SAGE® BS Digital Hot Water System Monitoring Installation, Operation, and Maintenance Manual

SAGE® BS has been supplied for this application based upon information provided to Armstrong at the time the order was placed.

SAGE® BS has been specifically configured for this application based upon the information provided. For further assistance, please call our technical department Toll Free at 1-888-468-4673.

Model Number: _____

Serial Number: _____

Ship Date: _____

Please read and save these instructions.

503-EN

Contents

Disclaimer

Armstrong does not assume any liability arising from the use of this product. SAGE® BS is capable of monitoring hot water system temperatures, pressures and flows and communicate the standard alarm conditions and error messages available with Armstrong's The Brain® Digital Recirculating Valve (DRV).

Armstrong does not assume any liability or responsibility for the failure to monitor the hot water system or communicate any information which may result in personal injury, death or property damage.

Installation

This manual provides a technical description of the hardware and software operation for the Sage® BS Digital Hot Water Monitoring System.

SAGE® BS is a Digital Hot Water Management System console optionally supplied with DRV (Digital Recirculating Valves) and DRV-based Digital Mixing Centers and DRV-based Digital-Flo® water heater packages.

SAGE® BS is required for SAGE® monitoring service.

SAGE® BS is factory configured to monitor system measurements with a built-in web browser graphical interface server.

SAGE® BS can also communicate with an external Building Automation System (BAS) or Human Machine Interface (HMI) using Modbus RTU or optional BACnet™ MSTP, BACnet™ IP, Metasys N2, Modbus TCP/IP, and LonWorks® protocols with the appropriate Protocessor.

All of the standard alarm conditions and error messages available through the DRV are also available through SAGE® BS.

SAGE® BS includes remote hot water supply, cold/recirculation water supply and blended water outlet temperature readings from the DRV's internal thermistors. SAGE® BS also provides the ability to remotely change blended water outlet temperature set point. Included with SAGE® BS are several valve/system graphics.

SAGE® BS includes connections for eleven 4-20 mA inputs and two 8-bit counter inputs for pulse-type flow meters. COM ports include: one RS-485 port for communication with the DRV (labeled ST5), and one DB9 Modbus RTU port (CN1). A ProtoCessor communication module socket (MOD2), modem socket (MOD1), RJ-11 port (JK2), RJ-45 ethernet port (JK1), and SD/MMC card slot (SOK2 MMC) are also included.

SAGE® BS field sensor data is stored in a Microsoft Excel compatible XML formatted log on the SD card. Users can monitor sensor readings and control the valve using the optional cloud based Sage monitoring service or with an external system communicating with SAGE® BS using Modbus, Metasys N2, BACnet™ or LonWorks® protocol.

Hardware

An overview of the SAGE® BS board is shown in Figure 2-1.

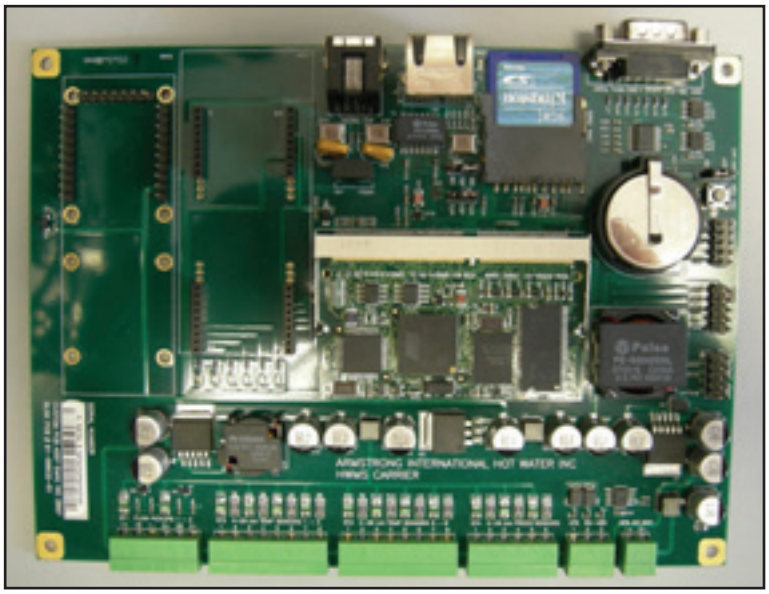

Figure 2-1. SAGE® BS Board (Top View)

Power

SAGE® BS is supplied completely pre-wired to an 85-264VAC 50-60Hz switching 24VDC power supply.

SD Card

The SAGE® BS board provides an SD card slot for data storage. Standard SD cards formatted to ext3 can be used in this slot 3. If the SD card is missing, corrupted, or read-only, SAGE® BS will not function properly.

Standby Battery

A 3V standby battery is provided on the SAGE® BS board to provide power to the real-time clock. This allows the system to hold the date and time when the board is not connected to external power. The standby battery is connected through a jumper JB1 which allows battery backup to be disconnected from the circuit. If the system is in storage with the battery installed, setting this jumper to the OFF position will extend battery life. JB1 is sent out from the factory in the OFF position. Figure 3-1 shows the standby battery jumper JB1 in the ON position.

Figure 3-1. Standby Battery Jumper JB1

Protocessor Socket

A socket is provided on the board for a Protocessor module which enables communication with BACnet™, LonWorks®, and Metasys N2. If the software is configured properly to use the Protocessor module, simply plug the Protocessor into the male header on MOD2 with the SAGE® BS powered off. Failing to remove power from the SAGE® BS before installing the ProtoCessor may result in product damage. The socket for the Protocessor is shown in Figure 3-2.

Modem Socket

A modem socket is also available on the board at location MOD1. This can be seen in Figure 3-2. If used, a multitech modem can be inserted into this socket to provide dial out networking communications through the telecommunications port on the board, JK2.

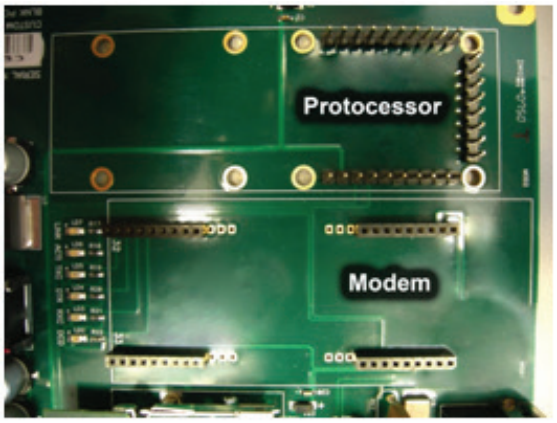

Figure 3-2. Protocessor and Modem Sockets

Ethernet

The SAGE® BS board uses Ethernet to access the local network. This interface is capable of connecting to 10BASE-T or 100BASE-TX networks.

Sensor and Valve Connections

For DRV interface, the SAGE® BS carrier board must be connected to the DRV's PCB via the ST5 port. Removable screw terminals are provided for these connections.

