

BMS Gateway for R513A Water Source Stand-Alone Heat Pumps



For units produced: 1/1/24 to:

Installation Manual

Contents

Description.....	3	Configuration and BMS Integration	6
Safety Precautions	3	Configuration Prep and Login	6
Specifications, and Required Items.....	3	Network Settings	7
Installation.....	5	Protonode Configuration.....	7
Mounting.....	5	Points Lists	8
Wiring	5	Testing	11

Description

The BMS Gateway accessory for R513A water source heat pumps allows for direct communication from a heat pump to a building management system, programmed by third parties. It allows commands and data to be transferred in both directions.

Older R134A heat pumps are compatible with this accessory, however, some points will not be available on older units. BMS-C gateways, a different accessory, are recommended with R134A heat pumps

The gateway is installed inside the heat pump's electrical enclosure on a factory supplied DIN rail. Then, it is wired to the BMS system through ethernet and/or control wiring terminals. One gateway accessory package is required for each heat pump that is to be connected to a BMS system.

Systems with Main Control Panels do not need this accessory if the BMS Gateway option was selected for the MCP, and the MCP installation manual should be consulted for configuration information for those systems.

Your gateway may be field installed, or it may be factory installed. If factory installed, refer only to the "Field Supplied Items Required" and "Configuration and BMS Integration" sections of this manual.

Specifications, and Required Items

Included in kit:

- 1x BMS Gateway unit
- 1x Power Wire
- 1x Communication Wire

Field requirements for installation:

- Active BACnet® IP or MSTP BMS system
- Ethernet cable to BACnet IP BMS, OR
- 22-3 minimum twisted/shielded wire to BACnet MSTP BMS
- Ethernet cable to laptop for configuration
- Small phillips head screwdriver
- Multimeter
- Laptop for configuration
- BMS integrator responsible for final programming

Safety Precautions



This is the safety alert symbol. It is used to alert you to potential personal injury hazards. Obey all safety messages that follow this symbol to avoid possible injury or death.

DANGER

Ensure control power is OFF at the control panel when wiring accessories to the unit to prevent injury or death due to electrical shock.

WARNING

To prevent inductive power transfer, do not run sensor or communication wiring in parallel with any wires carrying 120v or greater voltage power. If this is unavoidable, use shielded wire or conduit for sensor wiring.

Specifications

Specifications	
Connections	One 3-pin Phoenix connector with: RS-485/RS-232 (Tx+ / Rx- / gnd) BaseTport
	One 3-pin Phoenix connector with: RS-485 (+ / - / gnd)
	One 3-pin Phoenix connector with: Power port (+ / - / Frame-gnd)
	One Ethernet 10/100
Power	Input Voltage 12-24VDC or 24VAC
	Max Power 3 Watts
	Current Draw 24VAC 0.125A
	Current Draw 12-24VDC 0.25A @12VDC
Physical	4"H x 1.1"W x 2.7"D
	0.4 pounds
	-4 to 158 Deg. F. operating temperature range
	10-95% non-condensing operating relative humidity range
Approvals	FCC part 15 B
	BTL Marked
	DNP 3.0 and Modbus conformance tested, ODVA conformant
	UL 60950-1 and CAN/CSA C22.2
	EN IEC 62368-1
	CAN ICES-003(B)/NMB-003(B)
	CE, REACH, RoHS3, UKCA, and WEEE compliant
Baud	9600, 19200, 38400, 57600, 768000
Points	1,000

Installation

Mounting

Note: If the gateway unit was factory installed, please skip this section.

To Mount the Gateway:

DANGER

Power the heat pump off at the breaker so no live power is present at the unit to prevent injury or death due to electrical shock.

1. Open the door to the electrical enclosure.
2. Identify the mounting location. The heat pump will have a vacant DIN rail space in the electrical enclosure box available to mount the gateway. The exact location of the vacant DIN rail space varies by heat pump or main control panel, and can be found in the installation manuals for those products in their "Control Wiring" sections. The gateway unit can be mounted vertically or horizontally
3. Hook the Gateway unit over the top DIN rail in the specified mounting location.

