BASremote — Versatile BACnet/IP Controller/Gateway

The BASremote series provide the system integrator a flexible building block when integrating diverse building automation protocols or when expanding the number of points in a building automation system. By supporting open system protocols such as BACnet®, Modbus and Sedona Framework™ SOX, the BASremote series is easily adaptable. For small systems, it can operate stand-alone. For larger systems, it can communicate to supervisory controllers over Ethernet. Depending upon the model, the BASremote has the flexibility to provide the following:

Versatile Control Device — remote I/O, router, gateway and controller
- Web-page configuration
- BACnet/IP remote I/O
- Modbus TCP remote I/O
- Modbus Serial to Modbus TCP router
- Modbus Serial or TCP to BACnet/IP gateway
- Modbus Master to Modbus TCP or serial slaves
- Certified Sedona Framework Controller®
- Power over Ethernet (PoE)
- Customisable webpages
- Web Services

Flexible Input/Output — expandable with the addition of expansion I/O modules
- Six universal input/output points web-page configurable
- Two relay outputs
- Thermistor, voltage, current, contact closure and pulse inputs
- Voltage, current and relay outputs
- 2-wire Modbus Serial expansion bus
- Expansion port for up to three expansion I/O modules
The BASremote Master provides the ultimate in flexibility. It can be used for expansion I/O at remote locations where an Ethernet connection exists. Its built-in router and gateway capabilities address unique integration needs where more than one communications protocol is involved. It can operate as a function block programmable controller with its resident Sedona Framework 1.2 virtual machine. Powered by a Linux engine, the BASremote Master can operate as BACnet/IP and Modbus TCP remote I/O, Sedona Framework controller, Modbus Serial to Modbus TCP router, Modbus Serial to BACnet gateway, and Modbus master to attached Modbus slaves all at the same time. A 10/100 Mbps Ethernet port allows connection to IP networks and popular building automation protocols such as Modbus TCP, BACnet/IP, and Sedona SOX. Six universal I/O points and two relay outputs can be configured through resident web pages using a standard web browser and without the need of a special programming tool. A 2-wire Modbus serial port can greatly expand the I/O count with built-in routing to Modbus TCP clients. If BACnet mapping is preferred, the unit incorporates a Modbus serial to BACnet/IP gateway — capable of processing up to 1000 points. The BASremote Master also allows you to install custom web pages so you can view the status of your system in a convenient manner. And using its onboard Web Services, your IT department can easily interact with the BASremote Master.

Additional universal I/O can be achieved with the simple addition of BASremote Expansion modules. The BASremote PoE has the same capabilities as the BASremote Master except that it is powered over the Ethernet connection — thereby providing a “One Cable Solution”.

Universal I/O
Using web pages, six points can be configured as either inputs or outputs, analog or digital. In addition to being discoverable as BACnet objects, these same points can be assigned Modbus addresses.
- Analog inputs: 0–10 VDC, 0–20 mA but scalable to 0–5 VDC and 4–20 mA
- Temperature inputs: Type II or Type III thermistors
- Contact closure or Pulse inputs: Free-voltage, 40 Hz maximum
- Analog outputs: 0–10 VDC, 0–20 mA

All field connectors are removable.

Auxiliary Power Output
24 VDC @ 150 mA for powering field devices such as 4–20 mA transmitters.

Ethernet
10/100 Mbps Ethernet with auto-negotiation and Auto-MDIX. Protocols supported include HTTP, IP, UDP, TCP, SOAP, BACnet/IP, Modbus TCP, and Sedona SOX.

Power Input
24 VAC/VDC 17 VA half-wave regulated allows power sharing with other half-wave devices.

Modbus Serial Bus
RTU or ASCII master, 2.4–115.2 kbps, 2-wire non-isolated, up to 31 full-load EIA-485 devices

Expansion Port
Proprietary bus supporting up to three expansion modules requiring no configuration.

Relay Outputs
Two form “C” contacts for 30 VAC/VDC 2 A loads. Class 2 circuits only.
### 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
covenient 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 — Restrictions 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 encoder — float to 16-bit binary conversion
- **F2I**: Float to integer — float to integer conversion
- **I2B**: Integer to boolean — 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
- **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
- **Demux12B4**: Four-output Demux — integer to Boolean de-multiplexer
- **ISW**: Integer switch — selection between integer variables
- **Or2**: Two-input Boolean sum — two-input OR gate
- **Or4**: Four-input Boolean sum — four-input OR gate
- **Not**: Not — inverts the state of a Boolean
- **Xor**: Two-input exclusive Boolean sum — two-input XOR gate

### The Timing Group
extended Boolean logic

- **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
operations on Float, Integer and Boolean variables

- **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 N 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
Web Page Configuration

Web Server Screen

Typical I/O Point Configuration Screen
Powered by Sedona Framework for Implementing Control

The BASremote Master incorporates Sedona Virtual Machine (SVM) technology developed by Tridium and compatible with their Niagara Framework™. Using established Tridium tools such as Niagara Workbench or Sedona 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 BASremote Master and executes by way of the SVM. The application can run standalone in the BASremote Master or 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.

