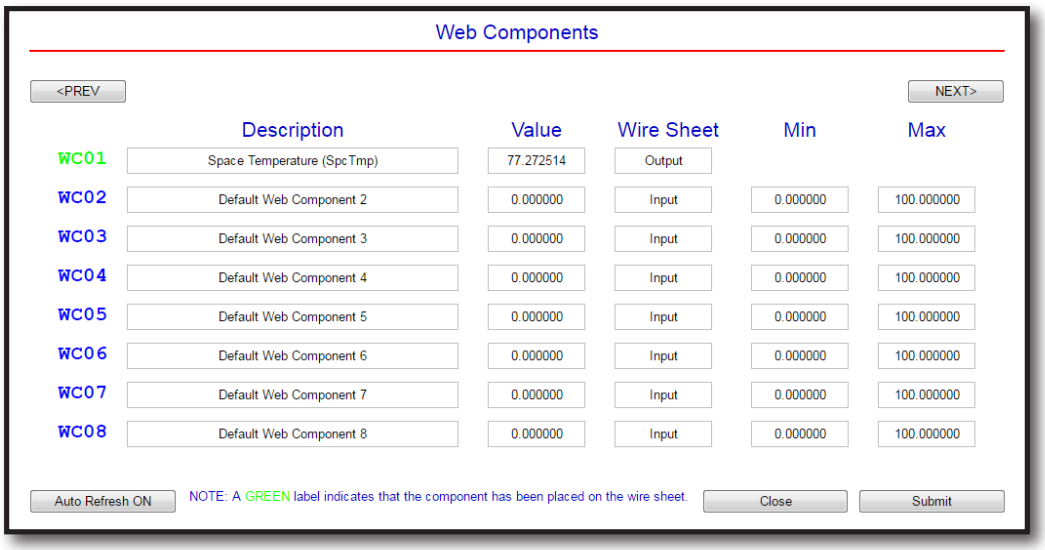


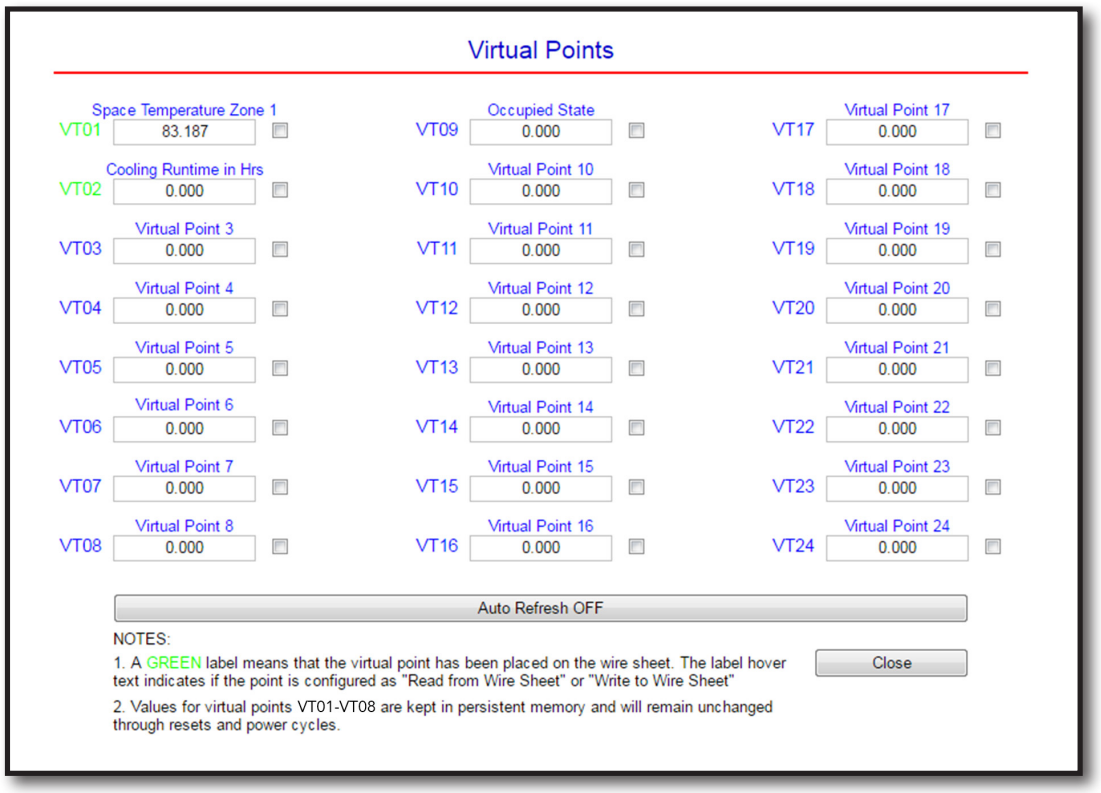


The BAS Channel should be configured first. Universal inputs must first be defined which may lead to more requests for information. Once the BAS Channel is configured, the BACnet Object Configuration can be accomplished. Although the BACnet Object Instance is predefined, the Object Name can be entered and Units can be selected with the drop-down. The COV Increment can be specified for those channels intended for COV reporting by the BACnet client device.

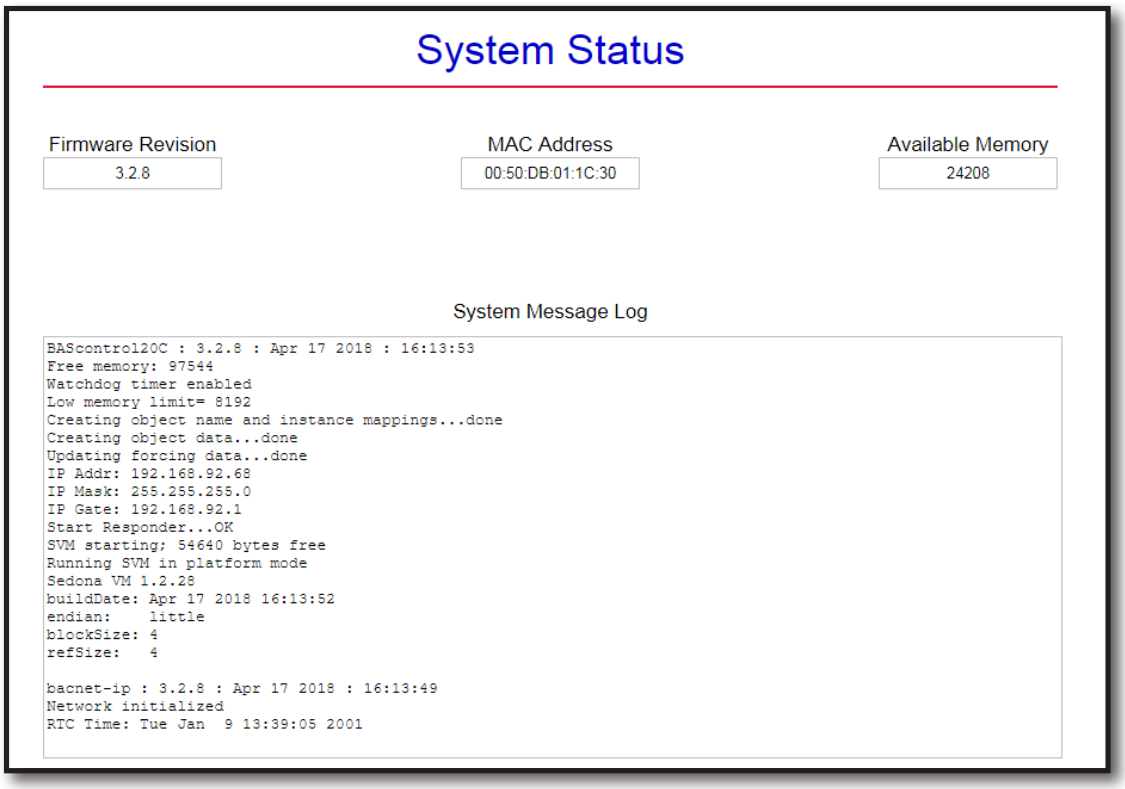
Time and date can be set manually or with the help of a NTP server if access to the Internet is possible. Daylight Savings Time can also be supported. Manually-set time is backed up for seven days through the use of a supercap in the event of power loss. If accessing an NTP server using domain names, make sure the DNS servers are specified in the System Configuration screen.

Separate web pages allow for the configuration of up to 48 web components. Web components provide a means to write and read data to and from Sedona wire sheets without the need of a Workbench tool. A web component configured as a wire sheet input can have its input range restricted to minimum and maximum values eliminating the need to add limit detection within the wire sheet logic. Web components are ideal for simplified control logic configuration.





The 24 virtual points are viewable from a separate web page.



