

A close-up photograph of a purple flower head, likely a thistle or similar species. The central part of the flower is in sharp focus, showing a dense arrangement of small, rounded florets. The surrounding petals are long, thin, and pointed, radiating outwards. The entire image has a strong magenta or purple color cast. The number '02' is overlaid in a large, white, sans-serif font in the upper right quadrant.

02

# 02

## Parts and Drip Products

Planting project come in various shapes, sizes and watering needs. To account for the diversity in watering requirements, there are an assortment of sprinkler, sprayers and drip line variations to accommodate the size and shape of your project. In this section, we will review the different product types available and what environments they are designed for. With this information, you'll be able to choose the correct sprinkler, sprayer and drip head for your watering needs.

### What We Will Cover

- **Controllers and Sensors**
  - AC and DC Controllers
  - Sensors
  - Troubleshooting
- **Pressure Comp Drip Line**
- **Tubing and Drip Line**
- **Drip Emitters**
- **Micro Sprinklers**
- **Micro Sprayers**
  - Sprayers
  - Misters
  - Low Flow
  - Jets
- **Fillters**
- **Fillings**

# Parts and Drip Products

## Pressure Compensating Drip Line

### About Pressure Compensating Drip Line

A pressure compensating drip line is a drip hose that contains pressurized drippers inserted into the extruded interior wall at specified intervals. Each of the drippers consists of a cylinder with a labyrinthine water passage and a diaphragm. The diaphragm inside the pressure compensating inline dripper continuously adjusts to varying water pressure, ensuring a constant flow rate. It also allows particles to pass through the dripper without harming it, providing reliable performance and a longer life. This method of dripper design, with a wider flow path, allows the dripper to operate at optimal flow rates under extreme conditions.

Most of the PC drip lines available today are self-flushing, though some have a better resistance to plugging than others.

In some drip lines, the dripper is cylindrical to reduce friction loss. In others it is flat and welded to the drip tubing. Both the tubing and the drippers are manufactured from quality resins using hi-tech equipment to form a product that withstands the various chemicals and fertilizers used in agriculture and landscaping.

The average pressure range for the pressure compensating drip line is from 10 to 50 PSI depending on the manufacturer.

Pressure compensating drip line is available in flow rates of .5 to 1 GPH and in lengths of 100', 500', and 1000'. It can be used with compression or barb fittings. Pressure compensating drip line can be used below or above the ground. If used in landscape areas above the ground can be covered with mulch.

Pressure compensating drip line is commonly used to provide a continuous wetting pattern along a row or line. The use of pressure compensating drip line can simplify the design of the entire irrigation system.





**Figure 1** Pressure compensating drip line provides uniform water application on long laterals and uneven slopes.

### Applications

- Agriculture, commercial, and residential
- Subsurface or surface irrigation
- High traffic areas
- Windy areas
- Reclaimed water
- Narrow and odd shaped areas

With pressure compensating drip line, water can be applied uniformly on long rows and uneven terrain. Pressure compensating drip line is commonly used in orchards, grape vines, nurseries, landscapes, and gardens. Much of today's agriculture uses this type of system.



## Recommended Spacing of Pressure Compensating Drip Line in Turf Applications

	Turf Applications			Groundcover and Shrubs		
	Sand	Loam	Clay	Sand	Loam	Clay
<b>Dripper Flow</b>	1 GPH	.5 GPH	.5 GPH	1 GPH	.5 GPH	.5 GPH
<b>Dripper Spacing</b>	12"	12"	18"	12"	18"	18"
<b>Drip Line Spacing</b>	12" - 16"	18" - 22"	18" - 22"	16" - 20"	18" - 24"	18" - 24"

= Sandy Soil    
  = Loamy Soil    
  = Clay Soil

Major manufacturers of pressure compensating drip line include DIG, Bowsmith, Netafim, Agrifim, Toro, Eurodrip, Rainbird, Point source, and Plastiro irrigation.

# Drip Emitters

## About Drip Emitters

Drippers come in two basic styles, pressure compensating (PC) and non-compensating (NC). Pressure compensating drippers will give the same amount of water flow within a range of pressures (For example, a dripper will be rated at 1 GPH between 10 and 55 PSI). Compensating drippers may be self-flushing during the start up and shutdown of the system. This equates to a longer life span and better constant flow during the lifetime of the dripper. These drippers should be used on systems with a very long run of drip tubing to maximize the amount of drippers on a single drip line, while maintaining an even flow rate from each dripper. They are also better suited to landscape area with elevation differences.

Non-compensating drippers do not compensate for pressure variance. In other words, the higher the pressure, the more flow the dripper will give. The lower the pressure, the less flow there is. These drippers cannot self-flush and need a filter, as do the PC drippers. These drippers work well for smaller systems with short run and where no elevation differences occur.

## Where to Use Drip Emitters

Drip irrigation has a wide range of uses. It is adaptable to different terrains and planting configurations, such as vegetable garden, container boxes, patios, vines, shrubs, trees, greenhouses and nurseries.