Wiring

Note: If the gateway unit was factory installed, please skip this section.

DANGER

Power the heat pump off at the breaker, so no live power is present at the unit to prevent injury or death due to electrical shock.

Within the heat pumps electrical enclosure:

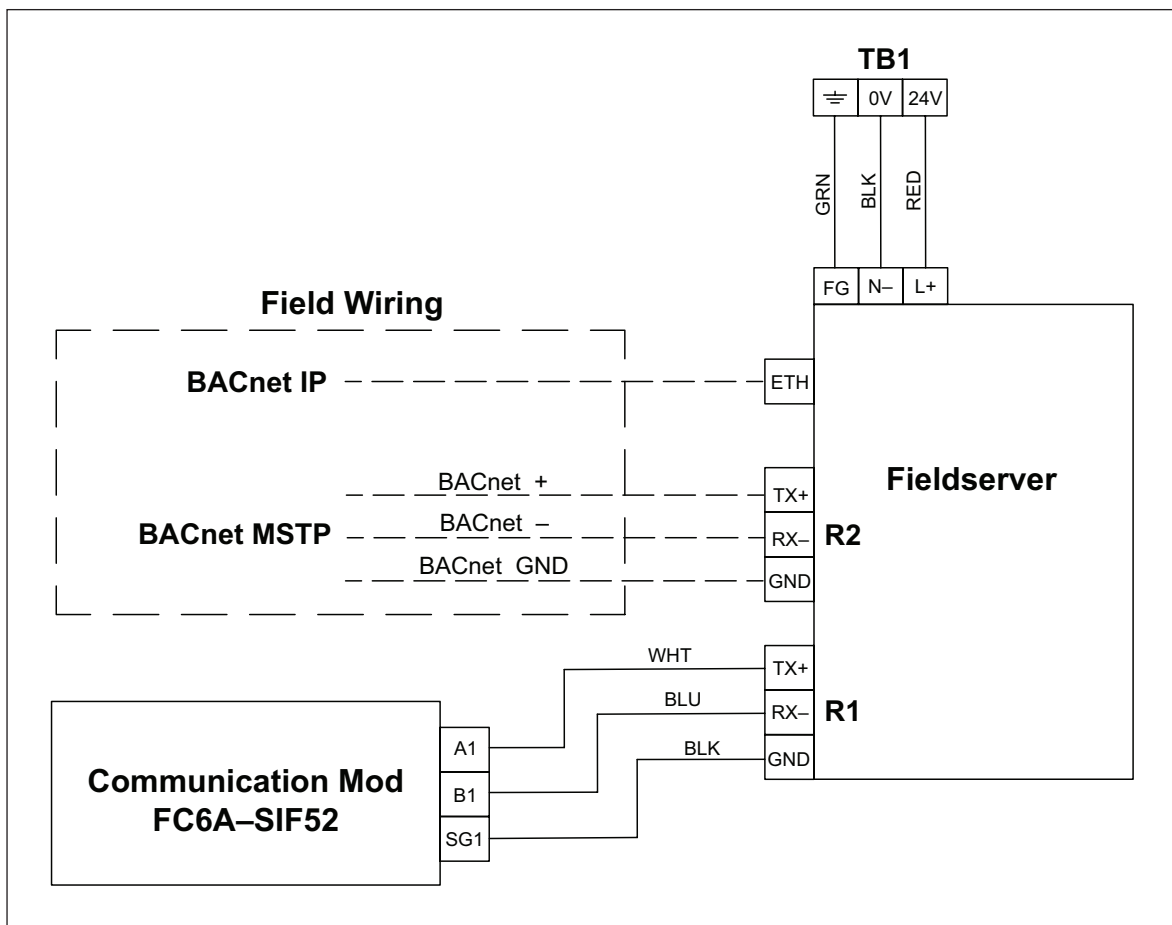
1. Wire the Gateway R1: TX+/RX-/GND terminals to the heat pump's communication module with 22-3 minimum twisted pair cable. Refer to [Figure 1 on page 6](#).
2. Wire the Gateway FG/N-/L terminals to the heat pump's Terminal Block 1 (TB1) with 18-3 minimum solid or stranded wire.
3. Make wiring connections from the enclosure to the building BMS system as appropriate.
 - a. BACnet® IP systems use the ethernet port.
 - b. BACnet MSTP systems use 22-3 minimum twisted pair cable to the R2 terminal block as shown in "[Figure 1: BMS Gateway Wiring](#)" on [page 6](#).

