PROLON

Product Guide for the BACnet Equipment Bridge

VERSION 02

PL-GUIDEBACNET-EN

www.proloncontrols.com

1-877-977-6566

info@proloncontrols.com

17510 Rue Charles, Suite 100, Mirabel, QC, J7J 1X9

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Prolon BACnet Equipement Bridge

The Prolon BACnet Equipment Bridge (EQB) is a device that allows Prolon networks, which natively communicate using Modbus, to communicate directly with BACnet package units or split systems. The EQB can be used to monitor and modify control points within equipment only accessible with BACnet communication. As a "Master" device, the EQB may also communicate directly with follower Prolon devices placed under its authority on the "Network" bus.

General Behavior

HVAC equipment that requires BACnet communication already has an integral controller for operating fan, cooling/heating stages, limits/safeties, etc. The EQB will not typically be used to provide direct operation of such points but rather be used to modify setpoints such as space temperature and duct pressure and monitor points such as supply air temperature and operational capacity. The primary operation of the equipment will be left to the onboard integral controller supplied by the equipment manufacturer. The BACnet Equipment Bridge will be able to communicate with follower devices placed under its authority, typically zone dampers, to retrieve their individual demands and share supply temperature from the BACnet system. As in a normal Prolon RTU controller, the EQB will be capable of applying a desired math function to the individual zone demands, which can then be used to modify a setpoint within the BACnet unit controller.

Networking

Prolon networks are divided into Master and Follower devices. Master devices are in charge of sharing information with Follower devices. The Prolon BACnet Equipment Bridge can be used as either a Master device or a follower device depending on the needed application and location of the EQB within the Prolon network.

Setting Master or Follower Mode: The Master or Follower mode is determined by the position of dipswitch #8 on the EQB. When dipswitch #8 is in the on position, the EQB will function as a master. When dipswitch #8 is in the off position, the EQB will function as a follower.

Note that in follower mode, the NET port (Modbus OUT) is not used and no Prolon controllers can be placed under the authority of the EQB.

Shared Information

The BACnet Equipment Bridge will automatically detect and start sharing information with the Follower controllers that it finds. Typical examples of shared information include occupancy status, supply air temperature, zone demand, and more.

The EQB can also receive the following information from the Prolon Network Controller:

- **Occupancy Status**: Occupancy (if applicable) must be gathered from a Prolon Network Controller, as the BACnet Equipment Bridge does not have an internal time clock.

Connecting to the equipment

Prior to connection and discovery of BACnet equipment, it may be necessary to configure the communication settings in both the BACnet connected equipment and/or the EQB. All devices on a BACnet network segment must use the same Baud Rate, Parity, and Stop Bits settings; these settings in the EQB can be found in Config > Communication. All devices on a BACnet network segment must also have a unique BACnet MAC address.

- **Max Master**: This specifies the highest allowable address for master devices and must be less than or equal to 127. The Max Master is used to reduce the Who-Is process by terminating the search before querying all the way to MAC address 127. This value must be set greater than or equal to the highest BACnet MAC address on the network for all devices to be successfully discovered.
- **Best practice**: Ideally, very low MAC addresses should be used for the connected device(s) (1, 2, 3) with the BACnet Equipment Bridge anywhere above the highest connected equipment address. Set the Max Master value to a value of the EQB address +1.
- **Device Instance**: By default, the device instance will be the same value as the MAC address and will follow the MAC address settings of the dip switches. Usually, this value will not need to be changed since the BACnet network segment connected to the EQB is essentially isolated from any other BACnet segments in the system.

If the device instance is changed in the software, it will no longer follow the dipswitch settings. To have the device instance resume following the dipswitch MAC address settings, either the dipswitch value or the device instance value must be set such that the two values match again.

The Communication settings for the Modbus ports should typically NOT be changed.

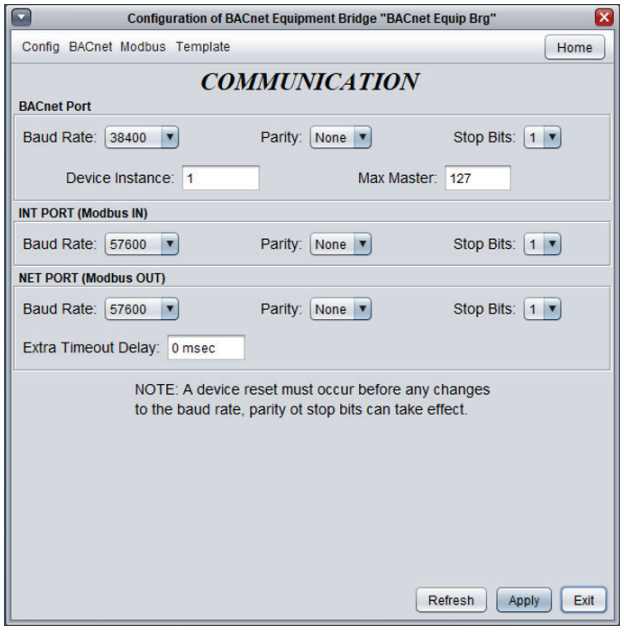

Figure 1 - Communication Settings Screen

If any communication settings are changed, the device must be reset before the changes take effect. Reset can be accomplished by either power-cycling the EQB or by navigating to Config > Device and clicking "Reset."

Addressing & Connections

The Prolon BACnet Equipment Bridge's address is assigned using the physical dipswitch found on the controller directly. The address will be encoded in binary.

The BACnet MAC address will always be the same as the MODBUS address set by the device dip switches. The Device instance will default to be the same as the BACnet MAC address and usually will not need to be changed. For the communication to work properly, the BACnet MAC address and Device Instance of the EQB must not match the BACnet MAC address and Device Instance set in the BACnet connected equipment.

BACnet Device Instance = default set by dip switch, but can be changed in software

Modbus address = dip switch only

BACnet MAC address = dip switch only

The BACnet Equipment Bridge has (3) communication connections, each with a different purpose. It will be important to connect the correct terminals to the correct segment of the network for communication to work properly.

- **SND lights**: Indicates the transmission of data onto the associated network bus.
- **REC lights**: Indicates reception of data from the associated network bus.
- **INT PORT (MODBUS IN)**: Connection back to the NC2000 Network Controller (if present)
- **BACnet Port**: Connection to the BACnet equipment
- **NET PORT (MODBUS OUT)**: Connection to zone dampers or other follower devices placed under the authority of the EQB (Not used in Follower mode)

