WattMaster VAV System
Operator Interfaces
Technical Guide
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Introduction

Modular Service Tool

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 straightforward, 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 (1.5V) 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 WattMaster VAV controller with an 8 pin DIN connector socket by simply plugging in the service tool to the socket on the controller. An adapter is also provided to allow connection to the 3 pin communications terminal block on controllers which do not have the 8 pin DIN connector.

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

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 WattMaster VAV 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 straightforward, 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 WattMaster VAV Systems, the Modular System Manager is wired to the communications and power loop of the system via a pigtail cable with modular connectors on one end and stripped wire ends on the other that is provided with the System Manager. This pigtail cable allows the user to setup and program any WattMaster VAV controller with a 8 pin DIN connector socket by simply plugging in the service tool to the socket on the controller. An adapter is also provided to allow connection to the 3 pin communications terminal block on controllers which do not have the 8 pin DIN connector.

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.
Technical Guide

System Connections

Modular Service Tool

Whether you have a Stand Alone, Interconnected or Networked 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](image)

- Be sure the Modular Service Tool is connected to the supplied power pack or has fresh batteries installed before attempting programming of the controller.
- Be sure the power is turned off on the Modular Service Tool before connecting the cable to the controller.

The Modular Service Tool can be connected to most controllers by plugging one end of the supplied cable into the Modular Service Tool DIN connector and the other end into the DIN connector on the controllers. Some controllers without DIN connectors require use of the supplied PL101904 adapter board shown above. To connect with adapter board, first unplug COMM terminal block from controller board. Plug PL101904 adapter board terminal end into terminal block base on controller. Plug DIN connector cable into DIN connector on PL101904 adapter board. See optional connection for controllers without DIN connector above for illustration of this connection.
Modular System Manager

Power and communications are supplied to the System Manager via a modular/pigtail cable that is supplied with the System Manager. This cable has a male Molex connector on one end for connection to the female Molex connector on the System Manager. On the other end are 5 insulated wires with a drain wire which are used for connection to the communication and power wiring from the transformer and from the local loop communications terminal on the WMVAV controller or any VAVBOX controller’s communication terminal. A class II, 24 VAC transformer (by others) rated at 6 VA or greater load capacity is required for powering the System Manager.

See Figure 4 & 5 for System Manager connection and wiring details.
Operator Interfaces Comparison

In order to configure and program the WattMaster VAV System controllers you must have a central operators interface or a personal computer with the Prism computer front end software installed. Two different central operators interfaces are available for programming of the WattMaster VAV 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.

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>
<th>System Manager</th>
<th>Modular Service Tool</th>
</tr>
</thead>
<tbody>
<tr>
<td>ESC</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</td>
<td>Same function as System Manager</td>
<td></td>
</tr>
<tr>
<td>ENTER</td>
<td>This key is used to close a data entry field and advance to the next item or screen</td>
<td>Same function as System Manager</td>
<td></td>
</tr>
<tr>
<td>Clear</td>
<td>If a data entry mistake is made, press this key to clear the data entry field and start over</td>
<td>Same function as System Manager but also turns off the power to the Service Tool when on the main menu screen</td>
<td></td>
</tr>
<tr>
<td>Minus</td>
<td>If a setpoint with a negative value is required, press this key for the minus sign</td>
<td>Same function as System Manager</td>
<td></td>
</tr>
<tr>
<td>DEC</td>
<td>Press this key when entering data that requires a decimal point</td>
<td>Same function as System Manager</td>
<td></td>
</tr>
<tr>
<td>PREV NEXT</td>
<td>Steps the user to the next controller on the loop on interconnected or networked systems</td>
<td>Same function as System Manager</td>
<td></td>
</tr>
<tr>
<td>UP DOWN</td>
<td>Steps the user backward or forward through the screens</td>
<td>Same function as System Manager</td>
<td></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.
### 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. Put in the ID of the controller you wish to communicate with then press the “ENTER” key.

If this is a Multiple Loop Network System, 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.

**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. On a Networked System, all controllers on the communications loop are available for programming by entering their loop address (ID).

If the System Manager is configured for Stand-Alone operation, only the HVAC unit controller that the System Manager is connected to is available for programming. The Stand-Alone feature is only used for servicing and testing. For normal operation, the System Manager must be configured for Network mode.

