data SHEET

BAScontrol22 – 22-point BACnet/IP Sedona Unitary Controller

The BAScontrol22 is a 22-point unitary controller that supports both BACnet/IP and Sedona Framework (SOX) protocols via an Ethernet connection. It complies with the B-ASC device profile having a convenient mix of eight universal inputs, four binary inputs, four analog outputs and six binary outputs.

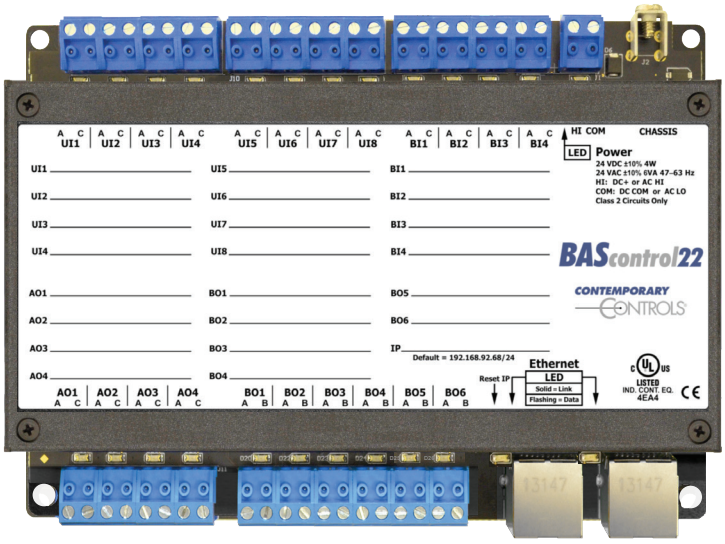
The device is freely-programmable controller executing Sedona's drag-and-drop methodology of assembling components onto a wire sheet to create applications. It can be programmed using Niagara Workbench or a third-party Sedona programming tool. BACnet and device configuration is via a common web browser. Optionally, the unit can function as BACnet/IP remote I/O.

Built on the Sedona Framework™, Contemporary Controls has developed more than 100 custom Sedona components which complement the Tridium developed Sedona 1.2 components. Unique to the unit are 48 web components that link wire sheet data to web pages, and 24 virtual points that link wire sheet data to a BACnet client.

Based on the BAScontrol20 3.1, the BAScontrol22 has all the features of the former along with two more binary outputs and a built-in Ethernet switch for daisy-chain network cabling.

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

- BACnet/IP compliant with a B-ASC device profile
- Resident Sedona Virtual Machine (SVM)
- Programmable via Workbench or Sedona Tool
- Configurable via a common web browser
- Direct connection to Ethernet network
- Manually or NTP settable real-time clock
- COV subscriptions – 14 binary and 2 analog



Flexible Input/Output — 22-points of physical I/O

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

BAScontrol22 — Overview

The BAScontrol22 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.

