



Educational Aquaponics Systems

User Guide

The Educational Aquaponics System allows you to view the fish, filtration, and fertilization process as well as the plants growing through the biofilter process.

Product includes:

- System control panel
- 14 plant sites
- LED grow lights
- 2 fans
- Water pump
- 33-gallon fish tank
- Biofilter tank
- Solid waste tank
- Reusable grow cups
- Germination tray
- Seeds
- Rockwool
- Storage shelf
- Downloadable curriculum
- 1-year limited warranty



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Parts identification:

1. System control panel
2. Fish tank
 - a. Opening for automatic feeder (if desired)*
 - b. Drain
3. Grow lights
4. Fans
5. Reusable grow cups
6. Grow bed
7. Bell siphon cap

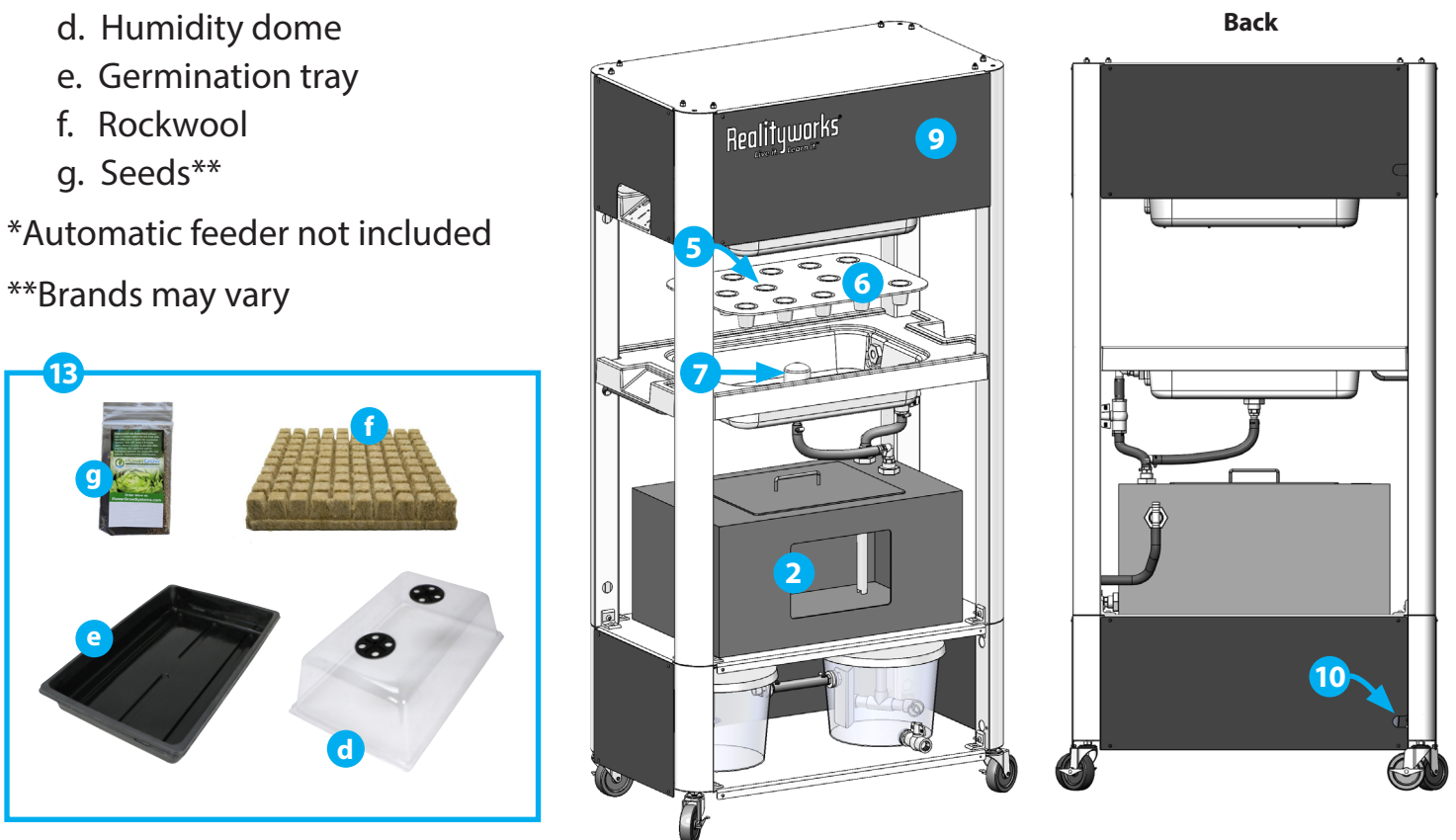
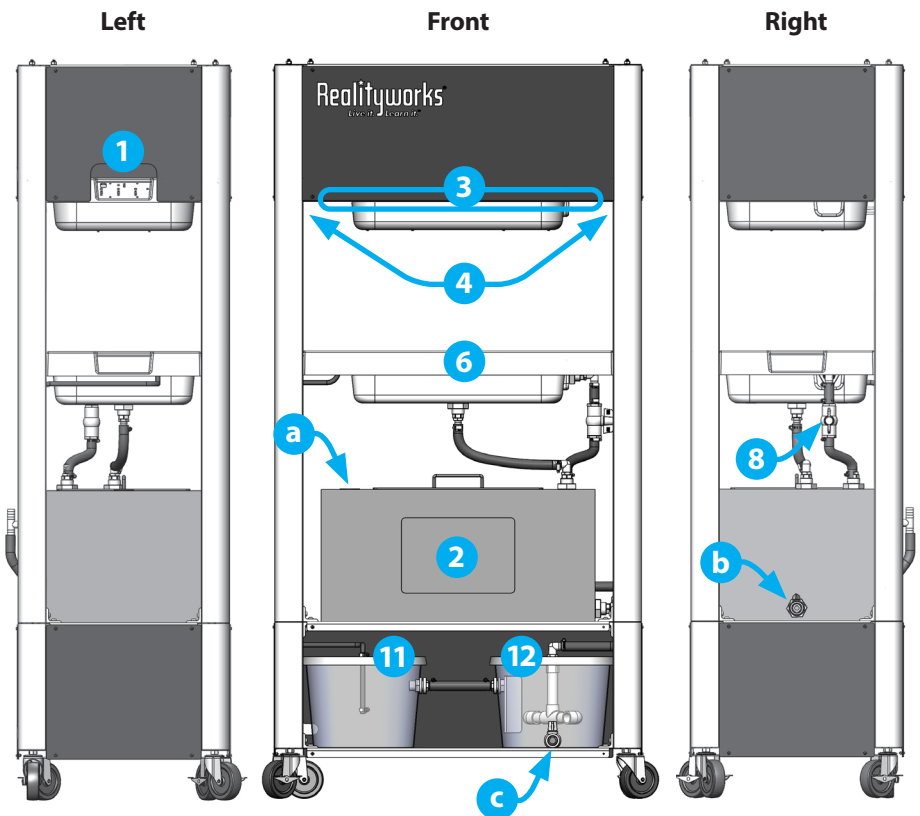
NOTE: Do not remove cap from siphon.

8. Grow method valve
9. Storage shelf (covered)
10. Power outlet
11. Biofilter tank
12. Solid waste tank

- c. Drain
13. Starter kit
 - d. Humidity dome
 - e. Germination tray
 - f. Rockwool
 - g. Seeds**

*Automatic feeder not included

**Brands may vary



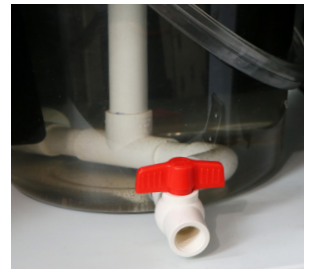
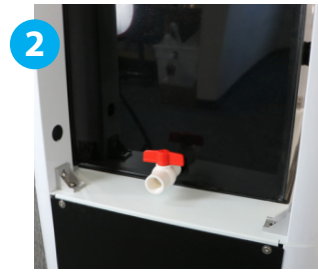
Setup instructions

Note: We recommend setting the system up 1-2 days before adding plants.

