



Polyethylene tubing comes in 100 ft and 500 ft rolls from Hawthorne. [HGC747750, HGC747564, HGC747566, HGC747559]

POLYETHYLENE

Polyethylene is the *go to* tubing material for professional horticultural applications. It is easy to work with, extremely cost effective, lasts for many years with proper maintenance, and you can punch holes and drip emitters directly into it. The PE tubing that HGC distributes (from Netafim) has two layers, an opaque white outer layer and black inner layer. The white outer layer reflects light and heat, while the black inner layer prevents algae growth within the tubing.

Punching emitter holes is a breeze with the Netafim Punch Tool. →

If you mess up and punch a hole in the tubing that you don't need, we have goof plugs for that. [Netafim Goof Plug HGC747760]



Punch Tool [HGC747759]

PLASTICIZED POLYVINYL CHLORIDE (AKA VINYL TUBING)

Vinyl tubing is more common in a hobbyist setting because it is more malleable/flexible than polyethylene tubing, which tends to kink if forced around a tight corner. This rigidity is great when you have long, straight runs of tubing that are going to remain in place for quite some time, but for hobbyist growers who may require added flexibility, such as in a tent, then vinyl is a great solution.

Note/Reminder: It's vital to select the right type and diameter of tubing. Each diameter has a maximum flow that it can handle. If in doubt, give us a call!



[HGC708265, HGC708245, HGC708251, HGC708223, HGC708221, HGC708220]

🌱 STEP 6: FITTINGS

Envision this: you have a nice rectangular bench, with nice polyethylene tubing that is going to go around the entire outside edge of the bench. The only thing is, the tubing isn't flexible enough to make the tight 90 degree bend. What's a grower to do? Give up and water by hand? Not if we have anything to say about it.

This is where fittings come in. 90 degree elbows, tees, adapters, bushings, straight connectors, the list is quite extensive. It is important that the fittings be able to withstand the pressure of a continuously operating irrigation system (which can be as high as 50 psi depending on the situation).

For more information, call Hawthorne at 888-808-4826 or visit our website at hawthornegc.com



One way to do this is with barb fittings. These fit in the inside of the polyethylene tubing, and will require a clamp to keep the tubing sealed around the barb (if pressure is above 10-15 psi). For a small garden outdoors, or an indoor garden this is fine, but once you get to larger operations in greenhouses or outdoors this clamping can become very tedious! One solution to this is the TechLock compression fittings from our friends at Netafim.

Some common barbed fittings
 [HGC708420, HGC708425, HGC708430] - 1/2"
 [HGC708440, HGC708445, HGC708450] - 3/4"
 [HGC708460, HGC708465, HGC708470] - 1.0"



These TechLock fittings allow growers to quickly and easily attach tubing together to allow tubing to get around tight corners, split into a tee, really do what your heart desires, all without needing to engage in the repetitive task of screwing clamps with power tools, or even worse, by hand!

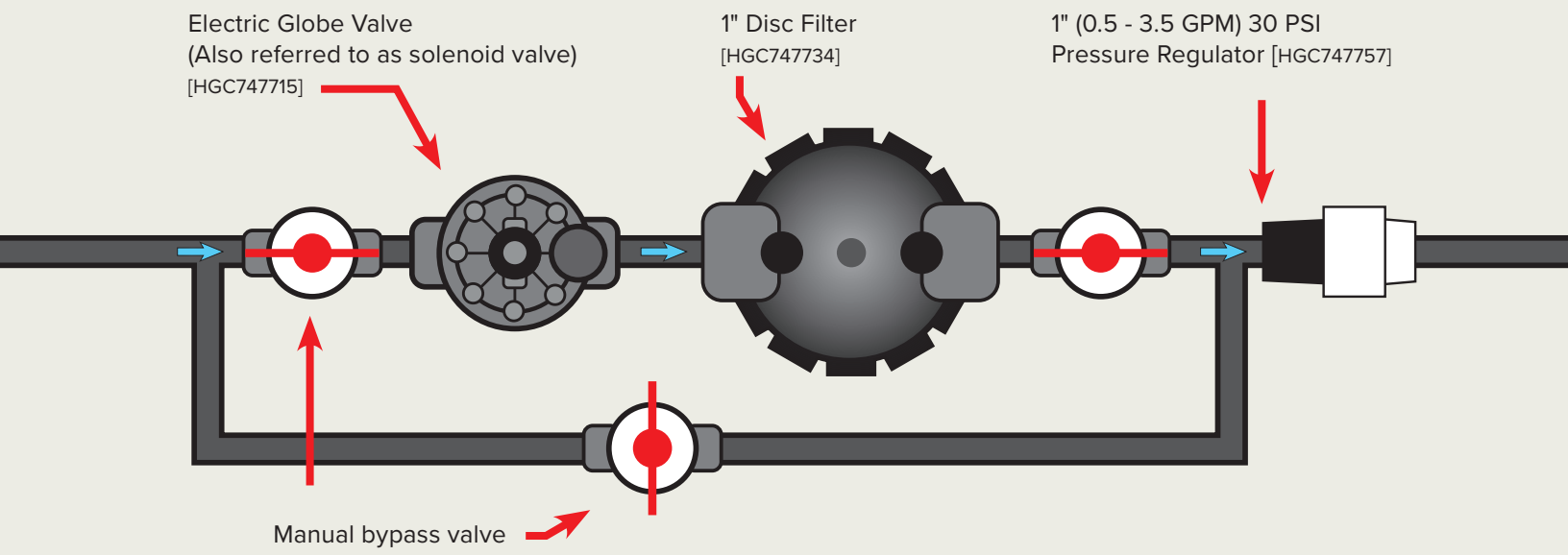
Now that we've worked our way back from the plant, to the tubing, to the fittings, hop aboard as we continue to our next step: zone control. This is where the magic of automation happens!

