MicroVent Vision Operating Manual
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, CO₂, 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, CO₂, 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, CO₂, Events, and Time Intervals that can be selected for viewing. Events are shown in a tabular form, while Temperatures, RH, and CO₂ 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, 1 hr, 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 CO₂ 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 CO₂

2.5.1 CO₂ purge
The CO₂ purge can be enabled or disabled using the drop down menu.

2.5.2 CO₂ purge start level
This setting tells the system what level of CO₂ to start the purge.

2.5.3 CO₂ purge stop level
This setting tells the system what level of CO₂ 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\(_2\) 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\(_2\) 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\(_2\) 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\(_2\) concentration.

2.6.3 If the system has a CO\(_2\) sensor, the user can also select a Sensor Purge. The
system will enter purge mode during these times if the CO\(_2\) concentration rises
to the CO\(_2\) start level and exit purge mode once the CO\(_2\) 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.
2.7.2Humidity 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.

2.7.3Humidity cycle off time
This setting is the length of time in minutes that the humidity system will be off.

2.7.4Humidity 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.

2.7.5Humidity 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.

2.7.6Maximum 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.

2.8Drying
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.

2.8.1Drying enabled/disabled
Using the drop down menu, the drying function can be enabled or disabled.

2.8.2Max outside drying
The maximum outside temperature at which the system will enter drying mode.

2.8.3Min outside drying
The minimum outside temperature at which the system will enter drying mode.

2.8.4Low 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).

2.8.5High 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
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
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 to
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:

<table>
<thead>
<tr>
<th>Error</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low plenum temp (ext)</td>
<td>The mechanical low temperature switch has been tripped.</td>
</tr>
<tr>
<td>Low plenum temp (int)</td>
<td>The low plenum stop temperature has been reached</td>
</tr>
<tr>
<td>Check fan overload</td>
<td>The fan overload has been tripped</td>
</tr>
<tr>
<td>Temp out of range</td>
<td>One of the temperature sensors is reading higher than possible due to a sensor failure</td>
</tr>
<tr>
<td>No fan current</td>
<td>The fans are not operating when they should</td>
</tr>
<tr>
<td>Frequency drive fault</td>
<td>One or more frequency drives have shut down</td>
</tr>
<tr>
<td>CO₂ purge too long</td>
<td>The system has been in purge for longer than 1 hr. The system will go into a warning and stop the purge</td>
</tr>
<tr>
<td>Dewpoint sensor error</td>
<td>The dewpoint sensor is reading 10F higher than the outside temperature</td>
</tr>
</tbody>
</table>

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.