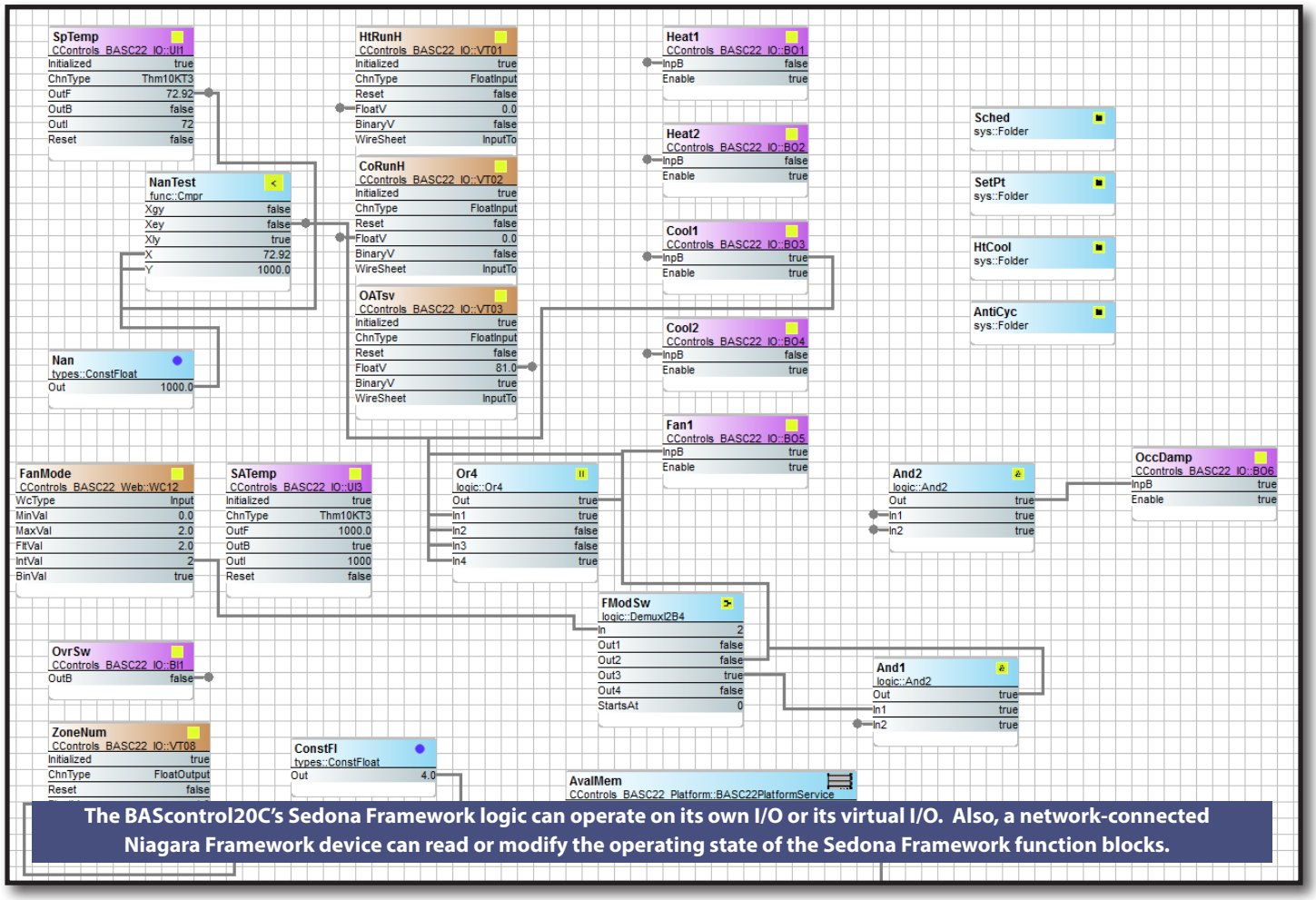
The System Status page provides information on the controller.

Powered by a Sedona Virtual Machine – for Implementing Control

The BAScontrol20C incorporates Sedona Virtual Machine (SVM) technology developed by Tridium. Using established Tridium tools such as Niagara Workbench AX, a system integrator can develop a control application using Workbench's powerful drag-and-drop visual programming methodology. Once developed, the program remains stored in the BAScontrol20C and executes by way of the SVM. The application can run standalone in the BAScontrol20C or it can interact with a program in a Tridium JACE supervisory controller over Ethernet. The number of potential applications is only limited by the imagination of the system integrator.