Figure 3-3 shows the locations of the field sensor connections: two (2) pulse-type flow meter connections labeled ST1, eight (8) 4-20mA temperature sensor connections labeled ST2 and ST3 and three (3) 4-20mA pressure transducer connections labeled ST4. As a result, some of the sensor inputs may not be used. **Reference Figure 7-1 for wiring schematic.**

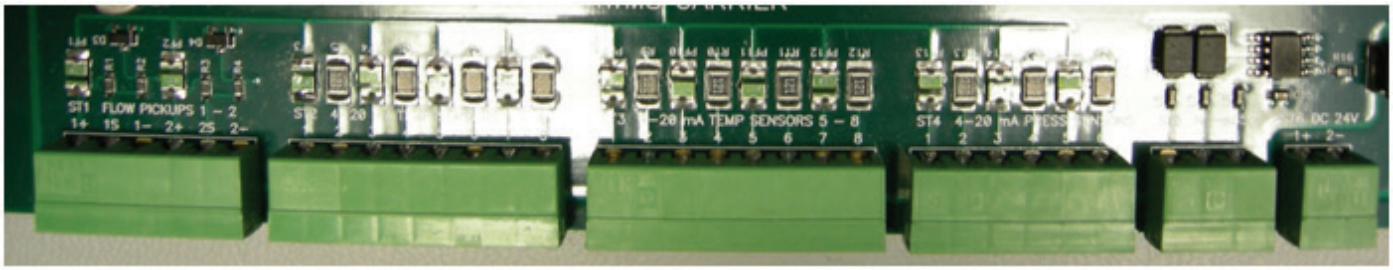

Figure 3-3. Sensor and Valve Connection Terminals

SAGE® BS Control Wiring

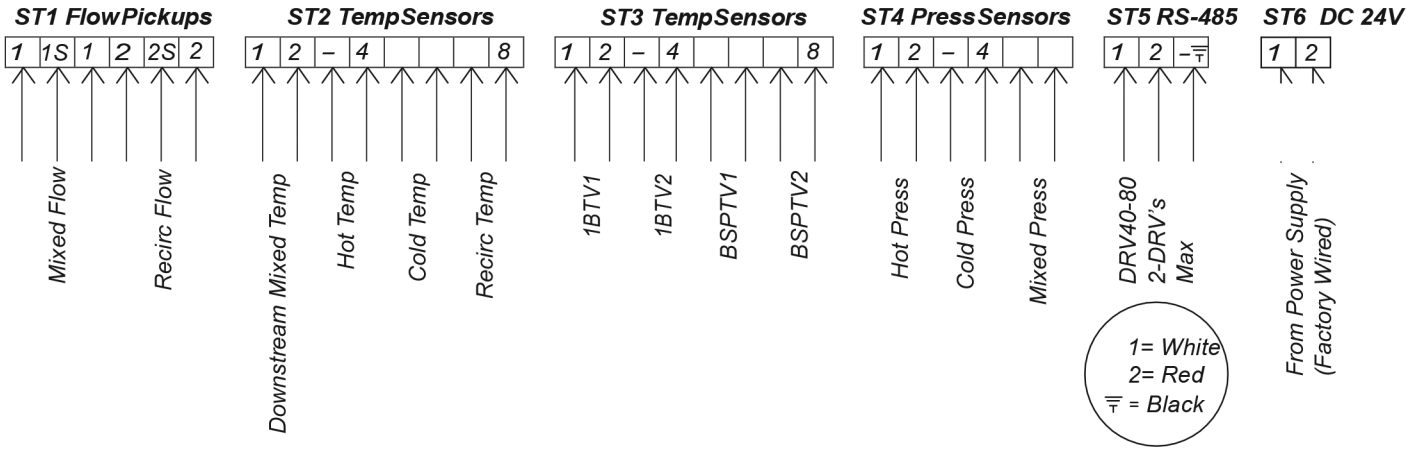

Figure 4-1.

Six removable screw terminals are provided with the SAGE® BS board. Each connector should be inserted into one of the ports above that matches the number of connections on the pluggable terminal. Be careful when inserting and removing the screw terminal plugs. Never pull directly on the wires connected to a plug. To insert a wire into a connector, use a screwdriver to loosen the screw on the terminal, insert the wire, and hand tighten the screw.

Note: The DRV data cable is provided with SAGE® BS designed specifically for direct connection to the dedicated RS-485 connection to the DRV PCB.

Pin 1: RS-485 A (the white wire on DRV data cable).

Pin 2: RS-485 B (the red wire on DRV data cable).

Pin 3: Ground, the black wire on DRV data cable.

Configuration, monitoring and data collection using web browser interface

A standard computer web browser is used to configure SAGE® BS and the DRV valve(s).

Configuration, monitoring and data collection using web browser interface

A standard computer web browser is used to configure SAGE® BS and the DRV valve(s).

Login Page

The login page is the index page for the web server. Users are required to login through this page before they will be allowed to access any other pages in the SAGE® BS web interface. A screenshot of this page is shown in Figure 5-1.

To login, connect a computer's Ethernet port to the SAGE® BS Ethernet port with a standard ethernet cable. Set your computer's IPV4 TCP/IP settings to the following:

IP: 172.16.31.2
Subnet: 255.255.0.0
Gateway: 172.16.31.201

In a web browser, access https://172.16.31.201
To login, the default admin-level access is
username: admin
password: admin

SAGE® BS Default IP Settings:

Static IP: 172.16.31.201
Subnet Mask: 255.255.0.0
Gateway: 172.16.254.1
Primary DNS: 172.16.8.66
Secondary DNS: 172.16.8.67

A step by step instruction set can be found on page 18.

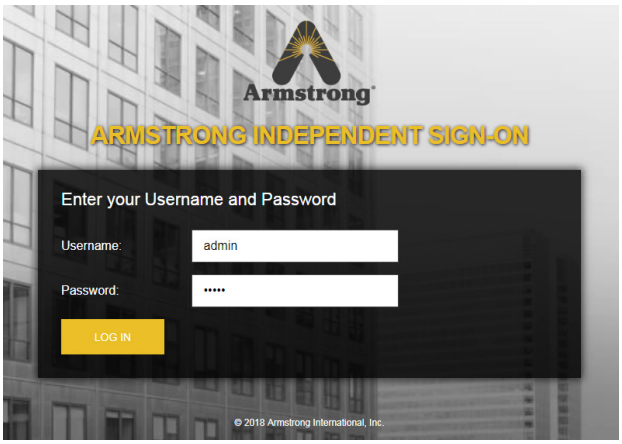

Figure 5-1. SAGE® BS Login

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armstronginternational.com

Login Page – continued

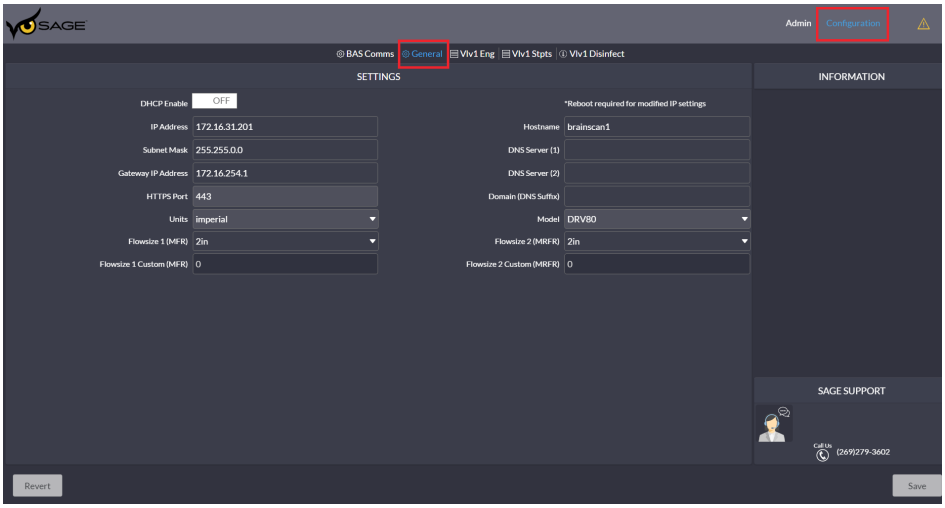
Configuration General

Set IP information:

- Input IP Address, Subnet Mask, Gateway IP Address, etc.

