

Sprinkler Systems Design Guide

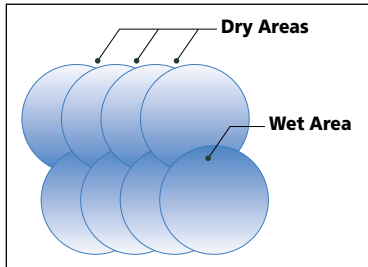
Automated
Watering
Systems
for Greenhouse
and Nursery



SpinNet Sprinkler

The Netafim Solution

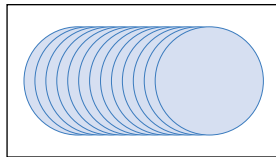
Why Netafim Systems Are Better



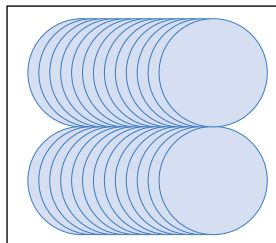
Traditional "Head to Head" Overlap.

Traditional sprinkler layout spaces the sprinklers "head to head" or at a spacing equal to the radius of the sprinkler throw. For larger areas, the patterns are overlapped creating both wet and dry areas.

The Netafim solution avoids the problems of the traditional sprinkler layout and achieves a high level of uniformity within a closely spaced "strip of sprinklers". By designing with these "strips" laid out side-by-side, large areas can be covered uniformly.



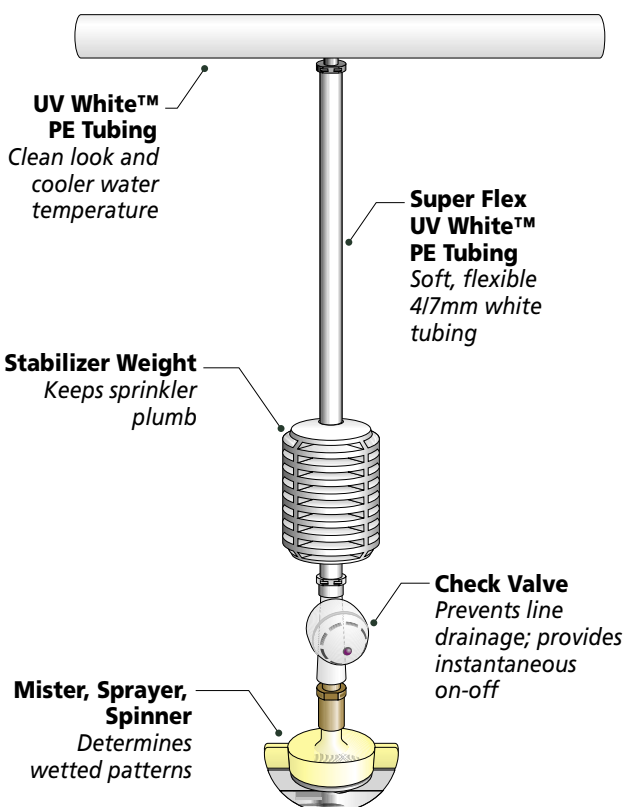
Netafim One Line Solution.



Netafim Two Line Solution.



SpinNet Drip-less Sprinkler



Low Cost and Fast Payback

- Payback for a complete system is usually within the first season of operation.

Drip-less Sprinklers

- The new SpinNet Sprinkler offers drip-less operation - the plants below are not damaged from water dripping off the sprinkler.
- Check Valve prevents the sprinkler line from draining onto the plants below after shut-down and provides instantaneous on-off for accurate short cycle watering and misting.
- Sprinklers hang below the supply pipe, preventing wetting of the pipe and dripping onto the plants below.

Highly Uniform Watering

- Increases crop uniformity.

Highly Durable

- Made from the highest quality plastics with excellent Ultra-Violet (UV) resistance. Our reflective white tubing is completely opaque to prevent algae growth, UV resistant, and can withstand heat, direct sun and harsh chemicals.

Low Maintenance

- All sprinkler parts can be assembled and disassembled in the greenhouse without tools.

