BASrouter — BACnet® Multi-Network Router (3.0 Version)

The BASrouter is a compact BACnet multi-network router which provides versatile stand-alone routing between BACnet/IP, BACnet Ethernet (ISO 8802-3), and BACnet MS/TP networks. The BACnet router is web page configurable and it is powered by 24 VAC/VDC. The BASrouter has a number of troubleshooting/ diagnostic capabilities. The BACnet MS/TP *"Status"* webpage contains a graphical table of all of the MS/TP devices on the network and their status. Also provided are network statistics, in addition to a BACnet/IP "Routing" webpage with a discoverable routing table which is useful when setting up or troubleshooting a BACnet network.

Versatile Routing Between …

- BACnet/IP and BACnet MS/TP
- BACnet Ethernet and BACnet MS/TP
- BACnet/IP and BACnet Ethernet
- BACnet/IP and BACnet Ethernet and BACnet MS/TP
- Two BACnet/IP Networks (between two UDP ports)

IP Network Support

- Web server for commissioning and troubleshooting
- DHCP option to automatically acquire IP address
- BACnet/IP Broadcast Management Device (BBMD)
- Foreign Device Registration (FDR)

Flexible Communications

- 10/100 Mbps Ethernet with auto-negotiation and Auto-MDIX
- Optically isolated MS/TP port
- MS/TP baud rates range from 9.6–76.8 kbps

Convenient Installation

- 24 VAC/VDC (± 10%), 47–63Hz input voltage
- Din-rail mounted
- Outdoor temperature operation -40°C to +75°C

Network diagnostics

- Webpage with graphical network map of all 128 MS/TP master devices and their status
- MS/TP error count
- BACnet network traffic statistics
- Discover and View current BACnet routing table

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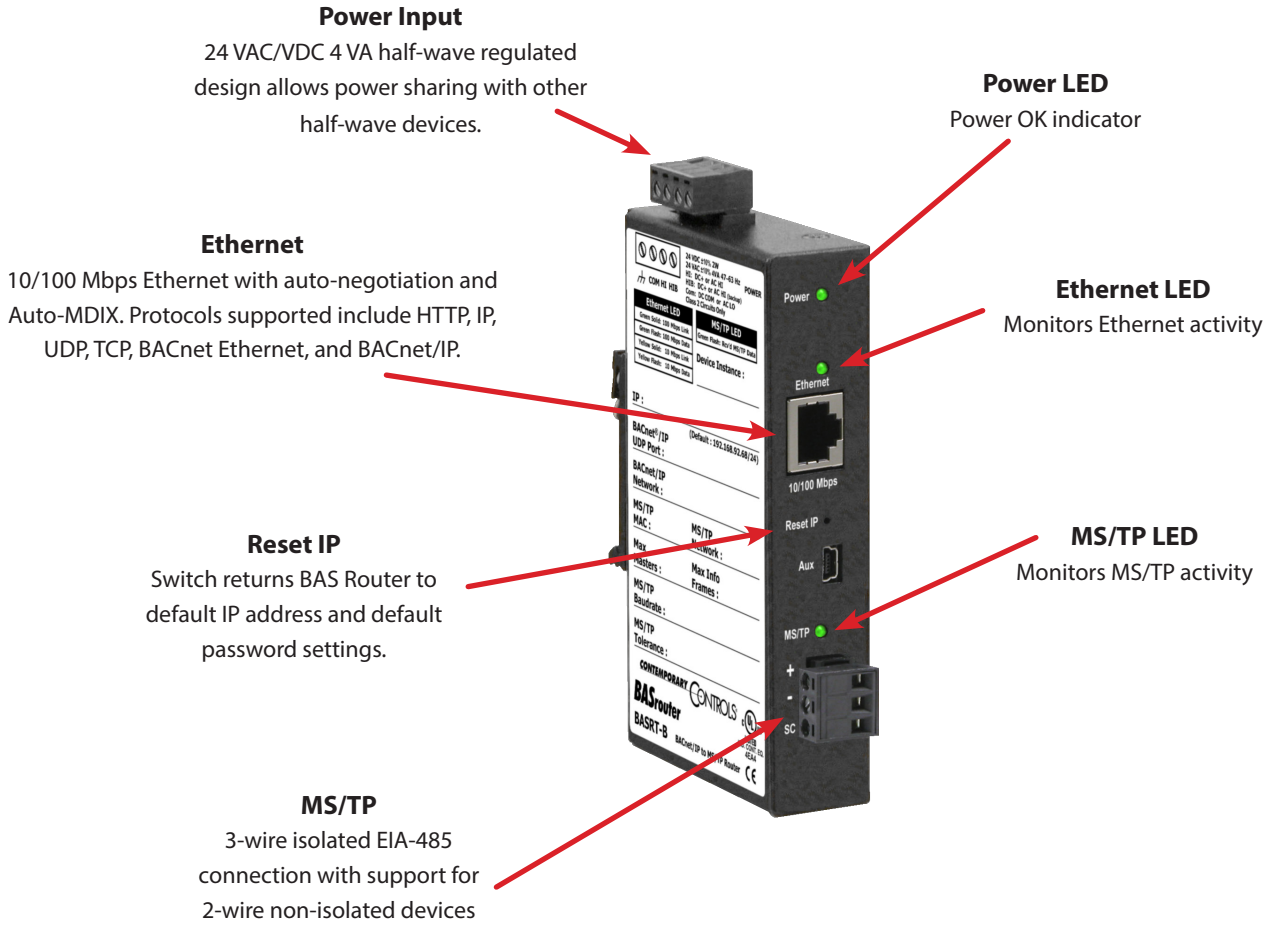
BASrouter — BACnet® Multi-Network Router

