VCM - Operator Interfaces
Technical Guide

VCM Controller Code: SS1016
Requires System Manager Code: SS1010 Version 3.0 and up
Requires Service Tool Code: SS1009 Version 3.0 and up
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Introduction

Modular Service Tool

Description
The OE391-05 Modular Service Tool is a system operator interface that provides a direct link to enable the system operator to view the status, configure and to adjust the setpoints of any controller on the control system communications loop. The Modular Service Tool is housed in an attractive beige colored plastic enclosure. The display area is covered with a clear plastic bezel for protection of the display screen. The Modular Service Tool has a four line by 20 character display panel with adjustable contrast control and a 27 key membrane keypad for data selection and entry. All keypad operations are simple and straight forward, utilizing non-cryptic plain English language messages. Menu driven programming allows for easy setup and operation without the need for specialized training. The OE391-05 Modular Service Tool is supplied with (4) AA 1.5 V Volt alkaline batteries, a wall mount DC power supply and a communication cable terminated with an 8 pin DIN connector for connection to the Service Tool. The cable allows the user to setup and program any Orion controller with a 8 pin DIN connector socket by simply plugging in the service tool to the socket on the controller.

The Modular Service Tool is designed to be carried by the system installer or service technician. Its rugged plastic housing, provides superior protection for the electronic components housed inside. The OE391-05 Modular Service Tool is a top quality service tool that will stand up to the demands of the typical job site environment for many years.

Modular System Manager

Description
The OE392-05 Modular System Manager provides a direct link to enable the system operator to view the status and to adjust the setpoints of any controller on the control system communications loop. The Modular System Manager is designed to be used with the Orion Control System. The System Manager is housed in an attractive off-white colored plastic enclosure. The System Manager is equipped with a four line by 20 character backlit display panel and a 24 key membrane keypad for data selection and entry. All keypad operations are simple and straight forward, utilizing non-cryptic plain English language messages. Menu driven programming allows for easy setup and operation without the need for specialized training. The System Manager also has 2 integral LED's for user notification of system alarm conditions and override initiations. Protection from unauthorized users is provided by the System Manager’s integral multi-level passcode authorization programming.

On a Networked Orion System the Modular System Manager is connected to the communications and power loop of the system via modular cables that simply plug into the System Manager board and the Power/Comm Distribution Board. This virtually eliminates wiring errors and makes installation fast and easy. When it is to be connected to a Stand Alone system, a cable with modular connectors on one end and stripped wire ends on the other end is provided to facilitate connecting communications and power to the Modular System Manager from the 24 VAC power source and the HVAC unit controller communication wiring terminals.

The Modular System Manager is designed for wall mounting. Mounting holes are provided to attach the Modular System Manager to a standard handy box. It is recommended that the System Manager be mounted at approximately eye level to allow for ease of programming and reading of the display. The System Manager is typically mounted in the building manager or superintendent’s office or in an equipment room. The attractive enclosure is quite suitable for mounting in any location or with most decors.
Modular Service Tool

Whether you have a Stand Alone, Interconnected or Networked Orion Controls System, the Modular Service Tool always connects to an HVAC unit controller via a prefabricated cable that is supplied with the service tool. The Modular Service Tool cable is terminated on both ends with a mini DIN connector. Attach one end to the Modular Service Tool and the other end to the mini DIN connector on the HVAC unit controller. If this is an Interconnected System, all controllers that are interconnected with communications cable can be programmed from any HVAC unit controller on the loop. If this is a Networked System, all controllers on the entire Networked System can be programmed from one HVAC unit controller.

Be sure that the Modular Service Tool has fresh batteries installed or that it is connected to a power source using the supplied power pack before attempting any programming of the controller. See Figure 3 for connection details.

Figure 3: Modular Service Tool
Modular System Manager

As previously described, when you are connecting the Modular System Manager to a Networked System, the Modular System Manager is connected to the communications and power loop of the system via modular cables. These cables simply plug into the System Manager board and to any device with modular connectors on any local loop on the system. Devices with modular connectors include the Power/Comm Distribution Board, VAV/Zone controller and the MiniLink Polling Device. By using these plug in connections wiring errors are virtually eliminated and system installation is fast and easy. See Figure 4 for typical connection information. See Figure 5 for typical Power/Comm board wiring and connection information.

When the System Manager is to be connected to a Stand Alone system, a 12 ft. cable with modular connectors on one end and stripped wire ends on the other end is provided for this purpose. This is used to facilitate connecting communications and power wiring to the Modular System Manager from a 24 VAC power source and to the HVAC unit controller communication wiring terminals. See Figure 6 for wiring details. If the supplied cable wire is not long enough for your installation, a standard modular cable of the correct length can be purchased through WattMaster and one of the modular connectors can be cutoff to allow for the transformer and communication terminal wiring connections. It is recommended that you do not splice the communications wire if at all possible. The transformer should be rated at 6 VA minimum power output.

**Figure 4: Modular System Manager - Networked**

**Figure 5: Typical Power/Comm Board Wiring**

**Figure 6: Modular System Manager - Stand Alone**
General Programming Information

Operator Interfaces Comparison

In order to configure and program the Orion System controllers you must have an Operators Interface, the Tactio Touch Screen Interface or a personal computer with the Prism II computer front end software installed. Two different Operator Interfaces are available for programming of the Orion Controls System. You may use either the Modular Service Tool and/or the Modular System Manager to access the status and setpoints of any controller on your communications loop.

The Modular Service Tool or the System Manager allow the user to view any temperature or output condition and change any setpoint to fine tune the operations of the total system. All keypad operations are simple and straightforward, utilizing non-cryptic plain English messages.

Display Screens & Data Entry Keys

The System Manager display screens and the Modular Service Tool display screens are very similar. For most setpoints and modes the only difference between using the Service Tool and the System Manager is a few differences in the function of the keypads. In this manual where a difference in the keypad input or the screens displayed exists between the two operators interfaces, both screens or keypads will be shown. See the chart below for a list of the keypad descriptions and functions.

<table>
<thead>
<tr>
<th>Keypad Description</th>
<th>Key Function</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>System Manager</strong></td>
<td><strong>Modular Service Tool</strong></td>
</tr>
<tr>
<td><strong>ESC</strong></td>
<td>Used to exit from screens or from data entry. Use this screen to return to the main menu from any screen in the system. Same function as System Manager</td>
</tr>
<tr>
<td><strong>ENTER</strong></td>
<td>This key is used to close a data entry field and advance to the next item or screen. Same function as System Manager</td>
</tr>
<tr>
<td><strong>Clear</strong></td>
<td>If a data entry mistake is made, press this key to clear the data entry field and start over. Same function as System Manager but also turns off the power to the Service Tool when on the main menu screen</td>
</tr>
<tr>
<td><strong>Minus</strong></td>
<td>If a setpoint with a negative value is required, press this key for the minus sign. Same function as System Manager</td>
</tr>
<tr>
<td><strong>DEC</strong></td>
<td>Press this key when entering data that requires a decimal point. Same function as System Manager</td>
</tr>
<tr>
<td><strong>⇐⇒</strong></td>
<td>Steps the user to the next controller on the loop on interconnected or networked systems. Same function as System Manager</td>
</tr>
<tr>
<td><strong>⇑⇓</strong></td>
<td>Steps the user backward or forward through the screens. Same function as System Manager</td>
</tr>
</tbody>
</table>

Mode Selection Buttons

Both the System Manager and the Modular Service Tool are provided with “Mode Selection Buttons”. These buttons give the user instant access to the specific mode desired without having to scroll through several menu screens to get there. The Modular Service Tool has 2 extra function keys (“Configuration” and “Balance-Test”) that are not available on the System Manager.
### Button Description

<table>
<thead>
<tr>
<th>Button</th>
<th>Mode Selection Buttons</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>STATUS</strong></td>
<td><strong>Modular Service Tool</strong></td>
<td>Pressing this button takes you directly to the controller “Status” screens</td>
</tr>
<tr>
<td></td>
<td><strong>System Manager</strong></td>
<td>Pressing this button takes you directly to the controller “Status” screens</td>
</tr>
<tr>
<td><strong>SETPOINTS</strong></td>
<td><strong>Modular Service Tool</strong></td>
<td>Pressing this button takes you directly to the controller “Setpoints” screens</td>
</tr>
<tr>
<td></td>
<td><strong>System Manager</strong></td>
<td>Pressing this button takes you directly to the controller “Setpoints” and “Configuration” Menu</td>
</tr>
<tr>
<td><strong>SCHEDULES</strong></td>
<td><strong>Modular Service Tool</strong></td>
<td>Pressing this button takes you directly to the controller “Schedules” screens</td>
</tr>
<tr>
<td></td>
<td><strong>System Manager</strong></td>
<td>Pressing this button takes you directly to the controller “Schedules” screens</td>
</tr>
<tr>
<td><strong>OVERRIDEs</strong></td>
<td><strong>Modular Service Tool</strong></td>
<td>Pressing this button takes you directly to the controller “OVERRIDEs” screen.</td>
</tr>
<tr>
<td></td>
<td><strong>System Manager</strong></td>
<td>Pressing this button takes you directly to the controller “OVERRIDEs” screen.</td>
</tr>
<tr>
<td><strong>ALARMS</strong></td>
<td><strong>Modular Service Tool</strong></td>
<td>Pressing this button takes you directly to the controller “ALARMS” screen.</td>
</tr>
<tr>
<td></td>
<td><strong>System Manager</strong></td>
<td>Pressing this button takes you directly to the controller “ALARMS” screen.</td>
</tr>
<tr>
<td><strong>CONFIGURATION</strong></td>
<td><strong>Modular Service Tool</strong></td>
<td>Not Available</td>
</tr>
<tr>
<td></td>
<td><strong>System Manager</strong></td>
<td>Use “Setpoints” Button To Access Menu</td>
</tr>
<tr>
<td><strong>BALANCE-TEST</strong></td>
<td><strong>Modular Service Tool</strong></td>
<td>Not Available</td>
</tr>
<tr>
<td></td>
<td><strong>System Manager</strong></td>
<td>Not Available</td>
</tr>
</tbody>
</table>

### Notes:
1. This button only functions when the system is configured for “Network Mode” or “Multiple MGRS Mode”. It will not function in ‘Stand Alone Mode’.
2. The “Search For Units” function must be performed on the System Manager upon initial system setup before this function will be available. See the “System Manager NM & MM Loop Search” section of this manual for complete instructions on performing a loop search.

### Service Tool And System Manager

#### Entering Unit ID (Address)

With both the Modular Service Tool and the Modular System Manager You must enter the ID (Address) of the controller you wish to program

With the main menu screen displayed, press the function key associated with the operation (setpoints, configuration, etc.) you want to perform. The screen shown above will appear asking you to enter a unit ID# (controller address). Put in the ID# of the controller you wish to communicate with then press the “Enter” key.

If this is Network System (the system has a CommLink), the Unit ID is actually two separate numbers, combined into one value. The first part of the number contains the Loop Address at which the controller is located. The second part of the number contains the actual controller address. See Examples #1 & #2 below.

If this is a Stand Alone System (system without a CommLink) this will be a number between 1 and 59. It is recommended the address be set to 1. See example #3 below.

**EXAMPLE #1**
You would like to view the 3rd controller on the 5th loop. Enter “503” as the Unit ID.

**EXAMPLE #2**
You would like to view the 12th controller on the 24th loop. Enter “2412” as the Unit ID.

**EXAMPLE #3**
You would like to view the only controller on the loop. Enter 1 as the Unit ID. No loop number is required since there is only one loop.

Hit the “Enter” key after entering the unit ID. If you are using the Modular Service Tool you will be taken directly to the first screen for the operation you are trying to program.

### Modular System Manager

#### System Manager Initialization Screens

When the System Manager is powered up, the first screen displays the current version of the software installed in your System Manager and whether your system is configured for Network or Stand-Alone operation. If it is configured for Stand-Alone operation, only the HVAC unit controller that the System Manager is connected to is available for programming. On a Networked System, all controllers on the communications loop are available for programming by entering their loop address (ID). If an Interconnected System is connected to the System Manager all controllers that are connected to the communication loop are available for programming.
The screen above will appear a few seconds later. The last line of the display will have the letters SA (Stand Alone Mode), MM (Multiple System Manager Mode) or NM (Network Mode) followed by the current outdoor air temperature. The System Manager normally ships from the factory set for SA (Stand Alone Mode). If you have a CommLink or MiniLink polling device on your system and only have a single System Manager, the system must be set for NM (Network Mode). If you have a CommLink or MiniLink polling device on your system and have multiple System Managers on your System, the system must be set for MM (Multiple System Managers Mode). If you believe your system is incorrectly configured, please follow the instructions that follow. If your system is configured correctly, proceed to the System Manager Network Mode Loop Search section.

### Configuring For Stand-Alone Mode, Multiple System Managers Mode or Network Mode

The System Manager must be configured for the correct mode of operation for your system. There are 3 modes of operation available for the Orion System. They are “Stand Alone Mode”, “Multiple MGRS Mode” or “Network Mode”. Look at the bottom line of the display as mentioned in the previous paragraph and determine which one your System Manager is currently set for. If you are using this System Manager on a communications loop that doesn’t have a MiniLink PD or CommLink II communications interface connected to it and you have a single System Manager on your system, then you need to operate in “Stand Alone Mode” and the first two characters on the bottom line of the display should be “SA”. If you are using this System Manager on a communications loop, have a MiniLink PD or CommLink II communications interface installed and you have multiple System Managers, then you need to operate in “Multiple MGRS Mode” and the first two characters on the bottom line of the display should be “MM”. If you are using this System Manager on a communications loop that has a MiniLink PD or CommLink II communications interface installed and you have a single System Manager for your entire system, then you need to operate in “Network Mode” and the first two characters on the bottom line of the display should be “NM”.

If your display indicates a different mode than the one you need, press the “Enter” key and the following screen will appear.

Press the “2” key on the keypad to enter the communications screen.

Enter the seven digit passcode “2337377” to access the next screen. These seven digits spell the word “ADDRESS” on your telephone keypad if you forget what they are.

You will then see the screen below displayed. You must use the keypad to enter the correct number for the mode of operation needed for your system.

For “Stand Alone Mode” enter “0”.

For “Multiple MGRS Mode” enter the address at which you want this particular System Manager to be set. When multiple System Managers are used on a local loop, each must be set with a unique address different from any other device on that loop. You must perform this same operation again for each System Manager installed. If you want one of these System Managers to be able to indicate alarms and overrides for the entire system you must enter “63” for “Network Mode” on that particular System Manager.

For “Network Mode” (or as explained above for Multiple System Managers when one is to be set to indicate alarms and overrides) enter “63”.

Once you have the correct number per the display above displayed, press the “Enter” key. The following screen will appear telling you that you have changed the system mode. Press any key on the keyboard to exit this screen.
**System Manager NM & MM Mode Loop Search**

When the System Manager is configured for Network Mode a loop search must initially be performed for the System Manager to recognize alarms or overrides. Also, when you have a system that has multiple System Managers and you have one of the System Managers set to (63) Network Mode for alarm and override indication, you must also perform a loop search for that System Manager. This allows the System Manager to be aware of all alarms and overrides for all local loops on the entire system.

*Note:* The Loop Search function is only required when using the System Manager(s), not the Modular Service Tool.

To access the Loop Search screen, do the following. From the main menu screen press “Enter” to display the following screen.

1) Set Time & Date
2) Communications
   ->) Next Menu
ESC) Exit Menu

Press the “Next” arrow key. The following screen will be displayed.

1) Change Passcodes
2) Loop Search
   <-) Prev. Menu
ESC) Exit Menu

Press the “2”. The following screen will be displayed.

Loop Search
Current Loop = XX
Loops Found = XX
Searching

The System Manager will now proceed to search all loops to find the MiniLink Polling Devices that are connected to the system. The screen will display the current loop being searched and the number of loops currently found.

Once the search is completed the following screen will be displayed.

Loop Search
Finished
Loops Found = XX
Press ESC to Exit

The screen will display the number of loops found on your system. The information will be saved into the System Manager’s memory. No further loop searches will be required unless an additional MiniLink Polling Device is added to the Network System.

**System Manager Alarm Search**

The System Manager can be used to search for all active alarms on the system. The MiniLink PD must be configured to allow for “Alarm Polling” for each controller that alarming is desired on for this function to work. See the MiniLink PD programming section of this manual for setting information. Press the “Alarm” key. The Unit Selection screen below will be displayed. Enter the Unit ID of any unit on the system and press “Enter”. This is the unit ID of where the alarm search begins. The entire system is searched from this point.

