

SOSYSTEMS



Owner's Manual

LooLoop Wastewater Treatment System

An SOSystems Technologies Product

175 Admiral Cochrane Blvd.
Suite 112
Annapolis, MD 21401
(703) 609 - 6715

Thank You

Thank you for purchasing a LooLoop wastewater treatment system. You have purchased the most robust, easy to operate, effective, yet technically simple onsite wastewater treatment system on the market today. LooLoop system is designed to remove a majority of the nitrogen from your home's wastewater as well as most of the drain field clogging contaminants. Nitrogen run-off is the primary cause of algae growth in our lakes, bays, and waterways. Algae growth contributes to the depletion of oxygen that is critical to sustaining our waterways. The LooLoop system helps you make a difference in watershed recovery efforts and leave a better world for future generations.

The LooLoop system has been tested and is listed under NSF/ANSI Standard 40 for Class 1 treatment systems and NSF/ANSI Standard 245 for nutrient removal systems.

LooLoop System Introduction

The LooLoop wastewater treatment system technology is an enhancement to conventional onsite septic tank systems. LooLoop efficiently and effectively treats septic system wastewater resulting in an effluent that meets the highest standards and expectations for environmental and water quality protection. The LooLoop process is simple and reliable, thereby avoiding the complications and costs associated with other nitrogen-removal products. LooLoop requires minimal maintenance, is simple to repair, and is fabricated using generic components that are universally available.

How the LooLoop System Treatment Process Works

The LooLoop process transforms traditional septic tank effluent to clean, almost odorless, and low nutrient water that prevents leach field failure. In more technical terms, it converts oxygen-starved anaerobic septic tank effluent to oxygen-rich aerobic effluent low in Biological Oxygen Demand (BOD), Total Suspended Solids (TSS, the leach field clogging material) and nitrogen. As an enhancement to an existing septic system, the LooLoop system (see Figure 1) requires one additional standard 1500 gallon underground two chamber septic tank placed adjacent to your existing septic tank and the installation of the LooLoop BioFilter Cabinet. The BioFilter Cabinet is a 4' X 4' x 6' tall pre-assembled cabinet that can be placed at any location on your property that drains by gravity back to your septic tanks.

The existing septic tank (Tank 1) continues to be where solids are settled and anaerobically digested. Unlike your current system, however, the wastewater from the first tank is not displaced into the drain field. Instead, the wastewater flows into the LooLoop tank (Tank 2) where additional treatment takes place and a small pump sends effluent to the LooLoop BioFilter Cabinet.

The BioFilter Cabinet is where it all happens. The BioFilter Cabinet is an ultrahigh rate recirculating trickling filter containing highly porous plastic filter media with a very high surface area per unit of volume. Wastewater from the second tank is pumped to the BioFilter Cabinet and sprayed directly onto the filter media. The plastic filter media is where aerobic bacteria live and grow using the nutrients and organic materials from the wastewater as their food source. Vents at the top and bottom of the BioFilter Cabinet ensure that an oxygen rich environment is maintained, allowing aerobic bacteria to survive and multiply. The aerobic bacteria consume the organic material in the home's wastewater faster than the anaerobic bacteria growing in the existing septic tank. The aerobic bacteria turn this food into carbon dioxide gas and more bacteria. The bacteria grow so there is just enough of them to consume almost all the "food" available.

The aerobic bacteria also play a key role in reducing nitrogen levels in the effluent reaching the drain field and the nearby groundwater by performing the first key step—converting nitrogen compounds in the wastewater to nitrate. After the nitrified wastewater drains from the BioFilter Cabinet, it flows by gravity back to existing septic tank where it mixes with septic tank effluent. The residual contamination in the BioFilter Cabinet flow plus the added food in the septic tank effluent stimulate bacterial growth and activity. The bacterial population's need for oxygen depletes the oxygen in the water. With the oxygen depleted, the aerobic bacteria (that can't survive without oxygen) get the oxygen needed by splitting it off the nitrate molecule which has 1 nitrogen and 3 oxygen atoms. Relieved of the oxygen atoms, the nitrogen is released to the air as a gas. Nitrogen gas is 70% of the air we breathe, so nitrogen in the air, and not in the water, is the way nature intended things to be.

The wastewater continues to recirculate to the BioFilter Cabinet and back to the septic tanks at the rate of about 7,000 gallons per day. The RecoSept tank pump chamber's final feature is an overflow pipe that allows the clean recirculating effluent water, containing low levels of nitrogen, TSS and BOD, flow to the drain field.

