![SMC sierra monitor logo]

BACnet Router Start-up Guide

BAS Router (BACnet Multi-Network Router)

APPLICABILITY & EFFECTIVITY

Effective for all systems manufactured after February 2015

Driver Version:	2.08
Application Version:	0.10.1
Document Revision:	0

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1   BACNET ROUTER DESCRIPTION

The BACnet Router provides stand-alone routing between BACnet networks such as BACnet/IP, BACnet Ethernet, and BACnet MS/TP — thereby allowing the system integrator to mix BACnet network technologies within a single BACnet internetwork. There are three physical communication ports on the BAS Router. One is a 10/100 Mbps Ethernet port and the other two are RS-485 MS/TP ports. Configuration is accomplished via a web page.

2   CERTIFICATION

2.1   Specifications[1]

Available Ports	One 6-pin Phoenix connector, one RS-485 +/- ground port, power +/- frame ground port
	One 3-pin RS-485 Phoenix connector, one RS-485 +/- ground port
	One Ethernet-10/100 port
Power Requirements	Input Voltage: 9-30VDC or 12-24VAC
	Input Power Frequency 50/60 Hz.
	Power Rating: 2.5 Watts
	Current draw @ 12V, 150 mA
Approvals	TUV approved to UL 916 Standard
	RoHS Compliant
	FCC Part 15 Compliant
	OPC self-tested to conformance
	CE Mark
Surge Suppression	
EN61000-4-2 ESD EN61000-4-3 EMC EN61000-4-4 EFT	
Physical Dimensions(excluding the external power supply)	
(WxDxH):	5.05 x 2.91 x 1.6 in. (12.82 x 7.39 x 4.06 cm) excluding mounting tabs
Weight:	0.4 lbs (0.2 Kg)
Environment:	
Operating Temperature:	-40°C to 75°C (-40°F to167°F)
Humidity:	5 - 90% RH (non-condensing)

"This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions:

- This device may not cause harmful interference
- This device must accept any interference received, including interference that may cause undesired operation.

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[1] Specifications subject to change without notice

Note: This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his expense.

Modifications not expressly approved by FieldServer could void the user's authority to operate the equipment under FCC rules"

3   INSTALLING THE BACNET ROUTER

3.1   RS-485 Connection R1 Port

Connect to the 3-pin connector as shown.

The following Baud Rates are supported on the R1 Port:
110, 300, 600, 1200, 2400, 4800, 9600, 19200, 20833, 28800, 38400, 57600, 76800, 115200

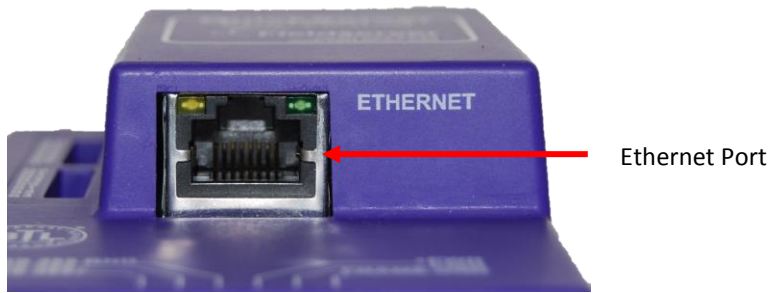### 3.2   RS-485 Connection R2 port

Connect to the 3 pins on the left-hand-side of the 6 pin connector as shown.

The following Baud Rates are supported on the R2 Port:
4800, 9600, 19200, 38400, 57600, 115200

### 3.3   10/100 Ethernet Connection port

Ethernet Port

The Ethernet Port is used both for BACnet Ethernet and BACnet/IP communications. It is also used for configuring the Router from a Web page. Follow the steps below to connect the Router to a BACnet network and optionally to a PC for configuration purposes:

- Connect an Ethernet cable between the PC and the BACnet Router or connect the BACnet Router and the PC to the Hub/switch using a straight Cat 5 cable.