The BAScontrol20C includes Tridium's Sedona 1.2 kits of components — and Contemporary Controls' product-specific and non-product-specific kits. The BAScontrol20 IO Kit components provide 20 physical points, virtual points and four retentive counters. The BAScontrol20C Web Kit has 48 components that share data with web pages. Input components receive data from hosted web pages. Output components send data to hosted web pages. The Contemporary Controls' Function kit provides additional components for increased flexibility.

The free Sedona Application Editor, Workbench AX, or a third-party Sedona tool can be used to program Sedona applications running on the BAScontrol 20C.



The BAScontrol20C's Sedona Framework logic can operate on its own I/O or its virtual I/O. Also, a network-connected Niagara Framework device can read or modify the operating state of the Sedona Framework function blocks.

Contemporary Controls' Developed Sedona Components

BAScontrol20 I/O Kit **BAScontrol20 platform specific components**	**AO1 – AO4**	Analog output – analog voltage output point
	BI1 – BI4	Binary input – binary input point
	BO1 – BO4	Binary output – binary output point
	ScanTim	Scan time monitor – records the min, max and average scan times
	UI1 – UI4	Universal input – binary, analog voltage, thermistor, resistance or accumulator
	UI5 – UI8	Universal input – binary, analog voltage, thermistor or resistance
	UC1 – UC4	Retentive universal counters – up/down retentive counters
	VT01 – VT08	Retentive virtual points – share retentive wire sheet data with BACnet/IP clients
	VT09 – VT24	Virtual points – share wire sheet data with BACnet/IP clients
BAScontrol20 Web Kit **BAScontrol20 platform specific components**	**WC01 – WC48**	Web components – share wire sheet data with the BAScontrol20 web pages
Contemporary Controls Function Kit **Common to Sedona 1.2 compliant controllers**	**Cand2**	Two-input Boolean product – two-input AND/NAND gate with complementary outputs
	Cand4	Four-input Boolean product – four-input AND/NAND gate with complementary outputs
	Cand6	Six-input Boolean product – six-input AND/NAND gate with complementary outputs
	Cand8	Eight-input Boolean product – eight-input AND/NAND gate with complementary outputs
	Cmt	Comment – comment field up to 64 characters
	Cor2	Two-input Boolean sum – two-input OR/NOR gate with complementary outputs
	Cor4	Four-input Boolean sum – four-input OR/NOR gate with complementary outputs
	Cor6	Six-input Boolean sum – six-input OR/NOR gate with complementary outputs
	Cor8	Eight-input Boolean sum – eight-input OR/NOR gate with complementary outputs
	CtoF	°C to °F – Celsius to Fahrenheit Temperature Conversion
	Dff	"D" Flip-Flop – D-style Edge-triggered Single-bit Storage
	FtoC	°F to °C – Fahrenheit to Celsius Temperature Conversion
	HLpre	High – Low Preset – defined logical true and false states
	PsychrE	Psychrometric Calculator – English Units
	PsychrS	Psychrometric Calculator – SI Units
	SCLatch	Set/Clear Latch – single-bit level-triggered single-bit data storage
Contemporary Controls Client Kit **BAScontrol20C platform specific components**	**NetV**	Network Variable — command single BACnet object of type AI, AO, AV, BI, BO, or BV
	NETVAI4	Network Variable AI4 — initiate read of up to four BACnet objects of type AI
	NETVAO4	Network Variable AO4 — initiate read or write of up to four BACnet objects of type AO
	NETVBI4	Network Variable BI4 — initiate read of up to four BACnet objects of type BI
	NETVBO4	Network Variable BO4 — initiate read or write of up to four BACnet objects of type BO