The following screen will appear. The System Manager will search for any active alarms on the entire system.

Alarm Screen
SEARCHING!

After the System Manager completes it’s search, it will list the first unit on the system that currently has an active alarm. Press “Enter” to scroll through all the alarms on that particular unit. To move to the next unit or back to the previous unit use the “Prev” or “Next” arrows to move between units with alarms.

To clear any alarms that are found you must fix the problem indicated in the alarm. Once the problem is fixed, the alarm will clear from the screen the next time the unit is polled.
System Manager Override Search

When a space sensor with override option is used with any VAV/Zone controller or VCM controller, the System Manager can determine and report any controllers which are currently operating in an override condition. This function requires that a MiniLink Polling Device is installed on each loop where the controllers may be located. The MiniLink PD must be configured to allow for “Alarm Polling” for each controller that Override Polling Enable is desired on, for this function to work. See the MiniLink PD programming section of this manual for setting information.

To access the Space Sensor Overrides screen, press the “Override” button located on the System Manager. A screen will appear asking you to enter a unit ID. Enter an ID for any active controller on the system and press “Enter”. The following screen will appear.

After the System Manager completes its search, it will list the first unit on the system that is currently in the override mode. Press the “Prev” or “Next” button to scroll through all units that are in the Override Mode.

System Manager Passcodes

Anytime you enter a unit ID with the Modular System Manager you will be asked for a passcode. Passcodes are not required to view Status Screens. The screen below will appear if this action requires passcode clearance.

The System Manager has two levels of user access. Level 1 users are limited to viewing status and/or changing the Time and Date and Operating Schedules. Level 2 users have complete system access. Any status or setpoint field can be read or reset from the System Manager.

These two levels of passcodes are programmable by any Level 2 user. The default Level 1 passcode is “1111” and the default Level 2 passcode is “2222.”

If you wish to change either Level 1 or Level 2 passcodes please see the instructions that follow.

Modular Service Tool

The Modular Service Tool is very similar to the System Manager in its operations as stated previously. Two exceptions to this are that the Service Tool unlike the System Manager does not check the entire system when performing an “Alarm” or “Override” search and it does not have any passcoding capability.

Note: When the Alarms or Overrides buttons are pressed on the Modular Service Tool it will search only the loop number of the unit ID that has been entered, therefore each local loop must be searched individually to access all alarms or overrides on the system.
Modular Service Tool Initialization Screen

After connecting the Service Tool to the controller with the supplied cable, press the “On” key. The following screen will appear.

![Modular Service Tool Initialization Screen](image)

Configuring The Modular Service Tool For Network Or Stand-Alone Operation

As with the System Manager described previously, you must determine if the mode displayed is correct for your system. If it is configured for Stand Alone you will see the words “Stand Alone Mode” on the bottom line of the display. This is the factory default setting. If you are using this tool on a system or controller that does not have a Commlink or MiniLink PD installed, then this is the correct setting and you can proceed to desired screen by pressing the menu key or any function key. If you are using this Service Tool on a communications loop and have installed a MiniLink PD or Commlink II communications interface, then you need to operate in network mode and the bottom line should display the words “Network Mode”.

If your display indicates a different mode than the one you need, press the “Enter” key and the following screen will appear.

![Configuring The Modular Service Tool For Network Or Stand-Alone Operation](image)

Press the “2” key on the keypad to enter the communications screen.

![Communications](image)

As the screen indicates, press the right or left arrow keys to select the proper mode of operation. When you are finished press “Enter” to move back to the main menu screen.

![Communications](image)

Modular Service Tool Alarm Search

First, press the “Alarm” key. The Unit Selection screen below will be displayed. Enter the Unit ID of any controller on the system and press “Enter”. This is the unit ID of the loop where the alarm search will be done. Unlike the System Manager, only the alarms on this loop will be searched, not the entire system.

![Modular Service Tool Alarm Search](image)

The following screen will appear. The Modular Service Tool will search for any active alarms on the local loop.

![Alarm Screen](image)

After the Modular Service Tool completes it’s search, it will list the first unit on the local loop, whose ID was entered, that currently has an active alarm. Press “Enter” to scroll through all the alarms for controllers on that particular loop. To move to the next controller or back to the previous unit use the “Prev” or “Next” arrows to move between controllers with alarms on the loop.

![Alarm Search Screen](image)

To clear any alarms that are found you must fix the problem indicated in the alarm. Once the problem is fixed, the alarm will clear from the screen the next time the unit is polled.
Modular Service Tool Override Search

When a space sensor with override option is used with any VAV/Zone controller or VCM controller, the Modular Service Tool can determine and report any controllers which are currently operating in an override condition on the local loop whose ID (Address) has been entered before running the search. This function requires that a MiniLink Polling Device is installed on each loop where the controllers may be located.

To access the Space Sensor Overrides screen, press the “Override” button located on the Modular Service Tool. A screen will appear asking you to enter a unit ID. Enter an ID for any active controller on the particular local loop you wish to search and press “Enter”. Unlike the System Manager, only the overrides on this loop will be searched, not the entire system. The following screen will appear.

After the Service Tool completes its search, it will list the first unit on the selected local loop that is currently in the override mode. Press the previous or next button to scroll through all units on the local loop you have selected that are in the Override Mode.

Setting The Energy Saving Timer

The Modular Service Tool has a built in timer that can be programmed to shut the Service Tool off after a specified period of time if no buttons are pressed. This is a very useful feature if you are powering the Service Tool from the internal batteries. To access this setting from the main status screen press "Enter".

When this screen appears press the “3” key to access the Energy Saving screen. The following screen will appear.

Enter the number of minutes you want the Service Tool to stay active before it automatically powers down. To cancel the automatic power down enter “99”. After you have entered this number between 1 and 99 minutes, press “ESC” to exit as the screen instructs you.
Programming The VCM Controller

Application Configurations

This area of the manual is designed to simplify the programming setup process for typical AAON® units which have factory installed VCM Controllers. Special applications are also included to guide the user through the setup process for more complicated configurations. The following configurations will step you through the Configuration Section of this manual. Not all configuration screens are listed in this section. This section is more of a quick setup guide for basic applications. Please read each description under the corresponding Configuration Screen in this manual to see if that option applies to your application.

Setpoints are not shown here since they are not necessarily configuration specific, but are based more on job requirements. Read the descriptions under the corresponding Setpoint Screens in this manual to understand which setpoints to use and what values are appropriate to enter.

VAV Unit

If you need to setup your HVAC unit for VAV operation use the following values:

Configuration Section

Screen #1 = “YES”
Screen #3 = “Supply Air”
Screen #4 = “No Reset”
Can be configured for Reset; see the Supply Air Setpoint Reset section that follows, before configuring.
Screen #9 = “YES”
Only if equipped with an Outdoor Air Humidity Sensor for Wetbulb control of Economizer.
Screen #12 = “YES”
Only if equipped with an Economizer.
Screen #13 = “YES”
Only if equipped with a Proof of Flow Switch.
Screen #22 = “2”
Only if standard CO₂ Sensor is installed for IAQ Control.
Screen #23 = “2000”
This is the proper CO₂ Sensor scaling for the Standard CO₂ Sensor.
Screen #24 = “YES”
Only if equipped with VFD exhaust fan or Modulating Exhaust Damper Actuator.
Screen #26 = “0” or “1”
Configure the proper Building Pressure Output signal.
Screen #28 = “YES”
Only if a Smoke Detector is connected to the VCM.
Screen #31 = “YES”
Only needed when connected to Orion VAV/Zone Controllers.
Screen #32 = “YES”
Only needed when connected to Orion VAV/Zone Controllers.
Screen #33 = “YES”
Only needed when connected to Orion VAV/Zone Controllers.
Screen #34 = “YES”
Only needed when connected to Orion VAV/Zone Controllers.
Screen #35 = “YES”
Only needed when connected to Orion VAV/Zone Controllers.

Screens #42-#61
Refer to the AAON® wiring diagram inside the unit before configuring onboard and Expansion Board Relays.

CAV Unit

If you need to setup your HVAC unit for CAV operation use the following values:

Configuration Section

Screen #1 = “NO”
Screen #2 = “NO”
Only configure as “YES” if the Supply Fan needs to be off when no Heating, Cooling or Dehumidification demand exists.
Screen #3 = “Space Temperature”
Can be “Return Air”; for cooling only units, select “Supply Air”.
Screen #4 = “No Reset”
Can be configured for Reset; see the Supply Air Setpoint Reset section that follows, before configuring.
Screen #6 = “YES”
Only if the unit is equipped for Dehumidification.
Screen #7 = “YES”
Screen #8 = “YES”
Only if Dehumidification is needed during the Unoccupied Mode.
Screen #9 = “YES”
Only if equipped with an Outdoor Air Humidity Sensor for Wetbulb Control of Economizer.
Screen #10 = “YES”
Only if equipped with an Indoor Humidity Sensor for Dehumidification.
Screen #12 = “YES”
Only if the unit is equipped with an Economizer.
Screen #13 = “YES”
Only if equipped with a Proof of Flow Switch.
Screen #22 = “2”
Only if standard CO₂ Sensor is installed for IAQ Control.
Screen #23 = “2000”
This is the proper CO₂ Sensor scaling for the Standard CO₂ Sensor.
Screen #24 = “YES”
Only if equipped with VFD Exhaust Fan or Modulating Exhaust Damper Actuator.
Programming The VCM Controller

Screen #26 = “0” or “1”
Configure the proper Building Pressure Output Signal.

Screen #28 = “YES”
Only if a Smoke Detector is connected to the VCM.

Screens #42-#61
Refer to the AAON® wiring diagram inside the unit before configuring onboard and expansion board relays.

MUA Unit

If you need to setup your HVAC unit for MUA operation use the following values:

Configuration Section
Screen #1 = “NO”
Screen #3 = “Outdoor Air”
Screen #4 = “No Reset”
Can be configured for Reset; see the Supply Air Setpoint Reset section that follows, before configuring.
Screen #6 = “YES”
Only if the unit is equipped for Dehumidification.

Screen #7 = “YES”
Screen #8 = “YES”
Only if Dehumidification is needed during the Unoccupied Mode.
Screen #9 = “YES”
Only if equipped with an Outdoor Air Humidity Sensor for Dehumidification.
Screen #11 = “NO”
Can be “YES” if Modulating Hot-Gas Reheat is not available or if additional heat is needed to supplement the Modulating Hot-Gas Reheat.
Screen #13 = “YES”
Only if equipped with a Proof of Flow Switch.
Screen #24 = “YES”
Only if equipped with VFD Exhaust Fan or Modulating Exhaust Damper Actuator.
Screen #26 = “0” or “1”
Configure the proper Building Pressure Output Signal.
Screen #28 = “YES”
Only if a Smoke Detector is connected to the VCM.
Screens #42-#61
Refer to the AAON® wiring diagram inside the unit before configuring onboard and expansion board relays.

Air to Air Heat Pump

Air to Air Heat Pumps can be configured as VAV, CAV or MUA. Configuration Screen #27 and #28 are used to configure the Air to Air Heat Pump. A Relay Output must be configured for a Reversing Valve on Screen #27 and on Screen #28, whether the Reversing Valve is to be activated during Heating or Cooling operation. When using AAON® equipment if the equipment is an AAON® packaged unit, the Reversing Valve activates during Heating operation. If the equipment is an AAON® split system, the Reversing Valve activates during Cooling operation. No matter which type of AAON® or other manufacturers equipment you are using, you must determine if the Reversing Valve should be energized during Heating or during Cooling and configure it on Screen #28 or the unit will not operate correctly.

Configuration Section
Screen #27 = “YES”
Screen #28 = “0=Heat” if the Reversing Valve should energize for Heating operation. “1=Cool” if the Reversing Valve should energize for Cooling operation

Screens #42-#61
Refer to the AAON® wiring diagram inside the unit before configuring onboard and expansion board relays.

Precision Air Control Units (PAC)

This application is only valid for CAV units with Space Temperature as the HVAC Mode Enable. All other configuration screens that apply to the CAV will apply to PAC.

Configuration Section
Screen #1 = “NO”
Screen #2 = “NO”
Screen #3 = “Space Temperature”
Screen #4 = “No Reset”
Can be configured for Reset; see the Supply Air Setpoint Reset section that follows, before configuring.

Screens #42-#61
Refer to the AAON® wiring diagram inside the unit before configuring onboard and expansion board relays.

Digital Precision Air Control Units (DPAC)

This application is only valid for CAV units with Space Temperature as the HVAC Mode Enable. All other configuration screens that apply to the CAV will apply to DPAC.

Configuration Section
Screen #1 = “NO”
Screen #2 = “NO”
Screen #3 = “Space Temperature”
Screen #4 = “No Reset”
Can be configured for Reset; see the Supply Air Setpoint Reset section that follows, before configuring.

Screen #14 = Mod Cooling: “YES”
Screen #19 = “YES”
Screen #21
This setpoint is for signal control. Read the description under the screen before determining the appropriate values to enter for the Window and Time Period.
Supply Air Setpoint Reset

There are three options for Supply Air Temperature Reset. Select from the options below for setup procedures.

**Option #1**
**Configuration Section**
Screen #4 = “Space Temperature” or “Return Air Temperature”
Screen #5 = “1 s”
Reset control loop rate; the recommended time is 1 second as shown.

**Setpoints Section**
Screen #4 = Cooling Spt: 75°F
Heating Spt: 70°F

Enter the desired space or return air temperatures to be maintained while in heating, cooling and dehumidification modes of operation. The supply air temperature setpoint will automatically be reset, warmer or colder as needed based on these setpoints. Sample setpoints are shown.

**Option #2**
**Configuration Section**
Screen #4 = “Fan VFD Signal”

**Setpoints Section**
Screen #4 = Cooling Spt: 55
Heating Spt: 100
Screen #5 = Cooling Spt: 65
Heating Spt: 120

Enter the coldest supply air temperature for cooling when the Supply Fan VFD signal is at 100% on Screen #4. Enter the coldest Supply Air Temperature for Heating when the Supply Fan VFD signal is at 0% on Screen #4.

Enter the warmest Supply Air Temperature for Cooling when the Supply Fan VFD signal is at 0% on Screen #5. Enter the warmest Supply Air Temperature for Heating when the Supply Fan VFD signal is at 100% on Screen #5.

**Option #3**
**Configuration Section**
Screen #4 = “Remote Reset”

**Setpoints Section**
Screen #4 = Cooling Spt: 55
Heating Spt: 100
Screen #5 = Cooling Spt: 65
Heating Spt: 120

Enter the coldest supply air temperatures for cooling and heating when the Remote Reset Input is **not active** on Screen #4. Enter the warmest supply air temperatures for cooling and heating when the Remote Supply Input is **active** on Screen #5.

Exhaust Hood Applications
(Dual Outdoor Air Damper Modes)

For kitchen and lab applications that require 100% outdoor air when the exhaust hood is on and minimum outdoor air when the exhaust hood is off.

In the Occupied Mode, the VCM Controller will operate under Space Temperature and Indoor Humidity control when the Exhaust Hood is off. When the Exhaust Hood is on and the “Exhaust Hood On” input is active, the VCM Controller will switch to Outdoor Air Temperature and Outdoor Air Dewpoint control.

In the Unoccupied Mode, the VCM Controller will operate under Space Temperature and Indoor Humidity control only.