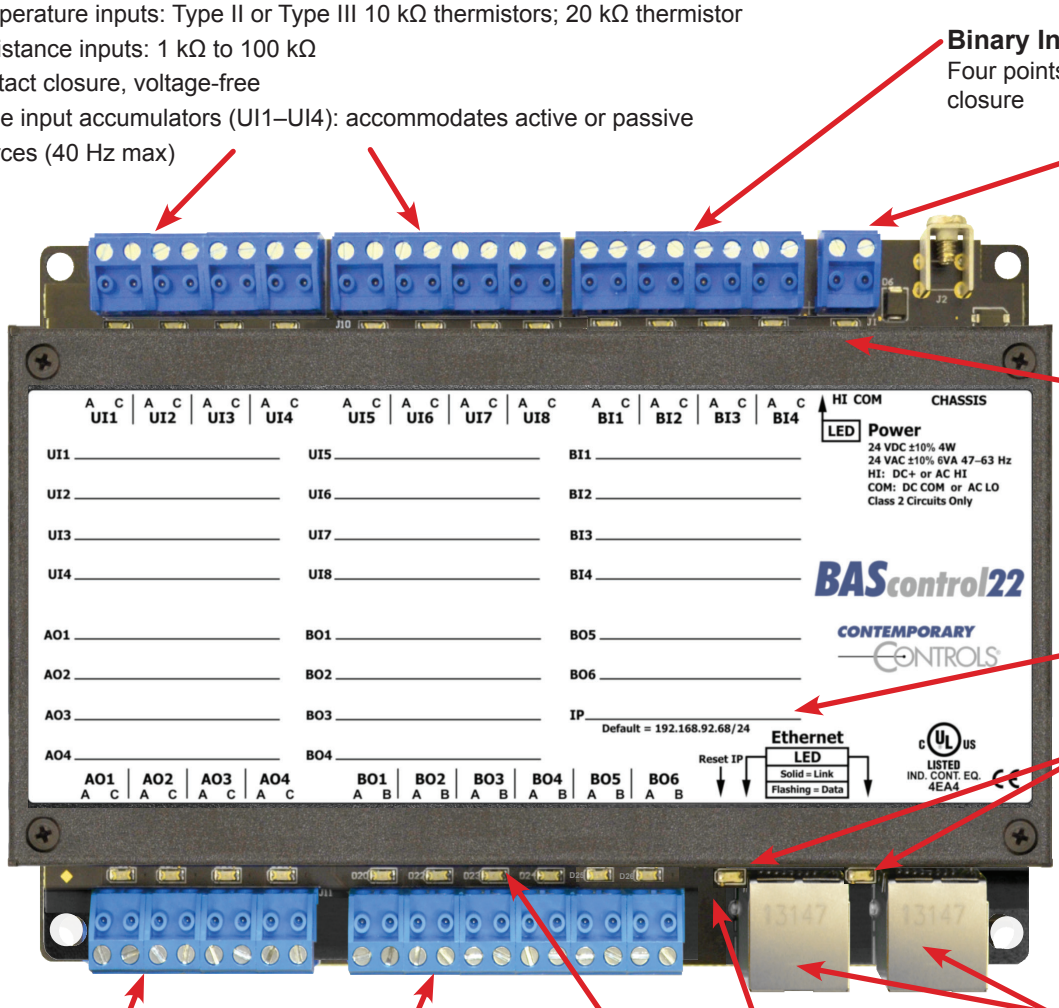
By operating at the BACnet/IP level, the BAScontrol22 can share the same Ethernet network with supervisory controllers and operator workstations. The unit can be configured for a fixed IP address or can operate as a DHCP client receiving its IP address from a DHCP server. A real-time clock with a super-cap backup allows for creating local schedules.

Via a 10/100 Mbps Ethernet switch, the Ethernet port 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.

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.

Power LED
Indicates power applied

IP Address
fixed or DHCP client

Ethernet LEDs for each port
Lights on link and flashes with data

Analog Outputs
0–10 V, 12-bit resolution

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

Point LEDs
for all 22 points

Reset
to factory IP defaults

Ethernet Switch Ports
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.

