VAV-B
Programming Manual

computrols

2520 Belle Chasse Highway | Gretna, Louisiana | Phone: 504.529.1413 | www.computrols.com

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www.computrols.com
504.529.1413
2520 Belle Chasse Highway
Gretna, Louisiana 70053

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Things You Will Need

» CBAS version 12 or newer

» Firmware version 13.7 or newer on Host controller

» USB-485 Isolator cable (B&B Elec. model USOPTL4, Computrols part no. USB-ISO)

» Drivers for isolator (disk comes with cable)

» VAV_Utility.exe commissioning software (latest)

All of the above software and firmware are included in the VAV-B Package (installs with CBAS-resides in CBAS 15 folder). Contact Customer Service or Technical Support for this, or for cables.

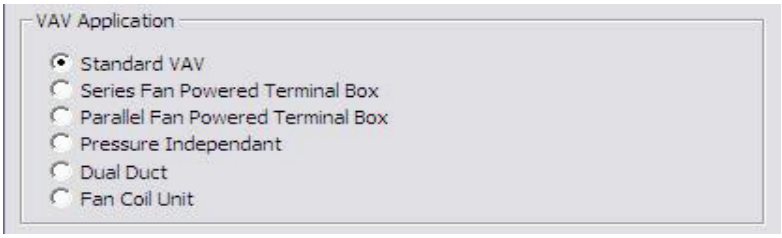
Things You Need to Know

The preferred protocol for the VAV-B is OPTO. It is easier to program the points in CBAS with OPTO. However, BASnet is also available if you need to add a VAV-B to an existing BASnet channel. We also now have special firmware versions for BACnet and Siemens VAV-B.

There are 2 ways of connecting to the VAV-B controller: One is through a USB port direct to the controller's Local 485 Port using a USB to 485 cable. This method is also used for balancing VAV boxes later after installation. The second is through the CBAS DPU using the host controller and OPTO 485 channel. The second method is covered later in this manual. For your first time, it is suggested that you use the direct connection method in your office before going to the jobsite.

The points you program in the CBAS database DO NOT DOWNLOAD to the controller. They are there for you to monitor the application that is running on the controller, and to command a few points if necessary.

The available applications included with the controller are:



Basic Steps Summary

» Wire the VAV-B including power, 485 Comm to Host, and commissioning cable.

» Set Address using dip switches.

» Place the VAV_Utility.exe commissioning software in the CBAS folder.

» Create shortcut to above software (optional).

» Plug in the cable to a USB slot and complete installation using drivers.

» Start Utility Program.

» Click VAV Connection and set the parameters to connect.

» Choose “Serial Port via 485 converter” and enter address.

» Select USB serial port, then click Connect. Database should download and Status should show Ready.

» You can now Click Pre Box Setup and work your way down the list of parameters. Click OK.

» Do the same with Installer button.

» Click “Save and Export Database”.

» Click Save All Changes to VAV. The controller will reboot and the program will reconnect.

» To zero out the pressure pickup and damper actuator, etc, click Test and Balance.

» Return to Main Screen, then Save/Export Database.

» Save All Changes to the VAV.

» Open CBAS in Editor Mode.

» In Hardware View, add a channel to host the VAV-B controllers (could be OPTO, BASnet, or BACnet.

» Add a VAV-B to the channel.

» OPTO: Import points from file saved in earlier step during commissioning.

» BASnet: Add a blank controller. Choose to Add from Template, or Copy from another controller. Click controller, then Add Points to VAV-B.

» BACnet: Add points either from text file saved when Save/Export Database or use an export file from another VAV-B.

» Go to Real Mode and start monitoring.

» Add a VAV-B Commission point to the Workstation channel. This allows you to commission VAV-Bs through the 485 channel. VAV_Utility.exe must be in the C:\CBAS folder.

Hardware

Wiring the VAV-B Controller

See wiring diagram. The commissioning cable can be connected through a MN-S3 display stat as shown.

» If you are not using a MN-S3, you will need a cable with bare wires on the end opposite the USB plug.

» The black wire attaches to the Programming Port (–) terminal and the red wire attaches to the (+) terminal.

» The 24VDC common must be connected to earth ground!

» You may daisy chain up to 50 VAV-B controllers on one 485 channel connected to either the Host port or Secondary port on the Host Controller.

» Terminate sensor and output wires to terminals according to the label on the controller.

Set the Address

Using the dipswitches, set the address.

» There is one set of dipswitches for the 10s and one set for the 1s, so the address can be from 1 to 99. Zero is an invalid address.

» Dipswitches in the UP position are added up to make the address.

» There are examples shown on the controller's label.

Install Commission Cable

To install the Ulinx USOPTL4 USB to RS-485 adapter, follow the instructions provided with the driver installation CD. To install the USB to 485 cable, continue.

» Plug in the USB to 485 commissioning cable and the Found New Hardware Wizard will appear.

» Browse to the location where you placed the cable drivers.

» Inside the i386 folder, highlight the ftdibus.sys file and click next.

» Complete the installation wizard.

The cable will be listed in Device Manager under Ports, as USB Serial Port COMXX. (XX represents the comm port number)

Software

Utility Program

VAV Utility is installed to the CBAS 15 folder when CBAS is installed. If you acquire an updated version of the program, copy the VAV_Utility.exe commissioning software to C:\CBAS15 (or other CBAS directory where CBAS is installed).

Right-click the file and click Send To, then Desktop (Shortcut), if you need a desktop shortcut for commissioning purposes.

Connecting

» Start the VAV_Utility program.

» If you get an error, run the vcredist_x86.exe then start the program again. (Should only be necessary on Windows XP, if CBAS has not been installed on the PC)

» With Windows 7, 8, 10, you might have to run as administrator. Right Click the program and go to Properties. On the Compatibility tab, check Run this Program as an Administrator.

» When program starts, at the top of the window, click VAV Connection. (See Figure below)

» Choose Serial Port Via 485 converter. If you do not see this option, you have not completed installation of the Commissioning Cable. The other 2 connection types are covered later.

» Choose RS-485 to Stat Channel. (Main Channel refers to 485 network to Host controller)

» Enter the address of the VAV-B.

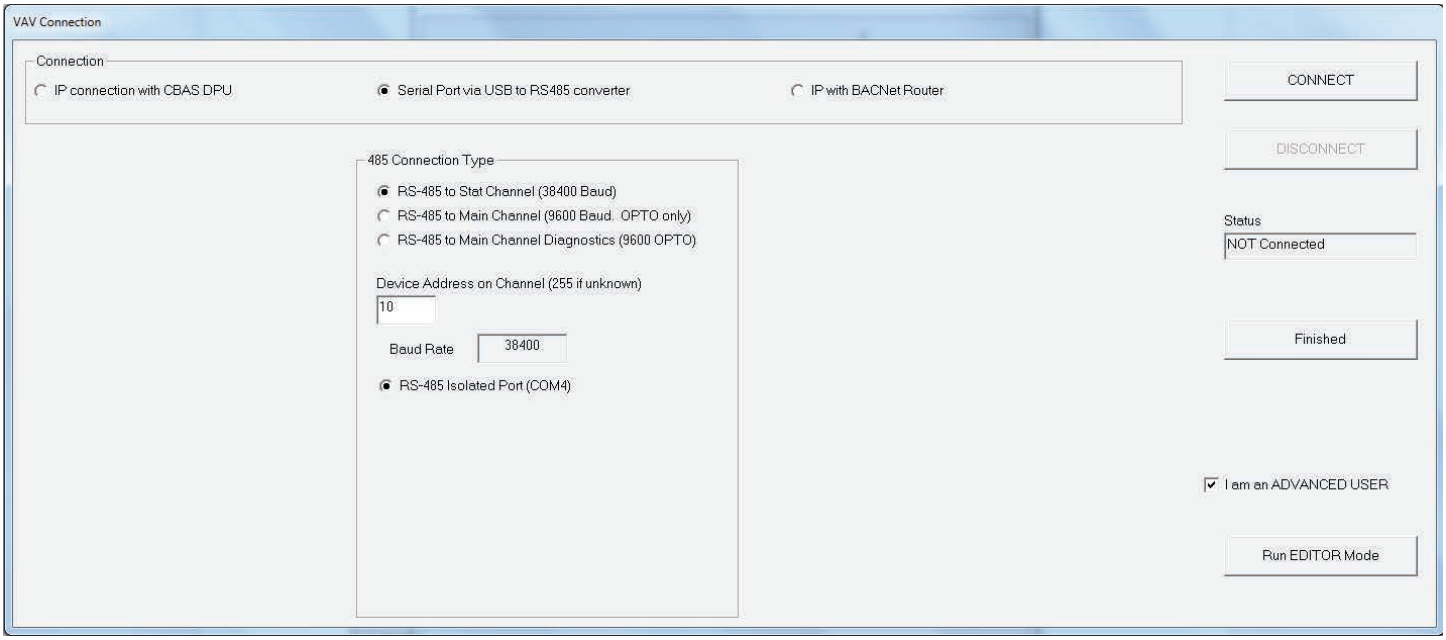
» Leave the Baud rate at default.

» Choose the USB Serial port. Should say Isolated Port.

» Check the “I am an advanced User” box.

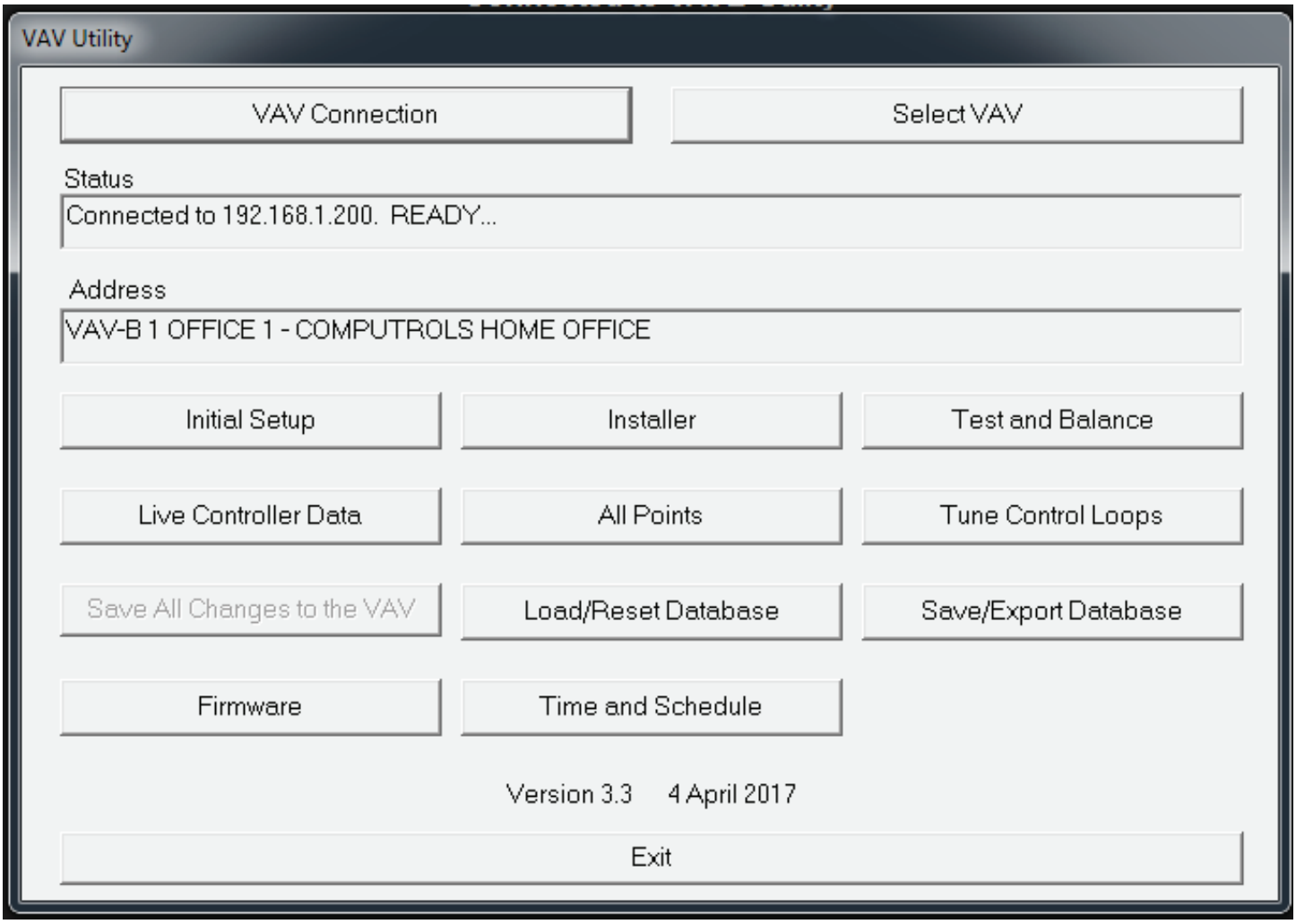
» Click Connect and the database will load within 10 seconds.