1. Ensure the aquaponics system is on a level surface and inspect it for any leaks or damage that may have occurred during shipping.
2. Make sure the drain valves on the fish and solid waste tanks are closed.
3. Ensure the grow method valve is open and remove the fish tank cover.
4. Fill the system with water by pouring it into the fish tank and grow bed. We recommend using a hose if one is available, but buckets or large pitchers work as well. You'll know the system has sufficient water when the water level in the biofilter tank is aligned with the tube that connects it to the solid waste tank.

Note: Do not lift the fish tank when full.

5. Assemble the power cord by plugging the cord into the power brick, then plug the other end into the system.
 6. Plug the power cable into an electrical wall outlet and flip the power switch on the control panel.
- Note:** Always make sure there is water in the system before turning it on.
7. Allow the system to run for 24 hours to degas the water before adding your fish to the tank. The fish tank can house up to 10 fish. We recommend goldfish, catfish, or tilapia.
- Note:** Goldfish are ornamental, but tilapia and catfish can be consumed if you would like to harvest fish as well as plants. If you have specific questions about fish care, please consult one of the fish sources on page #6.
8. Keep the grow method valve open to use a deep water culture method. Close the valve to use the ebb and flow method.



Starter kit

A starter kit is included to begin planting right away. This is a sample of the products that can be sourced after initial usage from many different retail and online stores.

- 1 pack of starter seeds*
- Rockwool
- Germination tray with humidity dome for seed development

*Brands may vary

Standard settings

There are three default settings on the aquaponics system: fast, medium, and slow grow speeds. You can switch between these by pressing the default settings button. You can customize the fan, light, and pump settings if desired. Change them by pushing their designated adjustment buttons.

GROW SPEED

● Fast

● Medium

● Slow

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FANS

- 10 min ON/40 min OFF
- 20 min ON/30 min OFF
- 30 min ON/20 min OFF
- OFF

LIGHTS

- 08 hrs ON/16 hrs OFF
- 10 hrs ON/14 hrs OFF
- 12 hrs ON/12 hrs OFF
- OFF

PUMP

- 10 sec ON/40 sec OFF
- 20 sec ON/30 sec OFF
- 30 sec ON/20 sec OFF
- OFF

Water pump

The water pump circulates the water so that vital nutrients can move to the plant roots. You can customize the water pump schedule via the control panel.

Water Pump ON	Water Pump OFF	Grow Tray Fills/Hour
10 seconds ON	40 seconds OFF	2 tray fills/drains per hour
20 seconds ON	30 seconds OFF	4 tray fills/drains per hour
30 seconds ON	20 seconds OFF	6 tray fills/drains per hour
OFF		

Lights

The LED light array mimics sunlight (including the red-and-blue light spectrum) to help the plants grow. The lights run on a 24-hour schedule based on the selected settings:

Light Settings	Lights ON	Lights OFF
Slow Growth	8 hours	16 hours
Normal Growth	10 hours	14 hours
Fast Growth	12 hours	12 hours

Fans

The fans help strengthen and reduce injury and disease to the plants. They always run at a consistent speed. You can customize the fan schedule via the control panel.