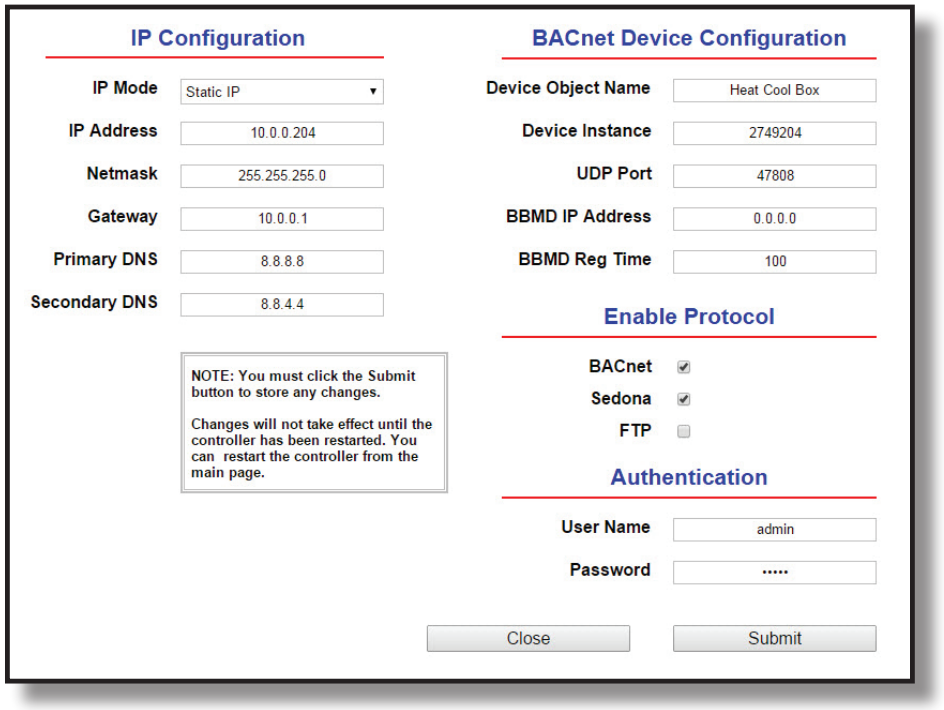
The main web page provides an overview of all real points plus access to other web pages.

Points can be temporary written by entering a value into one of the points. By checking the box adjacent to a point, the value written will be permanent until the box is unchecked. Care must be exercised when forcing values into points. 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 to ON.

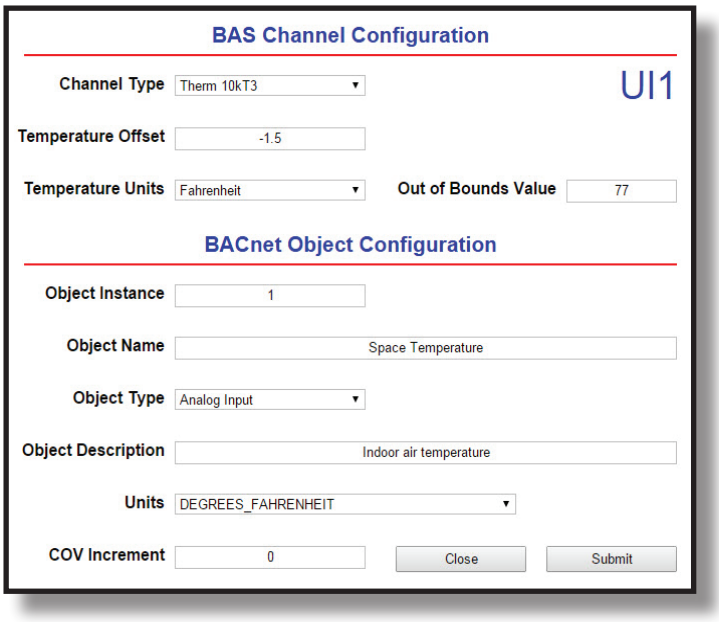
The IP settings can be changed to the desired values. Either DHCP or a static IP address can be selected. If a static address is desired, enter the value along with the network mask and gateway address. If domain address is required, enter in the Primary and Secondary DNS addresses.

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.