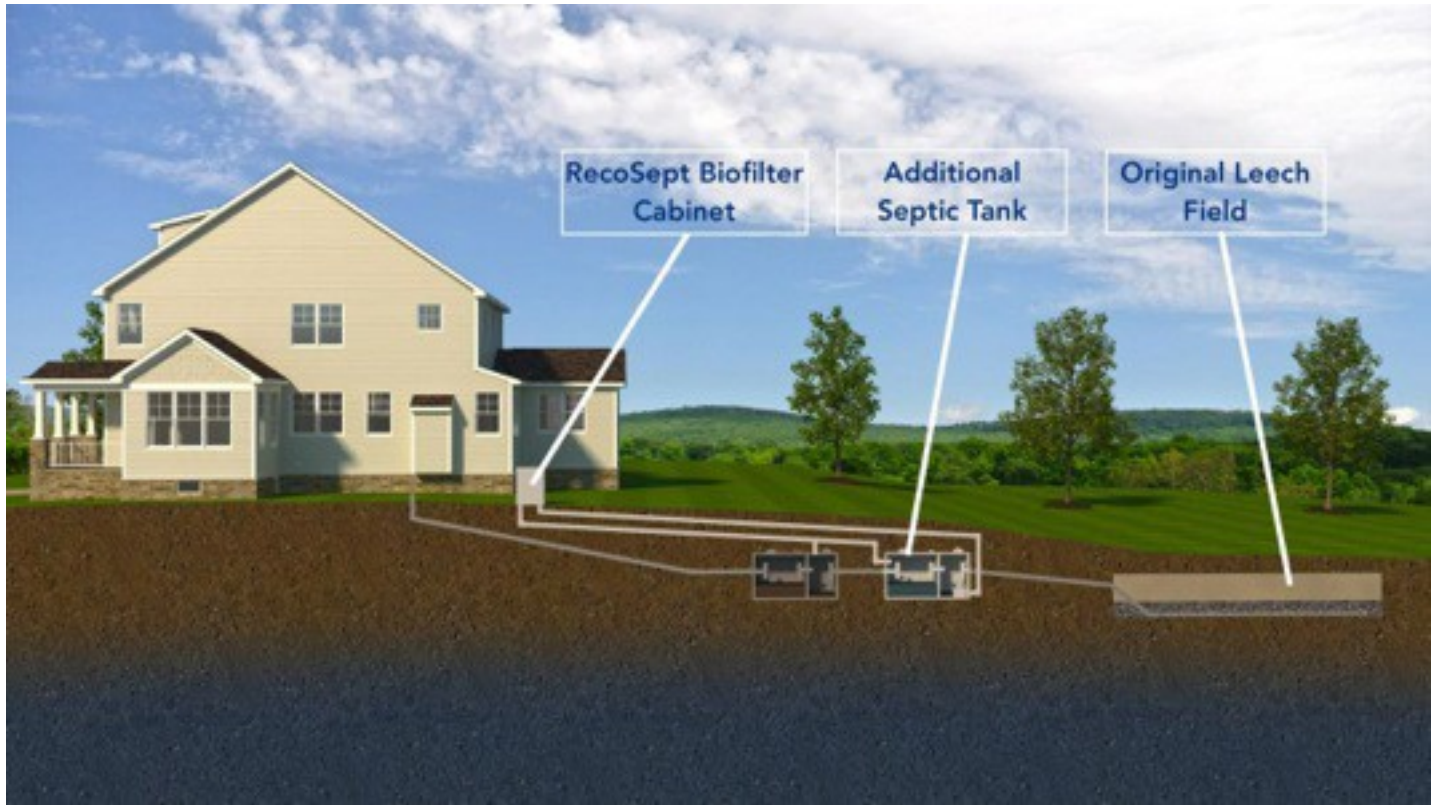


Figure 1. LooLoop System

In Figure 1, note that both tanks have 2 compartments. The LooLoop system can be added to any existing septic system by inserting a second tank between the existing tank and the soil disposal system, or an entirely new system can be installed. For those systems without a compartmented septic tank, the return from the trickling filter can be connected to the LooLoop tank.

Features and Advantages

The standard LooLoop treatment system consists of the following components:

