Drip Irrigation Design and Installation Guide

By Steve Okelberry

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Drip and Micro Irrigation

Welcome to Sprinkler Warehouse's Drip Irrigation Installation Guide. This guide is laid out in easy to follow steps with colorful illustrations.

Compared to conventional sprinkler systems, drip irrigation systems are simple to design, inexpensive, and easy to install. These efficient systems deliver water measured in Gallons Per Hour (GPH), as opposed to the Gallon Per Minute of standard spray heads and rotors, and apply water only where it is needed. This can improve plant health, conserve water, reduce the growth of weeds and save money all at the same time.

When designing an irrigation system consider the various areas and plants to be watered. We suggest using a drip irrigation application on trees, shrubs, vines, vegetables, flowerbeds, plant containers, pots, any individual plant and narrow planting areas.

CREATE A PLANT LIST

Note the list and locations of small and large trees, shrubs, groundcover, flowerbeds and vegetable gardens. Then divide the plants into groups with similar watering needs and plants that are in full sun or in shaded areas.
ABOUT THE SOIL

Soil is like a storage room for plant nutrients. It is the medium through which water and nutrients move. It anchors plants and is a reservoir of water for plant growth. There are various types of soil with different characteristics which determine what types of drippers or micro sprinklers should be used. To determine which type of soil you have in a given area, take a handful of dry soil, grip tightly and release. To determine which type of soil you have in a given area, take a handful of dry soil, grip tightly and release.

- **SANDY SOIL** - Sandy soil will crumble and fall apart when released. Water will tend to go straight down in this type of soil. Use closely spaced 2GPH drippers 10-12" apart or micro sprinklers in a wider spacing configuration.
- **LOAMY SOIL** - Loam soil will hold together but then easily break apart. Water will move slowly and will spread evenly. Use 1GPH drippers with 16-18" spacing.
- **CLAY SOIL** - Soil containing clay will hold together without breaking and water will be absorbed very slowly. Use .5GPH or 1GPH drippers with a 18-24" spacing.

CHOOSING A METHOD TO START

Determining how to start a system and what products to select are important decisions that should be made carefully. The correct choice will depend on the size of the area, the availability of water outlets, the garden design and the type of plant material to be irrigated. From the following three methods, you can choose the start method that is appropriate for your drip application.

**METHOD 1 - FAUCET CONNECTION**

One of the easiest ways to install a drip application above ground is starting from an outdoor faucet using 1/2" poly tubing as the main lateral line. It can be set for automation by using a hose-end-timer. Attach one of the kits below to the faucet and the 1/2" poly tubing to the swivel adapter.
Another way to connect your drip application is to connect it to an above ground anti-siphon valve or a below ground valve. An anti-siphon valve is a combination valve and atmospheric backflow preventer. An in-line valve requires the use of a backflow prevention device. Remember to check local codes for either application.

Below ground In-line installation using a pressure regulator, mesh filter, 1/2" riser and adapter tee.
You can also use a conversion elbow, pressure regulator and swivel adapter to convert a 1/2" sprinkler head riser directly to poly tubing.

**DISTRIBUTING THE WATER**

Now that you have selected a way to connect your drip irrigation application to a water source, it is time to roll out the hose and lay down a path for the water to travel to your plants. Three simple steps is all it takes to distribute the water.

**ROLL OUT THE HOSE**

After connecting to your water source, unroll hose or drip line. Position the hose in your garden or flowerbed.

Drip line ½”  poly tubing  ¼” poly tubing

**CUT THE HOSE TO LENGTH**

Now that you have laid out your hose, double check to make sure layout is correct and you are satisfied with the length. Use Poly Pipe Cutters to make clean precise cuts.
Poly-Gator 5 in 1 tool. Really handy

Tube cutters

**PUNCH HOLES FOR EMITTERS**

Using a punch tool, make a hole in the 1/2" hose wherever you want to place an emitter or a 1/4" barbed fitting for connection to distribution tubing. If you punch a hole in the wrong spot, you can seal it using a goof plug. Use 1/2" tubing stakes to secure the 1/2" tubing to the ground. Use 1/4" fittings to snap directly into the holes created in the 1/2" tubing to connect 1/4" distribution tubing. This type of connection can be used to reach individual plants.