The BAS Router is housed in a metal case that mounts on 35-mm DIN-rail and is powered from a 24 VAC/VDC (± 10%) source. There is one MS/TP port and one 10/100 Mbps Ethernet port.

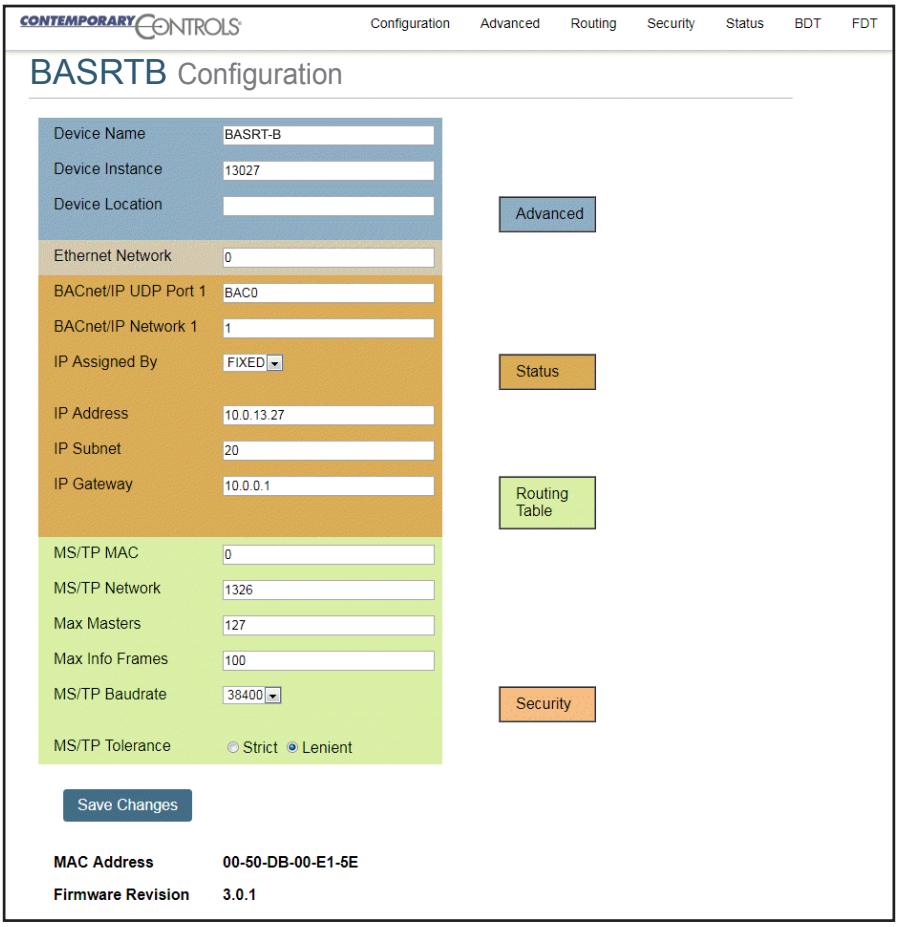
The MS/TP port offers an optically-isolated transceiver. It has a removable 3-pin terminal block for the EIA-485 connection. The Ethernet port offers a shielded RJ-45 connector. Auto-negotiation and Auto-MDIX allow this port to automatically match connections to the attached equipment. Therefore, either straight-through or crossover CAT5/6 cable can be used for hook-up.