Tridium's Sedona 1.2 Components

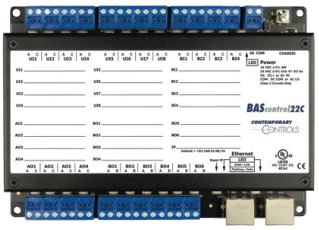
The HVAC Group operations that facilitate control	**LSeq**	Linear Sequencer — bar graph representation of input value
	ReheatSeq	Reheat sequence — linear sequence up to four outputs
	Reset	Reset — output scales an input range between two limits
	Tstat	Thermostat — on/off temperature controller
The Scheduling Group scheduling operations based upon time of day	**DailySc**	Daily Schedule Boolean — two-period Boolean scheduler
	DailyS1	Daily Schedule Float — two-period float scheduler
	DateTime	Time of Day — time, day, month, year
The Function Group convenient functions for developing control schemes	**Cmpr**	Comparison math — comparison (<=>) of two floats
	Count	Integer counter — up/down counter with integer output
	Freq	Pulse frequency — calculates the input pulse frequency
	Hysteresis	Hysteresis — setting on/off trip points to an input variable
	IRamp	IRamp — generates a repeating triangular wave with an integer output
	Limiter	Limiter — Restricts output within upper and lower bounds
	Linearize	Linearize — piecewise linearization of a float
	LP	LP — proportional, integral, derivative (PID) loop controller
	Ramp	Ramp — generates a repeating triangular or sawtooth wave with a float output
	SRLatch	Set/Reset Latch — single-bit data storage
	TickTock	Ticking clock — an astable oscillator used as a time base
	UpDn	Float counter — up/down counter with float output
The Priority Group prioritizing actions of Boolean, Float and Integer variables	**PrioritizedBool**	Prioritized boolean output — highest of sixteen inputs
	PrioritizedFloat	Prioritized float output — highest of sixteen inputs
	PrioritizedInt	Prioritized integer output — highest of sixteen inputs
The Types Group variable types and conversion between types	**B2F**	Binary to float encoder — 16-bit binary to float conversion
	ConstBool	Boolean constant — a predefined Boolean value
	ConstFloat	Float constant — a predefined float variable
	ConstInt	Integer constant — a predefined integer variable
	F2B	Float to binary decoder — float to 16-bit binary conversion
	F2I	Float to integer — float to integer conversion
	I2F	Integer to float — integer to float conversion
	L2F	Long to float — long integer to float conversion
	WriteBool	Write Boolean — setting a writable Boolean value
	WriteFloat	Write Float — setting a writable float value
	WriteInt	Write integer — setting an integer value
The Logic Group logical operations using Boolean variables	**ADemux2**	Analog Demux — Single-input, two-output analog de-multiplexer
	And2	Two-input Boolean product — two-input AND gate
	And4	Four-input Boolean product — four-input AND gate
	ASW	Analog switch — selection between two float variables
	ASW4	Analog switch — selection between four floats
	B2P	Binary to pulse — simple mono-stable oscillator (single-shot)
	BSW	Boolean switch — selection between two Boolean variables
	DemuxI2B4	Four-output Demux — integer to Boolean de-multiplexer
	ISW	Integer switch — selection between two integer variables
	Not	Not — inverts the state of a Boolean
	Or2	Two-input Boolean sum — two-input OR gate
	Or4	Four-input Boolean sum — four-input OR gate
	Xor	Two-input exclusive Boolean sum — two-input XOR gate
The Timing Group time-based components	**DlyOff**	Off delay timer — time delay from a "true" to "false" transition of the input
	DlyOn	On delay timer — time delay from an "false" to "true" transition of the input
	OneShot	Single Shot — provides an adjustable pulse width to an input transition
	Timer	Timer — countdown timer
The Math Group math-based components	**Add2**	Two-input addition — results in the addition of two floats
	Add4	Four-input addition — results in the addition of four floats
	Avg10	Average of 10 — sums the last ten floats while dividing by ten thereby providing a running average
	AvgN	Average of N — sums the last N floats while dividing by N thereby providing a running average
	Div2	Divide two — results in the division of two float variables
	FloatOffset	Float offset — float shifted by a fixed amount
	Max	Maximum selector — selects the greater of two inputs
	Min	Minimum selector — selects the lesser of two inputs
	MinMax	Min/Max detector — records both the maximum and minimum values of a float
	Mul2	Multiply two — results in the multiplication of two floats
	Mul4	Multiply four — results in the multiplication of four floats
	Neg	Negate — changes the sign of a float
	Round	Round — rounds a float to the nearest N places
	Sub2	Subtract two — results in the subtraction of two floats
	Sub4	Subtract four — results in the subtraction of four floats
	TimeAvg	Time average — average value of float over time

BACnet Protocol Implementation Conformance (PIC) Statement

CONTEMPORARY CONTROLS®

BAScontrol20C

BACnet/IP Sedona Field Controller



BACnet Protocol Implementation Conformance Statement (Annex A)

Date: **June** 21, 2019
Vendor Name: Contemporary Controls
Product Name: BAScontrol20C
Product Model Number: BASC-20CR
Applications Software Version: **1.2.28** **Firmware Revision:** 3.2.8 **BACnet Protocol Revision:** 3
Product Description: BACnet/IP compliant 20-point field controller or remote I/O that allows a direct connection to Ethernet without the need of a BACnet router.