Selecting a Sprinkler for Watering

Step 1

Visualize the Greenhouse

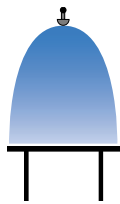
Evaluate the location of obstacles such as curtains or hanging baskets. Consider aisles and whether they can be wetted. Review cultural practices which might impact the height at which the sprinklers should be placed.

Step 2a

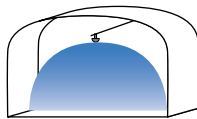
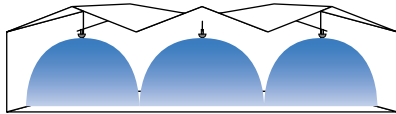
Select a Sprinkler Head for Watering Applications (go to Step 2b for Misting, Propagation or Cooling Applications)

All sprinkler solutions are based on an average sprinkler working pressure of 30 psi and spacing between the sprinklers of three feet.

Single Bench Solutions

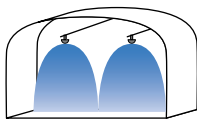
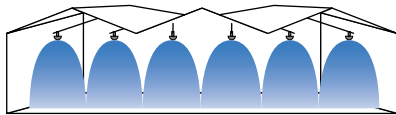


Bench Width (ft)	Spacing Between Sprinklers (ft)	Height Above Crop	
		2'	4'
4	3	VS-GN	VS-GN
5	3	VS-GN	VS-GN
6	3	VS-GN	VS-GN
7	3	SN-RRGY	SN-RRGY
8	3	SN-RRGY	SN-RRGY
10	3	SN-RRGY	SN-RRGY



One Line Solutions for Single Bay or Quonset

Bay Width (ft)	Spacing Between Sprinklers (ft)	Height Above Crop		
		2'	4'	6'
12	3	SN-RRGY	SN-YBGY	SN-YBGY
14	3	SN-RRGY	SN-YBGY	SN-YBGY
16	3	SN-RRGN	SN-YBGY	SN-YBGY
18	3	SN-RRGN	SN-RRGN	SN-YBGY
20	3	SN-RRGN	SN-RRGN	SN-BBGN
22	3	-	SN-RRGN	SN-BBGN
24	3	-	SN-RRGN	SN-BBGN



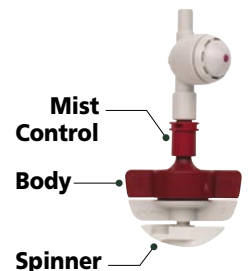
Two Line Solutions for Single Bay or Quonset

Bay Width (ft)	Spacing Between Sprinklers (ft)	Spacing Between Sprinkler Lines (ft)*	Height Above Crop		
			2'	4'	6'
24	3	14	SN-RRGY	SN-RRGY	SN-RRGY
26	3	14	SN-RRGY	SN-RRGY	SN-RRGY
28	3	14	SN-RRGY	SN-RRGY	SN-RRGY
30	3	16	SN-RRGY	SN-RRGY	SN-RRGY
32	3	18	SN-RRGN	SN-RRGY	SN-RRGY
34	3	20	SN-RRGN	SN-RRGN	-
36	3	21	SN-RRGN	SN-RRGN	-

*Note that a more symmetrical spacing will also work well, e.g. 15' between sprinkler lines for a 30' house.

Ordering Guide

Code	Description	Part Number	Flow (GPH)
VS-GN	Vibro-Spray Green Nozzle w/Check Valve	031050L-B	13.6
SN-RRGY	SpinNet Red Body, Red Mist Control, Grey Spinner w/Check Valve	03551200070L-B	18.4
SN-RRGN	SpinNet Red Body, Red Mist Control, Green Spinner w/Check Valve	03551200070GL-B	18.4
SN-BBGN	SpinNet Brown Body, Brown Mist Control, Green Spinner w/Check Valve	03551600090GL-B	23.4
SN-YBGY	SpinNet Yellow Body, Brown Mist Control, Grey Spinner w/Check Valve	03552000090L-B	23.4



Selecting a Mister or Fogger

**Step
2b**

Select a Sprinkler Head for Misting, Propagating and Cooling Applications



Micronet Fogger

The Micronet fogger is the best nozzle for propagation. It creates a zone of saturated humidity that is ideal for rooting. Please see the back page for recommendations on how to use this product for propagation (humidifying) and cooling.

