

Drip Irrigation System, Operation, & Components

Benefits of Drip Irrigation System

1. *Water Efficiently.* Today's most efficient technique of watering is drip irrigation. If you use the typical irrigation method, most of the water will evaporate and run off, resulting in future water scarcity. Every drop of water is applied directly where plants can get it with this drip system. This prevents water waste and allows your planting beds to make the most of every drop. As a result, you can achieve a good yield while using less water. The drip irrigation method places a precise amount of water exactly where it's needed. Overwatering is avoided. As a result, less weeding is required. It saves water and is cost-effective.

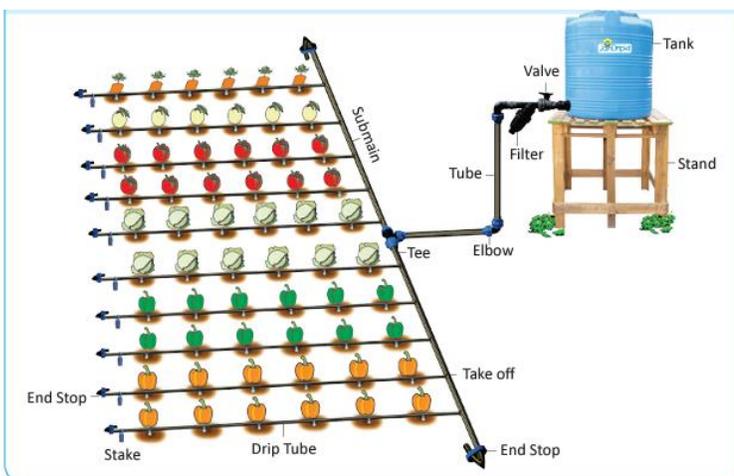


2. *Save your time.* Installing a drip system will save not just water but also your time. You don't have to water your plants by hand. With the use of a timer, it is also possible to fully automate the process.

3. *Save your money.* Drip systems water straight to the roots of the plants, which saves money. Drip irrigation utilizes 30 to 50 percent less water than traditional irrigation and in one to two seasons, you can recoup your investment in the system. With less water loss due to evaporation, your utility (water) cost will be lower. With good planning, drip irrigation components will survive for many years.

4. *Easy installation.* It takes only a few minutes to set up and is incredibly simple. The system is installed on the top layer of the floor. There are no modifications in the root systems of plants as a result of this. Instead, individuals may instantly reap the benefits of easy and direct access to water. Drip systems are also simple to move. Your drip system can be used to match your demands if you have a new vision for your garden or decide to grow or add new plants.

5. *Fewer pests, less disease & weeds incidence.* Insects love to find water on plant leaves or in water storage bodies; therefore there will be fewer pests, diseases, and weeds. A drip irrigation system delivers all of the water to the ground, ensuring that no water is wasted in undesirable places and that weeds are controlled. Because water will reach plants, there will be no water storage bodies in which pests and diseases can proliferate.



Designing and planning your drip system. A new plant may require only one emitter initially. As the plant grows, so does the demand for water. When a drip system is installed, it should be designed so it has the flexibility to change the number of emitters and the location of the emitters in the landscape. Each emitter should give you at least a 30-minute run time without runoff. Trees may also need more drip irrigation adjustments as they mature.

Maintaining your drip system. Check your drip line periodically for breaks and check emitters for clogs or heads that have broken off. Ensure that each emitter is

releasing the proper amount of water. Hold your finger over the emitter's outlet for a few seconds, so that the water can flush back and clean the emitter to help unclog it. Change the drip irrigation lines and filters at least twice a year, or whenever you change your irrigation schedule. Find the "end cap" on your drip line. This should be at the furthest point from your valve box. Open the cap and briefly run the system to flush out any debris that could be clogging your line. Turn off the water before trying to recap your line.

Operating a Drip Irrigation System. Follow the manufacturer's instructions for installation and use. A drip irrigation system won't be effective or efficient without correct water pressure and tubing length. You should know how many emitters a system can support (this is usually a maximum of 200 1-gallon drippers per ½" line), how to space them properly, and whether you can combine different types of emitters.

A stopped line or plugged emitter can shut down a drip irrigation system. Flush the lines to clear debris after installation and before you begin using the system in the spring. You should also flush the system and clean filters regularly, especially if your water supply contains a lot of minerals.

Follow the manufacturer's instructions for draining and winterizing your system before the freezing weather arrives.

While drip irrigation systems offer flexibility, a single system may not work for all of your plants. Make separate zones to accommodate plants with different watering needs. Lawns need a different watering method.

