



The important principles for an investment in the Airmix are:

- An even climate with small horizontal temperature differences. In practice, temperature differences of 5 °C are reduced to 0.3 °C. This contributes to the plant quality and in a quantitative way; to a higher production in places where it is normally colder.
- Energy savings by keeping the screen completely closed for a longer period. Up to 20% energy savings can be achieved in an unlighted cultivation with a single screen, this is a precept based on practical experience.¹ The climate control must be applied correctly for a good result.
- Regulating the degree of humidity and / or temperature; comply with light emission legislation. Regulating the humidity results in the desired growing climate. In certain situations/ countries there are restrictions with regard to light emission. By applying Airmix, local light emission requirements can be met.

The system

In 2014, Van der Ende Groep started developing the Airmix. In 2015, the first pilot project was installed and from the beginning of 2016 the Airmix is a commercial product. Currently, there are ca. 157 ha. of greenhouses equipped with the Airmix. The Airmix is a system with mainly two functions i.e.; the horizontal circulation of greenhouse air and the ventilation/ mixing with air from above the screen. Because the air from above the screen is dryer, it ensures dehumidification and because the air from above the screen is cooler, it also provides cooling under the screen.

Even climate

The usual method of humidity control is the moisture removal through screen gapping. This leads to cold draught, causing unwanted temperature differences and uncontrolled energy losses. The Airmix is a controllable way of humidity removal through a closed screen. By keeping the screen closed, the wind has less influence and there are no unwanted cold air flows that result in huge temperature differences. From practical experience, feedback is given that horizontal temperature differences of less than 0.3 ° C are achieved with the Airmix.

Cold dry air is heavier than warm moist greenhouse air. Because the Airmix mixes the cold air with the warm moist air, the composition of air changes. This ensures an even vertical air mixture. This keeps the removal of humidity at the bottom of the crop at the required level without heating the tubes.

Energy savings

The energy saving by an Airmix system is not directly due to the Airmix itself, but by the way of screening. With an Airmix it is possible to make about 50% more screen hours by screening at the edges of the day. (Transparent) screens are also possible during the day. By keeping the screen closed, heat loss through radiation is limited. In a traditional greenhouse with only an energy or blackout screen located in the Netherlands, it can be assumed that up to 20% energy can be saved with an Airmix system in a situation without lighting.¹ The greenhouse is better insulated with a second screen. Keeping the screen closed, which is made possible by the Airmix, can result in energy savings of up to 50% compared to a single screen installation without Airmix.¹ With an Airmix in a lighted cultivation, the lamp heat is used and the tube heating can often be switched off. Cannabis cultivation in Canada, for example, is only heated via the pipes at extremely cold temperatures. A Dutch cucumber grower has made a calculation for the winter period from December to February.

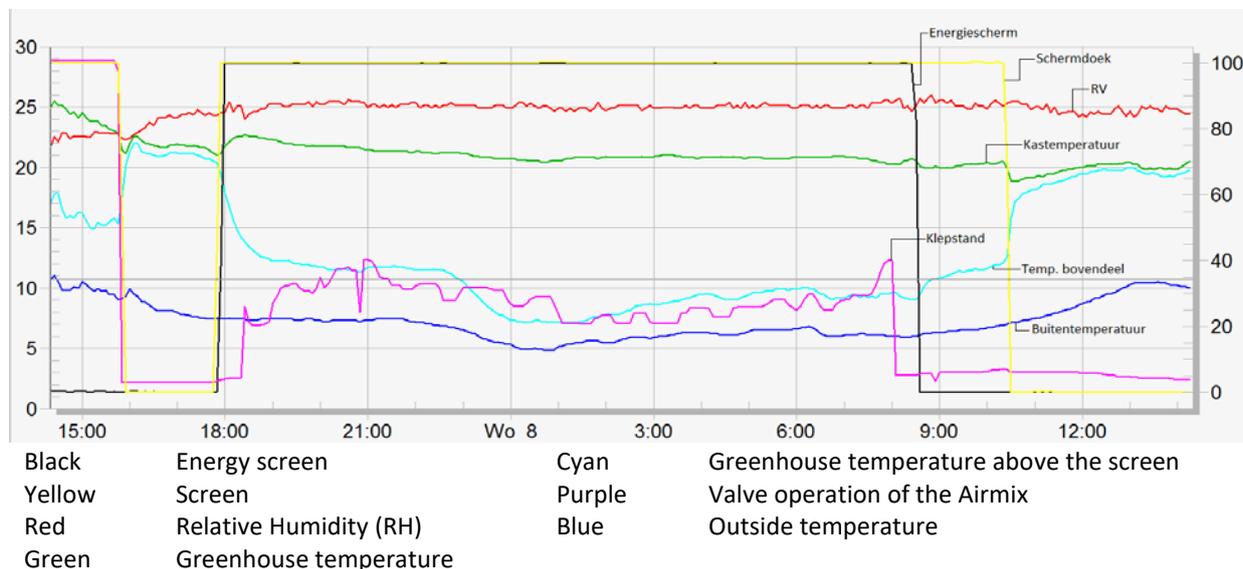
Here, the Airmix provides savings of 4.8 m³/m² in gas consumption, which is considerable given its annual consumption of approx. 40m³ / m².

