MISTERS AND **FOGGERS**

World Leader in Irrigation Technology

JAIN

JAIN Foggers and Misters

JAIN Foggers and misters provide superior and consistent climate control of temperature and humidity for greenhouse applications. The average fog droplet size is 60 microns at 58 PSI. Foggers are used for cooling, humidifying, cutting propagation and seed germination.

Benefits of JAIN Foggers and Misters

- Reduces greenhouse temperature
- Increases greenhouse humidity
- Provides perfect conditions for plant propagation and seed germination
- Extra fine droplet size (average 60 microns at 58 PSI)
- Easy to assemble and install
- Systems are easily disassembled for cleaning and maintenance

JAIN Fogger and Mister Applications
Evaporative cooling and humidifying control for greenhouses, high tunnels and apple orchards
Seed germination and cutting propogation
Livestock cooling
Chemical application - using the Super Fogger (Please follow product label instructions
Organic or conventional fields
Uniform irrigation applications

JAIN Foggers and Misters

Misters and Foggers Ordering Guide

Model #	Mount		Super LPD		Nozzle Color		Base		Tubing	
128	2	One Fogger	0	None	0	None	0	None	0	None
	5	2-Way Tee	7	LPD (Blue) - Female (standard)*	3	Blue	1	Butterfly - Barb (standard)	1	12" with weight
	1	4-Way Cross	8	LPD (Black) - Female (standard)**	5	Orange	2	1/2" Male - Base	2	18" with weight
	9	Green Mist	6	LPD (Blue) - Barb	7	Red	3	Fast-n-Fast	3	24" with weight
			3	LPD (Black) - Barb	8	Black			4	30" with weight
			5	LPD (Blue) - 3/8"	2	Green (Green Mist)			5	36" with weight
			2	LPD (Black) - 3/8"	9	Plug			6	48" with weight
									7	60" with weight

Catalog Number: 128 1 8 8 1 5

Description: Fogger, 4-Way Cross, LPD (Black), Black Nozzle, Butterfly Barb and 36" Tubing with Weight

Note: No tubing needed if a base is ordered.

* LPD (Blue) - Fogging applications, Opens @ 55psi, Closes @ 35psi

** LPD (Black) - Misting applications, Opens @ 20psi, Closes @ 9psi

Standard assemblies come with vinyl tubing.

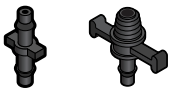
Selection Guide

Product	Nozzle Color	Super LPD Color	Pressure (psi)	Flow Rate (GPH) at listed pressure			
				Single Nozzle	2-Way Tee	4-Way Cross	2-Way
Dan Fogger*	Blue	Blue	58	1.8	3.6	7.2	
	Orange	Blue	58	3.6	7.2	14.4	
	Red	Blue	58	5.4	10.8	21.6	
	Black	Blue	58	7.4	14.8	29.6	
Super Fogger	Black	Built-in	58				3.3
Green Mist	Green	Black	30	7.9			
Green Mist Jr.	Purple	Black	30	5.3			

* For misting application with Dan Fogger use Super LDP - Black

JAIN Fogger Nozzles

Barb 4/7

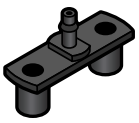


3/8" with Thread Connector for PVC Pipe Connection

Tube 4/7

Stabilizer Weight 5 -1/2"

Butterfly 4/7 x Male Taper



Part #	Description
12898200	Green Mist with low pressure LPD (3' to 4' above plants)
12857300	2-Way Tee Fogger with high pressure LPD
12817300	4-Way Cross Fogger with high pressure LPD