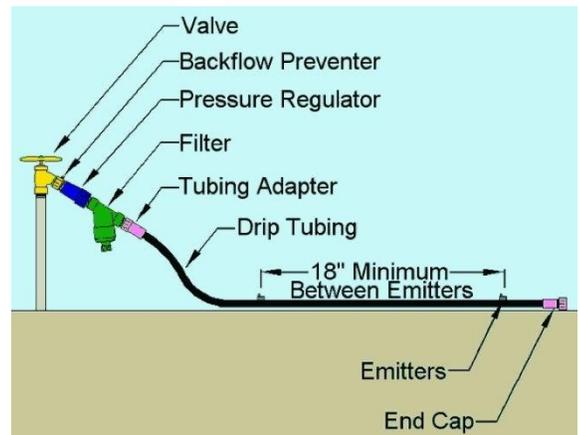
Drippers with lower flow rates work well in clay soil, which drains slowly. A wider network of drippers with higher flow rates is effective in sandy soil, which drains more quickly than clay.

Same Manufacturer! Buy components from the same manufacturer to ensure compatibility or buy an entire drip irrigation kit and work your way up to a customized system.

Components



Soaker hoses (prices vary according to hose length, about \$15 for 25' to \$22 for 75') are the simplest way to create drip irrigation. These garden hoses have tiny holes along their length to allow water to drip out. While it's an initially cost-effective option, it uses more water than a drip system in the long run. Soaker hoses also have a short life span when exposed to direct sun—about 1 season.



Kits (prices vary, garden kit about \$95) combine the components you need for specific applications. You can find kits to create systems for vegetable gardens, flower beds, container plants, and landscape plants like trees and shrubs. Some kits allow you to expand the system as your irrigation needs grow. Other kits provide repair parts or let you convert pop-up sprinklers for drip irrigation.



Backflow preventers or **anti-siphon devices** (about \$6) The anti-siphon backflow preventer allows water to flow in one direction and not in reverse, preventing unclean water from contaminating the water supply. Backflow preventors are required by most local health codes when using a potable. The vacuum breaker has a ¾" FHT (female hose thread) connection which threads onto the hose bibb or faucet; ¾" MPT (male pipe thread) connection on the other side to attach to ¾" FPT (female pipe thread) pipe. A removable filter washer blocks particles that can clog emitters. Use the directional arrow on the device to position in the direction of water flow.



Pressure regulators or **reducers**. (about \$8) Without these devices, the typical home water supply has too much pressure for a drip irrigation system. Drip irrigation systems are designed to work with low water pressure. When your water source emits high water pressure, it will be too much pressure for your system to handle. The pressure regulator lowers the water pressure and alleviates stress on your drip system. The ¾" FPT (female pipe thread) X ¾" MPT (male pipe thread) pressure regulator comes preset at 25 to 30 PSI (pounds per square inch). The device connects to ¾" MPT pipe on one side (such as an existing underground irrigation system), and ¾" FPT pipe on the other, or connects to tubing with a ¾" FPT adapter.



Filters (about \$15) prevent debris from clogging the tubing and emitters. Some pressure regulators have built-in filters. This component has a 3/4" MPT (male pipe thread) connection point on both ends to connect to 3/4" FPT (female pipe thread) spigot or pipe, such as a sprinkler riser in the ground. To install, position the directional arrow in the direction of water flow. The "Y" filters typically come with a 150-mesh (about 100 micron) filter that's easily removable for maintenance; just unscrew the flush cap or cleanout cap, remove the middle housing, and pull out the filter to clean.



Flexible tubing (price varies by pipe length, 1/2" x 50' main line about \$10, 1/4" x 100' drip line about \$20) transports the water. Black or brown coloring allows the tubing to blend in with soil and mulch. Ultraviolet (UV) resistance protects the tubing from deterioration caused by the sun. Tubing cuts with a pair of scissors, garden sheers, or tubing cutters and the tubing can be exposed to cold or warm climates and left on top of the ground all year long.



Fittings Many components, (prices vary) connect system components.



Stakes (about \$2.50 for a 10-pack) secure tubing and support emitters to prevent them from being clogged by soil, debris, or bugs. Some stakes have built-in emitters. Tubing stakes are used to hold down supply tubing and position the attached emitter close to your plant's root zone. Tubing stakes and clamps come in a variety of sizes and shapes to optimize your drip system.



Risers (about \$1.50) elevate emitters above the tops of the plants. They are not frequently used in gardens since they usually spray water from above and they are higher gallons per hour emitters. Risers provide lift to a sprinkler, sprayer, or jet with the 13" to 8" riser. Connect 1/4" supply tubing to the 1/4" barbed inlet at the bottom of the rigid riser; then place stake into ground for overhead watering where you want it.



