

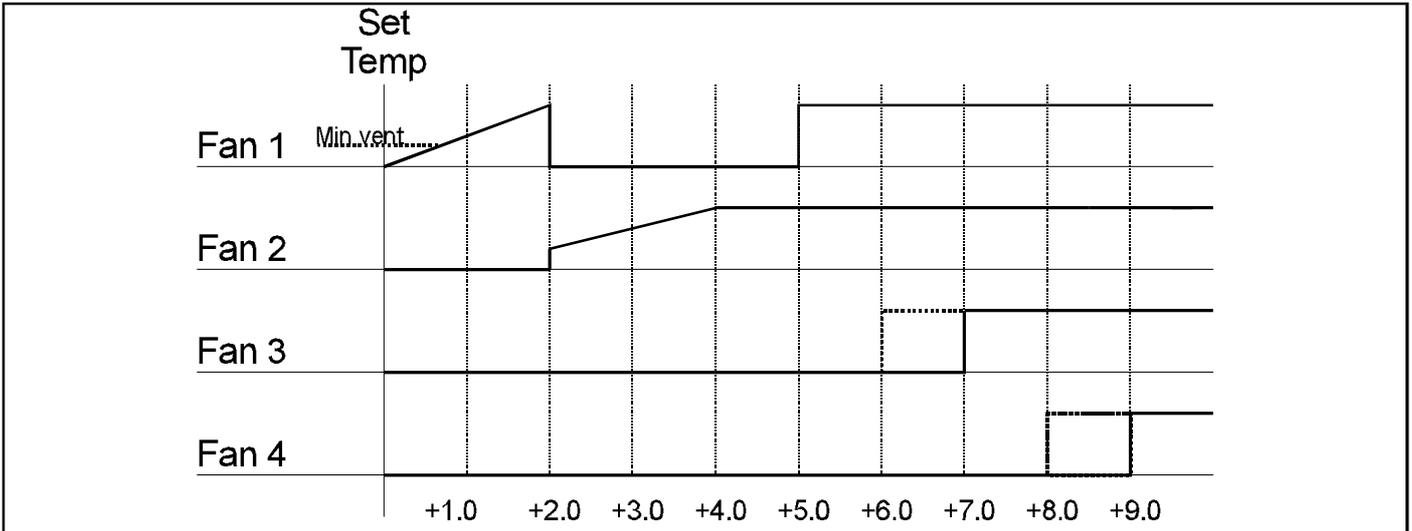
# CFC : Combinational Fan Control

CFC programs are for multi stage fan systems.

Unlike old fashioned multi stage systems, CFC programs allow flexible combinations of fans, with multiple stages of variable speed, as required.

**Example ventilation diagram below.**

In the example shown, the first stage of ventilation is with Fan 1, and next stage is two fans controlled together (Fan 2 is two fans), while Fan 1 is switched off. This allows finer increments in ventilation than simple sequential systems.



## How It Works

The program has two ways of setting the ventilation - from the Min Vent setting, or from temperature.

In cold weather and/or at low stocking rates/small animals, ventilation is determined by the Min Vent setting. This is aimed at providing an adequate level of ventilation to remove humidity and noxious gases.

Min Vent uses Fan bank 1 only. (Fan 1 may be more than one fan, depending on how your system is installed.)

If room temperature drops further, heaters are switched on (only when running at Minimum Ventilation.)

In warmer weather and/or with more or larger animals, there is a heat excess in the room, so ventilation needs to be increased to remove the excess heat.

Ventilation is only increased when the amount of heat in the room is greater than that needed to maintain target temperature - at the Minimum Ventilation rate you have set.

You don't need to increase Min Vent during hot weather, it will be increased automatically by temperature rise. (You may need to increase the Min vent setting as the animals grow, because bigger animals produce more water vapour.)

The more that room temperature rises above Set (target) temperature, the greater the amount of ventilation.

For any given circumstance of outside temperature and the amount of heat produced by the animals, the system will stabilise at an increased ventilation rate, with room temperature marginally above target temperature.

The ventilation requirement is assessed at intervals - usually once a minute - to allow adjustments to have an effect before another adjustment is made.

## Control Table

Temperature ventilation is made according to the difference between ACTual room temperature (ACT in the keypoint display) and SET temperature.

For example, if Actual is 71°, and Set is 70°, the *deviation* is 1°.

The "deviation" from Set is then compared with the Control Table for your particular controller.

The Control Table is very flexible and allows a wide range of fan combinations.

In the example shown above, a temperature deviation of 1° (above Set) would give 50% speed for Fan 1, with all the other fans off.

If the temperature deviation was 3°, you would get Fan 2 at 75% speed, with all the other fans off (including Fan 1, which was on before).

