

ASSEMBLY OUTDOOR SOLAR GARDEN

IMPORTANT

- Legs now include solar panel supports on 3 sides (E, S, & W)
- DO NOT ROTATE LEG TEES OR YOU MAY NEVER REPOSITION THEM AGAIN!
- With 2 exceptions gluing pipes and fittings is neither recommended nor needed. Not gluing allows for adjustments during assembly and for easy disassembly for moving and storage. Loose connections can often be tightened using Teflon tape (included)
- The Garden is described with ends (N&S) and sides (E&W). This is important from a horticultural standpoint because the N end receives no direct sun, the E side receives the excellent morning sun, and the S end and W side receive the hot direct afternoon and evening sun. The Garden's functional components reservoir and electrical box are located at the N end and Garden expansion occurs linearly to the S end.
- Use QPlugs only, NEVER use soil or loose growing media with the Garden. The small-bore spaghetti tubing will clog.
- Keep the Electrical box closed and sealed. There's lots of water around the Garden that's incompatible with electrical equipment and connections
- Flat surfaces e.g. patios, decks, driveways make life easier but with shims, a level, and patience the Garden can be situated almost anywhere. Proximity to a hose bib is a plus, see Autofill below
- Solar means for sun required for both plants and PV panels. Both need almost full sun to exceed expectations. Morning sun is most important. MyGarden will disappoint in shady locations.



Figure 1. Clockwise from the cross: tee, plug, cap, and elbow

Lift out the pipes and pipe bundles and separate them carefully on a large table or clean floor



Figure 2. Left to right: N end bundle, S end bundle, top side bars, bottom side bars (note crosses), Reservoir support bar, (2) Top Bars, Manifold, and Irrigation system attached to its support bar. Outside and in front of the reservoir is the pump and combination flow valve control / filter system, small bag of supporting items, the return to reservoir drainpipes, solar panel supports (2 of 6 shown), rubber mallet and GroPlugs (behind mallet). Inside reservoir is the electrical box (bottom), Autofill (above), plant nutrients and battery charger (immediately in front). Above the reservoir is the reservoir support shelf and a solar reflector to protect both the electrical box and the reservoir from the sun.

STRUCTURE

Begin assembly with the leg bundles (figure 3). Note the caps at the ends of some of the pipes (far right). They are "feet" that end up on the ground when the Garden is upright. The S end bundle has a straight bottom bar while the N bottom bar includes a short middle leg that will support the Reservoir.



Figure 3. Leg bundles: S end top, N end bottom of picture

Open the S end bundle and insert the S end bottom bar into the 2nd from the bottom tees on both legs. Note that there are lots of tees making up each leg. Do not twist them! Put aside the S end.



Figure 4. This makes the S end once the straight bar is inserted into the lowest tees on each leg

Open the N end bundle and note that the N end bottom bar includes a short central Reservoir support leg. Insert the short support leg into its tee and insert the N end bottom bar into the 2nd from the bottom tees on the N legs. This makes up the N end.



Figure 5. This makes the N end once the bottom bar and reservoir support is inserted into 2nd from the bottom tees on each leg

Locate the side bottom bars, the only components made with crosses.



Figure 6. side bottom bars. As always, the feet (caps) go down

Lay the S end flat on the ground. Insert the longer of the 2-side bottom bar pipe segments into the lowermost S end leg tees. The side top bars are straight pipes. Insert them into the top tees on the S end legs. Study figure 7. You Garden should look like this at this point.



figure 7 showing the top and bottom side bars inserted into the S end legs. Looking top down from the N end

Now lay the N end over top and match up the leg tees with pipe ends as shown in Figure 8.



Figure 8 showing the N end (top) overlaid onto the 4 side pipes coming from the S end (on the ground)

Once all pipes are in their fittings push down gently on all connections. Roll the Garden onto each of its four sides repeating the procedure. Then stand the Garden on its feet.

Locate the top bars identified by large $1 \frac{1}{2}$ " tees at each end with 3 small 1" tees along their horizontal axis'. Identical top bars go atop both the N and S ends and locking down the structure. Top bars have two horizontal pipe sections: $12 \frac{1}{2}$ and $8 \frac{1}{2}$ inches. When standing in front of the N end looking towards the S end the longer $12 \frac{1}{2}$ " section goes to your right.



Figure 9. Top bars, identical components atop both the N and S ends



Figure 10. The Garden structure on its feet with the identical N and S top bars attached. Notice that the longer pipe segment on the top bars goes to the right when looking from N end to S end as shown above.