**NOTE:** Make sure to flush out any debris before closing the line with a 1/2" hose end.

Use a **Small Punch** or a **Pro Punch** to pierce 1/2" Poly Tubing.

Use **1/2" Tubing Stakes** or **Stainless Steel Stakes** to secure the 1/2" Poly Tubing to the ground.
If you make a hole by mistake, simply seal it with a Goof Plug. It's Easy!

Insert Button Drippers, PC Drip Emitters, Flag Emitters or Adjustable Drip Emitters to distribute water to plants close to the tubing.

Use 1/4" barbed fittings, 1/4" distribution tubing and your choice of emitters to deliver water to plants.

Once you have flushed the line of all debris use a 1/2" Hose End to stop the flow at the end of the line. WATER THE PLANTS

Here are some of the possibilities when setting up your drip irrigation application. The following examples will help you better understand layout concepts and decide which application is right for you.
After connecting to your water source:

1. Layout the 1/2" tubing and secure it with 1/2" tubing stakes.
2. For hard-to-reach trees or shrubs, connect 1/4" distribution tubing to 1/2" hose using 1/4" barb fittings.
3. Use 1/4" drip line to loop around trees. Connect the drip line to the 1/2" hose using a 1/4" barbed tee.
4. Use Jet Sprays or Micro sprinkler on spike with 12" spike for flowers or ground cover.

Place emitters half way between the base of the plant and edge of its canopy.

Microsprinklers and jet sprays on spikes are great for flowers and ground cover.
After connecting to your water source:

1. Roll out the 1/2" Drip Line in rows spaced approximately 12" apart.
2. Use 1/2" Nut Lock Elbows and Tees to connect hose pieces. (bottom left)
3. Use 1/2" tubing stakes or stainless steel stakes to anchor the drip line to the ground.

![Image of vegetable garden with drip line layout]

**ROSES & SHRUBS**

After connecting to your water source:

1. Thread the Drip Head Outlet Manifold onto the 1/2" riser.
2. Connect 1/4" tubing to the outlet manifold. Layout the tubing to the base of the plants and cut it to the desired length.
3. Connect emitters, drip line (tubing with emitters), jet sprays or microsprinklers as shown to the right.

![Image of roses with drip line setup]

**PATIO CONTAINERS**

After connecting to your water source:

1. Run 1/2" hose to the patio from the water source. If needed, run the tubing up or along beams. Secure in place. Use an elbow fitting to get around corners. Secure the end of the hose using a 1/2" hose end clamp as shown in diagram.
2. Connect 1/4" tubing to the 1/2" tubing hose using a coupler or elbow and run it to container plants. Thread a 1/4" stake onto tubing and insert an emitter into the end. Push the stake down into the container.

![Image of patio container setup]
3. If using foggers, install them directly into 1/2" hose above each hanging container to mist the plants.

Foggers are great for irrigating hanging baskets or simply cooling patios.

Don't forget to clamp off the end of the hose after flushing the system of debris!

Before turning the system on the first time, leave all 1/2" poly tubing ends open and turn the water on and allow it to run freely for a few moments. This will flush out any dirt or other debris that may be in the system. Close the end of the line using either hose end clamp or end cap.

Check to see that the dippers and micro sprinklers are operating correctly and that there are no leaks in the system. If leakage occurs on 1/2" poly tubing at the base of a dripper or micro sprinkler, remove that dripper / micro sprinkler and insert a goof plug to close the hole. Reinsert the dripper or micro sprinkler in another area.

DONE!
Troubleshooting

Because drip irrigation is new to many people the trouble shooting steps are not well know. We’ve included a cheat sheet for you.