Note: *Editor mode is a way to simulate programming without being connected to a controller. This is equivalent to Simulator Mode in CBAS.*



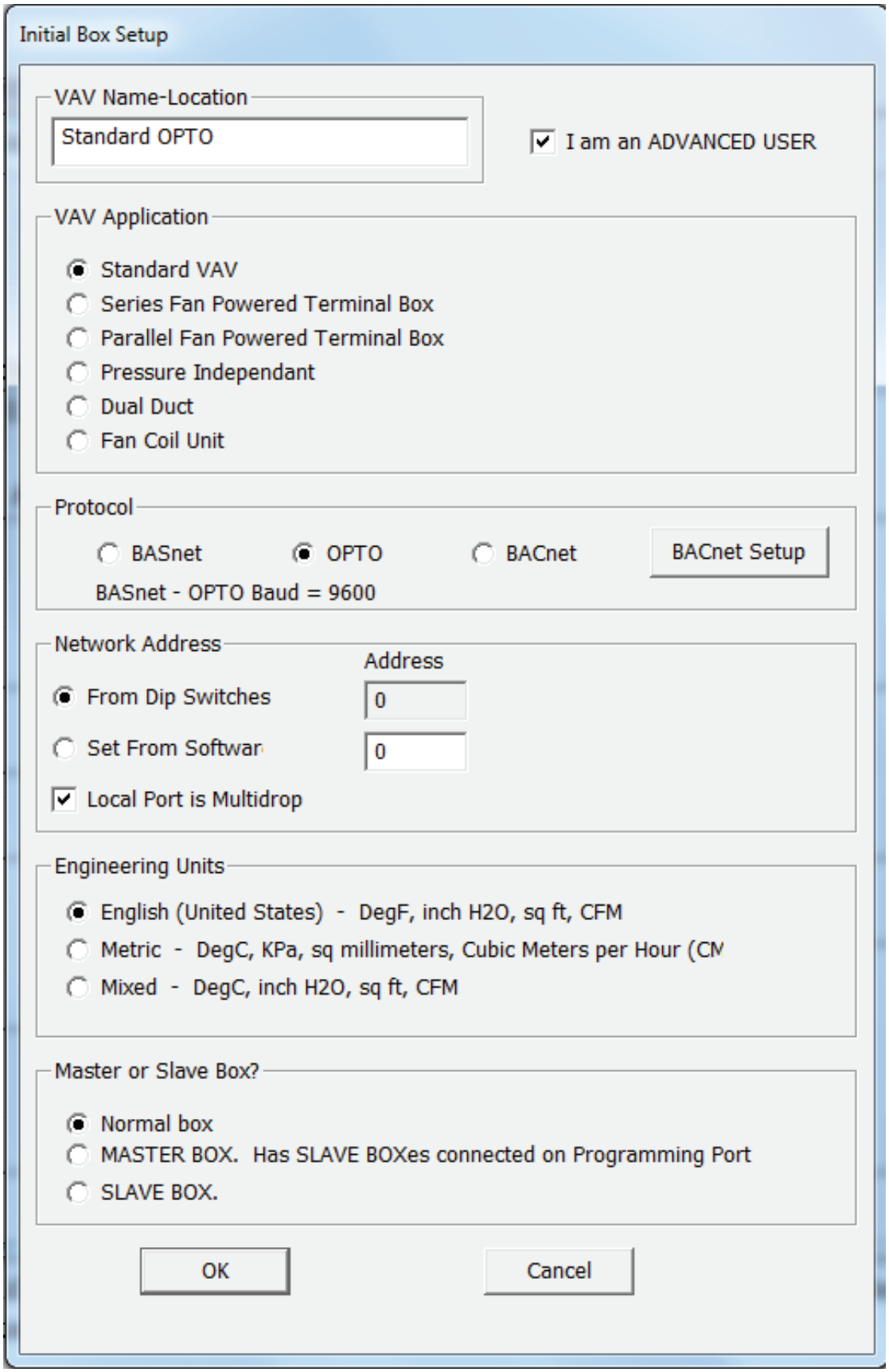
Commissioning the First VAV-B

Once you have connected, all the buttons will be active, except the Save All Changes button. It will be active as soon as changes are made. (See figure below) The buttons are in order from top to bottom, but you should normally only need the first 3, then the Save and Load buttons will be used.



Initial Setup

Click the first button, Initial Setup. (See figure below) Type in a VAV Name-Location.



Choose the VAV Application Type
Choices should be self-explanatory. Pressure Independent controls the VAV box based solely on Space Temperature and Setpoint, not CFM and CFM Min/Max.

Network Address
You should not have to change anything in the Network Address section. It is possible to change the address by selecting “Set in Software”.

» When you Save to VAV, the address changes.

» You will lose connection and will have to restart the connection using the new address.

» Choose your protocol and baud rate.

» BACnet is covered later.

Choose English Units or Metric

Master or Slave Box?
With most VAV-Bs, the box type will be Normal Box. Master and Slave are used when you have 2 or more boxes sharing a single space temperature and setpoint. The Master will contain the actual Space Temp and Setpoint.

» Select Master for the Master box and Slave for the Slave Box.

» You must also select “Local Port is Multidrop”. (Necessary for controllers to share Temp and SP) You have to select “I am an Advanced User” on the VAV Connection screen in order to see this option.

» Then, connect the 485 Local Port wires together on the 2 VAV-Bs.

» The Master box will share its space temp and setpoint with the Slave box. You can have multiple slave boxes per master. So, you could have 1 VAV-B with an S3 then several other VAV-Bs maintaining the space temp using the Master space temp and setpoint.

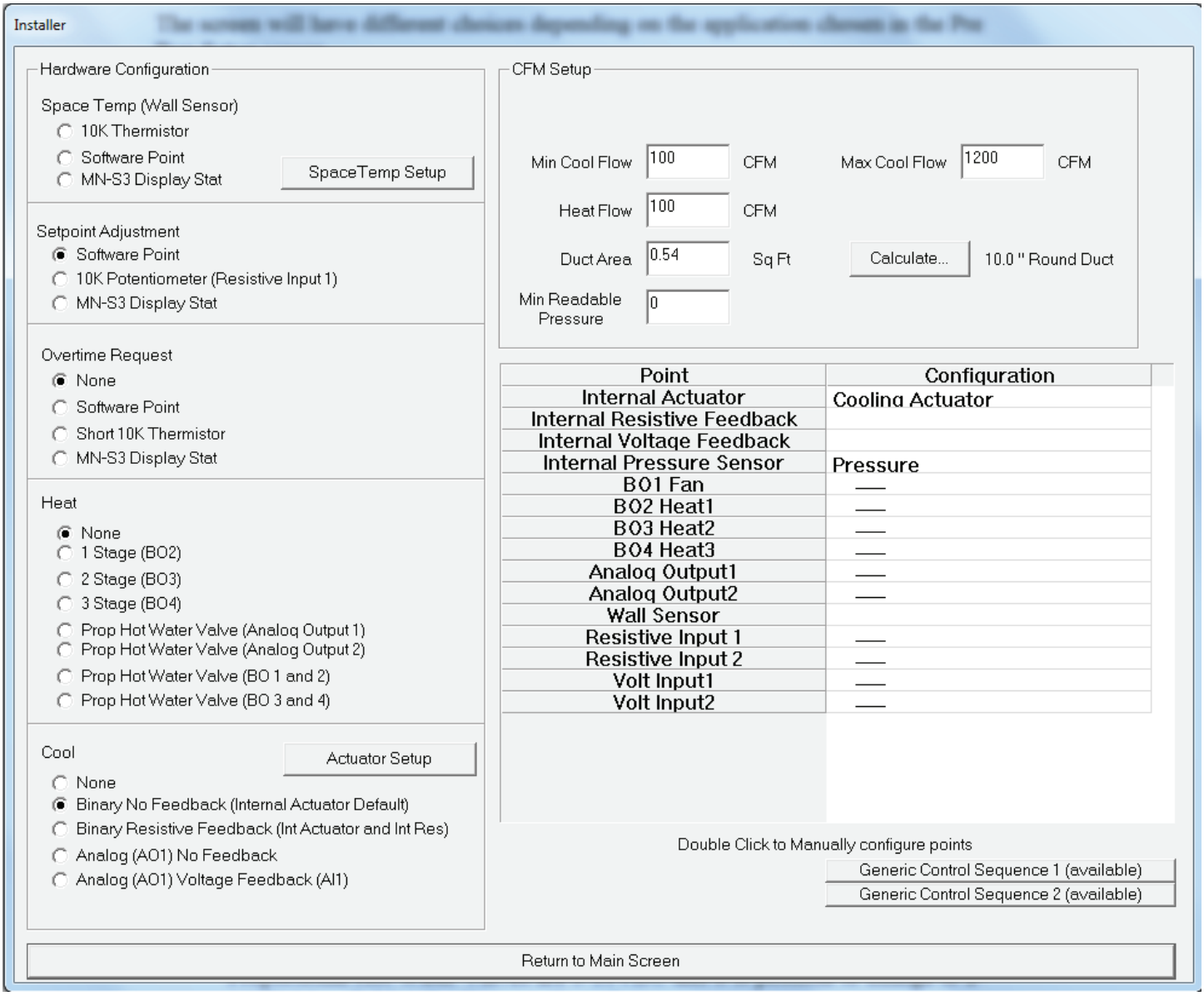
Saving Changes
Once you have made all of your choices under Pre Box Setup, click OK to save them. However, they will not be saved to the VAV-B until you Save All Changes to the VAV from the main screen. But, you will complete the Installer screen setup prior to saving.