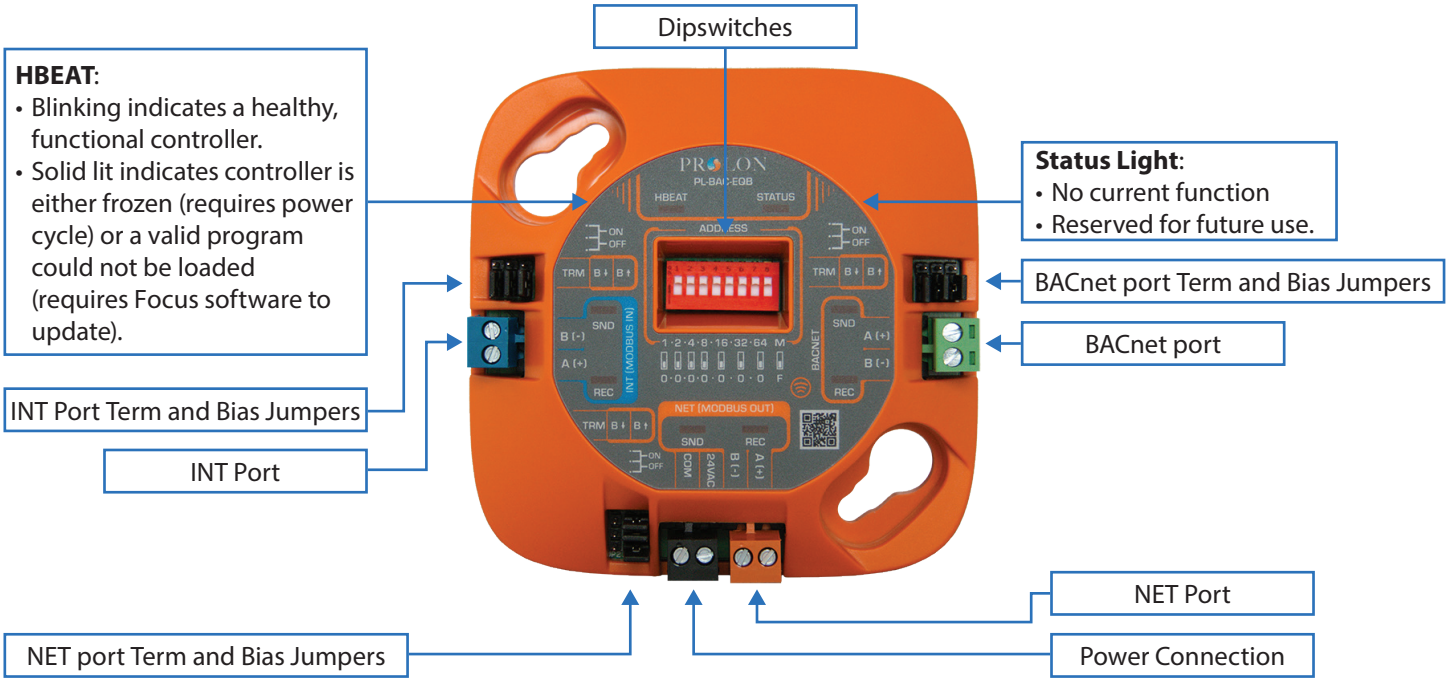

Figure 2 - Termination and Bias jumpers

Device Properties

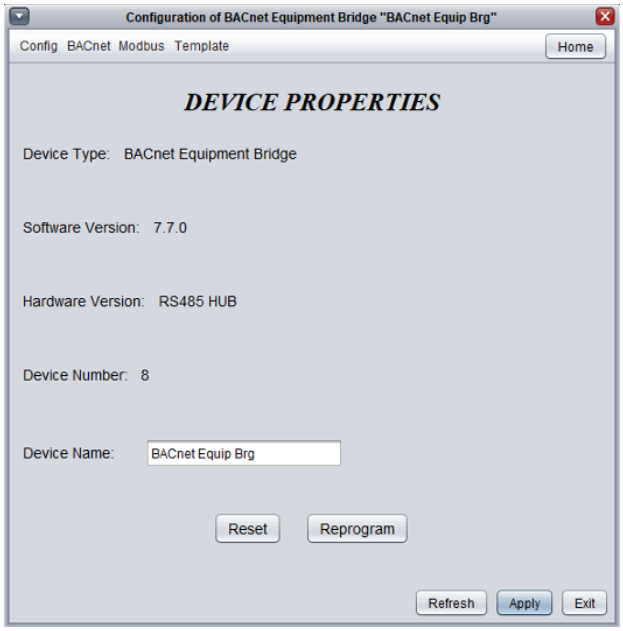

Figure 3 - Device Properties Screen

This screen shows all the intrinsic properties of the device you are configuring. This helps you determine its capabilities without having to visually inspect the device.

- **Device Type**: The type of controller you are configuring.
- **Software version**: The current software in the controller. The greater the software version, the more advanced the device is. Devices can be upgraded by reprogramming them (see "Reprogram" below).
- **Hardware version**: This is the physical hardware platform of the controller. Different hardware has different features. The hardware can only be changed by replacing it physically.
- **Device Number**: The network address of the controller, which is set manually using the dip switches or through software.
- **Device Name**: This field indicates the current name of the controller, which you can modify. Alternatively, you can just right-click on the icon and select the 'Rename' option.
- **Reset Device**: Causes the device to perform a reset. All configuration properties REMAIN SAVED. However, resetting the controller removes all active overrides. This function is useful for debugging purposes.
- **Reprogram**: This function is used to upgrade the controller to a new software version. Focus will begin by asking you for the PRLFW file that contains the software update. Software update PRLFW files can only be provided by Prolon. At the end of the procedure, Focus will automatically reapply all the parameters you have previously configured into the device.

Should there be any interruption during the programming procedure (due to intermittent communication or other), the procedure is halted to allow time for the problem to be fixed. When ready, the whole upgrade procedure can be resumed at any time by pressing this button again. It is normal for the icon to turn grey and become unresponsive during this period. Simply continue with the procedure anyways.

Adding the controller to Focus project

If the BACnet Equipment Bridge is being used as a “Master” device, the appropriate icon will be found in the “Master” controller group in Focus. If the EQB is being used as a “Follower” device, the appropriate icon will be found in the “Other” group.

To add the controller, simply click on the BACnet Equipment Bridge button, found in the Devices Drag and Drop list on the left side of the Focus screen.

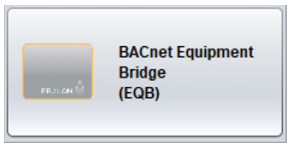

Figure 4 - New Master BACnet Equipment Bridge Icon Button

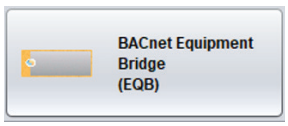

Figure 5 - New Follower BACnet Equipment Bridge Icon Button

Focus will ask for the address of the controller, attempt to locate it, and add it on the screen if successful.

Icon Data

Initially, only the name of the BACnet Equipment Bridge is shown on the icon. The device can be renamed by right-clicking on the icon and selecting “Rename”. By default, the name is “BACnet Equip Brg.” The name of the device is limited to 16 characters and spaces total.

After configuration of the EQB, up to 4 points may be chosen to be displayed on the icon.

Icon Colors

The BACnet Equipment Bridge icon changes color depending on the current status of communication.

- **Grey**: The EQB icon is grey when offline or if data is not being received.
- **Green**: The EQB icon is green when online and communicating.

Figure 6 - Grey Icon

Figure 7 - Green Icon

Icon Right Click

At any time, right clicking the Rooftop icon will access a list of useful functions.

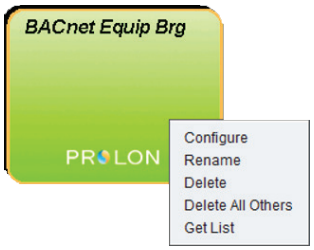

Figure 8 - Right-Click Menu

- **Configure**: This opens the configuration screen for the BACnet Equipment Bridge (same as double-clicking the icon).
- **Rename**: Lets you rename the BACnet Equipment Bridge. Names are limited to 16 characters.
- **Delete**: Removes the BACnet Equipment Bridge from the network
- **Delete All Others**: Removes all other Icons from the current system. This is useful for debugging purposes, for example when trying to exclusively establish communication with this controller, and the presence of the other controllers in your project is causing communications to slow down.
- **Get List**: Causes the BACnet Equipment Bridge to automatically retrieve the list of controllers connected to its network. A new icon is created for all controllers that are found. This function is unavailable offline.

BACnet Equipment Bridge Home Screen

Figure 9 - Home Screen

This screen shows the status of all points in the BACnet Poll and Control lists as well as any data received over the local Prolon network. All values will be "N/A" (Not Applicable) when offline.