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### Operator Interfaces

<table>
<thead>
<tr>
<th>Button Description</th>
<th>Mode Selection Buttons</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>STATUS</strong></td>
<td>Modular Service Tool</td>
</tr>
<tr>
<td></td>
<td>Pressing this button</td>
</tr>
<tr>
<td></td>
<td>takes you directly to</td>
</tr>
<tr>
<td></td>
<td>the controller</td>
</tr>
<tr>
<td></td>
<td>“Status” screens</td>
</tr>
<tr>
<td></td>
<td>System Manager</td>
</tr>
<tr>
<td></td>
<td>Pressing this button</td>
</tr>
<tr>
<td></td>
<td>takes you directly to</td>
</tr>
<tr>
<td></td>
<td>the controller</td>
</tr>
<tr>
<td></td>
<td>“Status” screens</td>
</tr>
<tr>
<td><strong>SETPOINTS</strong></td>
<td>Modular Service Tool</td>
</tr>
<tr>
<td></td>
<td>Pressing this button</td>
</tr>
<tr>
<td></td>
<td>takes you directly to</td>
</tr>
<tr>
<td></td>
<td>the controller</td>
</tr>
<tr>
<td></td>
<td>“Setpoints” screens</td>
</tr>
<tr>
<td></td>
<td>System Manager</td>
</tr>
<tr>
<td></td>
<td>Pressing this button</td>
</tr>
<tr>
<td></td>
<td>takes you directly to</td>
</tr>
<tr>
<td></td>
<td>the controller</td>
</tr>
<tr>
<td></td>
<td>“Setpoints” screens</td>
</tr>
<tr>
<td><strong>SCHEDULES</strong></td>
<td>Modular Service Tool</td>
</tr>
<tr>
<td></td>
<td>Pressing this button</td>
</tr>
<tr>
<td></td>
<td>takes you directly to</td>
</tr>
<tr>
<td></td>
<td>the controller</td>
</tr>
<tr>
<td></td>
<td>“Schedules” screens</td>
</tr>
<tr>
<td></td>
<td>System Manager</td>
</tr>
<tr>
<td></td>
<td>Pressing this button</td>
</tr>
<tr>
<td></td>
<td>takes you directly to</td>
</tr>
<tr>
<td></td>
<td>the controller</td>
</tr>
<tr>
<td></td>
<td>“Schedules” screens</td>
</tr>
<tr>
<td><strong>OVERRIDES</strong></td>
<td>Modular Service Tool</td>
</tr>
<tr>
<td></td>
<td>Pressing this button</td>
</tr>
<tr>
<td></td>
<td>takes you directly to</td>
</tr>
<tr>
<td></td>
<td>the controller</td>
</tr>
<tr>
<td></td>
<td>“Overrides” screen</td>
</tr>
<tr>
<td></td>
<td>System Manager</td>
</tr>
<tr>
<td></td>
<td>Pressing this button</td>
</tr>
<tr>
<td></td>
<td>takes you directly to</td>
</tr>
<tr>
<td></td>
<td>the controller</td>
</tr>
<tr>
<td></td>
<td>“Overrides” screen</td>
</tr>
<tr>
<td><strong>ALARMS</strong></td>
<td>Modular Service Tool</td>
</tr>
<tr>
<td></td>
<td>Pressing this button</td>
</tr>
<tr>
<td></td>
<td>takes you directly to</td>
</tr>
<tr>
<td></td>
<td>the controller</td>
</tr>
<tr>
<td></td>
<td>“Alarms” screen</td>
</tr>
<tr>
<td></td>
<td>System Manager</td>
</tr>
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<td></td>
<td>Pressing this button</td>
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<tr>
<td></td>
<td>takes you directly to</td>
</tr>
<tr>
<td></td>
<td>the controller</td>
</tr>
<tr>
<td></td>
<td>“Alarms” screen</td>
</tr>
<tr>
<td><strong>CONFIGURATION</strong></td>
<td>Modular Service Tool</td>
</tr>
<tr>
<td></td>
<td>Pressing this button</td>
</tr>
<tr>
<td></td>
<td>takes you directly to</td>
</tr>
<tr>
<td></td>
<td>the controller</td>
</tr>
<tr>
<td></td>
<td>“Configuration” screens</td>
</tr>
<tr>
<td></td>
<td>System Manager</td>
</tr>
<tr>
<td></td>
<td>Not Available</td>
</tr>
<tr>
<td></td>
<td>Use “Setpoints” Button To Access Menu</td>
</tr>
<tr>
<td><strong>BALANCE-TEST</strong></td>
<td>Modular Service Tool</td>
</tr>
<tr>
<td></td>
<td>Pressing this button</td>
</tr>
<tr>
<td></td>
<td>takes you directly to</td>
</tr>
<tr>
<td></td>
<td>the controller</td>
</tr>
<tr>
<td></td>
<td>“Balance-Test” screens</td>
</tr>
<tr>
<td></td>
<td>System Manager</td>
</tr>
<tr>
<td></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.
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 NM (Network Mode). If you have only one System Manager, the system must be set for NM (Network Mode). If you 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.

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

As previously described the System Manager must be configured for the correct mode of operation for your system. Again, there are 3 modes of operation available for the WattMaster VAV 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 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 you have multiple System Managers on your system then you need to operate in “Multiple MGRS Mode” and the first two characters on the bottom line of the display should be “MM”. The System Manager should never be set to “Stand-Alone” mode unless you have been instructed to configure this setting by WattMaster Technical Support.

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

For “Stand Alone Mode” enter “0”.

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.

SEARCHING!

After the System Manager completes its 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.

Alarm Search Screen
Loop = 1 Unit = 59
Space Sensor Failure

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 VAVBOX controller or WMVAV controller, the System Manager can determine and report any controllers which are currently operating in an override condition. 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.

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 previous or next button to scroll through all units that are in the Override Mode.

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.

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 or changing the Time, Date, Operating Schedules and Heating and Cooling Setpoints. 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.

From the main status screen press "Enter", The following screen will appear.

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

This screen allows you to enter new Level 1 or Level 2 passcodes. The actual digits in your passcodes are never displayed. An “X” is used as a place holder for each digit entered. Passcodes must always be four digits in length, so the usable range of numbers is 1000 to 9999.

Caution: If you change the Level 2 passcode and cannot remember what it is, you will be locked out of your system!

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.

![Service Tool vX.XX
Monday Operations
09/09/02 04:26 PM
Stand Alone Mode](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. Normally for most applications the words “Network Mode” should be displayed in the window. If it has been configured for Stand Alone mode you will see the words “Stand Alone Mode” on the bottom line of the display. Stand Alone Mode is only used when servicing or troubleshooting and is normally not used for general setup and programming as it only allows the user to access the controller it is attached to and not the entire networked system.

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

![1) Set Time & Date
2) Communications
3) Energy Saving
ESC) Exit Menu](image)

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

![0) Stand Alone
1) Network System
Enter Mode Of Op:.xx](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.

You Have Changed The System Mode
Press Any Key To Continue

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.

![Unit Selection
Enter Unit ID#
Selected ID#: xxxx](image)

The following screen will appear. The System Manager will search for any active alarms on the local loop.

![Alarm Screen
SEARCHING!](image)

After the Modular Service Tool completes its 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
Loop = 1 Unit = 59
Space Sensor Failure](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 VAVBOX controller or WMVAV 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.

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.
Programming The WMVAV Controller

Configuration

In order to correctly setup the WMVAV 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 WMVAV controller you want to configure and hit the “Enter” key. You will see the screen shown below.

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 WMVAV controller you want to configure and hit the “Enter” key. You will then see unit configuration screen #1.

Configuration Screen #1

This HVAC unit can be configured to operate as a Constant Volume or VAV unit. The Constant Volume Mode does not provide Static Pressure Control. You can install a Duct Pressure Sensor on a Constant Volume unit and only monitor the Static Pressure. This is the only mode that supports dehumidification.

Configuration Screen #2

Press the “0” key to select the desired method of control and the third line of the display will change text to show which sensor has been se-
If you need proof of airflow before allowing any heating or cooling stages to operate, install a differential pressure switch with a contact closure that is connected to analog input #7 and select this option. If this option is not selected, the WMVAV controller assumes there is adequate airflow anytime the fan is running and ignores this signal.

If your economizer control requires the use of the Wetbulb Temperature to enable or disable it, you must install a humidity sensor on analog input #5 and select this option. If you require the Remote Signal to determine the occupied mode of operation, you will need to move the remote signal to Input #2 on the Analog Input Expansion Board.