For MSTP Systems Only:

NOTICE

Refer to your BMS System's manual for specifics on how to set up the termination and bias resistors on the BMS Gateway component.

Figure 1: BMS Gateway Wiring



Configuration and BMS Integration

WARNING

DO NOT connect the heat pump to the building network prior to gateway configuration! This will potentially overwrite the default IP address of the gateway and make finding the gateway on the network more difficult. If this occurs, it may be necessary to find the gateway on the network using the MAC address on the gateway label.

Configuration Prep and Login

1. Power up the heat pump, and allow it to finish its startup, before attempting to configure the BMS gateway. After startup is completed, connect a laptop or PC directly to the gateway, using the ethernet port on the gateway.
2. Open a web browser and connect directly to <https://192.168.1.24>

- a. You may get a “Web Server Security Unconfigured” message. It is ok to proceed with HTTPS from that warning message.
 - b. You may get a “Your Connection is not Private” message. If so, click “Advanced”, and click “proceed to 192.168.1.24 (unsafe)”.
3. Login to the gateway web interface. Username is “admin”. Password is written on the gateway’s label, and is also available via QR code on the gateway. It may be necessary to temporarily unseat the gateway from the DIN rail to read the label.
 4. On the first login, the security mode will need to be set. Lochinvar recommends “Basic HTTP” or “HTTPS with own trusted certificate”.

After selecting a mode, you will get a “redirecting” message, and then the Fieldserver GUI should open.

Network Settings

5. To configure network settings, on the GUI landing page, click on the “Settings” tab. Within “Settings”, click on the “Network” tab.
 - a. On the first connection, you will get a warning message that you are about to leave the registration process. Click “Exit Registration”.
6. You should now see a page with “ETH 1” and “Routing” tabs. Click the “Routing” tab.
 - a. Select the default connection in the first row of the table.
 - b. Click the “Add Rule Button” to add a new row.
 - c. Set a new Destination Network, Netmask, and Gateway IP Address as needed.
 - d. Set the priority for each connection from 1 (highest) to 255 (lowest).
 - e. Click the “Save” button.
7. Now click the “ETH 1” tab to access the ethernet settings.

Be advised, if IP addresses are changed, you will need to reconnect to the gateway via your browser using the new IP address before you can continue with configuration settings! Only proceed once ready to connect to the building’s network.

8. DHCP to automatically accept IP settings can be enabled here, or IP settings can be manually configured.
 - a.. For manual configuration, set IP Address, Netmask, Default Gateway, and Domain Name Server.
 - b. If the gateway will be connected to a router, the gateway MUST set the “Gateway” field to the IP address of the router.
9. Click “Save” to activate the settings changes.

Protonode Configuration

To configure the protonode, start from the “Device List” page in the GUI and click “Settings”.

10. Choose “Configuration”, and click the “Profiles Configuration” Button.
 - a. Set the “protocol_select” field
 - i. Set to 1 for BACnet IP
 - ii. Set to 2 for BACnet MSTP
 - iii. Set to 3 for BACnet MSTP (Single Node)
 - iv. Hit “submit” after entering the correct value.

Selecting a protocol will change the list of visible parameters to only parameters applicable to your protocol

11. Set the remaining parameters according to the needs of your network and BMS system. Press “submit” to save each value.

Refer to [“Table 1: Configuration Parameters for BMS Gateway” on page 8](#)

12. Click the “Add Profile” Button.
 - a. Choose profile “Group 2”.
 - b. Verify the chosen profile is in the “Active Profiles” list.
 - c. When verified, press the ‘System Restart’ button.
13. Connect the gateway to the building network.
14. Reconnect to the new gateway IP address with your web browser, if necessary. Verify communications in accordance with the “Testing” instructions in the next section.
15. The gateway should now allow for building management system integration. Points lists for different heat pumps are available at the end of this section for this process.