*Did you know  
Irrigation water should be free of  
particles that are larger than 50-100  
micron, which is comparable to the width  
of a human hair!*

# Emitters

## What Drip Emitter to Select for My Garden

As you get ready to buy and install or extend your drip system, you research on the internet or at a home center to find the perfect drip emitter devices for your garden. You may be surprised that there are so many different types of emitters, flow rates, and shapes; yikes! What should you use, at what flow rate, and how many will you need? This article will try to clarify the issue of how to select the right drip emitter for your garden.

## The Three Types of Drip Emitters

### 1. Pressure Compensating (PC) Drippers

Give the same amount of flow within a range of pressures (for example a dripper will be rated at 1 GPH between 10 and 55 PSI). PC drippers are available with flow rates of .5, 1, 2, and 4 GPH. Pressure compensating drippers may have a self-flushing mode in which, during the system start up and shutdown, the flow increases and allows the dripper to clean itself. This equates to a longer life span and better constant flow during the lifetime of the dripper. The main use of the PC dripper is on systems with a long run of drip tubing. It will maximize the amount of drippers on a single drip line while maintaining an even flow rate from each dripper. They are also better suited for landscape areas with elevation differences. Lastly, they allow for good control of the total amount of the water used (e.g. one hour of use with 100 1-GPH drippers will give you the exact total flow rate of 100 GPH).

### 2. Non-Compensating Drippers

Non-compensating drippers are available in .5, 1, 2, 3 and 4 GPH. They will discharge the same amount of flow at a constant pressure of around 15 PSI. In other words, the higher the pressure the more flow the drippers will release, and at lower pressure, less flow will be released. The non-compensating drippers cannot be self-flushed and therefore will need a filter with a pressure regulator at the beginning of the line. They work well in smaller systems with short runs, and where no differences in elevation occur.

### 3. Adjustable Drip Emitters

Adjustable drip emitters are available in adjustable discharge ranges from 0-10 gallons per hour (GPH) at a constant pressure. As pressure changes, the flow rate will also change. These devices have the flexibility to allow adjustment of the flow rate for each individual plant as it grows. Twisting the dial on the top of the adjustable dripper toward the "+" or the "-" sign will allow an increase or decrease in flow. The adjustable drippers have a 360-degree flow pattern cap that produces a gentle stream pattern. The stream can be adjusted from a small to large coverage area by rotating the dripper cap.

Although the adjustable feature can be very advantageous, you may lose control of total flow rate as you adjust. In other words, the number of adjustable drippers that are used limits the efficiency of the system. For example, if used on 1/4" micro tubing, only three to four adjustable drippers can be used when opened to the maximum flow. When used on 1/2" poly tubing, 22 to 25 can be used.

## How to Select the Right Drip Emitter

This decision should be based on the needs of the plants. For example, if the plants need lots of water and you like to see the water flow, the solution is the adjustable dripper. It allows you to adjust the flow and apply a large amount of water very quickly. Remember, it can also limit the number of devices you can use (maximum of 22 to 25 adjustable drippers with full flow on 1/2" drip tubing).



### Adjustable Dripper Pros and Cons

<b>Pro</b>	They are easily adjustable to any size plant, and only one is needed per plant.
<b>Con</b>	No control on total flow rate and limited capability of the system. If open wide, as in most cases, it will saturate the root zone quickly. This will have some damaging effects on the plants, if left open for too long. Also, with the use of one dripper fully open per a large plant, it will not cover the root zone area required, and a second dripper may be needed to water the root zone.





## PC Drippers Pros and Cons

<b>Pro</b>	Provide the flexibility to make low flow and controlled drip irrigation better than many other methods of watering. Controlled amounts of water flow, the method applied, and the soil's physical and chemical properties determine the plant's ability to remove water and nutrients from the soil. This method is used very extensively in agriculture today because using low flow drippers with the same flow rate will allow long run with equal flow rate along the line. For example, using PC drippers with 1 GPH spaced every 4' allows a distance of up to 800'
<b>Con</b>	System requires 150-mesh filter and pressure regulator. System will need to be flushed regularly.



## Non-PC Drippers Pros and Cons

<b>Pro</b>	The higher the pressure the more flow the drippers will release, and at lower pressure, less flow will be released.
<b>Con</b>	The non-compensating drippers cannot be self-flushed and therefore will need a filter with a pressure regulator at the beginning of the line.



# Controllers and Sensors

## AC or DC Controllers

### Choosing The Right AC or DC Controller

- By using an irrigation controller, you will use your landscape water more efficiently, which will have many environmental and economic benefits.
- When selecting an irrigation controller, consider the demands your system will make on your controller. This is especially important if the irrigation system will be watering separate zones so as not to overload the hydraulic requirements.
- Examine how well each controller can be programmed to handle diverse landscape and weather conditions. How many valves are needed to control the separate zones in the landscape? How many programs does the controller have? There should be a separate program on the controller for each valve to control each zone.
- What time settings should be used for each zone? What are the requirements of the plants in each zone? The controller should have enough variables to accommodate for the various needs of each plant.
- We recommend buying a controller that can handle more zones than your landscape area presently calls for. This way you have room to grow with your system.
- Make sure to include a rain shut off sensor, multi-programming and water-budgeting capability, and battery or other back up programs (for AC controllers only).