Some common Techlock Fittings
 [HGC747730, HGC747731, HGC747732]

🌱 STEP 7: ZONE CONTROL

ZONE DEFINITION: A zone is the area within an irrigation system that is controlled by a control valve. This can theoretically be as small as one plant, and as large as a multi-acre field.

It is recommended to have three key components at the beginning of each zone: a control valve, a filter, and a pressure regulator. There are many more additions that can be included per zone, but these three components are the most essential pieces when designing a system. The diagram below shows the standard layout used in HGC Irrigation designs.



It is good practice to include a manual bypass for solenoid and filter maintenance. It is also a good idea to put the pressure regulator downstream of the solenoid valve as they are often not rated for sustained pressure.

Now that you understand the 3 basic components of zone control, let's dive deeper into each component.



SOLENOID VALVES

Solenoid control valves are **the** piece of equipment that allows for automated irrigation to be automated! Referred to as a solenoid, globe or simply as an electric control valve, this item turns on or off (open or closed) when a signal is sent by an irrigation controller. When the valve is open, then the water flows. When the water flows, our plants are happy and watered!

Some common Solenoid valves
[HGC747713, HGC747715, HGC747754] - ¾", 1", and 1-½" respectively



FILTERS

A filter is the difference between having an irrigation system that lasts for 5 years or 5 weeks. The path that water has to travel through inside a drip emitter is small. Very small!! Filters prevent any particulates from clogging drip emitters. HGC always recommends a disc filter with a micron size of 130 or less. Mesh and micron do not have a proper mathematical conversion rate. These numbers are commercial approximations provided by Netafim.

You might be thinking, “yeah well my water is clean, bro.” Or, “I have the purest nutrients that dissolve completely! Why should I filter my water, again?” While most irrigation systems have a primary method of water filtration, having another filter right before the bench adds a second level of protection from clogging in your drippers.

Nobody wants to put all this care and attention into designing and installing a system only to have drip emitters clog!

Note: Micron and mesh are two numbers which correspond to the level of filtration that a given filter is capable of.

	Finer filtration →						
Micron	400	250	177	125	105	100	74
Mesh	40	60	80	120	140	150	200



PRESSURE REGULATORS

Pressure regulators, well, regulate pressure. As long as the pressure before the regulator is higher than the rated set point (commonly 30 or 40 psi) then the outlet pressure remains regulated at the same psi. Since drip systems work best within a range (15-50 psi, in general) it is important to install regulators on each zone to ensure uniformity.

Note: Always double check the flow rating on the pressure regulator. These devices will only operate properly within a certain flow range.

Some common Solenoid valves
[HGC747758, HGC747757]

STEP 8: PUMP BASICS

Pumps generate the energy in the entire irrigation system. Despite their importance, they are one of the most misunderstood components within the entire irrigation system. Since commercial drip irrigation systems require a certain pressure to operate (often above 15 psi at the drip emitter), we need a specific type of pump that can produce a high pressure at high flow rates.

Pump	Application
Centrifugal Pump	<ul style="list-style-type: none"> • Commercial Drip Irrigation (pressure compensated) • Facility-wide water delivery • High pressure, high flow applications
Mag Drive Pumps	<ul style="list-style-type: none"> • Recirculating in a day tank • Transfer between tanks • Small drip irrigation (open flow) • Ebb and flow • Low pressure, variable flow applications
Centrifugal Pump	<ul style="list-style-type: none"> • Recirculation in a day tank • Transfer between tanks • Small drip irrigation (open flow) • Sump pumps • Temporary applications • Low pressure, high flow applications

Centrifugal pumps

are most commonly used in commercial drip irrigation applications due to the fact that they are reliable, quiet, easy to install, and most importantly, extremely powerful!

One of the most common questions we get is ‘can this pump run this system’. That can be a difficult question to answer, but some general tips are:

- Centrifugal pumps are required for large drip systems. Period. If you have more than 200 square feet of growing area, you will likely need a centrifugal pump.
- Mag drive pumps can work great for transferring large volumes of water or fertilizer, but they do not produce much pressure. These pumps are best for a small system without **pressure compensating emitters**.
- Submersible pumps (with the exception of the ECODIVER series, which is centrifugal [HGC727940, HGC727942, HGC727944]) will also not be capable of producing the high pressure required for drip irrigation.

