



## MicroVent Vision Operating Manual

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## 1 MicroVent Vision Display Screens

The MicroVent Vision system has 4 Display Screens to choose from at the top of the display:

### 1.1 System Status

The Temperatures, Relative Humidity, CO<sub>2</sub>, Fan Speed, Bin Status, Operation Mode, Outside Air Availability, Errors, Warnings, and Refrigeration and Heating Status are displayed on the System Status Screen.

### 1.2 Bin Settings

On the Bin Settings Screen the following options appear at the bottom of the screen: Basic, Modes, Fan Speed, Refrigeration/Heating, CO<sub>2</sub>, Purge Times, Humidity, Drying, Dewpoint, and Return Air

### 1.3 System Settings

System Settings includes the System Password, Recording Interval, Time, Date, and an option to record temperatures when an event occurs.

### 1.4 Records

The Records Screen brings up a Query Menu, in which, Bins, Temperatures, RH, CO<sub>2</sub>, Events, and Time Intervals that can be selected for viewing. Events are shown in a tabular form, while Temperatures, RH, and CO<sub>2</sub> can be displayed in tabular or graphical form.

## 2 Bin Settings

All the possible settings will be presented in this manual. If certain features are not included in the system, those settings and/or setting pages will not be displayed. For example: if a system does not have refrigeration, neither the refrigeration page, nor the refrigeration related settings will be displayed.

### 2.1 Basic Settings

#### 2.1.1 Plenum setpoint

The plenum setpoint is the desired temperature of the supply air to be delivered to the pile. Changing the plenum setpoint will change all other temperature setpoints by the same amount.

#### 2.1.2 Target temperature setpoint

If desired, the plenum setpoint can be automatically increased or decreased gradually over a desired time period (in days). The system will make this adjustment once a day at midnight to reach this target temperature.

#### 2.1.3 Days to target

Select the amount of days desired to reach the target plenum setpoint temperature. The target temperature will be reached in the number of days under ideal conditions. The following setting (3.6) will provide an exception to this

feature.

**2.1.4** Max target difference

This setting is the limit for which the target setpoint adjustment will be made in relation to the return air temperature. It prevents the plenum setpoint to be lowered without the return air temperature following the same trend. This setting will have no function if the target temperature setpoint is equal to the plenum setpoint.

**2.1.5** Low plenum start

The low plenum start setting is only effective if operating in the Automatic mode. If the plenum temperature drops below this setting the fans will start with the IAS closed in an attempt to increase the plenum temperature with heat from the pile. This setting will only have function during the time periods in which the system is operating in Automatic mode. In the case of an air overthrow system, the Low Plenum Start is replaced by a Low Return Start.

**2.1.6** Low plenum stop

The low plenum stop setting is always in effect for all operation modes. The system will stop and the IAS will close if the plenum temperature reaches this setting. The system will not start if the plenum temperature is at this setting.

**2.1.7** Return air start temperature

The return air start setting is only effective if operating in the Automatic mode. The system will start when the return air temperature reaches this setting. In the case of an air overthrow system the Return Air Start is replaced by a High Plenum Start.

**2.1.8** Return air stop temperature

The return air stop setting is only effective if operating in the Automatic mode. The system will stop when the return air temperature reaches this setting.

**2.1.9** Difference for air available

This setting defines how cool or warm the outside air must be in terms of the plenum setpoint or the return air temperature to be considered available for cooling or warming (see insert for further details).

**2.1.10** Air available reference

This setting defines whether the plenum setpoint or the return air temperature is used for to determine whether air is available. In the case of an air overthrow system the return air temperature is replaced by the plenum temperature (see insert for further details).

The **Reference** for the outside air to be considered available can be one of the following:

- Return air temperature (useful in the fall of the year, when the pile and return temperatures can be significantly higher than the plenum setpoint).
- Plenum setpoint (most often used during cooling and holding periods).
- Plenum temperature (in the case of a Air Overthrow system, useful in the fall of the year, when the pile and return temperatures can be significantly higher than the plenum setpoint).