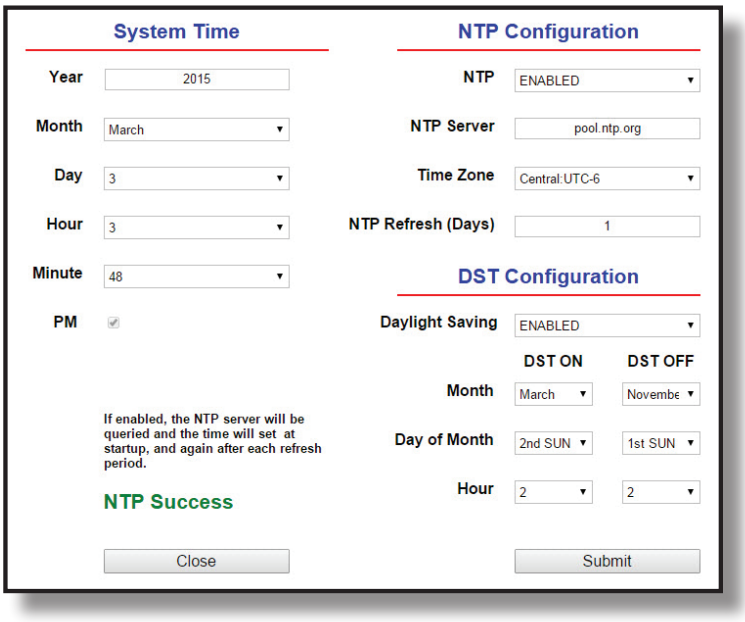
Either BACnet or Sedona protocols or both can be selected.



Web Page Configuration — Channel, Time and Web Components

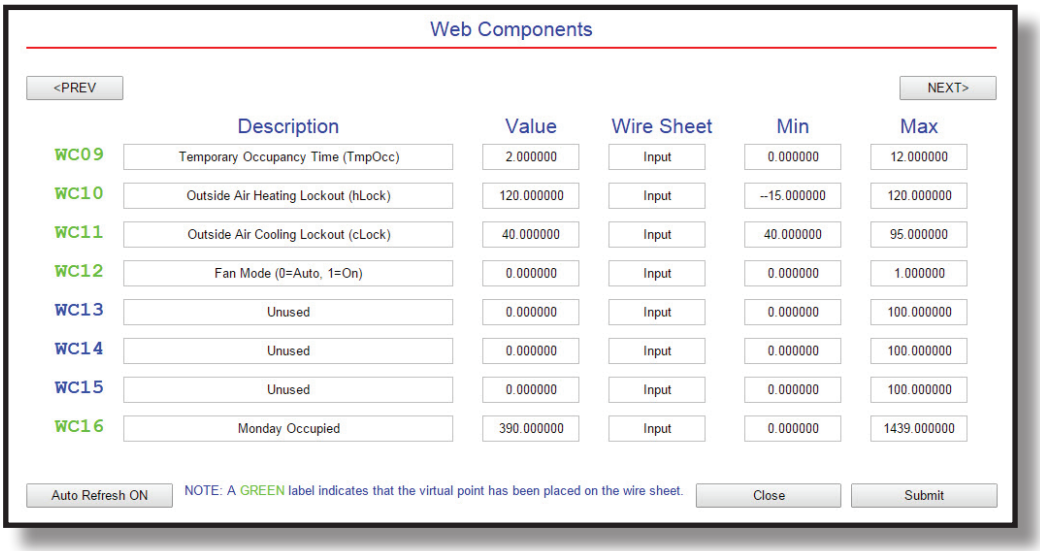


The BAS Channel should be configured first. Universal inputs must first be defined which may lead to more requests for information. Once the BAS Channel is configured, the BACnet Object Configuration can be accomplished. Although the BACnet Object Instance is predefined, the Object Name can be entered 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.