Table 1: Configuration Parameters for BMS Gateway

Parameter	Protocol	Values	Description
protocol_select	All	1,2,3	Protocol Selector: set to 1: BACnet IP. 2: BACnet MSTP. 3: BACnet MSTP (single node).
mod_baud_rate	All	9600-19200-38400-57600	Set to the Modbus RTU baud rate required.
mod_parity	All	None,Even,Odd	Set to the Modbus parity required (Factory Set)
mod_data_bits	All	7,8	Set to the Modbus data bits required (Factory Set)
mod_stop_bits	All	1,2	Set to the Modbus stop bits required (Factory Set)
network_nr	1, 3	1 - 65535	Sets the BACnet network number for the gateway.
node_offset	1, 3	0 - 4194303	Sets the BACnet device instance (Device address plus offset).
bac_ip_port	1	1 - 65535	Set to the BACnet IP port required for the gateway.
bac_cov_option	ALL	enable, disable	Enables or Disables COVs for the BACnet application
bac_bbmd_option	1	BBMD, -	Enables or Disables BBMD for the BACnet application
bac_virt_nodes	1, 3	No, Yes	No: single heat pump on gateway. Yes: multiple heat pumps on gateway.
bac_device_id	2	1 - 4194303	Sets this BACnet device instance
bac_mac_addr	2, 3	1 - 127	Sets the BACnet MSTP MAC address
bac_baud_rate	2, 3	9600-19200-38400-76800	Sets the BACnet MSTP Baud Rate
bac_max_master	2, 3	1 - 127	Sets the BACnet MSTP max master
bac_max_info_fr	2, 3	1 - 65535	Sets max number of frames before token must be passed

Points Lists

The Group 2 profile for R513A water source heat pumps allows access to the following points:

Table 2: Relevant Data Points for BMSe Profile “Group 2”: Writable Values

Profile Description	Profile Name	Description of Operation
Heat demnd for heat pump in REMOTE mode	HeatCall_BMS	Set to "1" to create a heat demand. "0" stops the demand.
Set to 1 for tank mode. Value not retained	Tank_Mode_Set	Set to "1" to make heat pump control itself in Tank Mode.
Set to 1 for remote mode. Value not retained	Remote_Mode_Set	Set to "1" to set heat pump to respond only to external demands.
Tank storage set point	Tank_Storage_Temp	Desired temperature of primary storage tank in tank mode. (Deg F)
Demand cut in dead band	Demand Diff	Value subtracted from Target tank temp to start/stop single-pass demands in tank mode. (Deg F)
Condenser Leaving water temperature set point	LWT_Set	Target water temperature from the heat pump. (Deg F)
Demand cut in set point for "cold" tank sensor	ColdSensor_CutIn	Multi-pass cold sensor temperature to start heat demand in tank mode (Deg F)
Demand cut in set point for "Hot" tank sensor	HotSensor_CutIn	Multi-pass warm sensor temperature to start heat demand in tank mode (Deg F)
Set to 1 to turn system ON. Value not retained	Start_Cycle	Set Bit to "1" to Enable operation
Set to 1 to turn system OFF. Value not retained	Stop_Cycle	Set Bit to "1" to Disable operation

