



### Conditioned cultivation

Conditioned cultivation is playing an increasingly important role in greenhouse horticulture because of the extra emphasis that is being put on sustainability and energy savings. Actively ventilating the greenhouse by drawing air from outside is a new, economically cost-effective application for this purpose. This process dehumidifies the greenhouse air because the outside air contains less moisture. This means that dehumidifying the greenhouse air by using a minimum pipe is no longer necessary.

In developing the Active Ventilation System (AVS) Van Dijk heating has created a system that makes it possible to dehumidify the greenhouse air with low costs. The system is based on actively ventilating the greenhouse air which is achieved by using high efficiency fans to draw in and distribute the outside air over the greenhouse. The system maintains circulation by having a small, forced air flow, which improves the greenhouse climate and saves energy.

## Active Ventilation System (AVS)

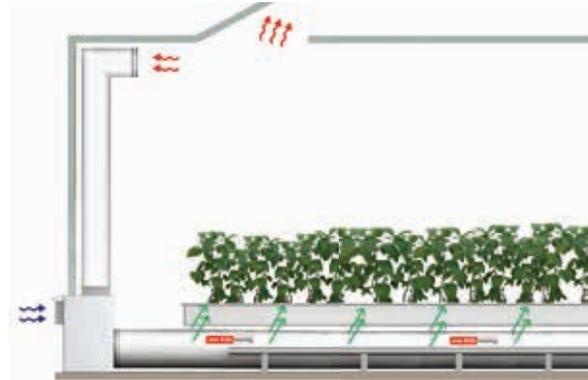
# 6.03 EN

## Active ventilation, dehumidifying, cooling and heater with minimum energy consumption

The temperature, humidity, and CO<sub>2</sub> concentration in a greenhouse can be controlled with the Active Ventilation System which uses a minimum amount of energy and has very low investment costs. The outside air can be heated as required by:

- A) mixing warm greenhouse air by having a mixing valve in the air flow, and/or
- B) having a heat exchanger with a low value central heating system.

The system can also be used for cooling by combining the active ventilation with a water misting system. Because of the cooling system's high COP value it is possible to achieve substantial cooling capacity using the lowest ventilation rate possible. This also limits CO<sub>2</sub> loss and can increase the average CO<sub>2</sub> concentration value in the greenhouse with normal CO<sub>2</sub> dosing.



### AVS installation

The Active Ventilation System's design conditions/specifications are determined in consultation with the client. Van Dijk heating recommends maintaining a minimum air input volume of 5 m<sup>3</sup>/h per m<sup>2</sup> of crops. When a client purchases an AVS we calculate the entire air distribution system. The climate computer controls the AVS unit. Our AVS units are available in two models: a wall unit (WU) for building into the wall of the greenhouse and a stationary unit (SU) which can be set up anywhere inside the greenhouse or outside.

### Stationary AVS unit

The stationary AVS unit (SU) consists of two main components: the ventilator and the valve block. The valve block also contains the central heating element with filter. Thanks to its modular construction an AVS system can be installed in almost any situation.

### AVS wall unit

The AVS wall unit (WU) consists of a plastic cabinet that is mounted in the greenhouse wall. The cabinet contains the following main AVS system components:

#### Valve block

The valve block consists of two aluminium shutter valves for controlling the amount of greenhouse air and outside air.

#### Central heating element with filter

The central heating element warms the mixed air from 10°C to approximately 20°C. On the central heating side the element is connected to a low temperature (LT) network with 40°C supply and 30°C return temperatures. The filter protects the installation against dust, insects etc. It has a pressure gauge and, when wanted, an electrical signal to indicate when cleaning is required.

The cabinet has a removable door on the outside for inspection, servicing and cleaning. The grating for drawing in outside air is also positioned on the outside of the cabinet. The connection for drawing in greenhouse air is positioned on the top of the cabinet. This connection can be extended with an air duct so that air can be drawn in from high in the greenhouse. The connection(s) for the air hose and/or the air distribution system are on the front and/or sides.

#### Ventilator

The ventilator consists of a low noise plastic rotor that is driven by an EC motor. An EC motor is a direct current motor with a built-in converter and should be connected to 3 phase alternating current. The motor has a speed regulator and is controlled with a 0-10V signal. The advantage of EC motors is their high efficiency throughout the entire adjustment range. A frequency regulator is not required with this motor. The capacity can be adjusted between 50 and 100% depending on the air distribution system that is used.

## Advantages of the Active Ventilation System in horticultural greenhouses

#### Energy savings due to:

- dehumidifying greenhouse air without adding heat
- keeping the screens closed for a longer time
- high COP value when used as a cooling system
- better utilisation of temperature integration.

#### Climate improvement due to:

- the effects of active ventilation
- minimum temperature differences when recirculating
- a vertical flow of fresh air through the crop
- improvement to the microclimate around the plants.

#### Improved returns due to:

- effective use of low temperature heating systems
- better CO<sub>2</sub> distribution
- higher CO<sub>2</sub> concentration in the greenhouse
- reducing the disease pressure