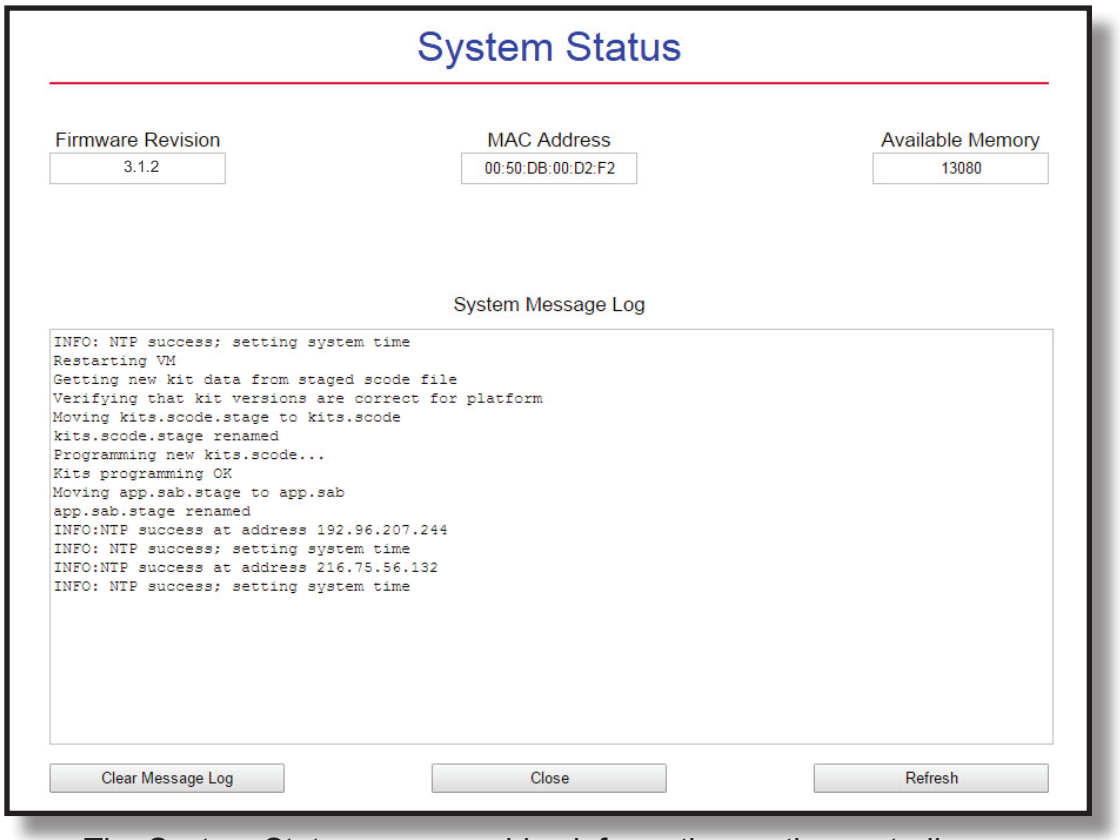


Time and date can be set manually or with the help of a NTP server if access to the Internet is possible. Daylight Savings Time can also be supported. Manually-set time is backed up for seven days through the use of a supercap in the event of power loss. If accessing an NTP server using domain names,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