- If power is not available consider using a battery operated controller.
- Controllers reduce water runoff from your landscape, which carries topsoil, fertilizers, and pesticides into lakes, rivers, and streams. Most importantly, the controller takes the hassle out of watering, giving you more time to enjoy your garden.

## How the Controller Works

Automatic drip irrigation systems can include AC or DC controllers, AC or DC valves, drip tubing, drip fittings, drippers, PVC pipes, drip emitters, sprinkler heads, and micro sprinklers. The AC or DC valves (also called stations or zones) control the flow of water to the landscape area. Each valve open and shuts their zone with a signal from the controller. For example, there may be a few valves in the system; one valve may control the water flow to groundcover using micro sprinklers, another valve controls a zone of shrubs using a drip system, and another valve runs a station for the lawn. The controller can control when, how often, and how long each valve will open, based on your programming instructions for that particular zone. The more programming flexibility the controller has, the more efficiently water can be applied to the landscape.



## Important Controller Features to Consider

- Multiple programs
- Station run-times from 1 minute up to 5 to 12 hours
- Three to four start times per day
- Odd/even day, weekly, and interval program capability of up to 30 days
- Water budgeting
- Battery back-up for AC controller
- “Off”, “Auto”, and “Manual” operation modes
- Rain shut-off capability

## About the Controller Features

Multiple programs, along with multiple valves and zones, allow for watering different parts of the yard on different days. The controller station run times determine how long an area can be watered. While watering times are usually in minutes, or hours for drip systems, a few controllers are capable of assigning run times in seconds (for potted plants or cooling inside the greenhouse — use The Drip Store model C034 battery operated controller or the C032 AC controller). Multiple start times allow for repeat watering in the same area on the same day. Odd/even, weekly, and interval program capability allows for flexibility in deciding what days to water. A 30-day calendar would allow watering a large tree once a month. Water budgeting allows for an increase or decrease in station run times by a certain percent. For example, during a cool spell, you may want to decrease watering time by 10% for all programs. This feature allows for the changing of all station run times within a given program in one easy step. A battery back-up is recommended to retain the program if power is off.

Rain shut-off device capability is used to automatically override the controller during rain events. (The actual rain shut-off device needs to be purchased separately since it is not included with the controller.)

At The Drip Store, we offer a wide selection of controllers and timers for home, commercial application, greenhouses, and nurseries, from 4, 6, 9, and 12 station AC irrigation and propagation models to 1, 4, or 6 station irrigation, or propagation battery operated controllers. The battery operated controllers are divided into two types: hose end controllers, which attach to your hose or faucet, and commercial grade field controllers, which are more versatile and can be connected anywhere on the line.



# Sensors



## Rain Sensors

<b>What Is a Rain Sensor?</b>	A rain sensor is a small device mounted in an open area outdoors and wired to a controller's sensor connection. Rain sensors are designed to override the cycle of an automatic irrigation system when adequate rainfall has been received.
<b>Do I Need a Permit to Install the Rain Sensor?</b>	No permit is required to install rain sensors on irrigation systems.
<b>Will a Rain Sensor Affect the Irrigation Schedule of My Controller?</b>	No. The rain sensor merely overrides the cycle until the rain sensor's disks dry out. The irrigation system's timer will then come back online to the regular irrigation schedule. The rain sensor must be set to shut off the system when up to 1/4" of rainfall has occurred.
<b>Who Can Install Rain Sensors?</b>	Homeowners or irrigation professionals can install rain sensors. The sensor has a simple setting, which accurately measures rainfall in quantities of 1/8 inch to 1 inch and shuts off the controller. Adjustment ranges for this sensor: Rainfall shutoff at 1/8, 1/4, 1/2, 3/4, or 1 inch, + / - 1/16 inch.



# Weather Station

The Mini-Weather Station has three different sensor devices in one single convenient unit. The Mini-Click rain sensor shuts sprinklers off when it rains, automatically compensating for the amount of rainfall that occurred. The Freeze-Click prevents system activation by stopping the flow of water when outdoor temperatures drop near freezing. The Wind-Click shuts off systems during periods of high wind, and then

automatically allows for restart when conditions are more favorable. The Mini-Weather Station takes all the guesswork out of when you shouldn't water. The weather station works with any controller with a sensor connection option, both AC and DC. The weather station comes with PVC fitting that allows for two mounting options: it can be screwed or mounted on PVC pipe, or, it can be slipped over any wood beam. Both options help to keep the weather station above ground level and out of the spray of sprinklers, and also help to give the wind sensor "clear air" to get an accurate reading on the wind.