Note that this screen will initially have empty Poll and Control lists but will later populate with the points chosen within the respective lists in BACnet setup.

There are three sections in the BACnet Controller Home Screen: BACnet Poll List, Prolon Network Data, and BACnet Control list. Each section can be minimized on screen.

BACnet Menu

The BACnet menu has three separate sections: Config, Polling, and Control. The number of BACnet devices with which an EQB may communicate is limited based on the specific hardware version of the EQB. The number of Configuration points, Polling points, and Control point available in a BACnet Equipment Bridge will vary based upon the hardware selected. See table on page 26 for exact hardware specifications and capabilities. All points are a collective pool which may be distributed across the various BACnet devices as the user sees fit.

- **Config**: Points in the Equipment Configuration section are for setting long term permanent values that are typically set once and left alone (i.e. application mode, minimum outdoor air, etc.). Only writable points may be added to the Equipment Configuration section, as the purpose is specifically for setting values in the controller.
- **Polling**: Points added for polling serve two purposes, viewing/monitoring a dynamic data point (i.e. supply air temperature or fan status) or manually writing values to the point polled by way of right clicking and entering a value (i.e. setting values in the equipment that will essentially be permanent like "mode", fixed setpoints, etc.).
- **Control**: Points added to the control list are for regular, automatic interactions from the EQB based on other variables within the Prolon system (Math Functions, Occupancy, etc.).

Before a particular BACnet object can be viewed or interacted with in any way, it must first be added to either the Polling or Control list. BACnet objects (points) may either be added directly, if the device address and object instance are known, or the BACnet Equipment Bridge can scan for connected BACnet devices. Once all BACnet devices have been identified, an individual device may then be selected to further scan that specific device for its BACnet objects. Desired points may then be added to the list for further interaction.

It may be beneficial to configure the package unit/split system for a particular mode of operation (Single zone, VAV, etc.) via a local interface on the integral BACnet controller (if present) prior to discovering objects with the EQB.

Note: Manufacturers of equipment with integral BACnet communication publish a list of BACnet object/points available in their controller. It will be extremely helpful to have the documentation for the equipment available to aid in locating the desired objects. Available objects/points are different for every equipment manufacturer and may even vary between different series or types of equipment offered by the same manufacturer.

Polling

The Object Poll List will show all current BACnet points being polled for their value. The first eight objects will be shown on the screen. Drag the slide bar on the right side to view any points not currently shown. Use the up/down arrows to change the order of an element in the poll list. Objects are polled at a rate of one object per half-second, meaning that a poll list of 20 points will be completely updated every 10 seconds.

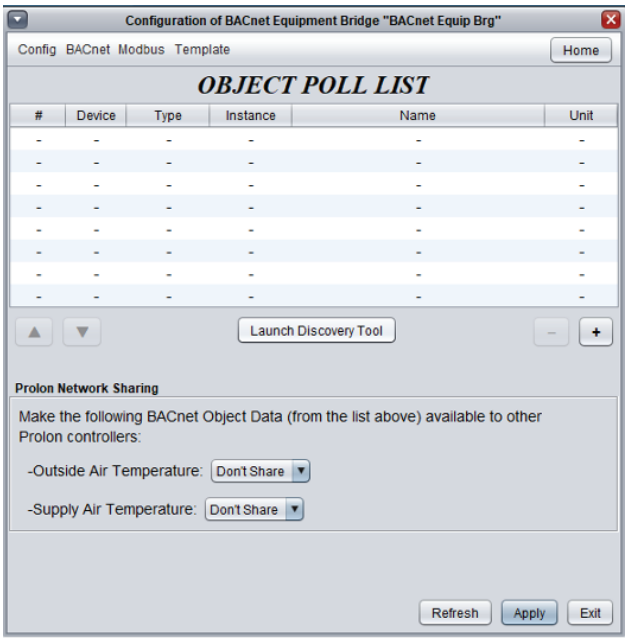

Figure 10 - BACnet Polling List Screen

- **Adding points:** If the device number and object instance are known, it may be manually added to the poll list directly by clicking the "+" button below the list and entering the information for the point. Note that adding points in this manner will not retrieve the name of the point in the device.

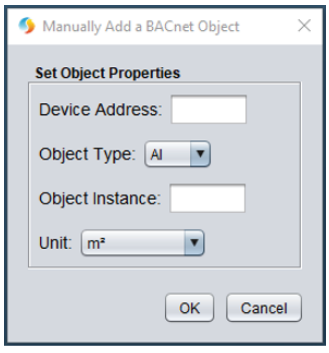

Figure 11 - BACnet Object Manual Add Tool

- **Removing Points**: If any point is no longer desired to be polled, click on the point to be removed to highlight it, then click on the "-" button below the list.

Discovery Tool

The “Launch Discovery Tool” Button opens the discovery tool to detect both devices and objects within those devices.

Make sure that the Detect Devices range includes the BACnet MAC address of the connected equipment, then click “Detect Devices”

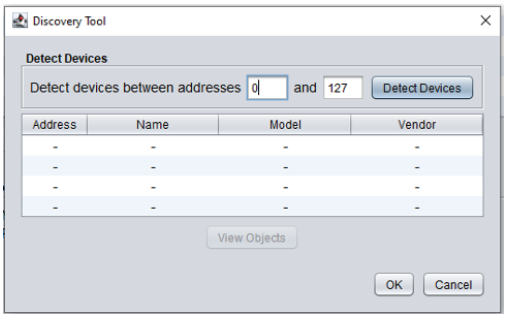

Figure 12 - BACnet Device Discovery Tool

All BACnet devices discovered will be shown in the Discovery Tool list. Select a device from the list and then click on the “View Objects” button to see the available BACnet objects in the device.

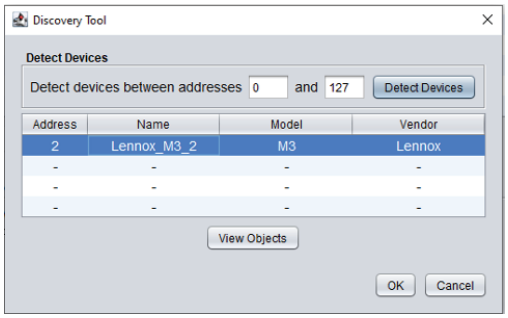

Figure 13 - Discovered BACnet Devices

The Discovery Tool will list the first 10 available BACnet objects found in the device. If a desired object is not in the list, click “Next” to show the next 10 available BACnet objects.

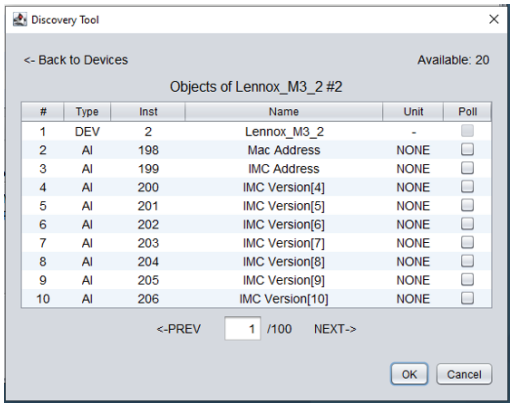

Figure 14 - Discovered BACnet Objects

To select a BACnet object for polling, simply mark the check the box in the Poll column beside the object to be added. Multiple objects can be added at one time by checking multiple boxes.

Note: This is where having documentation from the equipment manufacturer regarding the BACnet objects will be helpful as some BACnet objects may have similar or even same names but hold different functions within the controller. Depending on the desired use of the point, it will be critical to have the correct object to obtain the desired operation. Also note that some points are read only while others are writable.