You can monitor a wet contact closure on the first binary input on the 4 Binary Input Expansion board and whenever it closes, the Gas Reheat relay will be activated. This assumes you are in a cooling mode. The Gas Reheat does not activate if the WMVAV controller is in the heating mode. The option is only available on units that are configured for Constant Volume Mode. If you are controlling static pressure (VAV Mode) then this option is ignored.

If you need to control building pressure, select this option by entering a ‘1’ and connect the Relief Pressure Sensor to the Analog Expansion Input #4. The Relief Fan VFD Signal is also found on the Analog Input Expansion module as the only analog output on that board.

Press the “0” key to select the desired method of resetting the Cooling and Heating Mode Supply Setpoint and the third line of the display will change text to show what type of method has been selected to control the Reset Setpoint. Available selections are:

- Input Voltage Signal
- Outdoor Air Sensor
- Space Sensor
- Fan VFD Percentage
- Local Analog Value
- Return Temp Sensor

You can install a CO₂ Sensor on this HVAC unit to monitor the Carbon Dioxide levels and/or to provide for Indoor Air Quality (IAQ) control. If you just want to monitor the level, enter the same Maximum Economizer Position that you set for the Minimum Position and it will not be reset as the CO₂ level increases. If you do want IAQ control, set the desired Maximum Economizer Position to reset up to during high levels of CO₂. The factory supplied sensor provided for the CO₂ readings is a 0-10 VDC, 0 to 2000 PPM sensor. Be sure you enter a “2” if you are using the default sensor.
Programming The WMVAV Controller

**Configuration Screen #12**

WMVAV Config ID 59
CO2 Sensor Maximum
Reading: 2000 PPM
Enter 0 If No Sensor

If you install the default CO₂ sensor, it will be a 0-10 VDC device that provides 0-2000 PPM readings. Make sure this is set to the 2000 PPM level unless you have installed your own sensor with a different scaling range.

**Configuration Screen #13**

WMVAV Config ID 59
Air to Air Heat Pump Control: NO
[0=NO 1=YES]

The WMVAV controller can be configured to operate as an Air To Air Heat Pump Controller. If you make this selection, the same relays are used to stage the compressors in both the heating and cooling modes. The only difference is that a separate Reversing Valve relay will activate in the heating mode to enable heating to occur. You must configure at least one relay for the reversing valve.

You can also configure for an Auxiliary Heat relay that will activate whenever the supply air drops below the supply setpoint by 5°F, to provide heat when the outdoor air is too cold for the heating mode to operate correctly.

**Configuration Screen #14**

WMVAV Config ID 59
Broadcast Time Clock to Loop Units: NO
[0=NO 1=YES]

This enables the WMVAV Controller to send its real time clock information to all controllers on the local loop. This must be used when connecting VAVBOX Controllers on the local loop, but can be used to synchronize clock time in all controllers on the local loop.

**Configuration Screen #15**

WMVAV Config ID 59
Broadcast Outside Temperature: NO
[0=NO 1=YES]

This enables the WMVAV Controller to send its outdoor air temperature reading to all other controllers on the entire system. It is specifically used when more than one HVAC unit is installed, and only one outdoor air sensor is used to supply its signal to all controllers.

**Configuration Screen #16**

WMVAV Config ID 59
Broadcast Supply Temperature: NO
[0=NO 1=YES]

This enables the WMVAV Controller to send its supply air temperature reading to all controllers that do not have their own sensor on the local loop. This is standard for VAVBOX applications.

**Configuration Screen #17**

WMVAV Config ID 59
Broadcast Humidity Reading: NO
[0=NO 1=YES]

This enables the WMVAV Controller to send its relative humidity reading to all other controllers on the entire system. It is specifically used when more than one HVAC unit is installed, and only one relative humidity sensor is used to supply its signal to all controllers.

**Configuration Screen #18**

WMVAV Config ID 59
Broadcast Internal Schedule: NO
[0=NO 1=YES]

This enables the WMVAV Controller to send its Occupied and Unoccupied status to the VAVBOX Controllers on the local loop.

**Configuration Screen #19**

WMVAV Config ID 59
Broadcast Status Fan & Heat: NO
[0=NO 1=YES]

This enables the WMVAV Controller to send status information on whether the HVAC unit main fan is running, or if it is in heat mode, to the VAVBOX Controllers on the local loop. This enable is required when VAVBOX Controllers have heating stages or are fan-powered.
### Configuration Screen #20

**WMVAV Config ID 59**  
Broadcast VAV Boxes  
Force To Max: NO  
[0=NO 1=YES]

When “1=YES” is selected all VAVBOX controllers connected to this WMVAV controller will be forced to their “Maximum Airflow” position during the Morning Warm-up mode of operation. Select “0=NO” if you do not want this to occur. See the VAVBOX controller setpoint screens for setting of the “Maximum Airflow” position.

### Configuration Screen #21

**WMVAV Config ID 59**  
Broadcast VAV Boxes  
Force To Fix: NO  
[0=NO 1=YES]

When “1=YES” is selected all VAVBOX controllers connected to this WMVAV controller will be forced to their “Fixed Airflow” position during the Morning Warm-up mode of operation. Select “0=NO” if you do not want this to occur. See the VAVBOX controller setpoint screens for setting of the “Fixed Airflow” position.

### Configuration Screen #22- #41

**WMVAV Config ID 59**  
Stage Configurations  
Rly xx: Not Used  
Press “0” to Change

The following 20 screens allow you to set the four relays on the WMVAV controller board and up to sixteen additional relays when relay expansion board(s) are used.

The first relay on the WMVAV controller is always reserved for the Supply Fan. The remaining four relays on the main board and the additional sixteen relays on the expansion relay modules can be configured by pressing the “0” key to change the relay to the desired configuration. Available relay configurations are listed in the table that follows.