Set DRV Configuration:

- Select the model of DRV (single DRV or multiple DRV configuration) that SAGE® BS is connected to
- Press “Save”



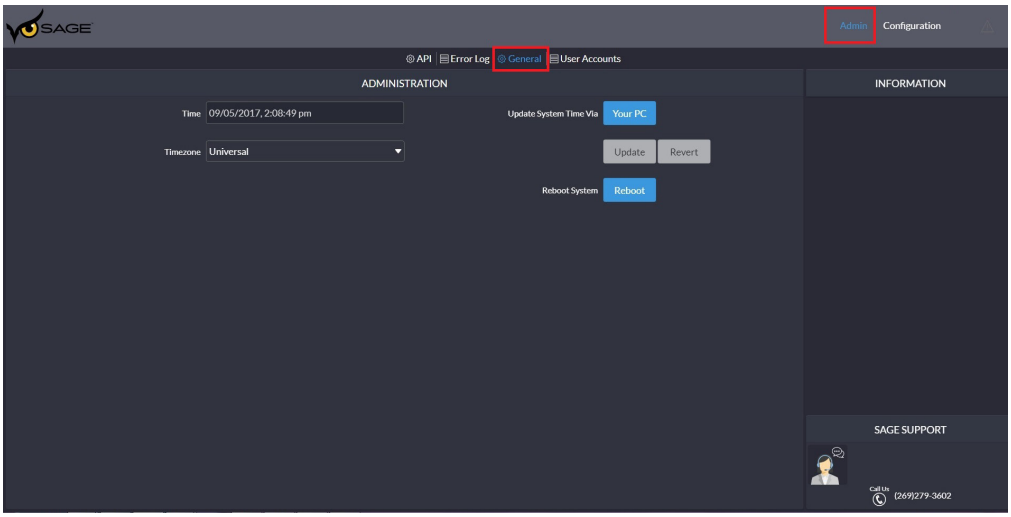
Administrative Configuration General

Step 1: Set current date and time

- Select time and date parameters by ‘Your PC”
- Press “update”

Step 2: Update valve configuration

- For a second valve to be viewed, one valve must be set to alternate
- Remove power from the desired 1st valve
- Leave valve address toggle to 1 and press “Toggle”
- “Reboot” for changes to take affect
- Repower valve 1



BAS Comms Configuration

SAGE® BS provides several options for Building Automation Systems (BAS) interface. The options are enabled by the installation of a specific Protocessor and settings in the SAGE® BS Comms Configuration page. Protocessors are not sent with SAGE® BS unless the Installation Detail Form (IDF) has been provided to Armstrong at the time of order. If a Protocessor is needed, but was not provided, please contact your local factory representative.

Two different types of Protocessors are available. Refer to Table 11-1 for the protocols provided by each.

The Protocessor plugs into the MOD2 socket on the SAGE® BS circuit board. This socket is shown in Figure 3-2 on page 3.

The required network connection(s) for each device are described below.

Protocessor Module	Supported Protocols
FPC-ED2	BACnet™ IP, BACnet™ MSTP, Modbus TCP, Metasys N2
FPC-F04	LonWorks®

Table 11-1. BAS Protocols Provided by Protocessor Modules.

Modbus

Modbus is a standard protocol for process control and building automation systems. The physical connection uses the CN1 DB9 connector which is a configurable RS-232/422/485 serial port.

The default mode is RS-232, and configuration is controlled in the configuration software. CN1 is used for the Modbus interface when configured in the software. In this case, it will automatically be placed in RS-422/485 mode. See Table 11-2 for connections to an external RS-422/485 network. To use the device in two-wire RS-485 mode, jumper 422 TX+ to 422RX+ and jumper 422TX- to 422RX-.

Note: There are no jumper terminating resistors or pullup resistors in this port. Depending on the network used, terminating or pull-up resistors may need to be installed externally.

Terminating resistors of 120 W are recommended only on the two end nodes of a multi-drop RS-422/485 network between the positive and negative differential pairs. Pull-up resistors may be used on some nodes as well to keep the data lines at a neutral state when the drivers on the network are in a high impendence state. Armstrong recommends using 560 W resistors to pull the positive data lines to 5 volts and same value to pull the negative data lines to the common ground.

120 W between 1 - 2 and between 3 - 4

560 W between 1 - 5 and between 4 - 5

560 W between 2 - 5 and between 3 - 5

The baud rate, slave id, and parity for the CN1 DB9 port are selectable through the BAS Comms Configuration page under “External Port”.

A register map of the Modbus interface shown on pages 8-9 is the same register map used for BACnet™ and LonWorks® except the map is offset by 1 (ex. register 0 is register 1). These registers must be configured in the customer’s system as “Holding” registers not as “Input” registers.

Pin	Name
1	BACnet™ IP, BACnet™ MSTP, Modbus TCP, Metasys N2
2	232RX/422TX+/485B
3	232TX/422RX+
4	422RX-
5	GND
6	NC
7	232RTS
8	232CTS
9	NC

Table 11-2. CN1 DB9 Pin-Out

For RS-485 mode, jump pins 1 to 4 and pins 2 to 3.

Modbus Register Map

Register	Name	Type	Description	Read / Write Access
0	update	integer	force refresh of valve configuration data	Write Only
1	ret_code	integer	return code of last valve command (See Fig 14-1 for more information)	Read Only
2	spv1	integer	valve 1 setpoint	Read Only
3	hitv1	integer	valve 1 hot inlet temp	Read Only
4	citv1	integer	valve 1 cold inlet temp	Read Only
5	otv1	integer	valve 1 outlet temp	Read Only
6	spv2	integer	valve 2 setpoint	Read Only
7	hitv2	integer	valve 2 hot inlet temp	Read Only
8	citv2	integer	valve 2 cold inlet temp	Read Only
9	otv2	integer	valve 2 outlet temp	Read Only
10*	mfr	integer	mixed flow rate	Read Only
11*	mrfr	integer	mixed return flow rate	Read Only
12*	dmt	integer	downstream mixed temp	Read Only
13*	ht	integer	hot water temp	Read Only
14*	ct	integer	cold water temp	Read Only
15*	mrt	integer	mixed return temp	Read Only
16*	ibtv1	integer	valve 1 inlet blended temp	Read Only
17*	ibtv2	integer	valve 2 inlet blended temp	Read Only
18*	bsptv1	integer	valve 1 blended setpoint	Read Only
19*	bsptv2	integer	valve 2 blended setpoint	Read Only
20*	hp	integer	hot water pressure	Read Only
21*	cp	integer	cold water pressure	Read Only
22*	dmp	integer	downstream mixed pressure	Read Only
23	v_select	integer	current valve selection	Read/write
24	v_state	integer	state of selected valve	Read/write
25	curr_sp	integer	current setpoint	Read/write
26	max_sp	integer	maximum setpoint	Read/write
27	def_sp	integer	default setpoint	Read/write
28	min_sp	integer	minimum setpoint	Read/write
29	al_above	integer	above temperature alarm	Read/write
30	al_below	integer	below temperature alarm	Read/write
31	al_error	integer	error temperature alarm	Read/write
32	serialno	integer	valve serial number	Read Only
33				
34	man_time	integer	valve manufacture time and date in seconds from the Unix epoch	Read Only
35				
36	fw_type	integer	valve firmware type	Read Only
37	fw_id	integer	valve firmware id	Read Only
38	units	integer	valve units	Read/write

* field sensors not installed by Armstrong International.