Fan ON	Fan OFF	Approx. Hours Fan ON/Day
10 minutes ON	40 minutes OFF	4-5 hours
20 minutes ON	30 minutes OFF	8-9 hours
30 minutes ON	20 minutes OFF	12-13 hours
OFF		

Guide to growing plants

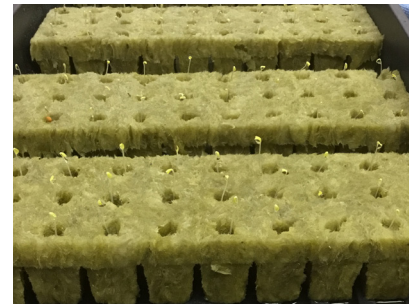
There are many ways to grow plants using aquaponics systems and a variety of variables to consider. We recommend a seven-step process to prepare and use the aquaponics system. Read through all seven steps prior to starting the growing process.

Step 1: Prep and growth understanding

Plants

Plan what plants to grow based on the goals of your program. Some recommendations are cabbage, cucumbers, green beans, kale, leaks, lettuce, radishes, Swiss chard, and tomatoes. Below is a sampling of companies that offer online ordering and direct shipping of seeds. Larger retailers like amazon.com, homedepot.com, walmart.com, and other chain stores are also available. Local, regional, or national seed suppliers are also resources for seeds.

1. Johnny's Selected Seeds in Winslow, ME www.johnnyseeds.com
2. Seed Savers Exchange in Decorah, IA www.seedsavers.org
3. Baker Creek Heirloom Seeds in Mansfield, MO www.rareseeds.com
4. Burpee Seeds and Plants in Warminster, PA www.burpee.com
5. Territorial Seed Company in Cottage Grove, OR www.territorialseed.com
6. Seeds of Change in Rancho Dominguez, CA www.seedsofchange.com
7. Ferry-Morse Seed Company in Fulton, KY www.ferrymorse.com
8. Southern Exposure Seed Exchange in Mineral, VA www.southernexposure.com
9. High Mowing Organic Seeds in Wolcott, VT www.highmowingseeds.com
10. Fedco Seeds in Waterville, ME www.fedcoseeds.com
11. Nichols Garden Nursery in Albany, OR www.nicholsgardennursery.com
12. Botanical Interests in Broomfield, CO www.botanicalinterests.com
13. Renee's Garden Seeds in Felton, CA www.reneesgarden.com
14. Peaceful Valley Farm & Garden Supply in Grass Valley, CA www.groworganic.com



NOTE: Be aware of the average germination times for plants. Start the germination tray, then set up the aquaponics system while the seeds are germinating. Below is a list of average timelines for growth of popular plants.

Planting and Harvesting Cheat Sheet			
Plant	Direct Light Needed	Days to Germinate	Days to Maturation
Cabbages	Yes	4-10	65-85
Cucumbers		6-10	55-65
Green Beans		7-14	80-100
Kale	Yes	3-10	55-80
Leeks	Yes	7-12	80-90
Lettuce	Yes	4-10	35-65
Radishes	Yes	3-10	50-60
Swiss Chard	Yes	7-10	55-65
Tomatoes		6-14	55-90

BEFORE HARVEST: Start growing new seeds 7-10 days before harvesting the plants in the aquaponics system. This will allow movement of new plants from the germination tray directly to the aquaponics system without many or any days between harvest and new growth.

Fish

Before purchasing fry, consider factors such as the species compatibility with your system, the water temperatures, and any permits or regulations that govern the possession and transportation of live fish in your area. Below is a sampling of sources for fish and fish information.