Example: In the Lennox unit shown below, object 239 and object 252 both have the same name of "Space Temperature" with a unit of °F. When referring to the documentation provided by the manufacturer, it is found that object 239 is a physical analog input for a sensor connected to the controller whereas object 252 is the effective temperature setpoint for the space which is also affected by other factors like occupancy and any offsets applied.

Objects may be selected from more than one page prior to adding all selected objects to the poll list.

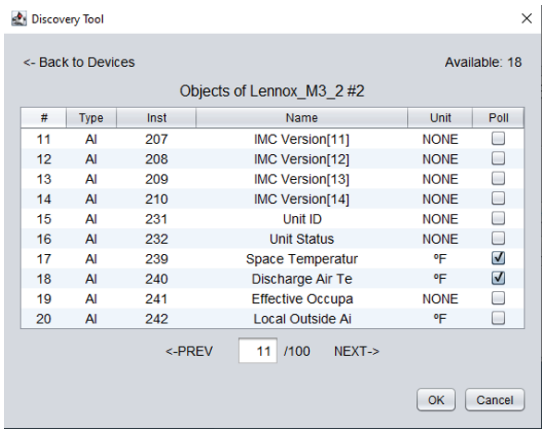

Figure 15 - Selecting Objects to Poll

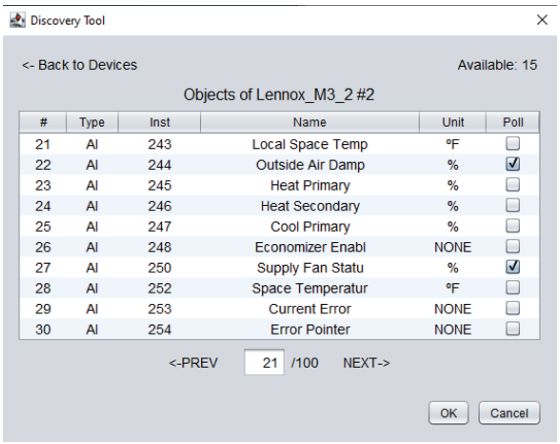

Figure 16 - Selecting Objects to Poll (cont'd)

Clicking OK will add all selected objects to the Object Poll List.

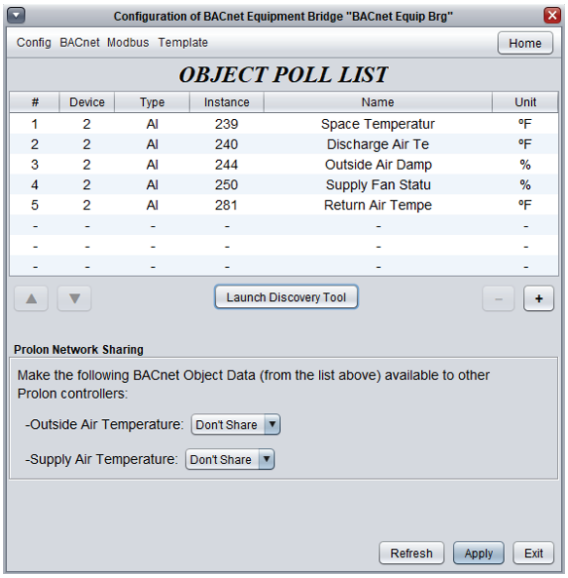

Figure 17 - Objects added to Poll List

Once objects are included in the Object Poll List, the name of the object may be edited to better represent or more clearly communicate its purpose. To edit the name of the object, simply double-click on the name of the object to be renamed and type the new name. There is a 16-character limit, including spaces, for an object name.

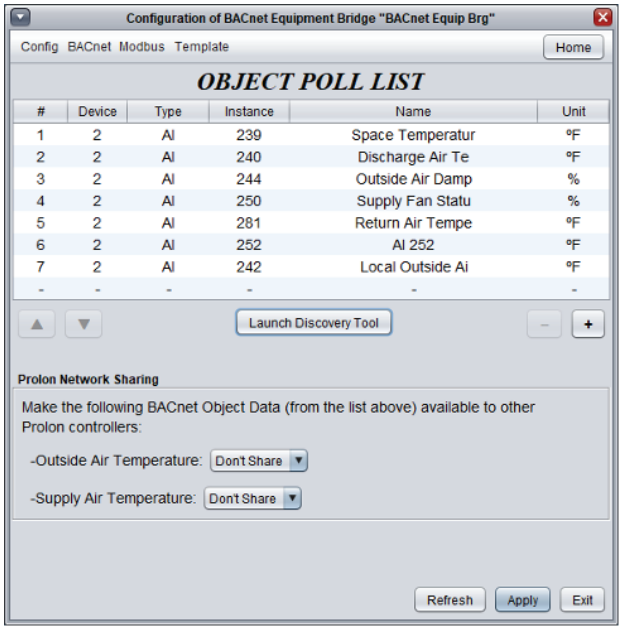

Figure 18 - Discovered Object Names

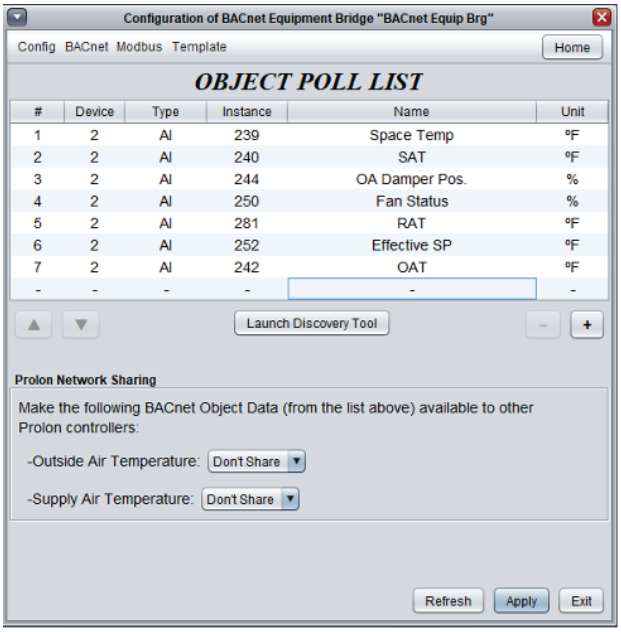

Figure 19 - Objects Renamed

Prolon Network Sharing

BACnet objects can be sourced from a BACnet device and shared over the Prolon network with other Prolon controllers. To share, the correct point in the Object Poll List must be selected for the value needing to be shared.

Points that can be shared include:

- Outside Air Temperature
- Supply Air Temperature
- Supply Water Temperature
- Outside Humidity
- Fan Status

In this example, the OAT sensor and the SAT sensor from the connected BACnet RTU needs to be shared to the VAV zones that will be served by this equipment. In the drop-down list for Outside Air Temperature, select the line number of the correct point to be shared. In this case, the OAT sensor is located on line 7, so 7 is selected in the drop-down menu. Repeat this process for the Supply Air Temperature.