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armstronginternational.com

Modbus Register Map – continued

Register	Name	Type	Description	Read / Write Access
39	location	ASCII String	valve location represented as an ASCII string that is not necessarily null-terminated	Read/write
40				
41				
42				
43				
44				
45				
46				
47	dis_enable	integer	enable disinfection at the SAGE® BS level	Read/write
48	dis_timeout	integer	disinfection timeout in minutes	Read/write
49				
50	calib_num	integer	calibration number	Read/write
51	comm_time	integer	valve commission time and date in seconds from the Unix epoch	Read/write
52				
53	dis_on	integer	arm and trigger disinfection mode	Write Only
54	dis_cooldown	integer	set disinfection cooldown mode	Write Only
55	dis_id	integer	user id for last disinfection	Read/write
56	dis_time	integer	time and date of last disinfection in seconds from the Unix epoch	Read/write
57				
58	service_id	integer	user id for last service	Read/write
59	service_time	integer	time and date of last service in seconds from the Unix epoch	Read/write
60				
61	bs_units	integer	units for SAGE® BS system	Read/write
62	dev_type	integer	valve type for SAGE® BS operation	Read/write
63*	mfr_size	integer	mixed flow sensor size	Read/write
64*	mrfr_size	integer	mixed return flow sensor size	Read/write

* field sensors not installed by Armstrong International.

On the first read of the Modbus interface, all values are read from the sensors and the valve. On subsequent reads, only the valve prime data and sensor readings are updated. Valve configuration data such as the serial number, location, setpoint configuration, etc. are cached. When a write command is received for the update register, all values are re-read from the valve and updated. The actual value of the update register will not change with a write, and it does not matter what value is actually written to the register. If a configuration change is made to the valve from the Modbus interface, that particular section of values is automatically refreshed from the valve following the write command.

Modbus Register Map – continued

The return code register holds the value of the return code from the previous write or read command from the DRV. Zero indicates normal operation. The value of the return code is defined by the actual error codes returned from the DRV. All possible values are given in Figure 14-1.

Times and dates such as manufacture, commission, service, and disinfection date/time are represented by a 32-bit integer storing the number of seconds elapsed since midnight on January 1, 1970.

Writing any value to a date/time register will cause that field to be set to the current date/time. The only exception to this is the manufacture date/time register which has read only access.

The DRV and the SAGE® BS software can be set to use Fahrenheit or Celsius temperature units. Fahrenheit is represented by a 1, Celsius is represented by a 0 value. This is currently set in two separate registers. The units register controls the units setting in the DRV. This will only change the read out on the DRV LCD display. The bs_units register controls the units used by the SAGE® BS board and will be used for temperatures in all Modbus registers. To avoid confusion, make sure that the 'bs_units' and 'units' match.

The size of the flow meters is a configuration option specific to the SAGE® BS software.

The baud rate, slave id, and parity for the CN1 DB9 port are selectable through the configuration page.

Error Code	Description
0	OK
1	General OK value
2	Range error for analog to digital converter
3	Difference error
4	Comparator feedback error
5	Basic analog to digital converter error
6	Analog to digital converter timeout
7	Over temperature error
8	RAM checksum error
16	EE RAM error
32	Flash memory error
35	Welded contact
36	Open contact relay fault
37	General algorithm fault
40	General controller fault
41	Battery fault
45	General outlet error
50	Flow turbine error
60	Motor stuck error
70	Motor calibration error
80	Stack overrun error
90	Incorrect schedule phase
91	Incomplete message was received from controller
92	Invalid message was received from controller
93	A bad checksum was detected by the controller
94	A bad checksum was received from the controller
96	A timeout occurred contacting the valve

Table 14-1. Error Code Description

BACnet™

BACnet™ MSTP uses an RS-485 signaling interface. BACnet™ IP uses an ethernet network. The FPC-ED2 ProtoCessor module can provide both BACnet™ IP and BACnet™ MSTP as well as Modbus TCP at the same time.

Connect an Ethernet cable to the Ethernet port on the Protocessor module and connect this to the network to access BACnet™ IP and Modbus TCP. Connect the 3-wire RS-485 port on the Protocessor to the BACnet™ MSTP network to access the BACnet™ MSTP interface.

BACnet™ uses a node ID or instance ID for each device. This must be unique on the network. The default node ID for BACnet™ interfaces is:

BACnet™ MSTP: 12

BACnet™ IP: 11

The BACnet™ MAC address is factory set to 11. The default baud rate for the BACnet™ MSTP interface is 38400.

If these values need to be changed for a particular application, the ProtoCessor module can be configured in the BAS Comms Configuration page.

The Modbus TCP interface uses the same register map used for the Modbus RTU interface. Example of a BACnet™ Setup can be found on page 18.

LonWorks®

BACnet™ MSTP uses an RS-485 signaling interface. BACnet™ IP uses an ethernet network. The FPC-ED2 ProtoCessor module can provide both BACnet™ IP and BACnet™ MSTP as well as Modbus TCP at the same time.

Connect an Ethernet cable to the Ethernet port on the Protocessor module and connect this to the network to access BACnet™ IP and Modbus TCP. Connect the 3-wire RS-485 port on the Protocessor to the BACnet™ MSTP network to access the BACnet™ MSTP interface.

BACnet™ uses a node ID or instance ID for each device. This must be unique on the network. The default node ID for BACnet™ interfaces is:

BACnet™ MSTP: 12

BACnet™ IP: 11

The BACnet™ MAC address is factory set to 11. The default baud rate for the BACnet™ MSTP interface is 38400.

If these values need to be changed for a particular application, the ProtoCessor module can be configured in the BAS Comms Configuration page.

The Modbus TCP interface uses the same register map used for the Modbus RTU interface. Example of a BACnet™ Setup can be found on page 18.

Commissioning a LonWorks® Protocessor Using LonMaker

This section describes the process of commissioning a LonWorks® Protocessor using LonMaker. This software is available from Echelon Corporation. The edition used in the examples below is Standard TURBO Edition SR-A Release 3.2. A USB adapter is used to connect the PC to the FT-10 port on the Protocessor.

To begin, start LonMaker and open an existing network or open a new one using the network wizard. Connect the computer to the FT-10 port using a USB adapter and power up the SAGE® BS . Allow a few minutes for the ProtoCessor to boot. A new network is shown in Figure 15-1.

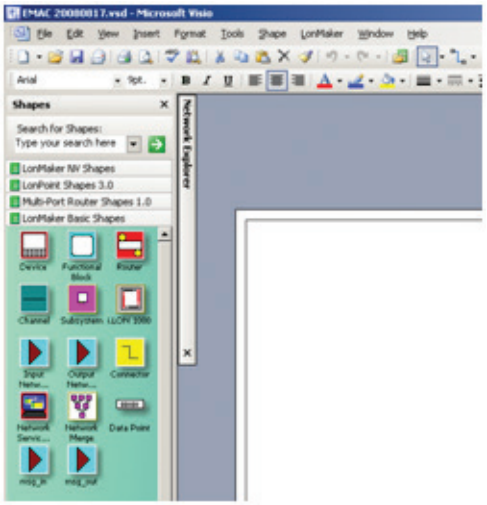


Table 15-1. LonMaker Blank Network

To commission the Protocessor, drag a new LonWorks® device from the left of the screen onto the new network drawing. This will start the New Device Wizard. Follow the instructions below to complete the device wizard.

The first screen of the wizard will allow you to name the device. Enter a name for the device and select create new device template. Set the channel to auto-detect.

This screen is shown in Figure 15-2.

The second screen sets the source for the external interface definition. This must be uploaded from the device. This screen is shown in Figure 15-3.

