
05

05

Greenhouse and Nursery Irrigation Systems

We have provided you with all the information necessary to install a very efficient greenhouse or nursery irrigation system. Using uniform drip tape and drip tubing laid out in triangle or rectangle spacing, we can reliably obtain total saturation for field production. Emitters and micro sprinklers with reliable flow rates attached to quality tubing offer greenhouse growers precise application of irrigation water.

What We Will Cover

- Selecting the Right Sprinklers
  - Upright Micro Sprinklers for Bench Crops
  - Inverted Micro Sprinklers for Bench Crops
  - Inverted Mister For Misting of Bench Crops
  - Drip Irrigation System Design for Greenhouses and Nurseries
- Determining the Quantity of Sprinklers Needed
- Troubleshooting and Maintenance

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Selecting the Right Sprinklers

Understanding your system needs will help you select the most appropriate sprinkler and the best uniformity for your greenhouse or nursery. Sketching the layout of your area will give you a better understanding of what your needs are and what obstacles you must overcome. Use the guide below to determine if upright micro sprinklers, inverted micro sprinklers, inverted misters or drip irrigation is best for your nursery or greenhouse irrigation needs.

Upright Micro Sprinklers for Bench Crops

Conversion from high flow, or inefficient low flow, micro sprinklers to low flow ones with reliable and regulated flow rates can help your bottom line. Upright micro sprinklers are suitable for all applications in the irrigation of seedlings, young saplings and mature plants in benches or rows for greenhouses and nurseries. The use of micro sprinklers with a spinner type or turbine mechanism, each providing smooth operation and uniform water distribution, will give a higher coefficient of uniformity at a variety of spacing requirements. Make the change now to get improved distribution uniformity and even growth from your irrigation system. We have selected four different nozzles to offer four flow rates with two sprinkler configurations.

Step 1
Sketch the Area and Bench Layout

- You may need single or multiple lines with low flow for narrow benches, or multiple lines with high flow rates for good overlap in wider benches.
- Make sure there are no obstacles, such as beams, curtains and anything else that can prevent good coverage.
- Determine the height at which you plan to have the sprinkler installed above the benches.

Step 2
Select the Upright Micro Sprinkler Head from the Product List Based on Your Application Requirements and Design Features

- Common features are desired flow rate, sprinkler spacing and uniformity.

Upright Micro Sprinklers Spacing and Uniformity

	Bench Width																
	2′	**3′**	**4′**	**5′**	**6′**	**8′**	**10′**	**12′**	**13′**	**14′**	**15′**	**16′**	**17′**	**18′**	**20′**	**21′**	**22′**
Low Application Rate (18 to 19 GPH)			98	98	96	97	93	89	90	89	90						
High Application Rate (32 to 43 GPH)							93	96	90	94	93	93	94	93	91	91	88

Inverted Micro Sprinklers for Bench Crops

Micro sprinklers hanging upside down from the ceiling offer a very efficient way to water and can be designed for almost any bench width. This inverted, handging method of watering prevents wetting the supply line. A wet supply line can cause drip damage to the plant below. The anti-leak device prevents the sprinkler from draining the supply line at the end of the irrigation cycle. Another feature of this assembly is a stabilizer weight that maintains the sprinkler in perfect position relative to the bench. In addition, there are no sprinkler heads to trip over, providing a safer and more efficient working environment. In this category we have selected four different micro sprinklers with four flow rates and two configurations.

Step 1
Sketch the Area and Bench Layout

- You may need single or multiple lines with low flow for narrow benches, or multiple lines with high flow rates for good overlap in wider benches.
- Make sure there are no obstacles, such as hanging baskets, beams, curtains and anything else that can prevent good coverage.
- Determine the height at which you plan to have the sprinkler installed above the benches.

Step 2
Select the Inverted Micro Sprinkler Head from the Product List Based on Your Application Requirements and Design Features

- Common features are desired flow rate, sprinkler spacing and uniformity.

Inverted Micro Sprinklers or Sprayers Spacing and Uniformity (CU)

	Bench Width																
	Ht.	2′	3′	4′	5′	6′	7′	8′	10′	12′	13′	14′	15′	16′	17′	18′	20′
Low Application Rate (18 to 19 GPH)	2′			94	94	94	92	96	86			93	91	98			
	4′											90	91	91	88		
	6′											93	93	93	93		
High Application Rate (32 to 43 GPH)	4′			96	94	94	90	85	93			95	95	95	95	95	93
	6′												94	94	94	94	93

= Green Kiwi Spinner = Height

Inverted Mister for Bench Crops

Misters hanging upside down from the ceiling can be used in germination and propagation in greenhouses and nurseries. We offer a very high uniformity misting system, which can be designed for any bench width up to 8'. This irrigation method prevents wetting the supply line, which when wetted can cause drip damage to the plant below. The anti-leak device prevents the sprinkler from draining the supply line at the end of the irrigation cycle. Another feature of this assembly is that a stabilizer weight maintains the sprayer in perfect position relative to the bench. In addition, there are no sprayer heads to trip over, providing a safer and more efficient working environment.