Installer Screen
Now click the Installer button. (See figure below)
The screen will have different choices depending on the application chosen in the Pre Box Setup screen.

» Make your choices for the type of temperature sensor, setpoint, and overtime. The Software Point choices refer to a point on the VAV-B controller where the setpoint can be commanded only from CBAS. This is covered in a later section.

» To change the range of the Setpoint (ex. 68-72), click the Setpoint Setup button.

» If you choose MN-S3 Display Stat, click the Space Temp Setup button for choices on how the S3 setpoint range and the buttons work.



If you choose MN-S3 Display Stat, click the Space Temp Setup button for choices on how the S3 set-point range and the buttons work.

Choose Your Type of Heat, or None

» The 1 – 3 Stage Heat choices are for electric heat of course, and require a relay. Proportional Hot Water Valves are 0-10VDC and it is possible to change to 2-10VDC by clicking the Actuator Setup button.

» The final 2 choices are for Pulse Valves and those choices take up 2 Binary Outputs each. BO1 pulses the valve in a positive direction and BO2 is the negative or opposite pulse. The same is true for BO3 and 4.

Choose Your Cooling Damper Type, or None

» Binary No Feedback is the default when you are using the internal damper included with the VAV-B-AP.

» With Resistive Feedback, you would not be using an Internal Damper. On the VAV-B-X, there is a plug on the side where you would plug in that damper with feedback.

» The final 2 choices are for External Dampers on AO1 and are 0-10VDC. Click the Actuator Setup button and you will find a check box to make the damper 2-10 Volts.

» The last choice allows you to use the actuator feedback on AI1.

Unused Points

» In the section listing the points in the bottom right, you can click a line that is not being used and manually configure the type of input or output. Use the Scaler Setup button to manually configure scaling on any of the scalable points. You can use the following Generic Control Sequences to command the outputs.

Generic Control Sequence 1 and 2

» Click one of the Generic Control Sequence buttons to configure a sequence to override internal application and/or command a point.

» You can find an example of how to use these sequences in Appendix B at the end of this manual.

Initial CFM Calibration

In the top right section, set your Min, Max, and Heat CFM targets.

» For your CFM calculation to work, you must set the correct duct area.

» Click the Calculate button.

» Enter the size and shape of the duct and click Calculate.

» Then click Save and it will be saved to the Duct Area field.

» Min Readable Pressure is the lowest that your sensor can read in Inches of Water Column (“WC). Anything below this amount will display as 0 CFM.

» If you are not using a pressure sensor, you can choose the Pressure Independent application on the Initial Setup screen.

When the Installer screen is complete, click Return to Main Screen and it will be saved.

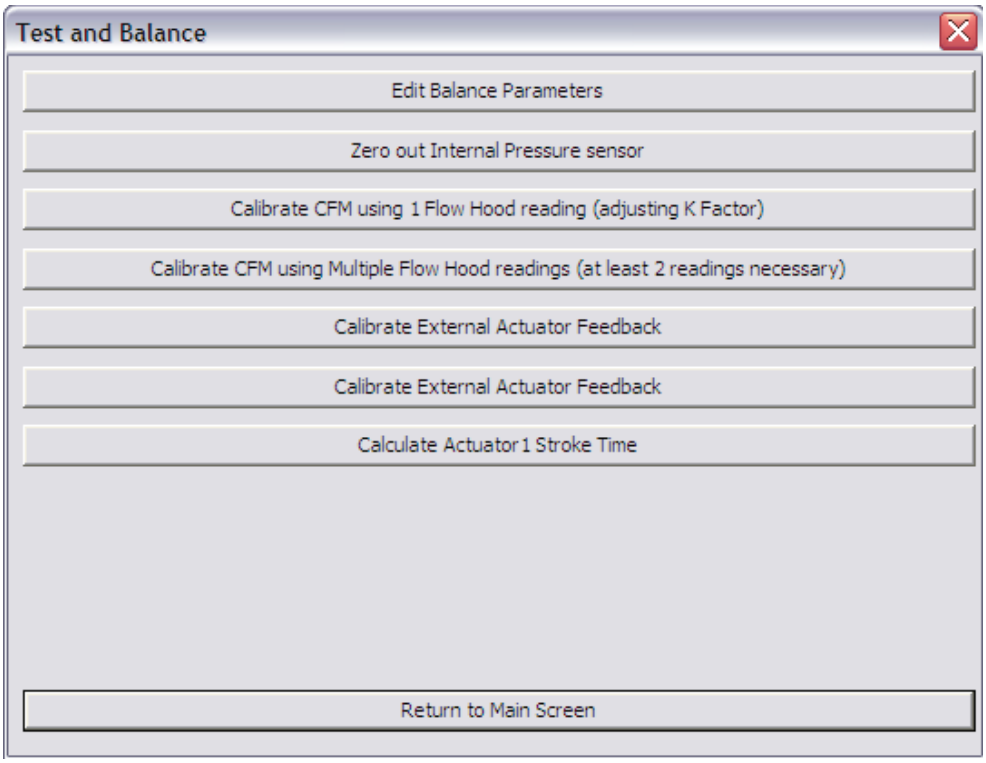
Save Configuration

Now is a good time to click Save/Export Database. This will create a file containing all of the setup choices you have made. The file is saved in the C:\CBAS15\Personalities folder and can be used to add identical VAV-B controllers in the future. This will be covered in a later section.

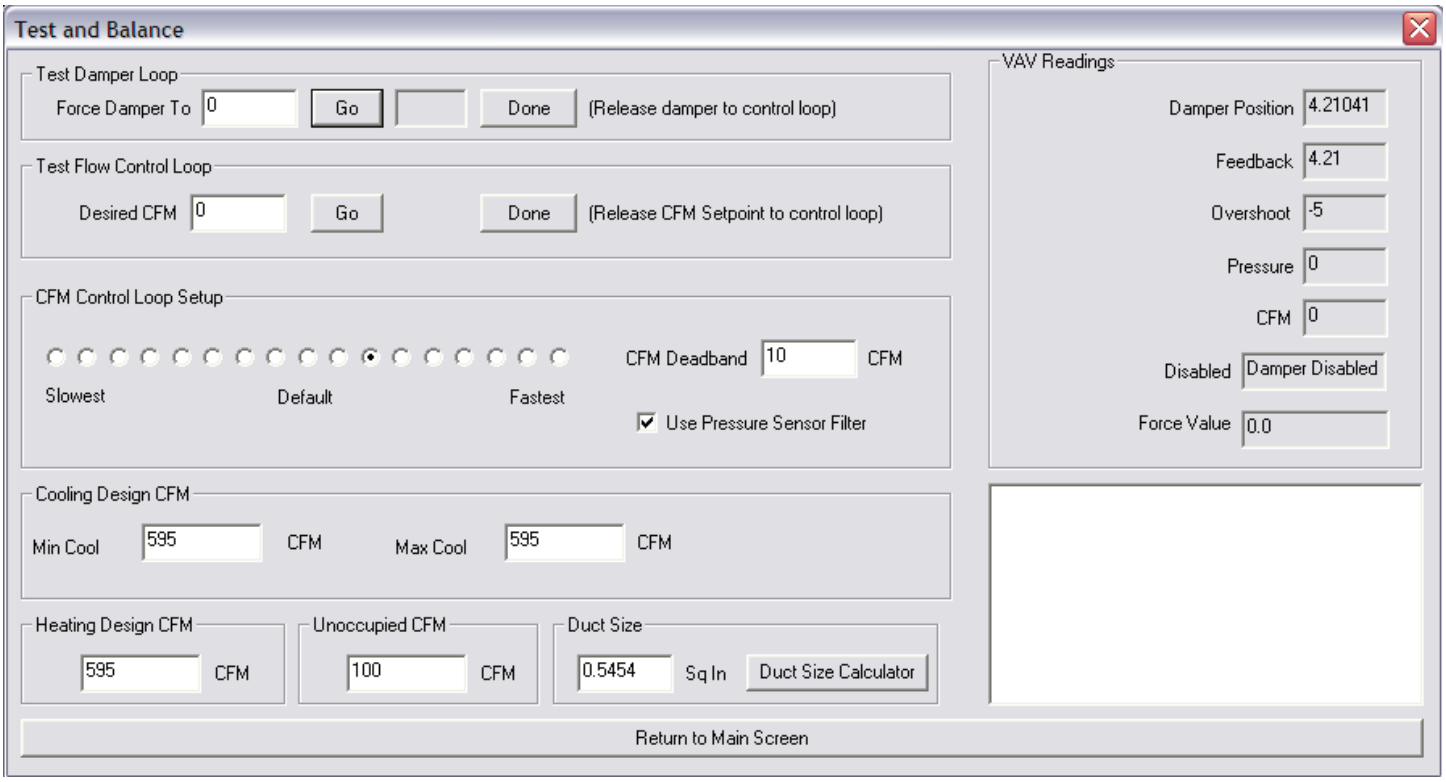
Now click Save All Changes to VAV. Within a minute, the utility program will reconnect to the VAV-B for further configuration.

Test, Balance and Zero-Out Pressure/Damper

From the Main Screen, click the Test and Balance button. (See figure below)



Edit Balance Parameters (See figure below)



From this screen, you can test the operation of the damper alone and in relation to CFM Targets.

Also, targets, duct size and control loop speed can be adjusted.

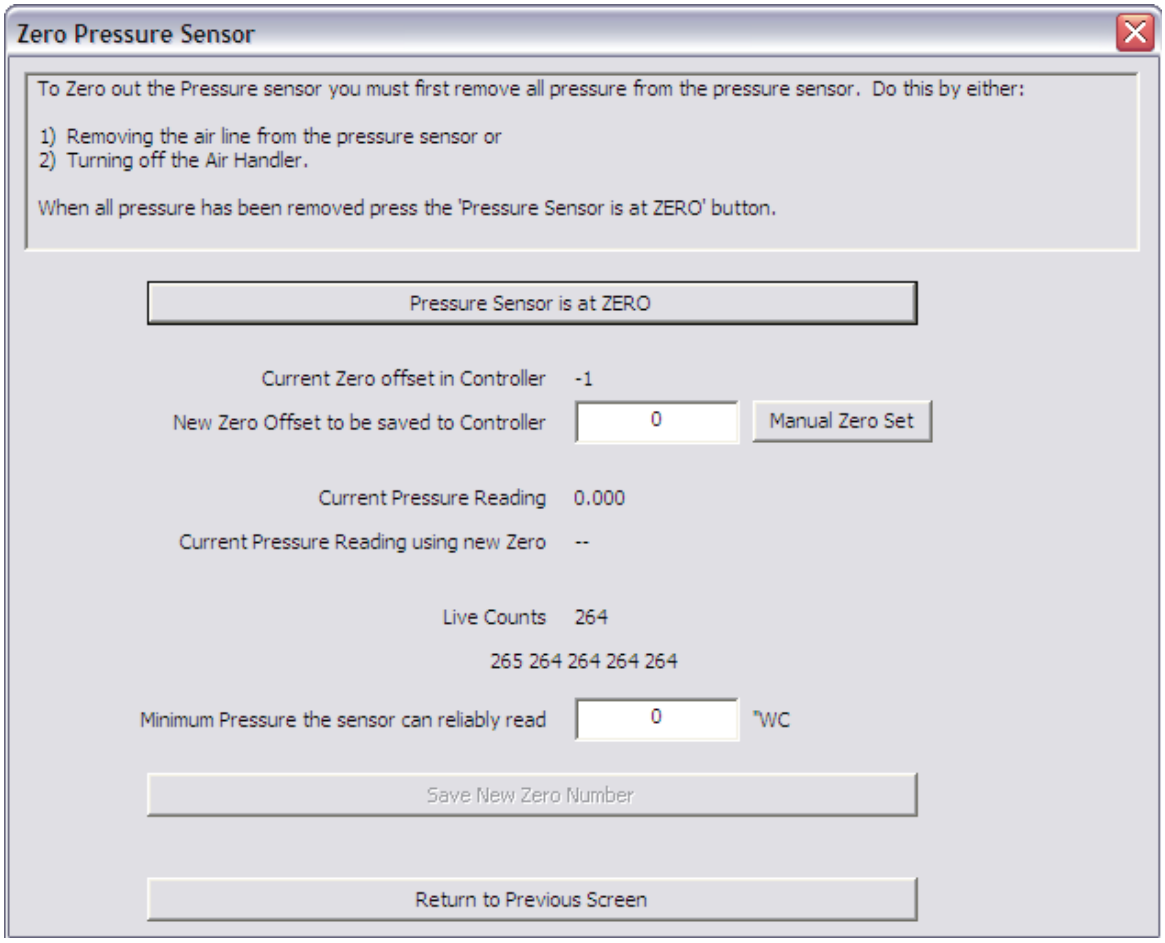
To test, just type in a damper position or a desired CFM flow then click the GO button. You will see actual readings from the damper on the right as they change. When finished testing, click Done and the control loop will take over.