<table>
<thead>
<tr>
<th>Potential Cause</th>
<th>Solution</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wrong valve size, flow too low</td>
<td>Replace with correct size valve</td>
</tr>
<tr>
<td>Diaphragm orifice is plugged</td>
<td>Clean or replace diaphragm</td>
</tr>
<tr>
<td>Solenoid faulty</td>
<td>Check wiring or replace solenoid</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Potential Cause</th>
<th>Solution</th>
</tr>
</thead>
<tbody>
<tr>
<td>9-Volt battery is low or no longer good</td>
<td>Replace with a new 9-volt battery</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Potential Cause</th>
<th>Solution</th>
</tr>
</thead>
<tbody>
<tr>
<td>Puppet is missing</td>
<td>&quot;O&quot; ring is missing, lever is open.</td>
</tr>
<tr>
<td>Diaphragm is torn or worn out</td>
<td>Replace diaphragm</td>
</tr>
<tr>
<td>Valve is installed backwards</td>
<td>Turn valve around</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Potential Cause</th>
<th>Solution</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dirt inside the pressure regulator</td>
<td>Remove from line, remove the washer and clean.</td>
</tr>
<tr>
<td>Regulator is installed on mainline</td>
<td>Move to downstream side of control valve</td>
</tr>
</tbody>
</table>
### DRIPPERS OR MICRO SPRINKLERS HAVE UNEVEN OR NO FLOW

<table>
<thead>
<tr>
<th>Potential Cause</th>
<th>Solution</th>
</tr>
</thead>
<tbody>
<tr>
<td>Line broken</td>
<td>Fix broken line</td>
</tr>
<tr>
<td>Filter or dripper clogged</td>
<td>Clean dripper nozzle - Clean or replace filter</td>
</tr>
<tr>
<td>Pressure to low</td>
<td>Check pressure regulator</td>
</tr>
</tbody>
</table>

### DRIPPER OR MICRO SPRINKLERS HAVE NO FLOW AT END OF THE LINE

<table>
<thead>
<tr>
<th>Potential Cause</th>
<th>Solution</th>
</tr>
</thead>
<tbody>
<tr>
<td>Too many drippers on the line</td>
<td>Make sure you did not exceed the total maximum recommended flow rate (220 GPH)</td>
</tr>
</tbody>
</table>
Conclusion

My name is Steve Okelberry and I want to thank you for reading our repair guide. I am a person who truly loves irrigation and the beautiful results it brings to our life. What began as a sprinkler system contractor business with my dad became a life-long pursuit and career. Despite the fact that it’s been a few years since I worked as a contractor, I take the time to maintain my certifications and licenses as a contractor.

I started this guide as a way to share some of my knowledge and passion and as a way to give something back to all my loyal customers.

I enjoy teaching and sharing not only the knowledge but the stories I’ve seen and heard through the years. Don’t feel bad if you don’t know anything or if you have made a mistake. I promise you I have met someone who knows less and has made far bigger mistakes. I’m here to help you with your system design, installation and troubleshooting.

The drought we have experienced over the last years makes proper irrigation more important than ever. A properly designed and installed system helps the lawn and flowers, conserves water and saves money. This is what our guides are all about. Save water, save money, save time, build confidence and end up with a great looking yard.

Sprinkler Warehouse

Sprinkler Warehouse is the premier online provider of irrigation supplies. We are the largest on line provider in the nation. Because of this we offer pallet pricing on every part, whether you buy one or one hundred. We also maintain the most modern and exciting showroom in the industry, staffed with knowledgeable and friendly people.

I am a customer, just like you. I know what I want when I purchase a product. I’ve designed Sprinkler Warehouse from the beginning to meet these needs.

Our products are all brand new with warranties. No seconds or refurbished products. We stock major name brands, known worldwide. We cover the entire spectrum of lawn irrigation, from the pump to get it from the well to the spray heads and rotors to the final drip emitter.
Additional Resources

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