<table>
<thead>
<tr>
<th>Available Relay Configurations</th>
<th>Description Of Use</th>
</tr>
</thead>
<tbody>
<tr>
<td>Heat Stage</td>
<td>On/Off Control Of A Heating Stage (8 Stages Max)</td>
</tr>
<tr>
<td>Cool Stage</td>
<td>On/Off Control Of A Cooling Stage (8 Stages Max)</td>
</tr>
<tr>
<td>Rev Valve</td>
<td>On/Off Control Of A Reversing Valve</td>
</tr>
<tr>
<td>Exhaust Fan</td>
<td>On/Off Control Of An Exhaust Fan or Exhaust Damper</td>
</tr>
<tr>
<td>Re-Heat</td>
<td>On/Off Control Of A Re-heat Device</td>
</tr>
<tr>
<td>Warm-up Mode</td>
<td>On/Off Signal That Causes WattMaster Controlled VAV Boxes To Drive Open to Maximum Airflow</td>
</tr>
<tr>
<td>Pre-heater</td>
<td>On/Off Control Of A Pre-heat Device</td>
</tr>
<tr>
<td>Economizer</td>
<td>On/Off Control Of An Economizer</td>
</tr>
<tr>
<td>Alarm Relay</td>
<td>On/Off Indication Of Alarms</td>
</tr>
<tr>
<td>Override</td>
<td>On/Off Indication Of The Unit Being In Override Mode</td>
</tr>
<tr>
<td>Occupied</td>
<td>On/Off Indication Of The Unit Being In Occupied Mode</td>
</tr>
</tbody>
</table>

The WMVAV controller does not require that you start configuring your heating or cooling stages first and it doesn’t require that you utilize consecutive relays until all heating or cooling stages have been defined. All relays can be used for any of the above options in any order you desire. This method allows the greatest flexibility in the field, but it requires close attention to the wiring of the heating and cooling stages to prevent incorrect and possibly harmful operation.

The controller assumes there will only be one relay configured for Morning Warm-up Mode although it doesn’t prevent multiple relays from being selected. Since this relay is used to send a signal to VAV boxes to drive to their maximum airflow position, redundant relays are not required.

Relays #2 through #21 can be individually configured. This should be enough to handle up to 8 stages of heating and 8 stages of cooling on large HVAC units. 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.
Programming The WMVAV Controller

Setpoints

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 WMVAV controller you want to change setpoints for and hit the “Enter” key. You will see the screen shown below.

During the unoccupied mode these values will be added to the cooling setpoint and subtracted from the heating setpoint. These settings are only used if the controller has been configured to utilize a Space Temperature Sensor.

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 WMVAV controller you want to change setpoints and press the “Enter” key. You will then see setpoint screen #1.

Setpoint Screen #1

If the controller is configured for Space Temperature, Return Air Temperature or Return Air with Day Heating control, the unit attempts to maintain these Cooling and Heating setpoints.

If you are using a remote BAS to activate the heating or cooling modes with contact closures on the binary input board, set these two setpoints to zero and select the supply air as the controlling sensor.

<table>
<thead>
<tr>
<th>Description</th>
<th>Minimum</th>
<th>Default</th>
<th>Maximum</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cooling</td>
<td>0° F</td>
<td>74° F</td>
<td>90° F</td>
</tr>
<tr>
<td>Heating</td>
<td>0° F</td>
<td>65° F</td>
<td>90° F</td>
</tr>
</tbody>
</table>

The HVAC Mode Select Deadband is the amount of error from setpoint required to activate the heating or cooling mode of operation. This assumes the Return Air or Space Temperature are the controlling sensors. If the Supply Air is the controlling sensor then this setpoint is not used.

<table>
<thead>
<tr>
<th>Description</th>
<th>Minimum</th>
<th>Default</th>
<th>Maximum</th>
</tr>
</thead>
<tbody>
<tr>
<td>Deadband</td>
<td>0.1° F</td>
<td>1.0° F</td>
<td>10.0° F</td>
</tr>
</tbody>
</table>

This is the Supply Air Temperature that the HVAC unit will try to maintain when in heating or cooling mode. The Heating Supply Air Setpoint will also be used for the Morning Warm-up Supply Air Temperature.

<table>
<thead>
<tr>
<th>Description</th>
<th>Minimum</th>
<th>Default</th>
<th>Maximum</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cooling</td>
<td>50° F</td>
<td>55° F</td>
<td>70° F</td>
</tr>
<tr>
<td>Heating</td>
<td>60° F</td>
<td>140° F</td>
<td>200° F</td>
</tr>
</tbody>
</table>
Setpoint Screen #5

WMVAV Spts ID 59
Both Heating/Cooling
Supply Control Use
Deadband Of.: xx°F

All heating and cooling stages are staged up and down based on the Heating/Cooling Supply Control Staging Deadband setpoint that is entered on this screen. The value that is entered here will be added to the Supply Air Temperature Setpoint to determine the high end of the range and subtracted from the Supply Air Temperature Setpoint to determine the low end of the range. Staging of Heating/Cooling will occur above and below this deadband range. When the temperature is within this deadband range, no staging will occur.

<table>
<thead>
<tr>
<th>Description</th>
<th>Minimum</th>
<th>Default</th>
<th>Maximum</th>
</tr>
</thead>
<tbody>
<tr>
<td>Deadband</td>
<td>0°F</td>
<td>1°F</td>
<td>20°F</td>
</tr>
</tbody>
</table>

Setpoint Screen #6

WMVAV Spts ID 59
Morning WarmUp Setup
Target Temp: xx°F
Max Length.: xxx Min

If you need a Morning Warm-up period on your HVAC unit enter a Target Temp you want the Return Air Temperature to achieve and the Max Length of time you want to spend in warm-up mode trying to achieve the target temperature. If you don’t need morning warm-up, simply ignore the Target Temp setpoint and enter a ‘0’ for the Max Length value.

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

Setpoint Screen #7

WMVAV Spts ID 59
Outdoor Air Lockouts
Cooling:......: xx°F
Heating:......: xx°F

If the Outdoor Air Temperature drops below the Cooling lockout setpoint by 1°F, the DX cooling will be locked out until the Outdoor Air Temperature rises 1°F back above the lockout setpoint. The same 1°F deadband applies to the Heat lockout setpoint except the Outdoor Air locks out the heating when it is above the lockout instead of below the lockout.

<table>
<thead>
<tr>
<th>Description</th>
<th>Minimum</th>
<th>Default</th>
<th>Maximum</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cooling</td>
<td>-30°F</td>
<td>50°F</td>
<td>80°F</td>
</tr>
<tr>
<td>Heating</td>
<td>50°F</td>
<td>75°F</td>
<td>90°F</td>
</tr>
</tbody>
</table>

Setpoint Screen #8

WMVAV Spts ID 59
All Cooling Cuts Off
If Supply Air Temp Drops Below: xx°F

If the Supply Air Temperature ever drops below this value, all cooling stages are immediately cutoff, regardless of run time. If the economizer is being controlled, it is also closed completely to prevent freezing.