A resident web server allows for commissioning, and troubleshooting using a standard web browser. A reset switch is provided on the router to return the unit to the factory default IP address of 192.168.92.68 (/24). Three LEDs are provided: The power LED glows green when proper power is provided. A bicolour Ethernet LED glows green for 100 Mbps, and yellow for 10 Mbps, and indicates activity by flashing. MS/TP LED flashes green when valid MS/TP traffic is received. When flashing continuously and without long interruptions, the MS/TP receive LED is a good indicator that the MS/TP network is operational.

Internal MS/TP bias and termination jumpers allow flexible bias and termination options. They can be removed for mid-span installations.

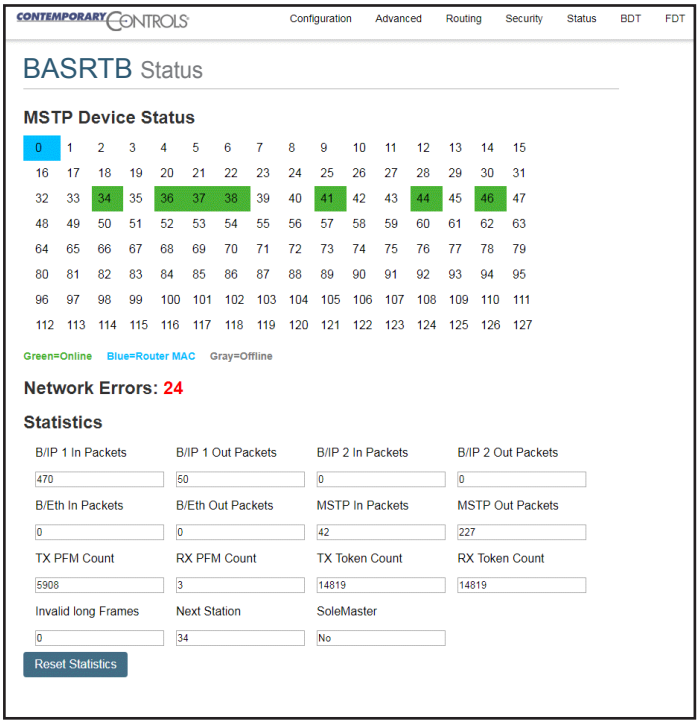


Web Page Configuration



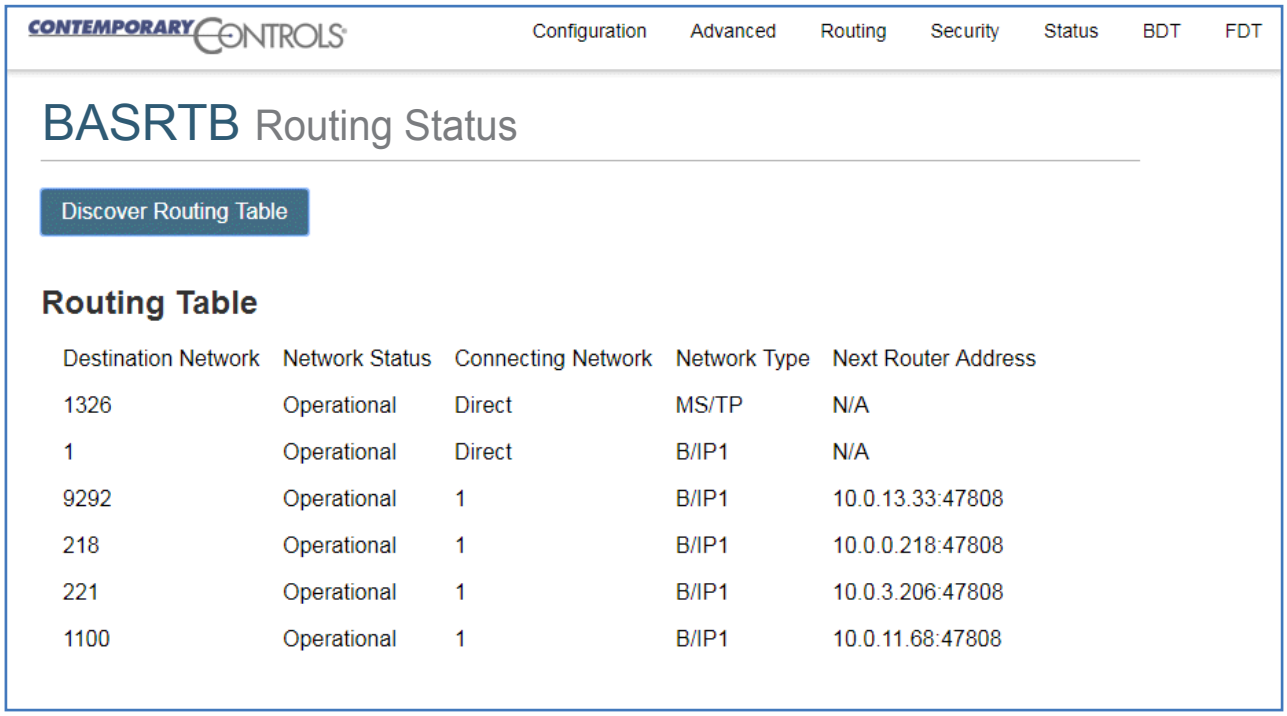
Status Screen

The Status screen is always operational as long as the BASrouter is powered. It consists of *MS/TP Device Status* table, *Network Errors* count, and *Statistics* on BACnet networks to which the BASrouter is connected. The *Status* page will automatically refresh every 5 seconds with the updated status on networks and devices — so you can observe the network state changes and gain insight into the condition of the BACnet network (as seen by the BASrouter). These statistics are retained over time, unless the BASrouter is powered off or rebooted from the main web page using the *"Save Changes"* button, then all Status page parameters are reset. The *"Reset Statistics"* button on Status page will reset Network Errors count, and Statistics, but retain the MSTP Device Status table history. For more information on the Status page refer to the BASrouter User Manual.



Routing Table

Multiple networks, possibly employing different physical layer technologies, may be interconnected by BACnet routers to form a BACnet internetwork. The Routing table web page provides a routing table which contains information about the network topology of the surrounding BACnet internetwork such as *Destination Network, Network Type, Connecting Network,* and *Network Status*. This table will be blank upon powering the BASrouter. Click the *"Discover Routing Table"* button to discover other routers on the BACnet network which will send a *"Who-Is-Router-To-Network"* message and fill the table with the discovered BACnet routers.