Step 1
Sketch the Area and Bench Layout

- You may need single or multiple lines with low flow for narrow benches, or multiple lines with high flow rates for good overlap in wider benches.
- Make sure there are no obstacles, such as hanging baskets, beams, curtains and anything else that can prevent good coverage.
- Determine the height at which you plan to have the sprinkler installed above the benches.

Step 2
Select the Mister from the Product List Based on Your Application Requirements and Design Feature

- Common features are desired flow rate, mister spacing, bench spacing and uniformity.

Inverted Mister for Misting Spacing and Uniformity (CU)

	Bench Width															
	Ht.	2'	3'	4'	5'	6'	7'	8'	10'	12'	13'	14'	15'	16'	17'	18'	20'
Low Application Rate (18 to 19 GPH)	2'			94	94	94	92	96	86			93	91	98			
	4'											90	91	91	88		
	6'											93	93	93	93		
High Application Rate (32 to 43 GPH)	4'			96	94	94	90	85	93			95	95	95	95	95	93
	6'												94	94	94	94	93

= Green Kiwi Spinner = Height

Drip Irrigation System Design for Greenhouses and Nurseries

Pressure compensating (PC) drippers operate between 7 to 55 PSI and deliver positive results when installed correctly. Using The Drip Store brand name PC drippers with one or four outlets ensures uniform flow rates from each outlet along the length of the drip line. By applying water directly to the pot, the rest of the plant remains dry, helping to minimize foliage pathogens. Another benefit of drip irrigation is that pesticides applied to the foliage are not washed off, reducing the need for spraying. Overall, drip irrigation can help lower production costs. To use this category select the dripper flow rate. Each dripper will require 1 adapter, pre-cut micro tube and a stake.

Step 1
Sketch the Area and Pot Layout on the Bench

- You may need single or multiple outlets dripper.
- See the length of micro tube that you will need; select from 24" or 36" length.
- For small hanging baskets, you will need to add a weight to balance the dripper.

Step 2
Select the Dripper from the Product List Based on Your Application Requirements and Design Features

- Common features are desired flow rate, micro tube length, pot size and pot layout.

Determine the Quantity of Sprinklers Needed

Now that you have selected the appropriate sprinkler system, it is time to decide how many sprinklers you will need to give you the best results. We have provided information below to select and size the poly tube laterals and filters for the initial start of the system.

Step 1
Size the Sprinkler's Lateral Lines for Your Bench Length Based on the Maximum Number of Heads Allowed on Each Lateral

- Determine the bench length and number of sprinklers, sprayers or foggers allowed on the poly tube. We strongly recommend polyethylene pipe.
- (poly tubing or blank tubing) for use in the laterals in your layout. Light can penetrate PVC pipe, which can cause algae to grow, leading to many problems, such as plugged emitters.

Maximum Recommended Drip Line Length with PC Dripper Spacing

	Bench Width								
	PC Dripper Spacing	1/2" hose .520 ID				1/2" hose .600 ID			
		Drip	Line	Inlet	Pressure	Drip	Line	Inlet	Pressure
1 GPH Color Black		15′	20′	30′	45′	15′	20′	30′	45′
	30"	250′	300′	440′	540′	300′	360′	550′	680′
	40"	300′	360′	540′	670′	370′	420′	670′	830′
	50"	350′	420′	620′	790′	440′	530′	770′	950′
2 GPH Color Green	20"	115′	155′	200′	250′	140′	180′	250′	315′
	30"	150′	190′	270′	340′	190′	220′	340′	420′

= .520 ID = .600 ID

Step 2
Size the Distribution Mainline

- Use the chart below to select the size for your distribution line up to 100 feet, and for your main line up to 125 feet in length. This chart should serve as a general guideline only.

Distributor Pipe Sizing

Pipe Size	Maximum GPM
3/4″	10
1″	15
1 1/2″	25

Main Line Pipe Sizing

Pipe Size	Maximum GPM
3/4″	8
1″	12
1 1/2″	30
2″	45

Step 3
Size the Main Control Components, Such as Valves and Filters

- The components should be sized according to the flow range of the filter. Make sure not to exceed the recommendation in the chart below.