<table>
<thead>
<tr>
<th>Description</th>
<th>Minimum</th>
<th>Default</th>
<th>Maximum</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low Cutoff</td>
<td>30°F</td>
<td>40°F</td>
<td>60°F</td>
</tr>
</tbody>
</table>

Setpoint Screen #9

WMVAV Spts ID 59
All Heating Cuts Off
If Supply Air Temp Exceeds....: xx°F

If the Supply Air Temperature ever exceeds this value, all heating stages are immediately cutoff, regardless of run time.

<table>
<thead>
<tr>
<th>Description</th>
<th>Minimum</th>
<th>Default</th>
<th>Maximum</th>
</tr>
</thead>
<tbody>
<tr>
<td>High Cutoff</td>
<td>60°F</td>
<td>170°F</td>
<td>250°F</td>
</tr>
</tbody>
</table>
If the Supply Fan VFD drops below this value, the heat will stage off. The Supply Fan VFD will not be allowed to drop below this value while the unit is in Heating Mode unless the static pressure rises 0.5” above the static setpoint.

<table>
<thead>
<tr>
<th>Description</th>
<th>Minimum</th>
<th>Default</th>
<th>Maximum</th>
</tr>
</thead>
<tbody>
<tr>
<td>Below SP</td>
<td>0 %</td>
<td>30 %</td>
<td>100 %</td>
</tr>
</tbody>
</table>

Setpoint Screen #11

If your air handler has at least one heating stage and you require a low ambient protection or preheating of the air stream, you can enter a supply temperature value that causes one stage of heating to come on and remain on continuous if the outdoor air drops below this level. If you don’t want this protection do not configure any relays for this function.

<table>
<thead>
<tr>
<th>Description</th>
<th>Minimum</th>
<th>Default</th>
<th>Maximum</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low Ambient Level</td>
<td>-50°F</td>
<td>0°F</td>
<td>70°F</td>
</tr>
</tbody>
</table>

Setpoint Screen #12

If the Outdoor Air Temperature drops below the OAT/WB Enable (Outdoor Air Temperature or the optional Wetbulb Temperature, if it’s available), the Economizer will be enabled to operate as the first stage of cooling anytime there is a demand for cooling. If the economizer is currently in a control mode, it will attempt to maintain the Supply Air Temperature at the Supply Air Cooling Setpoint.

<table>
<thead>
<tr>
<th>Description</th>
<th>Minimum</th>
<th>Default</th>
<th>Maximum</th>
</tr>
</thead>
<tbody>
<tr>
<td>OAT/WB Enable</td>
<td>-30°F</td>
<td>55°F</td>
<td>80°F</td>
</tr>
</tbody>
</table>

If the Economizer is not enabled or currently required during the occupied mode of operation, the outside air dampers will maintain the Min Position setpoint to provide ventilation into the space.

The Control Rate can be used to speed up or slow down the operation of the outside air dampers to prevent hunting. Unless you actually witness this damper hunting it is not recommended that the Control Rate value be changed. Large values speed up the damper, and small values slow down the damper.

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

Setpoint Screen #14

The WMVAV controller uses the Fan VFD signal to maintain the Static Spt (duct static pressure) value plus or minus the Deadband value. Adjustments to the signal are made at a rate equal to the Control Rate setpoint, which can be used to speed up or slow down the signal to prevent hunting.

<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” WG</td>
<td>0.50” WG</td>
<td>3.0” WG</td>
</tr>
<tr>
<td>Deadband</td>
<td>0.01” WG</td>
<td>0.10” WG</td>
<td>1.0” WG</td>
</tr>
<tr>
<td>Control Rate</td>
<td>1 Sec</td>
<td>10 Sec</td>
<td>30 Sec</td>
</tr>
</tbody>
</table>
**Setpoint Screen #15**

<table>
<thead>
<tr>
<th>VMVAV Spts ID 59</th>
</tr>
</thead>
<tbody>
<tr>
<td>Relief Spt: x.xx”</td>
</tr>
<tr>
<td>Deadband: x.xx”</td>
</tr>
</tbody>
</table>

The WMVAV controller uses the Relay Fan VFD signal to maintain the Relief Spt value plus or minus the Deadband value. Adjustments to the signal are made at a rate equal to the Control Rate setpoint on the previous Static Pressure screen. If you don’t require relief pressure control, simply ignore these settings.

**Description** | **Minimum** | **Default** | **Maximum**
---|---|---|---
Relief Spt | -0.20” WG | 0.10” WG | +0.20” WG
Deadband | 0.01” WG | 0.02” WG | 0.10” WG

**Setpoint Screen #16 & 17**

<table>
<thead>
<tr>
<th>VMVAV Spts ID 59</th>
</tr>
</thead>
</table>
| Set SAT Cool Reset
VLT=0V Spt=55
VLT=10V Rst=55 |

<table>
<thead>
<tr>
<th>VMVAV Spts ID 59</th>
</tr>
</thead>
</table>
| Set SAT Heat Reset
VLT=0V Spt=140
VLT=10V Rst=140 |

These screens allow you to set values for resetting the supply air temperature when the unit is in cooling and/or heating mode. You can configure the HVAC unit to reset the supply air temperature setpoint based on the Outdoor Air Temperature, Input Voltage Signal, Space Temperature, Return Air Temperature or Fan VFD Percentage. These are the reset values that cause the supply setpoint to reset from its minimum to its maximum value. Please note that the Supply Air Setpoint value (Spt) must be set using Setpoint Screen #4 and cannot be changed from this screen.