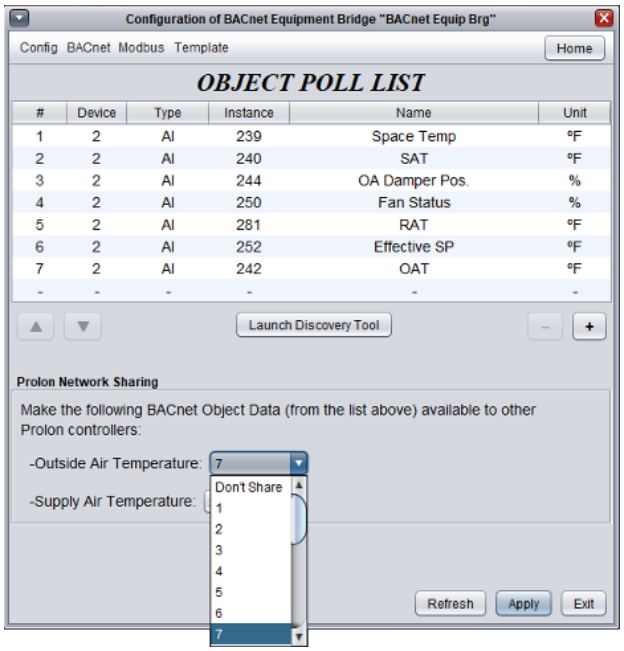

Figure 20 - Selecting BACnet Object as Outside Air Temperature value

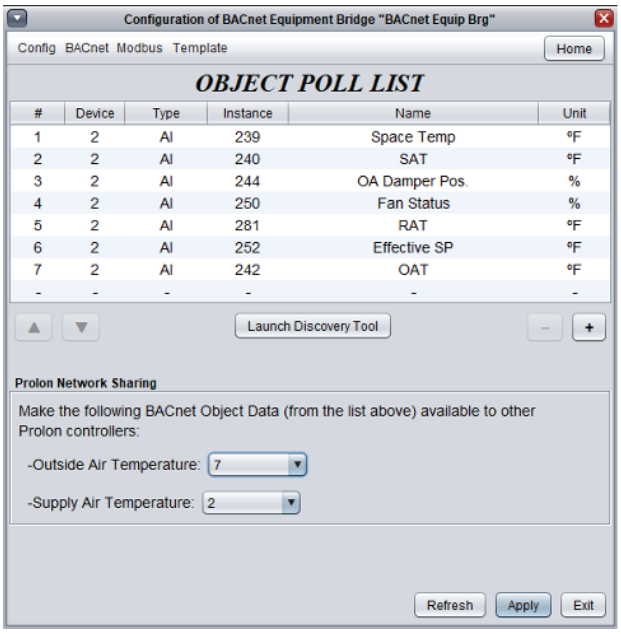

Figure 21 - Selecting BACnet Object as Supply Air Temperature Value

Once added to the Object Poll list, all polled points will be shown on the home screen of the EQB

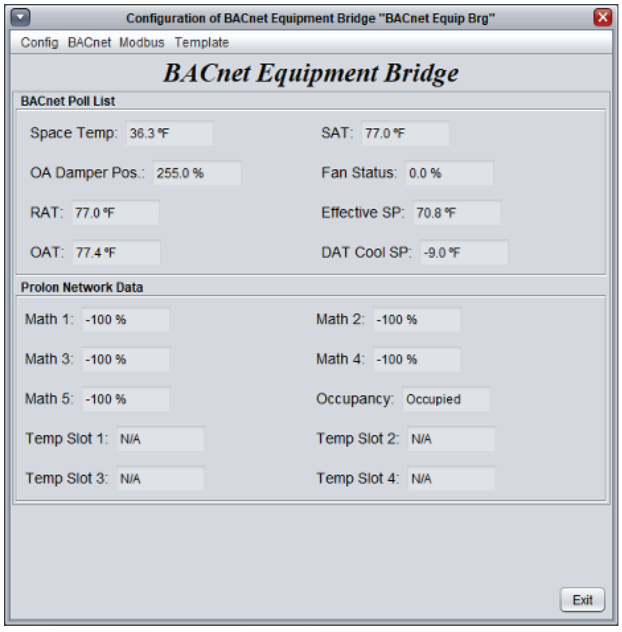

Figure 22 - Object polling data shown on home screen

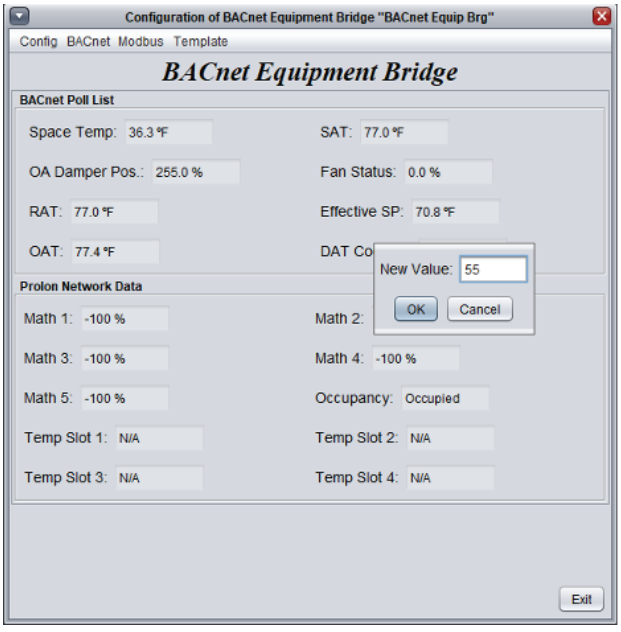

Figure 23 - Right-click on writable polled point

Right-clicking on a polled point will allow you to manually write a new value to that point.

Note: Not all polled points are necessarily writeable. Right-clicking on a read-only point will not provide this option.

Equipment Configuration

BACnet objects may be added to the Equipment Configuration list and edited in the same manner as in the Polling list. Only writable points may be added to the Configuration list. Note that no objects or values associated with the Equipment Configuration page will be shown on the device's home screen.

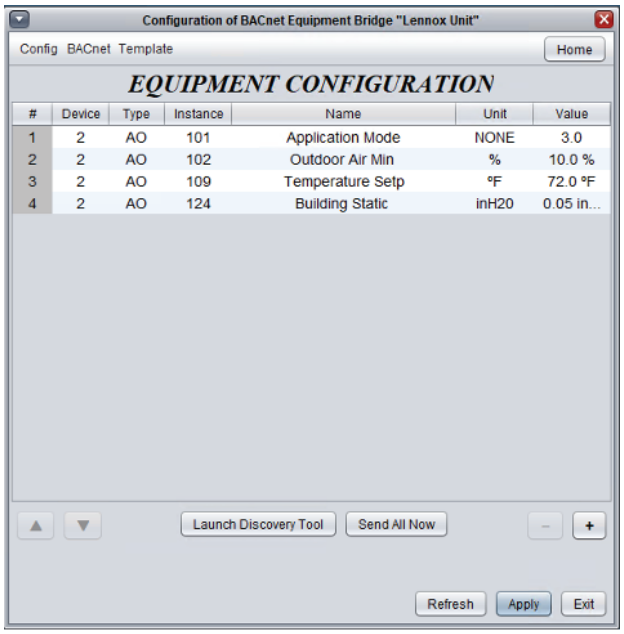

Figure 24 - BACnet Equipment Configuration Screen

- **Send All Now**: Writes all values to all objects in the Equipment Configuration list. No values associated with the Equipment Configuration screen will be written to the BACnet device until clicking this button.
- **Apply**: Saves BACnet objects and values internally in EQB for future reference or use but does not cause values to be sent to BACnet device.
- **Refresh**: Reads objects and values as they were previously stored in EQB. This does not poll the connected BACnet device for current values of the objects in this list .

All object values will be automatically sent to the connected BACnet device upon reset of the EQB controller (i.e. recovery from power failure).

The Equipment Configuration page is strictly Write Only and does not at any time read or show current actual values from within the BACnet device. If verification is desired that a given BACnet object was successfully written to the BACnet device, that same object must be separately setup in the Polling list in order to read the data.