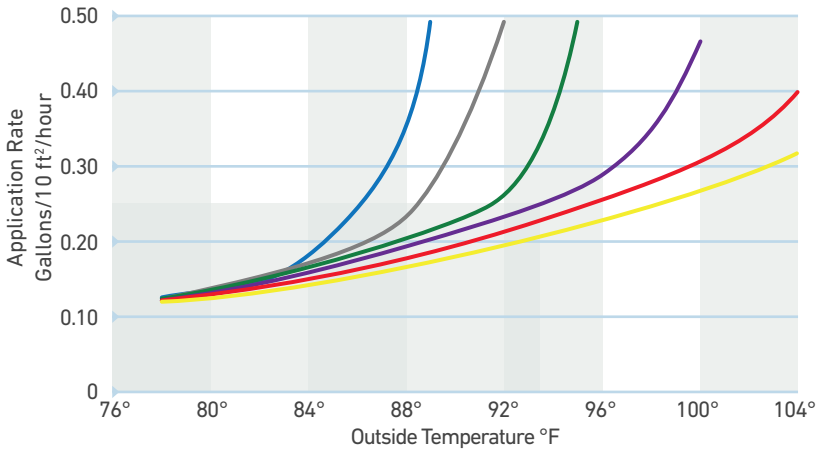
Cooling

- One calorie is the amount of heat necessary to raise the temperature of 1 cm^3 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 per 1 gram of evaporated water. This process lowers the air temperature.
- Efficient installation and operation can reduce the temperature in the greenhouse between 6° and 9° F, depending on two environmental factors: external temperature and external humidity.
- Efficient cooling with foggers requires an adequate ventilation system that continually introduces external dry air into the greenhouse to replace the humid air.
- A precipitation rate of .118 in/hour (3mm/hour) is suitable for cooling.
- The duration of the fogging depends upon the air velocity created by the ventilation system.

Cooling

Air Velocity	Interval	Duration
0.5 ft/sec	10 seconds	1-2 seconds
1.5 ft/sec	10 seconds	3-5 seconds
3 ft/sec	10 seconds	10 seconds

The amount of water to be evaporated to keep a greenhouse at 82° at various outside temperatures and relative humidities. The inside relative humidity assumed to be 80%.



Example:
Site Conditions: Outside Relative Humidity: 30%
Outside temperature: 93.5°F
Steps: Read up from 93.5°F Outside Temperature to intersection with 30% RH curve. Read across to left to find application rate.

Evaporate 0.25 gallon/10 ft^2 /hr. of water to maintain keep 82° in the greenhouse.

Fogger Model	Flow Rate (gph)	Desired Application (gal/10ft²/hr)	Lateral Spacing (ft)	Head Spacing (ft)	Interval (sec)	Duration (sec)	Actual Application (gal/10ft²/hr)	Water Use (gpm/ac)	Hours Per Day Window (hrs/day)	7 day water use in Window (acre-inches)
2-Way Tee	3.60	0.25	6.0	3.5	10	2	0.261	18.2	6	1.7
4-Way Cross	7.20	0.25	12.0	3.5	10	2	0.261	18.2	6	1.7
Super x 2	3.00	0.25	6.0	3.0	10	2	0.254	18.2	6	1.7

Operating at 60psi, 8' to 14' above crop

Humidification

- The Jain Fogger and Super Fogger allow optimal control of humidity in the greenhouse.
- The system only requires 45 to 60 PSI at the Fogger inlet.
- Achieve optimal vapor pressure deficit for plants.
- Use with the Leak Prevention Device to allow proper pulsing of the system. Adjust humidity levels by changing the application interval - see table for sample runtimes.

Humidification

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

Humidification - Spacing Guidelines

Fogger Model	Flow Rate (gph)	Height above Surface (ft)	Fogger Inlet Pressure (psi)	Lateral Spacing (ft)	Head Spacing (ft)
2-Way Tee	3.60	8-15	60	8-14	8-14
4-Way Cross	7.20	8-15	60	8-15	8-14

Additional Instructions for Cooling and Humidification

- Use Two-Way Fogger or Super Fogger for maximum evaporative cooling effect. (4-way or cross is no longer recommended because they cause high precipitation rates and prevent some of the water from evaporating)
- Recommended pressure is 60 PSI
- Use high pressure LPD (Leak Prevention Device)
- Install foggers as high as possible above the ground
- Install foggers perpendicular to the lateral line
- Use anti-twist flexible PVC vinyl tube
- Avoid contact between the droplets and any part of the greenhouse structure

Propogation and Germination

JAIN's range of Foggers and Misters, with various droplet sizes, help to maintain optimal conditions for greenhouse propagation and germination..