*Space temperature setpoints are 74 COOL, and 72 HEAT*

**Space Temperature Cool Reset Example:**

- Space Temperature (SPC) = 76 F SAT Setpoint (Spt) = 55 F
- Space Temperature (SPC) = 74 F SAT Setpoint (Rst) = 65 F

**Space Temperature Heat Reset Example:**

- Space Temperature (SPC) = 72 F SAT Setpoint (Spt) = 90 F
- Space Temperature (SPC) = 70 F SAT Setpoint (Rst) = 120 F

**VFD Percentage Cool Reset Example:**

- VFD Percentage (VFD) = 70% SAT Setpoint (Spt) = 55 F
- VFD Percentage (VFD) = 30% SAT Setpoint (Rst) = 65 F

**VFD Percentage Heat Reset Example:**

- VFD Percentage (VFD) = 30% SAT Setpoint (Spt) = 90 F
- VFD Percentage (VFD) = 70% SAT Setpoint (Rst) = 120 F

**Input Voltage Cool Reset Example:**

- Input Voltage (VLT) = 0 Volts SAT Setpoint (Spt) = 55 F
- Input Voltage (VLT) = 10 Volts SAT Setpoint (Rst) = 65 F

**Input Voltage Heat Reset Example:**

- Input Voltage (VLT) = 0 Volts SAT Setpoint (Spt) = 90 F
- Input Voltage (VLT) = 10 Volts SAT Setpoint (Rst) = 120 F

**Setpoint Screen #18**

<table>
<thead>
<tr>
<th>VMVAV Spts ID 59</th>
</tr>
</thead>
</table>
| Start Fan Delay
Timer...:10 Sec |

This is the amount of time that the main HVAC unit fan will delay before starting after an occupied signal is initiated or after a power failure. The default value is 999. With the default value the delay will be equal to the unit address multiplied by 5.

Example: Controller ID (address) 18 would cause a 90 second delay when the default value of 999 is used. Controller ID (address) 30 would cause a 150 second delay when the default value of 999 is used.

**Description** | **Minimum** | **Default** | **Maximum**
---|---|---|---
Timer | 0 Sec | 999 Sec | 999 Sec

**Setpoint Screen #19**

<table>
<thead>
<tr>
<th>VMVAV Spts ID 59</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mechanical Heat/Cool Failures Occur After No Change For xxx M</td>
</tr>
</tbody>
</table>

Once a heating or cooling stage is activated, the Supply Air must change accordingly by 5° before this amount of time elapses, or a mechanical failure is assumed and an alarm is generated.

**Description** | **Minimum** | **Default** | **Maximum**
---|---|---|---
Alarm Delay | 0 Min. | 15 Min. | 300 Min.
Normally, the HVAC unit will use its own internal time clock and week schedules to set the occupied mode of operation. If you have several air handlers you can connect an external scheduling device to the communications loop and program the air handler for the desired schedule to follow. If the HVAC unit is using its internal schedule, enter a ‘0’ for the Schedule Number.

<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>

If you configured the air handler to read a CO₂ sensor, it will override the minimum economizer position up to this position if the CO₂ level rises above its setpoint by the adjustable Reset Rng amount. See Setpoint Screen #22.

**Note:** Minimum Position determined by user adjustable Min Position Setpoint on Setpoint Screen #13.

<table>
<thead>
<tr>
<th>Description</th>
<th>Minimum</th>
<th>Default</th>
<th>Maximum</th>
</tr>
</thead>
<tbody>
<tr>
<td>Max Position</td>
<td>See Note</td>
<td>100%</td>
<td>100%</td>
</tr>
</tbody>
</table>

If you configure the air handler to read a CO₂ Sensor, the Max Level is the point at which the economizer minimum position starts to reset upward. As the CO₂ level rises above the Max Level by the Reset Rng amount, the economizer will have reset its minimum position proportionally up to the previously defined economizer maximum damper position setpoint.

<table>
<thead>
<tr>
<th>Description</th>
<th>Minimum</th>
<th>Default</th>
<th>Maximum</th>
</tr>
</thead>
<tbody>
<tr>
<td>Max Level</td>
<td>0 PPM</td>
<td>900 PPM</td>
<td>5000 PPM</td>
</tr>
<tr>
<td>Reset Rng</td>
<td>0 PPM</td>
<td>100 PPM</td>
<td>1000 PPM</td>
</tr>
</tbody>
</table>

If the Space Temperature sensor contains the optional push-button override then this is the amount of time the unit will revert to occupied operation whenever the button is pressed during the unoccupied mode.

<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>2.0 Hr</td>
<td>8.0 Hr</td>
</tr>
</tbody>
</table>

If Space Temperature is used as the controlling sensor for the HVAC unit and it is supplied with 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>Slide Offset Setpoint</td>
<td>0° F</td>
<td>0° F</td>
<td>6° F</td>
</tr>
</tbody>
</table>

If you configured this air handler to control as an Air to Air Heat Pump unit and you have auxiliary heating on this unit, you can adjust how long the unit uses the compressor to attempt to provide heating before it activates the Aux Heat to supplement the compressor.

**Note:** On Air to Air Heat Pumps you must configure one of the relays to be used as the Reversing Valve. This output is active anytime the unit is in the heating mode and this mode is the only time the Aux Heat will be activated, if needed.

<table>
<thead>
<tr>
<th>Description</th>
<th>Minimum</th>
<th>Default</th>
<th>Maximum</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aux Heating Delay</td>
<td>0 Min</td>
<td>3 Min</td>
<td>30 Min</td>
</tr>
</tbody>
</table>
If you have decided to use the AHU internal schedule and entered a ‘0’ on the previous screen for the schedule number, you can enable this internal schedule to perform an optimal start. This feature requires a Space Sensor input for the optimal start calculations. If you don’t require optimal start or you are not using a space sensor, enter a ‘0’ for this multiplier. If you do have a space sensor and want optimal start, enter a value greater than ‘1.0’ to enable the calculations. The soak multiplier is used to increase the normal optimal start calculation whenever the building has been in the unoccupied mode for 24 consecutive hours or more. If you used a 1.5 multiplier and the optimal start had calculated a 30 minute pre-start, the soak multiplier would add an additional 15 minutes to the pre-start for a total of 45 minutes (1.5 x 30). The system would then start 45 minutes earlier than the normally scheduled occupied mode schedule to bring the space temperature under control.

<table>
<thead>
<tr>
<th>Description</th>
<th>Minimum</th>
<th>Default</th>
<th>Maximum</th>
</tr>
</thead>
<tbody>
<tr>
<td>Multiplier</td>
<td>0.0</td>
<td>0.0</td>
<td>5.0</td>
</tr>
</tbody>
</table>

Both the Heating Stages and the DX Cooling Stages utilize Staging Up and Down delay periods between stages and Minimum Run Times and Off Times.

Both modes have their own set of staging and run delay times. The Heating timer screens look exactly the same as the cooling except they reference the Heating instead of Cooling.

See the Sequence of Operation Manual for information on how these delays and run times are used.

<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>

Both the Heating Stages and the DX Cooling Stages utilize Staging Up and Down delay periods between stages and Minimum Run Times and Off Times.

Both modes have their own set of staging and run delay times. The Heating timer screens look exactly the same as the cooling except they reference the Heating instead of Cooling.