1. **Local Aquaponics or Aquaculture Suppliers:** Many regions have local aquaponics or aquaculture suppliers who may sell fry or fingerlings (young fish) for aquaponics systems. They may be best to help you with your individual needs.
2. **Local Fish Farms or Hatcheries:** Research fish farms in your area. They may be able to sell fry or fingerlings directly to consumers or recommend retailers in your area. This may also present a great opportunity to bring students to the site or have a guest speaker. They may be able to sell fry or fingerlings directly to consumers or recommend retailers in your area.
3. **Aquarium Stores:** Some aquarium stores carry a selection of fish species that could work for your needs, especially goldfish and koi. While they may not be fry, they might have young fish or be able to order them special for your needs.
4. **Local Fisherman or Fish Stocking Programs:** Depending on your location and regulations, you may be able to source fry or fingerlings from local fisherman or students who can acquire them. Additionally, there are some fish stocking programs that you could look into, including what the Department of Natural Resources may be able to help with.
5. **Online Aquaponics Retailers:** Several online retailers specialize in aquaponics or aquaculture needs. We have included some below to help with your needs.
 - Aquaponics Source: <https://www.theaquaponicsource.com/>
 - AmeriCulture: <https://americulture.com/>
 - Nelson and Pade: <https://aquaponics.com/>
 - Aquaponics USA: <https://www.aquaponicsusa.net/>
 - LIVE Aquaponics: <https://liveaquaponics.com/>
 - CropKing: <https://cropking.com/>
 - R&D Aquaponics Inc.: <https://www.rdaquafarms.com/index.html>



Growth and Harvesting Cheat Sheet			
Fish Type	Growth to Harvest	Best Water Temp	Best Temperatures (°F)
Tilapia	6-9 months	Warm	80-86
Koi	Varies by Size	Cool	37-90
Goldfish	Varies by Size	Cool	72-74
Catfish	5-10 months	Warm	75-86
Perch	9-16 months	Cool	70-80
Cod	12-24 months	Cool	50-77
Bass	12-18 months	Warm	70-86
Trout	12-16 months	Cool	57-60
Bluegill	18-22 months	Cool	65-80

Step 2: Start seeds

Once seeds are chosen, it is important to make sure there is time to start the plants in a germination tray before moving them into the aquaponics system. The starter kit includes the following: germination tray, humidity dome, rockwool, and seeds.

Rockwool is a natural fiber made from basalt and chalk and heated to a high temperature. It is then spun in a chamber to create fibers, much like how cotton candy is made. Chalk is naturally high in pH, and it is important to soak the rockwool in water to lower its pH level.

Prepare the rockwool:

1. Match the number of rockwool pieces with the number of seeds being planted.
2. Soak the rockwool in water for 15-20 minutes, then drain the water from it for one to two minutes.
3. Place the rockwool into the germination tray.
4. Put one seed into the small divot of each rockwool piece.
5. Place the germination humidity dome onto the germination tray.

6. Put the germination tray in a location that has sunlight, such as a sunlit windowsill or the aquaponics system with the grow lights on.
7. Check daily and use a water mister to spray the rockwool when it looks dried out.
8. Check standard germination time for the seeds being used.

Reusing rockwool:

1. Rockwool can often be reused 2-3 times if cleaned properly.
2. Wash the rockwool in a sink after and remove any roots or algae that may have formed from the nutrients and moisture.
3. Do not squeeze the cubes of rockwool when wet. If you need to remove some of the water from the cubes, simply shake them gently. If squeezed, the rockwool will compress, which hinders the benefits of water holding capacity and oxygen movement.

NOTE: Rockwool will not break down in a landfill. Rather than throwing rockwool away, it's recommended to break it up into pieces and work it into your garden or potting soil to help increase water retention.

Step 3: Seed planting

When the roots of the germinating seed begin to emerge from the bottom of the rockwool, it is time to move the germinated seeds to the aquaponics unit. Germination should begin about three to four days after the seeds are planted in the rockwool. Wait about four more days until the roots emerge from the bottom of the rockwool before moving plants to the aquaponic grow beds. Place one rockwool piece into each grow cup.

Try to put the roots near or through the grow cups when placing the rockwool and plant into the cups. This will help the roots access the water more easily once in the aquaponics system.