Table 3: Relevant Data Points for BMSe Profile “Group 2”: Read-Only Values

Profile Description	Profile Name	Description of Operation
1: tank mode, heat demand from heat pump's tank sensor(s) 0: remote mode, heat demand from remote source (BMS, remote enable switch, or master control panel)"	Demand_Mode	Current mode of the heat pump. "1" is Tank Mode and "0" is Remote Mode.
1: system ON 0: system OFF	System_Cycle_Status	Current on/off or "ready" status of the heat pump. "1" is on/ready, "0" is off.
Current value of compressor start delay timer	Comp_CTD	Current time remaining on compressor cycle delay. (Seconds)
Compressor status	Comp_Status	Current compressor status. "1" is on, "0" is off.
Cummulative compressor run hours	Comp_RunHrs	Current total accumulated run time for this compressor. (Hours)
suction line pressure	SLP	Current Suction Line Pressure (PSI)
Discharge line pressure	DLP	Current Discharge Line Pressure (PSI)
liquid line solenoid valve status	LLSV_Status	Current solenoid status: "1" is open, "0" is closed.
Air source: evaporator fin temp Water source: evaporator leaving water temp	Evap1_EvapLWT	Current leaving temperature of the evaporator (water source or air source) (Deg F)
Evap 2 fin temp. for dual evap only	Evap2_C250Aonly	Current leaving air temperature on 2nd evaporator for dual evaporator heat pumps (Deg F)
Air source: ambient air temp Water source: evaporator entering water temp	AmbAir_EvapEWT	Current entering/ambient temp for the evap (ambient air or entering water) (Deg F)
Condenser leaving water temp	Cond_LWT	Current load side leaving water temperature at the heat pump. (Deg F)
Condenser entering water temp	Cond_EWT	Current load side entering water temperature at the heat pump. (Deg F)
condenser flow	Cond_GPM	Current load side flow rate through the heat pump. (GPM)
Single-pass: tank probe temp Multi-pass: "cold" tank probe temp	Tank_MPCold	Current tank temperature at Tank Sensor 1. (Deg F)
Single-pass: tank probe temp Multi-pass: "hot" tank probe temp	Tank_MPHot	Current tank temperature at Tank Sensor 2, multi-pass only. (Deg F)
Current superheat	Superheat	Current superheat across the evaporator (Deg F)
Suction line temp	SLT	Current Suction Line Temperature (Deg F)
Internal circulator pump status 1 - pump OFF 0 - pump ON	Pump_Status	Current pump status: "1" is on, "0" is off.
Encoded alarm value reg1	Alarm_Reg1	Lockout Alarms. Value greater than zero indicates an active alarm on this register
Encoded alarm value reg2	Alarm_Reg2	Lockout Alarms. Value greater than zero indicates an active alarm on this register
Encoded alarm value reg3	Alarm_Reg3	Warning Alarms. Value greater than zero indicates an active alarm on this register
High pressure alarm	HP_Alarm	Status of this particular alarm. "1" this alarm is present, "0" this alarm is not present.
Power fault alarm	PowerFault_Alarm	Status of this particular alarm. "1" this alarm is present, "0" this alarm is not present.
Condenser flow alarm	Cond_Flow_Alarm	Status of this particular alarm. "1" this alarm is present, "0" this alarm is not present.
Evaporator flow alarm	Evap_Flow_Alarm	Status of this particular alarm. "1" this alarm is present, "0" this alarm is not present.
Modbus communication fault	Modbus_Alarm	Status of this particular alarm. "1" this alarm is present, "0" this alarm is not present.
Air overtemperature switch alarm	AOTS_Alarm	Status of this particular alarm. "1" this alarm is present, "0" this alarm is not present.
Defrost alarm	Defrost_Alarm	Status of this particular alarm. "1" this alarm is present, "0" this alarm is not present.

Relevant Data Points for BMSe Profile “Group 2”: Read-Only Values (Continued)