BAS Router Parameters Main Settings

Device Parameters	*Default Value*	*Description*
Device Name	BASRT-Bxxxxxx	The unique default value ends with the last 6 characters of the unit's Ethernet MAC address. You can edit it to be up to 20 characters.
Device Instance	0	The router device instance is a 22-bit decimal value (0–4,194,303). Each BACnet device has a unique device instance.
BACnet Ethernet Parameter	***Default Value***	***Description***
BACnet Ethernet Network	0	16-bit decimal value (1–65534). Each BACnet network, regardless of technology, must have a unique network number. By retaining the default value of 0, BACnet Ethernet routing is disabled.
BACnet/IP Parameters	***Default Value***	***Description***
BACnet/IP UDP Port	BAC0	16-bit hex value (0–FFFF) is set to BAC0 as the default value and should be used. All BACnet/IP devices on the same BACnet network must have the same UDP port assignment. For other assignments choose ports in the range from BAC1 to BACF while verifying that these ports are available.
BACnet/IP Network	1	16-bit decimal value (1–65534). Each BACnet network, regardless of technology, must have a unique network number. It is recommended that all subnets of the same BACnet/IP network be given the same BACnet network number as well.
IP Address	192.168.92.68	IP address in dotted decimal format. Select a valid address in the range from 0.0.0.1 through 255.255.255.254.
IP Subnet	24	Decimal value (0–30) in the "slash" notation is the number of bits with a "1" in the mask. The default value of 24 corresponds to 255.255.255.0 in the dotted decimal format. All devices on the same subnet which communicate via BACnet/IP should use the same subnet mask.
IP Gateway	192.168.92.1	IP Gateway address in dotted decimal format. Select a valid address in the range from 0.0.0.1 through 255.255.255.254.
MS/TP Parameters	***Default Value***	***Description***
MS/TP MAC Address	0	Decimal value (0–127) represents the MAC address of the router's MS/TP port. Lower MAC address numbers are preferred.
MS/TP Network	2001	16-bit decimal value (1–65535). Each BACnet network, regardless of technology, must have a unique network number.
Max Masters	127	This 8-bit decimal value (1–127) represents the highest master MAC address in the MS/TP network. If the highest value MAC address is unknown or if additional devices are to be added in the future above the current highest MAC address, use the default setting of 127.
Max Info Frames	100	This is the maximum number of messages (1–100) that can be routed onto the MS/TP network by the router per token pass. Values above 20 are typical.
MS/TP Baud Rate	38400	The baud rate of the MS/TP network can be 9600, 19200, 38400 or 76800 bps. All MS/TP devices on the same MS/TP network must use the same baud rate. Auto-bauding devices will set their baud rates to that of the BAS Router.
MS/TP Tolerance	Lenient	Affects the degree to which interoperability with devices is successful. Lenient option causes less efficient traffic but optimises interoperability.

BAS Router Parameters Advanced Settings — BBMD

BBMD Parameters	*Default Value*	*Description*
BBMD Enable	Unchecked	Check to enable BACnet/IP Broadcast Management Device (BBMD).
BBMD UDP Port	Primary	Normally the primary port is selected. The secondary port is used in very special applications.
Accept FDR	Checked	Uncheck to disable foreign devices from registering with this router.
Secondary BACnet/IP UDP Port	0000	Enter secondary UDP port as a 16-bit hex value (0-FFFF) when operating with two BACnet/IP BACnet networks. In this case use BAC1 if it is available.
Secondary BACnet/IP Net	0	Assign a unique network number from all other BACnet networks.
Public IP Address	0.0.0.0	Enter the public IP address in dotted decimal format of the IP router in the system.

BAS Router Additional Tables and Screens

Table or Screen Name	*Description*
Broadcast Distribution Table (BDT)	This table must contain the entries of any other BBMDs located on the network. The IP address and subnet mask of the BBMDs must be listed.
Foreign Device Table (FDT)	This table is automatically lists all the foreign devices that have registered with this router. Information includes IP address, port number, time-to-live, and remaining time on its lease.
Status Screen	Displays a log of events (automatically refreshed each second) to facilitate troubleshooting. Use this information when discussing any routing issues with Contemporary Controls' technical support.
Security Screen	Authentication menu. Allows the user to change user name and password. Depressing the Reset IP button restores user name and password to default settings.

BACnet Protocol Implementation Conformance (PIC) Statement

CONTEMPORARY CONTROLS

BASrouter

BACnet Multi-Network Router

BACnet Protocol Implementation Conformance Statement (Annex A)

Date: 15 February 2018
Vendor Name: Contemporary Controls
Product Name: BASrouter
Product Model Number: BASRT-B
Applications Software Version: 3.0.3 **Firmware Revision:** 3.0.3 **BACnet Protocol Revision:** 13

Product Description: The BASrouter from Contemporary Controls provides BACnet routing between BACnet/IP, MS/TP and ISO 8802-3 networks. It also supports BACnet Broadcast Management Device (BBMD) and Foreign Device Registration (FDR). By supporting two BACnet/IP UDP ports it can also assist BACnet messages in traversing NAT routers.