Timers (prices vary widely depending on type and brand) turn the water on and off at times you set. Timers can prevent overwatering, minimize wasted water, and allow your system to function as an automatic watering system. Some can connect to home automation systems to control from a computer or smart device. Certain smart devices can even regulate watering schedules based on weather activity and provide reports on water usage, making them ideal smart home solutions.



Hole punch and Cutter (about \$15/set) create insertion points in the tubing to connect emitters or smaller-diameter tubing. Cutters make clean cuts in different sized tubing. Some cutters can also function as hole punches.



Plugs (about \$2.5 for a 16-pack) securely stop up any holes you punched by mistake—"goof plugs." Plugs also allow you to move emitters without replacing the tubing.



Emitters. (.5 gal/hr, 10-pack about \$7; 1 gal/hr, 10-pack about \$7; 2 gal/hr, 10-pack about \$8) The drip emitters insert into the 1/2" or 3/4" tubing and discharge the water into the soil or onto plants. A gallons-per-hour (GPH) rating indicates the flow rate.

The flow rate you need will vary depending on the type of plants you're watering and your soil type. Emitters have a rating for the maximum water pressure they can accept, noted in pounds per square inch (PSI).



Pressure-compensating emitters (.5 gal/hr, 10-pack about \$7; 1 gal/hr, 10-pack about \$7; 2 gal/hr, 10-pack about \$8) deliver a constant flow rate even if the water pressure varies. Turbulent flow emitters feature a design that helps prevent clogging. Drip irrigation systems can include drippers, bubblers, and misters.

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Warm it up. When installing your drip irrigation system, allow the tubes to sit in the sun for a few hours. The heat will make them more flexible and easier to connect to fittings and emitters.

How often to water. Seasonal watering restrictions apply to customers with drip irrigation systems. While drip irrigation may occur any day of the week, the number of days is limited by season. Plants need far less water than grass. We recommend you run drip irrigation systems:

- Twice a week in spring and fall
- Every other day in the summer
- Once a week or every other week in winter

Rate of flow. To find out how fast your drip emitter produces water, measure how many seconds it takes to fill a tablespoon:

- 14 seconds equals 1 gallon per hour (gph)
- 7 seconds equals 2 gph
- 4 seconds equals 4 gph

Determine the Flow Rate. Flow rate is measured in gallons per minute

(GPM). Using your outside spigot, fill a measurable container with water. Record the time it takes to fill to a measurable level; a gallon is the easiest amount. Divide the filled container size (in gallons) by time (in seconds) it takes to fill it. Multiply it by 60 seconds. The number you get is the flow rate in GPM. Multiply that number by 60 if you need to determine gallons per hour (GPH).

Example 1: A 3-gallon bucket takes 15 seconds to fill.

$$3 \div 15 = 0.2$$

$$0.2 \times 60 = 12 \text{ GPM or } 720 \text{ GPH}$$

Example 2: A 4-gallon bucket takes 30 seconds to fill.

$$4 \div 30 = 0.13$$

$$0.13 \times 60 = 7.8 \text{ GPM or } 468 \text{ GPH}$$



How long to water

Determine the amount of time to water based on the rate of flow of your drip emitters.

Emitter type	Length of each watering
High-flow emitter (Up to 20 gph)	12 minutes
Low-flow emitter (Up to 4 gph)	30 minutes
Low-flow emitter (Up to 2 gph)	60 minutes
Low-flow emitter (Up to 1 gph)	90 minutes

Final thoughts. If you are having trouble with your drip irrigation system, there are a few things you can do to troubleshoot the problem.

- **Leaks.** The first thing to check is the tubing for leaks. A slow leak can waste a lot of water over time, so it's important to fix any leaks as soon as you find them.
- **Emitters.** Next, check the emitters and make sure they are working correctly. If you notice that your plants aren't getting enough water, try adjusting the flow rate on the emitters or using a different type of emitter.
- **Weather.** Finally, pay attention to the weather when using drip irrigation. Because drip systems are usually left running most of the day, you could overwater your garden if there is a sudden rainstorm. If you know bad weather is on the way, be sure to turn off your system or reduce the amount of water flow to avoid flooding your garden.
- **System before planting.** Set up your drip irrigation system before planting. This will help you to avoid damaging roots and ensure that each plant gets the correct amount of water.
- **Timers.** Use a timer to automate your drip irrigation system. This will save you time and energy and help you to avoid over-watering or under-watering your plants.
- **Work the system.** Replace leaking or clogged emitters regularly. This will help you to avoid wasting water and keep your plants watered properly.
- **Mulch.** Mulch to help conserve water. This will reduce evaporation and help the soil to retain moisture.

Using drip irrigation is a great way to improve the health and appearance of your plants. By following the tips above, you can learn how to use drip irrigation to efficiently water your garden and save money in the process.