Part Number	Description	Flow (GPH)
0306643HL-B	4 Nozzles with High Pressure Check Valve	8.1
0306643LL-B	4 Nozzles with Low Pressure Check Valve	8.1
0306613HL-B	1 Nozzle with High Pressure Check Valve	2.0

Jet-Clear Mister

For Misting Single Benches

The Jet-Clear mister is used for light watering or propagation on a single bench. Use the blue nozzle for benches up to 4' wide and the black nozzle for benches up to 5' wide.

Part Number	Description	Flow (GPH)
03630407-B	Blue Nozzle with Check Valve	10.9
03630707-B	Black Nozzle with Check Valve	18.2



Vibro-Mist Mister

For Misting Larger Areas

The Vibro-Mist mister is used when a light mist is required for watering, for example when germinating seeds. The highest uniformity is found with spacings of 4' x 4', 4' x 6' and 3' x 7'.

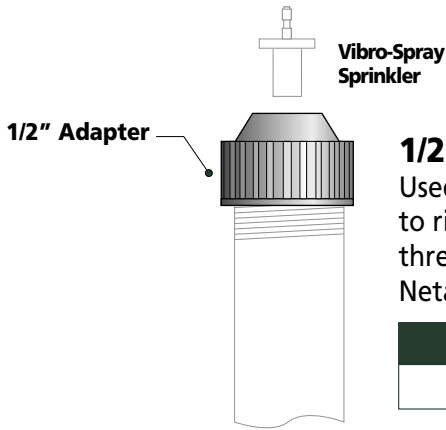
Part Number	Description	Flow (GPH)
03630407-B	Violet Nozzle with Check Valve	5.7

Selecting the Sprinkler Base

Step 3

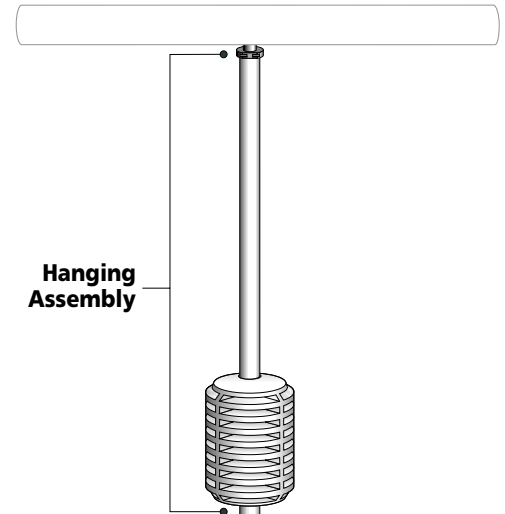
Select a Sprinkler Base

Netafim offers a selection of three bases to connect the sprinkler, mister or fogger to the supply pipe.

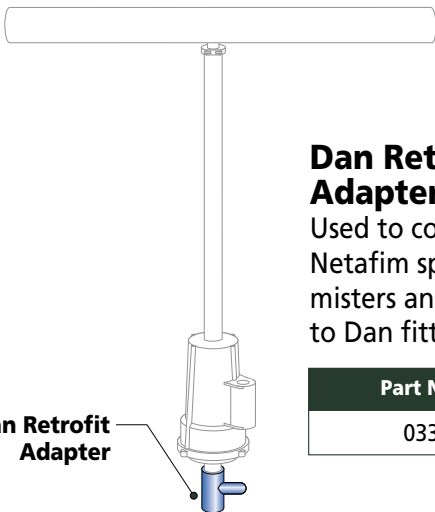


1/2" Adapter
Used for connection to rigid pipe with 1/2" threaded connections and Netafim sprinklers.