The exact pattern of outputs used is very flexible - speeds, levels, temperature offsets, combinations, and so on - and can vary widely from installation to installation, according to the size, number and placing of the fans installed.

The temperature offsets, combinations and so on are normally determined when the system is designed, and don't usually need to be adjusted thereafter.

On a day to day basis, the only adjustments needed are Set Temperature and Minimum Ventilation rate, the same as any other system.

In systems with a Curve you don't even need to adjust set temperature or minimum, you only need to start the curve.

## Min Vent

Min Vent is the lowest setting for Fan1 (but see below). This is to provide a level of ventilation to remove moisture and noxious gases, even in cold conditions. The higher the Min Vent setting, the cleaner the atmosphere in colder conditions, but the harder it is to maintain target temperatures, and the higher the heating costs.

The lower the Min Vent setting, the easier it is to maintain temperature, but the air quality may become poor in colder conditions.

Min Vent is lowest speed of Fan 1 UNLESS other fans are switched on.

In the example diagram shown, you will notice that below to just above Set Temp, Fan 1 is always running, but once Fan 2 is switched on, Fan 1 is switched off.

## Inlets & Curtains

Alongside changing the ventilation rate by fans, the system may position inlets or curtains.

This may be in one of two ways :

- 1) Automatically adjusting the curtain into the room or
- 2) Adjusting a curtain into a corridor.

In either case, it works in a similar way.

The inlet or curtain is positioned according to the volume of ventilating air. The higher the volume of ventilation, the more open the inlet or curtain.

Generally, the inlet or curtain is kept fully closed at low ventilation rates - perhaps until Fan 1 and Fan are at full speed (there may be additional "passive inlets" for air entry at low volumes), and only opened at higher rates.

When ventilation is from a corridor shared by several rooms, the corridor curtain is positioned according to the average ventilation rate demanded by all the rooms drawing air from that corridor.

## How to set target temperature and minimum ventilation

### Set Temperature

- 1 In the Settings menu, find Set Temp. Press the button to Select it.
- 2 Turn the knob to the desired value.
- 3 Press the button to Enter the value.

### Minimum Ventilation

- 1 In the Settings menu, find Min Vent. Press the button to Select it.
- 2 Turn the knob to the desired value.
- 3 Press the button to Enter the value.

## More information

### Fans Banks

A controller may have a number of *Fan Banks* and may have an *Inlet* (curtain) or not.

To check what your system has, look in Test : Outputs or in the Information menu. Depending on your building, you may have two or more fan banks.

For example, if you can see FAN1, FAN2, FAN3 (but not FAN4) your system has 3 fan banks .

A *Fan Bank* might be just one fan, but it may be more than one. For example, your system might have one fan as FAN1, two fans as FAN2 and 2 fans as FAN3 (five fans, but only three banks).

At any one moment, each output has a *Level* between 0 and 100%. To check the level, see the Information menu.

You could have all or any combination of output levels, depending on your system setup. Generally, you should expect to have at least one fan running (output greater than 0%), unless your system is set up for *Fan Cycling*.

## Speed Control and On-Off Fans

In any particular system, you may have a combination of speed controlled fans (varied from 0 to 100%) and on-off fans (0% or 100% only).

Speed controlled fans vary speed over a *temperature band*. For example, Fan 1 may go from 0% to 100% over the temperature range Set Temp to Set+2°.

On-Off fans usually switch On or Off with a *temperature switching band*. For example, Fan 3 may switch on at Set+7°F, and stay switched on until temperature falls to Set+6°.

## Fan Min Cycling

Fan Min Cycling is an optional feature

If the program is set up to use this feature, it automatically cycles Fan 1 if the Minimum Ventilation rate is adjusted to be lower than the lowest running speed permitted for Fan 1.

For example, Fan 1 may not run or give good air mixing at less than 50% speed, but you might need a ventilation rate lower than this.

If that's the case, it's possible to get a lower ventilation rate by running the fan for only part of the time.

For example, the system can get 25% by running the fan at 50% speed for only half the time. (Or even by running the fan at 100% speed, for 25% of the time.)

If your controller has this feature (AutoFan), then you don't need to adjust timers, you simply set the Min Vent you really want ( as a % of Fan 1 full capacity), and if the system can do it, it will do it automatically.

## Inlets

Inlets are positioned by "absolute reckoning", based on "stroke time" - the time it takes to go from fully open to fully closed and vice versa.

It first "initialises" the inlet or curtain to a known position - full stroke open or closed - and then calculates the time to go to other positions as required, keeping a tally of movements as it goes. Inlets or curtains are initialised when the program is started for the first time, or after a mains failure.

While the inlet or curtain is opening, some of the fans may be prevented from switching on, to avoid excessive strain on the curtain.