Emergency stop alarm	Estop_Alarm	Status of this particular alarm. "1" this alarm is present, "0" this alarm is not present.
Ambient air out of range	Amb_Range_Alarm	Status of this particular alarm. "1" this alarm is present, "0" this alarm is not present.
Condenser freeze protection active	Cond_FrzPro_Alarm	Status of this particular alarm. "1" this alarm is present, "0" this alarm is not present.
Evaporator freeze protection active	Evap_FrzPro_Alarm	Status of this particular alarm. "1" this alarm is present, "0" this alarm is not present.
Low pressure alarm	LP_Alarm	Status of this particular alarm. "1" this alarm is present, "0" this alarm is not present.
Sensor fault alarm	Sensor_Alarm	Status of this particular alarm. "1" this alarm is present, "0" this alarm is not present.
Lockout alarm active	Lockout_Alarm	Status of this particular alarm. "1" this alarm is present, "0" this alarm is not present.
High pressure lockout alarm	HP_Lockout_Alarm	Status of this particular alarm. "1" this alarm is present, "0" this alarm is not present.
Power fault lockout alarm	PowerFault_Lockout_Alarm	Status of this particular alarm. "1" this alarm is present, "0" this alarm is not present.
Condenser flow lockout alarm	Cond_Flow_Lockout_Alarm	Status of this particular alarm. "1" this alarm is present, "0" this alarm is not present.
Evaporator flow lockout alarm	Evap_Flow_Lockout_Alarm	Status of this particular alarm. "1" this alarm is present, "0" this alarm is not present.
Oil pressure safety switch alarm	OPSS_Lockout_Alarm	Status of this particular alarm. "1" this alarm is present, "0" this alarm is not present.
Low pressure lockout alarm	LP_Lockout_Alarm	Status of this particular alarm. "1" this alarm is present, "0" this alarm is not present.
Pump down safety lockout alarm	PDS_Lockout_Alarm	Status of this particular alarm. "1" this alarm is present, "0" this alarm is not present.
Defrost fault lockout alarm	Defrost_Lockout_Alarm	Status of this particular alarm. "1" this alarm is present, "0" this alarm is not present.
Motor protection module lockout alarm	MPM_Lockout_Alarm	Status of this particular alarm. "1" this alarm is present, "0" this alarm is not present.
Tank probe (MP - cold) alarm	Tank_Probe_Cold_Alarm	Status of this particular alarm. "1" this alarm is present, "0" this alarm is not present.
Tank probe (MP - hot) alarm	Tank_Probe_Hot_Alarm	Status of this particular alarm. "1" this alarm is present, "0" this alarm is not present.
Condenser LWT probe alarm	Cond_LWT_Probe_Alarm	Status of this particular alarm. "1" this alarm is present, "0" this alarm is not present.
Condenser EWT probe alarm	Cond_EWT_Probe_Alarm	Status of this particular alarm. "1" this alarm is present, "0" this alarm is not present.
Evaporator probe alarm	Evap_Probe_Alarm	Status of this particular alarm. "1" this alarm is present, "0" this alarm is not present.
Ambient air probe alarm	Amb_Air_Probe_Alarm	Status of this particular alarm. "1" this alarm is present, "0" this alarm is not present.
SLT probe alarm	SLT_Probe_Alarm	Status of this particular alarm. "1" this alarm is present, "0" this alarm is not present.
High pressure transducer alarm	HP_Sensor_Alarm	Status of this particular alarm. "1" this alarm is present, "0" this alarm is not present.
Low pressure transducer alarm	LP_Sensor_Alarm	Status of this particular alarm. "1" this alarm is present, "0" this alarm is not present.
Flow meter alarm	Flow_Meter_Alarm	Status of this particular alarm. "1" this alarm is present, "0" this alarm is not present.

Testing

Good practice will include thorough verification that values reported by the heat pump match the values received in the BMS system. Ideally, this would include monitoring through an active heat demand and comparing BMS reported values to heat pump reported values.

In addition, system communication can be checked. For serial connections, check that the TX and RX LEDs are rapidly flashing.

You can also log into the fieldserver GUI with a web browser, as in the “configuration” section. From there, clicking on “Diagnostics and Debugging”, and then on “connections”, shows you a table of communication connections. The “errors” column would indicate if there are errors requiring additional troubleshooting.

Communication errors are usually caused by:

- Baud rate, parity, data bits or stop bits set incorrectly
- Device addresses incorrect
- Wiring problems
- Device not listed in the Web Configurator
- IP Addressing incorrect.

If communication errors cannot be troubleshot, a “Diagnostic Capture” can be taken and emailed to Lochinvar for assistance.

1. Connect to the fieldserver GUI with your web browser
2. Click on “Diagnostics”
3. Select “Full Diagnostic”
4. Set the capture time period
5. Click start. When the capture period is finished, a download button will appear.
6. Download the capture
7. Email the capture to your factory rep, along with any supporting information needed to describe the problem.

Service Log

[illegible]