This is also the only screen where you can set the Unoccupied CFM. If you are using an Occupied Schedule or commanding the VAV-B to Unoccupied at any time, then you might want to set this to a different number, or 0.

Click Return to Main Screen when finished testing and making changes. If changes are made to the control loop and CFM Targets, you will need to Save All Changes again.

Zero-Out Internal Pressure Sensor

In order to get an accurate zero CFM reading from the internal pressure sensor when there is no air-flow, you must zero it out. Click the button and you will see the following screen.



- This is an easy process. Either turn off the AHU or remove the tubes from the pressure sensor on the VAV-B.
- When you know that the flow has stopped, click Pressure Sensor is at ZERO. The process will take about a minute.
- When the process is complete, the Save New Zero Number button will become active. Click that

button.

» You will get a warning to Reboot Controller for New Setting to Take Effect.

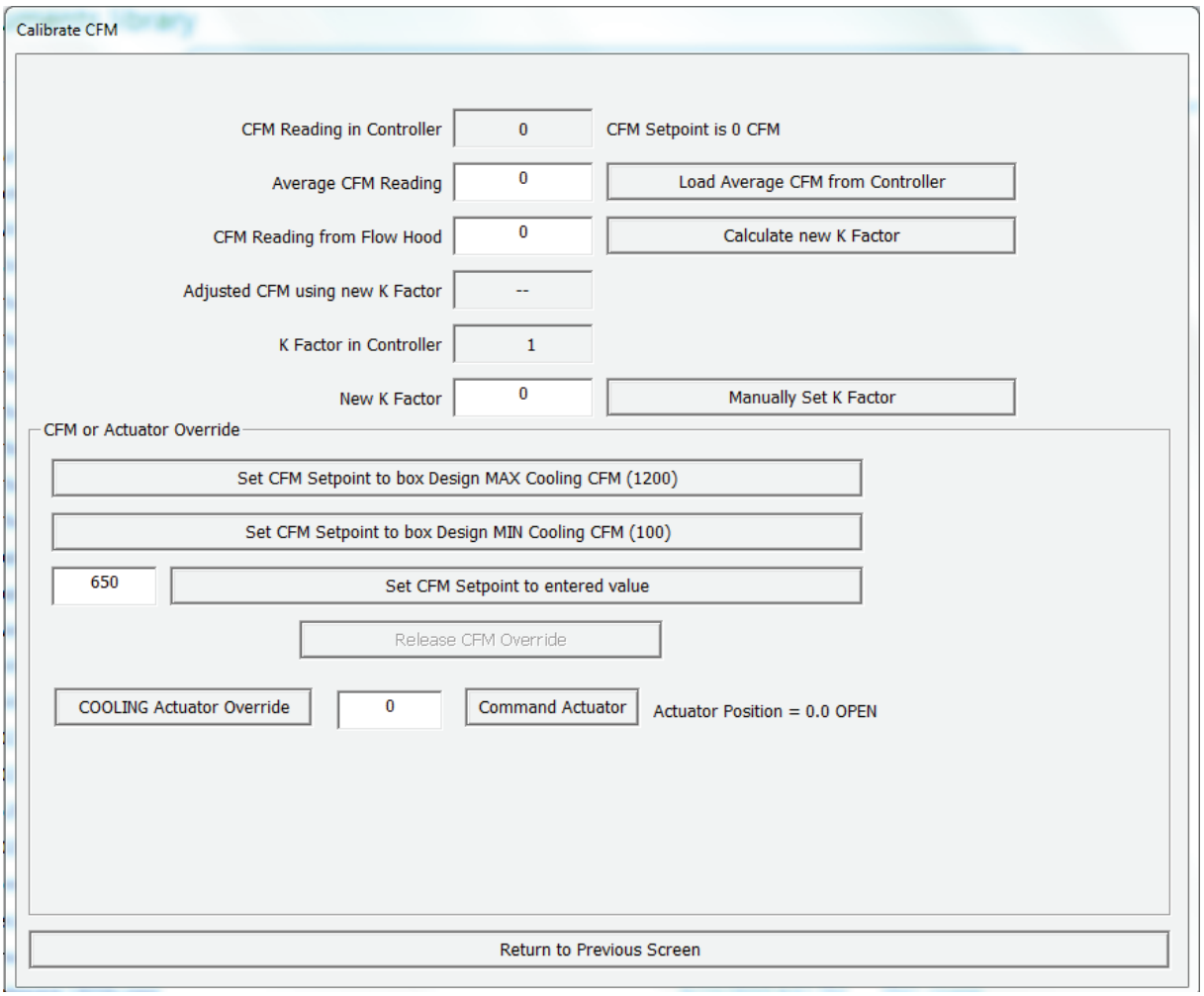
» Click OK to return to the Test and Balance choices.

» When you save changes again, the new settings will be saved.

Calibrate CFM Using One Flow Hood Reading

Click this button and you will see the following screen, which is intended for use in balancing the VAV boxes after installation.

The first step is to override the CFM so that it doesn't move during the calibration process. Wait for the CFM to settle, then click the Load Average.



» Click Load Average CFM From Controller.

» Type in the CFM Reading from the Flow Hood and click Calculate New K Factor.

» If you would like to manually set the K factor, type it into the New K Factor field and click the button to the right.

» To test the operation of the damper in relation to the Setpoints, click the buttons in the next section.

» Be sure to click the Release CFM Override button when finished.

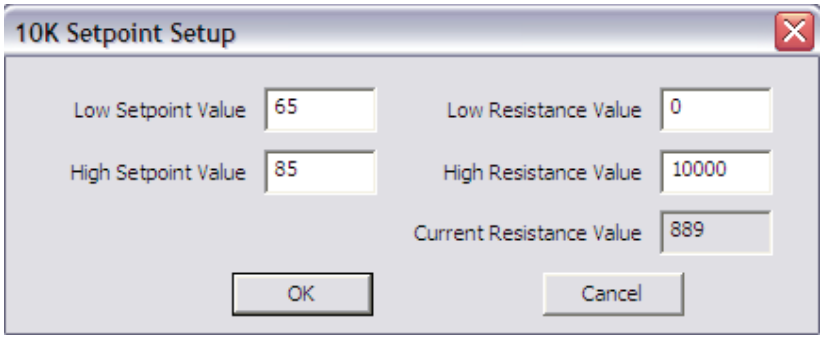
» Click Return to Previous Section.

Calibrate CFM using Multiple Flow Hood Readings

Complete the process by following the onscreen instructions for steps 1 and 2. There is also a test section identical to the one in the Edit Balance Parameters screen. When finished, click Return to Main Screen.

Calibrate 10K Resistive Setpoint

If you are using a 10K Potentiometer for the field setpoint, this is where you set the range of possible temperatures for the setpoint. In most cases, you should be able to just type in the low and high setpoint value and click OK. This is the same screen as the Setpoint Setup found on the Installer screen.

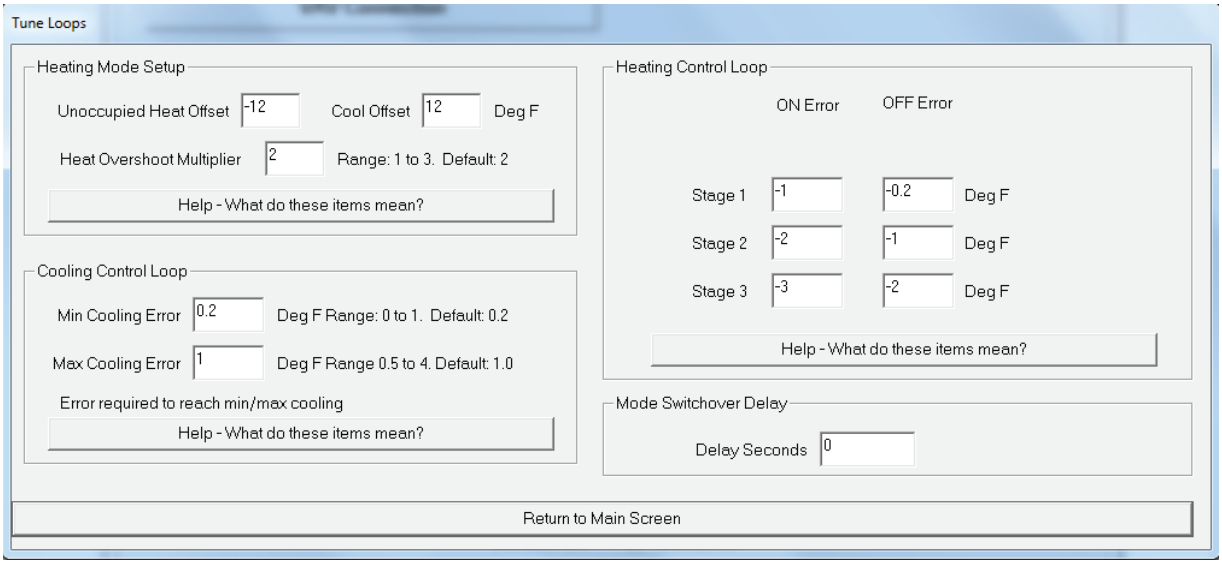


Calibrate Actuator One Stroke Time

You must calibrate (or at least verify) stroke time. It should not be necessary to do this with the Internal Damper, as it is calibrated at the factory. Stroke time is the time it takes to go from 0% to 100%. The standard damper has a stroke time of about 95 seconds. Damper 1 is the Internal Damper. If all VAV boxes at a site are the same, then maybe you can calibrate the first few, then use the same setting on the rest.