#### **Air Available Time Out**

- There is a 5 min minimum time for the air to be considered available or unavailable to prevent from excessive system starts and stops.
- **Example:** If the air becomes unavailable for any reason, the system will consider air to be unavailable for a minimum of 5 minutes regardless of changing conditions.

#### **Absolute Minimum Settings**

- 2 degrees below plenum setpoint
- 3 degrees below return air (plenum temperature, in the case of an Air Overthrow system)
- If your return air temperature is more than **1 degree** warmer than the plenum setpoint, this setting **must be increased**.
- A smaller differential (**less than 2 degrees** below plenum setpoint) will result in **warming** your pile and possibly **condensation**

#### **2.1.11 Reconditioning (Warm-up)**

Reconditioning can be enabled to warm a pile rather than cool. If enabled the system looks for warm outside air that is available to raise the plenum temperature.

#### **2.1.12 High plenum temperature shutoff**

This setting is only available when refrigeration is enabled; if the plenum temperature reaches this setpoint, the system will shut off.

### **2.2 Modes**

The Micro Vent Vision operating modes can be selected on a timed basis, so that the user could use one or all of the 4 operating modes during a 24 hour time period. The 'Commit Page' button must be pressed to have a mode change to come into effect. The time intervals can be displayed in 2 hr, 1hr, 30 min, or 15 min periods. The MicroVent Vision system allows for the selection of the following operating modes:

#### **2.2.1 Off Mode**

The fans will not run. The system is effectively shut down, but will still provide temperature, humidity, and CO<sub>2</sub> readings.

#### **2.2.2 Constant Mode**

The fans will run regardless of temperatures. The IAS will move to a position that will allow the system to deliver air to the plenum at the plenum setpoint temperature if conditions permit.

### 2.2.3 Automatic Mode

In Automatic Mode the system will start under two conditions:

1. The Return Air temperature reaches the Return Air Start setpoint and the outside air is considered available for cooling. The fans will continue to run until the return air temperature reaches the Return Air Stop setpoint or outside air becomes unavailable. In the case of an air overthrow system, the Return Air Start will be replaced with High Plenum Start.
2. Plenum Air temperature reaches the Low Plenum Start setpoint. The fans will turn on and run for 10 minutes in an effort to increase the plenum temperature. If the plenum temperature continues to decrease below the Low Plenum Shutoff setpoint, the system will shut down. In the case of an air overthrow system, the Low Plenum Start will be replaced with by a Low Return Start.

### 2.2.4 Air Available Mode

The fans will operate during the times selected by the user if the outside air is considered available.

## 2.3 Fan Speed

### 2.3.1 Max speed

The return air temperature at which the system will control the fans at their maximum speed when automatic speed control is used.

### 2.3.2 Min speed

The return air temperature at which the system will control the fans at their minimum speed when automatic speed control is used.

*Note: For temperatures between the maximum and minimum temperatures, the fan speed will be modulated in accordance to the temperature.*

### 2.3.3 Speed when refrigeration is running

If the auto box is checked the fans will run based on the return air temperature when refrigeration is running. If the auto box is not checked, a fixed fan speed % can be entered on the keypad.

### 2.3.4 Speed when purging

If the auto box is checked the fans will run based on the return air temperature when the system is in purge mode. If the auto box is not checked, a fixed fan speed % can be entered on the keypad.

### 2.3.5 Speed when air available

If the auto box is checked the fans will run based on the return air temperature when air is available. If the auto box is not checked, a fixed fan speed % can be entered on the keypad.

### **2.3.6 Fan speed**

If the auto box is checked the fans will run based on the return air temperature when refrigeration is not running, the system is not in purge mode, and air is not available. If the auto box is not checked, a fixed fan speed % can be entered on the keypad.

**2.3.6.1** If a fixed fan speed % is entered at the Fan speed setting, the fans will run at that speed for all conditions even if the 'Auto' box is checked for the previous three settings.

