data SHEET

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™
- Power over Ethernet (PoE)
- 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

BASautomation®

CONTEMPORARY CONTROLS®

BASremote Master – Versatile BACnet/IP Controller/Gateway

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. 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.
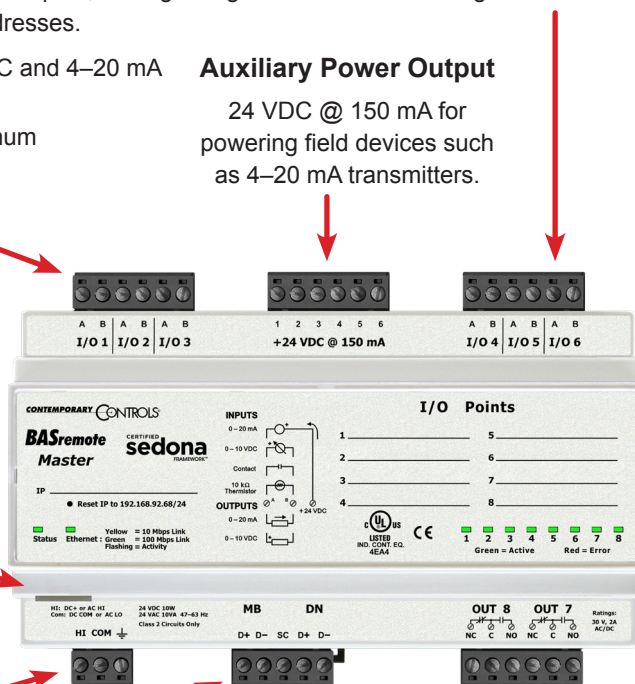
Modbus Serial Bus

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.

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Common Components Used In Function Block Programming

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

# Web Page Configuration

Web Server Screen

Typical I/O Point Configuration Screen

Certified 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, 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 Niagara Workbench can be used to program Sedona running in the BASremote.
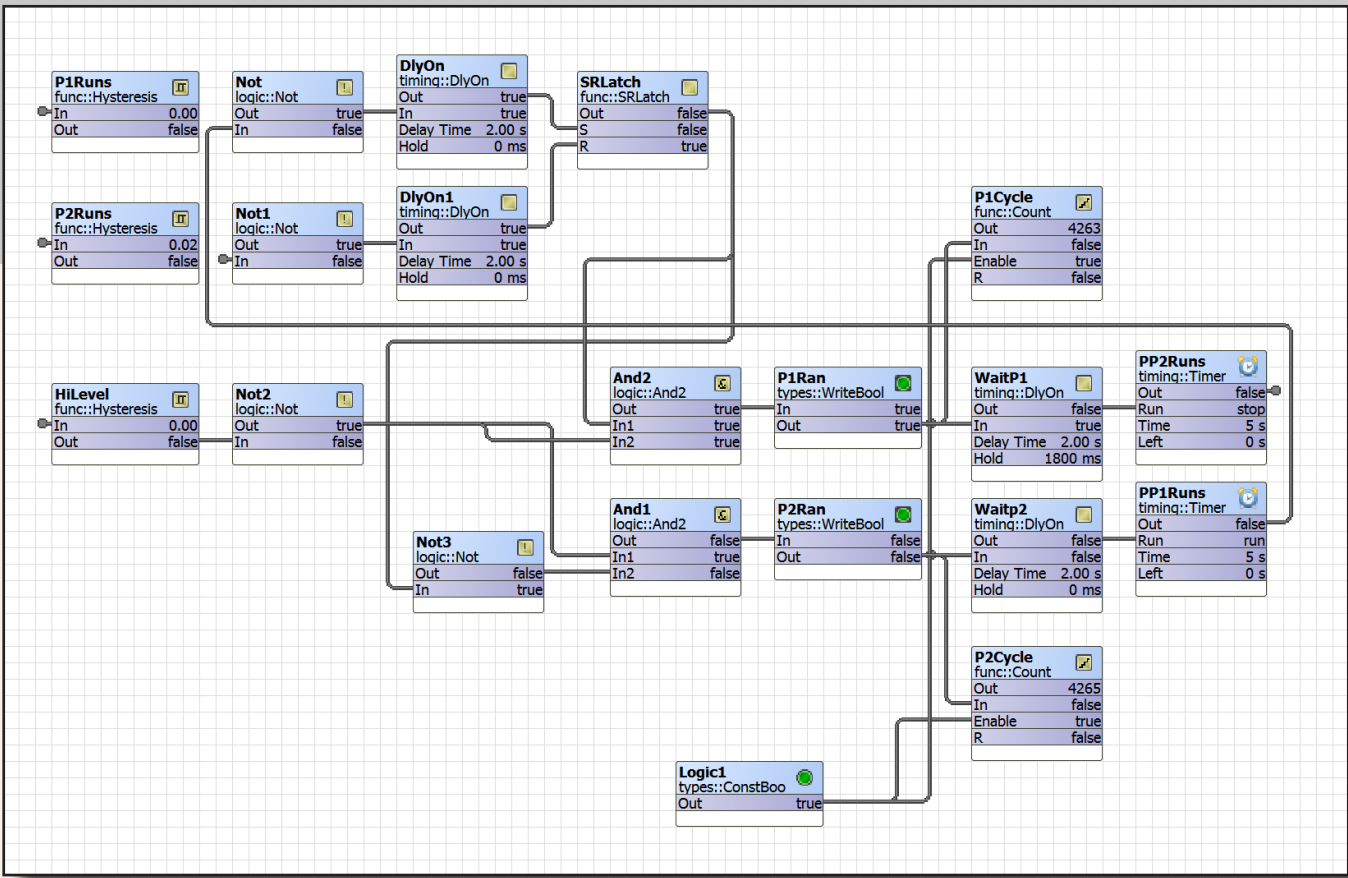
The BASremote's Sedona Framework logic can operate on its own I/O as well as that of connected Modbus Serial or TCP devices. Also, a network connected Niagara Framework device can read or modify the operating state of the Sedona Framework function blocks.