**Configuration Section**
Screen #1 = “NO”
Screen #3 = “Space Temperature”
Screen #4 = “No Reset”
Can be configured for Reset; see the Supply Air Setpoint Reset section that follows, before configuring.
Screen #6 = “YES”
Screen #7 = “YES”
Screen #8 = “YES”
Only if Dehumidification is needed during the Unoccupied Mode.
Screen #9 = “YES”
Screen #10 = “YES”
Screen #11 = “NO”
Can be “YES” if Modulating Hot-Gas Reheat is not available or if additional heat is needed to supplement the Modulating Hot-Gas Reheat.
Screen #12 = “NO”
Screen #13 = “YES”
Only if equipped with a Proof of Flow Switch.
Screen #24 = “YES”
Only if equipped with VFD Exhaust Fan or Modulating Exhaust Damper Actuator.
Screen #26 = “0” or “1”
Configure the proper Building Pressure Output Signal.
Screen #28 = “YES”
Only if a Smoke Detector is connected to the VCM.
Screens #42-#61 = Refer to the AAON® wiring diagram inside the unit before configuring onboard and expansion board relays.
## Programming The VCM Controller

### Configuration Screen Index

The available Configuration Screens for the VCM controller are listed on the next few pages by sequential screen number. When each VCM controller is configured for the first time, it is best to start with screen #1 and proceed to each screen in numerical order until you have viewed all available Configuration Screens. This ensures that you have seen all the available VCM controller configuration possibilities and have the opportunity to change or accept the defaults for each screen. Once the unit is configured and you decide to change one of the screen options it is helpful to know what screen number contains the configuration you wish to change. With this in mind, following is a list of all the VCM Configuration Screens in numerical order with a brief listing of the configuration feature available on each screen.

| Configuration Screen #1       | Duct Static Pressure Control |
| Configuration Screen #2       | Supply Fan Cycle Mode        |
| Configuration Screen #3       | HVAC Mode Enable             |
| Configuration Screen #4       | HVAC Reset Source            |
| Configuration Screen #5       | HVAC Reset Source Loop Rate  |
| Configuration Screen #6       | Dehumidification Control     |
| Configuration Screen #7       | Dehumidification Priority    |
| Configuration Screen #8       | Dehumidification Unoccupied  |
| Configuration Screen #9       | Outdoor Humidity Sensor      |
| Configuration Screen #10      | Indoor Humidity Sensor       |
| Configuration Screen #11      | Heat During Dehumidify       |
| Configuration Screen #12      | Economizer Control           |
| Configuration Screen #13      | Proof Of Flow Input          |
| Configuration Screen #14      | Modulating Heating/Cooling   |
| Configuration Screen #15      | Modulating Heat Output Signal|
| Configuration Screen #16      | Modulating Heat Rev. Acting  |
| Configuration Screen #17      | Modulating Heat Prop. Window |
| Configuration Screen #18      | Modulating Cooling Output Signal |
| Configuration Screen #19      | Digital Compressor Signal    |
| Configuration Screen #20      | Modulating Cooling Rev. Acting |
| Configuration Screen #21      | Modulating Cool Prop. Window |
| Configuration Screen #22      | CO2 Sensor Output Signal     |
| Configuration Screen #23      | CO2 Sensor Maximum Signal    |
| Configuration Screen #24      | Building Pressure Mod Control|
| Configuration Screen #25      | Building Pressure Rev. Acting|
| Configuration Screen #26      | Building Pressure Output Signal |
| Configuration Screen #27      | Air To Air Heat Pump Control |
| Configuration Screen #28      | Rev. Valve Active During     |
| Configuration Screen #29      | Smoke Detector Input Enabled |
| Configuration Screen #30      | Return Air Bypass Control    |
| Configuration Screen #31      | Broadcast Outdoor Temperature|
| Configuration Screen #32      | Broadcast Outdoor Humidity   |
| Configuration Screen #33      | Broadcast Supply Temperature |
| Configuration Screen #34      | Broadcast Status Fan & Heat  |
| Configuration Screen #35      | Broadcast Internal Time Clock|
| Configuration Screen #36      | Broadcast Internal Schedule  |
| Configuration Screen #37      | Broadcast VAV Boxes Force To Max |
| Configuration Screen #38      | Broadcast VAV Boxes Force To Fixed |
| Configuration Screen #39      | Enable Broadcast To Multiple Loops |
| Configuration Screen #40-43   | Cooling & Heating Staging Delays |
| Configuration Screen #44-68   | Relay Configuration Screens  |
**Configuration Screens**

In order to correctly setup the VCM controller you must first configure several parameters in regard to the type of HVAC unit and system you have installed. Most of these values and operating parameters are only set once, at the initial system setup and are never changed.

**System Manager Instructions**

From any menu screen press the “Setpoint” key. The unit selection screen will appear requesting that you enter the unit ID number. Enter the correct unit ID number of the VCM controller you want to configure and hit the “Enter” key. You will see the screen shown below.

- 1) Change Setpoint
- 2) Configure Unit
- 3) Damper Force
- ESC) Exit Menu

Press “2” on the keypad to enter Configuration Screen #1.

**Modular Service Tool Instructions**

From any menu screen press the “Configuration” key. The unit selection screen will appear requesting that you enter the unit ID number. Enter the correct unit ID number of the VCM controller you want to configure and hit the “Enter” key. You will then see unit configuration screen #1.

**Configuration Screen #1**

- VCM Cnfg ID 59
- Duct Static Pressure Control: YES
  
  [0=YES 1=NO]

If the HVAC unit has a Supply Fan that delivers a Constant Volume of air, enter “1” for “NO”. If the HVAC unit has a Supply Fan that delivers a Variable Volume of Air using a VFD or a Bypass Damper, enter “0” for “YES”.

**Configuration Screen #2**

- VCM Cnfg ID 59
- Supply Fan Cycle Mode: NO
  
  [0=NO 1=YES]

If you want the HVAC unit’s Supply Fan to run during Heating, Cooling or Dehumidification Modes, enter “1” for “YES”. If you want the HVAC unit’s Supply Fan to run continuously while in the Occupied Mode, regardless of the Heating, Cooling or Dehumidification Modes, enter “0” for “NO”.

**Configuration Screen #3**

- VCM Cnfg ID 59
- HVAC Mode Enable
  - Supply Air
    - Press "0" to Change

Press the “0” key to select the Temperature Sensor that will determine the Heating, Cooling or Vent Modes of operation. The available selections are:

- Supply Air
  - This is typical for VAV applications. Occupied Cooling with Morning Warm-up.

- Outdoor Air
  - This is for 100% Outdoor Air (MUA) units. Dehumidification utilizing a Dewpoint Calculation if equipped with an Outdoor Air Humidity sensor.

- Space Temperature
  - This is for any unit that conditions a space and is not 100% Outdoor air. Occupied/Unoccupied Heating, Cooling and Vent Modes of operation.

- Return Air
  - This selection can be used when an Average Building Temperature (the Return Air Temperature) needs to determine Heating, Cooling and Vent Modes of operation.

**Configuration Screen #4**

- VCM Cnfg ID 59
- HVAC Reset Source
  - No Reset
    - Press “0” to Change

Press the “0” key to select the desired Reset Source for Supply Air Temperature Reset. The selections are Space Temperature Sensor, Return Air Temperature Sensor, Fan VFD Signal, Remote Reset Input and No Reset. If No Reset Source is selected, the Supply Air Setpoint will not be Reset. The Reset Source Setpoints will then become the Supply Air Heating and Cooling Setpoints. If the Remote Reset Input is selected, then the Reset Source will be the Supply Air Temperature Setpoints when the Remote Input is not active. When the Remote Input is active, the new Supply Air Temperature Setpoints will be the Remote Reset Setpoints that are on Setpoint Screen #5.
Programming The VCM Controller

Configuration Screen #5

| VCM Cnfg ID 59                  |
| HVAC Reset Source              |
| Loop Rate: 10 s                |
| [1-255 Seconds]                |

When Space or Return Air Temperature Reset is selected, this value determines how fast the Supply Air Temperature Setpoint is adjusted as the Reset Source changes.

Configuration Screen #6

| VCM Cnfg ID 59                  |
| Dehumidification Control: NO   |
| [0=NO 1=YES]                   |

Enter a “1” for “YES” if Dehumidification Control is required.

Configuration Screen #7

| VCM Cnfg ID 59                  |
| Dehumidification Priority: NO  |
| [0=NO 1=YES]                   |

Enter a “1” for “YES” if Dehumidification is a Priority during the Occupied Mode. Priority means that the Cooling stages will activate based on Coil Temperature and Reheat will be used regardless of Heating, Cooling or Vent Modes of Operation.

Configuration Screen #8

| VCM Cnfg ID 59                  |
| Dehumidification Unoccupied: NO|
| [0=NO 1=YES]                   |

Enter a “1” for “YES” if Dehumidification is required during the Unoccupied mode. Unoccupied Dehumidification is activated based on Indoor Air Humidity only.

Configuration Screen #9

| VCM Cnfg ID 59                  |
| Outdoor Humidity Sensor: NO    |
| [0=NO 1=YES]                   |

Enter a “1” for “YES” if the HVAC unit is equipped with an Outdoor Air Humidity Sensor.

Configuration Screen #10

| VCM Cnfg ID 59                  |
| Indoor Humidity Sensor: NO     |
| [0=NO 1=YES]                   |

Enter a “1” for “YES” if the HVAC unit is equipped with an Indoor Air Humidity Sensor.

Configuration Screen #11

| VCM Cnfg ID 59                  |
| Heat During Dehumidify: NO     |
| [0=NO 1=YES]                   |

Enter a “1” for “YES” if additional Heating during Dehumidification is required to supplement Reheat. If Reheat is not available, you can use Heating Only for Reheat during Dehumidification by selecting “YES” as well.

Configuration Screen #12

| VCM Cnfg ID 59                  |
| Economizer Control: NO         |
| [0=NO 1=YES]                   |

Enter a “1” for “YES” if the VCM is controlling the Economizer.

Configuration Screen #13

| VCM Cnfg ID 59                  |
| Proof Of Flow Input: NO        |
| [0=NO 1=YES]                   |

Enter a “1” for “YES” if the unit is equipped with a Proof of Flow Switch and it is connected to the VCM. If selected as “YES” and the Proof of Flow Switch is open, only the Supply Fan Relay will be active. If any other relays such as Heating Stages or Cooling Stages are active, they will be deactivated when the Proof of Flow Switch input is lost.
Configuration Screen #14

VCM Cnfg ID 59
Mod Cooling: NO
Mod Heating: NO
[0=NO 1=YES]

Enter a “1” for “YES” if the HVAC unit is controlling Modulating Heating or Modulating Cooling or both. If your HVAC unit is going to use a Modulating Chilled Water Valve or is equipped with a Digital Compressor, you must select “YES” for Modulating Cooling. If your HVAC is using a Modulating Hot Water Valve, Modulating Steam valve or a SCR Controlled Electric Heater you must select “YES” for Modulating Heating.

Configuration Screen #15

VCM Cnfg ID 59
Mod Heating
Output Signal.: 0
[0=0-10 V 1=2-10 V]

Enter a “0” for a 0-10 VDC signal to a Modulating Heat Source such as a Hot Water Valve or SCR Electric Heater. Enter a “1” for a 2-10 VDC signal to a Hot Water Valve or SCR Electric Heater.

Configuration Screen #16

VCM Cnfg ID 59
Mod Heating
Rev Acting: NO
[0=NO 1=YES]

Enter a “1” for “YES” if the Modulating Heat Source requires 0 VDC to open and 10 VDC to close.

Configuration Screen #17

VCM Cnfg ID 59
Mod Heating
Prop. Window: 5°F
Time Period: 10 s

The Modulating Heating Proportional Window is the control range of the Modulating Signal above and below the Active Supply Air Temperature Setpoint. Smaller numbers make the Modulating Signal larger per °F from the Active Supply Air Temperature Setpoint. Regardless of how big the signal is per °F, the signal will not make a change until the Time Period elapses. The Time Period is the length of time between Modulating Signal adjustments. Short Time Periods may cause hunting of the Modulating Signal.

Configuration Screen #18

VCM Cnfg ID 59
Mod Cooling
Output Signal.: 0
[0=0-10 V 1=2-10 V]

Enter a “0” for a 0-10 VDC signal to a Modulating Cool source such as a Chilled Water Valve. Enter a “1” for a 2-10 VDC signal to a Chilled Water Valve.

Configuration Screen #19

VCM Cnfg ID 59
Digital Compressor
Signal 1-5V : NO
[0=NO 1=YES]

If the HVAC unit is equipped with a Digital Compressor, enter a “1” for “YES”.

Configuration Screen #20

VCM Cnfg ID 59
Mod Cooling
Rev Acting: NO
[0=NO 1=YES]

Enter a “1” for “YES” if the Modulating Cooling Source requires 0 VDC to open and 10 VDC to close. You cannot use a Reverse Acting Signal if a Digital Compressor is being used.

Configuration Screen #21

VCM Cnfg ID 59
Mod Cooling
Prop. Window: 5°F
Time Period: 10 s

The Modulating Cooling Proportional Window is the control range of the Modulating Signal above and below the Active Supply Air Temperature Setpoint. Smaller numbers make the Modulating Signal larger °F from the Active Supply Air Temperature Setpoint. Regardless of how big the signal is per °F, the signal will not change until the Time Period elapses. The Time Period is the length of time between Modulating Signal adjustments. Short Time Periods may cause hunting of the Modulating Signal.
Programming The VCM Controller

Configuration Screen #22

The VCM needs to know what type of CO₂ sensor signal output is being provided. Enter a “2” for a 0-10 VDC CO₂ sensor signal (standard sensor used). Enter a “1” for a 4-20 mA CO₂ sensor signal. Enter a “0” if no CO₂ sensor is used.

Configuration Screen #23

The VCM needs to know the CO₂ Sensor scaling for proper reading of the CO₂ Sensor output. The Standard CO₂ Sensor should be scaled to 2000 PPM.

Configuration Screen #24

Enter a “1” for “YES” if Modulating Building Pressure Control is needed. Modulating Building Pressure Control is used for a VFD Exhaust Fan or a Modulating Exhaust Fan Damper Actuator for Direct Acting Building Pressure Control. Modulating Building Pressure Control is also used for a modulating outdoor air damper actuator for Reverse Acting Building Pressure Control. Enter a “0” for “NO” if Modulating Building Pressure Control is not needed when using a Constant Volume Exhaust Fan for On/Off Control.

Configuration Screen #25

Enter a “1” for “YES” if Reverse Acting Building Pressure control is needed. Reverse Acting Building Pressure Control can either be On/Off or Modulating Control. Modulating Control is normally used for this configuration. On a drop in Building Pressure, below the Building Static Pressure Setpoint, the Outdoor Air Damper will modulate open to increase pressure.

Configuration Screen #26

This Screen is used to configure the Building Pressure Output Signal voltage needed for your application. You can select either a 0-10 VDC signal (default) or enter a “1” to make the output signal 2-10 VDC as required by the device you are using to control the pressure.

Configuration Screen #27

Enter a “1” for “YES” if the HVAC unit is an Air to Air Heat Pump.

Configuration Screen #28

Enter a “0” for “Heat” if your Air to Air Heat Pump unit activates its Reversing Valve during Heating operation. Enter a “1” for “Cool” if your Air to Air Heat Pump unit activates its Reversing Valve during Cooling operation.

Configuration Screen #29

The VCM needs to know if a Smoke Detector is connected to its binary input. If the Smoke Detector input is active, the Supply Fan, Heating and Cooling Relay Outputs will be disabled.

Configuration Screen #30

Enter a “1” for “YES” if your HVAC unit requires Return Air Bypass Control.
The VCM can broadcast its Outdoor Air temperature Reading to other HVAC units if they are not equipped with their own Outdoor Air Temperature sensors. A network communications device is needed in order for this feature to operate.

Configuration Screen #32

The VCM can broadcast its Outdoor Air Humidity reading to other HVAC units if they are not equipped with their own Outdoor Air Humidity sensors. A network communications device is required in order for this feature to operate.

Configuration Screen #33

This broadcast sends the VCM’s Supply Air Temperature to all controllers on its local loop. This broadcast needs to be configured on a VAV or Zoning System using the VCM with Orion VAV/Zone Controllers. A network communications device is required in order for this feature to operate.

Configuration Screen #34

This broadcast sends the VCM’s Supply Fan and Heating Status to all controllers on its local loop. This broadcast needs to be configured on a VAV or Zoning System using the VCM with Orion VAV/Zone Controllers. A network communications device is required in order for this feature to operate.

Configuration Screen #35

This broadcast sends the time from the VCM’s Internal Time Clock to all controllers on its local loop. This broadcast needs to be configured on a VAV or Zoning System using the VCM with Orion VAV/Zone Controllers. A network communications device is required in order for this feature to operate, but can also be used to synchronize all controllers on the local loop.

Configuration Screen #36

This is always required when you have VAV/Zone controllers connected to this VCM controller. This will broadcast the Occupied and Unoccupied Condition of the VCM controller to all VAV/Zone controllers on the local loop.