Next insert the central reservoir support bar into the crosses on the side bottom bars.



Figure 11. Inserting the central reservoir support bar completes assembly of the main structure

To fully insert pipes into fittings firmly press down on each corner once more repeating the procedure while rotating the structure.

Plant support bars are optional and can be replaced with plugs when plants are small. The bars server two purposes. They support taller, bearing plants that often tend fall over, and they're easily substituted for bottle support pipes if a gardener chooses to grow larger plants in 2-liter bottles (another optional method of production in MyGarden).



Figure 12 showing plant support bars often replaced with the plugs when crops are small. The small holes in the long horizontal pipes (not shown in the pipes above) are for bottle support straps if the option for a GroBottle option is selected.

Locate the manifold illustrated upside down in Figure 13 below. Make certain the 5 ports are perfectly lined up, stand the manifold vertically on a concrete surface, and push down firmly to make sure all fittings are firmly seated. The manifold sits atop the N end top bar, held in place by the five GroPipes that screw into the manifold ports. Hold it in place now by screwing in one

GroPipe. The return to reservoir section (pointing up here but down during operation) is glued together except for its connection with the manifold. That connection is made with Teflon tape to allow for fine tuning adjustments during assembly. If it drips during testing add additional tape.

PLUMBING



Figure 13 the drain manifold and return to reservoir section (shown here upside down). The 5 manifold ports point to the S end to accept the GroPipes, and the return to reserve sits below underneath pointing towards the reservoir (see Figure 14)



Figure 14 view from N end to S end illustrating how one threaded GroPipe supports the manifold in place above the N top bar. Note return to reservoir section below the top bar



Figure 15 is a view from the S end looking towards the N end and the manifold held in place using one threaded GroPipe. Note return to reservoir section below the top bar



Figure 16: The 5 GroPipes installed on the manifold



Figure 17 illustrating the return to reservoir manifold section connected to the reservoir via a removable return to reserve pipe. A 2nd 90⁰ return to bucket pipe (not shown) is included to use when draining the reservoir into a bucket during nutrient solution change out (Hint: fertilize potted plants and flowers with used nutrient solution).

Locate and install the irrigation system (Figure 18). Components include the support bar (horizontal PVC), connection system to the pump and filter system inside the reservoir (vertical section), irrigation tube (1/2" rubber tube), nutrient solution manifold, and five spaghetti distribution tubes, one to each GroPipe. Everything is preassembled. Insert the irrigation support bar's vertical pipes into the middle tees on N and S end's top bars. The irrigation manifold goes to the S end. The vertical connection system to the reservoir is flexible and swivels to assure easy access into the Reservoir through a small 1" hole. The short rubber tube section is glued into the white plastic connector but is not glued with the grey plastic 90° connecting elbow. If you find a leak here, simply tighten the small pipe clamp.



Figure 18 Irrigation system. Note the vertical section that drops down and enters the reservoir, connecting to the pump and filter system inside the reservoir through a small 1" hole.

Free the spaghetti tubes and stick one down into the small holes at the end of each GroPipe. CAUTION: Do not loosen the cable ties holding the $\frac{1}{2}$ " rubber irrigation tube on its PVC support bar!



Figure 19 is how your assembly should look at this point. Move the spaghetti tubes into the small Gropipe holes. These GroPipes and the irrigation system are shown ready to couple with same on an Add On Unit (an option not shown). The empty top bar tees should hold either the plant support bars or plugs to keep rainwater out of the structure (you can install the plant support bars later when your plants require support).

THE RESERVOIR & AUTOFILL

Two options often ordered with the Outdoor MyGarden are Autofill, which automatically replenishes the water in the reservoir either once or twice per day, and Add On Units (AOU), which set up easily and double and triple MyGarden production for little additional cost.

Autofill is not necessary to start out and when the Garden is used to germinate small seedlings for transplanting, when growing miniature vegetables, or under artificial lights. Autofill is almost essential, however, when growing larger crops especially in hot sunny weather when you're not available to add water to the reservoir manually once or twice a day. Because Autofill is so important all reservoirs for Outdoor Gardens ship with the Autofill Level Control Valve installed. The Valve is preset to the 8-gallon mark (the top of the float at 6 ¾"). Adding the Autofill option later is very easy. See below for more Autofill information.