Input Boolean	BASremote binary input
Input Float	BASremote analog input or value
Output Boolean	BASremote binary output
Output Float	BASremote analog output
Output Float Conditional	BASremote conditional analog output
Send Email	BASremote email alert

BASremote Services
Sedona Components

Send Email from the Sedona Application

SendEmail allows the Sedona application to send emails when a specific event has occurred in the Sedona application. This can be a good way to send alarm alerts to the maintenance personal. The email will also carry the value which is passed into the component.

The email also contains text which can be used to describe the alarm condition, along with the component input value. Many different emails can be sent by the BASremote to many different email addresses.

Email Server Setup

Individual Email Setup

Trending

The new trending feature will allow the trending of the BASremote's 8 channels, any connected expansion unit's channels and those of any mapped Modbus devices (RTU or Modbus TCP). The trend data will be stored within the BASremote. You can select the frequency of trending and the frequency of storage.

After the trend file is filled, it will discard the oldest trend data. The trend data is available via the BASremote webpage in a simple CSV format. The BASremote can store up to about 150,000 entries. The trend feature also supports an NTP feature for accurately setting the time within the trend.

Trending

Firmware Upload Screen

The firmware of the new BASremote can be upgraded via a webpage screen on the BASremote.

Authentication Screen

The new authentication feature will allow the BASremote's webpages to be password protected. You can set the user ID and password of the BASremote.

Customisable Webpages

1 MB of Flash is set aside for your use. Assuming the default IP address as an example, your Flash area is accessible at:

192.168.92.68/user/

A userid and password secure your access to the user folder. By uploading web pages and images to your Flash space, you can view the BASremote status in a graphical format of your own design.

Via custom webpage Java applets, you can access the current status of a channel, virtual object or mapped Modbus variable. The **Binary Applet** displays status by a coloured square. Red represents a 0 and green a 1 — with the pixel size specified in your HTML code. The **Channel Set Applet** writes to a channel or instance and the **Channel View Applet** reads a channel or instance. An example web page shows you how to use the three applets. It is available at:

192.168.92.68/user.html

After studying it, you can replace it with your own design. An example appears below.