### **2.3.7 Order of precedence for MicroVent Vision Speed Control**

Speed when refrigeration is running

Speed when purging

Speed when air available

Fan speed

## **2.4 Refrigeration/ Heating**

### **2.4.1 Refrigeration**

The desired number of refrigeration stages to be enabled are selected on the drop down menu.

### **2.4.2 Heating**

The desired number of heating stages to be enabled are selected on the drop down menu.

### **2.4.3 Outside air cooling**

Outside air cooling can be enabled or disabled on the drop down menu.

### **2.4.4 Heater setpoint**

The heating system can be controlled by any sensor in the system. This setpoint is the temperature that the heating system begin to stage on and attempt to maintain. The heating system will shut off once this temperature is achieved.

## **2.5 CO<sub>2</sub>**

### **2.5.1 CO<sub>2</sub> purge**

The CO<sub>2</sub> purge can be enabled or disabled using the drop down menu

### **2.5.2 CO<sub>2</sub> purge start level**

This setting tells the system what level of CO<sub>2</sub> to start the purge.

### **2.5.3 CO<sub>2</sub> purge stop level**

This setting tells the system what level of CO<sub>2</sub> to stop the purge.

- 2.5.4** Max outside purge  
The maximum outside temperature at which the system will enter purge mode
- 2.5.5** Min outside purge  
The minimum outside temperature at which the system will enter purge mode.
- 2.5.6** Low plenum stop during CO<sub>2</sub> purge  
If the system is in purge mode this will be the plenum temperature when the system will stop (usually set at 1 degree below the low plenum stop on the basic settings page).
- 2.5.7** High plenum stop during CO<sub>2</sub> purge  
If the system is in purge mode this will be the plenum temperature when the system will stop when refrigeration is running.
- 2.5.8** Max below setpoint when purging  
The system will allow the intake system to open during a purge until the plenum temperature meets the plenum setpoint less the number in this setting.
- 2.5.9** Max above setpoint when purging  
The system will allow the intake system to open during a purge until the plenum temperature meets the plenum setpoint plus the number in this setting.
  - 2.5.9.1** Example: Plenum setpoint 50, Max below = 2, Max above = 2, the plenum temperature will be controlled between 48 and 52.

## **2.6 Purge Times**

- 2.6.1** The function needs to be enabled on the CO<sub>2</sub> Option on the Bin Settings Screen.
- 2.6.2** The user can select Forced Purges that will put the system in purge mode regardless of CO<sub>2</sub> concentration.
- 2.6.3** If the system has a CO<sub>2</sub> sensor, the user can also select a Sensor Purge. The system will enter purge mode during these times if the CO<sub>2</sub> concentration rises to the CO<sub>2</sub> start level and exit purge mode once the CO<sub>2</sub> concentration goes below the stop level.

## **2.7 Humidity**

- 2.7.1** Humidity setpoint  
This setting will control the humidity system so that the relative humidity setpoint is maintained.

- 2.7.2** Humidity cycle on time  
The user can enter a duty cycle for their humidity system. This setting is the length of time in minutes that the humidity system will be on.
- 2.7.3** Humidity cycle off time  
This setting is the length of time in minutes that the humidity system will be off.
- 2.7.4** Humidity pulse on time  
This user can enter a pulse cycle for their humidity system. This setting is the length of time in seconds that the humidity system will be on.
- 2.7.5** Humidity pulse off time  
This setting is the length of time in seconds that the humidity system will be off.

*Note: For systems with humidicell systems, the pulse cycle should **not** be used. The pulse off time should be set to 0 so that the pulse cycle does not operate.*

- 2.7.6** Maximum outside relative humidity for air available  
For systems that have outside humidity sensors, this setting will prevent the system from opening the intake system when the relative humidity is above this setpoint.

## **2.8 Drying**

With the drying function enabled the system will consider outside air to be available regardless of temperature. This will allow the system to maximize the amount of fresh air the system will intake. The following settings will provide the limitations of this function.