Configuration Screen #37

This broadcast is to ensure the VAV/Zone Controllers will drive their dampers to the Max Airflow Damper Position during Morning Warmup. This is important to allow the proper amount of airflow for Heating in the HVAC unit.

Configuration Screen #38

When “1=YES” is selected all VAV/Zone controllers connected to this VCM controller will be Forced to their “Fixed Airflow” Position during the Morning Warmup Mode of operation. Select “0=NO” if you do not want this to occur. See the VAV/Zone controller Setpoint Screens for setting of the “Fixed Airflow” Position.
When “1=YES” is selected, all broadcasts that have been configured on Configuration Screens 31 through 35 will be sent to all local loops on the entire system, not just the local loop the VCM controller is on. This is normally only required if you have a large HVAC unit that requires more than the 58 VAV/Zone controllers normally allowed on the local loop. This allows other VAV/Zone controllers connected on additional local loops to receive the required broadcasts. This only is allowed when you have a single VCM controller with VAV/Zone controllers on multiple loops. Other VCM or add-on devices may be connected but no other VCM with VAV/Zone controllers can be connected on the system.

Both modes have their own set of Staging and Run Delay Times. The Heating Timer Screens look exactly the same as the Cooling Timer Screens except they reference the Heating settings instead of the Cooling settings.

See the Sequence of Operation Manual for information on how these Delays and Run Times are used.

### Configuration Screen #44-68

<table>
<thead>
<tr>
<th>Description</th>
<th>Minimum</th>
<th>Default</th>
<th>Maximum</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cooling Stage Up</td>
<td>3 Min</td>
<td>3 Min</td>
<td>15 Min</td>
</tr>
<tr>
<td>Cooling Stage Down</td>
<td>1 Min</td>
<td>1 Min</td>
<td>15 Min</td>
</tr>
<tr>
<td>Cooling Min Run Time</td>
<td>5 Min</td>
<td>5 Min</td>
<td>15 Min</td>
</tr>
<tr>
<td>Cooling Min Off Time</td>
<td>3 Min</td>
<td>3 Min</td>
<td>15 Min</td>
</tr>
<tr>
<td>Heating Stage Up</td>
<td>3 Min</td>
<td>3 Min</td>
<td>15 Min</td>
</tr>
<tr>
<td>Heating Stage Down</td>
<td>1 Min</td>
<td>1 Min</td>
<td>15 Min</td>
</tr>
<tr>
<td>Heating Min Run Time</td>
<td>2 Min</td>
<td>2 Min</td>
<td>15 Min</td>
</tr>
<tr>
<td>Heating Min Off Time</td>
<td>1 Min</td>
<td>1 Min</td>
<td>15 Min</td>
</tr>
</tbody>
</table>

RELAY CONFIGURATIONS

Relay #1 is not configurable as it is reserved for the Supply Air Fan. Relays #2-#21 are configurable for the following options:

- Cooling Stage
- Heating Stage
- Warm-up Mode
- Reversing Valve
- Reheat
- Pre-Heater
- Exhaust Fan
- Alarm
- Override
- Occupied
- Economizer

Relays #2 through #21 can be individually configured. By using all (4) of the available 4 Relay Expansion Boards and the 4 relay outputs available on the VCM controller, you have the ability to configure up to a combined total of 20, Heating Stages, Cooling Stages, and options 3 through 11 listed above. Only the Heating and Cooling relays can be configured with multiple outputs. If any other option is selected more than once, it will simply activate redundant relays but no multiple staging will occur.
Setpoints - General Procedures

System Manager Instructions
From any menu screen press the “Setpoint” key. The unit selection screen will appear requesting that you enter the unit ID number. Enter the correct unit ID number of the VCM controller you want to change Setpoints for and press the “Enter” key. You will see the screen shown below.

Press “1” on the keypad to enter the first unit Setpoint screen.

Modular Service Tool Instructions
From any menu screen press the “Setpoint” key. The unit selection screen will appear requesting that you enter the unit ID number. Enter the correct unit ID number of the VCM controller you want to change Setpoints for and press the “Enter” key. You will then see Setpoint screen #1.

Setpoint Screen Index
The available Setpoint Screens for the VCM controller are listed on the next few pages by sequential screen number. When each VCM controller is configured for the first time, it is best to start with screen #1 and proceed to each Setpoint Screen in numerical order until you have viewed all available Setpoint Screens. This ensures that you have seen all the available VCM controller Setpoint possibilities and have the opportunity to change or accept the defaults for each screen. Once the unit Setpoints are configured and you decide to change one of the screen options it is helpful to know what screen number contains the configuration you wish to change. With this in mind, following is a list of all the VCM Setpoint Screens in numerical order with a brief listing of the Setpoint feature available on each screen.

<table>
<thead>
<tr>
<th>Setpoint Screen #1</th>
<th>HVAC Mode Setpoints</th>
</tr>
</thead>
<tbody>
<tr>
<td>Setpoint Screen #2</td>
<td>HVAC Mode Select Deadband</td>
</tr>
<tr>
<td>Setpoint Screen #3</td>
<td>Unoccupied Setbacks</td>
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<td>Remote SAT Reset Setpoints</td>
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<td>Setpoint Screen #6</td>
<td>Stage Control Window</td>
</tr>
<tr>
<td>Setpoint Screen #7</td>
<td>Outdoor Air Lockouts</td>
</tr>
<tr>
<td>Setpoint Screen #8</td>
<td>Cuttoff Temperature Lo SAT &amp; Hi SAT</td>
</tr>
<tr>
<td>Setpoint Screen #9</td>
<td>Minimum Supply Fan VFD Speed For Heating</td>
</tr>
<tr>
<td>Setpoint Screen #10</td>
<td>Morning Warm-up Target Temp &amp; Max Length</td>
</tr>
<tr>
<td>Setpoint Screen #11</td>
<td>Dehumidification Indoor RH &amp; OA Dewpoint Setpoints</td>
</tr>
<tr>
<td>Setpoint Screen #12</td>
<td>Dehumidification Coil Temperature</td>
</tr>
<tr>
<td>Setpoint Screen #13</td>
<td>Economist Setpoints OAT/WB Enable</td>
</tr>
<tr>
<td>Setpoint Screen #14</td>
<td>Economist Setpoints Min Position &amp; Control Rate</td>
</tr>
<tr>
<td>Setpoint Screen #15</td>
<td>Maximum Economist Position If High CO2 Level Occurs</td>
</tr>
<tr>
<td>Setpoint Screen #16</td>
<td>CO2 Protection Limit Max Level &amp; Reset Range</td>
</tr>
<tr>
<td>Setpoint Screen #17</td>
<td>Static Spt, Deadband &amp; Control Rate</td>
</tr>
<tr>
<td>Setpoint Screen #18</td>
<td>Building Pressure Setpoint &amp; Deadband</td>
</tr>
<tr>
<td>Setpoint Screen #19</td>
<td>Return Air Bypass Damper Factor Setpoint</td>
</tr>
<tr>
<td>Setpoint Screen #20</td>
<td>Fan Starting Delay Timer</td>
</tr>
<tr>
<td>Setpoint Screen #21</td>
<td>Mechanical Heat Cool Failures Occur After No Change For</td>
</tr>
<tr>
<td>Setpoint Screen #22</td>
<td>Low OA Ambient Protection Temperature</td>
</tr>
<tr>
<td>Setpoint Screen #23</td>
<td>HVAC Schedule</td>
</tr>
<tr>
<td>Setpoint Screen #24</td>
<td>Push-button Override Duration</td>
</tr>
<tr>
<td>Setpoint Screen #25</td>
<td>HVAC Mode Sensor Slide Offset</td>
</tr>
<tr>
<td>Setpoint Screen #26</td>
<td>Air To Air Heat Pump Auxiliary Heating Delay</td>
</tr>
<tr>
<td>Setpoint Screen #27</td>
<td>Internal Schedule Optimal Start Soak Multiplier</td>
</tr>
<tr>
<td>Setpoint Screen #28</td>
<td>Sensor Calibration For SPC &amp; SAT</td>
</tr>
<tr>
<td>Setpoint Screen #29</td>
<td>Sensor Calibration For RAT &amp; OAT</td>
</tr>
</tbody>
</table>

Setpoint Screen #1

VCM Spts ID 59
HVAC Mode Setpoints
Cooling......:  75°F
Heating......:  70°F

These Setpoints are used to determine the Heating, Cooling or Vent Modes of operation in reference to the HVAC Mode Enable Sensor. If the Supply Air Sensor is configured to be the HVAC Mode Enable, these Setpoints are used in conjunction with the Unoccupied Setbacks if equipped with a Space Temperature Sensor.

<table>
<thead>
<tr>
<th>Description</th>
<th>Minimum</th>
<th>Default</th>
<th>Maximum</th>
</tr>
</thead>
<tbody>
<tr>
<td>HVAC Mode Setpoints Cooling</td>
<td>0° F</td>
<td>75° F</td>
<td>90° F</td>
</tr>
<tr>
<td>HVAC Mode Setpoints Heating</td>
<td>0° F</td>
<td>70° F</td>
<td>90° F</td>
</tr>
</tbody>
</table>
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**Programming The VCM Controller**

**Setpoint Screen #2**

```
VCM Spts ID 59
HVAC Mode Select
Deadband:  1.0°F
```

This Setpoint is added to and subtracted from the HVAC Mode Setpoints. It provides the user with flexibility on when the Heating and Cooling Modes should be active above or below the HVAC Mode Setpoints.

<table>
<thead>
<tr>
<th>Description</th>
<th>Minimum</th>
<th>Default</th>
<th>Maximum</th>
</tr>
</thead>
<tbody>
<tr>
<td>HVAC Mode Select</td>
<td>0°F</td>
<td>1°F</td>
<td>10°F</td>
</tr>
<tr>
<td>Deadband</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Setpoint Screen #3**

```
VCM Spts ID 59
Unoccupied Setbacks
Cooling:  5°F
Heating:  5°F
```

During the Unoccupied Mode of Operation, these Setpoints spread the HVAC Mode Setpoints out by a user adjustable amount. Use only positive numbers for these Setpoints. If you do not want Cooling or Heating to operate during the Unoccupied Mode, use the default setting of 30°F for these setpoints.

<table>
<thead>
<tr>
<th>Description</th>
<th>Minimum</th>
<th>Default</th>
<th>Maximum</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unoccupied Setbacks</td>
<td>0°F</td>
<td>30°F</td>
<td>30°F</td>
</tr>
<tr>
<td>Cooling</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Heating</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Setpoint Screen #4**

```
VCM Spts ID 59
SAT/Reset Source
Cooling Spt:  75°F
Heating Spt:  70°F
```

If no reset source has been configured, then these setpoints will be the Supply Air Temperature Cooling and Heating Setpoints when the Remote Reset Input is active. If the Supply Fan VFD Signal is configured as the Reset Source, then the Cooling Setpoint will be the highest Supply Air Temperature Setpoint for Cooling when the Supply Fan VFD Signal is at 100%. If the Supply Fan VFD Signal is configured as the Reset source, then the Heating Setpoint will be the highest Supply Air Temperature Setpoint for Heating when the Supply Fan VFD Signal is at 0%. See Setpoint Screen #5 for more information on the Supply Fan VFD Signal and Remote SAT Reset setup.

<table>
<thead>
<tr>
<th>Description</th>
<th>Minimum</th>
<th>Default</th>
<th>Maximum</th>
</tr>
</thead>
<tbody>
<tr>
<td>Remote SAT Reset</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reset Cooling Spt</td>
<td>55°F</td>
<td>200°F</td>
<td></td>
</tr>
<tr>
<td>Reset Heating Spt</td>
<td>120°F</td>
<td>200°F</td>
<td></td>
</tr>
</tbody>
</table>

**Setpoint Screen #5**

```
VCM Spts ID 59
Remote SAT Reset
Cooling Spt:  65°F
Heating Spt:  120°F
```

When Remote SAT Reset is configured as the Reset Source, then these setpoints will be the Supply Air Temperature Cooling and Heating Setpoints when the Remote Reset Input is active. If the Supply Fan VFD Signal is configured as the Reset Source, then the Cooling Setpoint will be the highest Supply Air Temperature Setpoint for Cooling when the Supply Fan VFD Signal is at 100%. If the Supply Fan VFD Signal is configured as the Reset Source, then the Heating Setpoint will be the highest Supply Air Temperature Setpoint for Heating when the Supply Fan VFD signal is at 100%. See Setpoint Screen #4 for more information on the Supply Fan VFD signal and Remote SAT Reset setup.
When the VCM controller is in Cooling Mode, if the Supply Air Temperature drops below the Active Supply Air Temperature Setpoint minus the Cooling Stage Control Window value, a Cooling Stage will be deactivated after its Minimum Run Time. In the Heating Mode, if the Supply Air Temperature rises above the Active Supply Air Temperature Setpoint plus the Heating Stage Control Window value, a Heating stage will be deactivated after its Minimum Run Time.

The VCM controller will temporarily disable Heating or Cooling if while in Heating or Cooling Mode the Supply Air Temperature rises above the Hi SAT Cutoff Temperature Setpoint or falls below the Lo SAT Cutoff Temperature Setpoint. See the VCM Controller Technical Guide for detailed information on the Lo and Hi Supply Air Temperature Cutoff sequence of operation.

### Setpoint Screen #8

<table>
<thead>
<tr>
<th>Description</th>
<th>Minimum</th>
<th>Default</th>
<th>Maximum</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lo SAT Cutoff</td>
<td>0°F</td>
<td>40°F</td>
<td>250°F</td>
</tr>
<tr>
<td>Hi SAT Cutoff</td>
<td>0°F</td>
<td>170°F</td>
<td>250°F</td>
</tr>
</tbody>
</table>

When the VCM controller is in Cooling Mode, if the Supply Air Temperature drops below the Active Supply Air Temperature Setpoint minus the Cooling Stage Control Window value, a Cooling Stage will be deactivated after its Minimum Run Time.

### Setpoint Screen #7

The VCM will Lockout Mechanical Heating or Cooling when the Outdoor Air Temperature is above or below these Setpoints.

### Setpoint Screen #9

If the Supply Fan VFD Signal falls below the Minimum Supply Fan VFD Speed Setpoint, Heating will be disabled.

<table>
<thead>
<tr>
<th>Description</th>
<th>Minimum</th>
<th>Default</th>
<th>Maximum</th>
</tr>
</thead>
<tbody>
<tr>
<td>Outdoor Air Lockouts Cooling</td>
<td>0°F</td>
<td>50°F</td>
<td>80°F</td>
</tr>
<tr>
<td>Outdoor Air Lockout Heating</td>
<td>50°F</td>
<td>70°F</td>
<td>90°F</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Description</th>
<th>Minimum</th>
<th>Default</th>
<th>Maximum</th>
</tr>
</thead>
<tbody>
<tr>
<td>Min Supply Fan VFD Speed For Heating</td>
<td>0%</td>
<td>50%</td>
<td>100%</td>
</tr>
</tbody>
</table>
**Programming The VCM Controller**

**Setpoint Screen #10**

When the VCM is configured for VAV operation and the controller enters the Occupied Mode, the VCM looks at the Return Air Temperature to determine if the unit should initiate Morning Warm-up Mode. If the Return Air Temperature is below the Morning Warm-up Target Temperature and the Max Length is greater than "0", the VCM controller will initiate Heating. This is considered Morning Warm-up and will run until the Return Air Temperature rises above the Morning Warm-up Target Temperature or the Max Length Setpoint time expires.

<table>
<thead>
<tr>
<th>Description</th>
<th>Minimum</th>
<th>Default</th>
<th>Maximum</th>
</tr>
</thead>
<tbody>
<tr>
<td>Morning Warm Up Target Temp</td>
<td>50°F</td>
<td>72°F</td>
<td>90°F</td>
</tr>
<tr>
<td>Morning Warm Up Max Length</td>
<td>0 Min</td>
<td>60 Min</td>
<td>240 Min</td>
</tr>
</tbody>
</table>

**Setpoint Screen #12**

During the Dehumidification Mode, the VCM uses the calculated Coil Temperature to activate DX Cooling based on this Dehumidification Coil Temperature Setpoint. The VCM uses a Suction Pressure Transducer to read Suction Pressure (the Saturation Vapor Pressure of the Refrigerant) and converts this Suction Pressure reading to a Coil Temperature value. This calculation is based on using R22 refrigerant only and will not work with any other refrigerant. This setpoint determines

<table>
<thead>
<tr>
<th>Description</th>
<th>Minimum</th>
<th>Default</th>
<th>Maximum</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dehumidification Coil Temperature Setpoint</td>
<td>35°F</td>
<td>45°F</td>
<td>70°F</td>
</tr>
</tbody>
</table>

**Setpoint Screen #11**

On VAV or CAV configured units that are not using 100% Outdoor Air, when the Indoor Relative Humidity percentage rises above the Indoor RH Setpoint the unit will start operating in Dehumidification Mode.