Sample Web Page
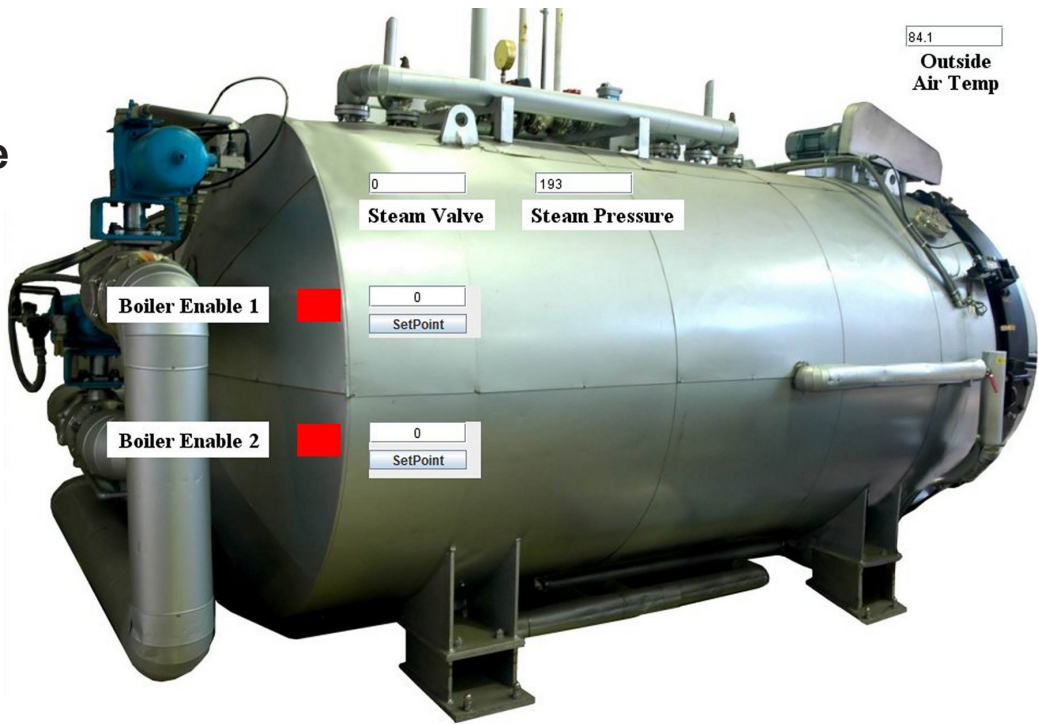
Set Time

The BASremote Master has a **Set Time Screen** that allows you to set the unit's time and date. This is most useful in Sedona control strategies. The *Time* and *Date* can be read via Telnet. The time can also be set by the BACnet Time Synchronization service.

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BASgatewayLX
Modbus to BACnet® Converter

BACnet Protocol Implementation Conformance Statement (Annex A)

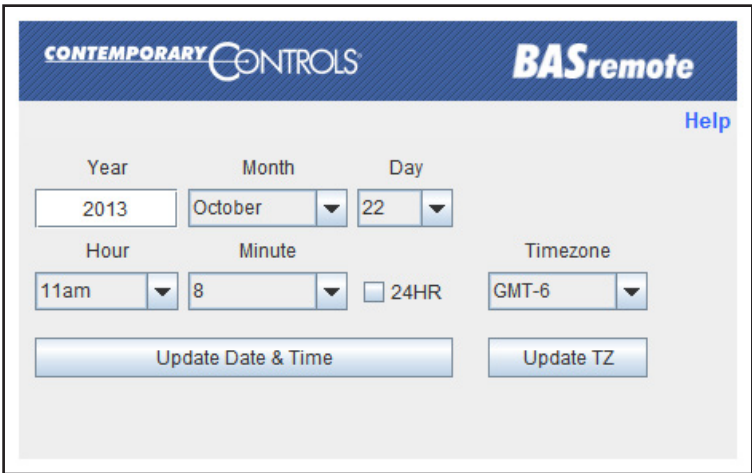|	
Date:	March 1, 2013
Vendor Name:	Contemporary Controls
Product Name:	BASgatewayLX
Product Model Number:	BASGLX-M1

Applications Software Version: 1.2.0   **Firmware Revision:** 1.2.0   **BACnet Protocol Revision:** 6

Product Description: Gateway between Modbus and BACnet.