Controlling the application of a fine mist of water, JAIN Foggers and Misters aid in supplying just the right amount of water required by the plant in it's developmental stage.

The Green Mist offers a water droplet slightly smaller than that of our traditional misters, but larger than the Fogger. The spray pattern is more defined and only requires 30 PSI operating pressure.

The 4-Way Cross Fogger is available in multiple flow rates to match any desired application rate. The JAIN Fogger operates between 45 and 65 PSI. Within this range droplet size is adjusted and subsequently the amount of water reaching the plants and substrate changes.

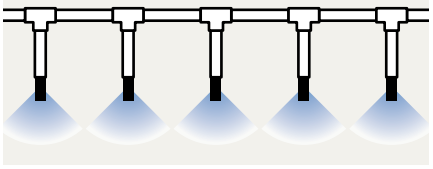
Propagation and Germination Spacing Guidelines

Application	Product	Nozzle Color	Flow rate (gph)	Height above Surface (ft)	Inlet Pressure (ft)	Lateral Spacing (ft)	Head Spacing (ft)	Maximum Distance from Edge (ft)
Propagation	4-Way Cross	Violet	5.6	3-5	60	3-4	2-3	1
	4-Way Cross	Blue	7.2	3-5	60	3-4	2-3	1
Germination	Green Mist	Green	7.9	3-4	30	2-2.5	2	1
	4-Way Cross	Blue	6.4	3-5	45	3-4	2-3	1
	4-Way Cross	Orange	12.9	3-5	45	3-4	2-3	1
	4-Way Cross	Red	19.4	3-5	45	3-4	2-3	1
	4-Way Cross	Black	25.8	3-5	45	3-4	2-3	1

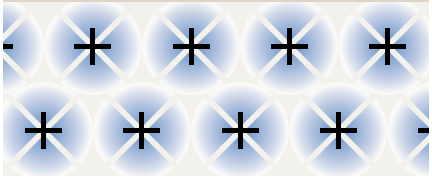
Recommended number of Lateral lines based on Bench width

Product	Bench Width				
	2'	3'	4'	5'	6'
4-Way Fogger Cross	1	1	1-2	2	2-3
Green Mist	1	1	2	2	3

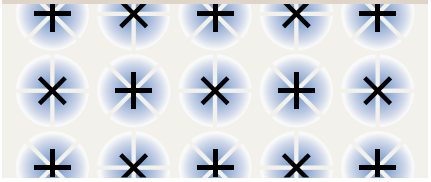
Narrow Bench - One line with Foggers/Misters spaced 2' apart



5' Bench - Two lines with no more than 3' between them.



6' Bench - Use three lines with crosses equally spaced. Outside lines no more than 1' from edge.



JAIN Green Mist

Product Features

- A dual purpose unit for misting and irrigating over propagation benches
- Green Mist offers a dripless spray in a defined pattern
- Low pressure friendly, operates at a low 30 PSI
- Use with Low Pressure LPD (Leak Prevention Device)
- Precision droplet size - prevents drift of fine mist.
- Symmetrical water distribution patterns

Green Mist Technical Data

- Operating Pressure: 30 - 50 PSI
- Flow Rate: 7.9 -10.6 GPH
- Filtration: 120 mesh
- Wetted Diameter: 4'
- Low Pressure LPD: opens at 20 PSI