The third screen sets an optional description for the device as well as the ping interval. Pinging is not necessary and can be set to any value. This screen is shown in Figure 15-4.

The fourth screen is used to set the device identification method. This should be set to service pin. This screen is shown in Figure 15-5.

Table 15-2. Device Wizard Screen 1

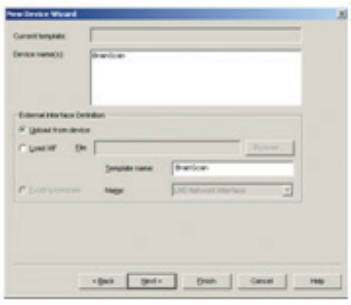


Table 15-3. Device Wizard Screen 2

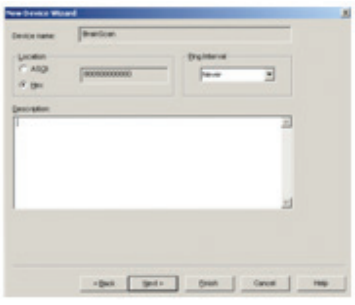


Table 15-4. Device Wizard Screen 3

Table 15-5. Device Wizard Screen 4

Commissioning a LonWorks® Protocessor Using LonMaker – continued

The fifth screen is used to set the application image. This should not be loaded. This screen is shown in Figure 18-1.

The sixth screen is used set the initial state of the device. The device should be set to Online. This screen is shown in Figure 18-2.

The wizard is finished after the sixth screen. The wizard will now prompt for the service pin to be pressed on the Protocessor. To ensure that the device is detected properly, select Display data from service pin before pressing the service pin (located next to the FT-10 port on the Protocessor). This screen is shown in Figure 18-3.

After pressing the service pin on the Protocessor, the device data screen will be displayed as shown in Figure 18-4.

Press OK to let LonMaker commission the device. Once this is complete, the device has been commissioned and can be managed using LonMaker and added to the network.

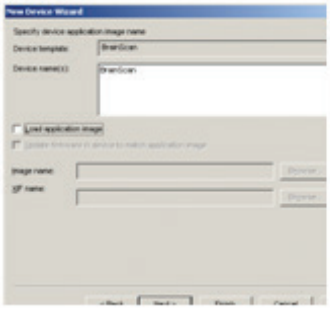
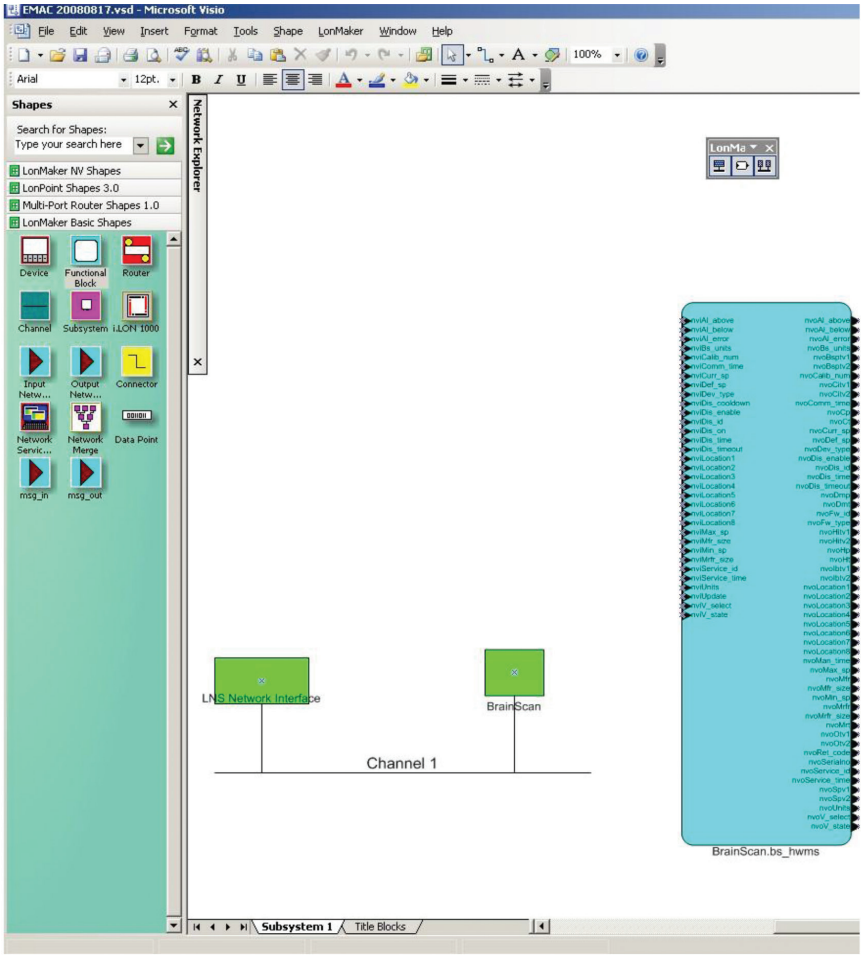


Table 16-1. Device Wizard Screen 5

Table 16-2. Device Wizard Screen 6

Table 16-3. Service Pin Prompt

Table 16-4. Service Pin Data



After successfully commissioning the device, a new functional block can be added to the network and associated with SAGE® BS

Input and output variables can then be added manually as needed or all variables can be added to the new functional block automatically.

A functional block with all variables added is shown in Figure 16-5.

Table 16-5. LonMaker SAGE® BS Functional Block

Accessing SAGE® BS via the Ethernet

The following will explain the procedure to access the SAGE® BS board through an Ethernet connection to a Windows PC/Laptop. This is required in order to change default settings or to access data.

Note: This is assuming that SAGE® BS IP address has NOT been changed from original factory default settings.

Tools Required:

- Ethernet Cable
- Computer with Admin access (Windows Operating System)

Replacement Process/Steps:

1. Ensure not currently connected to internet before starting (local area or wireless)
2. Click Start → Control Panel → Network and Sharing Center