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)
- ☐ 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
Binary Input	No	No
Binary Output	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)
- ☐ 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):
- ☐ LonTalk, (Clause 11), medium:
- ☐ BACnet/Zigbee (Annex O)
- ☐ 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, 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
    - Does the BBMD support network address translation?   ☐ Yes   ☐ No

Character Sets Supported:
Indicating support for multiple character sets does not imply that they can all be supported simultaneously.
- ☒ 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)

November 28, 2017   TD100301-0XC

Wiring Diagram
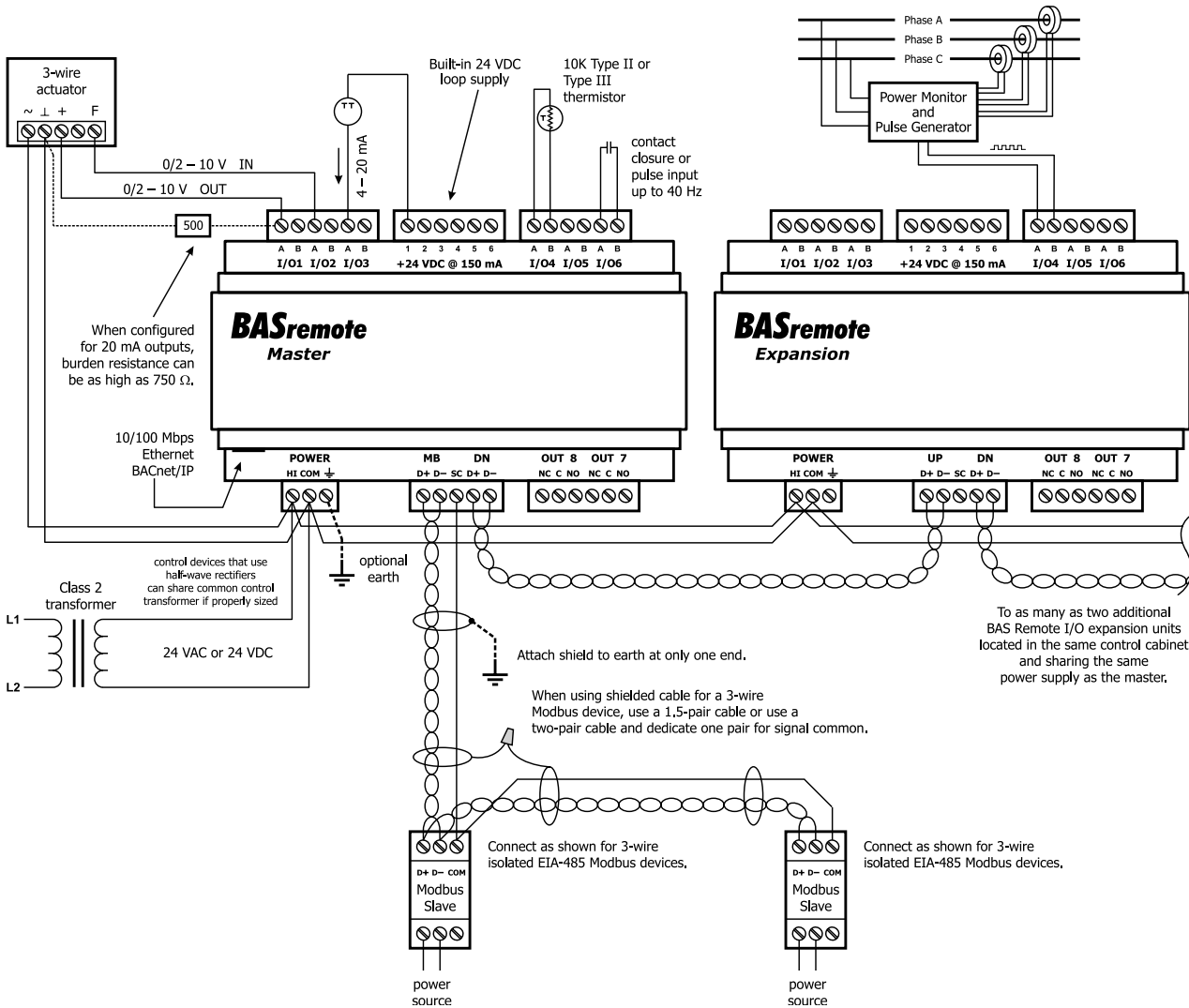
Dimensions (for all models)