Green Mist Installation Details

- Install Green Mist 3'-4' above bench
- Maximum head spacing along lateral: 2.5'
- Maximum distance between laterals: 3'
- Maximum distance from edge of bench: 1'

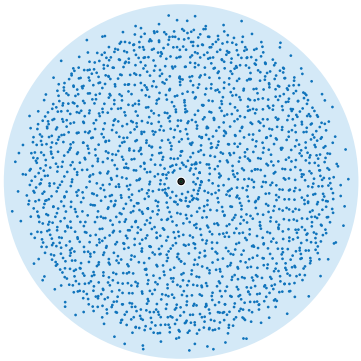
Related Products

Suspended Assembly with 3/8"W Inlet and 12" Tube with Stabilizer P/N 11997141

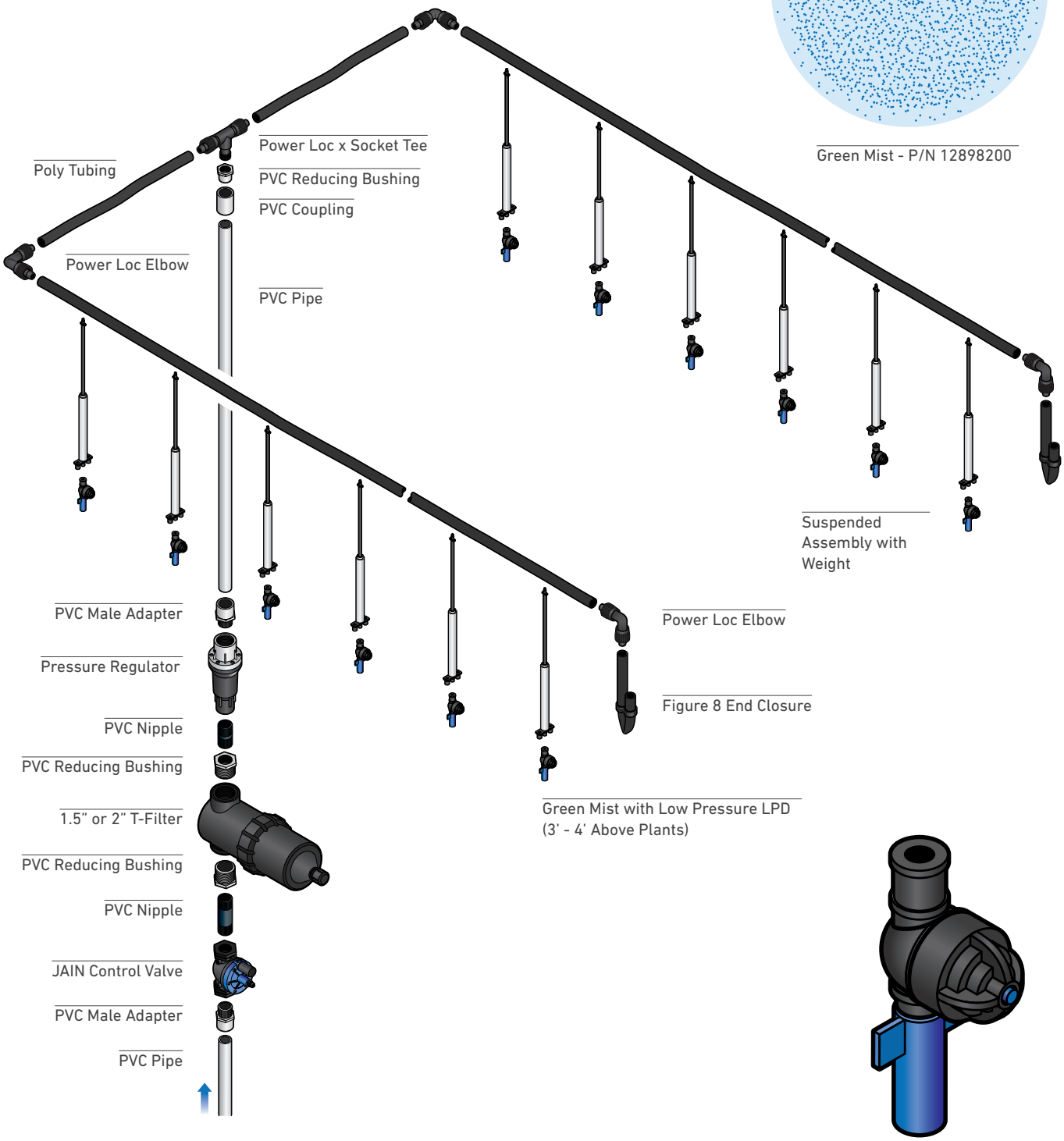
Green Mist System Layout

Maximum 3' Lateral Spacing

2'-2.5' spacing along lateral



Green Mist - P/N 12898200



JAIN 2-Way Fogger

Product Features

- Reduces greenhouse temperature
- Increases greenhouse humidity
- Ideal for chemical applications
- Extra fine droplet size 60 micros at 58 PSI
- Available with multiple lateral line inlet options
- Manufactured with high quality plastic for long term operation
- Chemical resistant materials
- Easy to assemble and install
- Clog resistant due to wider water passages
- Easily retrofits existing fogger systems
- Optional plug for end of line to keep water off structure

JAIN 2-Way Tee Fogger Technical Data

- Operating Pressure: 45 - 60 PSI
- Flow Rate: 7.9 -10.6 GPH
- Recommended Filtration: 120 mesh
- High Pressure LPD: opens at 55 PSI

JAIN 2-Way Tee Fogger Installation Details

- Install 2-Way Fogger as high as possible for cooling and humidifying operation
- Standard Head Spacing: 4' to 14'
- Typical Lateral Spacing: 6' to 15'
- Try to keep water off of structures and avoid overlap between foggers.
- Install foggers perpendicular to lateral line