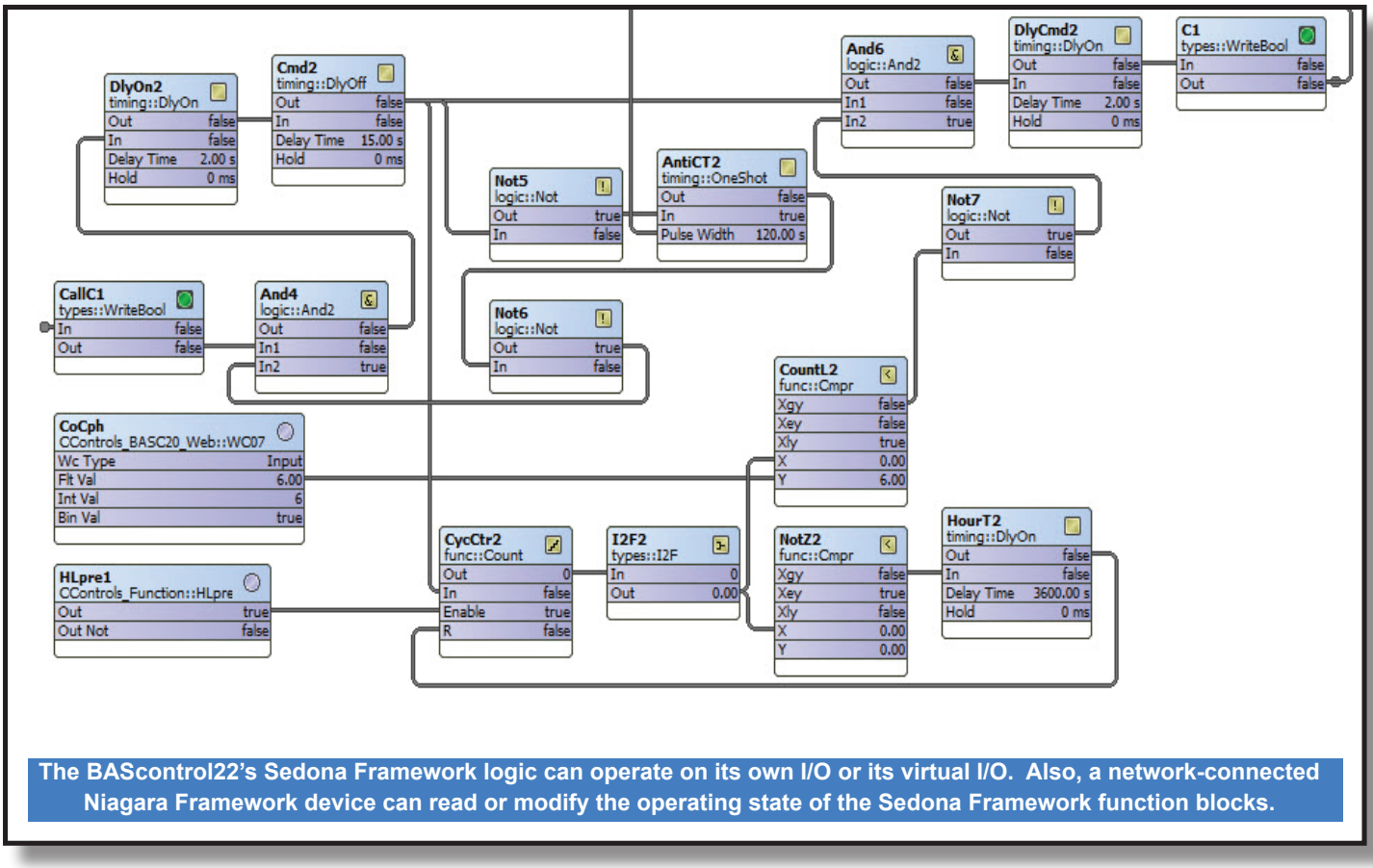
The System Status page provides information on the controller.

Powered by a Sedona Virtual Machine — for Implementing Control

The BAScontrol22 incorporates Sedona Virtual Machine (SVM) technology developed by Tridium. Using established Tridium tools such as Niagara Workbench, 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 BAScontrol22 and executes by way of the SVM. The application can run standalone in the BAScontrol22 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 BAScontrol22 includes Tridium's Sedona 1.2 kits of components — and Contemporary Controls' product-specific and non-product-specific kits. The BAScontrol22 IO Kit components provide 22 physical points, virtual points and four retentive counters. The BAScontrol22 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.

Tridium's Niagara Workbench or a third-party tool can be used to program a Sedona application running in the BAScontrol22.



The BAScontrol22'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

BAScontrol22 I/O Kit – BAScontrol22 platform specific components

AO1 – AO4	Analog output – analog voltage output point
BI1 – BI4	Binary input – binary input point
BO1 – BO6	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

BAScontrol22 Web Kit – BAScontrol22 platform specific components

WC01 – WC48	Web components – share wire sheet data with the BAScontrol22 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

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

BAScontrol22

22-point BACnet/IP Sedona Field Controller

BACnet Protocol Implementation Conformance Statement (Annex A)

Date: July 1, 2015
Vendor Name: Contemporary Controls
Product Name: BAScontrol22
Product Model Number: BASC-22R
Applications Software Version: 1.2.28 **Firmware Revision:** 3.1.2 **BACnet Protocol Revision:** 3
Product Description: BACnet/IP compliant 22-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 – B
DS-WP-B Data Sharing — WriteProperty – 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