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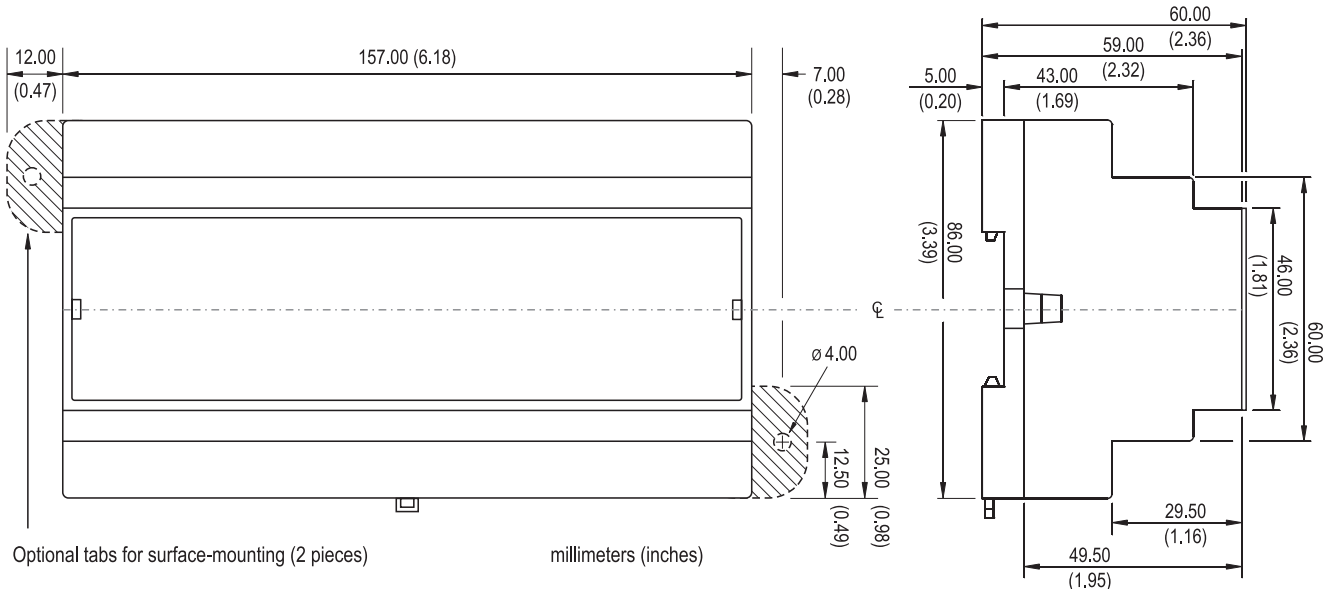
Specifications

Universal Inputs/Outputs (Channels 1–6)

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

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 (BASremote Master Only)	Modbus Serial
Compliance	IEEE 802.3	V1.02
Protocols supported	Modbus TCP BACnet/IP SOX	RTU master ASCII master
Data rate	10 Mbps, 100 Mbps	2.4 to 115.2 kbps
Physical layer	10BASE-T, 100BASE-TX	EIA-485, 2-wire, non-isolated
Cable length	100 m (max)	100 m (max)
Port connector	Shielded RJ-45	3-pin terminal
Flow control	Half-duplex (backpressure)	

LEDs

Ethernet (master only)	**Green:** 100 Mbps link — **Yellow:** 10 Mbps link — **Flashing:** 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 — **Flashing:** data exchange with master

Electrical

	Master		Expansion		Master/PoE
Input (DC or AC)	DC	AC	DC	AC	DC
Voltage (V, ± 10%)	24	24	24	24	48
Power	10 W	17 VA	8 W	17 VA	10 W
Frequency	N/A	47–63 Hz	N/A	47–63 Hz	N/A
Loop supply (24 VDC nom.)	150 mA (max)		150 mA (max)		150 mA (max)

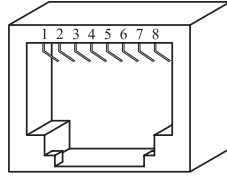## Environmental/Mechanical

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)

Specifications (continued)

RJ-45 Pin Assignments

MDI 10BASE-T/100BASE-TX

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

Modbus (MB) Pin Assignments

Terminal	Usage
D +	Data +
D −	Data −
SC	Signal Common
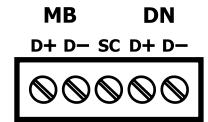
Expansion Port (DN) Pin Assignments

Terminal	Usage
D +	Data +
D −	Data −

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	Conducted Emissions	Class B
EN 55022	CISPR 22	Radiated Emissions	Class A
CFR 47, Part 15	ANSI C63-4	Radiated Emissions	Class A

Ordering Information

Model	RoHS	Description
BASR-8M	✔	BASremote Master with 8 I/O points
BASR-8X	✔	BASremote Expansion with 8 I/O points
BASR-8M/P	✔	BASremote Master with 8 I/O points and PoE