Part Number
03206-B

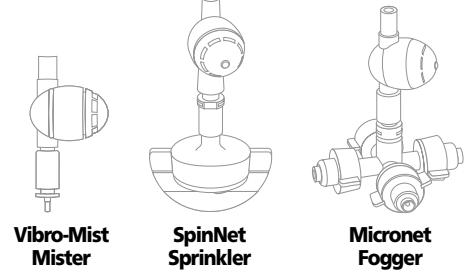


Hanging Assembly



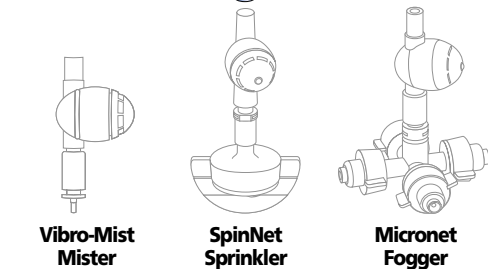
Dan Retrofit Adapter
Used to connect Netafim sprinklers, misters and foggers to Dan fittings.

Part Number
03302-B



Hanging Sprinkler, Mister or Fogger Assembly

Used for connection to Polyethylene (PE) Tubing with Netafim sprinklers, misters and foggers.



Part Number	Tube Length
0300HSAC-12-B	12"
0300HSAC-24-B	24"
0300HSAC-30-B	30"
0300HSAC-36-B	36"
0300HSAC-48-B	48"
0300HSAC-48X-B*	Extension

*Used to achieve tube lengths over 48".

Sizing the Pipes

Step 4

Size the Sprinkler Supply Pipe

Use the chart below to select the correct sprinkler supply pipe size. Low density polyethylene is strongly recommended.



Netafim UV White™ PE Tubing

Offers a cool look, cooler water temperature, enhanced plant growth.

Poly Pipe Sizing

	Nozzle Color	Average Flow (GPH)	Length of Sprinkler Supply Pipe					
			25'	50'	75'	100'	125'	150'
Micronet Fogger	-	8.1	3/4"	3/4"	3/4"	3/4"	3/4"	3/4"
Vibro-Mist	Violet	5.7	3/4"	3/4"	3/4"	3/4"	3/4"	3/4"
Jet Clear	Blue	10.9	3/4"	3/4"	3/4"	3/4"	3/4"	1"
	Black	18.2	3/4"	3/4"	3/4"	1"	1"	1"
Vibro-Spray	Green	13.6	3/4"	3/4"	3/4"	3/4"	1"	1"
SpinNet (Body/Mist Control)	Red/Red	18.4	3/4"	3/4"	3/4"	1"	1"	1"
	Brown/Brown	23.4	3/4"	3/4"	3/4"	1"	1"	-
	Yellow/Brown	23.4	3/4"	3/4"	3/4"	1"	1"	-

Step 5

Size the Distributor and Mainline

The remaining piping and system components are sized based upon the maximum flow they will receive. Use the **Flow Per Sprinkler Line** chart to determine the flow of a single sprinkler supply pipe for the length of run in your design. If more than one sprinkler line will be operated at once, be sure to multiply the flow by the number of lines when sizing the system pipes and components. Pipe size recommendations are guidelines only. For distributor lines over 40 feet, mainlines over 100 feet or when slopes are a factor, please consult a design professional.

Flow Per Sprinkler Line (GPM)