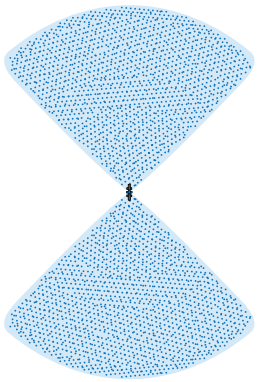
Related Products

Suspended Assembly with 4/7 Barb Inlet and 24" Tube with Stabilizer P/N 11997143

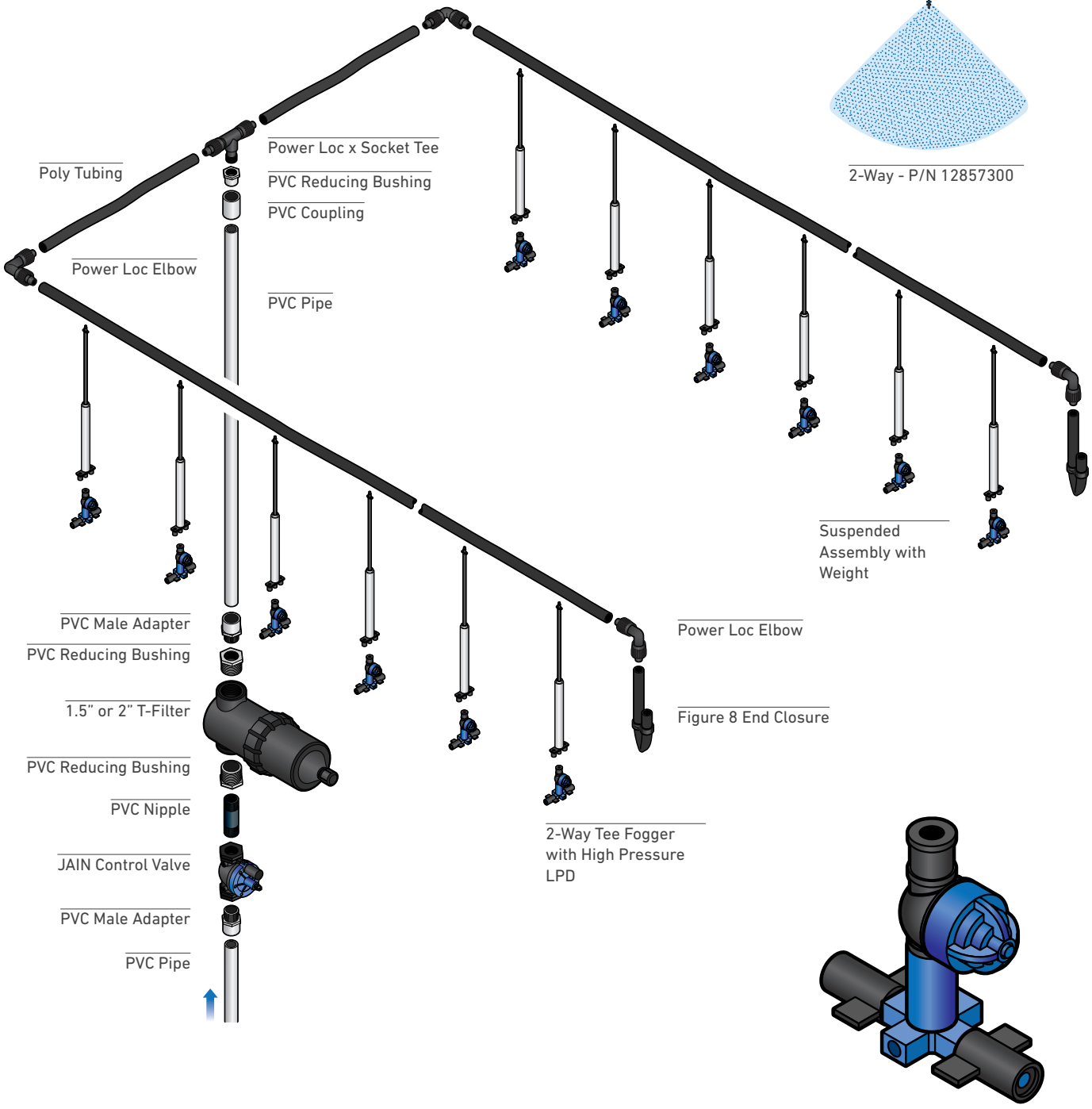
JAIN 2-Way Fogger System Layout

8' x 8' spacing

8' - 15' above ground



2-Way - P/N 12857300



JAIN 4-Way Cross Fogger

Product Features

- Provides optimal conditions for propagation and germination.
- Reduces greenhouse temperature
- Increases greenhouse humidity
- Fine droplet sizes from 60 to 90 micros
- Available with multiple lateral line connection options
- Manufactured with high quality plastic for long term operation
- Chemical resistant materials
- Easy to assemble and install
- Wide water passages for improved clog resistance
- Easily retrofits existing fogger systems
- Optional Plug for end of line to keep water off structure

4-Way Cross Fogger Technical Data

- Operating Pressure: 45 - 60 PSI
- Color Coded Nozzles: Violet, Blue, Green, Orange, Red, Black
- Flow Rate: 4.7 - 25.8 GPH
- Filtration: 120 mesh
- High Pressure LPD: opens at 55 PSI
- Low Pressure LPD: opens at 20 PSI

4-Way Cross Fogger Installation Details

- Standard lateral spacing: 3' to 4'
- Standard head spacing for propagation: 2' to 3'
- Maximum distance from edge: 1'
- Height above bench: 3' to 5' for propagation
- 8' minimum installation height for Cooling or Humidification
- See pages 8 and 9 for head layouts for Cooling and Humidification.