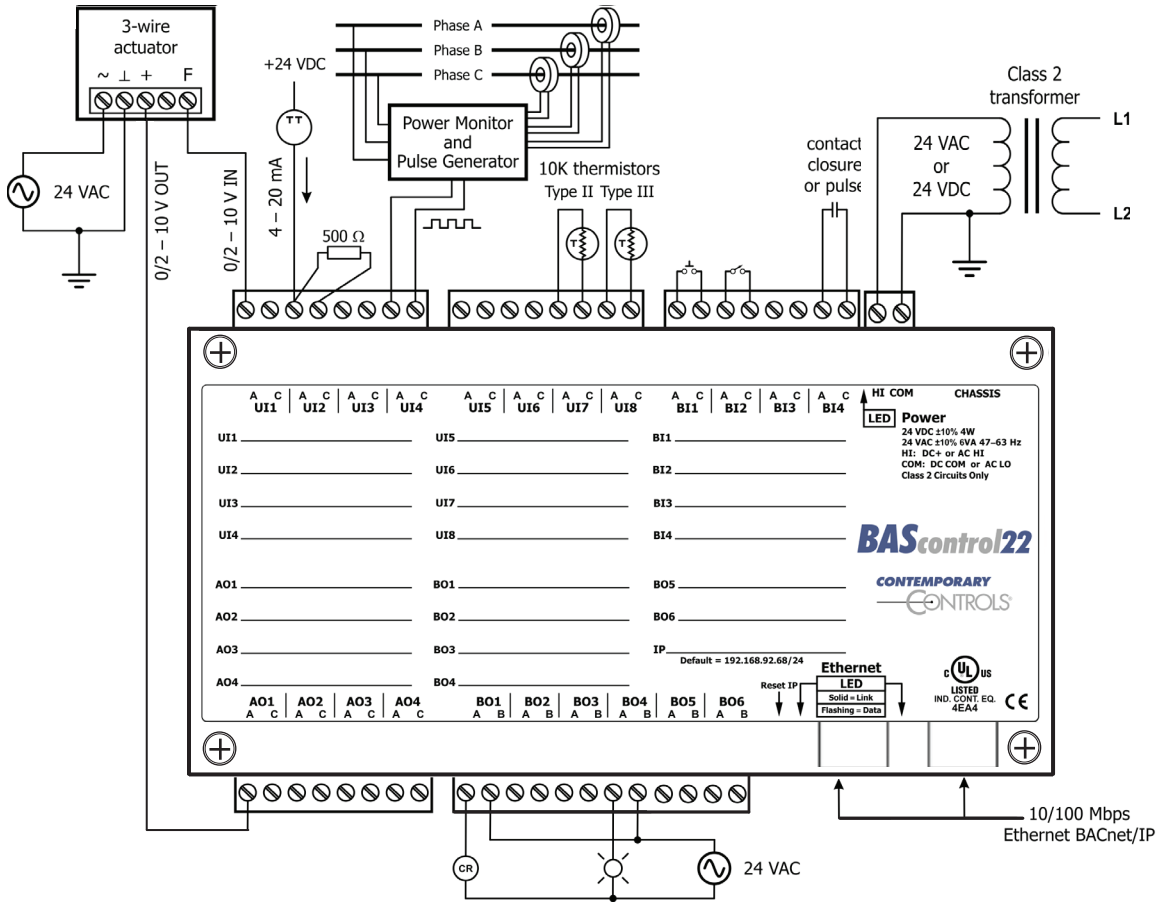
Networking Options:
- ☐ Router, Clause 6 – List all routing configurations, e.g., ARCNET-Ethernet-MS/TP, etc.
- ☐ Annex H, BACnet Tunnelling Router over IP
- ☐ BACnet/IP Broadcast Management Device (BBMD)
  Does the BBMD support registrations by Foreign Devices? ☐ Yes ☐ No