- Disable any wireless Ethernet adapters on the PC/Laptop.

- Disable firewall and virus protection software .

4   OPERATION

4.1   Power up the device

Apply power to the device. Ensure that the power supply used complies with the specifications provided in Section 2.1. Ensure that the cable is grounded using the "Frame GND" terminal. The BACnet Router is factory set for 9-30VDC or 12-24VAC.
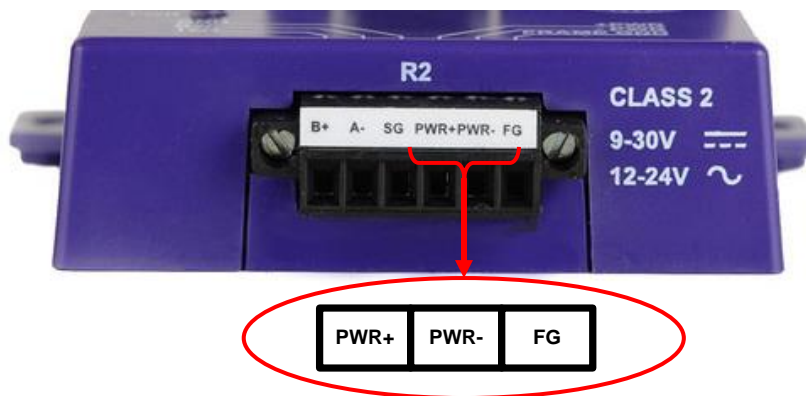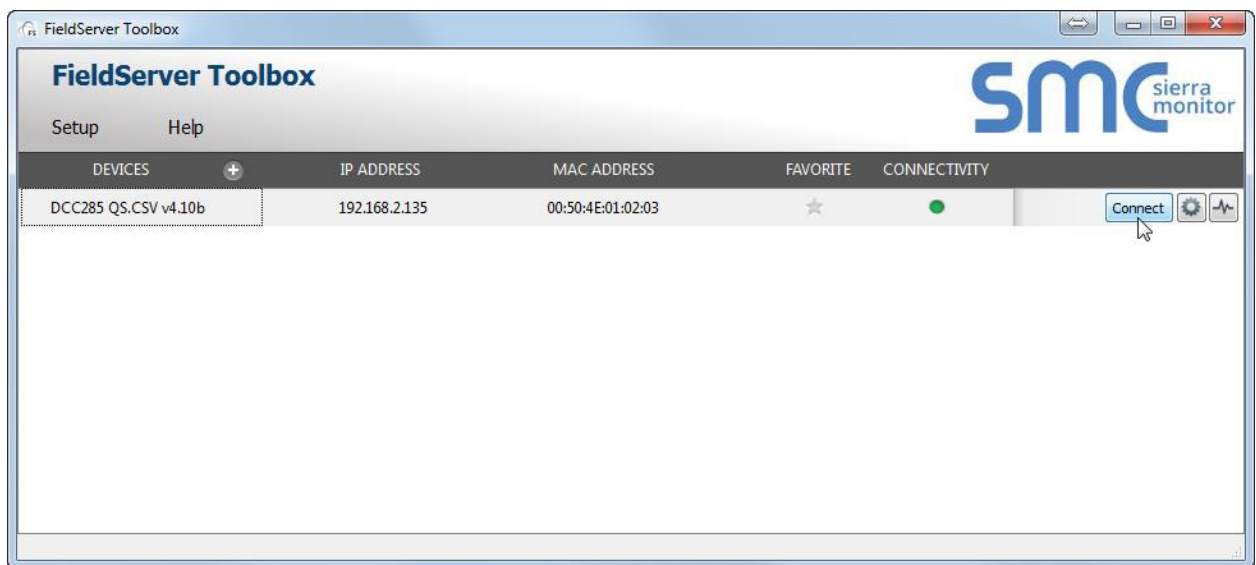
5   CONNECTING TO THE BACNET ROUTER

The FieldServer Toolbox Application can be used to discover and connect to the BACnet Router on a local area network. To connect to the BACnet Router over the Internet using Toolbox, add the Internet exposed IP address of the Router by clicking on the ➕ button, or alternatively enter the Internet exposed IP address in a Web Browser directly.