¹ Based on statements made by an external consultant (former employee of Wageningen University & Research)



Regulating the degree of Humidity and/ or temperature

Due to the modulating valves in the Airmix, the degree of dehumidification and cooling can be adjusted according to the needs. The air that is brought under the screen creates a slight overpressure, so that the same amount of greenhouse air is expelled upwards again by the (porous) screen. Above the screen, the moisture condenses against the roof of the greenhouse and leaves the greenhouse through the ventilation windows when they are open. The diagram below shows how a modulating valve position ensures a constant RH of 85% in the pot plants.



Cooling when shading (black-out)

Cooling when shading without a ventilation system causes challenges; the soil and substrate are still warm and deliver heat; by dissipating heat with screen gaps, temperature differences arise and unwanted light rays enter; RH quickly rises due to rapid cooling, which increases the risk of condensation. With the Airmix, outside air is distributed and brought into the cultivation area in a controlled manner, which contributes to the removal of moisture and cooling to the desired temperature.

With the addition of the direct intake of outside air, we are moving towards the closed greenhouse principle. Here we see the following advantages;

- A slight overpressure is created in the greenhouse by keeping the vents closed. Through the gaps and openings in the greenhouse, the air will only go out and not come in.
- It is possible to ventilate or cool with an open screen installation;
- Unwanted insects from outside the greenhouse are kept out or destroyed by the fan;
- Keeping air vents closed ensures savings in CO₂ and heat.

Quotes heard (translated)

- "The Airmix gives a lot of savings on energy and control" Aad Vreugdenhil, Kwekerij Vreugdenberg (kalanchoe)
- "I can tell from the state of the crop that it is working" Kees Hendriks, Kees Hendriks Pijnacker BV (cucumber)
- "With the Airmix, screen gapping is a thing of the past" Ferry Visser, Visser Chrysanten
- "I have a more even temperature in the 160m long paths" Henry Rodenburg, Botanica cucumbers

Publication (English)

- [HortiDaily "This system is priceless"](#)
- [Wageningen University & Research "Screen fans secures better climate and lower humidity"](#)
- [In Greenhouses "Using dry air above screen to remove moisture seems effective"](#)

Publication (Dutch)

- [BP Nieuws "Dit systeem is helemaal goud"](#)
- [BP Nieuws "Met gesloten schermdoek ventileren en ontvochtigen wint aan populariteit"](#)
- [Onder Glas "Betere luchtcirculatie leidt tot meer gelijkheid in het gewas"](#)
- [BP Nieuws "Gelijkmatig klimaat met Airmix systeem"](#)
- [BP Nieuws "Airmix in de potplanten"](#)
- [BP Nieuws "Video: rozenteler vertelt over ervaringen met Airmix"](#)
- [BP Nieuws "Ventilatiesysteem Airmix operationeel bij Berg Roses"](#)
- [BP Nieuws "Ontvochtigen zonder temperatuurverschillen binnen gewas met Airmix"](#)
- [Groente Nieuws "Gestuurd ventileren zonder kieren in scherm"](#)

Documents and more (English)

- [Airmix web page](#)
- [Airmix leaflet](#)
- [Airmix user manual model G](#)

Animated movie: Airmix controlled ventilation





Photos of the Airmix Model G