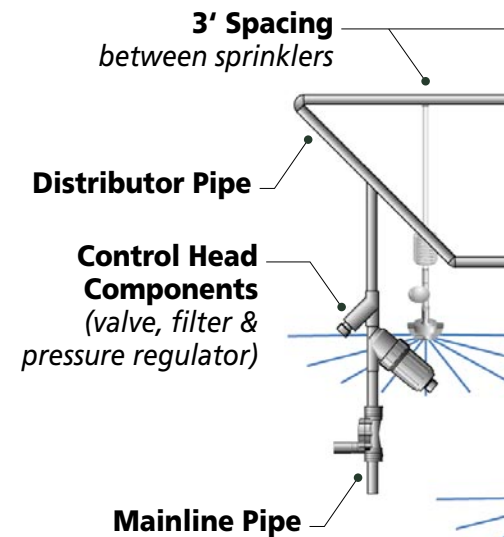
	Nozzle Color	Average Flow (GPH)	Length of Sprinkler Supply Pipe (# of Sprinklers)						
			25' (9)	50' (17)	75' (25)	100' (34)	125' (42)	150' (50)	
Micronet Fogger	-	8.1	1	2	3	4	6	7	
Vibro-Mist	Violet	5.7	1	2	3	3	4	5	
Jet Clear	Blue	10.9	2	3	5	6	8	9	
	Black	18.2	3	5	8	10	13	15	
Vibro-Spray	Green	13.6	2	4	6	8	10	12	
SpinNet (Body/Mist Control)	Red/Red	18.4	3	5	8	10	13	15	
	Brown/Brown	23.4	3	7	10	13	16	20	
	Yellow/Brown	23.4	3	7	10	13	16	20	

Distributor Pipe Sizing

Pipe Size	Maximum GPM
3/4"	10
1"	15.8
1 1/4"	20
1 1/2"	27
2"	35

Mainline Pipe Sizing

Pipe Size	Maximum GPM
3/4"	7
1"	11
1 1/4"	20
1 1/2"	28
2"	45



Sizing the Head Control Components

Step 6

Size the Head Control Components

The components should be sized according to the flow range shown in the *Filter, Valve & Pressure Regulator Sizing* chart. The pipe connecting to the components can be of a different size.

Filter, Valve and Pressure Regulator Sizing

	Flow Range (GPM)	Unit Size	Part Number
Electric Valve (AC)	Up to 50	1"	61ET1PBI
	Up to 125	1 1/2"	61ET1.5PBI2
	Up to 175	2"	61ET2PBI2
	Up to 225	3/2"	61ET323PBI2
Disc Filter (120 mesh)	Up to 18	3/4"	25A45-120
	Up to 26	1"	25A45-120
	Up to 52	1 1/2" Super	25A17-120
	Up to 120	2" Dual	25A30-120
Pressure Regulator (35 psi)*	3.5 to 17.6	3/4"	32PRV.75-35V2K
	7 to 35	1 1/2"	32PRV1.5-35V2K
	14 to 70	2" (x4)	32PRV2-435V2K

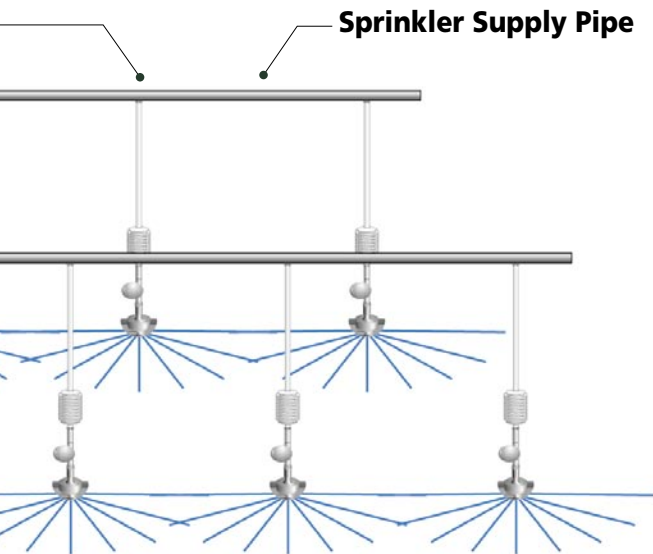


*A 35 psi regulator will typically provide the desired 30 psi average sprinkler pressure after line and component pressure losses.