This is another easy process. Click the first button.
When the damper has gotten to zero percent, click the second and it will go to 100 percent.
You must watch the damper. When it stops moving, click the third button and it will stop counting.
Click the next button to save the new stroke time.

Tune Control Loops (See figure below)



» Change your Unoccupied Heating and Cooling Offsets. Ex: if Heat Setpoint is 68 and the offset is –12, then Heat will activate when the temperature gets below 56 Degrees.

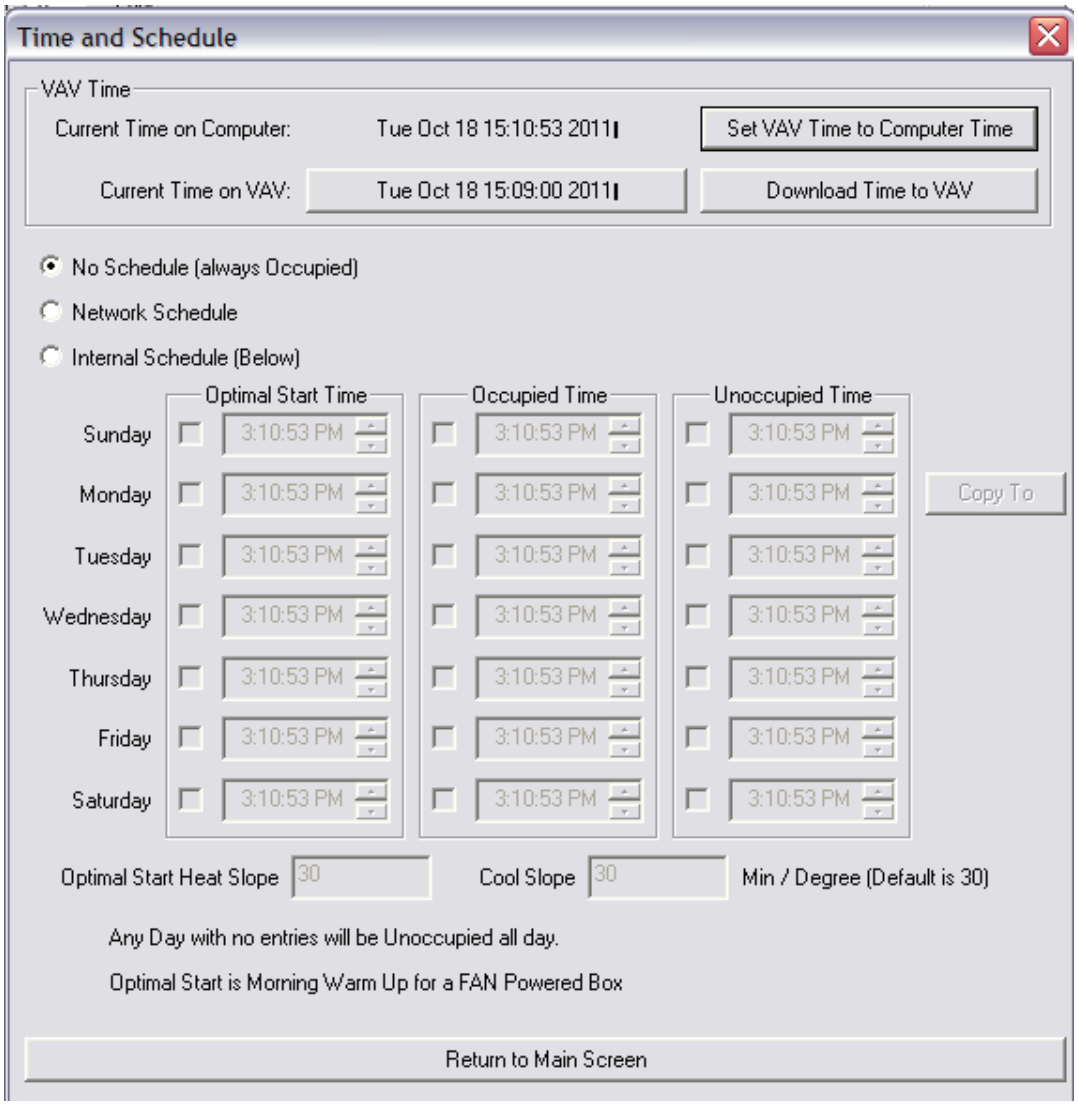
» Cooling Control Loop allows you to change when the box goes into Min and Max cooling CFM. Click Help for explanation.

» Heating Control Loop allows you to change when Heating is activated. The above example shows 3 stages of electric heat.

» Mode Switchover Delay allows you to put in a delay in seconds before switching between Heating and Cooling.

Time and Schedule

This screen allows you to adjust the time and set an Occupied Schedule. It should be self-explanatory, except Network Schedule. Choosing that allows you to add the Occupied point in CBAS and place a Schedule on the point. When the point goes On, the VAV-B is commanded to Occupied.



DON'T FORGET TO SAVE CHANGES TO VAV!

Live Controller Data

This screen (See figure below) allows you to see what is actually happening in the application on the controller. For instance, you can change the setpoint in the field or in CBAS, and watch it change from Heat Mode to Cool Mode as well as the CFM Setpoint change. This is a good way to test operation.

In the Position column, OPTO point configurations are shown. This is a good resource when you want to know how to program a point in CBAS.

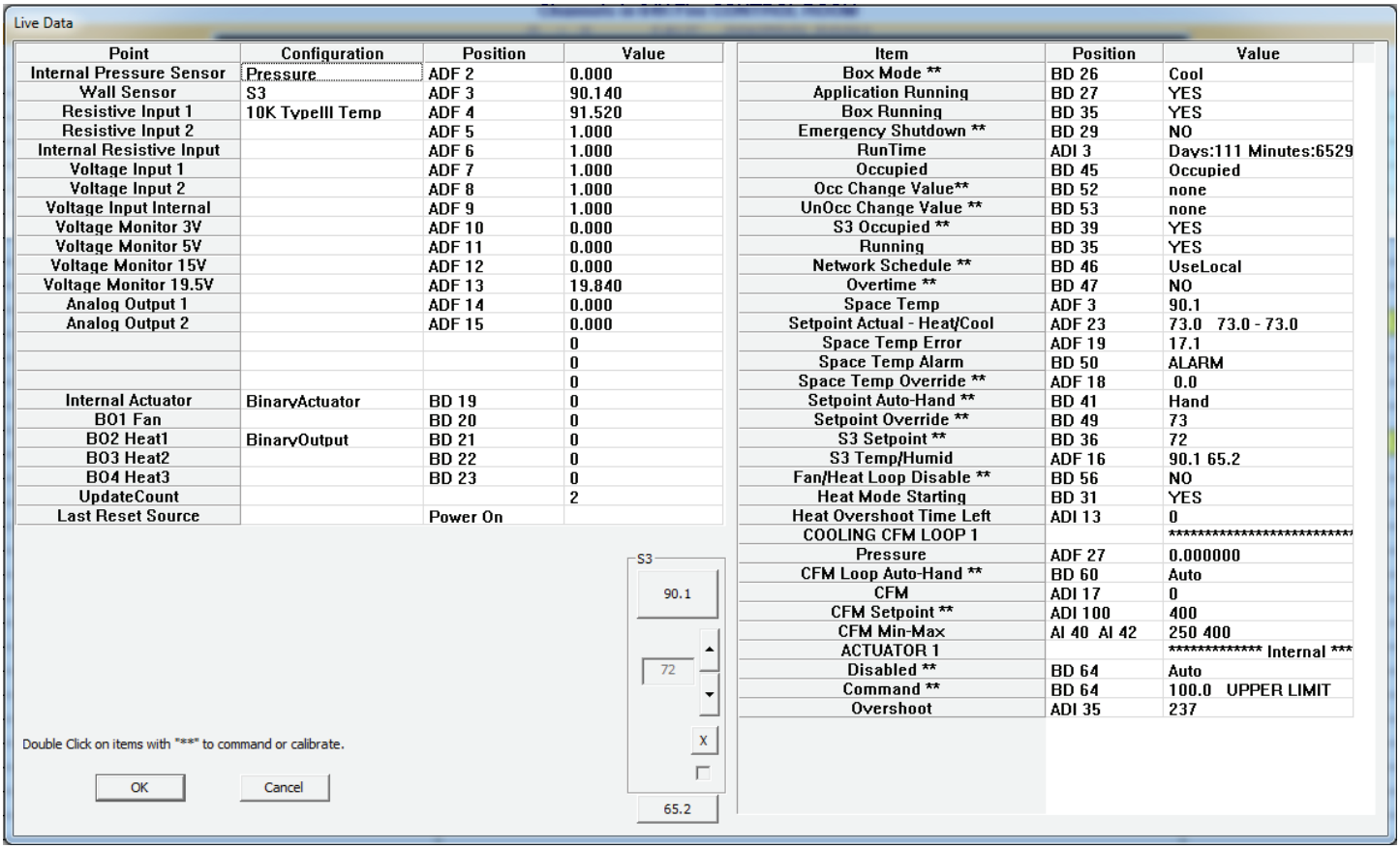
Also, you can double-click points with a ** next to them in order to command.

The S3 section allows you to simulate changing the setpoint at the S3, but only when in Editor Mode, which can be selected on the VAV Connection screen. This is like using Simulator Mode in CBAS.

Network Space Temp can be commanded to a value for testing purposes, but you must remember to release it by commanding to 0. Otherwise, the VAV-B will not control properly because the Space Temperature will never change.

Network Setpoint works the same as the point in CBAS with the same name. Use it to command the setpoint. It releases back to 0 automatically when commanded but you will see the actual setpoint change.

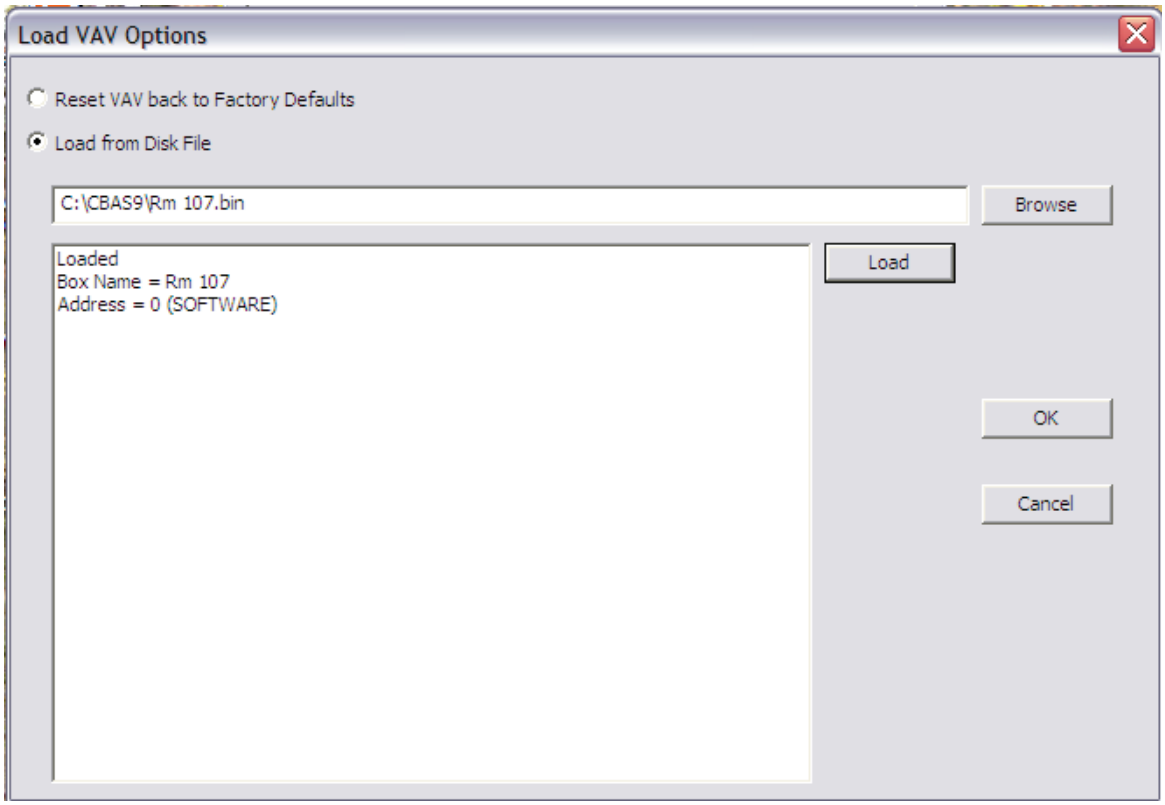
Actuator 1 is the Cooling Damper Actuator and Actuator 2 is the Heating Valve Actuator. The example below does not have a heating valve.