BACnet Standardized Device Profile (Annex L):
- ☐ **BACnet Operator Workstation (B-OWS)**
- ☐ **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)**

List all BACnet Interoperability Building Block Supported (Annex K):
- DS-RP-B Data Sharing — ReadProperty – A,B
- DS-WP-B Data Sharing — WriteProperty – A,B
- DS-RPM-B Data Sharing — ReadPropertyMultiple – B
- DS-COV-B Data Sharing — ChangeOfValue – B
- DM-DDB-B Device Management — Dynamic Device Binding – B
- DM-DOB-B Device Management — Dynamic Object Binding – B
- DM-DCC-B Device Management — Device Communication Control – B
- DM-TS-B Device Management — Time Synchronization – B

Segmentation Capability:
- ☐ Able to transmit segmented messages Window Size:
- ☐ Able to receive segmented messages Window Size:

Standard Object Types Supported:

Object Type Supported	Can Be Created Dynamically	Can Be Deleted Dynamically
Analog Input	No	No
Analog Output	No	No
Analog Value	No	No
Binary Input	No	No
Binary Output	No	No
Binary Value	No	No
Device	No	No

No optional properties are supported.

Data Link Layer Options:
- ☒ BACnet IP, (Annex J)
- ☒ BACnet IP, (Annex J), Foreign Device
- ☐ ISO 8802-3, Ethernet (Clause 7)
- ☐ ANSI/ATA 878.1, EIA-485 ARCNET (Clause 8), baud rate(s):
- ☐ MS/TP master (Clause 9), baud rate(s):
- ☐ MS/TP slave (Clause 9), baud rate(s):
- ☐ Point-To-Point, EIA 232 (Clause 10), baud rate(s):
- ☐ Point-To-Point, modem, (Clause 10), baud rate(s):
- ☐ LonTalk, (Clause 11), medium:
- ☐ Other:

Device Address Binding:
Is static device binding supported? (This is currently necessary for two-way communication with MS/TP slaves and certain other devices.) ☐ Yes ☒ No

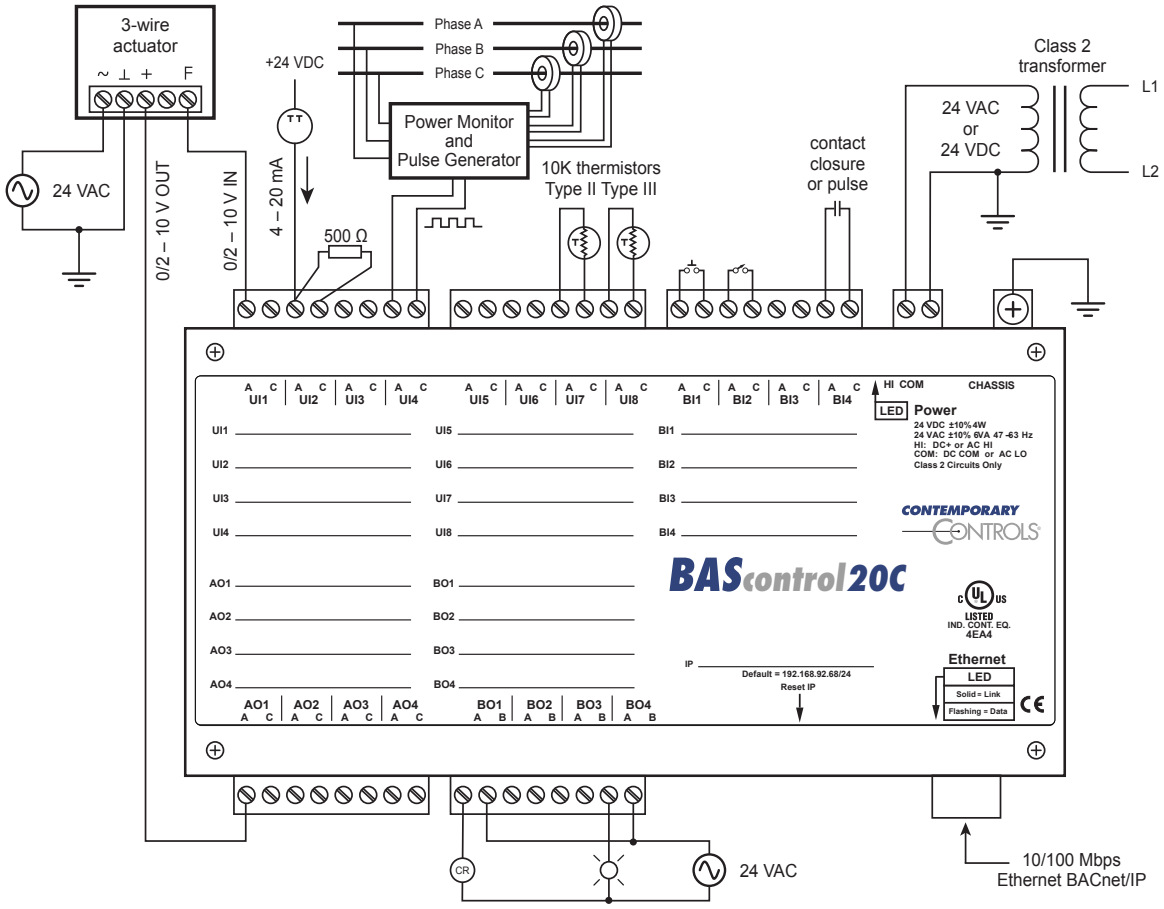
Networking Options:
- ☐ Router, Clause 6 – List all routing configurations, e.g., ARCNET-Ethernet-MS/TP, etc.
- ☐ Annex H, BACnet Tunnelling Router over IP
- ☐ BACnet/IP Broadcast Management Device (BBMD)
  Does the BBMD support registrations by Foreign Devices? ☐ Yes ☐ No

