

Fogger

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For optimal cooling or humidifying of greenhouses

- Reduces greenhouse temperature
- Increases greenhouse humidity
- Fine droplets (average 90 microns)
- Provides perfect conditions for plant propagation
- Leakage Prevention Device for simultaneous start-up and shut-down of the system



Climate Control of Temperature and Humidity in Greenhouses

Climate control in a greenhouse is based on the principle of the exchange of energy between the air and the fog moisture supplied by the **NaanDan Fogger**.

One calorie is the amount of heat necessary to raise the temperature of 1 cm³ of water by 1°C.

The conversion of water from liquid to vapor absorbs heat from the surrounding air, at a rate of 590 calories/1 gram of evaporated water. This process lowers the air temperature.

Efficient installation and operation can reduce the temperature in the greenhouse by 4 to 6°C, depending on the environmental conditions. Efficiency of the cooling system depends on two environmental factors:

- External temperature
- External humidity

Essential conditions for efficient cooling with the **NaanDan Fogger** are:

- An efficient ventilation system which continuously introduces external dry air into the greenhouse to replace the humid air.
- Pulse operation of the fogging system, to minimize the amount of water that may settle on the foliage.

How much water is needed to cool a greenhouse?

In our experience, a fog precipitation of 2.5 to 3 mm/h is suitable in the majority of cases (3 mm/h = 30 m³/h per ha.)

How to choose the fogging duration and the interval between fogging pulses?

The interval between fogging pulses is set at 10 seconds. The duration of fogging depends on the air velocity created by the ventilation system.

Cooling

Determining the fogging duration

Air velocity	Interval	Duration
0.10 m/s	10 seconds	1 - 2 seconds
0.50 m/s	10 seconds	3 - 5 seconds
1.0 m/s	10 seconds	10 seconds

A controller will be installed to manage these pulsations. The controller will be connected to temperature and humidity sensors. Due to the short intervals between fogging pulses, the **NaanDan Fogger** should be installed with an anti-drainage device. This will ensure that all Foggers will start up and shut down quickly and simultaneously.

What is the importance of the droplet size created by the NaanDan Fogger?

With a 7 l/h nozzle at 4 bars, the average fog droplet is 90 microns. These droplets evaporate without wetting the leaves or greenhouse floor.

Installation design of 7 l/h NaanDan Fogger (T-shape)

- Distance between lines: 3 m
- Distance between Foggers: 1.5 - 2 m
- The Foggers should be installed as high as possible above ground
- The Foggers should be mounted on a T, with two Foggers installed perpendicularly to the mainline (anti-twist PVC).

Cooling and humidifying cannot be conducted simultaneously.

Humidification

If we need to increase the humidity, ventilation must be shut down. The duration of fogging should be as short as possible (1 second). The intervals between fogging vary according to the minimal relative humidity required. In the morning, when temperatures rise and humidity decreases, the humidity sensor will start the fogging system.

Determining the interval between fogging

Humidity	Interval	Duration
30 - 40%	60 seconds	1 second
40 - 50%	90 seconds	1 second
50 - 60%	120 seconds	1 second

Spraying

Spraying pesticides through the **NaanDan Fogger** system has been tested successfully in various countries.

Water quality

In order to avoid clogging by carbonates or the accumulation of salt deposits on the leaves, it is recommended to avoid irrigation with hard or saline water. Rainwater, soft water or osmosis-treated water is the most suitable.

Optional nozzles

Colour	blue	orange	red	black
Flow rate l/h at 4.0 bar	7.0	14.0	21.0	28.0