5.1   Using the FieldServer Toolbox

- Install the Toolbox application from the USB drive or get it from our website http://fieldserver.com/techsupport/utility/downloads.php

- Use the Toolbox application to find the BACnet Router, change the IP address detail if required and launch the Web GUI.

5.2   Using a Web Browser directly

- Open a Web Browser and connect to the BACnet Router's Default IP address. The Default IP Address of the BACnet Router is **192.168.2.101**, Subnet Mask is **255.255.255.0**

- If the PC and the BACnet Router are on different IP Networks, assign a Static IP Address to the PC on the 192.168.2.X network.
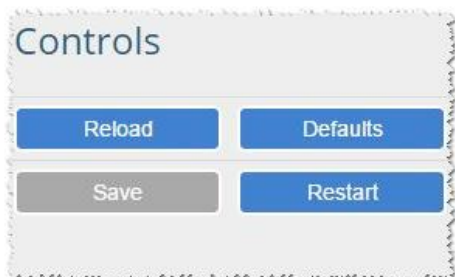
6   CONFIGURING THE BACNET ROUTER

6.1   Settings

6.1.1   Button functions

- Save - write the currently displayed settings to the device. A restart will be required to apply the updated settings.

- Reload - discard the currently displayed settings and reload the settings stored on the device. This will undo any unsaved edits.

- Defaults - discard the currently displayed settings and load default settings. This must still be saved and the device must be restarted for the default settings to be applied.

- Restart - restarts the device.

6.1.2   Network Settings

The IP settings for the Router are also used by both BACnet/IP connections. The IP settings can be changed in the Network Settings section as shown.

6.1.3   All connections

- Network Number - set up the BACnet network number for the connection. Legal values are 1-65534. Each network number must be unique across the entire BACnet internetwork.

- Enable - enable or disable the connection; note that BACnet/IP Primary is always enabled.

6.1.4   BACnet IP Primary

- Device Instance and Device Name - A BACnet Router must provide a Device Object. Configure its name and Instance Number here. Take care to select a Device Instance Number that is unique across the entire BACnet internetwork.

- IP Port - the BACnet/IP default is 47808 (0xBAC0), but a different port number may be specified here.

6.1.5 BACnet IP Secondary

- Enable BBMD - select this checkbox to enable the Router to act as a BBMD.

- Public IP Address and Port - if the BBMD is being accessed across a NAT Router, then these values must be configured with the public IP address and Port by which the BBMD can be reached from across the NAT Router. The Public IP Address and Port would also be used in the BDT of remote BBMD's that need to reach this BBMD across the NAT Router. If no NAT Router is being used, these fields can be left blank.

- IP Port - this MUST be different to the IP Port used on the BACnet IP Primary connection. Default is 47809 (0xBAC1).

6.1.6 BACnet MSTP

- Max_Info_Frames - the number of transactions the Router may initiate while it has the MSTP token. Default is 50.

- Max_Master - the highest MAC address to scan for other MSTP master devices. The default of 127 is guaranteed to discover all other MSTP master devices on the network.

- MAC Address - legal values are 0..127, must be unique on the physical network

- Baud Rate - the serial baud rate used on the network.

- Token Usage Timeout (ms) - the number of milliseconds the router will wait before deciding that another master has dropped the MSTP token. This value must be between 20ms and 100ms. Choose a larger value to improve reliability when working with slow MSTP devices that may not be able to meet strict timing specifications.

6.2   Diagnostics

By clicking on the Diagnostics tab all the connection communication details can be viewed to ensure the BACnet Router is working correctly.