On MUA configured units that are using 100% Outdoor Air, when the Outdoor Air Dewpoint Temperature rises above the OA Dewpoint Setpoint the unit will start operating in Dehumidification Mode.

<table>
<thead>
<tr>
<th>Description</th>
<th>Minimum</th>
<th>Default</th>
<th>Maximum</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dehumidification Spt Indoor RH</td>
<td>1%</td>
<td>50%</td>
<td>100%</td>
</tr>
<tr>
<td>Dehumidification Spt OA Dewpoint</td>
<td>35°F</td>
<td>55°F</td>
<td>80°F</td>
</tr>
</tbody>
</table>

**Setpoint Screen #13**

If an Outdoor Air Humidity Sensor is not connected to the VCM and the Outdoor Air Temperature falls below this Setpoint, the Economizer can be used for Free Cooling. If an Outdoor Air Humidity Sensor is connected to the VCM, then a Wetbulb Temperature will be calculated and used instead of the Outdoor Air Drybulb Temperature to determine when Free Cooling can be used.

<table>
<thead>
<tr>
<th>Description</th>
<th>Minimum</th>
<th>Default</th>
<th>Maximum</th>
</tr>
</thead>
<tbody>
<tr>
<td>Economizer Setpoints OAT/WB Enable</td>
<td>0°F</td>
<td>55°F</td>
<td>80°F</td>
</tr>
</tbody>
</table>
Setpoint Screen #14

The Economizer (Outdoor Air Damper) Min Position Setpoint is maintained during the Occupied Mode even if the Economizer is disabled due to the Outdoor Air Temperature or Wetbulb Temperature being above the Economizer Enable Setpoint. The Control Rate Setpoint allows the user to adjust the Economizer to modulate the Outdoor Air Damper Actuator faster or slower as desired. The Control Rate Setpoint range is 1-99. Larger numbers make the Economizer Outdoor Air Damper Actuator modulate faster, smaller numbers make the Outdoor Air Damper Actuator modulate slower.

<table>
<thead>
<tr>
<th>Description</th>
<th>Minimum</th>
<th>Default</th>
<th>Maximum</th>
</tr>
</thead>
<tbody>
<tr>
<td>Economizer Setpoints Min Position</td>
<td>0%</td>
<td>10%</td>
<td>100%</td>
</tr>
<tr>
<td>Economizer Setpoints Control Rate</td>
<td>10</td>
<td>90</td>
<td>99</td>
</tr>
</tbody>
</table>

Setpoint Screen #16

When the CO₂ level rises above the CO₂ Protection Limit Max Level, the Economizer’s Minimum Position will begin to reset open proportionally between the CO₂ Protection Limit Max Level and the Reset Range Setpoint. The Reset Range value is added to the Max Level value. If the CO₂ levels are equal to or above the Max Level plus the Reset Range, the Economizer will be opened to its Maximum Economizer Position if high CO₂ levels occur.

<table>
<thead>
<tr>
<th>Description</th>
<th>Minimum</th>
<th>Default</th>
<th>Maximum</th>
</tr>
</thead>
<tbody>
<tr>
<td>CO₂ Protection Limit Max Level</td>
<td>0 PPM</td>
<td>900 PPM</td>
<td>3000 PPM</td>
</tr>
<tr>
<td>CO₂ Protection Limit Reset Range</td>
<td>0 PPM</td>
<td>100 PPM</td>
<td>1500 PPM</td>
</tr>
</tbody>
</table>

Setpoint Screen #15

This Setpoint allows the user to set the Maximum Position the Economizer will open if high CO₂ conditions occur in the space. The Maximum Economizer Position Setpoint is used to limit the amount of Outdoor Air that will be introduced to the HVAC unit in order to ensure the unit is operating within its Heating and Cooling design limitations. As shown in the table below the Minimum setting for this Setpoint is the value previously set for the Economizer Min Position Setpoint.

<table>
<thead>
<tr>
<th>Description</th>
<th>Minimum</th>
<th>Default</th>
<th>Maximum</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maximum Economizer Position If High CO₂ Level Occurs</td>
<td>100%</td>
<td>100%</td>
<td>100%</td>
</tr>
</tbody>
</table>

Setpoint Screen #17

For VAV units, a Supply Fan VFD or a Bypass Damper Actuator is used to maintain the Duct Static Pressure Setpoint. The Duct Static Pressure Output Signal varies to control the Static Pressure Setpoint. If the Duct Static Pressure is above the Static Setpoint plus the Deadband, the Static Pressure Output Signal will be reduced at every Control Rate interval. If the Static Pressure is below the Static Setpoint minus the Deadband, the Output signal will be increased at every Control Rate interval.

The Duct Static Pressure Control Output Signal is a non-configurable Direct Acting Signal (0-10 VDC). This can be used to directly connect to a Supply Fan VFD without any modifications.

When you are using a Bypass Damper Actuator to control the Duct Static Pressure, you must set up the Bypass Damper Actuator or the Bypass Damper so that it is Reverse Acting in operation. The Output Signal increases (closes Bypass Damper) if the Duct Static Pressure is below the Duct Static Pressure Setpoint by the Deadband amount and the Output Signal decreases (opens Bypass Damper) if the Static Pressure is above the Setpoint by the Deadband amount.

<table>
<thead>
<tr>
<th>Description</th>
<th>Minimum</th>
<th>Default</th>
<th>Maximum</th>
</tr>
</thead>
<tbody>
<tr>
<td>Static Spt</td>
<td>0.10&quot; WG</td>
<td>0.50&quot; WG</td>
<td>3.0&quot; WG</td>
</tr>
<tr>
<td>Deadband</td>
<td>0.01&quot; WG</td>
<td>0.10&quot; WG</td>
<td>1.0&quot; WG</td>
</tr>
<tr>
<td>Control Rate</td>
<td>1 Sec</td>
<td>10 Sec</td>
<td>30 Sec</td>
</tr>
</tbody>
</table>
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### Setpoint Screen #18

![VCM Spts ID 59
Building Pressure
Setpoint: 0.02"
Deadband: 0.01”](image)

**Direct Acting Control**

If an Exhaust Fan Relay is configured, when the Building Static Pressure rises above the Building Pressure Setpoint plus the Deadband, the Exhaust Fan Relay will activate. It will remain on until the Building Pressure falls below the Building Pressure Setpoint minus the Deadband. If Modulating Building Pressure is configured, when the Building Static Pressure rises above the Building Pressure Setpoint plus the Deadband, the Building Pressure Output Signal will increase until the Building Static Pressure falls within the Deadband. If the Building Static Pressure falls below the Building Pressure Setpoint minus the Deadband, the Building Pressure Output Signal will decrease until the Building Static Pressure rises within the Deadband. The Building Pressure Output Signal is configurable for 0-10 or 2-10 VDC. For more detailed operation information, see the VCM Technical Guide for the complete Building Pressure Control Sequence of Operation.

**Reverse Acting Control**

The Building Pressure Output Signal remains a Direct Acting 0-10 or 2-10 VDC signal, but the logic is reversed. On a drop in Building Static Pressure below the Building Pressure Setpoint minus the Deadband, the Building Pressure Output Signal will increase.

### Setpoint Screen #19

![VCM Spts ID 59
Return Air Bypass Damper Factor Setpoint..:XXX%](image)

This setpoint is used when your HVAC unit is configured for Return Air Bypass Damper control. The Return Air Bypass Damper Factor Setpoint is a percentage value that is used to calculate the Return Air Damper position in relation to the Return Air Bypass Damper position. This provides a method for adjusting the airflow through the Return Air Bypass Damper.

Increasing this percentage increases the airflow through the Return Air Bypass Damper by causing the Return Air Damper to move further towards its closed position in relation to the Return Air Bypass Damper moving towards its open position.

### Setpoint Screen #20

![VCM Spts ID 59
Fan Starting Delay Timer: 10 s](image)

This is the Supply Fan Starting Delay Timer initiated whenever the VCM initiates Supply Fan operation. This is useful when you are using multiple VCM controlled HVAC units and want to be sure that all the units do not start at exactly the same time when the Occupied schedule occurs. Each VCM should be set with staggered Fan Starting Delay Timer Setpoint values. When the 255 Second default setpoint is used it multiplies each VCM controllers address by 5 and uses this value in seconds as the Fan Starting Delay Time. This provides a staggered start for each VCM controller on the system without having to individually set each VCM controller for its own time delay.

### Setpoint Screen #21

![VCM Spts ID 59
Mechanical Heat/Cool Failures Occur After No Change For:10 Min](image)

When Heating or Cooling Mode is initiated and staging is activated, if the Supply Air Temperature does not rise or fall 5°F within the Mechanical Heat/Cool Failures Occur After No Change For Setpoint time period, a Mechanical Heating or Cooling failure alarm will be generated. The Alarm is for Status Reporting only. The HVAC unit will continue to run.

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Setpoint Screen #22

For cold climates where freezing temperatures may be experienced, a Pre-heater relay output can be activated based on the Outdoor Air Temperature to prevent freezing of Water Coils. One of the VCM Relay Outputs must be configured for the Pre-heater control. When configured, if the Outdoor Air Temperature falls below the Low OAT Ambient Protection Temperature Setpoint and the HVAC unit is in Occupied Mode, the Pre-heater relay will activate.

<table>
<thead>
<tr>
<th>Description</th>
<th>Minimum</th>
<th>Default</th>
<th>Maximum</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low Ambient Protection Temperature</td>
<td>0°F</td>
<td>0°F</td>
<td>100°F</td>
</tr>
</tbody>
</table>

Setpoint Screen #23

The VCM has an Internal Scheduler. If you want the VCM to use its own Internal Schedule to schedule the HVAC unit, enter a “0” for “Internal”. To use the External Schedule option you must have a GPC Plus controller installed and operating on your system.

To use one of the (5) External Schedules available on the GPC Plus controller, enter the number of the GPC Plus Schedule (1 through 5) you wish to use.

<table>
<thead>
<tr>
<th>Description</th>
<th>Minimum</th>
<th>Default</th>
<th>Maximum</th>
</tr>
</thead>
<tbody>
<tr>
<td>HVAC Schedule</td>
<td>0</td>
<td>0</td>
<td>5</td>
</tr>
</tbody>
</table>

Setpoint Screen #24

If the VCM has a Space Temperature Sensor installed and it has the Override Button option, the HVAC unit will initiate Occupied Mode any time the Override Button is pressed and held for less than 3 seconds. The Push Button Override Duration Setpoint allows you to adjust the amount of time the Override will remain in effect when the Override Button is pressed. To cancel the Override before the Override Duration time period expires, press the Override Button for between 5 to 10 seconds.

<table>
<thead>
<tr>
<th>Description</th>
<th>Minimum</th>
<th>Default</th>
<th>Maximum</th>
</tr>
</thead>
<tbody>
<tr>
<td>Push-Button Override Duration</td>
<td>0.0 Hr</td>
<td>2.0 Hr</td>
<td>8.0 Hr</td>
</tr>
</tbody>
</table>

Setpoint Screen #25

If the VCM has a Space Temperature Sensor with the Slide Adjust option installed, the HVAC Mode Enable Heating and Cooling Setpoints can be offset by the HVAC Mode Sensor Slide Offset Setpoint value. When the Slide Adjust bar is in the middle, no offset will occur. If the Slide Adjust bar is moved all the way to the top of the Sensor, the Heating and Cooling Setpoints will be raised by the Setpoint value you have entered. If the Slide Adjust bar is moved all the way down to the bottom of the Sensor, the Heating and Cooling Setpoints will be lowered by the Setpoint value you have entered.

<table>
<thead>
<tr>
<th>Description</th>
<th>Minimum</th>
<th>Default</th>
<th>Maximum</th>
</tr>
</thead>
<tbody>
<tr>
<td>HVAC Mode Sensor Slide Offset</td>
<td>0°F</td>
<td>0°F</td>
<td>10°F</td>
</tr>
</tbody>
</table>
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**Setpoint Screen #26**

If your VCM is configured to operate as an Air to Air Heat Pump, the Air to Air Heat Pump Auxiliary Heating Delay Setpoint can be configured to provide a time delay period before Auxiliary Heating Stages can be activated once activation of the Compressor Heating Stages have been initiated.

<table>
<thead>
<tr>
<th>Description</th>
<th>Minimum</th>
<th>Default</th>
<th>Maximum</th>
</tr>
</thead>
<tbody>
<tr>
<td>Air To Air Heat Pump Auxiliary Heating Delay</td>
<td>0</td>
<td>3 Min</td>
<td>30 Min</td>
</tr>
</tbody>
</table>

**Setpoint Screen #27**

The Internal Schedule Optimal Start Soak Multiplier Setpoint is a multiplier which if set to a number greater than 0 will be used as a multiplier for calculating the Optimal Start Time for the HVAC unit. This multiplier is only applied if the unit has been off for more than 24 hours. See the VCM Technical Guide for more detailed information regarding the Optimal Start. This multiplier is only applied if you are using the VCM Internal Schedule.

<table>
<thead>
<tr>
<th>Description</th>
<th>Minimum</th>
<th>Default</th>
<th>Maximum</th>
</tr>
</thead>
<tbody>
<tr>
<td>Internal Schedule Optimal Start Soak Multiplier</td>
<td>0.0</td>
<td>0.0</td>
<td>5.0</td>
</tr>
</tbody>
</table>

**Setpoint Screen #28**

If one or more of your Temperature Sensors is reading incorrectly, you can use this option to enter an offset temperature to adjust the Sensor’s Temperature. Enter a positive Sensor Calibration value to raise the Space Temperature and/or Supply Air Temperature Sensor reading and a negative value to lower the Sensor reading. See the next Setpoint Screen for Return Air Temperature and Outdoor Air Temperature Sensor calibration.

<table>
<thead>
<tr>
<th>Description</th>
<th>Minimum</th>
<th>Default</th>
<th>Maximum</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sensor Calibration SPC</td>
<td>-100.0°F</td>
<td>0.0°F</td>
<td>+100.0°F</td>
</tr>
<tr>
<td>Sensor Calibration SAT</td>
<td>-100.0°F</td>
<td>0.0°F</td>
<td>+100.0°F</td>
</tr>
</tbody>
</table>

**Setpoint Screen #29**

If one or more of your Temperature Sensors is reading incorrectly, you can use this option to enter an offset temperature to adjust the Sensor’s Temperature. Enter a positive Sensor Calibration value to raise the Return Air Temperature and/or Outdoor Air Temperature Sensor reading and a negative value to lower the Sensor reading. See the previous screen for Space Temperature and Supply Air Temperature Sensor calibration.

<table>
<thead>
<tr>
<th>Description</th>
<th>Minimum</th>
<th>Default</th>
<th>Maximum</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sensor Calibration RAT</td>
<td>-100.0°F</td>
<td>0.0°F</td>
<td>+100.0°F</td>
</tr>
<tr>
<td>Sensor Calibration OAT</td>
<td>-100.0°F</td>
<td>0.0°F</td>
<td>+100.0°F</td>
</tr>
</tbody>
</table>
Scheduling

The VCM controller scheduling screens are accessed by pressing the “Schedule” button on either the System Manager or the Modular Service Tool. Press the number button for the scheduling function you wish to view.

1) Schedule Override
2) Week Schedules
3) Holidays
ESC) Exit Menu

Week Schedules

Event #1

VCM Schd ID 59
Sunday Event #1
Start Time..: xxxx
Stop Time..: xxxx

Event #2

VCM Schd ID 59
Sunday Event #2
Start Time..: xxxx
Stop Time..: xxxx

If you are using the internal scheduling capability of the VCM controller, set the schedule hours and holiday periods from the menu shown above. You can also force the unit to operate continuously in occupied or unoccupied mode by selecting the Schedule Override menu item and entering the desired command.

If you are using an external contact closure to signal the occupied mode, you must access the Week Schedule screens and set all start and stop times to zero to prevent the internal schedule from bringing the equipment on when you don’t want it to operate.