Step 4: Adding fish

Before you put in your fish, consider water temperature, pH levels, and growth rates. Remember the following:

1. **Water Temperature:** Fish will perform better at certain water temperatures, make sure you test the temperature of the water before including the fish. You may need to add water to make it warmer or cooler based on the needs of your fish.
2. **pH Levels:** Like plants, it is important to have and maintain a pH range that suits your fish and plants. This is vital for the health of your plants and fish.
3. **Growth Rates:** It is important to know the different speeds at which the fish grow and how that will change due the balance of your system. Planning to grow plants as long as the fish are growing is best for the system's balance.

Step 5: Checking levels

Once all plants are in the grow cups, it is necessary to monitor the growth of the plants and check the levels of the water, pH, and electrical conductivity (EC). Water levels will begin to decrease as water evaporates. As the plants grow, they will consume increasing amounts of water.

It is important to check on the plants periodically to ensure that they are growing as expected. Monitoring and checking on the plants in a systematic format (recordkeeping or journaling) will help to keep optimal growth. We recommend checking pH and EC once per week to keep the fish healthy. When water levels get too low, the system will beep once every 30 seconds. However, it's good to check water levels:

- 2 times per week when less than half of the plant sites are in use
- 3 times per week when over half of the plant sites are in use

Water in the biofilter tank should be just below the tube connecting it to the solid waste tank. If water is below this level, more should be added. Before adding water, degas it by letting it sit in a bucket or pitcher for 24 hours.

EC measures the potential for electrical current to be transported by water. It is measured in Seimens (S) and eases the flow of nutrients to plants. Test EC and pH with meters that can be purchased online or at a pet store. The pH should be 7-8. EC levels should be 200-2000. If either of these levels are not in the desired range, change out half the water in the system every other day until you see the desired levels.

Remember all water added to the system must first sit for 24 hours to degas. If pH is too low and water changes aren't helping, try adding baking soda to the water.

Step 6: Care and maintenance

- Check the solid waste tank periodically. If waste is building up in the bottom of the tank and causing clogging issues, drain it. When pushing it back on the shelf, ensure the filters are in the proper location and hoses are free of tight bends and kinks.
 - If you see food or solid waste in the fish tank, remove the waste with an aquarium siphon.
 - You may want to add an aquarium heater to the fish tank if your classroom is very cold.
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Step 7: Harvesting

When it is time to harvest, start to remove the plants from the water and the baskets they have been growing in. Start by taking plants from the front and working backwards. It is best to have a tray, bowl, or holder for the harvested plant material. Having a trash can or compost bin to put the plant waste in is also good for easy cleanup.

Tips for harvesting:

- Start with the front plants and move back
- Take the grow cups out, then clip the base of the leaves/plant (edible portion) with a knife or scissors, or tear off by hand
- Once the plants are harvested, pull the roots out of the rockwool and put them in a composting bin
- Clean off the rockwool for reuse if desired

REMEMBER: Fish and plants grow at different levels and times. You may harvest the plants more often than the fish.

Step 8: Cleaning prior to the next planting

Once the crop is harvested, clean up the aquaponics unit to start another planting. Remember that seeds should be planted about 7-10 days before harvesting the current crop to make sure they are ready to put into the aquaponics system.

To clean up the aquaponics system:

1. Clean up the rockwool for reuse (optional) or purchase new rockwool.
2. Clean the grow cups, bed, and bed cover with warm water.
3. Remove all visible green algae that may have accumulated from the previous harvest.
4. Dry the grow cups and bed cover with a cloth or let air dry.
5. If needed, drain the solid waste tank and mix up or dilute.
6. Siphon any food or solid waste out of the fish tank with an aquarium siphon.



Additional Help and Information

Online Product Support

We're here to help! Our online product support features video tutorials, downloadable documents, frequently asked questions, and product notices, all of which make it easy for you to get support for products, software, and more, day or night. Find our online product support area here: <https://www.realityworks.com/knowledge-base/>

Online Store

Supplies, accessories, select simulators, curricula, and more are available for purchase from our website 24 hours a day!