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<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>

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.

<table>
<thead>
<tr>
<th>Description</th>
<th>Minimum</th>
<th>Default</th>
<th>Maximum</th>
</tr>
</thead>
<tbody>
<tr>
<td>Space Sensor SPC</td>
<td>-100.0°F</td>
<td>0.0°F</td>
<td>+100.0°F</td>
</tr>
<tr>
<td>Supply Sensor SAT</td>
<td>-100.0°F</td>
<td>0.0°F</td>
<td>+100.0°F</td>
</tr>
<tr>
<td>Return Sensor RAT</td>
<td>-100.0°F</td>
<td>0.0°F</td>
<td>+100.0°F</td>
</tr>
<tr>
<td>Outdoor Sensor OAT</td>
<td>-100.0°F</td>
<td>0.0°F</td>
<td>+100.0°F</td>
</tr>
</tbody>
</table>
Programming The WMVAV Controller

Status

The WMVAV 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

Line 2 Line displays one of the following:
Unoccupied Mode Occupied Mode
Venting Mode Normal Operation
Normal Operation

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

Line 4 Line displays one of the following:
Normal Operation
Fan Starting Delay
xx Left in WarmUp (Number of Minutes Left)

Status Screen 2

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

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

Line 4 Line displays:
Economizer Enabled
Economizer Disabled

Status Screen 3

Line 2 Current Controlling Temperature
Can be Supply Air, Return Air or Space 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. If the Supply Air Sensor is the controlling sensor, this will indicate the Night Setback temperature that the Space Temperature uses to bring on heat during the unoccupied mode.

Status Screen 4

Line 2 Current Heating or Cooling Demand
Based on the comparison between the Controlling Temperature and the Heating and Cooling Setpoints. A positive number indicates a cooling demand and a negative number indicates a heating demand.

Line 3 Current Space Temperature reading.
This sensor is only used during unoccupied hours unless it has been configured as the Controlling Sensor.

Line 4 Current CO₂ Level.
If you configured for a CO₂ Sensor, this line will display the CO₂ Level. Otherwise, it will remain blank.

Status Screen 5

Line 2 Current Outdoor Air Temperature.
Line 3  Current Outdoor Air Relative Humidity
If this unit is configured for a humidity sensor a value will appear on this line. If a humidistat is configured this line will display “Humidistat Open” or “Humidistat Close”. If neither is configured, this line will be blank.

Line 4  Displays calculated Wetbulb Temperature
If this unit is configured for a humidity sensor a value will appear on this line. If no humidity sensor is configured, this line will be blank.

Status Screen 6

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

Line 2  Current Supply Air Temperature.
Line 3  Current Return Air Temperature
Line 4  Current Supply Air Setpoint
Can be reset from an external signal if this option is selected

Status Screen 7

WMVAV v1.00 ID 59
Static Pr..: x.xx”
Fan VFD....: xxx %
Economizer.: xxx %

Line 2 - Current Static Pressure Reading.
Line 3 - Current Fan VFD Signal percentage
Line 4 - Current Economizer damper percentage open.

Status Screen 8

WMVAV v1.00 ID 59
Relief Pr..: xx.xx”
Relief VFD.: xxx %
[Relief is Optional]

Line 2  Current Relief Pressure
If the unit is configured for Relief Pressure control. This will display 0.00” if you don’t control relief pressure.

Line 3  Current Relief Fan VFD Signal.
This will display 0% if the unit is not configured for relief pressure control.

Line 4  Just a reminder that this is an optional control output and may or may not have live data to display.

Status Screen 9-15

WMVAV v1.00 ID 59
Fan Relay......: OFF
CoolStage 1....: OFF
HeatStage 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 10 to 14 this line will indicate the relays use as a Heating / Cooling, Warm-up Mode, Reversing Valve, etc., and the ON/OFF condition for that relay. Possible options are:

HeatStage  CoolStage  Warm-up Mode
Rev. Valve    Re-Heat    Exhaust Fan
Pre-Heater    Economizer  Alarm
Override      Occupied

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.

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 16

WMVAV v1.00 ID 59
NO  ALARMS

Line 2 - Blank Line
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:

BAD SPACE SENSOR
FAN PROVING FAILURE!
MECH COOLING FAILURE
MECH HEATING FAILURE
DIRTY FILTER ALARM
CONTROL TEMP ALARM

If you press “Enter” the screen will scroll through all the active alarms.

Line 4 - Blank Line
Programming The WMVAV Controller

Scheduling

The WMVAV 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

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

Event #2

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

If you are using the internal scheduling capability of the WMVAV 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 day's 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

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

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

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 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.

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.

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 “2” 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 WMVAV 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.

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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.

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.

1) Outputs Force
2) Dampers Force

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

Damper Force Mode Screens

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

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 Output 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 WMVAV controller you wish to access and press "Enter". The Output Force settings are only available for the WMVAV controller. They are not supported for the VAVBOX controller. If you enter a unit ID for any other type of unit except a WMVAV controller the following screen will be displayed.
If you entered the unit ID of a WMVAV controller the following screen will be displayed.

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

The first Outputs Force screen allows the Supply 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.

After the screen for relay 20 is displayed, the first Analog Output Override screen will be displayed.
Programming The VAVBOX Controller

Configuration

In order to correctly setup the VAVBOX controller you must first configure several parameters in regard to the type of system and operating parameters for the VAVBOX 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 VAVBOX 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 VAVBOX 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.

If the damper opens in a clockwise direction, it is DIRECT ACTING
If the damper opens in a counterclockwise direction, it is REVERSE ACTING

Configuration Screen #3

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 #4

If you require the VAVBOX 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.

Configuration Screen #5

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

Configuration Screen #6

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 #7

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 #8

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 #9

A “Dump Zone” is used when you want to control a duct heater or baseboard heater independently. A VAVBOX 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.
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.

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.

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 1000 CFM</td>
<td>100% or 30000 CFM</td>
</tr>
<tr>
<td>Heat Min</td>
<td>0% or 0 CFM</td>
<td>10% or 1000 CFM</td>
<td>100% or 30000 CFM</td>
</tr>
</tbody>
</table>

The Nt/Rh Min (Night or Reheat Minimum Damper Position) has different functions depending on whether the VAVBOX controller is in the occupied or unoccupied mode and whether the VAVBOX controller is used on a fan powered or non-fan powered terminal unit.