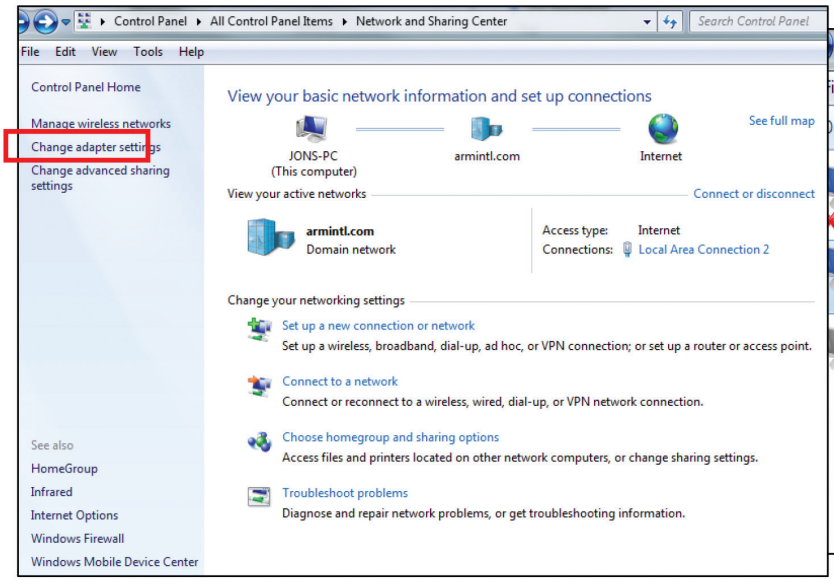


Figure 1: "Change adapter settings" Window

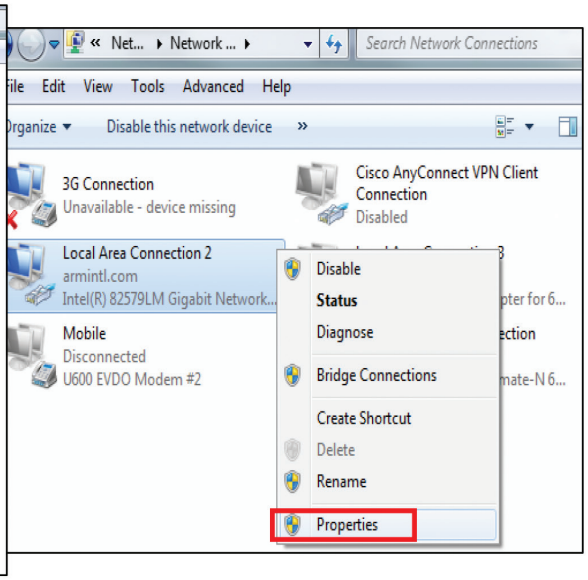


Table Figure 2: Local Area Connection Window

3. Click "Change adapter settings" on the left side of the window **(see Figure 1)**.
4. Right mouse click your network adapter and then click "Properties" **(see Figure 2)**.

Accessing SAGE® BS via the Ethernet – continued

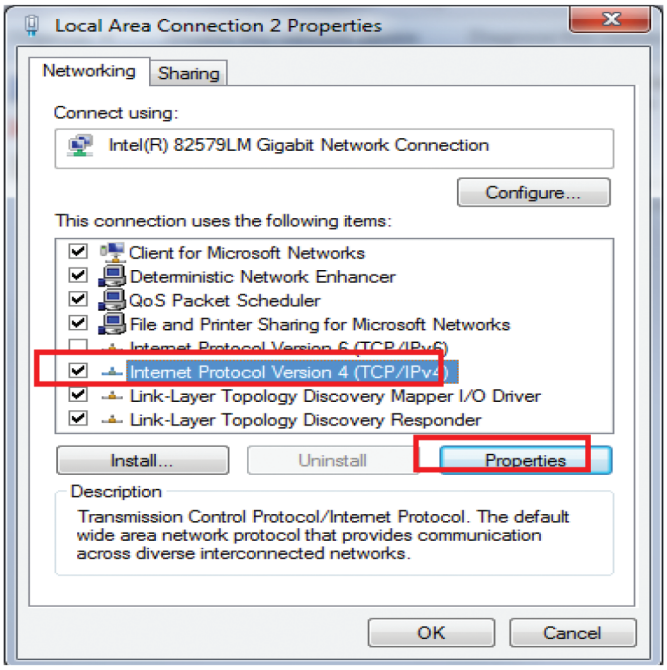


Figure 3: Internet Protocol

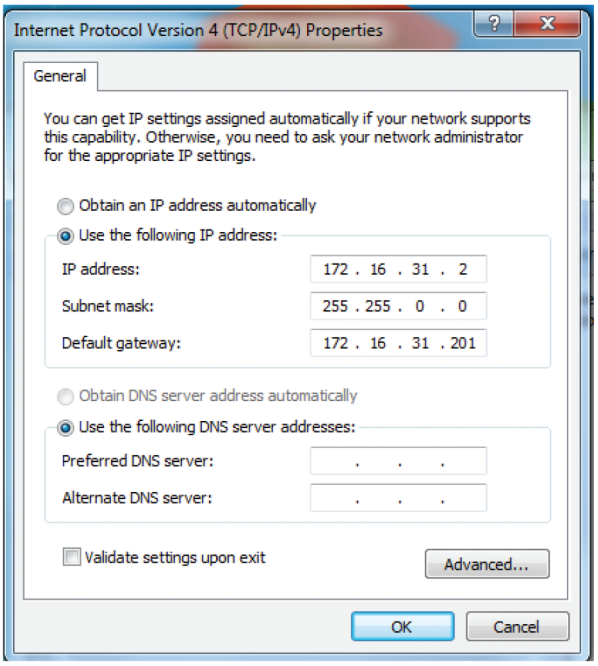
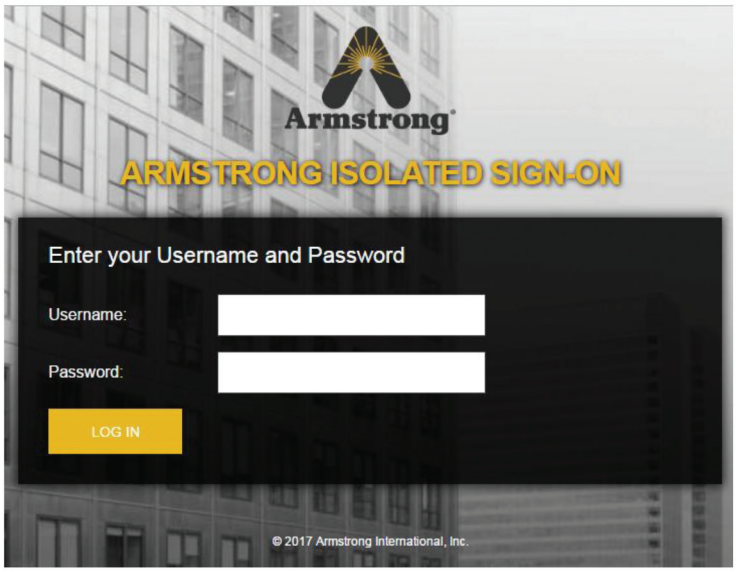


Figure 4: TCP/IPv4 Window

5. Select "Internet Protocol Version 4 (TCP/IPv4)" and then click "Properties" (see Figure 3)
   a. **Note** – do NOT uncheck the box, simply click the title
6. Select "Use the following IP address:" and fill out the boxes as shown above (see Figure 4)
7. Click OK and exit both "TCP/IPv4" window as well as "Local Area Connection" window

Open web-browser and access the following address – https://172.16.31.201



Username: admin

Password: admin

Configuring SAGE® for specific BAS BACnet™ Settings

The following will explain the procedure to configure SAGE® for specific Building Automation System (i.e. BAS) protocol settings for the BACnet™ MSTP, BACnet™ IP or BACnet™ Metasys N2 protocols.

In order to successfully connect to and utilize the BACnet™ protocol via the Sage system there needs to be a BACnet™ specific ProtoCessor module plugged into the SAGE® BS board (see Figure 1). This would have either been specified at time of order and subsequently shipped already installed OR would have been requested after the order and thus shipped out and installed onsite.