## Basic Controllers and Sensors Troubleshooting

Problem	Cause	Solution
<b>Display Indicates Irrigation while Valve Is Off</b>	Faulty or miss-wired valve	Check valve and valve wiring
	Faulty pump or pump relay if used	Check pumps and pump relay, replace if defective
<b>Display is Blank</b>	No AC power and no backup battery installed (or dead battery)	Verify AC power and wiring
<b>Time of Day is Blinking</b>	Unit is initially powered up	Press any button
	Extended power outage has occurred and built-in backup period has expired	Reprogram controller
<b>Display Reads "SENSOR RAIN OFF"</b>	If you are not using a rain sensor, the jumper between the sensor terminal is missing or loose	Reconnect the jumper between the rain sensor terminals of the terminal block
	If you are using a rain sensor, the sensor has been activated by moisture or is stuck	Verify operation of rain sensor and Replace if defective (reinstall jumper until new rain sensor is installed)

# Micro Sprinklers and Micro Sprayers

## About Micro Sprayers

Micro sprinklers and sprayers throw water over a wider area, for areas where drippers are not practical, such as ground cover, trees, flowerbeds, and hillsides. They operate at low pressure and have a wide range of flow rates (5 to 50 GPH) and diameters (3 to 30'). Micro sprinklers have small droplets and a low flow application rate. Micro sprinklers can prevent plant stress by maintaining low water tension in the soil, using a low flow application rate.

Micro sprinklers, sprayers and jets are available in a variety of styles and configurations. Like drip emitters, they operate at a low-pressure range of 10 to 35 PSI. Micro sprinklers, sprayers, and jets are rated by flow rate, wetting diameter (full circle or part circle) and distribution uniformity.

Application rates now vary widely, from 0.05 inches/hour up to 6 inches/hour. Because there is a direct relation between application rate and irrigation duration, there can also be a range in the duration to complete an irrigation cycle. For example, 8 minutes is required to apply 0.4 inch of water on the wetted area with an application rate of 3 inches/hour, while 8 hours is needed to apply the same amount at a rate of 0.05 inch/hour. This range of rates is readily available with micro sprinklers today.

## Micro Sprinklers

Micro sprinklers operate using a spinner, which typically is seated on a nozzle or orifice. When water passes thru the nozzle it spins the spinner, which throws the water in a full circle to the diameter determined by flow rate and pressure. Micro sprinklers can be used for orchards, groundcover, seed germination and flowerbeds.

### Uses

- Suits all applications in the irrigation of seedlings, young saplings and mature trees.
- Use in orchards, greenhouses and nurseries.
- Use in groundcover, flowerbeds and hillsides.
- Can be used for frost protection and cooling.

### Features

- Good performance with uniform water distribution.
- Large water passage to achieving flow rates from 5 to 50GPH.
- Covers diameters between 10' to 35'.
- Operating pressure: 15 to 35 PSI.
- Some have an anti-insect spinner that closes when irrigation cycle is complete.
- They are available on 10/32" thread base, 3/8" thread base, 1/2" threaded base or assembled on a spike with micro tube in different lengths and barbs.
- All are made of durable plastic materials, ensuring resistance to most chemicals and fertilizers used in irrigation.
- Low precipitation rate, allowing longer watering time with less runoff.
- Filtration requirement: 80 to 120 mesh depending on flow rate.



# Micro Sprinklers



## Micro Sprinkler on 10/32" Thread

Models: MS005, MS004

Model #	Specs	Use
MS005	 11 GPH  360° Pattern  21' Distance  14' – 16' Spacing Between Sprinklers	<ul style="list-style-type: none"> <li>• Flowerbeds</li> <li>• Groundcover</li> <li>• Hillside</li> <li>• Large Trees</li> </ul>
MS004	 21 GPH  360° Pattern  26' Distance  14' – 16' Spacing Between Sprinklers	

## Large Diameter Micro Sprinkler on 1/2" FPT Base

Model: MS011

Model #	Specs	Use
MS011	 32 GPH  360° Pattern  42' Distance  16' – 20' Spacing Between Sprinklers	<ul style="list-style-type: none"> <li>• Groundcover</li> <li>• Orchards</li> <li>• Nurseries</li> </ul>

## Flow Regulated Micro Sprinkler with 24" Micro Tubing

Models: MSA017, MSA015

Model #	Specs	Use
MSA017	 7 GPH  360° Pattern  14' Distance  6' – 8' Spacing Between Sprinklers	<ul style="list-style-type: none"> <li>• Groundcover</li> <li>• Hillsides</li> <li>• Trees (one per tree)</li> </ul>
MSA015	 15 GPH  360° Pattern  15' Distance  6' – 10' Spacing Between Laterals	