Adding More VAV-Bs from Saved Configuration File

» First, open the Utility program and connect to the next VAV-B.

» Now click Load/Reset Database.



» Click Browse and find the file you saved earlier. It should have been saved in C:\CBAS\Personalities.

» Select the file with the .bin extension and click OPEN. The path will be shown next to the Browse button.

» Click Load, then OK.

» Now go back to Pre Box Setup and change the name/location of the box, then click OK.

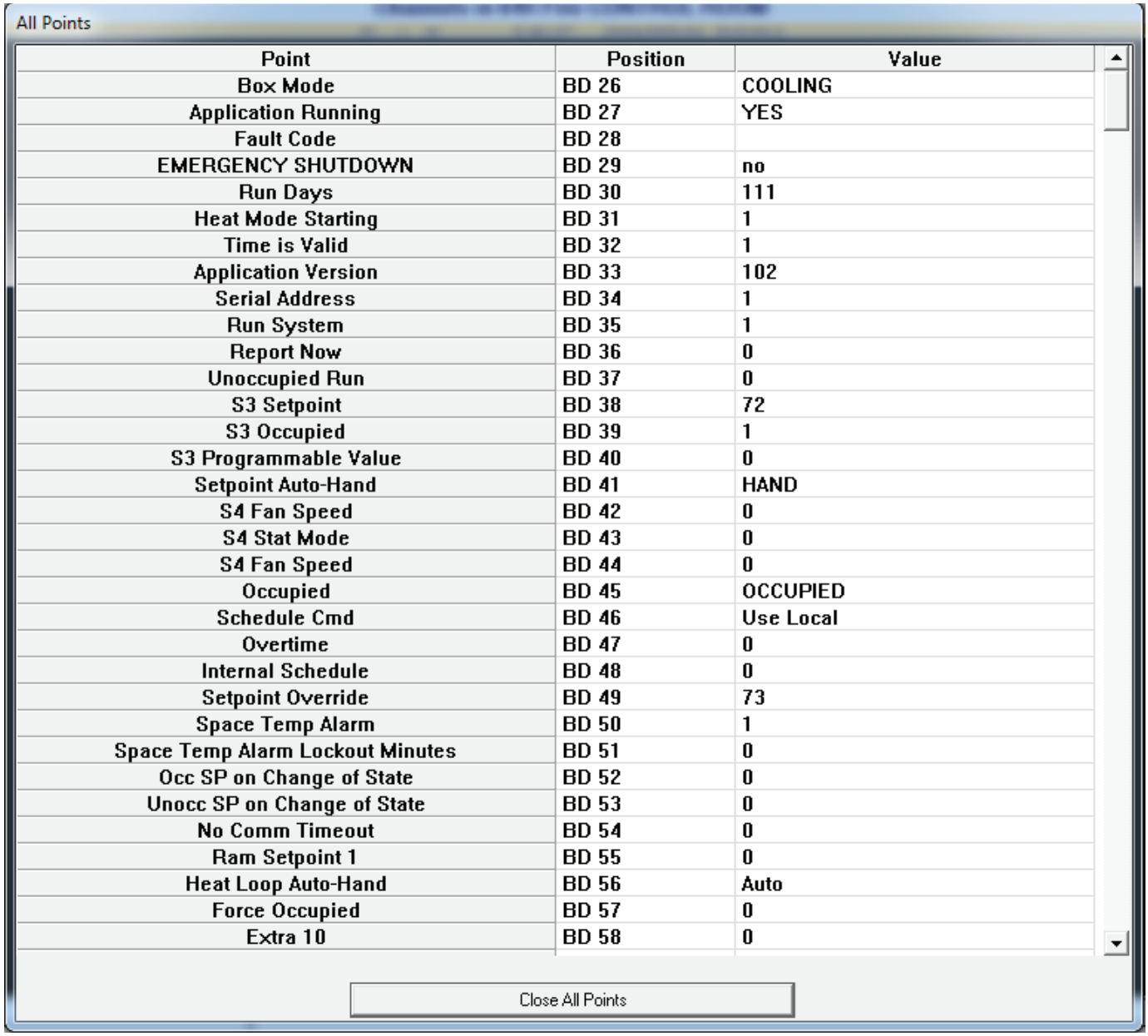
» If the duct size or Min/Max CFM is different on this box, go back to the Installer screen and make the change there, then click OK.

» If you would like to save this configuration also, click Save/Export Database.

» Now click Save All Changes to VAV.

All Points

This screen gives you all of the point configurations, which could come in handy when adding points in CBAS. (See figure below)



CBAS Configuration

Adding VAV-B to the Database

VAV-B controllers can be added to the following channel types at this time: OPTO 485 over TCP/IP (same as N2), OPTO-22 on Controller (also N2), BASnet 485 over TCP/IP, and BACnet 485 over TCP/IP (BACnet MS/TP) and BACnet on Controller. Of course, you must match the CBAS Protocol selection to the one that you chose earlier in the VAV-B Utility program and then saved to the controller.

The advantage of an “On Controller Channel” is that the databases of the controllers on the channel are contained in the database of the Host controller as well as the Server PC. So, all software points and the logic, schedules, etc. should be programmed on the Host controller, making the entire chan-

nel head-end independent or stand-alone.

Either of the OPTO channels would be preferred and would also work if the site had an existing channel of Johnson Metasys controllers that you would like to add a VAV-B to. BASnet would only be preferred if the site had an existing channel of VAVs and you were replacing one with a VAV-B, or needed to add an additional VAV-B to the channel.

Add Channel to the Host Controller

These instructions assume that you have already learned how to add a controller to the TCP/IP for Controllers channel.

» In Editor Mode, Hardware View, TCP/IP for Controllers channel, locate the controller that will host the VAV-B channel.

» Click the controller, then Channels.

» Click Add A Channel to either the Host or Secondary 485.

» Give the channel a name and choose the protocol configuration.

» Click Add Channel Now.

» If the channel is an “On Controller” channel, click the channel just created to add a controller to it.

» If not, escape to the main Channel screen in Hardware View to find the channel.

Add a VAV-B

» Click the Channel, then Controllers.

» Click Add a Controller on the line that contains the address you want to use. (The address can later be changed on the controller program screen if necessary)

» Give the controller a name similar to the one you gave it in the Utility program.

» For configuration, choose VAV-B (-AP, -P, -X).

» If adding to a BASnet channel, then you have a choice of adding from a Template or Copy from Another Controller. BASnet Templates are included in the CBAS15\VAV-B Package folder or you can obtain from Computrols Tech Support.

» Click Add Controller Now.

» If adding to OPTO or OPTO22, a pop up box will ask if you would like to import the points.

» If the channel is OPTO or BACnet, answer YES.

» The next screen will allow you to browse to the location where you saved the configuration from the VAV Utility program or you can choose an export file from another location if you made an export before.

» Choose the txt file with either OPTO or BACnet in the name, then click OPEN.

» You will be prompted to enter a prefix for the point names. Click Yes and you can enter the prefix which will differentiate these points from the points of another controller.

» Hit the ENTER key and CBAS will verify how many points were imported.

» Click OK, and you can now click the controller and view the points.

» Subsequent controllers can be added the same way.

» You can also manually add or remove points and make your own template or export.

» Templates reside in C:\CBAS15\Templates\VAVB folder.

Make a BASnet VAV-B Template

In Hardware View, go to the BASnet Channel that contains the VAV-B. Click the channel then Controllers. Click the Controller then click Save Controller Database as A Template. Follow on-screen directions.

Make an OPTO VAV-B Export

In Hardware View, go to the OPTO Channel that contains the VAV-B. Click the channel then Controllers. Click the Controller then click Export Database and follow on-screen directions.
OPTO points can be added to the VAV-B manually and the point configurations can be found at the end of this manual in Appendix A. There is also a spreadsheet in the CBAS15\VAV-B Package\Documentation folder.

Make a BACnet VAV-B Export

Click the controller in Hardware View and click Export Database. The points can also be added manually in CBAS.

BACnet points can be found later in this manual in Appendix C.