Tridium’s Sedona Workbench or Niagara Workbench can be used to program Sedona running in the BAS Remote.

The BASremote’s Sedona Framework logic can operate on its own I/O as well as that of connected Modbus Serial or TCP devices. Also, a network connected Niagara Framework device can read or modify the operating state of the Sedona Framework function blocks.
BACnet Protocol Implementation Conformance Statement (Annex A)

Date: August 12, 2013
Vendor Name: Contemporary Controls
Product Name: BASremote
Product Model Number: BASR-8M
Applications Software Version: 3.5.6
Firmware Revision: 3.5.6
BACnet Protocol Revision: 2

Product Description: BACnet/IP compliant 8-point Sedona Framework controller with Modbus Gateway.

BACnet Standardized Device Profile (Annex L):
- BACon Operator Workstation (B-OWS)
- BACon Advanced Operator Workstation (B-AWS)
- BACon Operator Display (B-OD)
- BACon Building Controller (B-BC)

BACnet Application Specific Controller (Annex B):
- BACon Application Controller (B-AAC)
- BACon Application Specific Controller (B-ASC)
- BACon Smart Sensor (B-SS)
- BACon Smart Actuator (B-SA)

BACnet Building Control (Annex C):
- DA-EOS Building Controller (B-BC)
- DA-BCD Building Controller (B-BCD)

BACnet Advanced Application Controller (Annex D):
- BACon Advanced Application Controller (B-AAC)
- BACon Application Specific Controller (B-ASC)

BACnet Smart Object (Annex E):
- BACon Smart Sensor (B-SS)
- BACon Smart Actuator (B-SA)

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

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

Standard Object Types Supported:

<table>
<thead>
<tr>
<th>Object Type Supported</th>
<th>Can Be Created Dynamically</th>
<th>Can Be Deleted Dynamically</th>
</tr>
</thead>
<tbody>
<tr>
<td>Analog Input</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>Analog Output</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>Analog Value</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>Binary Input</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>Binary Output</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>Device</td>
<td>No</td>
<td>No</td>
</tr>
</tbody>
</table>

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)
- ATA 878.1, 2.5 Mb, ARQNET (Clause 8)
- ATA 878, 1, EIA-485 ARQNET (Clause 8), baud rate(s):
- MS/TP master (Clause 9), baud rate(s):
- Other:

Device Addressing:
- 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.
- BACnet/IP Broadcast Management Device (BBMD)
- Does the BBMD support registrations by Foreign Devices? Yes
- No
- Does the BBMD support network address translation? Yes
- No

Character Sets Supported:
- ISO 10646 (UTF-8)
- IBM™/Microsoft™ DBCS
- ISO 8859-1
- ISO 10646 (UCS-2)
- ISO 10646 (UCS-4)
- JIS X 0208

If this product is a communication gateway, describe the types of non-BACnet equipment/network(s) that the gateway supports:
- Modbus gateway support.

Network Security Options:
- Non-secure Device — is capable of operating without BACnet Network Security
- Secure Device — is capable of using BACnet Network Security (NS-SD BIBB)
- Key Server (NS-KS BIBB)
Wiring Diagram

Dimensions (for all models)
## Universal Inputs/Outputs (Channels 1–6)

<table>
<thead>
<tr>
<th>Configured As</th>
<th>Characteristics</th>
</tr>
</thead>
<tbody>
<tr>
<td>Analog input</td>
<td>0–10 VDC or 0–20 mA scalable by user. 10-bit resolution. Input impedance 100 kΩ on voltage and 250 Ω on current.</td>
</tr>
<tr>
<td>Temperature input</td>
<td>Type II or type III thermistors +40°F to +110°F (+4.4°C to +44°C)</td>
</tr>
<tr>
<td>Contact closure input</td>
<td>Excitation current 2 mA. Open circuit voltage 24 VDC. Sensing threshold 0.3 VDC. Response time 20 ms.</td>
</tr>
<tr>
<td>Pulse input</td>
<td>0–10 VDC scalable by user. User adjustable threshold. 40 Hz maximum input frequency with 50% duty cycle.</td>
</tr>
<tr>
<td>Analog output</td>
<td>0–10 VDC or 0–20 mA scalable by user. 12-bit resolution. Maximum burden 750 Ohms when using current output.</td>
</tr>
</tbody>
</table>

## Relay Outputs (Channels 7 and 8)

Form “C” contact with both NO and NC contacts. 30 VAC/VDC 2 A. Class 2 circuits only.