Sequence Control

BACnet objects requiring regular, automatic interaction from the EQB must separately be discovered and added to the Sequence Control list. Points may be added manually or discovered in the same manner as the Polling list. Objects added to the control list will be automatically updated at a rate of 2 seconds per object plus 8 second delay before repeat, meaning that a list of 8 control objects will have all objects updated every 24 seconds.

Note: Setting up the control objects is again where having the documentation from the equipment manufacturer will be key to making sure that the correct points are selected and interacted with in the appropriate manner.

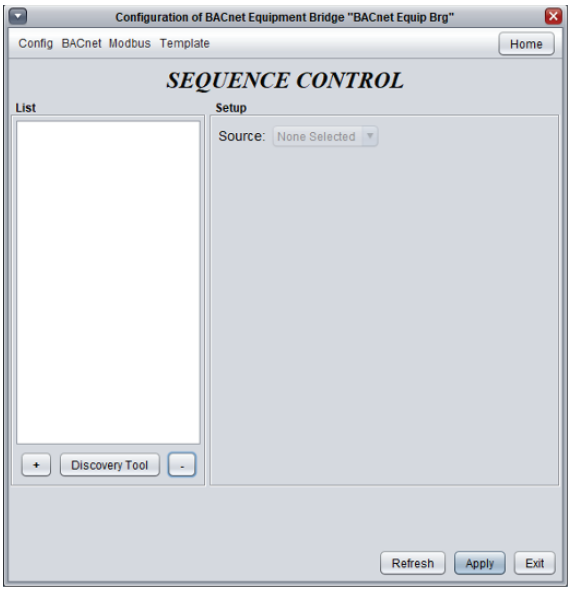

Figure 25 - BACnet Sequence Control Screen

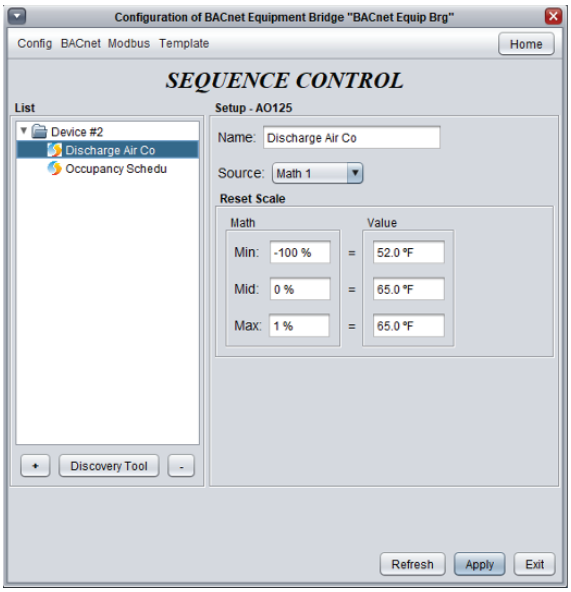

Figure 26 - Object added for Math Function Reset

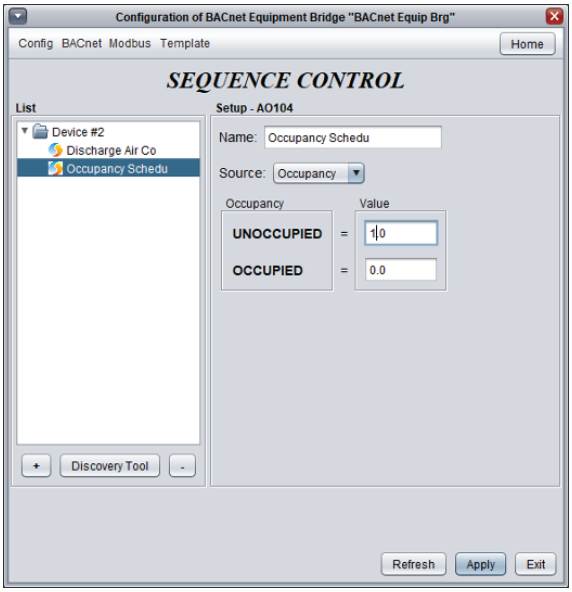

Figure 27 - Object added for Occupancy control

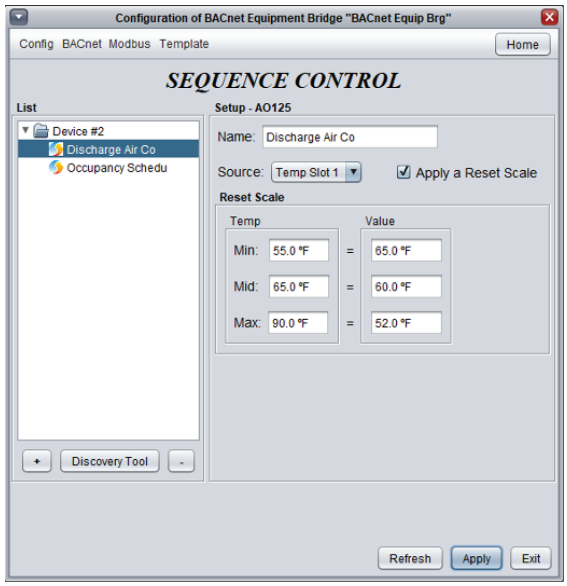

Figure 28 - Object added for Temperature Slot Reset

- **Name**: When discovered and added, the name of the BACnet object will be imported automatically. The name of the object can be changed if desired. Names have a 16 character limit including spaces.
- **Source**: The source drop-down menu provides the options available within the EQB controller that may be used as a criteria for writing new values to the selected controlled BACnet object. Source options include:
- **Math Functions**: A reset scale will be applied to the math function to create a dynamic setpoint. The Min, Mid, and Max math values must be different, but the written setpoint values for the BACnet object may overlap.
- **Occupancy**: The Occupancy value has 2 states; occupied and unoccupied. The correct numeric value for each state may then be entered into the value field for the BACnet object.
- **Temp Slots**: A reset scale may be applied to the point being written to based on the temp slot selected. If the "Apply a Reset Scale" box is not checked, the numeric value of the temp slot will be written directly to the BACnet object

Icon Setup

This screen is used to select and configure the information that will be displayed on the EQB's main icon in Focus.

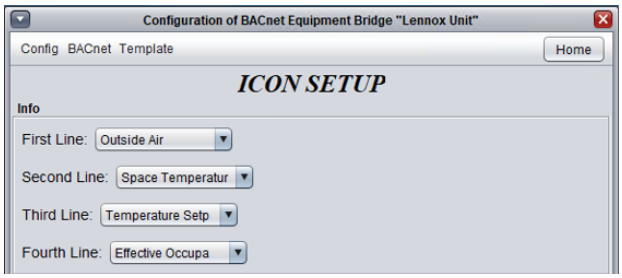

Figure 29 - Icon Setup Screen

This section lets you select which data is to be shown on the EQB's icon. The icon can display the current values of up to four different BACnet objects. Only BACnet objects in the Polling or Control lists may be selected to be shown on the icon.

Note: Unlike other controllers from Prolon, the color of the icon cannot be augmented based on any object values. Only grey (offline) and green (online) colors are supported.

Modbus Menu

Note that the Modbus menu is not available when the EQB is being used as a follower device (dipswitch #8 off)

As a Prolon Master Controller, the BACnet Equipment Bridge manages the Prolon Follower controllers (VAV Controller, Thermostat, etc.) in its system. It exchanges data with them and this data can be used to calculate math functions, control the occupancy, activate morning warm up functions, and much more. A proper network configuration is an important element in any zoning system.

Device List

This screen displays two different lists of known controllers in the current system and is mainly used for debugging purposes.