- 2.8.1** Drying enabled/disabled  
Using the drop down menu, the drying function can be enabled or disabled.
- 2.8.2** Max outside drying  
The maximum outside temperature at which the system will enter drying mode.
- 2.8.3** Min outside drying  
The minimum outside temperature at which the system will enter drying mode.
- 2.8.4** Low plenum stop temperature during drying  
If the system is in dry mode this will be the plenum temperature when the system will stop (usually set at 1 degree below the low plenum stop on the basic settings page).
- 2.8.5** High plenum stop temperature during drying  
If the system is in dry mode this will be the plenum temperature when the system will stop when refrigeration is running.

**2.8.6** Max below setpoint when drying  
The system will allow the intake system to open during drying until the plenum temperature meets the plenum setpoint less the number in this setting.

**2.8.7** Max above setpoint when drying  
The system will allow the intake system to open during drying until the plenum temperature meets the plenum setpoint plus the number in this setting.

**2.8.7.1** Example: Plenum setpoint 50, Max below = 2, Max above = 2, the plenum temperature will be controlled between 48 and 52.

## **2.9 Dewpoint**

Systems equipped with outside dewpoint sensors can use this measurement as a second criterion for the system to use in determining if outside air is available.

**2.9.1** Max when purging  
With the 'Monitor' box checked the system will not enter purge mode if the outside dewpoint is higher than the entered value. If the user wants the system to enter purge mode regardless of the outside dewpoint, the 'Monitor' box should be unchecked.

**2.9.2** Max when drying  
With the 'Monitor' box checked the system will not enter dry mode if the outside dewpoint is higher than the entered value. If the user wants the system to enter dry mode regardless of the outside dewpoint, the 'Monitor' box should be unchecked.

**2.9.3** Max at all other times  
With the 'Monitor' box checked the system will not consider air to be available if the outside dewpoint is higher than this value. If the user wants the system consider air available regardless of the outside dewpoint, the 'Monitor' box should be unchecked.

## **2.10 Return air**

The 'Return air' page is present if the system has incorporated auxiliary or pile sensors. These sensors can be used in conjunction (or without) the return air sensor to control the system in **Automatic mode**. The collaboration of these sensors provides the **Control Temperature** that the system uses to start and stop the system.

**2.10.1** Return air, Auxiliary 1, Auxiliary 2,.....  
To include a given sensor in the Control Temperature, the check box next to the temperature must be checked. To exclude a sensor, uncheck the check box.

- 2.10.2**    Method  
The user can select the Average, Maximum, or Minimum of the included sensors for the Control Temperature.
- 2.10.3**    Differential start  
The system can start to circulate air when there is a difference in the auxiliary or pile sensors to provide a uniform temperature throughout the pile.
- 2.10.4**    Start when difference is greater than  
This setting is the temperature difference between the auxiliary or pile sensors when the system should start circulating to even out the temperatures.
- 2.10.5**    Run until difference is less than  
This setting is the temperature difference between the auxiliary or pile sensors when the system should stop circulating to even out the temperatures.
- 2.10.6**    Extend runtime when temperature is satisfied  
This setting is the length of time the fans will continue to run after the Control stop temperature is achieved.

### 3 System Errors

If the system detects a error in a bin, it will shut that bin off and flash the red outside light. The error is displayed on the System Status Screen. The following is a list of possible errors:

Error	Description
Low plenum temp (ext)	The mechanical low temperature switch has been tripped.
Low plenum temp (int)	The low plenum stop temperature has been reached
Check fan overload	The fan overload has been tripped
Temp out of range	One of the temperature sensors is reading higher than possible due to a sensor failure
No fan current	The fans are not operating when they should
Frequency drive fault	One or more frequency drives have shut down
CO <sub>2</sub> purge too long	The system has been in purge for longer than 1 hr. The system will go into a warning and stop the purge
Dewpoint sensor error	The dewpoint sensor is reading 10F higher than the outside temperature

#### 3.1 Restarting the system

The error must be fixed. As an example, if the error is a low plenum temperature, the plenum air must be warmed before the error can be cleared. The error needs to be cleared from the system by pressing on the error button on the System Status Screen.