BACnet Standardized Device Profile (Annex L):
☒ **BACnet Router (B-RTR)**
☒ **BACnet Broadcast Management Device (B-BBMD)**

List all BACnet Interoperability Building Block Supported (Annex K):

DS-RP-B Data Sharing — ReadProperty – B	DS-RPM-B Data Sharing – ReadPropertyMultiple – B
DM-DOB-B Device Management — Dynamic Object Binding – B	DM-DDB-B Device Management — Dynamic Device Binding – B
NM-RC-B Network Management — Router Configuration – B	NM-BBMDC-B Network Management — BBMD Configuration – B

Segmentation Capability:
Segmentation is not supported.

Standard Object Types Supported:

Object Type Supported	Can Be Created Dynamically	Can Be Deleted Dynamically
Device	No	No

No optional properties are supported. **NOTE:** The above object is directed supported on the router. The router will pass to the appropriate network all BACnet communications not directed to the router.

Data Link Layer Options:
☒ BACnet IP, (Annex J) BACnet Broadcast Management Device (BBMD)
☒ BACnet IP, (Annex J), Network Address Translation (NAT Traversal)
☒ 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): 9600; 19,200; 38,400; 76,800
☐ 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:

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 — routing between BACnet/IP, ISO 8802-3, and MS/TP

Character Sets Supported:
Indicating support for multiple character sets does not imply that they can all be supported simultaneously.
☒ ISO 10646 UTF-8

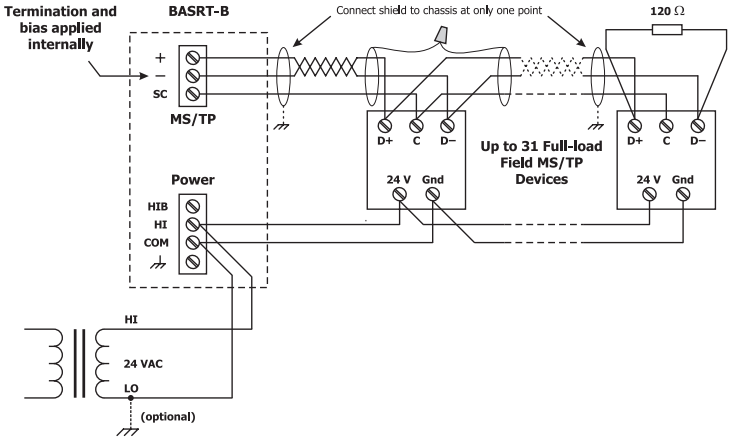
If this product is a communication gateway, describe the types of non-BACnet equipment/network(s) that the gateway supports:
No gateway support.

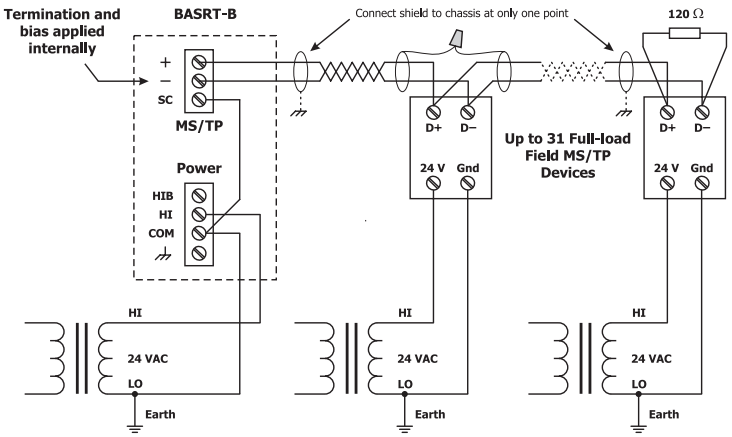
15 February 2018 PI-BASRTB00-AA1

Wiring Diagrams

Since the BAS Router incorporates a half-wave rectifier circuit, it can share the same 24 VAC power with other half-wave rectified devices. It can also be powered from a 24 VDC source. A redundant power connection exists for back-up power schemes.