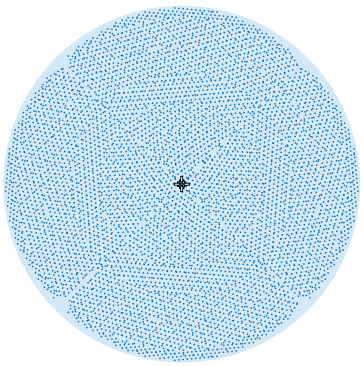
Related Products

Suspended Assembly with 4/7 Barb Inlet and 48" Tube with Stabilizer PN 11997152

JAIN 4-Way Fogger System Layout

Maximum 3-4' Lateral Spacing

2'-3' Head Spacing For Propagation Along Lateral



4-Way - P/N 12817300

Preventative Maintenance for Mister and Fogger Sprinkler Systems

Maintenance

1. **Regular maintenance**
    - a. **Routine Maintenance—Every Irrigation**
        - i. **Filtration**
            1. Automatic Filters
                - a. Verify flushing is occurring properly
                - b. Check settings on controller that they are within system specification
                - c. Check pressure differential across filter after a flush cycle to see that it returns to normal
            2. Manual Filters
                - a. Make sure filter element is clean before start-up
                - b. Make sure pressure differential on filter is within specification for system
        - ii. **Flow Meter**
            1. Verify system flow rate every time you irrigate. Possible problems include
                - a. High flows
                    - i. Verify the correct valve(s) are open/closed
                    - ii. Possible broken lines
                - b. Low flows
                    - i. Verify the correct valves(s) are open/closed
                    - ii. Possible plugged spray heads
        - iii. **Pressure Gauges**
            1. Verify system pressures every time you irrigate.
                - a. High pressures
                    - i. Verify the correct valve(s) are open/closed
                    - ii. Possible plugged Filter
                    - iii. Possible plugged spray heads
                - b. Low pressures
                    - i. Verify the correct valve(s) are open/closed
                    - ii. Possible broken lines
        - iv. **Visual inspections**
            1. Filter Station
                - a. Verify correct pressures and flow rates are maintained
                - b. Check for leaks around gaskets and fittings
            2. Valve Stations
                - a. Verify correct valves are open/closed
                - b. Verify correct pressures
            3. Along lateral lines
                - a. Spray heads are vertical and without interference
                - b. No leaks at connections
                - c. No missing spray heads or plugging
    - b. **Scheduled Maintenance- Weekly, Monthly**
        - i. **Filtration**
            1. Visually inspect filter element (screen, disks, sand, etc.)
                - a. Verify filer element is clean, manually clean if needed
                - b. Check for wear on filter element
                - c. Check gaskets for wear
        - ii. **Flushing**
            1. PVC manifolds, sub mains, and mainlines
                - a. Consult designer for flush time
                - b. Check for proper support and no damage or leaks
            2. Laterals (PVC or Polyethylene)
                - a. Recommendation is 1fps for flush velocity
                    - i. 600" lateral takes a minimum of 10 minutes to complete flushing
                    - ii. Consult designer for maximum lines to open at once to ensure adequate flush velocity
        - iii. **Cleaning**
            1. Routine removal/trimming of plants
                - a. Maintain access to areas around filters and valves and flush-outs.
            2. Removing Lime deposits from spray heads
                - a. With hydrochloric acid the recommended concentration is 0.2%. High acid concentrations can damage irrigation components.
        - iv. **Seasonal System Checkup**
            1. Flow Rate Check
                - a. Take a sample area and check flow rates and pressures of spray heads near the valve, middle of the section and at the farthest point. See Troubleshooting section for any issues of high or low flow rates or pressures that are outside of design specification.

