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. With the release of version 3.7.0, support for open system protocols now goes beyond BACnet® and Modbus to include Sedona Framework™ SOX. For small systems, it can operate stand-alone. For larger systems, it can communicate to supervisory controllers via 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™
- Customisable webpages
- Programmatically send alarm emails
- Trending for all onboard and attached channels

**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 the addition of Modbus slaves. 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.

Additional universal I/O can be achieved with the simple addition of BASremote Expansion modules.

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.

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

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

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.
### Some Common Components Used In Function Block Programming

#### The HVAC Group
- **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
- **DailySc**: Daily Schedule Boolean — two-period Boolean scheduler
- **DailySl**: Daily Schedule Float — two-period float scheduler
- **DateTime**: Time of Day — time, day, month, year

#### The Function Group
- **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 Priority Group
- **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
- **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

#### The Logic Group
- **AND**: 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**: Four-output Analog switch — selection between two Boolean variables

#### The Math Group
- **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
- **MM**: Maximum selector — selects the lesser of two inputs
- **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

#### The Timing Group
- **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 Scheduling Group
- **SDaily2**: Daily Schedule Boolean — two-period Boolean scheduler
- **SDaily4**: Daily Schedule Float — two-period float scheduler
- **SDS**: Time of Day — time, day, month, year

#### The Function Group
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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 BASremote.
**CONTEMPORARY CONTROLS**

**BASremote**

**BACnet/IP Sedona Framework™ Controller**

**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):**
- BACnet Operator Workstation (B-OWS)  
- BACnet Advanced Operator Workstation (B-AWS)  
- BACnet Operator Display (B-OD)  
- BACnet Building Controller (B-BC)

**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

**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)  
- ISO 8802-3, Ethernet (Clause 7)  
- ATA 878.1, 2.5 Mb. ARCNET (Clause 8)  
- 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):  
- BACnet/Zigbee (Annex O)

**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)

**Character Sets Supported:**
- Indicating support for multiple character sets does not imply that they can all be supported simultaneously.  
- ISO 10646 (UTF-8)  
- ISO 10646 (UCS-2)  
- ISO 10646 (UCS-4)  
- ISO 8859-1  
- ISO 8859-2  
- JIS X 0208

**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)

August 12, 2013  
TD040301-0XE
Wiring Diagram

Dimensions (for all models)

Optional tabs for surface-mounting (2 pieces) millimeters (inches)
Specifications

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

<table>
<thead>
<tr>
<th>Ethernet</th>
<th>Modbus Serial</th>
</tr>
</thead>
<tbody>
<tr>
<td>Compliance</td>
<td>IEEE 802.3</td>
</tr>
<tr>
<td>Protocols supported</td>
<td>Modbus TCP, BACnet/IP, SOX</td>
</tr>
<tr>
<td>Data rate</td>
<td>10 Mbps, 100 Mbps</td>
</tr>
<tr>
<td>Physical layer</td>
<td>10BASE-T, 100BASE-TX</td>
</tr>
<tr>
<td>Cable length</td>
<td>100 m (max)</td>
</tr>
<tr>
<td>Port connector</td>
<td>Shielded RJ-45</td>
</tr>
<tr>
<td>Flow control</td>
<td>Half-duplex (backpressure)</td>
</tr>
</tbody>
</table>

LEDs

- **Ethernet (master only)**
  - **Green**: 100 Mbps link — **Yellow**: 10 Mbps link — **Flash**: link activity
- **Status (all units)**
  - **Green solid**: unit operational — **Green flashing**: unit booting — **Red**: unit in fault state
- **I/O channels (all units)**
  - **Unlit**: channel inactive — **Green**: channel active — **Red**: channel fault (detailed in manual)
- **Network (expansion only)**
  - **Green**: valid link to master — **Flash**: data exchange with master

Electrical

<table>
<thead>
<tr>
<th>Master</th>
<th>Expansion</th>
</tr>
</thead>
<tbody>
<tr>
<td>Input (DC or AC)</td>
<td>DC</td>
</tr>
<tr>
<td>Voltage (V, ± 10%)</td>
<td>24</td>
</tr>
<tr>
<td>Power</td>
<td>10 W</td>
</tr>
<tr>
<td>Frequency</td>
<td>N/A</td>
</tr>
<tr>
<td>Loop supply (24 VDC nom.)</td>
<td>150 mA (max)</td>
</tr>
</tbody>
</table>

Environmental/Mechanical

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Operating temperature</td>
<td>0°C to 60°C</td>
</tr>
<tr>
<td>Storage temperature</td>
<td>−40°C to +85°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>
## 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) 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>Conducted Emissions</td>
<td>Class B</td>
</tr>
<tr>
<td>EN 55022</td>
<td>CISPR 22</td>
<td>Radiated Emissions</td>
<td>Class A</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>RoHS</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>BASR-8M</td>
<td></td>
<td>BASremote Master with 8 I/O points</td>
</tr>
<tr>
<td>BASR-8X</td>
<td></td>
<td>BASremote Expansion with 8 I/O points</td>
</tr>
</tbody>
</table>

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