**Occupied Mode**

If the VAVBOX controller is used on a non-fan-powered terminal unit that has reheat, the VAVBOX damper will move to the Nite/Reheat position whenever a Space Heating demand occurs and the HVAC unit is in Supply Air Cooling or Vent modes. When the HVAC unit is in Supply Air Heating mode the VAVBOX damper will modulate as required to maintain the Space Heating setpoint. This setting has no effect on fan powered terminal units when they are in the occupied mode.

**Unoccupied Mode**

When using non-fan powered terminal units, the VAVBOX damper will position itself in the Nite/Reheat minimum position. In order for fan powered terminal units to position the damper to the Nite/Reheat minimum position, the check for main fan status must be selected and the HVAC unit fan must be operating.

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.

### Setpoint Screen #8

**HC Box Spts IDxxxx**  
Damper/Airflow Spt  
Fixed Pos: xxx %

<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>

This screen allows you to set the VAVBOX controller to operate on a remote schedule instead of the schedule that is contained in the WMVAV controller.

### Setpoint Screen #11

**HC Box Spts IDxxxx**  
Day/Night Schedule  
Control #: x  
0=AHU 1-7=Scheduler

<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 #9

**HC Box Spts IDxxxx**  
Zone Alarm Offsets  
Hi Zone........: xx°F  
Lo Zone........: xx°F

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>

### Setpoint Screen #12

**HC Box Spts IDxxxx**  
Maximum Slide Offset  
Effect on Spt.: x°F

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 #10

**HC Box Spts IDxxxx**  
Zone Alarm Delay  
Must Be Out Of Limits For.: xxx Min

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 #13

**HC Box Spts IDxxxx**  
Push-Button Override  
Duration : x.x Hr

If the Flush Mount Wall Sensor has the optional Push-Button Override, this is the amount of time 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>
Programming The VAVBOX Controller

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>

Status Screen #2

<table>
<thead>
<tr>
<th>Description</th>
<th>Minimum</th>
<th>Default</th>
<th>Maximum</th>
</tr>
</thead>
<tbody>
<tr>
<td>Zone Temp..</td>
<td>xx.x°F</td>
<td>xx.x°F</td>
<td>xx.x°F</td>
</tr>
<tr>
<td>Cooling Spt</td>
<td>xx.x°F</td>
<td>xx.x°F</td>
<td>xx.x°F</td>
</tr>
<tr>
<td>Heating Spt</td>
<td>xx.x°F</td>
<td>xx.x°F</td>
<td>xx.x°F</td>
</tr>
</tbody>
</table>

Status Screen #3

<table>
<thead>
<tr>
<th>Description</th>
<th>Minimum</th>
<th>Default</th>
<th>Maximum</th>
</tr>
</thead>
<tbody>
<tr>
<td>Slide Offset..</td>
<td>xx°F</td>
<td>xx°F</td>
<td>xx°F</td>
</tr>
<tr>
<td>H/C Demand..</td>
<td>xx°F</td>
<td>xx°F</td>
<td>xx°F</td>
</tr>
</tbody>
</table>

Status

Status Screen #1

<table>
<thead>
<tr>
<th>Description</th>
<th>Minimum</th>
<th>Default</th>
<th>Maximum</th>
</tr>
</thead>
<tbody>
<tr>
<td>Occupied Mode</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vent Mode</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Belongs to Group # 1</td>
<td></td>
<td></td>
<td></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
Warm-up Mode
Sensor Fail Mode
Line 4- Belongs to Group # xx
No Group Affiliation

Status Screen #2

<table>
<thead>
<tr>
<th>Description</th>
<th>Minimum</th>
<th>Default</th>
<th>Maximum</th>
</tr>
</thead>
<tbody>
<tr>
<td>Current Zone Temperature</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Currently active Cooling Setpoint based on the current Occupied / Unoccupied mode of operation.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Currently active Heating Setpoint based on the current Occupied / Unoccupied mode of operation.</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Status Screen #3

<table>
<thead>
<tr>
<th>Description</th>
<th>Minimum</th>
<th>Default</th>
<th>Maximum</th>
</tr>
</thead>
<tbody>
<tr>
<td>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.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Current Heating or Cooling Demand in the Zone based on the current Heating and Cooling Setpoints when compared to the current Zone Temperature.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Current Supply Air Temperature received via broadcast from the WMVAV controller or from the VAVBox Controllers own installed Supply Air Sensor on the AUX2 input.</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
**Status Screen #4**

![Illustration](image)

**Line 2** Current **Supply Air Temperature** received via broadcast from the WMVAV controller or from the VAVBox Controllers own installed Supply Air Sensor on the AUX2 input.

**Line 3** Current **Duct Air Temperature** at the duct air temperature sensor location if a duct temperature sensor is installed and connected to the VAVBOX controller. If a duct air temperature sensor is not installed this line will display the same supply air temperature as on Line 2 above.

**Status Screen #5**

![Illustration](image)

**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 current 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**

![Illustration](image)

**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”

**Status Screen #7**

![Illustration](image)

**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 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.

1) Outputs Force
2) Dampers Force

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.

1) Outputs Force
2) Dampers Force

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 VAVBOX controller.

Damper Force Mode Screens

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

<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</td>
</tr>
<tr>
<td>3=Max 4=Min 5=Fixd</td>
</tr>
</tbody>
</table>

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

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 the dampers maximum airflow position set under Setpoint Screen #4

4 = Min
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.

5 = Fixd
This setting will force the damper to a fixed position based on the fixed position setpoint. See VAVBOX controller Setpoint Screen #7 for available setpoint information.

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.

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 controller you want to configure and hit the “Enter” key. You will then see unit configuration screen #1.

Configuration Screen #1

Polling Unit Config
Last Polled Zone
Address: xx
[Enter Last Zone]

Enter the address of the last controller (largest address number) for the local loop the MiniLink PD is connected to.

Configuration Screen #2

Polling Unit Config
Optimal Start Zone
Target Unit: xx
[Enter Target Zone]

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 #3-62

Polling Unit Config
Enable Alarm Polling
Unit xx : YES
[0=NO 1=YES]

Enabling Alarm Polling for the controller whose unit ID you have entered, allows any alarm from that controller to be polled and reported by the MiniLink Polling Device. If alarming is enabled when an alarm condition is encountered, the alarm light on the System Manager will be lit and the various alarms can be displayed for that controller at the System Manager by pressing the “Alarms” button. You must configure this setting to “YES” for each controller on the loop that you wish to receive alarms from.