The BAS Router incorporates a 3-wire optically-isolated EIA-485 interface for the MS/TP connection, allowing better circuit protection and noise immunity. To connect to other 3-wire devices simply make a one-to-one connection to the other devices. But when connecting to 2-wire non-isolated devices, the signal common (SC) on the BAS Router must share the reference used by the 2-wire devices. This is accomplished by tying the SC pin to COM on the BAS Router and by grounding the low-side of each power supply on all connected devices. In this way all EIA-485 transceivers share the same earth reference. Notice that the SC pin is signal common and not a shield pin.

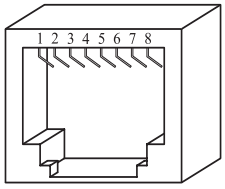




Connector Pin Assignments

Ethernet

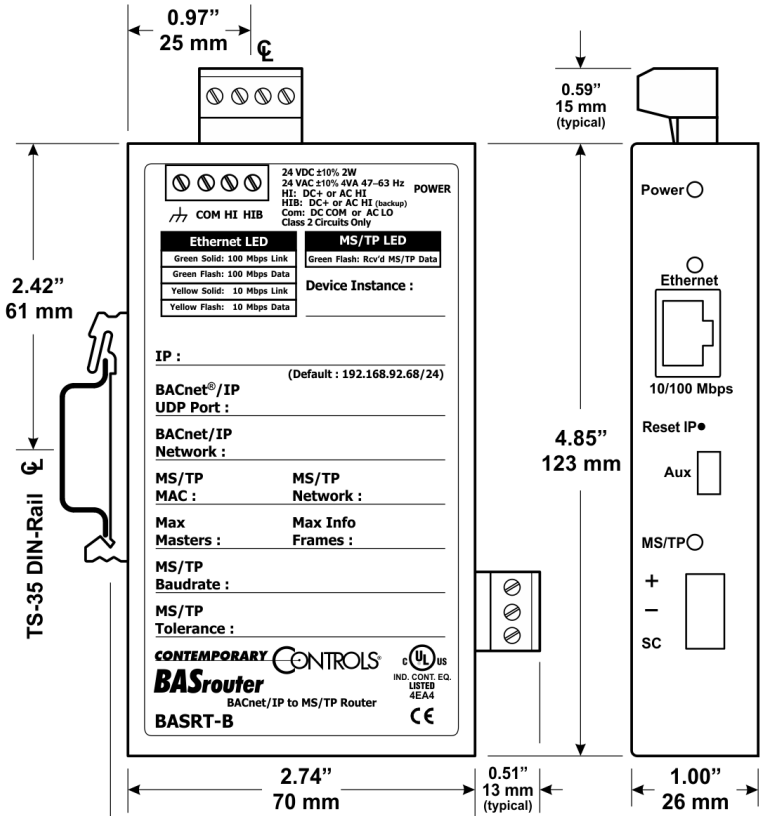
Pin	Function
1	Signal 1
2	Signal 2
3	Signal 3
4	N/C
5	N/C
6	Signal 4
7	N/C
8	N/C



MS/TP

Pin	Function
+	Signal High
–	Signal Low
SC	Signal Common

Mechanical Drawing



Specifications

Power Requirements	24 VDC ±10% 2 W or 24 VAC ±10% 4 VA 47–63 Hz	
Operating Temperature	–40°C to +75°C	
Storage Temperature	–40°C to +85°C	
Relative Humidity	10–95%, non-condensing	
Protection	IP30	
Ethernet Communications	IEEE 802.3 10/100 Mbps data rate 10BASE-T, 100BASE-TX physical layer 100 m (max) CAT5 cable length	
MS/TP Communications	ANSI/ASHRAE 135 (ISO 16484-5) 9600, 19200, 38400, 76800 bps data rate EIA-485 physical layer 1200 m (max) cable length	
LEDs	Power	Green = power OK
	Ethernet	Green = 100 Mbps Yellow = 10 Mbps Flash = activity
	MS/TP	Flashing Green = receive activity
Regulatory Compliance	CE Mark; CFR 47, Part 15 Class A; RoHS UL 508, C22.2 No. 142-M1987	

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Ordering Information

Model	***RoHS***	***Description***
BASRT-B	✔	BASrouter BACnet/IP to MS/TP to Ethernet DIN-Rail Mount

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