# Micro Sprinklers Continued

## Full Circle or Adjustable Large Diameter Micro Sprinklers with 24" Micro Tubing

Models: MS009, MS010

Model #	Specs	Use			
MS009	 32 GPH	 360° Pattern	 3' - 30' Distance	 16' - 20' Spacing Between Sprinklers	<ul style="list-style-type: none"><li>• Groundcover</li><li>• Orchards</li><li>• Nurseries</li></ul>
MS010	 32 GPH	 360° Pattern	 42' Distance	 16' - 20' Spacing Between Laterals	



# Micro Sprayers and Foggers

Micro sprayers and foggers are low flow watering devices, smaller in size than a conventional sprinklers heads. They are placed closely spacing in a rectangular or triangular spacing for better overlapping and higher uniformity under fruit trees, crops, greenhouse, hot houses, densely planted field crops, and work best in low wind area. It is highly recommended to consider the area, the application rate, and the micro sprinkler droplet size in order to prevent droplets drifting under windy condition.

Micro sprayers deliver water in low application rates and in fine drops. The micro sprayer's small size droplets can dissipate in the air, even under low to moderate wind conditions, affecting the micro sprayer's uniformity. In order to ensure a high uniformity of application, the spacing should be decreased and should not exceed 50 percent of the diameter or coverage suggested by the manufacturer. In order to mitigate the adverse effects of wind on uniformity, a relatively large number of micro sprayers or foggers per area should be operated simultaneously.

Unlike drippers, micro sprayers and foggers are available in a wide variety of styles, flow rates, diameters, and configurations. Like micro sprinklers, they operate at low pressure and require a filter to protect the small orifice of the sprayer from clogging. Micro sprayers have no moving parts and produce small sized droplets, providing a low precipitation rate and allowing longer watering time with less runoff. The Drip Store has a range of micro sprayers and foggers that are used in agriculture, nurseries, greenhouses, professional landscapes, and homes. The micro sprayers are designed for areas where drippers may not be as practical, such as for ground cover and trees. Micro sprayers are rated by flow rate and wetting diameter or radius. The Drip Store offers a variety of sprayers in flow rates from .8 GPH up to 30 GPH with diameters from 1' to 26'.

## Micro Sprayers

- Flow rates: from 5 to 45 GPH
- Covers diameters between 5' to 12'
- Operating pressure: 15 to 35 PSI
- Available on 10/32" thread base, 1/2" threaded base, or assembled on a spike with micro tube in different lengths and barbs
- All are made of durable plastic materials, ensuring resistance to most chemicals and fertilizers used in irrigation.
- Low precipitation rate, allowing longer watering time with less runoff
- Filtration requirement: 80 to 150 mesh depending on flow rate.





## Available Sprayers



### Sprayer with 24" Micro Tubing

Models: MSA030, MSA029

Model #	Specs	Use
MSA030	 27 GPH  360° Pattern  10' Distance  5' – 7' Spacing Between Sprinklers	<ul style="list-style-type: none"> <li>• Flowerbeds</li> <li>• Germination</li> <li>• Propagation</li> <li>• Greenhouse</li> <li>• Trees (one per tree)</li> </ul>
MSA029	 36 GPH  360° Pattern  11' Distance  6' – 8' Spacing Between Laterals	

### Spray Jet on Threaded Barb

Models: MS001, MS002, and MS003

### Micro Sprayer with 24" Micro Tubing

Models: MSA001, MSA002 and MSA003:

Model #	Specs	Use
MSA001, MS001	 14 GPH  360° Pattern  12' Distance	<ul style="list-style-type: none"> <li>• Groundcover</li> <li>• Flowerbeds</li> <li>• Shrubs</li> </ul>
	 14 GPH  90° Pattern  7' Distance	
MSA002, MS002	 14 GPH  180° Pattern  8' Distance	

### 12 Jet Micro Sprayer with 10/32 Thread

Model: MS006

Model #	Specs	Use
MS006	 10 GPH  360° Pattern  5' Distance	<ul style="list-style-type: none"> <li>• Small or medium trees (one per tree)</li> </ul>



## Available Sprayers Continued

### 12" Pop-Up Sprayers on 1/2" MPT

Models: MP001, MP002, and MP003

Model #	Specs	Use
MP001	 14 GPH  360° Pattern  12' Distance  4' - 6' Spacing	<ul style="list-style-type: none"> <li>• Groundcover</li> <li>• Flowerbeds</li> <li>• Shrubs</li> </ul>
MP002	 14 GPH  180° Pattern  8' - 12' Distance  4' - 6' Spacing	
MP003	 14 GPH  90° Pattern  7' - 12' Distance  4' - 6' Spacing	

### Adjustable Spray Jets on 10/32 Thread

Models: MS014, MS015, and MS016

Model #	Specs	Use
MS014	 0 - 25 GPH  360° Pattern  13' Distance  4' - 9' Spacing	<ul style="list-style-type: none"> <li>• Home Garden</li> <li>• Groundcover</li> <li>• Flowerbeds</li> <li>• Trees</li> </ul>
MS015	 0 - 25 GPH  180° Pattern  9' Distance  4' - 9' Spacing	
MS016	 0 - 25 GPH  90° Pattern  8' Distance  4' - 9' Spacing	