Figure 30 - Device List Screen

- **System List**: This is simply the list of icons that have been added to the current system in your Focus project. It does not imply that the controllers in this list are functional and communicating. Icons that are currently non-responsive (grey color) will still appear in this list, as long as they appear somewhere on the project screen.
- **Master's List**: This is the list of follower controllers that the master controller is currently aware of. The master builds this list after a Get List procedure, which occurs periodically or upon user command. This list can be useful during a job start-up or during troubleshooting, letting you know what controllers the master can detect, highlighting possible sources of problems.

An important note here is that if a follower is not currently on the master's follower list, the master will NOT attempt to communicate with it. This means that the demand of this follower will not be included in any math function calculation, and the follower will not receive the system-shared supply air temperature or occupancy status. In addition, Prolon Focus will NOT be able to communicate with the follower (its icon becomes grey). This is because the master assumes that the follower does not exist and therefore blocks any related network traffic.

When online, updating the master's follower list can be done quickly by simply pressing the "Check Network" button, by right clicking the master icon and choosing "Get List", or by resetting the master controller. Under normal circumstances, both lists should match.

- **Add>>**: Add the selected followers from the system's follower list to the master's follower list. To select a follower, simply click on its name in the list. To select multiple followers, hold CTRL while clicking on their names.
- **Add All>>**: Add all the followers from the system's follower list to the master's follower list.
- **Remove**: Remove the selected followers from the master's follower list. To select a follower to remove, simply click on its name in the list. To select multiple followers, hold CTRL while clicking on their names.
- **Remove All**: Remove all the followers from the master's follower list.
- **Create Icons**: Create Focus icons for each follower in the master's follower list, unless the icon already exists.
- **Check Network**: Causes the master to automatically retrieve the list of followers attached to it. All followers found will be displayed in the "Master's List" box. This function is unavailable offline.

Math Functions

This screen is used to configure a Prolon Master's math functions.

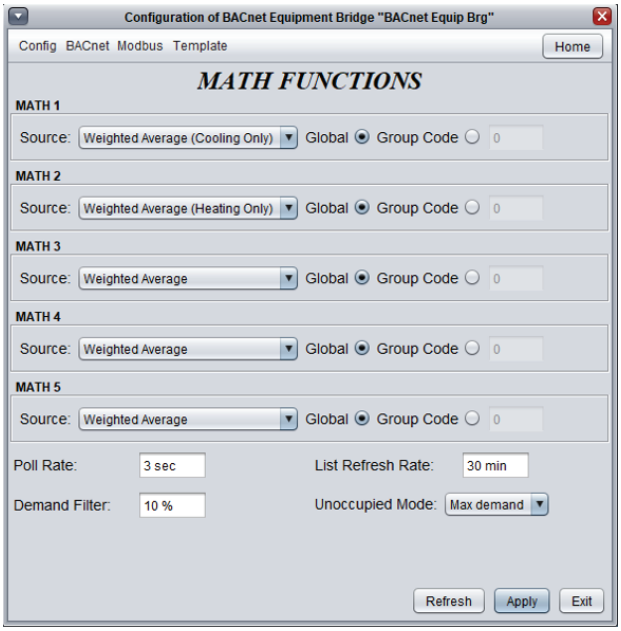

Figure 31 - Math Function Screen

The Prolon BACnet Equipment Bridge will detect and analyze the demand and group codes of all the zone controllers on its network. With the various demands on hand, it calculates the math functions as specified below.

The results of these math functions can then be applied to various points and functions in the EQB to affect cooling, heating and other functions of the BACnet connected equipment, as defined by the user. The math function results will also be shared with devices connected to the EQB's network, such as a FlexIO controller or Zone Damper controllers.

There are five available math functions to configure. For each function, you have the following options:

Source: Each math function can be calculated in one of the following ways:

- **Weighted Average**: The weighted average of all the Zone Controllers included in the calculation. The weighted average is calculated by multiplying the demand of each Zone Controller by its respective weight and adding them together. The result is then divided by the total weight in the calculation. This provides a math function whose final result is more influenced by the zones with greater weight. Note that this calculation will allow heating demands and cooling demands to effectively cancel each other out.
- **Max Heating**: This returns the highest demand for heating of all the Zone Controllers included in the calculation.
- **Max Cooling**: This returns the highest demand for cooling of all the Zone Controllers included in the calculation.
- **Weighted Average (heating only)**: This is the same as "Weighted Average", except only zones with a heating demand are included in the calculation. Zones in cooling are worth 0%.
- **Weighted Average (cooling only)**: This is the same as "Weighted Average", except only zones with a cooling demand are included in the calculation. Zones in heating are worth 0%.
- **Occupancy**: If there is at least one Zone Controller found in this calculation that is occupied (or overridden to be occupied), this math function will return 100%, otherwise it will be 0%.

- **Override**: If there is at least one Zone Controller found in this calculation that is overridden from unoccupied to occupied mode, this math function will return 100%, otherwise it will be 0%.
- **Radiant Request**: As soon as the radiant cycle percentage of any single one of the participating zones in the math function becomes greater than 0%, the math value goes to 100%. Otherwise, it remains at 0%.
- **Heat/Cool Combo with Priority**: This math function is exclusively for VVT zoning systems to combine all temperature control data into a single point. The prioritized mode will be output at all times unless the non-prioritized mode demand is above the conflict threshold while the prioritized mode demand remains below the conflict threshold.
- **Global**: When this is selected, ALL Zone Controllers found in the system are included in the calculation. If "Weighted Average" is selected, then the weight used will be specified in the Group Codes configuration screen, in the Global field of each Zone Controller.
- **Group Code**: When this is selected, ONLY the Zone Controllers belonging to this group are included in the calculation. There are 250 groups available, numbered 1 through 250. If weighted average is selected, then the weight will be specified in the Group Codes configuration screen of each Zone Controller. When group codes are not being used, it is automatically set to zero.
- **Poll Rate**: The interval at which this device will retrieve new data from the Zone Controllers on the network. Increase this value to alleviate network traffic.
- **List Refresh Rate**: The interval at which this device will attempt to detect any Zone Controllers on the network. The purpose of this setting is to remove any zones that may have become non-functional from the calculation. Also, once a previously non-functional zone becomes functional again, it will be automatically added back into the math function calculation. Setting this to zero will disable list refreshing.
- **Demand Filter**: The demand filter is used to limit the rate of change of the math functions. When a math value changes, it is first compared to its previous value. The difference between the two is multiplied by the demand filter and added to the previous value.

  Example:

  - Demand Filter = 30%
  - Previous math value = 50%
  - Desired math value = 75%
  - Final math value = (75-50) x 30% + 50 = 57.5%

  Therefore, instead of the math value suddenly jumping from 50% to 75% in the span of 1 second, it will instead jump to 57.5 % and gradually reach the 75% mark. This calculation repeats once per second. Smaller demand filter values will cause a slower transition. Note that the demand filter is not applied if the difference between the previous math value and the desired math value is equal to or less than 3%.
- **Unoccupied Mode**: This option can modify the math calculation strategies during unoccupied mode.
- **Max demand**: During unoccupied mode, "Averaging" type math functions will be replaced by "Max demand" type functions:
  - "Weighted Average" is replaced by "Max Demand". In the case where there are conflicting demands between different followers (cooling and heating), priority is used to decide between them.
  - "Weighted Average (Cooling Only)" is replaced by "Maximum Cooling"
  - "Weighted Average (Heating Only)" is replaced by "Maximum Heating"
- **Normal**: Math functions will be calculated the same way, regardless of occupancy

Temperature Data Collection

This screen allows local temperature sensors on the Prolon network to be used by the EQB for various functions. Since the EQB does not have any physical sensor inputs, these values must come from Prolon devices on the EQB's network.