Improperly sized pumps, which impact the efficiency of a system enormously, are all too common in poorly designed irrigation systems. Proper pump selection is critical for the success and longevity of any irrigation system.

Selecting the correct pumps for your facility can be quite overwhelming but our team is here to help you make that decision and provide guidance on keeping your pumps and system running smoothly. Sizing a pump is a difficult task requiring experience and know-how. We’ll cover that in-depth another time. For now, here are some of the most important centrifugal pump features HGC offers:



DAB E.SYBOX
[HGC727958]

DAB E.SYBOX Mini 3
[HGC727956]

VARIABLE FREQUENCY DRIVES

A pump that is too large will be working very hard in order to deliver very little flow to the system. Without adequate flow, the pump’s motor can potentially overheat (most pumps use the water flow to cool themselves). This drastically reduces the lifespan of your pump.

One very easy way to avoid this issue is to use a pump equipped with a variable frequency drive (VFD). Pumps equipped with a VFD are able to throttle down the speed at which the impeller spins, allowing them to match the needs of the system without wasting excess energy. The DAB E.SYBOX [HGC727958] and DAB E.SYBOX MINI3 [HGC727956] are both equipped with VFDs, meaning they are extremely efficient, only using the energy required for the task at hand, no more.

PRESSURE SWITCH

A pressure switch is an electronic device that turns a pump on and off when a certain pressure is reached. This allows a pump to operate without external controls such as an irrigation timer telling it to turn on or off. It does not matter if the pressure drops because a manual ball valve, electric solenoid valve, or hose bibb opens, the pump will detect the pressure drop and turn on, giving uninterrupted pressure and flow to the system.

Once the valve closes, the pressure builds to a preset amount (often 40, or 50 PSI) and then shuts the pump off, preventing any overheating or damage from a no-flow situation.

The DAB E.SYBOX and Mini3, mentioned above [HGC727958 and HGC727956], both have this feature. More pumps that have this feature include the ECOTRONIC series [HGC727978, HGC727982, HGC727984, HGC727986, HGC727988] and the ECO Plus Elite Electronic Series [HGC727194, HGC727196]



ECO Plus Elite Electronic Series [HGC727196]

LEAK DETECTION

If a pump has a pressure switch installed and there is a small leak somewhere in the system, this will result in a phenomenon known as pump cycling. The pump will automatically shut-off at the preset pressure value of say 50 PSI, but the leak in the system will cause this pressure to decrease. Once the pressure drops below the 'cut-in' point, the pump will turn back on again, but only for a brief period to repressurize the system. If you have a pump that turns itself on for 5-10 seconds when everything is shut off, you may have a leak!

This on-and-off repetition is called cycling, and is bad for the longevity of the pump. Pump motors do not perform well if they turn on and off many times quickly. Pump manufacturers realize this, and have leak detection programs built into the controllers of the 'smart pumps' above (DAB, Eco Plus Elite, and ECOTRONIC). If a pump turns on and off too many times in an hour it will shut down to protect the motor.

OVERHEAT PROTECTION

Like many electronics, overheating is catastrophic to pump motors. This is why a thermal protection device is included in every centrifugal pump that Hawthorne distributes. If the pump motor exceeds a preset temperature it will shut off, protecting the pump and facility from damage or fire!

“DUMB” CENTRIFUGAL PUMPS

So, you don't need any of that fancy electronic stuff, you just want a pump that turns on and off? Dumb pumps are pumps too, as we say in the irrigation department. We have you covered! These pumps will require you to manually plug them in or flip the switch to operate them. They can also be controlled using a relay switch connected to a standard irrigation controller (24VAC to 120VAC for these pumps).



EcoPlus Elite Jet and Multistage pump [HGC727180, HGC727182, HGC727188, HGC727190]



Ecojet and Ecoplus series [HGC727972, HGC727976, HGC727960, HGC727962, HGC727964]



Ecodiver series (Dumb submersible centrifugal pump!) [HGC727940, HGC727942, HGC727944]



WRAPPING IT UP

We've been on a journey from the plant all the way back to the pump, the originator of the entire system's energy. We hope that this has helped demystify what is often an overlooked, but essential piece in every grow facility. Contact Hawthorne for our support and guidance. We're here to help you, from your basement grow to the largest greenhouse, achieve success by implementing irrigation best practices.

THE PRODUCTS AND ADVICE TO KEEP YOU IN THE GAME

- Hawthorne Gardening Company, in partnership with the largest irrigation equipment manufacturers in the world, is here to help you maximize your crops' potential with the best irrigation management strategies and information available today.
- Our dedicated team can assist you in every step of the way to ensure that your system will work exactly how it is supposed to from day one.



 HAWTHORNE™

North America's largest, most
comprehensive provider of
**CONTROLLED ENVIRONMENT,
HYDROPONIC PRODUCTS
AND SERVICES.**

For more information, call Hawthorne
at 888-808-4826 or visit our website at
hawthornegc.com