Proceed to Real Mode and Begin Monitoring the VAV-B

Commanding the Setpoints

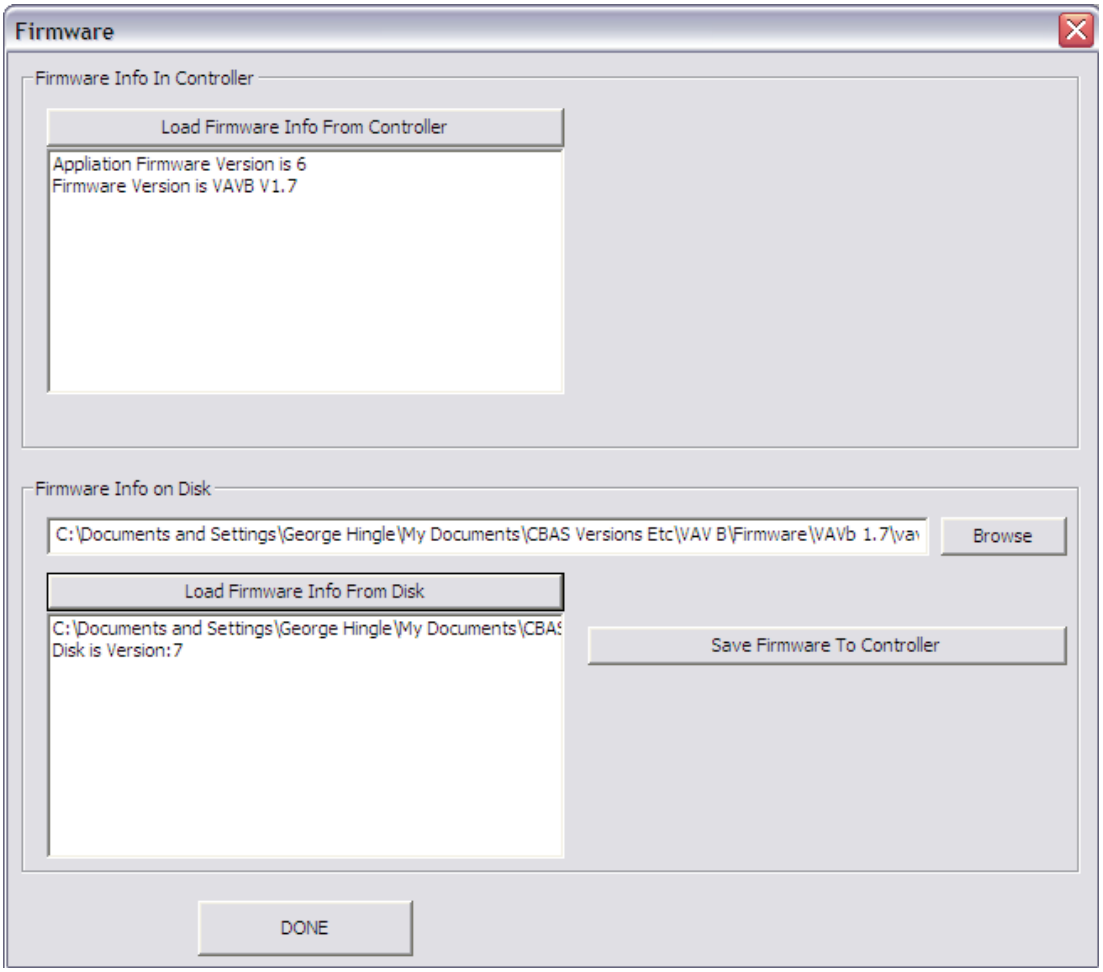
There is a NETWORK SPACE TEMP point that you can command at any time. A command to this point will override the space temp sensor. The space temp will remain at the commanded value until the user commands the point to 0. Zero releases the space temp. This is only used for simulation purposes.

The NETWORK SETPOINT is the point you command to change the Active Setpoint. It can be changed from the S3 or Potentiometer. If you command this point from CBAS it overrides the internal setpoint in the VAV-B. The setpoint point may behave differently if the VAV-B is using an S3 or 10K potentiometer. When using an S3 the NETWORK SETPOINT point will go back to 0 after the command. But when using a 10K potentiometer, it will retain its value. For the 10K potentiometer, you would have to command to 0 to release the setpoint override. That is because when using an S3, the user can override the commanded value. But when using 10K potentiometer, you can slide the potentiometer all you want, but as long as there is a NETWORK SETPOINT command it will keep the network setpoint value.

Reburning the Application Firmware

The Application Firmware contains the programming code for each of the VAV Applications that you can choose in the Pre Box Setup screen of the Utility program. If Computrols makes a change to one of the applications, it may be necessary for you to upgrade the firmware. Obtain the firmware file from

Computrols Technical Support. New VAV-B controllers are shipped with the most recent firmware. Connect to the controller using the VAV Utility program. The last button is labeled Firmware. Click Firmware and you will see the following screen.



» To check the firmware on the controller, use the first button.

» Click Browse and select the firmware file, which will have a .bin extension.

» To check the version of your firmware file, click Load Firmware Info from Disk.

» Click Save Firmware to Controller. After the process is complete, the controller will reboot and reconnect to the Utility Program.

» When complete, click DONE to exit.

Setup Program

To burn both the Application and non-Application firmware, a program called Setup.exe is required. Firmware file, VAV7 xxxx.bin, contains both firmwares.

» Open the Setup Program by double clicking Setup.exe.

» Click the Alpha Set button then Comm Port Config. and choose your comm port. This is the port number that the USB to 485 Commissioning cable uses.

» Click “Put Controller into Bootload” and you will see 3 lights blinking in succession on the controller.

» Click VAV7 Setup button and point to the bin (firmware) file.

» Click VAV7 Burn then Start.

» Once finished, open Utility program to verify firmware versions.

VAV Utility through CBAS

This allows you to commission VAV-Bs through the 485 channel.

» VAV_Utility.exe must be in the C:\CBAS15 folder.

» Add a VAV-B Commission point to the Workstation channel in CBAS.

» In Real Mode, go to the channel containing the VAV-B you want to work with.

» Once the controller has Normal communication, click the VAV-B controller, then click Utility Program.

» The Utility Program will pop up and connect to the VAV-B automatically as long as the controller is online.

» From there, everything is the same as described earlier in this manual.

» Don’t forget to Save All Changes and Save/Export the Database.

Appendix A: VAV-B Points in CBAS

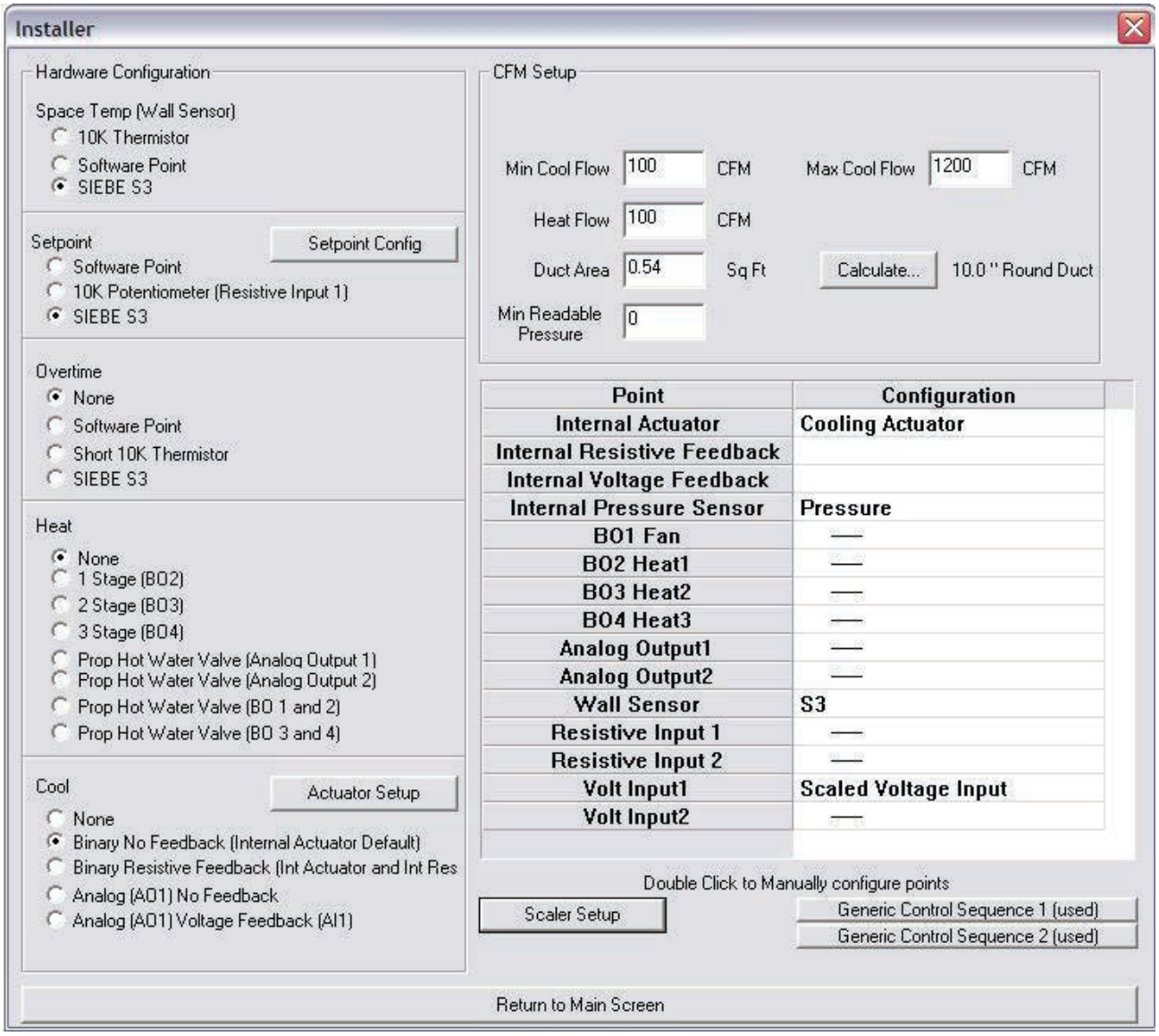
CBAS Name (Suggested)	BASnet Name	OPTO Position	Commandable
Essential			
Occupied command	Occupied	BDM46	YES
Occupied Feedback	Box Occupied	BDM45	
Space Temp	Space	ADF3	
Space Temp Setpoint	Setpoint	ADF23	
Space Temp Setpoint Com	Network Setpoint	BDM49	YES
Space Temp Error	Space Err	ADF19	
Space Temp Alarm	Space Alm	BD50	
CFM	CFM	ADI17	
CFM Setpoint	CFM SP	ADI21	
Box Mode	Box Mode	BDM26	
Damper Feedback	Damper FB2	ADF6	
Damper Position	Dampercmd	ADF39	
Supply Temp	Extra Temp	ADF5	
Humidity	Humidity	ADF17	
Non-Essential			
Occupied Schedule	Net Sched	BDM46	YES
Overtime Command	Overtime	BD47	YES
Emergency Shutdown	Emer Shut	BD29	YES
Heat Control Loop Disable	Heat LP Dis	BD56	YES
Damper 1 Disable	Damp Dis	BDM64	YES
Damper 2 Disable	Damp Dis	BDM65	YES
Cooling Setpoint	Cool SP	ADF29	
Heating Setpoint	Heat SP	ADF30	
Pressure	Pressure	ADF27	
External Pressure	Pressure 2	ADF28	
Multiplexor			
Binary Output 1 (Fan)	BO1 FAN	BD20	YES
Binary Output 2 (Heat 1)	BO2 HEAT1	BD21	YES
Binary Output 3 (Heat 2)	BO2 HEAT2	BD22	YES
Binary Output 4 (Heat 3)	BO2 HEAT3	BD23	YES
Analog Output 1	VOLT OUT 1	ADF14	YES
Analog Output 2	VOLT OUT 2	ADF15	YES

CBAS Name (Suggested)	BASnet Name	OPTO Position	Commandable
Multiplexor (cont.)			
Internal Pressure Sensor	PRESSURE	ADF2	
Wall Sensor	WALL STAT	ADF3	
External Resistive Input 1	RES INPUT 1	ADF4	
External Resistive Input 2	RES INPUT 2	ADF5	
Internal Resistive Input	INT RES INPUT	ADF6	
External Voltage Input 1	VOLTIN 1	ADF7	
External Voltage Input 2	VOLTIN 2	ADF8	
Internal Voltage Input	INT VOLTIN	ADF9	
Not Needed			
Internal Sched	Int Sched	BDM48	
Application Running	app running	BD27	
Application Error	app error	ADI2	
Fault Code	fault code	BDM28	
Cooling Damper Position	Damper Position 1	ADF39	
Heating Damp/HWV Pos	Damper Position 2	ADF40	
Internal Press Sensor DP	Internal Press Sensor	ADF27	
External Press Sensor DP	Voltage Input 2	ADF28	
Damper 1 Moving	Damp Mov	BDM68	
Damper 2 Moving	Damp Mov	BDM69	
Dampter 1 Runtime	Damp Run	ADF55	
Damper 2 Runtime	Damp Run	ADF56	

Notes on Commanding Points	
Occupied Command	0=useLocal, 1=OCC, 2=OptStart, 3=UNOCC-OvrdOFF
Space Temp Setpoint Command	Command, then 0=release
Overtime Command	Used for overtime scheduling
Emergency Shutdown	Rarely used/needed
Heat Control Loop Disable	Stops the 4 BOs from doing anything so they can be commanded via network
Damper 1 Disable	1-Stops Damp 4-104 Cmds Damp to 0-100. 2 and 3 are resvd for Box Startup
Damper 2 Disable	1-Stops Damp 4-104 Cmds Damp to 0-100. 2 and 3 are resvd for Box Startup

Appendix B: Using Generic Control Sequences

The Generic Control Loop buttons are in the bottom right of the Installer screen.