The screens will step through the Start Time and then the Stop Time for each day of the week. You can quit at any point in the process by pressing the “Escape” key. There are two Start/Stop events available per day so the screen will show which event is being programmed. If you need only one event, leave Event #2 times to ZERO.

All times are in 24-hour military format, so 5:00 PM would be entered as 1700.

If both the Start and Stop Times are ZERO, the schedule is in a continuous OFF mode. (Use for Remote Signal Contact)

If both the Start and Stop Times are 2359, the schedule is in a continuous ON mode.

Note: The second line displays which day of the week is currently being programmed. This automatically increments as you finish the Event #2 screen and continue to the next days Event #1 screen.

Caution: The controller ships with all schedules set to zero so that the controller will not attempt to heat or cool before the user has configured his system.

Holiday Start/Stop Day Selection

VCM Hldy ID 59
Holiday #  1
Start Mon/Day.: xxxx
[ July 4th = 704 ]

VCM Hldy ID 59
Holiday #  1
Stop Mon/Day.: xxxx
[ July 5th = 705 ]

The screens will step through the fourteen possible holidays, one period at a time. Line 2 shows which holiday is currently being programmed. Since a holiday period can encompass more than one day, you need to program the day the holiday starts and the day the holiday ends. If your holiday only lasts one day simply set both the Start Day and the Stop Day to the same value. Remember to combine the month and day into a single four-digit value.

EXAMPLE: 704 = July 4th (Note: Leading zero not required)
1225 = December 25th
**Holiday Start/Stop Times**

The fourteen holidays all use the same Start and Stop times which are entered on this screen and then the next. It is entered in 24-hour military format, the same as a regular week schedule.

Normally the holidays will operate in an unoccupied mode or a reduced schedule mode. There are two start/stop events available on holidays to match the standard schedule number of events.

**Schedule Override**

If you want to force the unit to operate in a continuous Occupied or Unoccupied mode, select this menu item to activate the desired method. If a Schedule Override is active, all other methods of schedule control are ignored. (Push-Button, Internal or Remote)

As you can see on the last line of the display you enter a ‘1’ to run continuously in the Occupied Mode or a ‘2’ to run continuously in the Unoccupied Mode.

To restore normal schedule operations, make sure a ‘0’ is entered here. This override remains in effect until canceled by the user and does not time-out like the Output Overrides do after 10 minutes of no communications.

---

**Setting Time & Date**

Both the Modular Service Tool and Modular System Manager are equipped with a real time clock chip allowing it to maintain the correct time. Once the correct time and date are entered, the information is broadcast globally to all controllers on the entire system. The System Manager will also broadcast this information once every day at midnight to synchronize all the controllers on the system.

**Programming Times**

From the main menu press the “Enter” key. The following screen will appear.

- Press “1” on your keypad to access the “Set Time & Date” screens.

Although the times are displayed on the Main Screen in a standard 12-hour format, they are programmed using the 24-hour military format. If the VCM controller was configured to use its own Internal Schedules, the Occupied/Unoccupied modes are calculated on the basis of the current real time clock reading.

- **Day** Enter the Day of the Week (0 to 6) Sunday = 0
- **Hours (Hr)** Enter Hours in 24-Hour Military Format (1700 = 5:00 PM)
- **Minutes** Enter the Minutes (0 to 59)

---

**Note:** Do not use the Force OFF mode in place of setting all the week schedules to ZERO if you are using a Remote Signal for your scheduling since the Override has priority over the Remote Signal.
**Programming Date**

<table>
<thead>
<tr>
<th>Program Time/Date</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Month</strong> (1-12): xx</td>
</tr>
<tr>
<td><strong>Day</strong> (1-31): xx</td>
</tr>
<tr>
<td><strong>Year</strong> (00-99): xx</td>
</tr>
</tbody>
</table>

Month Enter the Month (1 to 12)
Day Enter the Day of the Month (1 to 31)
Year Enter the current Year with two digits (00 to 99)

After the date is programmed the Daylight Savings Time Auto Adjust Screen will be displayed. If you want the time to be automatically adjusted for daylight savings time select yes, if not select no.

Press the “2” key to access the Damper Force Modes screen.

**Damper Force Mode Screens**

If the unit ID you entered is for a VCM controller that has VAV/Zone controllers connected to its communication loop, the Damper Force Mode will act as a “Global” Damper Force Mode. That is, all VAV/Zone controllers on that VCM controllers communication loop will be forced to the same Damper Force Mode setting. If the unit ID you entered is for a VAV/Zone controller, the Damper Force Mode setting will only apply to that VAV/Zone controller.

**Damper Force Mode Screens**

<table>
<thead>
<tr>
<th>Damper Force ID 159</th>
</tr>
</thead>
<tbody>
<tr>
<td>Enter Force Mode: 0</td>
</tr>
<tr>
<td>0=Auto 1=Open 2=Clsd 3=Max 4=Min 5=Fixed</td>
</tr>
</tbody>
</table>

Set the appropriate Damper Force Mode by entering numbers 0 through 5. Following is a list of the force modes and their meaning.

- **0 = Auto**
  - This is the default setpoint. With this setting the damper will operate normally and modulate according to the controller setpoints.

- **1= Open**
  - This setting will force the dampers to their fully open position.

- **2= Clsd**
  - This setting will force the damper to its fully closed position.

- **3= Max**
  - This setting will force the damper to its Maximum Position Setpoint. See VAV/Zone controller Setpoint Screen #5 for complete setpoint information.

- **4= Min**
  - This setting will force the damper to its Minimum Position Setpoint. See VAV/Zone controller Setpoint Screen #5 for complete setpoint information.

- **5=Fixed**
  - This setting will force the damper to a fixed position based on the Fixed Position Setpoint. See VAV/Zone controller Setpoint Screen #8 for complete setpoint information.

**System Manager Instructions**

To access the Damper Force Modes from the System Manager, press the “Setpoints” key. You will then see the unit ID screen. Enter the unit ID of the controller you wish to access and press “Enter”. The following screen will appear.

press “3” on the keypad and then the “Enter” key. You will then see the unit ID screen. Enter the unit ID of the controller you wish to access and press “Enter”. At this time the password screen will be displayed. Enter your level 2 password. Press “Enter” and the damper force modes screen will be displayed.

**Modular Service Tool Instructions**

When using the Modular Service Tool simply press the “Balance-Test” key. You will then see the unit ID screen. Enter the unit ID of the controller you wish to access and press “Enter”. The following screen will be displayed.
Programming The VCM Controller

**Caution:** The Damper Force Modes should only be used by qualified service personnel. Serious damage to the ductwork could result if the dampers are all forced closed and the HVAC unit fan is operating.

**Outputs Force**

Output Force settings are available for testing or troubleshooting the system. These Force settings can only be accessed and programmed from the Modular Service Tool, the System Manager does not allow for programming of this function.

**Caution:** The Output Force settings should only be applied by qualified service personnel. Serious damage to the HVAC unit could result from improper use of these Outputs Force settings.

To access the Output Force settings simply press the “Balance-Test” key on the Modular Service Tool. You will then see the unit ID screen. Enter the unit ID of the VCM controller you wish to access and press “Enter”. The Output Force settings are only available for the VCM controller. They are not supported for the VAV/Zone controllers or other Add-on controllers. If you enter a unit ID for any other type of unit except a VCM controller the following screen will be displayed.

If you entered the unit ID of a VCM controller the following screen will be displayed.

```
Unit xxx Does Not Support The Function
Press Any Key To Continue
```

Press the “1” key to access the Outputs Force screen.

```
Supply Fan Override
Enter Override...: 0
[0=Auto 1=ON 2=OFF]
```

The first Outputs Force screen allows the AHU fan relay to be set for Auto, ON or OFF by entering a 0, 1 or 2 as desired. The default setting is 0=Auto. After completion of all troubleshooting or testing procedures all relays should be changed back to this setting. The 1=ON setting will force the relay to the ON (energized) position. The 2=OFF selection will force the relay to the OFF (de-energized) position.

The next screen displays the Relay Overrides for Relay 2. After pressing the "Enter" key the next relay will be displayed. All 20 Relay Override screens (including the AHU fan relay) are available by pressing the "Enter" key after each setting is made.

```
Relay Overrides
Relay 2 Override: 0
[0=Auto 1=ON 2=OFF]
```

After the screen for relay 21 is displayed, the first Analog Output Override screen will be displayed.

```
Economizer Overrides
Analog Output #1
Override Volts: -1.0
[-1.0=Auto]
```

The default setting for normal operation is -1.0 volts. Voltages between 0 to 10.0 can be set for any of the Analog Output Overrides. Press “Enter” after making a setting change and the next Analog Output Override screen will be displayed.

```
Supply VFD Override
Analog Output #2
Override Volts: -1.0
[-1.0=Auto]
```

```
Exhaust VFD Override
Analog Output #3
Override Volts: -1.0
[-1.0=Auto]
```

Analog Output 4 Screen

Mod Heating Override
Analog Output #4
Override Volts: -1.0
[-1.0=Auto]

Analog Output 5 Screen

Mod Cooling Override
Analog Output #5
Override Volts: -1.0
[-1.0=Auto]

Analog Output 6 Screen

RA Damper Override
Analog Output #6
Override Volts: -1.0
[-1.0=Auto]

Analog Output 7 Screen

RA Bypass Override
Analog Output #7
Override Volts: -1.0
[-1.0=Auto]
Technical Guide

Programming The VCM Controller

Status

The VCM controller status screens are accessed by pressing the “Status” button on either the System Manager or the Modular Service Tool. Following are the available status screens and a description of their functions.

Status Screen 1

VCM v1.00 ID 59
Occupied Mode
Venting Mode
03/10/05 5:00 PM

Line 2
Line displays one of the following:
Unoccupied Mode  Remote FRC Occupied
Occupied Mode  Override Mode
Holiday Mode  Zone Demand!
Forced Schedule Mode  OUTPUT FORCE MODE!
SUPPLY AIR CUTOFF!  High CO2 Level Mode!

Line 3
If you selected Supply Air as the controlling sensor, this line will display:
Supply Air Control

If you select Space Temp or Return Air Control the display will show one of the following:
Venting Mode  Cooling Mode
Heating Mode  Dehumidify Mode

Status Screen 2

VCM v1.00 ID 59
Cooling Enabled
Heating Enabled
Economizer Disabled

Line 2
Line displays one of the following:
Cooling Enabled
Cooling Disabled

Line 3
Line displays one of the following:
Heating Enabled
Heating Disabled

Line 4
Line displays one of the following:
Economizer Enabled
Economizer Disabled

Status Screen 3

VCM v1.00 ID 59
Enable Tmp : xx.x°F
Cooling Spt: xx.x°F
Heating Spt: xx.x°F

Line 2
Mode Enable Temperature
Can be the Supply Air Temperature, Return Air Temperature, Outdoor Air Temperature or Space Temperature depending on which one has been configured as the Mode Enable Sensor.

Line 3
Mode Cooling Setpoint
Based on the current Occupied / Unoccupied Mode of operation.

Line 4
Mode Heating Setpoint
Based on the current Occupied/Unoccupied Mode of operation.

Status Screen 4

VCM v1.00 ID 59
SAT/Reset Source
Cooling Spt: xx.x°F
Heating Spt: xx.x°F

Line 2
Supply Air Temperature Reset Source
Can be the Return Air Temperature, Space Temperature, Fan VFD or Remote Reset Input depending on which one has been installed and configured as the Supply Air Temperature Reset Source.

Line 3
Currently Supply Air Temperature Reset for Cooling Setpoint
Based on the Occupied Mode of operation.

Line 4
Currently Active Heating Setpoint
Based on the Occupied Heating Mode of operation.
## Status Screen 5

<table>
<thead>
<tr>
<th>VCM v1.00 ID 59</th>
</tr>
</thead>
<tbody>
<tr>
<td>H/C Demand: xx.x°F</td>
</tr>
<tr>
<td>Space Tmp.: xx.x°F</td>
</tr>
</tbody>
</table>

### Line 2: Current Heating or Cooling Demand

Based on the comparison between the current HVAC Mode Enable Temperature and the HVAC Mode Heating or Cooling Setpoint Temperatures. This number is calculated by subtracting the HVAC Mode Enable Temperature from either the HVAC Mode Enable Heating Or HVAC Mode Enable Cooling Setpoint values (depending on which Mode is currently active) to arrive at this value. A positive number indicates a Cooling demand and a negative number indicates a Heating demand.

### Line 3: Current Space Temperature reading

If you are using a Space Temperature Sensor, this line will display the current Space Temperature during the Occupied or Unoccupied Mode.

### Line 4: Blank

## Status Screen 6

<table>
<thead>
<tr>
<th>VCM v1.00 ID 59</th>
</tr>
</thead>
<tbody>
<tr>
<td>Outdoor Tmp.: xx.x°F</td>
</tr>
<tr>
<td>Outdoor RH.: xx.%</td>
</tr>
<tr>
<td>Coil Tmp.....: xx.x°F</td>
</tr>
</tbody>
</table>

### Line 2: Current Outdoor Air Temperature

If an Outdoor Air Temperature Sensor has been installed and configured on the unit or an Outdoor Air Broadcast is configured on another VCM controller on the system, the Outdoor Air Temperature will appear on this line. If not this line will display a temperature that is halfway between the Cooling and Heating Lockout Setpoints.

### Line 3: Current Outdoor Air Relative Humidity

If an Outdoor Humidity Sensor has been installed and configured on the VCM, the current Outdoor Air Relative Humidity Percentage will appear on this line. If not this line will display 0%.

### Line 4: Blank

## Status Screen 7

<table>
<thead>
<tr>
<th>VCM v1.00 ID 59</th>
</tr>
</thead>
<tbody>
<tr>
<td>OA Dewpoint.: xx.x°F</td>
</tr>
<tr>
<td>Dewpoint Spt: xx.x°F</td>
</tr>
</tbody>
</table>

### Line 2: Current Calculated Outdoor Air Dewpoint Temperature

If both an Outdoor Humidity Sensor and a Outdoor Air Temperature Sensor have been installed and configured on the unit, the calculated Outdoor Air Dewpoint Temperature will appear on this line. If not, this screen display 0°F.

### Line 3: Current Outdoor Air Dewpoint Setpoint

The user adjustable Outdoor Air Dewpoint Temperature Setpoint will appear on this line.

### Line 4: Blank

## Status Screen 8

<table>
<thead>
<tr>
<th>VCM v1.00 ID 59</th>
</tr>
</thead>
<tbody>
<tr>
<td>Indoor RH.....: XXX%</td>
</tr>
<tr>
<td>Indoor RH Spt: XXX%</td>
</tr>
</tbody>
</table>

### Line 2: Current Indoor Relative Humidity Percentage

If an Indoor Humidity Sensor has been installed and configured on the unit, the current Indoor Air Relative Humidity Percentage will appear on this line. The installed Indoor Humidity Sensor can be either a Wall Mounted type or a Return Air Mounted type. If an Indoor Humidity Sensor is not installed this line will display 0%.

### Line 3: Current Indoor Relative Humidity Setpoint Percentage

This is the adjustable Indoor Air Relative Humidity Setpoint Percentage that has been set by the user.

### Line 4: Blank
Programming The VCM Controller

Status Screen 9

- VCM v1.00 ID 59
- Economizer.: xxx%
- OA Wetbulb.: xx.x°F
- CO2 Level.: XXXXPPM

Line 2  Current Economizer Open Percentage
The Economizer is optional. This shows the Outdoor Air Damper open percentage. If Economizer Control is not configured it will display 0%.

Line 3  Current  Wetbulb Temperature
The Outdoor Air Wetbulb Temperature is optional. To display the Outdoor Air Wetbulb Temperature, an Outdoor Air Temperature Sensor (or an Outdoor Air Temperature Broadcast) and a Outdoor Air Relative Humidity Sensor must be installed. If these conditions exist, this line will display the calculated Outdoor Air Wetbulb Temperature. If these conditions do not exist it will display 0°F.

Line 4  Current CO2 Level
The CO2 Level is optional. It requires a CO2 Sensor be installed and configured to display the CO2 Level. If a CO2 Sensor is not installed and configured, this line will display 0 PPM.