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

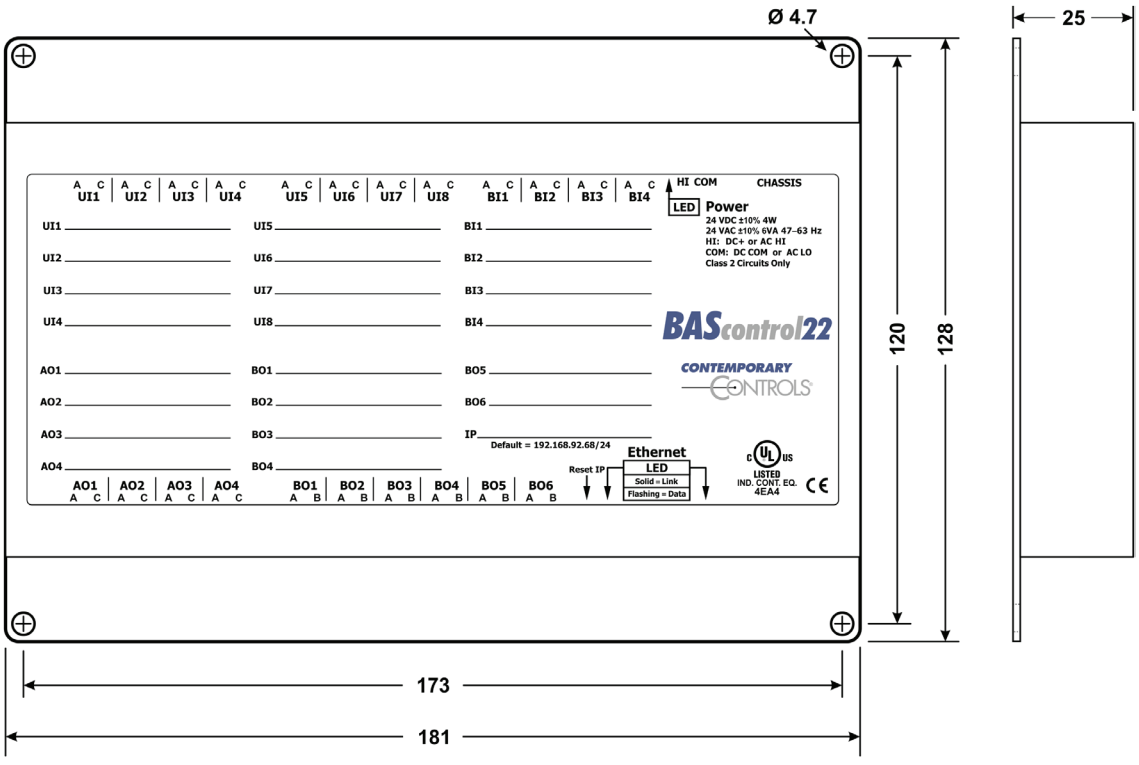
If this product is a communication gateway, describe the types of non-BACnet equipment/network(s) that the gateway supports:
No gateway support.

July 1, 2015 TD140500-0XB

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: –10º to +190 ºF (–23.3º to +87.8ºC) Type III 10 kΩ thermistors: –15º to +200 ºF (–26.1º to +93.3ºC) 20 kΩ thermistors: 15º to 215º F (–9º to +101º 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. 12-bit resolution. 4 mA maximum.

Binary Outputs (Points BO1 through BO6) (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 / *Ethernet*

Compliance	IEEE 802.3
Protocols supported	BACnet/IP
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

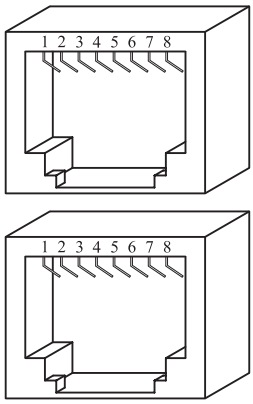
Electrical

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	0°C to 60°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

BASautomation®

Model	*Description*
BASC-22R	BAScontrol with 22 I/O points, includes 6 relay outputs

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