Character Sets Supported:
Indicating support for multiple character sets does not imply that they can all be supported simultaneously.
- ☒ ANSI X3.4
- ☐ IBM™/Microsoft™ DBCS
- ☐ ISO 8859-1
- ☐ ISO 10646 (UCS-2)
- ☐ ISO 10646 (UCS-4)
- ☐ JIS C 6226

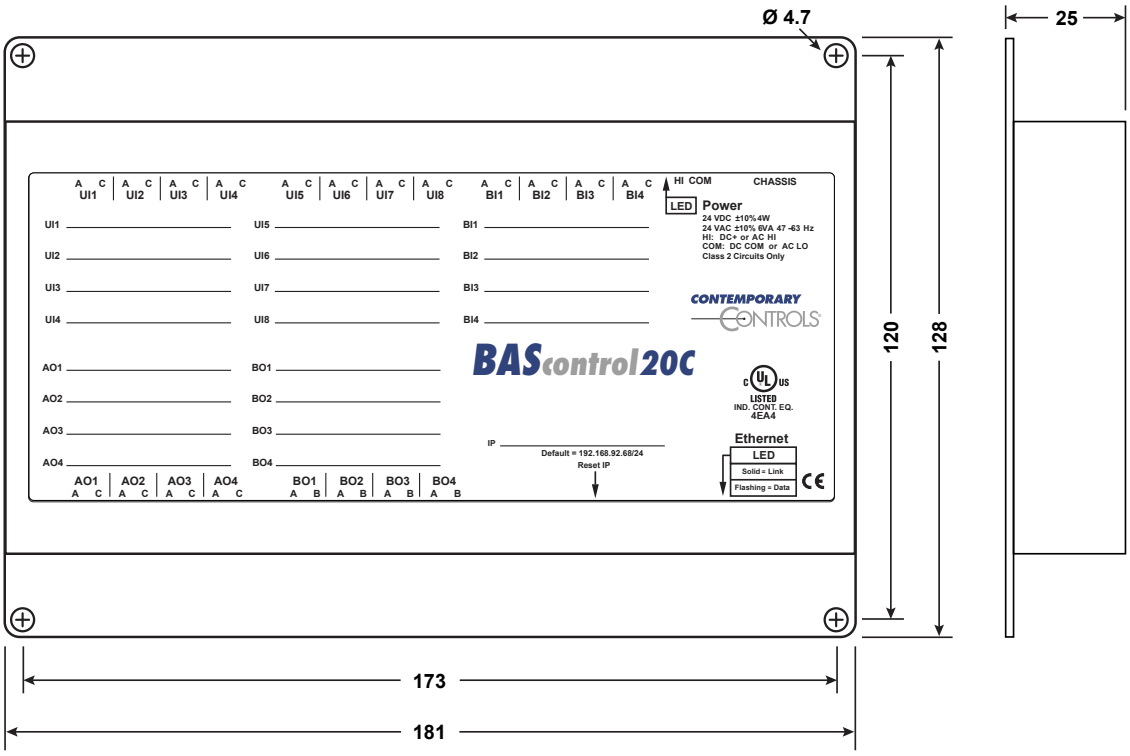
If this product is a communication gateway, describe the types of non-BACnet equipment/network(s) that the gateway supports:
No gateway support.