## Regulatory Compliance

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

## Functional

### Ethernet

(BAS Remote Master Only)
- Compliance: IEEE 802.3
- Protocols supported: Modbus TCP, BACnet/IP, SOX
- Data rate: 10 Mbps, 100 Mbps
- Physical layer: 10BASE-T, 100BASE-TX
- Cable length: 100 m (max)
- Port connector: Shielded RJ-45
- LEDs: Green = 100 Mbps, Yellow = 10 Mbps, Flash = activity
- Flow control: Half-duplex (backpressure)

### Modbus Serial

- V1.02
- RTU master
- ASCII master
- EIA-485, 2-wire, non-isolated
- Data rate: 2.4 to 115.2 kbps
- Physical layer: 100BASE-TX
- Cable length: 100 m (max)
- Port connector: 3-pin terminal
- LEDs: Status green flashing = Modbus active

## Electrical

<table>
<thead>
<tr>
<th>Input (DC or AC)</th>
<th>Master</th>
<th>Expansion</th>
<th>Master/PoE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Voltage (V, ± 10%)</td>
<td>DC</td>
<td>AC</td>
<td>DC</td>
</tr>
<tr>
<td>Power</td>
<td>24</td>
<td>24</td>
<td>48</td>
</tr>
<tr>
<td>Frequency</td>
<td>10 W</td>
<td>17 VA</td>
<td>8 W</td>
</tr>
<tr>
<td></td>
<td>47–63 Hz</td>
<td>47–63 Hz</td>
<td>10 W</td>
</tr>
<tr>
<td>Loop supply (24 VDC nom.)</td>
<td>150 mA (max)</td>
<td>150 mA (max)</td>
<td>150 mA (max)</td>
</tr>
</tbody>
</table>

## Environmental/Mechanical

<table>
<thead>
<tr>
<th>Operating temperature</th>
<th>0°C to 60°C</th>
</tr>
</thead>
<tbody>
<tr>
<td>Storage temperature</td>
<td>−40°C to +65°C</td>
</tr>
<tr>
<td>Relative humidity</td>
<td>10–95%, noncondensing</td>
</tr>
<tr>
<td>Protection</td>
<td>IP30</td>
</tr>
<tr>
<td>Weight</td>
<td>0.6 lbs. (.27 kg)</td>
</tr>
</tbody>
</table>
Data Sheet — BASremote

Specifications (continued)

**RJ-45 Pin Assignments**

MDI 10BASE-T/100BASE-TX

<table>
<thead>
<tr>
<th>Terminal</th>
<th>Usage</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>TD +</td>
</tr>
<tr>
<td>2</td>
<td>TD –</td>
</tr>
<tr>
<td>3</td>
<td>RD +</td>
</tr>
<tr>
<td>6</td>
<td>RD –</td>
</tr>
<tr>
<td>Other pins</td>
<td>Not Used</td>
</tr>
</tbody>
</table>

**Modbus (MB) Pin Assignments**

<table>
<thead>
<tr>
<th>Terminal</th>
<th>Usage</th>
</tr>
</thead>
<tbody>
<tr>
<td>D +</td>
<td>Data +</td>
</tr>
<tr>
<td>D –</td>
<td>Data –</td>
</tr>
<tr>
<td>SC</td>
<td>Signal Common</td>
</tr>
</tbody>
</table>

**Expansion Port (DN/UP) Pin Assignments**

<table>
<thead>
<tr>
<th>Terminal</th>
<th>Usage</th>
</tr>
</thead>
<tbody>
<tr>
<td>D +</td>
<td>Data +</td>
</tr>
<tr>
<td>D –</td>
<td>Data –</td>
</tr>
</tbody>
</table>

**Electromagnetic Compatibility**

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

**Ordering Information**

<table>
<thead>
<tr>
<th>Model</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>BASR-8M</td>
<td>BASremote I/O Master 6 Universal 2 Relay I/O</td>
</tr>
<tr>
<td>BASR-8X</td>
<td>BASremote I/O Expansion 6 Unverisal 2 Relay I/O</td>
</tr>
<tr>
<td>BASR-8M/P</td>
<td>BASremote I/O Master PoE 6 Universal 2 Relay I/O</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>United States</th>
<th>China</th>
<th>United Kingdom</th>
<th>Germany</th>
</tr>
</thead>
<tbody>
<tr>
<td>Contemporary Control Systems, Inc.</td>
<td>Contemporary Controls (Suzhou) Co. Ltd</td>
<td>Contemporary Controls Ltd</td>
<td>Contemporary Controls GmbH</td>
</tr>
<tr>
<td>2431 Curtiss Street, Downers Grove, IL 60515, USA</td>
<td>11 Huoju Road, Science &amp; Technology Industrial Park, New District, Suzhou, PR China 215009</td>
<td>14 Bow Court, Fletchworth Gate, Coventry CV5 6SP, United Kingdom</td>
<td>Fuggerstraße 1 B, 04158 Leipzig, Germany</td>
</tr>
</tbody>
</table>

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