Put the support board on its support pipes (Figure 20) and place the reservoir on the board all the way to the West (right) with sidewall holes to the left (Figure 17 above). Center the Level Control Valve stem inside the 3" circle cutout in the board. The reservoir extends beyond the N End for easy access when you need to change out the nutrient solution, clean the filter, replace the pump, or adjust the Level Control Valve.

The Level Control Valve can be damaged in shipping and this is the best time to test it for leaks. Leaks cannot be tolerated because, although water is easily replaced especially with Autofill, lost nutrients are not replaced until the next nutrient solution change out. Place a paper under the base of the Valve and put 4 gallons of water in the reservoir to check for leaks. If you see no drips, you're good, continue with assembly. If the Valve does drip (rare) turn it over and carefully tighten the large white nut. If dripping persists (very rare) you'll have to unscrew it and add more rope putty (included) to its base before replacing and tightening the nut.



Figure 20. Note the correct positioning of the reservoir support board at the N end of the Garden. The 3" diameter circle holds the base of the Autofill Level Control Valve.

Download a separate short document for Autofill installation details

ELECTRICAL

Place the electrical box next to the reservoir on the reservoir support bars (Figure 21).



Figure 21. Correct Reservoir positioning. Note the 2 holes in the reservoir wall, the smaller and larger accommodate respectively the vertical section of the irrigation system and the return to Reservoir pipe. The level control valve (inside Reservoir) ships installed in every Reservoir. The silver connector below the Reservoir is part of the optional AutoFill. Reservoir support board not shown.



Figure 22 the electrical box situates adjacent to the reservoir. Note the manifold return to reservoir system above the box.



Figure 23 showing the pump and filter assembly with wires exiting to the adjacent electrical box. Newer Reservoirs lack the wire slit in the upper rim and the wires pass through the same hole as the vertical valve / filter irrigation assembly. Pump positioning and attachment methods vary.

The most current assembly and operations instructions and suggestions are always available at www.KoolSci.org



Figure 24 Electrical box. Contents include battery (12v, 7ahr); Genasun solar charge controller; programmable timer (instructions beneath); battery charger; and battery tester (green). Solar panel inputs enter through the elbow on the left and mate with the connectors at "solar panels in". Pump wires enter through the elbow at bottom of picture and attach to the terminals labeled "pump in". Pump brown (+) and black (-) wires connect with circuit red (+) and blue (-) wires respectively. Everything is easy to reach especially the timer for programming. Lift the timer to access the single AA battery that we recommend changing between crops. The battery charger is for emergency charging only as in operation the battery stays continually charged by the solar panels. The battery tester is useful for measuring solar panel input as well as battery current.

The electrical box serves to connect the solar panels directly to the pump, and to a charge controller that keeps a small battery fully charged. We find it satisfactory for the timer to run the pump off the battery for 2 minutes at 10a, noon, 2p, 4p, and 6p. On sunny days the battery is irrelevant as the panels power the pump. On rainy cloudy days, however, plants still transpire slowly and eventually wilt. A few minutes of battery charged pump operation throughout the day is more than adequate to save those plants under those conditions. Don't run the battery more than necessary on cloudy days or you risk running it down. A battery tester is provided. Set it to 12v to see how much juice is left in the battery. A battery charger is also provided. If you find your battery discharged remove it to a 120v source and let it charge overnight. Detailed instructions including for programming the timer are included in the Operating Instructions. The timer can be gently lifted to reach the battery compartment to replace the 2 AA batteries

Each Garden comes with 6 solar panel supports, 2 each for the E, S, and W sides. Almost always keep a panel on the E side to catch the morning sun. The 2nd panel is usually best positioned on the S side but that depends on time of year and position of shade on your Garden spot. Sometimes an intermediate orientation is required e.g. SW. Panel wires are extra-long so you can position them anywhere around the Garden if it becomes necessary. Insert all 6 supports but when a side is not in use rotate the supports in line with the Garden and out of the way. They rotate easily. Run the panel wires through a hole in the appropriate elbow on the electrical box and plug them in to the wire leads connecting to "PV Panels – In" inside the box (see Figure 24). There is no on/off switch for the panels, simply turn them over or cover them with cardboard when you must shut them off e.g. for a minute during nutrient solution change out.