6.2.1   DeviceFind™

The Diagnostics page offers a DeviceFind™ function for listing BACnet devices that are visible to the Router. A configurable Who-Is broadcast is sent out when the 'Start' button is pressed, and I-Am responses received back from the field are listed, along with the name of the Router Port by which each device can be reached.

DeviceFind™ is limited to 300 devices. There may be more devices on a large BACnet network, and the Who-Is request can be limited to devices of interest by configuring discovery parameters.

The following fields exist for configuring the Who-Is broadcast. All are optional.

- Low Device Instance - sets a low limit for the Device Instance. Devices with a lower instance number will ignore the Who-Is request
- High Device Instance - sets a high limit for the Device Instance. Devices with a higher instance number will ignore the Who-Is request
- Network - broadcasts the Who-Is request only on the BACnet network segment with the specified network number. This depends on the router being able to find the specified network.

DeviceFind^{TM} is performed by the device object configured on the Router. Since this device is bound locally to the BACnet IP Primary segment, all devices present on this BACnet segment will appear as local devices with network number 0. Also, to discover only the devices present on this BACnet segment, set the Network parameter to 0.

6.2.1.1   Export Button:

This button appears when some devices have been discovered. The user may click this button to save the list of discovered devices to a file called "BACnet Devices.csv".

Appendix A Useful Features

Appendix A.1. Tooltips

Tooltips appear when the mouse pointer hovers over the corresponding settings field. A balloon will appear giving a description of that input field. This applies to all input fields except Network Settings input fields.

Parameter	Corresponding Tooltips
IP Address	Configure the IP Address used by BACnet/IP and the web server.
Netmask	Configure the Netmask used by BACnet/IP and the web server.
Default Gateway	Configure the Default Gateway used by BACnet/IP and the web server.
DHCP Client	Note that the IP Address may change and you may need to rediscover the router if the DHCP Client is enabled.
DHCP Server	Note that the DHCP Server becomes inactive if another DHCP Server is detected on the network.
Network Number	Enter a value between 1 and 65534 that is unique across the entire BACnet network.
IP Port	The IP Port number to be used for this BACnet/IP connection. Common values: 47808, 47809.
Device Instance	Enter a value between 0 and 4194302. The Device Instance must be unique across the entire BACnet network.
Device Name	Enter a name for the Device. The name may not contain any commas.
Device Location	Enter a location for the Device. The location may not contain any commas.
MAC Address	Enter a value between 0 and 127 that is unique for this MS/TP segment.
Max_Master	Sets the highest allowable address for MS/TP master nodes on the network. Set a value between 0 and 127.
Max_Info_Frames	The number of frames that can be sent by this device during a single token hold. Set a value between 1 and 100.
Token Usage Timeout (ms)	Set a larger value to improve network reliability with slow devices.

Appendix B Limited 2 year Warranty

Sierra Monitor Corporation warrants its products to be free from defects in workmanship or material under normal use and service for two years after date of shipment. Sierra Monitor Corporation will repair or replace any equipment found to be defective during the warranty period. Final determination of the nature and responsibility for defective or damaged equipment will be made by Sierra Monitor Corporation personnel.

All warranties hereunder are contingent upon proper use in the application for which the product was intended and do not cover products which have been modified or repaired without Sierra Monitor Corporation's approval or which have been subjected to accident, improper maintenance, installation or application, or on which original identification marks have been removed or altered. This Limited Warranty also will not apply to interconnecting cables or wires, consumables or to any damage resulting from battery leakage.

In all cases Sierra Monitor Corporation's responsibility and liability under this warranty shall be limited to the cost of the equipment. The purchaser must obtain shipping instructions for the prepaid return of any item under this warranty provision and compliance with such instruction shall be a condition of this warranty.

Except for the express warranty stated above, Sierra Monitor Corporation disclaims all warranties with regard to the products sold hereunder including all implied warranties of merchantability and fitness and the express warranties stated herein are in lieu of all obligations or liabilities on the part of Sierra Monitor Corporation for damages including, but not limited to, consequential damages arising out of/or in connection with the use or performance of the product.