## Available Sprayers Continued



### 12 Jet Micro-Sprayer with 24" Micro Tubing

Model: MSA006

Model #	Specs	Use
MSA006	 10 GPH  360° PATTERN  13' DISTANCE	<ul style="list-style-type: none"> <li>• Small or Medium Trees (one per tree)</li> </ul>

### Adjustable Spray Jets on 10/32 Thread

Models: MS020, MS021, and MS022

### Adjustable Spray Jets with 24' Micro Tubing

Models: MSA020, MSA021 and MSA022

Model #	Specs	Use
MSA020, MS020	 0 - 30 GPH  360° PATTERN  0 - 25' DISTANCE  5' - 8' SPACING	<ul style="list-style-type: none"> <li>• Home Garden</li> <li>• Groundcover</li> <li>• Flowerbeds</li> <li>• Trees</li> </ul>
MSA021, MS021	 0 - 30 GPH  180° PATTERN  0 - 8' DISTANCE  5' - 8' SPACING	
MSA022, MS022	 0 - 30 GPH  90° PATTERN  0 - 7' DISTANCE  5' - 8' SPACING	

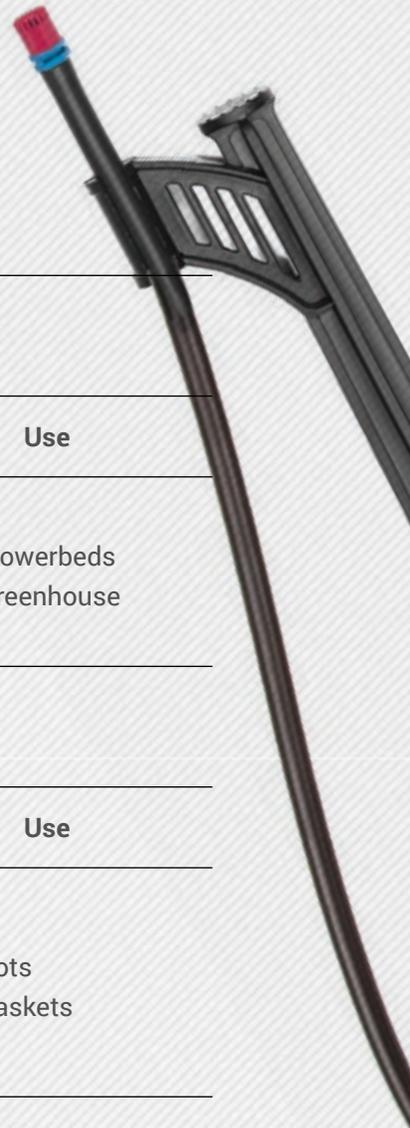
### Adjustable Sprayer On-a-Spike

Model: MS023

Model #	Specs	Use
MS023	 0 - 20 GPH  360° PATTERN  0 - 12' DISTANCE	<ul style="list-style-type: none"> <li>• Groundcover</li> <li>• Hillsides</li> </ul>



## Available Sprayers Continued



### Fogger/Mister on 10/32 Thread

Model: MS007

Model #	Specs	Use
MS007	 7 GPH  360° Pattern  0' – 5' Distance  3' – 5' Spacing	<ul style="list-style-type: none"> <li>• Flowerbeds</li> <li>• Greenhouse</li> </ul>

### Pot and Basket Mister with Barbed Elbow

Model: MS007

Model #	Specs	Use
MS007	 2 GPH  360° Pattern  8" – 2' Distance When Upright  5" – 24" Distance When Upside Down	<ul style="list-style-type: none"> <li>• Pots</li> <li>• Baskets</li> </ul>

### Misting Nozzles on 1/4" Barb

Model: MS013

Model #	Specs	Use
MS013	 3 - 4 GPH  25 - 40 PSI  360° Pattern  2' – 4' Spacing	<ul style="list-style-type: none"> <li>• Plant Canopy</li> <li>• Group of Plants</li> </ul>

### Misting Nozzles on 1/2" FPT Base

Model: MS017

Model #	Specs	Use
MS017	 2 GPH  360° Pattern  3' – 4' Distance When Upside Down  3' – 4' Spacing	<ul style="list-style-type: none"> <li>• Humidity Control</li> <li>• Light Irrigation</li> </ul>

## Flow Regulated Micro Sprayers and Sprinklers

Flow regulated micro sprinklers or sprayers operate the same as micro sprinklers or sprayers with the additional of a flow regulating device. This important addition maintains consistent flow rates whether the pressure is low or high, from around 10 to 45 PSI, depending on brand. As pressure rises, the diaphragm restricts the water passage and slows the water velocity allowing the emitters along the laterals to deliver equal amounts of water. This provides uniformity, allows a longer run and accommodates almost any topography.