Although the Rule pump is very reliable a breakdown can quickly ruin the garden. It is recommended to keep a spare handy. The filter is a combination filter/ball valve. Nothing inside the Reservoir is glued since small leaks there do no harm. Pull the ball valve apart frequently to check and clean the screen inside. If the Reservoir is kept closed there is seldom a filter problem after the first week of growing. The ball valve provides some adjustment if/when needed. In most cases on solar outdoors the valve is left wide open.

Cut the autoshade reflective cover in half with scissors. Place half atop the closed Reservoir where it effectively reduces solar heating of the nutrient solution (In Florida summers the solution has been measured at 110 degrees way too hot for the roots of almost all crops). Place the other half on the Electrical Box to protect the plastic. Without protection one growing season in the sun can destroy the plastic. A thorough, overlapping cover is essential to preserve the electrical box.

CONGRATULATIONS

You've assembled MyGarden. Add a couple of gallons of water to the Reservoir and start up the system to check for leaks and to rinse the system Leaks can occur in transit. Potential leak points include the Level Control Valve in the reservoir (tighten the white nut underneath) and the Manifold Ports (turn the GroPipes another revolution to tighten the threaded connections. Even tiny leaks can never be tolerated because they lose not only easily replaced water but also nutrients!

Read the detailed Operating Instructions carefully for much more information

AUTOFILL

Check nutrient solution levels on a regular basis. During germination and early seedling growth the level will drop very little. If necessary, add a small amount of water to return the level to the fill line. If growing seedlings for transplant Autofill won't be necessary. If growing a full crop in the Garden, however, one month after planting you may be adding water daily. Once crops are producing e.g. large tomato plants you may be adding significant quantities of water twice daily (depending on temperatures and sunlight intensity). Large plants transpire lots of water to keep cool especially on hot, sunny days, making automatic watering a must.

There are 7 parts to AutoFill:

1. No-leak hose bib, the closer to the Garden the better (customer provides)

2. Optional **"Y" splitter** that accommodates the timer while leaving a bib port available for other uses;

3. Timer that attaches to, and controls the water on and off at set times on one side of the splitter;

- 4. Nutrient solution level control valve already preinstalled in the Reservoir;
- 5. Solid reservoir support board
- 6. Connecting assembly that connects the above level control valve to a garden hose;
- 7. Garden hose (customer provides)



Autofill components from a building with a no-leak hose bib (left) to an outdoor MyGarden (right): hose bib (not shown, customer responsibility); splitter (allows Autofill to share the hose bib); timer (takes over the on/off function from the hose bib; garden hose (not shown, customer responsibility); level control valve (installed inside the Reservoir)

The hose bib **MUST BE** leak-free because it will be permanently open with water flow controlled by the Rainbird timer. Small leaks may be stopped by wrapping Teflon tape over the bib threads. As a last resort replace the bib.

Install batteries into the timer and program it per instructions. With medium leaf area setting the timer to refill the reservoir once daily is adequate. Large leaf areas e.g. several giant tomato plants growing over the Overhead Rack, you'll need to re-up the reservoir twice daily. We suggest on for 2 minutes at approximately noon and again at 4p. This becomes easy with practice. And you cannot overfill the reservoir because it's the Level Control Valve in the reservoir that shuts off the water even when the timer is on.

Screw the splitter onto the bib hand tighten only. Screw the timer onto one side of the splitter. Now with the timer controlling on and off open the bib handle about ¼ turn. Now under pressure the hose bib / splitter / timer connections **must not** leak because they'll stay pressurized continuously 24/7. Note – leaks beyond the timer for example a rare hose burst are not problems because 1. The bib is only opened a quarter turn, and 2. The timer will allow for flow for only several minutes daily. Thread the female end of the connecting assembly to the level control valve stem under the Reservoir and the male end to the garden hose. The ends are not interchangeable as the pipe threads are different at each end. Screw the female end of the garden hose to the timer. Turn the timer to the continuous on position and adjust the level control valve until the water level is right at the desired mark. Turn the timer back to the auto position.

With Autofill installed and adjusted (a few minutes of adjusting the level control valve) sit back and watch the Garden take care of itself. It's a beautiful thing! More Autofill information available in the Operating Instructions.

Check the website frequently for Assembly and Operating Instruction updates and revisions as well as for fun project-based learning ideas!



The reservoir (support board not shown in this illustration) showing the two Autofill components best installed during initial setup



Note the connection between level control valve and connector, which is in turn connected to the customer's garden hose. The white nut indicated by the blue arrow must be tight. No leaking from the Reservoir permitted or nutrients are lost.