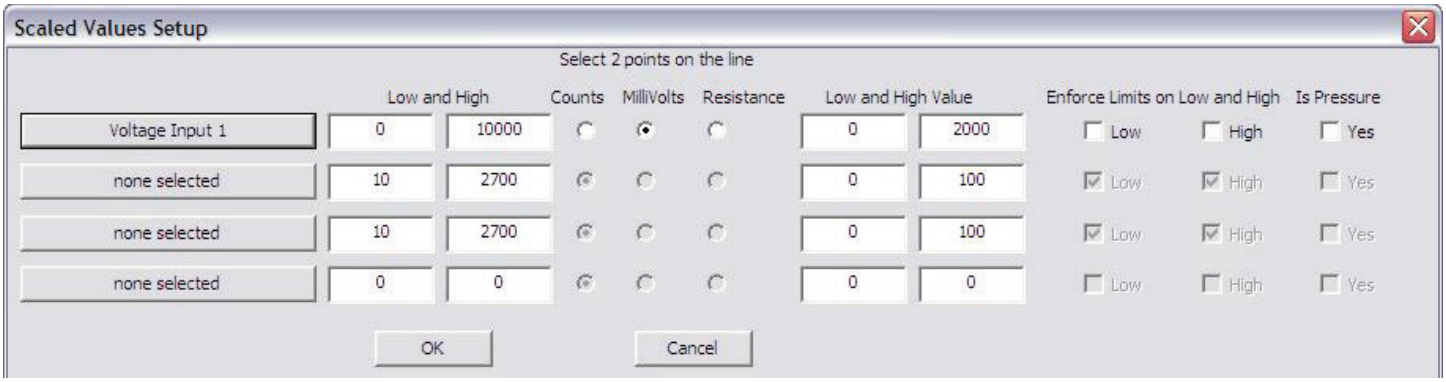


Here is an example how to setup a sequence where a CO2 sensor is used to set the CFM Setpoint to the Max CFM when CO2 level reaches a certain value.

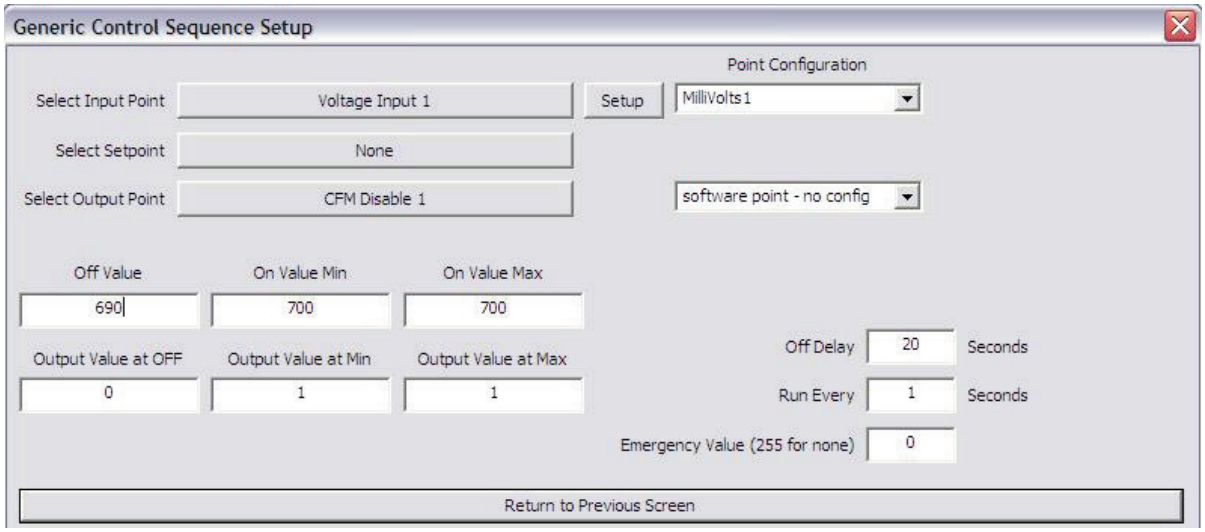
The sensor is connected to Voltage input 1. It also needs 24V. And the Thermistor part of it will connect to Wall Sensor.

In the installer screen, click to the right of VoltInput1 and make it a Scaled Voltage Input. See above.

Then click the Scaler Setup button and set the values as seen below. I assumed that the high limit of the output from the sensor is 2000 ppm, so the Low Limit is 0 and the High Limit is 2000. The 10000 is the number of millivolts in 10 Volts. So, 0 to 10 Volts equals 0 to 2000 ppm. Click OK when done.

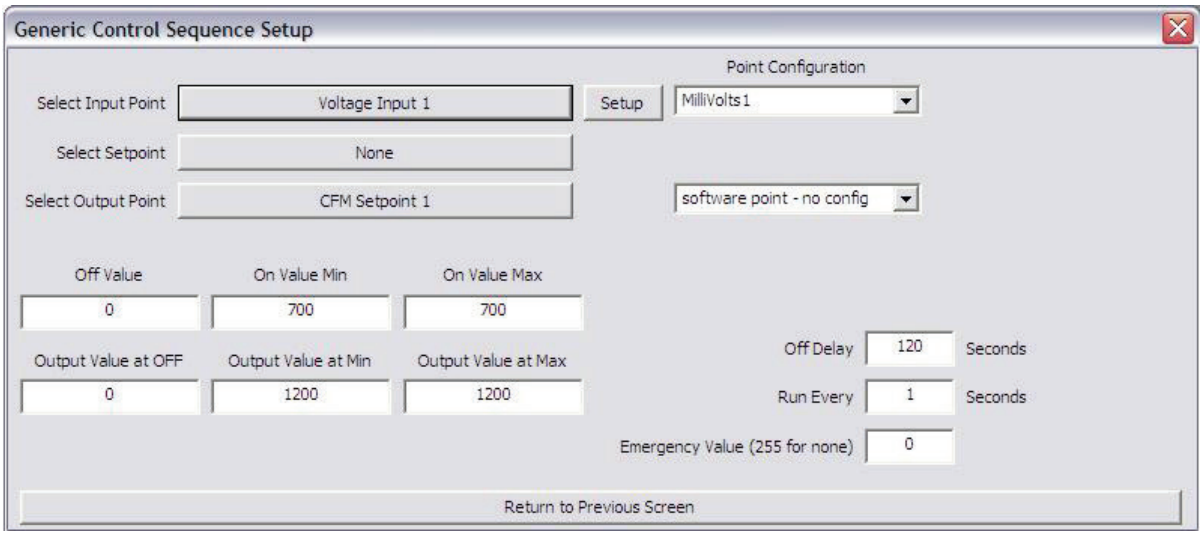


Then click the first Generic Control Sequence button.



You choose VoltInput1 for the input, which is CO2 Level. Leave it as None for the setpoint. Choose CFM Disable for the output. CFM Disable is the point that allows you to disable the internal programming that determines which Setpoint is used to open the damper. The output when it goes over the limit is going to be 1, which disables the internal setpoint logic and allows you to command it. It will go to 0 when the value goes below 690, which gives you a deadband of 10 ppm. This releases the point.

Click Generic Control Sequence 2 and set it up.



This time, the Input point is the same, but your Output is going to be CFM Setpoint. The limits will be the same, but the output will be whatever you want the CFM setpoint to be. I guess the same as the MAX Cooling CFM.

There is another way of doing this with a Setpoint used in the loop. That way you could command the Setpoint from CBAS. But this way is easier.

Appendix C: BACnet Points in CBAS

The points are listed below and are organized by point type.

```
// Binaries
{"BI1"},                    // 16
{"BI2"},                    // 17
{"BO1"},                    // 19
{"BO2"},                    // 20
{"BO3"},                    // 21
{"BO4"},                    // 22
{"AppRun"},                 // 26    Application Running
{"EmerShdn"},               // 28    Emergency Shutdown
{"Ovrtime"},                // 46    Overtime
{"CFMDisCl"},               // 59    CFM Loop Disable Cool
{"CFMDisHt"},     // 11     // 60    CFM Loop Disable Heat

// MultiStates
{"Box Mode"},               // 25    BoxMode
{"RunSys"},                 // 34    System Running
{"S3 SP"},                  // 37    S3 Setpoint
{"S3 Occ"},                 // 38    S3 Occupied Button
{"Occupd Fb"},              // 44    Occupied Read Only
{"OccupdCmd"},              // 45    Occupied Command
{"SP Ovrd"},                // 48    Commandable Network Setpoint
{"HeatDisbl"},              // 55    Heat Disable
{"DampOvdCl"},              // 63    Damper Override Cool
{"DampOvdHt"},    // 10     // 64    Damper Override Heat

// Analog Integers
{"VAVMinuts"},              // 82 Run Minutes
{"CFM Total"},              // 84 Total CFM
{"CFM SP"},                 // 85 Total CFM Setpoint
{"S3 Lockut"},              // 87 S3/S4 Locked by User
{"Ot Remain"},              // 93 Overtime Remaining
{"CFMCoolAc"},              // 96 Actual CFM Cool
{"CFMHeatAc"},              // 97 Actual CFM Heat
{"CFMCoolSP"},              // 100 CFM Setpoint Cooling
{"CFMHeatSP"},    // 9      // 101 CFM Setpoint Heating
```

```
// Analog Floats
{"Pressure"},                   // 161 Pressure
{"ResIn1"},                     // 162 Resistive Input 1
{"ResIn2"},                     // 163 Resistive Input 2
{"ResIn3"},                     // 164 Resistive Input 3
{"VoltIn1"},                    // 166 Voltage Input 1
{"VoltIn2"},                    // 167 Voltage Input 2
{"AO1"},                        // 173 Analog Output 1
{"AO2"},                        // 174 Analog Output 2
{"S3 Temp"},                    // 175 S3/S4 Space Temp
{"S3 Humid"},                   // 176 S3/S4 Humidity
{"Temp Ovrd"},                  // 177 Space Temp Network Override
{"Active SP"},                  // 182 10K Active Setpoint
{"Pres Cool"},                  // 186 Pressure Cool
{"Pres Heat"},                  // 187 Pressure Heat
{"SP Cool"},                    // 188 Temp Setpoint Cool
{"SP Heat"},                    // 189 Temp Setpoint Heat
{"DampCmdCl"},                  // 198 Damper Command Cool
{"DampCmdHt"} // 18             // 199 Damper Command Heat
// 48 points total
```