Status Screen 10

- VCM v1.00 ID 59
- Return Air.:xx.x°F
- Supply Air.:xx.x°F
- Supply Spt.:xx.x°F

Line 2  Current  Return Air Temperature
This sensor is optional. If a Return Air Temperature Sensor is not used it will display 0°F

Line 3  Current  Supply Air Temperature
The Supply Air Temperature Sensor is always required. If a Supply Air Temperature Sensor is not installed the VCM controller will not operate correctly and will display 0°F.

Line 4  Current  Active Supply Air Temperature Setpoint
This line displays the Active Supply Air Temperature Setpoint.

Status Screen 11

- VCM v1.00 ID 59
- MODGAS Pos.: xxx%
- MHGRV Pos.: xxx%
- [Optional Equipment]

Line 2  Current MODGAS II Heating Output Signal
Indicates the percentage of the output signal being supplied to the MODGAS II controller when you have one connected to your HVAC unit.

If you do not have a MODGAS II controller connected to your VCM controller this screen will indicate [No MODGAS Connected]

Line 3  Current MHGRV II Reheat Valve Output Signal Percentage
Indicates the percentage of the output signal being supplied to the MHGRV II controller when you have one connected to your VCM controller.

If you do not have a MHGRV II controller connected to your VCM controller, this screen will indicate [No MHGRV Connected]

Line 4  Optional Equipment
Indicates that these outputs are optional and therefore may or may not have live data to display.

Status Screen 12

- VCM v1.00 ID 59
- Mod Cooling: XXX%
- Mod Heating: XXX%
- [Optional Outputs]

Line 2  Current Modulating Cooling Output Signal Percentage
Indicates the percentage of the output signal being supplied to a Modulating Cooling device when you have configured this option for your HVAC unit. If reverse acting is configured, this percentage will be reversed. See the following examples for clarification.

Standard Operation:

<table>
<thead>
<tr>
<th>Voltage Range</th>
<th>Percentage</th>
<th>Voltage Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-10 VDC</td>
<td>0% = 0 VDC</td>
<td>100% = 10 VDC</td>
</tr>
<tr>
<td>2-10 VDC</td>
<td>0% = 2 VDC</td>
<td>100% = 10 VDC</td>
</tr>
<tr>
<td>1.5-5.0 VDC</td>
<td>0% = 1.5 VDC</td>
<td>100% = 5.0 VDC</td>
</tr>
</tbody>
</table>
Operator Interfaces

Reverse Acting Operation:

0-10 VDC  0% = 10 VDC  100% = 0 VDC
2-10 VDC  0% = 10 VDC  100% = 2 VDC

If you do not have a Modulating Cooling device connected to your HVAC unit and configured, this screen will indicate [No Mod Cool Config]

Line 3  Current Modulating Heating Output Signal Percentage
Indicates the percentage of the output signal being supplied to a Modulating Heating device when you have configured this option for your HVAC unit. If Reverse Acting operation is configured, this percentage will be Reversed. See the following example for clarification.

Standard Operation:

0-10 VDC  0% = 0 VDC  100% = 10 VDC
2-10 VDC  0% = 2 VDC  100% = 10 VDC

Reverse Acting Operation:

0-10 VDC  0% = 10 VDC  100% = 0 VDC
2-10 VDC  0% = 10 VDC  100% = 2 VDC

If you do not have a Modulating Heating device configured, this screen will indicate [No Mod Heat Config]

Line 4  Indicates That These Are Optional Outputs
These outputs may or may not have live data to display.

Status Screen 13

Status Screen 14

VCM v1.00 ID 59
Building Pr.: X.XX”
Press Output : XXX%
[Optional Outputs]

Line 2  Current Building Pressure
Indicates the current Building Pressure. This display requires the installation of a Building Pressure Sensor.

If you don’t have a Building Pressure Sensor correctly installed and wired to the controller, this line will display “0.0”.

Line 3  Current Building Pressure Output Signal Percentage
Indicates the output signal percentage being supplied to the Exhaust Fan VFD controller or Exhaust Damper Actuator when you have configured one of these options for your HVAC unit.

If you have not configured Building Pressure Control, this line will display [No Press Out Config]

Line 4  Indicates That These Are Optional Outputs
This output may or may not have live data to display.

Status Screen 15

VCM v1.00 ID 59
Return Dmp.: XXX%
Bypass Dmp.: XXX%
[Optional Equipment]

Line 2  Current Return Air Damper Signal
Indicates the current Output Signal percentage being sent to the Return Air Damper Actuator. If you haven’t configured a Return Air Bypass Damper [No Return Dmp Config] will be displayed instead.

Line 2  Current Return Air Bypass Damper Signal
Indicates the current Output Signal percentage being sent to the Return Air Bypass Damper Actuator. If you haven’t configured a Return Air Bypass Damper [No Bypass Dmp Config] will be displayed instead.

Line 4  Indicates That These Are Optional Outputs
This output may or may not have live data to display.
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Programming The VCM Controller

Status Screen 16-22

VCM v1.00 ID 59
Fan Relay: OFF
Cool Stage 1: OFF
Heat Stage 1: OFF

Line 2 - Current Supply Fan Relay status
The letters FRC will appear before the colon if this Relay is in a Force Mode. On screens 16 to 21 this line will indicate the relays use and the ON/OFF condition for that relay.
Possible options are:

- Cooling Stage: Pre-Heater
- Heating Stage: Alarm
- Warm-up Mode: Override
- Reversing Valve: Occupied
- Reheat: Economizer
- Exhaust Fan: Not Used

Line 3 - Current relay status and description of what it is configured for.
The letters FRC will indicate the relay is forced to its current condition.

Status Screen 23

VCM v1.00 ID 59
	NO ALARMS

Line 2 Blank
Line 3 Alarm Conditions. Can Be One Of The Following:

- NO SUPPLY AIR TEMP
- NO OUTDOOR AIR TEMP
- SPACE SENSOR FAILURE
- MECH COOLING FAILURE
- MECH HEATING FAILURE
- FAN PROVING ALARM
- DIRTY FILTER ALARM
- SMOKE ALARM
- LO SUPPLY AIR ALARM
- HI SUPPLY AIR ALARM
- LOW CONTROL TEMP
- HIGH CONTROL TEMP

If you press "Enter" the screen will scroll through all the active alarms.
Programming The VAV/Zone Controller

Configuration

In order to correctly setup the VAV/Zone controller you must first configure several parameters in regard to the type of system and operating parameters for the VAV/Zone controller you have installed. Most of these values are and operating parameters are only set once, at the initial system setup and are never changed.

System Manager Instructions

From any menu screen press the “Setpoint” key. The unit selection screen will appear requesting that you enter the unit ID number. Enter the correct unit ID number of the VAV/Zone controller you want to configure and hit the “Enter” key. You will see the screen shown below.

1) Change Setpoint
2) Configure Unit
3) Damper Force
ESC) Exit Menu

Press “2” on the keypad to enter the first unit configuration screen.

Modular Service Tool Instructions

From any menu screen press the “Configuration” key. The unit selection screen will appear requesting that you enter the unit ID number. Enter the correct unit ID number of the VAV/Zone controller you want to configure and hit the “Enter” key. You will then see unit configuration screen #1.

Configuration Screen #1

This Box Control code will operate in one of four possible modes:

0 = COOLING ONLY BOX
1 = H/C CHANGEOVER BOX
2 = SERIES FAN BOX
3 = PARALLEL FAN BOX

Configuration Screen #2

Enter a ‘0’ for DIRECT ACTING or a ‘1’ for REVERSE ACTING.

CAUTION: If you change this setting, you MUST cycle power to the controller to allow it to re-calibrate the damper feedback positions for its’ new direction of control!

Configuration Screen #3

HC Box Cnfg IDxxxx
Is This a Voting System: NO
[0=NO  1=YES]

If this is a Zoned System, select this option so that the CFM readings can be correctly calculated. Do not forget to remove the jumper JP2 from the box controller.

Configuration Screen #4

HC Box Cnfg IDxxxx
Is This Unit a Voting Zone: YES
[0=NO  1=YES]

If this is a Zoned System, select this option so that the unit can be included as a voting unit.

Configuration Screen #5

HC Box Cnfg IDxxxx
Pr Independent Boxes
Airflow @ 1" WG
Constant: 1200 CFM

If this is a Pressure Independent Box, you must enter this airflow constant so that the CFM readings can be correctly calculated. This airflow constant is provided by the box manufacturer and depends on the diameter of the duct.

Configuration Screen #6

HC Box Cnfg IDxxxx
Expansion Relays
[Optional]
Steps of Reheat: 2

If you require the Box Controller to control reheat for the zone it is installed in, you must include a relay expansion board and then configure the number of heating stages (1, 2 or 3) that it will be controlling whenever there is a heating demand in the space. Enter ‘0’ if you don’t require this option.
**Technical Guide**

**Programming The VAV/Zone Controller**

**Configuration Screen #7**

<table>
<thead>
<tr>
<th>HC Box Cnfg IDxxxx</th>
<th>Proportional Heating</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Signal.: 0 - 10 VDC</td>
</tr>
<tr>
<td></td>
<td>[0 = 0-10  1 = 2-10]</td>
</tr>
</tbody>
</table>

Select this option to change the range of the proportional heat output from 0-10 VDC to 2-10 VDC.

**Configuration Screen #8**

<table>
<thead>
<tr>
<th>HC Box Cnfg IDxxxx</th>
<th>Allow Box Heat With</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>AHU Heat....: NO</td>
</tr>
<tr>
<td></td>
<td>[0=NO   1=YES]</td>
</tr>
</tbody>
</table>

Set this option to 1 = YES to allow the heating relays controlling box heat to remain on even when the AHU is in Supply Air Heating Mode. This is used as a method to provide supplemental heat if for some reason the AHU heat cannot satisfy the heating demand.

**Configuration Screen #9**

<table>
<thead>
<tr>
<th>HC Box Cnfg IDxxxx</th>
<th>This Unit Needs Main</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Fan Status...: NO</td>
</tr>
<tr>
<td></td>
<td>[0=NO   1=YES]</td>
</tr>
</tbody>
</table>

This setting only applies to the unoccupied mode of operation. Select 1=YES to activate the heating stages only when the main fan is operating on non fan terminal units. For series fan terminal units if this setting is set to 1=YES the series box fan will only run when the main HVAC unit fan is running or when a space heating demand is made. For series fan terminal units if this setting is set to 0=NO the series box fan will only run when a space heating demand is made. This setting has no effect on the parallel flow fan terminal unit.

**Configuration Screen #10**

<table>
<thead>
<tr>
<th>HC Box Cnfg IDxxxx</th>
<th>Push-Button Override</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Group ID #: 1</td>
</tr>
</tbody>
</table>

During Unoccupied Mode, all zones with a corresponding Group ID # will resume Occupied operation whenever any of the zones in that group has its push-button depressed to initiate an override condition. This allows you to group zones in various areas of the building. For example, individual tenants with several offices could restore occupied mode for just their zones and not affect other zones in the building.

If you don’t want a specific zone to be a part of any group, enter a ‘0’ for its Group ID #.

**Configuration Screen #11**

<table>
<thead>
<tr>
<th>HC Box Cnfg IDxxxx</th>
<th>Is This A Dump Zone</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(No Actuator): NO</td>
</tr>
<tr>
<td></td>
<td>[0=NO   1=YES]</td>
</tr>
</tbody>
</table>

A “Dump Zone” is used when you want to control a duct heater or baseboard heater independently. A VAV/Zone Controller board with a relay expansion board is used for this purpose. No damper or actuator is used. If you need to control an auxiliary heater select 1=YES otherwise be sure it is set to 0=NO.
Setpoints

**Setpoint Screen #1**

Enter the Occupied Cooling Setpoint as the maximum temperature you would like the zone to reach before modulating the damper open to bring in more cool air to cool the space. Enter the Occupied Heating Setpoint as the minimum temperature you would like the zone to reach before activating the Reheat Stages on the optional Expansion Relay board. If this is a Cooling Only box that doesn’t contain reheat, this setpoint will be ignored.

<table>
<thead>
<tr>
<th>Description</th>
<th>Minimum</th>
<th>Default</th>
<th>Maximum</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cooling Spt</td>
<td>50°F</td>
<td>74°F</td>
<td>90°F</td>
</tr>
<tr>
<td>Heating Spt</td>
<td>50°F</td>
<td>70°F</td>
<td>90°F</td>
</tr>
</tbody>
</table>

**Setpoint Screen #2**

During unoccupied hours, the Occupied Cooling Setpoint is adjusted up by the amount entered for the Cooling SetUp. The Occupied Heating Setpoint is adjusted down by the amount entered for the Heating SetBk.

<table>
<thead>
<tr>
<th>Description</th>
<th>Minimum</th>
<th>Default</th>
<th>Maximum</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cooling SetUp</td>
<td>0°F</td>
<td>+10°F</td>
<td>+30°F</td>
</tr>
<tr>
<td>Heating SetBk</td>
<td>0°F</td>
<td>-10°F</td>
<td>-30°F</td>
</tr>
</tbody>
</table>

**Setpoint Screen #3**

This setpoint allows the user to set a Space Temperature that will cause the Box Controller to send a call for heat to the HVAC unit.

<table>
<thead>
<tr>
<th>Description</th>
<th>Minimum</th>
<th>Default</th>
<th>Maximum</th>
</tr>
</thead>
<tbody>
<tr>
<td>AHU Heat Call</td>
<td>50°F</td>
<td>70°F</td>
<td>90°F</td>
</tr>
</tbody>
</table>

**Setpoint Screen #4**

The Box Controller normally opens its damper based on a Proportional Error from Setpoint. That means if the zone temperature is 4°F from setpoint, the damper would be 100% open or it would be modulating to provide the Maximum CFM on Pressure Independent boxes. If the error is less than 4°F, the damper may stagnate at that position and never satisfy the zone. If you add Integral into the damper calculation process, this will cause the damper or airflow calculations to continue to increase as long as the zone temperature is still above the setpoint. That means it can provide 100% or Maximum CFM before the 4°F error is achieved, bringing the zone under control faster than it normally would. Start with a small (5 or 10) value, if you use this, and monitor the effect it has. If you enter too large a value, you can create “hunting” situations that can cause the damper actuator to prematurely wear out.

<table>
<thead>
<tr>
<th>Description</th>
<th>Minimum</th>
<th>Default</th>
<th>Maximum</th>
</tr>
</thead>
<tbody>
<tr>
<td>Integral</td>
<td>0</td>
<td>0</td>
<td>100</td>
</tr>
</tbody>
</table>

**Setpoint Screen #5**

The Box Controller will not allow the damper or airflow calculation to exceed the Maximum setpoint while it is allowing the damper to modulate. During Vent mode when there is no heating or cooling demand, the damper or airflow will maintain at least the Vent Min amount of airflow into the zone for ventilation.

<table>
<thead>
<tr>
<th>Description</th>
<th>Minimum</th>
<th>Default</th>
<th>Maximum</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maximum</td>
<td>0% or 0 CFM</td>
<td>100% or 1000 CFM</td>
<td>100% or 30000 CFM</td>
</tr>
<tr>
<td>Vent Min.</td>
<td>0% or 0 CFM</td>
<td>25% or 250 CFM</td>
<td>100% or 30000 CFM</td>
</tr>
</tbody>
</table>
During Supply Air Cooling Mode if the space being served by this damper is satisfied and has no cooling demand the damper will close to this Cool Min setting. This provides a minimum amount of airflow into the space for ventilation, even if the space does not require additional cooling. During Supply Air Heating Mode if the space being served by this damper is satisfied and has no heating demand the damper will close to this Heat Min setting. This provides a minimum amount of airflow into the space for ventilation, even if the space does not require additional heating.

<table>
<thead>
<tr>
<th>Description</th>
<th>Minimum</th>
<th>Default</th>
<th>Maximum</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cool Min</td>
<td>0% or 0 CFM</td>
<td>10% or 100 CFM</td>
<td>100% or 30000 CFM</td>
</tr>
<tr>
<td>Heat Min</td>
<td>0% or 0 CFM</td>
<td>10% or 100 CFM</td>
<td>100% or 30000 CFM</td>
</tr>
</tbody>
</table>

The Nt/Rh Min is the position the damper will move to when the system is in Override Mode and this particular damper is not part of the override group. This Nt/Rh Min position only affects non-fan powered boxes.

The Fan On Min is used for Parallel Fan boxes only. This is the damper position that will cause the Parallel Fan to start if the damper/airflow drops below this value. Normally the Parallel Fan only operates when the Reheat stages are activated. If this is not a Parallel Fan box, the last line will remain blank. Series Fan boxes are not affected by this setting as the fan is always on anytime the HVAC unit fan is running.