Step 7

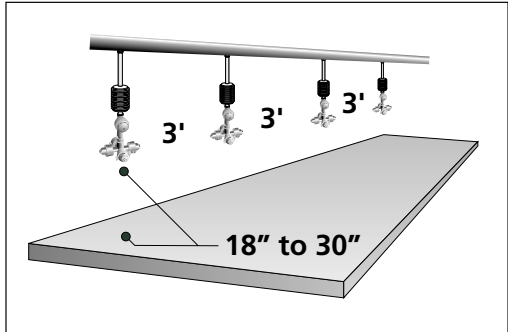
Starting Up a System for the First Time

The most important point to remember when starting up a new system is to flush the mainlines. Debris from construction can otherwise be washed into the sprinklers, causing a plug or improper operation. To properly flush a system, first connect all the pipes and assemblies, except the sprinklers with Check Valves. Next, open the ends of the distributor line and the sprinkler supply pipes. Close them off, one by one, starting with the opening closest to the head control, and proceeding to the most distant opening. Only after complete flushing should the sprinklers with Check Valves be attached to the assemblies.



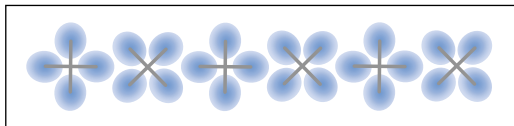
Micronet Fogger Installations

Rooting Benches (Propagation) Information

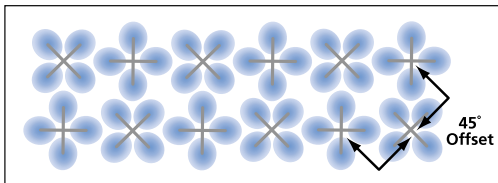


3 to 4 Foot Bench - The height of the fogger assembly should be 18" to 30" above the propagation material. The distance between the fogger assemblies should be 3 feet. (Place the lateral above the center of a 3 to 4' bench.)

Wide Bench - For wide benches (up to 8') use two lines of foggers equally distanced from the center of the bench. For large areas, use one row of foggers for every 4' width of area to be fogged.



45° Offset - 4-way crosses should be placed at 45° angles to one another.



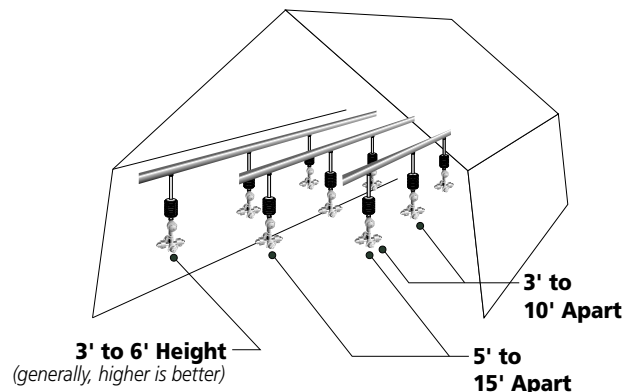
Humidification and Cooling Information

General Spacing and Operation for Humidifying and Cooling

Distance Between Fogger Units (ft.)	3	5	6.5	10	6.5	10
Distance Between Lines (ft.)	6.5	10.5	10	10	13	13
Single Fogger - Pulse (sec.)	3	5	10	20	30	40
Single Fogger - Interval (sec.)	50	30	50	60	111	85
4-Way Fogger - Pulse (sec.)	1	3	5	10	20	30
4-Way Fogger - Interval (sec.)	74	91	120	150	355	345

- In order to maximize the cooling effect, exhaust fans are recommended to exchange the air about 20 times per hour.
- These recommendations are general and should be applied in accordance with local conditions and limitations.
- Duration of pulse and interval is to be fine-tuned according to local conditions; the timing provided is just a starting point.
- For crops that are not sensitive to wetting, the pulse can be prolonged, and/or the interval shortened.
- Other spacing can certainly be used with foggers; the spacings above give some reference points between spacing and operation intervals.

Typical Installation for Humidification or Cooling



Cooling considerations include:

- Place foggers as high as possible
- Avoid spraying against the roof or structure
- Prevent precipitation by adjusting the cycle time

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