Distributor Pipe Sizing

Sizing the Filter with 120 Mesh				Sizing the Filter with 150 Mesh			
Plastic Screen Filter		Plastic Disc Filter		Plastic Screen Filter		Plastic Disc Filter	
Size	Max. GPM	Size	Max. GPM	Size	Max. GPM	Size	Max. GPM
3/4″	10	3/4″	N/A	3/4″	9	3/4″	N/A
1″	12	1″	17	1″	13	1″	15
1 1/2″	40	1 1/2″	60	1 1/2″	35	1 1/2″	50
2″	60	2″	80	2″	55	2″	70

= Plastic Screen Filter = Plastic Disc Filter

Step 4
Starting the System for the First Time and Flushing the System

The most important thing for you to remember when starting a new system for the first time is to flush the lines. Debris from the irrigation installation can pass into the micro sprinklers and foggers and can cause the irrigation system to plug, or to operate improperly. To properly flush the irrigation system, first connect the valves, filters, main line and distribution pipes. Then flush the line. Second, connect the lateral pipes and then flush the whole system again. Third, attach the micro sprinklers or foggers, open the ends of the laterals and have a final flushing of the whole irrigation system. Close the ends of the laterals one by one before the water is turned off. After complete flushing, check that the irrigation system is operating correctly and adjust if needed.

Troubleshooting and Maintenance

Assuring that your system runs flawlessly and continues to work at the most efficient level possible is the ultimate goal. We have put together a list of ongoing maintenance and troubleshooting tips that will help you stay ahead of any unforeseen mishaps.

Troubleshooting

Problem	Cause	Solution
Flow Line Broken, Filter Clogged, Micro Sprinklers, Drippers or Foggers Clogged or Faulty	Pressure too high or too low	Check the poly tubing, clean or replace screen filter, replace or clean micro sprinklers or foggers, check pressure regulator
Micro Sprinklers, Drippers or Foggers Have Uneven or No Flow at the End of The Drip Line	Too many micro sprinklers on the drip line or too long a run of poly tubing	Make sure that you did not exceed our recommendations
Fittings Separating from Poly Tubing	Fittings improperly installed; compression fitting is not far enough inside the tube, or it is the wrong size fitting	Make sure you used the correct size color-coded fittings
Micro Sprinklers, Drippers, Foggers or Micro Tubing Popping out of Poly Tubing	Pressure regulator is defective, micro sprinklers, drippers or foggers are installed improperly, faulty or worn punch	Replace pressure regulator, check or replace micro sprinklers or foggers, plug hole with goof plug, replace or clean punch, or if pressure is too high, install (or replace) pressure regulator
Clogged Micro Sprinklers, Drippers or Foggers	The use of incorrect filter mesh	The use of a proper filter should avoid clogging problems
Micro Sprinklers, Drippers or Foggers Have Calcium Deposits (white color buildup)	Hard water	Inject a 1% to 2% chlorine solution through the system
Plants Appear Stressed	Run time is inadequate for the plants	Reset controller for more time

Maintenance

Part	Action	Frequency
Micro Sprinklers, Foggers, and Drippers	Inspect for clogging	Periodically
Micro Tubes	Inspect for clogging, and if they are out of place	Periodically
Filter Screen	Flush and clean	At least once a month (depending on water quality)
Filter	Check for any build up to give you an idea of how often to schedule cleanings	One week after installation
Tubing Lines	Flush and clean	Periodically (depending on water quality)
Drip Line	Remove end caps, or open hose ends to flush and clean	Once a year

05

Chapter in Review

Greenhouse and Nursery Irrigation Systems

To install an efficient greenhouse or nursery irrigation system, it is important to select the right sprinklers and to create the right growing environment. We hope that in this chapter has thoroughly explained the type and quantity of sprinklers that is best for your project. Use guide to the right help you decide which system you will need for your nursery or greenhouse.

If you ever have any questions regarding sprinklers or maintenance, you can always call our Customer Care team at The Drip Store. We're available Monday through Friday, 7 a.m. – 4 p.m. (PST) at 760-597-1669 or toll free 877-597-1669.

My System Checklist

1) Greenhouse

Upright Micro Sprinklers for Bench Crops

Inverted Micro Sprinklers for Bench Crops

Inverted Mister for Misting of Bench Crops

Drip Irrigation System Design for Greenhouses

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2) Nursery

Upright Micro Sprinklers for Bench Crops

Inverted Micro Sprinklers for Bench Crops

Inverted Mister For Misting of Bench Crops

Drip Irrigation System Design for Greenhouses