## Spray Jet

Similar to sprayers, micro jets are available in a full circle, half circle and quarter circle patterns. Micro jets have no moving parts and distribute the water in a very similar manner to the micro sprayers. The water passes thru the nozzle in a straight stream, hitting the spreader, which has a number of grooves (from 6 to 16) that deflect the water in narrow, multi jet streams, leaving dry spots between the jets. The ideal use is for small to large trees and in areas where water quality is poor.

- Covers diameters between 5' to 16'
- Operating pressure: 15 to 30 PSI
- Available on 10/32" thread base or assembled on a spike with micro tube in different lengths and barbs
- All made of durable plastic materials, ensuring resistance to most chemicals and fertilizers used in irrigation
- Low precipitation rate, allowing longer watering time with less runoff
- Filtration requirement: 80 to 150 mesh depending on flow rate

# Tubing and Drip Line

## About Poly Drip Tubing

Drip irrigation uses polyethylene tubing as the main water pathway to the drippers and micro sprinklers.

There are many sizes of drip tubing that are used for drip irrigation. The Drip Store carries polyethylene tubing in sizes of 1", 3/4" (special order, please call or email us for a quote) and 1/2". The 1/2" is available in two dimensional sizes, one with .700 OD and the other with .620 OD (16 mm); the two different sizes are commonly referred to as "1/2". The fittings for these two are not interchangeable. Make sure you use the correct fittings for the size of your tubing. The 3/4" or the 1/2" serves as the main line or a branch line, into which the drippers, micro sprinklers or 1/4" connectors are inserted. All of our tubing has been designed to meet every demand of low volume irrigation from agriculture installation, landscape installations to backyard gardens, and it can be installed above or below the ground.

## About Micro Tubing

The 1/4" micro tube, or sometimes referred to as distribution tubing, serves as an individual feeder line to deliver the water to each dripper or micro sprinkler. The micro tubing is available in two basic materials, vinyl and poly. The vinyl is soft and the poly is hard. Both are made from high quality vinyl or polyethylene compounds, with 2% + carbon black for extra resistance to the damaging effects of ultraviolet rays.

## About Drip Line and Drip Tape

The Drip Store carries a wide range of drip lines with spacing from 12", 18", 24" to 30", in 100', 500 and 1000' lengths and flow rates of .5 or 1 GPH. Our inline pressure compensating drippers are fully self-contained units that are inserted into the drip tubing or welded into the interior wall of the drip tubing. Both tubing and drippers are manufactured from high quality material that can withstand chemicals and fertilizers. Inline PC drippers contain a diaphragm that continuously adjusts to varying water pressure to ensure a constant flow rate. The diaphragm inside the inline dripper allows particles to pass through the dripper without harming it, providing reliable performance and a longer life. This method of continuous flushing and wide flow path allows the dripper to operate at optimal flow rates under extreme conditions. PC inline drippers discharge the same amount of water under a wide pressure range, providing high uniformity and longer run on any topography. All our 1/2" drip line are 1/2" (16 mm) in size and are used with a 16 mm barb fittings and 1/2" green color compression fittings.

The Drip Store also has drip tape in 500', and 5000'. The 500' is 15 mil and the 5000' is 12.5 mil, both with 12" drippers spacing. The drip tape is a flat tape with pre-inserted drippers every 12". Drip tape can be installed above or below the ground with emitters facing up. Drip tape fittings are different in design from those used with 1/2" drip hose in that they work with a twisting lock device rather than with compression.

# Filters

## About Filters

Perhaps the most important part of micro irrigation system design is the attention to treatment of the irrigation water before it enters the pipelines, tube, drip emitters, or drip heads. A well designed irrigation system will have little chance of success without careful filtration and treatment of any contaminants that are present in the water source. Since micro irrigation (drip or spray) is designed with very small discharge openings, they can be partially or totally blocked by a number of types of contaminants found in irrigation water. In general there are two types of contaminants that must be removed from micro-irrigation water:

1. Inorganic (or “hard”) materials: sand or any particulate that does not change its shape under system pressure. These contaminants can be removed by a screen-type filter system.
2. Organic (or “soft”) Materials: algae, iron slime or any material which can change shape and extrude through a screen filter. These contaminants are best removed by a sand media or disk filter systems, which is also excellent for “hard” material filtration.

A laboratory analysis of any proposed irrigation water source is advisable to identify the filter system required.

Micro irrigation filter systems (screen, disc or sand) are rated by:

1. System flow-rate capacity, which is the volume of water in gallons per minute (GPM) to be filtered.
2. Mesh rating which indicates the dimension of the smallest particle allowed through the filter.

Both of these ratings are important in the selection of filtration equipment.

### Note

Injection of chemicals into irrigation water has become common, particularly when micro irrigation systems are used. Some of these chemicals have the capacity to improve water quality, but should never be presumed to be substitutes for the mechanical removal of particulates by filtration.



## Screen Filters (3/4", 1", 1 1/2" and 2" with 40 to 200 mesh)

Screen filters are probably the most common filters and the least expensive in most cases. Screen filters are excellent for removing hard particulates from water. They are less effective at removing organic materials such as algae, mold and slime. These non-solid materials tend to embed themselves into the screen material where they are very difficult to remove. In other cases, they simply slide through the holes in the screen by temporarily altering their shape.