<table>
<thead>
<tr>
<th>Description</th>
<th>Minimum</th>
<th>Default</th>
<th>Maximum</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nt/Rh Min</td>
<td>0% or 0 CFM</td>
<td>0% or 0 CFM</td>
<td>100% or 30000 CFM</td>
</tr>
<tr>
<td>Fan On Min</td>
<td>0% or 0 CFM</td>
<td>0% or 250 CFM</td>
<td>100% or 30000 CFM</td>
</tr>
</tbody>
</table>

Many times while troubleshooting a system, it is useful to have the zone damper set to a specific damper position or airflow setting. This setpoint can be used to determine where the damper/airflow will remain when the box controller receives a Force to Fixed Position command from the user.

<table>
<thead>
<tr>
<th>Description</th>
<th>Minimum</th>
<th>Default</th>
<th>Maximum</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fixed Pos</td>
<td>0% or 0 CFM</td>
<td>0% or 0 CFM</td>
<td>100% or 30000 CFM</td>
</tr>
</tbody>
</table>

The VAV Box Controller can be setup to generate an alarm anytime the Zone Temperature exceeds the user defined alarm limits for a user defined period of time. A High Temperature Alarm Setpoint is created by adding the Hi Zone Alarm offset to the current Cooling Setpoint. The Low Temperature Alarm Setpoint is created by adding the Lo Zone Alarm offset to the current Heating Setpoint. If the zone temperature exceeds either of these limits for a period defined by the Alarm Delay setpoint, the controller can generate an alarm callout if all the options required for this to occur are installed.

<table>
<thead>
<tr>
<th>Description</th>
<th>Minimum</th>
<th>Default</th>
<th>Maximum</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hi Zone Alarm</td>
<td>+1°F</td>
<td>-30°F</td>
<td>+50°F</td>
</tr>
<tr>
<td>Lo Zone Alarm</td>
<td>-1°F</td>
<td>-30°F</td>
<td>-50°F</td>
</tr>
</tbody>
</table>

As mentioned above, if the user configures the controller to generate zone temperature alarms, this is the amount of time the temperature must be outside the alarm limits before an alarm is generated.

<table>
<thead>
<tr>
<th>Description</th>
<th>Minimum</th>
<th>Default</th>
<th>Maximum</th>
</tr>
</thead>
<tbody>
<tr>
<td>Out Of Limits</td>
<td>1 Min</td>
<td>30 Min</td>
<td>300 Min</td>
</tr>
</tbody>
</table>
**Setpoint Screen #11**

This screen allows you to set the VAV/Zone controller to operate on a remote schedule instead of the schedule that is contained in the VCM controller.

<table>
<thead>
<tr>
<th>Description</th>
<th>Minimum</th>
<th>Default</th>
<th>Maximum</th>
</tr>
</thead>
<tbody>
<tr>
<td>Schedule Number</td>
<td>0</td>
<td>0</td>
<td>1 to 7</td>
</tr>
</tbody>
</table>

**Setpoint Screen #12**

If the Flush Mount Wall Sensor has the optional Setpoint Slide Adjust, this is the maximum amount the user can adjust the heating and cooling setpoints up or down as the slide is moved from the center position to its full up or down position.

<table>
<thead>
<tr>
<th>Description</th>
<th>Minimum</th>
<th>Default</th>
<th>Maximum</th>
</tr>
</thead>
<tbody>
<tr>
<td>Effect on SP</td>
<td>0°F</td>
<td>0°F</td>
<td>6°F</td>
</tr>
</tbody>
</table>

**Setpoint Screen #13**

If the Flush Mount Wall Sensor has the optional Push-Button Override, this is the amount of the Box Controller will resume using its Occupied Setpoints during unoccupied mode. This will generate a call for the Air Handler to start its fan and provide heating or cooling, depending on how the user configures the Air Handler.

<table>
<thead>
<tr>
<th>Description</th>
<th>Minimum</th>
<th>Default</th>
<th>Maximum</th>
</tr>
</thead>
<tbody>
<tr>
<td>Duration</td>
<td>0.0 Hr</td>
<td>0.0 Hr</td>
<td>8.0 Hr</td>
</tr>
</tbody>
</table>

**Setpoint Screen #14**

This screen is currently not used for this application.

<table>
<thead>
<tr>
<th>Description</th>
<th>Minimum</th>
<th>Default</th>
<th>Maximum</th>
</tr>
</thead>
<tbody>
<tr>
<td>EMS Setpoint</td>
<td>x</td>
<td>x</td>
<td>x</td>
</tr>
</tbody>
</table>

**Setpoint Screen #15**

The Thermistor Type III sensor readings can be calibrated. Enter a Positive value to increase a reading and a Negative value to decrease a reading.

**Note:** The Supply Air Temperature calibration offset only operates on the reading when the Box Controller has its own Supply Air Temperature sensor installed on the AUX2 input. If the supply temperature is received from a global broadcast, you will need to go to the air handler to calibrate the temperature reading.

<table>
<thead>
<tr>
<th>Description</th>
<th>Minimum</th>
<th>Default</th>
<th>Maximum</th>
</tr>
</thead>
<tbody>
<tr>
<td>SPC [Space Temp]</td>
<td>-100.0°F</td>
<td>0.0°F</td>
<td>+100.0°F</td>
</tr>
<tr>
<td>SAT [Supply Air]</td>
<td>-100.0°F</td>
<td>0.0°F</td>
<td>+100.0°F</td>
</tr>
</tbody>
</table>
Programming The VAV/Zone Controller

Status

Status Screen #1

<table>
<thead>
<tr>
<th>HC Box v1.04 IDxxxx</th>
</tr>
</thead>
<tbody>
<tr>
<td>Occupied Mode</td>
</tr>
<tr>
<td>Vent Mode</td>
</tr>
<tr>
<td>Belongs to Group # 1</td>
</tr>
</tbody>
</table>

Line 2 Unoccupied Mode
Occupied Mode
Override Mode
Override Pending
Damper Calibration
Remote Signal ON
Group Override
Line 3 OFF Mode
Vent Mode
Cooling Mode
Heating Mode
Sensor Fail Mode
Line 4 Belongs to Group # xx
No Group Affiliation

Status Screen #2

<table>
<thead>
<tr>
<th>HC Box v1.04 IDxxxx</th>
</tr>
</thead>
<tbody>
<tr>
<td>Zone Temp.: xx.x°F</td>
</tr>
<tr>
<td>Cooling Spt: xx.x°F</td>
</tr>
<tr>
<td>Heating Spt: xx.x°F</td>
</tr>
</tbody>
</table>

Line 2 Current Zone Temperature
Line 3 Currently active Cooling Setpoint based on the current Occupied / Unoccupied mode of operation.
Line 4 Currently active Heating Setpoint based on the current Occupied / Unoccupied mode of operation.

Status Screen #3

<table>
<thead>
<tr>
<th>HC Box v1.04 IDxxxx</th>
</tr>
</thead>
<tbody>
<tr>
<td>SlideOffset: xx.x°F</td>
</tr>
<tr>
<td>H/C Demand.: xx.x°F</td>
</tr>
</tbody>
</table>

Line 2 If the optional Setpoint Slide Adjust is installed on the Flush Mount Wall Sensor, this line will display the current amount the Slide Offset is affecting the Heating and Cooling Setpoints.
Line 3 Current Heating or Cooling Demand in the Zone based on the current Heating and Cooling Setpoints when compared to the current Zone Temperature.
Line 4 Blank

Status Screen #4

<table>
<thead>
<tr>
<th>HC Box v1.04 IDxxxx</th>
</tr>
</thead>
<tbody>
<tr>
<td>Supply Air: xx.x°F</td>
</tr>
<tr>
<td>Box Air.: xx.x°F</td>
</tr>
</tbody>
</table>

Line 2 Current Supply Air Temperature received via broadcast from the DX Air Handler or from the Box Controllers own installed Box Air Temperature Sensor connected to the AUX input of the VAV/Zone Controller board.
Line 3 Current Box Air Temperature.
If you have configured the VCM Controller to broadcast the Supply Air Temperature to the VAV/Zone controller and don’t have a Box Air Temperature Sensor attached to the AUX input on the VAV/Zone controller board, this line will display the Supply Air Temperature the same as line 2.
If you have a Box Air Temperature Sensor attached to the AUX input on the VAV/Zone controller board, this line will display the Box Air Temperature at the location where the Box Air Temperature Sensor is installed.
Line 4 Blank
Status Screen #5

**HC Box v1.04 IDxxxx**
Damper FRC: xxx %
Airflow : xxxx CFM
Desired : xxxx CFM

**Line 2**  Current Zone Damper Position If the user has entered a FORCE command, the letters FRC will appear. If this is normal damper operation, the FRC is not displayed.

**Line 3**  If this is a Pressure Independent box, the current Airflow will be displayed. If not, this line will display the desired damper position.

**Line 4**  If this is a Pressure Independent box, this line will display the Desired CFM the box would like to provide to the zone. If not, this line will display [Controls to +/- 3%] to indicate how accurately the damper will maintain the desired position.

Status Screen #6

**HC Box v1.04 IDxxxx**
Fan Status : OFF
Heating Relay#1: OFF
Heating Relay#2: OFF

**Line 2**  If this is a Fan Powered box, this line will display the Fan On/Off Status. On non fan powered boxes, this line will display: Exp Relay 1 Not Used

**Line 3**  If your VAV Box Controller has been configured to control reheat stages, this line reflects the On/Off Status of the first stage of Reheat. If proportional heating is used this line will display **“Heating Signal: xxx %”**. If you have 3 stages of reheat this line will display the total number of active heating stages.

Example:
“1 Reheat Stages On” or
“2 Reheat Stages On” or
“3 Reheat Stages On”

**Line 4**  If your VAV Box Controller has been configured to control reheat stages, this line reflects the On/Off Status of the second stage of Reheat. If you have 3 stages of reheat as explained on line 2, this line will be blank.

Status Screen #7

**HC Box v1.04 IDxxxx**
NO ALARMS!

**Line 2**  Blank

**Line 3**  NO ALARMS!

This is displayed if no alarms are detected. If there are one or more alarms active, the possible messages are shown below:

- **SPACE SENSOR FAILURE**
- **CFM SENSOR FAILURE**
- **DAMPER OPENING ALARM**
- **DAMPER CLOSING ALARM**
- **HI SPACE TEMP ALARM**
- **LO SPACE TEMP ALARM**
- **DPR SPACE TEMP ALARM**
- **DPR FEEDBACK FAILURE**

**Line 4**  Blank

**Damper Force Modes**

Damper Force Modes are available for testing or balancing the system. These Force Modes can be accessed and programmed from either the System Manager or the Modular Service Tool.

**System Manager Instructions**

To access the Damper Force Modes from the System Manager, press the “Setpoints” key. You will then see the unit ID screen. Enter the unit ID of the controller you wish to access and press “Enter”. The following screen will appear.

1) Change Setpoint
2) Configure Unit
3) Damper Force
ESC) Exit Menu

Press “3” on the keypad and then the “Enter” key. You will then see the unit ID screen. Enter the unit ID of the controller you wish to access and press “Enter”. At this time the password screen will be displayed. Enter your level 2 password. Press “Enter” and the damper force modes screen will be displayed.
Press the “2” key to access the Damper Force Modes screen. Outputs Force is not available with the System Manager.

**Modular Service Tool Instructions**

When using the Modular Service Tool simply press the “Balance-Test” key. You will then see the unit ID screen. Enter the unit ID of the controller you wish to access and press “Enter”. The damper force modes screen will be displayed.

Press the “2” key to access the Damper Force Modes screen. Outputs Force is available with the Modular Service Tool but is not used with the VAV/Zone controller.

**Damper Force Mode Screens**

If the unit ID you entered is for a VCM controller that has VAV/Zone controllers connected to its communication loop, the Damper Force Mode will act as a “Global” Damper Force Mode. That is, all VAV/Zone controllers on that VCM controllers communication loop will be forced to the same Damper Force Mode setting. If the unit ID you entered is for a VAV/Zone controller, the Damper Force Mode setting will only apply to that VAV/Zone controller.

Set the appropriate Damper Force Mode by entering numbers 0 through 5. The Force Modes for each of these settings is outlined below.

<table>
<thead>
<tr>
<th>Force Mode</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>0=Auto</td>
<td>This is the default setpoint. With this setting the damper will operate normally and modulate according to the controller setpoints.</td>
</tr>
<tr>
<td>1=Open</td>
<td>This setting will force the dampers to their fully open position.</td>
</tr>
<tr>
<td>2=Clsd</td>
<td>This setting will force the damper to it’s fully closed position.</td>
</tr>
<tr>
<td>3=Max</td>
<td>This setting will force the damper to the dampers maximum airflow position set under Setpoint Screen #4</td>
</tr>
<tr>
<td>4=Min</td>
<td>This setting will force the damper to the current modes, minimum position setpoint. These modes are Vent Mode, Heat Mode and Cool Mode. They may each have a different minimum depending on how you configured the setpoints.</td>
</tr>
<tr>
<td>5=Fixed</td>
<td>This setting will force the damper to a fixed position based on the fixed position setpoint. See VAV/Zone controller Setpoint Screen #7 for available setpoint information.</td>
</tr>
</tbody>
</table>

**Caution:** The Damper Force Modes should only be used by qualified service personnel. Serious damage to the ductwork could result if the dampers are all forced closed and the HVAC unit fan is operating.
Programming The MiniLink PD

Configuration

In order to correctly setup the MiniLink PD you must first configure several parameters in regard to the type of system and operating parameters for the system it is installed on. Most of these values and operating parameters are only set once, at the initial system setup and are never changed.

System Manager Instructions

From any menu screen press the “Setpoint” key. The unit selection screen will appear requesting that you enter the unit ID number. All MiniLink PDs are set at address 60. Enter the correct unit loop number for the loop the MiniLink Polling Device is connected to (Loop 1 you would enter 1) and then enter 60. Press the “Enter” key. You will see the screen shown below.

Press “2” on the keypad to enter the first unit configuration screen.

Modular Service Tool Instructions

From any menu screen press the “Configuration” key. The unit selection screen will appear requesting that you enter the unit ID number. Enter the correct unit ID number of the controller you want to configure and hit the “Enter” key. You will then see unit configuration screen #1.

Configuration Screen #1

This screen allows you to select whether you want the system to behave as a VAV system or a Zoning System. If you select VAV this will allow tenant logging for your VAV system.

Configuration Screen #2

This zone is the last zone on the local loop of your zoning system that is to be included in zone voting.

Configuration Screen #3

This is the amount of time that you want to allow between changeover from heating to cooling modes.

Configuration Screen #4

This is the unit ID of the Zone that you want to be satisfied by the normally scheduled start time. If you enter “-1” into this box it will average all zones instead of picking a specific zone. If you do not require optimal start enter “0”.

Configuration Screen #5

Disabling the Maverick Testing allows known troubled zone(s) to continue voting without causing a Maverick alarm. In other words, all zones are included in the voting regardless of whether they are more than four degrees from setpoint or not.

Configuration Screen #6-65

Enabling Alarm Polling allows any alarm from the loop to be polled. You must set this for each controller on the loop.
Programming The MiniLink PD

Status

Status Screen #1

<table>
<thead>
<tr>
<th>Line 2</th>
<th>Current Schedule Mode</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Can be System Occupied or System Unoccupied</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Line 3</th>
<th>Currently System Status</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Can be Vent Mode, Cooling Mode or Heat Mode</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Line 4</th>
<th>Minutes Left In Mode</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>The number of minutes left in the current mode of operation before it can switch modes. This value is user adjustable. See Configuration Screen #3.</td>
</tr>
</tbody>
</table>

Status Screen #2

<table>
<thead>
<tr>
<th>Polling Device</th>
</tr>
</thead>
<tbody>
<tr>
<td>System Occupied</td>
</tr>
<tr>
<td>Venting Mode</td>
</tr>
<tr>
<td>XXX Min Left in Mode</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Line 2</th>
<th>Mode Priority</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Can be Heat Priority or Cool Priority. This is based on the voting zones and their demand.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Line 3</th>
<th>Cool Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Total cooling temperature demand from all zones</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Line 4</th>
<th>Heat Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Total heating temperature demand from all zones</td>
</tr>
</tbody>
</table>