Figure 32 - Temperature Slot Screen

Figure 33 - Selecting Device for Temperature Slot

Four temperature slots are available in the EQB. These slots may be used to poll a single point from up to four different devices or as many as four points from a single device.

All devices in the EQB's "Masters List" will be available to choose from in the device drop-down for each slot.

Once a device is selected, all available temperature related points within that device will be available from which to select.

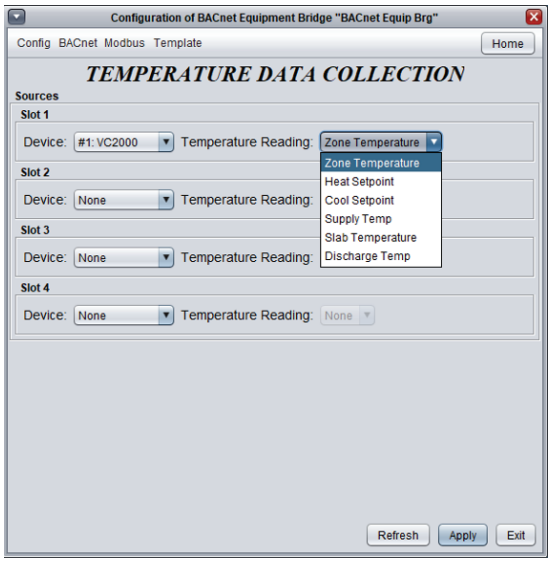

Figure 34 - Selecting Device Point for Temperature Slot

Morning Warm Up Sequence

The Morning Warm Up Sequence is used to temporarily disable the outputs on selected zone controllers upon a transition to Occupied Mode. This is a way to obtain considerable energy savings by relegating morning heating demands to the Master Controller, instead of using terminal heating on top of the Master's own heating.

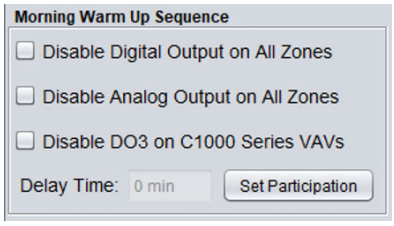

Figure 35 - Morning Warm Up Sequence

Upon a transition from unoccupied to occupied (but not including those which occur due to manual overrides), the Master Controller commands all participating zones controllers to disable the selected outputs for the amount of time specified.

For C1050 VAV Controllers, the Digital output corresponds to Output 4, and the Analog Output corresponds to Output 5.

Cooling Priority Zones

When a zone is specified as a cooling priority zone, the Master will use the cooling demand of that zone to drive the cooling sequence, as long as the demand of that zone is greater than the math output normally assigned to cooling.

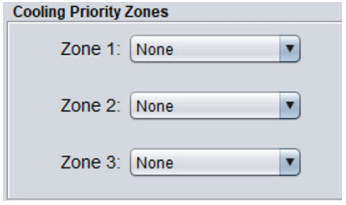

Figure 36 - Cooling Priority Zones

A maximum of three high-priority cooling zones may be selected. This feature can be very useful for conference rooms, which under most circumstances are empty and without cooling demand. But once that room fills with occupants, it can effectively drive the cooling in the Master controller.

Note that this sequence takes priority over heating, even if heating normally has priority

WARNING: This sequence should only be used by experienced building automation specialists.

Outside Temperature Overrides

This function commands the selected zone controllers to set their outputs to a minimum specified value under certain outside temperature conditions. These overrides can be activated when the outside temperature is either greater or less than a given setpoint:

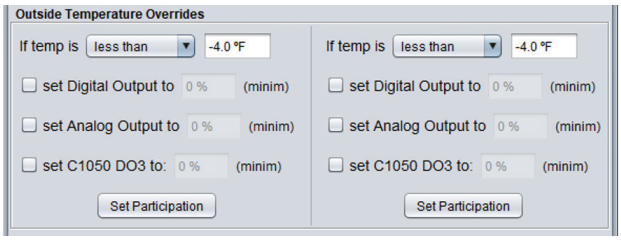

Figure 37 - Zone Outside Temperature Overrides

This can be useful to force specific zone controllers to activate their heating outputs in anticipation of a strong heating demand due to cold outside temperatures, for example, during unoccupied mode.

For modulating or pulsing outputs, the override only acts as a minimum in this case: the overridden output can still increase its action if called to.

For ON/OFF differential outputs, only an override of 100% will activate that output. Otherwise, it will remain off.

Alternatively, in the special case where the override is set to zero, the output will instead remain deactivated for the duration of the override. This can be useful to ensure that heating outputs stay off during warmer seasons.

For C1050 VAV Controllers, the Digital output corresponds to Output 4, and the Analog Output corresponds to Output 5.

Zone Damper Override

This function commands all VAV zone dampers to the desired position.

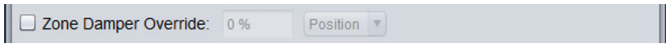

Figure 38 - Global Zone Damper Override

This function is useful during air balancing procedures. The available modes are:

- **Position**: Dampers simply go to the desired position.
- **Flow**: For pressure independent zone controllers, the damper will move to target a flow reading determined by the override percentage, using its minimum and maximum air flow setpoints as a scale. For example, if the minimum flow setpoint for a VAV Zone Controller is 100 CFM, and the maximum flow setpoint is 200 CFM, and the override is set to 75%, then the VAV controller will target 175 CFM.
- **Min**: Dampers go to their minimum position if pressure dependent, or their minimum flow setpoint if pressure independent. The override value is not used.
- **Max**: Dampers go to their maximum position if pressure dependent, or their maximum flow setpoint if pressure independent. The override value is not used.

This parameter is an override and will be lost if the master loses power or is reset.

Template Menu

Save as Template

The template function gives you the ability to save the configuration of a particular BACnet Equipment Bridge for future use, which can then be applied to any other BACnet Equipment Bridge. Each configurable property of the EQB is saved into this template file, except for its name. This function is very useful if you have many EQB Controllers with the same or very similar configurations. You will be able to quickly copy and paste the configuration. Additionally, a template can serve as a backup in the event a BACnet Equipment Bridge would ever need to be replaced.

Load Template

After saving an EQB configuration in a template, you can load this template into another EQB by selecting this menu item in the configuration screen of the EQB you wish to change. All configuration properties found in the template are then copied into the configuration screen for your viewing or possible modification. Once you are satisfied with the set of properties, click the “Apply” button. Note: The template configuration will not be applied to the EQB Controller until you click on the “Apply” button. If you do not wish to use the configuration properties of a loaded template, click on the “Refresh” or “Exit” buttons.

Hardware Specifications

Technical Specifications	
SUPPLY	24 VAC ±10%, 50/60 Hz, Class 2
POWER	1.3 VA
INDICATION LIGHTS (LED)	Communication / Power / State of microprocessor
COMMUNICATION	BACnet MSTP, Modbus RTU (RS485) up to 127 nodes
CONNECTION	Removable screw-type terminal blocks (max 16 AWG)
WEIGHT	0.3 Lbs, (1.36 kg)
ENVIRONMENT	-4 to 122°F (-20°to 50°C) Non-condensing
CERTIFICATION	UL 916 Energy Management Equipment and CSA C22.2 No.205 Signal Equipment (Pending), FCC Part 15 subpart B Class B, ICES-003:2020

Model Specifications and Control Capabilities

PART NUMBER	NUMBER OF DEVICES	CONFIGURATION POINTS	POLLING POINTS	SEQUENCE CONTROL POINTS
PL-BAC-EQB-01	1	15	15	4
PL-BAC-EQB-03	3	30	30	6