Screen filters are cleaned by removing the screen and cleaning them by hand, or thru automatic flushing using the system water. Depending on the flush method used, you will probably have to periodically hand clean the screen to remove garbage not removed by flushing.

There are several common methods of flushing. The simplest is a flush valve outlet where the valve is opened and the debris washes thru the flush valve outlet! An improved variation on this is the directed-flow flush valve. Again, a flush valve outlet is opened, but in this case the structure of the filter is designed so that the flush valve flow rushes over the face of the screen, sweeping the debris along with it. This is the most common method found in inexpensive filters.

The most effective method of flushing is the backwash method. In this method, the flush water is forced backwards through the screen for a very effective cleaning. This is accomplished by either using two filters side-by-side (the clean water from one is used to flush the other) or by "vacuuming" the screen with a small nozzle.

## Disk Filters (2", 3", 4" angle and 3" double)

Disk filters are a cross between a screen filter and a media filter, with many advantages of both. Disk filters are good at removing both particulates and organic matter. A disk filter consists of a stack of round disks. The face of each disk is covered with various sized small groves. A close view of the groves reveals that each has a sharp point on the top of it, somewhat like a tiny pyramid. Because of the groves, the filter disks have tiny spaces between them when stacked together. The water is forced between the disks and the organic particulates are snagged by the sharp points on the groves and filtered out.



## What Filter to Use?

There is no fixed answer. Your budget, water quality and availability of filters and parts must all be considered. Screen filters are generally the least expensive. If you have a city water supply with nothing more than a periodic grain of sand or flake of rust in it, a screen filter will be fine in most cases. For a smaller size system a disk filter would remove both sand and organics, but you might need to frequently clean it! Here are some suggestions based on the source of your irrigation water.

## Filter Recommendations

- **Municipal Water System**  
Screen Filter or Disk Filter.
- **Well**  
Screen Filter or Disk Filter.
- **River or Creek**  
Disk Filter, Media Filter and Screen Filter, Centrifugal and Media Filter.
- **Pond or Lake**  
Disk Filter, Media Filter and Screen Filter, Centrifugal and Media Filter.
- **Spring or Artesian Well**  
Screen Filter, Centrifugal Filter, or Disk Filter.
- **Organic Material in Water**  
Disk Filter, Media Filter and Screen Filter, Centrifugal and Media Filter.
- **Sand in Water**  
Screen Filter, Centrifugal Filter, or Disk Filter.

## How Much Filtration Do You Need?

The amount of filtration you need is dependent to a large degree on what type of irrigation you have. For example, drip irrigation systems need a much higher degree of filtration in order to protect the emitters from plugging. For most applications, the amount of filtration is measured by the “mesh size” of the screen or maximum size in “microns” of an object that can pass through the filter.

You always want to use the highest level of filtration that is practical. Even if your sprinkler system can easily handle a fairly good size grain of sand without clogging, removing that sand grain is still advantageous, as it will eliminate the wear on the system caused by the sand grain as it passes through. The balancing factor is that the more particles removed, the more often the filter clogs up and needs to be flushed. Excessive flushing can waste water and energy, so a trade off is necessary.



# Fittings

## Types of Fittings

- Compression type: compatibility is based on tubing outside diameter. The tubing is forced into the fitting.
- Barbed type: based on tubing's inner diameter and the fitting is inserted into the tubing.
- Spin lock type: compatibility dependent on tubing inner diameter and uses a downlocking nut to secure the tubing over the barb.

## Swivel Fittings

- This line of fittings will help make quick work of installing any multiple or single valve head assembly.
- Swivel fittings need no tools and only need to be hand tightened.
- All the swivel ends come with an installed "O" ring to ensure a tight seal without any glue or Teflon tape.
- They are made of high quality plastic to withstand direct sunlight for many years.
- Use these fittings along with our other components to create a custom valve manifold. Because these products are threaded, it will allow you to add or exchange components without ever having to cut or glue PVC pipe again! Once you have used these products you will never use anything else.



*Did you know  
Micro sprinkler are ideal for  
irrigating slopes or irregularly  
shaped areas that cannot be  
flood/furrow irrigated.*



# 02



## Chapter in Review

### Drip Products

To successfully fulfill your watering needs, it is important to choose the correct controller, sprinklers, sprayers, drip emitters and tubing. Consider the size, shape, and plant types of your watering area before choosing product models. After reading this chapter, you should feel confident about which product variation will best accommodate your project. Use the list on the right to insure that you've selected a complete system.

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

### My Drip Product Checklist

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1) Controller/Sensor

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2) Micro Sprinklers

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3) Micro Sprayers/Foggers

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4) Poly Tubing/Micro Tubing

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5) Drip Line/Drip Tape

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6) Filters

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7) Fittings

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