21 June 2019 PI-BASC20C-AA0

Wiring Diagram



Dimensions (all dimensions are in mm)



Specifications

Universal Inputs (Points UI1 through UI8)

Configured As	*Characteristics*
Analog input	0–10 VDC or 0–20 mA (with external resistor). Input impedance 1 MΩ on voltage.
Temperature input	Type II 10 kΩ thermistors: –10° to +190 °F (–23.3° to +87.8°C) Type III 10 kΩ thermistors: –15° to +200 °F (–26.1° to +93.3°C) 20 kΩ thermistors: 15° to 215° F (–9° to +101° C)
Contact closure input	Excitation current 0.5 mA. Open circuit voltage 12 VDC. Sensing threshold 3 VDC (low) and 7 VDC (high). Response time 20 ms.
Pulse input (Points UI1–UI4)	0–10 VDC for active output devices 0–12 VDC for passive devices (configured for internal pull-up resistor) 40 Hz maximum input frequency with 50% duty cycle. Adjustable high and low thresholds.
Resistance	1 kΩ -100 kΩ range

Binary Inputs (Points BI1 through BI4)

Contact closure	Excitation current 1.2 mA. Open circuit voltage 12 VDC Sensing threshold 3 VDC (low) and 7 VDC (high). Response time 20 ms

Analog Outputs (Points AO1 through AO4)

Analog output	0–10 VDC. 10-bit resolution. 4 mA maximum

Binary Outputs (Points BO1 through BO4) (Class 2 circuits only — requires external power source)

Binary output	Normally open relay contacts. 30VAC/VDC 2A

Regulatory Compliance

CE Mark; CFR 47, Part 15 Class A; RoHS
UL 508, C22.2 No. 142-M1987

Functional

Compliance	IEEE 802.3
Protocols supported	BACnet/IP, Sedona SOX, HTTP and FTP
Data rate	10 Mbps, 100 Mbps
Physical layer	10BASE-T, 100BASE-TX
Cable length	100 m (max)
Port connector	Shielded RJ-45
LED	Green = Link established Flash = Link activity

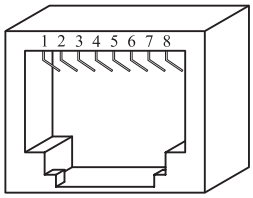
Electrical

Input (DC or AC)	*DC*	*AC*
Voltage (V, ± 10%)	24	24
Power	4 W	6 VA
Frequency	N/A	47–63 Hz

Specifications (continued)

Environmental/Mechanical

Operating temperature	-40°C to +75°C
Storage temperature	-40°C to +85°C
Relative humidity	10–95%, noncondensing
Protection	IP30
Weight	0.6 lbs. (.27 kg)



RJ-45 Pin Assignments

10BASE-T/100BASE-TX

Terminal	Usage
1	TD +
2	TD –
3	RD +
6	RD –
Other pins	Not Used

Electromagnetic Compatibility

Standard	*Test Method*	*Description*	*Test Levels*
EN 55024	EN 61000-4-2	Electrostatic Discharge	6 kV contact & 8 kV air
EN 55024	EN 61000-4-3	Radiated Immunity	10 V/m, 80 MHz to 1 GHz
EN 55024	EN 61000-4-4	Fast Transient Burst	1 kV clamp & 2 kV direct
EN 55024	EN 61000-4-5	Voltage Surge	2 kV L-L & 2 kV L-Earth
EN 55024	EN 61000-4-6	Conducted Immunity	10 Volts (rms)
EN 55024	EN 61000-4-11	Voltage Dips & Interruptions	1 Line Cycle, 1 to 5 s @ 100% dip
EN 55022	CISPR 22	Radiated Emissions	Class A
EN 55022	CISPR 22	Conducted Emissions	Class B
CFR 47, Part 15	ANSI C63-4	Radiated Emissions	Class A

Ordering Information

Model	*Description*
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