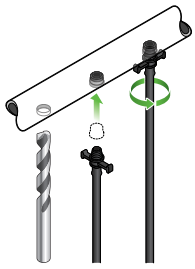
2. **Preventative Maintenance**
    - a. **Best Management Practice is performing scheduled and routine maintenance as described above**
    - b. **Chemigation**
        - i. **Water Treatment**
            1. High mineral content – hydrochloric acid or phosphoric acid can control calcium phosphate scale, please consult with your PCA or CCA for recommendation
            2. Organic matter- Biocides (Chlorine) can prevent growth, please consult with your PCA or CCA for recommendation
            3. Example: 600' lateral with water velocity of 1fps takes a minimum of 10 minutes to complete flushing
    - c. **Fertigation**
        - i. **Chemical compatibility**
            1. Jar test to ensure no precipitates.
            2. Harsh chemicals that increase plugging and premature wear - Lime, gypsum, acid, surfactants, etc.

Mister and Fogger Troubleshooting

Troubleshooting

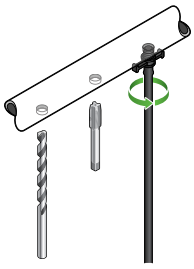
Problem	Description	Possible Cause	Solutions
Dripping from Nozzle	Water drips when system shuts off	Check that LPD device is installed and operating	Install LPD or clean LPD
Droplet Size too large	Droplet size of Fogger has increased in size. Need more cooling or humidification and less irrigation.	Check pressure at head, see that it meets design specification. Dirty nozzle	Check for system leaks, dirty filter, low pump discharge pressure. See System Maintenance section
Droplet size too small	Too much water evaporating and not enough reaching the substrate.	Lower pressure at Fogger. Check design specification.	Adjust pressure into zone. Use Low Pressure LPD. Add pressure regulator to system.
Plugging	Debris found in nozzle reducing or stopping flow.	Check filter mesh rating Adjust system maintenance Lime deposits	Use 120 mesh (130 microns) or finer for Foggers and Misters. Increase frequency of lateral line flushing. Ensure proper flush velocity. See System Maintenance section
Excessive Wear	Component parts wearing out prematurely	Unfiltered water Injecting abrasive or incompatible chemicals Harsh chemicals Excessive use	Install proper filtration Perform Jar Test for chemical precipitation Check with PCA or CCA for compatibility with irrigation system System underdesigned
Dripping while operating	Water leaking from sprinkler head	Improper Assembly Damaged component - freezing, mechanial, pest, etc.	Check for proper assembly Inspect and replace affected components

Options for Connecting Suspended Assembly to PVC Pipe



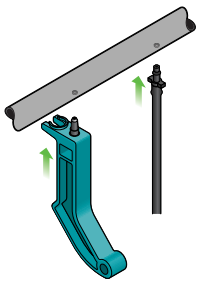
Option 1: With Grommet

- Drill a 7/16" hole
- Push the grommet into the hole
- Screw the connector into the grommet



Option 2: Direct Thread

- Drill a 5/16" hole
- Using a 3/8"-16 hand tap, thread the hole
- Screw the connector into the threaded hole
- Use pipe with minimum 1" O.D. and minimum wall thickness of 0.0625"



Connecting Tubing to Poly Pipe

JAIN is a fully integrated global food / plant production company recognized by Harvard Business to be one of five global sustainability champions, the G-20 for lifting people out of poverty, and Fortune magazine for being a "Change the World Company." Our irrigation manufacturing capabilities include everything from the pump discharge to the flush valve at the end of the lateral and everything in between. We lead the industry in manufacturing technology, owning both our extrusion and mold manufacturing equipment providers.

JAIN leads plant science research globally across a variety of food crops and is staffed with some of the world's leading research scientists. With the Gandhi Library, JAIN now houses the leading collection of the world's best plant science knowledge in a single facility. Our agronomic knowledge is integrated from our world class plant tissue culture operations through our food processing businesses. We research, educate, advance, manufacture, finance, propagate plants, and purchase produce for processing all in an effort to fulfill the JAIN mission:

"Leave This World Better Than You Found It"

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