Tools Required:

- Ethernet Cable
- Computer with Admin access (Windows Operating System)
- **Sierra Monitor Field Server Toolbox**

Replacement Process/Steps:

1. Before proceeding, follow all steps shown on page 14-15; this will allow you to connect to the SAGE® web browser and continue with the steps below
2. Once connected to the SAGE® GUI select BAS Comms

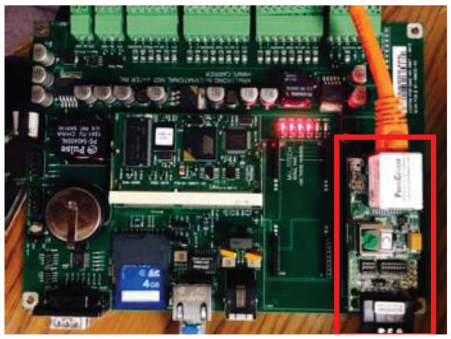


Figure 1: ProtoCessor Module

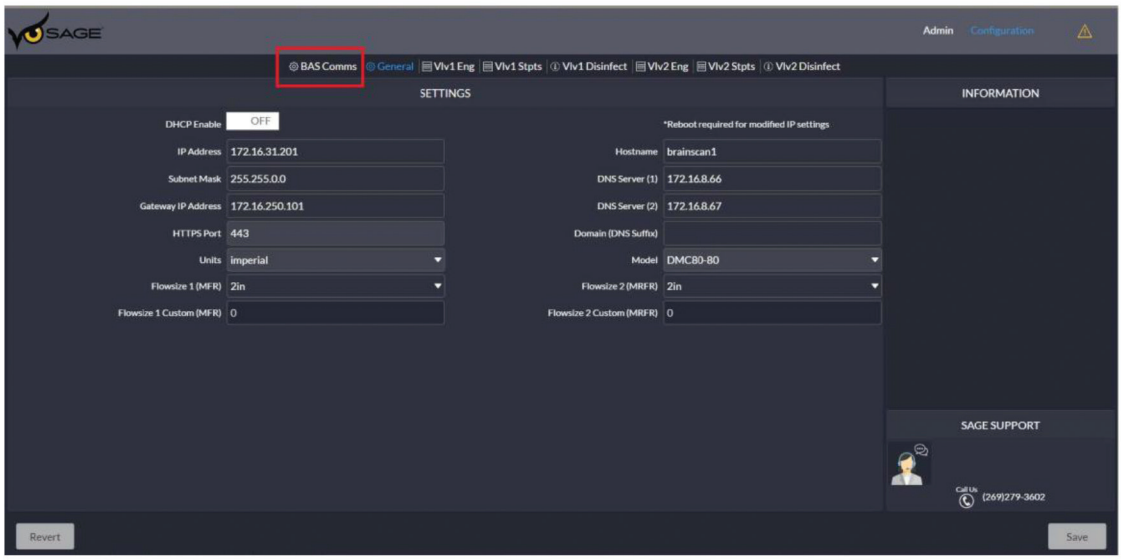


Figure 2: Initial System Graphic Page

Configuring SAGE® for specific BAS BACnet™ Settings – continued

3. Ensure **Protocessor Port State** is **on** and **Protocessor Port Baud Rate** is set for **38400**. **(see Figure 3)**; do not change these

4. If **BACnet™ IP** is the desired protocol change the following to the specific settings
   - **'Type' = BACnet™/Modbus**
   - **Node ID = 1-60000**
     - Aka 'Instance'
   - **Modbus TCP ID = Leave as is**

5. If **BACnet™ MSTP** is the desired protocol change the following to the specific settings
   - **'Type' = BACnet™/Modbus**
   - **MAC Address = 1-127**
   - **Node ID = 1-60000**
     - Aka 'Instance'
   - Modbus TCP
     ID = Leave as is

6. If **BACnet™ Metasys N2** is the desired protocol change the following to the specific settings
   - **'Type' = Metasys N2**
   - MAC Address = Leave as is
   - **Node ID = 1-127**
     - Aka 'Instance'
   - Modbus TCP ID = Leave as is

7. Go to ProtoCessor Module & set 'B' bank of dip switches per the required baud rate (see Figure 4)
   Note: if BACnet™ IP dip switches can remain defaulted

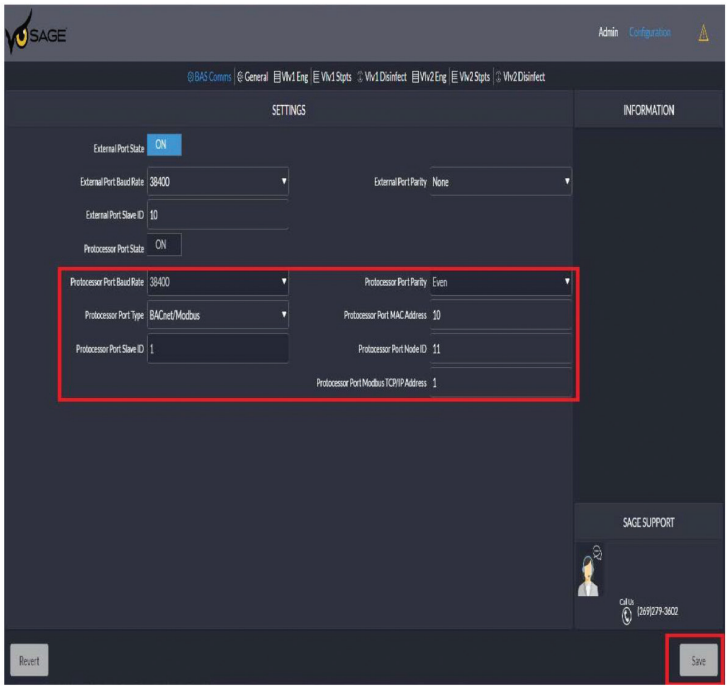


Figure 3: Admin Configuration Page

Configuring SAGE® for specific BAS BACnet™ Settings – continued

- The following are the dip switch baud rate settings ('On' is denoted on dip switch bank):

B1	B2	B3	B4	Baud
Off	Off	Off	Off	Auto
On	On	On	Off	9600
Off	Off	Off	On	19200
On	On	Off	On	38400
On	Off	On	On	76800
Off	On	On	On	115200

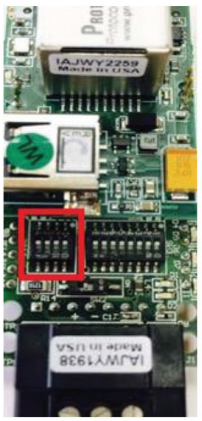
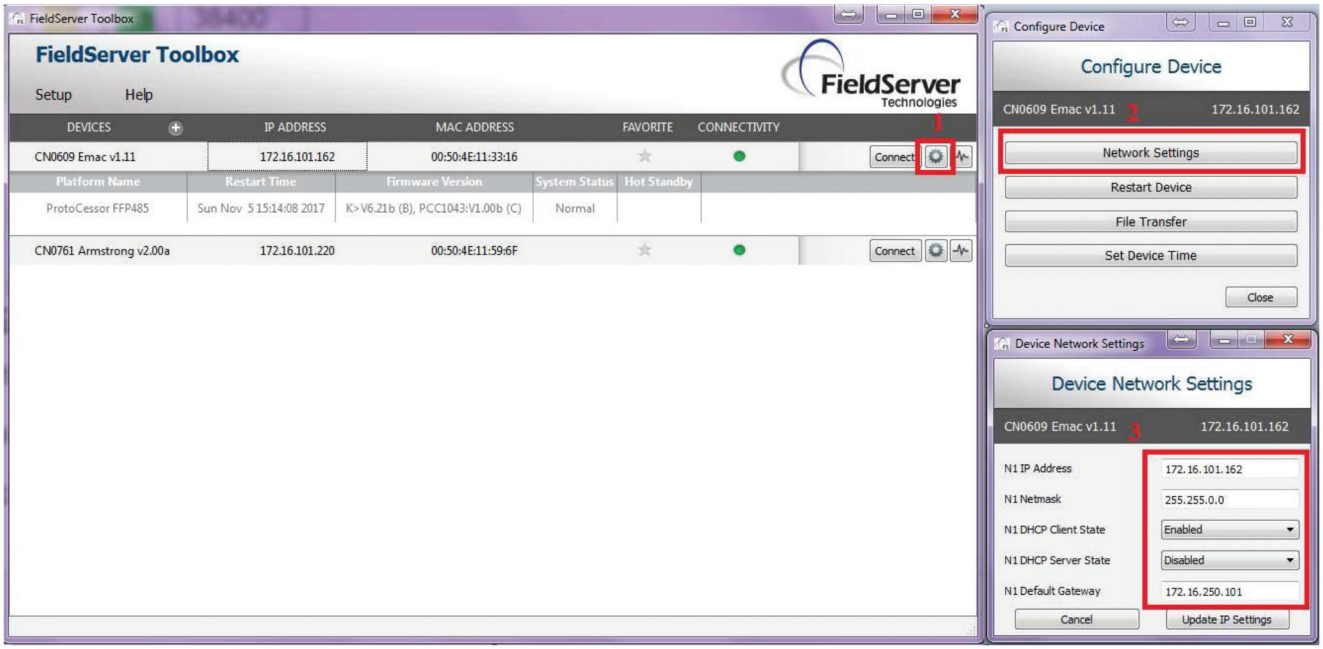


Figure 4: ProtoCessor Dip Switch's

8. Click '**Save**'
9. After clicking '**Save**'; SAGE® will update showing the changes that have been made.
10. You are now done & should be able to bring the register map points in to the BAS protocol system. **If the protocol is BACnet™ IP continue on.**
11. Plug into the ethernet connector of the protocessor with your ethernet cable.
    a. Open Fieldserver Toolbox and wait for the software to find your protocessor.
    b. Once found click on the settings icon (1).
    c. Choose network settings (2) and input your desired values (3).
    d. Select update IP settings.



Configuring SAGE® BS for BAS LonWorks®

The following will explain the procedure to configure SAGE® BS for specific Building Automation System (i.e. BAS) protocol settings for the LonWorks® protocol.

In order to successfully connect to and utilize the LonWorks® protocol via the SAGE® BS system there needs to be a LonWorks® specific ProtoCessor module plugged into the SAGE® BS board (see Figure 1). This would have either been specified at time of order and subsequently shipped already installed OR would have been requested after the order and thus shipped out and installed onsite.

Tools Required:

- Ethernet Cable
- Computer with Admin access (Windows Operating System)

Process/Steps:

1. Once connected to the SAGE® BS web browser and the initial system graphic page is up click on the icon labeled '**BAS Comms**' **(see Figure 2)**

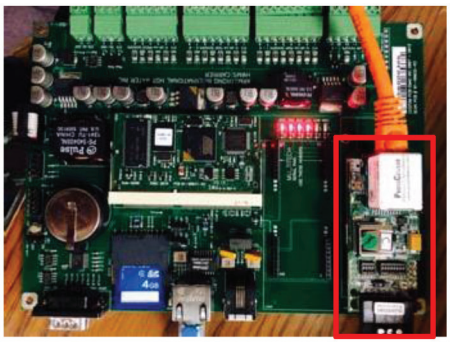


Figure 1: ProtoCessor Module

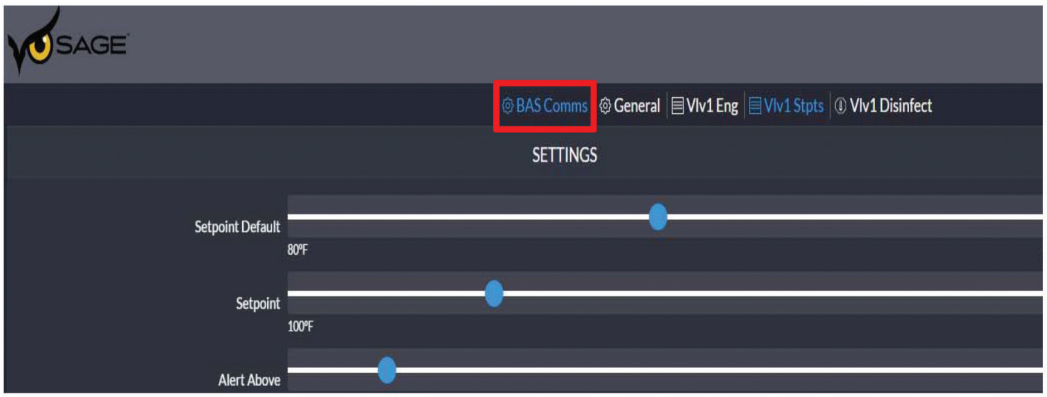


Figure 2: Initial System Graphic Page

2. Ensure the '**Protocessor Port**' is **ON**

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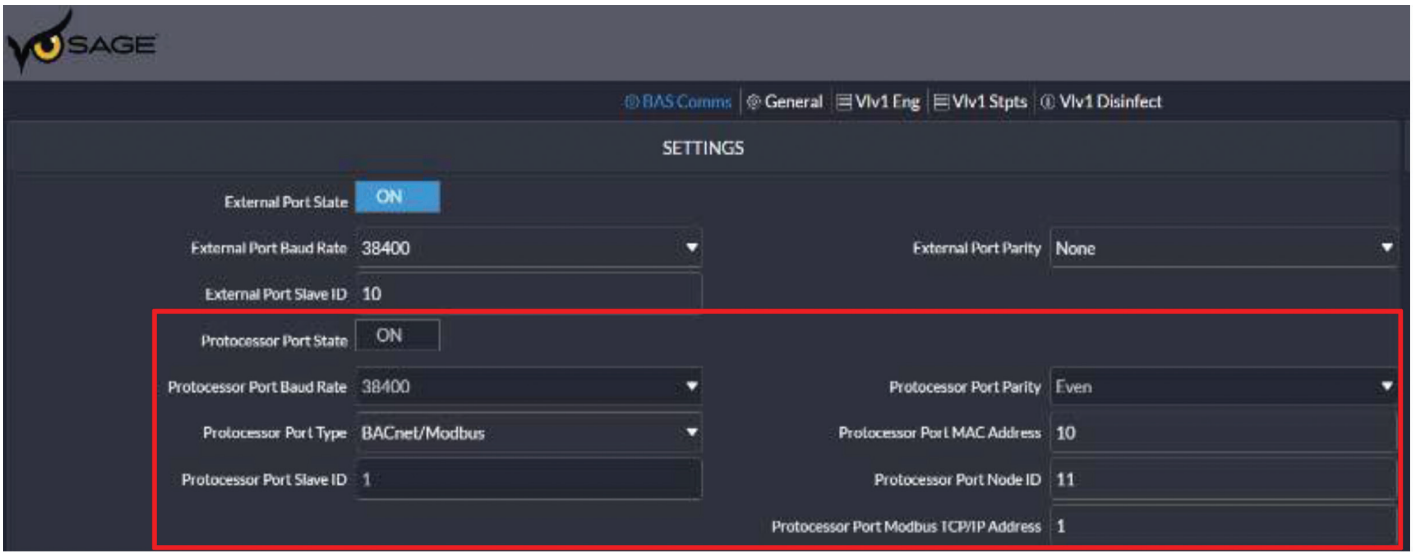
armstronginternational.com

Configuring SAGE® BS for BAS LonWorks® – continued



3. Select **LonWorks®** from the **'Protocessor Port Type'** drop down menu. All other items should be left to defaults as they are specific to other protocols. Select save at the bottom right. After roughly 1 minute the unit should be reset and verification can be completed on the BAS system.

References

[1] http://en.wikipedia.org/wiki/POSIX_Threads

[2] http://freeModbus.berlios.de/

[3] http://www.lighttpd.net

[4] http://www.openssl.org

[5] http://www.protocessor.com

[6] http://en.wikipedia.org/wiki/BACnet™

[7] http://en.wikipedia.org/wiki/LonWorks®

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SAGE® BS Digital Hot Water System Monitoring Installation, Operation, and Maintenance Manual

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