- The BioFilter Cabinet is the key component of the LooLoop system and has no moving or mechanical components other than three valves and operable vents at the top and bottom of the cabinet. Thus, the BioFilter Cabinet is designed for long term performance and minimal maintenance. The BioFilter Cabinet is designed to resemble a small garden or pool equipment shed that can easily be placed adjacent to the house, similar to other mechanical systems, or on any other part of the property that drains by gravity to the septic tanks. The BioFilter Cabinet is constructed with water-resistant PVC board, polystyrene foam insulation, and stainless steel vent louvers. All components of the system that contact wastewater are of stainless steel, PVC, or rubber construction for durability. The recirculating trickling filter media is a self-supporting PVC sheet media.
- The LooLoop tank is a 1,500-gallon, two compartment concrete or plastic septic tank. The standard tank is sized with $\frac{3}{4}$ capacity for the first compartment and $\frac{1}{4}$ for the second compartment. Compartment capacities may vary but in no instance shall the capacity of the first compartment be less than $\frac{2}{3}$ total capacity and the second compartment no more than $\frac{1}{3}$ of tank capacity. These criteria are flexible to accommodate local tank suppliers. A LooLoop sales agent will determine site-specific tank selection.
- The LooLoop tank submersible pump is 115V, 60 hertz, single phase, fractional horsepower motor of stainless steel and composite resin materials used in all wetted parts. The pump is expected to operate for at least 60,000 hours or about 9 years. The pump is the only electrically powered component of the LooLoop system.
- The LooLoop system is supplied with a prewired repeat cycle flow controller contained in a NEMA rated enclosure and is accessible through the door on the cabinet. The controller controls the recirculating pump cycle time from 5 minutes per hour of operation to 55 minutes per hour of operation. A LooLoop representative will determine the pump cycle time for the specific installation. The weatherproof controller is equipped with a fail to start detector, a visible alarm, an audible alarm and silencer switch. The controller contains a power switch and time clock that control the recirculating pump operation. The local dealers name, address, and telephone number are displayed on a placard located on the wall of the BioFilter Cabinet beside the controller. A high level switch connected to the alarm circuit is provided to alert the user

of blockages in the disposal system piping between the LooLoop and the leaching system components. The backup alarm is provided for the convenience of the owner and is not integral to the LooLoop system.

- The LooLoop treatment system is capable of treating 500 gallons per day of domestic wastewater from a single-family residence or 250 gallons per day from two single-family residences.

LooLoop System Performance

The performance of the LooLoop system complies with and is listed under NSF/ANSI 40 Class 1 treatment systems and NSF/ANSI 245 for nutrient removal systems. The LooLoop system is certified with a Class 1 rating after successfully completing the 6 month Standard 40 test protocol, with an averaged effluent of < 6 mg/L CBOD and < 7 mg/L TSS and <19 mg/L Total Nitrogen.

Operational Requirements

The LooLoop system is designed to treat only wastewater generated from a typical residence. Typical domestic wastewater streams include those from kitchen sinks, bathroom sinks, utility sinks, mop basins, shower stalls, bathtubs, clothes washers, dishwashers, drinking fountains, wash sinks, toilets, and whirlpool baths. The LooLoop system is designed to handle typical amounts of wastewater from the kitchen, bathroom, or laundry. The use of the detergents, bleach, and drain cleaners as recommended by the manufacturer is acceptable. The following is summary of items that should not be disposed of into the plumbing system:

Septic System Operation	
	Don't Dispose of These Items
Household Waste	Feminine hygiene products, wipes, paper towels, condoms and their wrappers, cotton swabs, cotton balls, and bandages should not be discharged to the septic tank. The real concern with these items is that they can block the house plumbing and cause a backup. Frequent discharges will necessitate more frequent septic tank pump outs.
Kitchen Waste	Grease and oil should not be dumped down the drain. The residual grease on eating utensils is OK but a quick wipe with a paper towel is best before washing. Excessive grease disposal will necessitate more frequent septic tank pumping. Tip, after cooking oils have cooled, place them in an empty jar with screw on lid or a premium grade sealable freezer bag and dispose of them with the dry trash. Garbage grinders should not be used unless the capacity of the first compartment of the septic tank is increased by a factor of 2 and the first compartment of the septic tank pumped no less than once every 3 years.
Household Maintenance Waste	Flammable solvents, gasoline, kerosene, toxic liquids, paints, pesticides, liquid fertilizers, and any liquid where you are uncertain about the disposal method should not be disposed of in the septic tank. Call your local solid waste management authority for guidance. Cleaning water soluble paint brushes (in moderation) should not impair the operation of the septic tank or LooLoop. The main concern regarding these household wastes is not the effect that they have on the performance of the septic tank or LooLoop. The concern is that these liquids may not be treated by the septic or aerobic process and could be a source of fire or explosion or they could get into the groundwater via the soil disposal system.
Medical Waste	Liquid antibiotics and other medicines should not be disposed on in the septic tank. The ability of these substances to pass through wastewater treatment systems unaffected by the treatment process is a developing concern.

In addition, all water softener backwash, roofing down spouts, sump pump piping, footer drains, basement and garage floor drains, must not be connected to the domestic wastewater plumbing system.

Electrical Requirements

The LooLoop controller must be wired to a dedicated 115 VAC, single phase, 15 amp circuit with a lockable disconnect switch mounted in the immediate vicinity of the BioFilter Cabinet. The controller wiring diagram is provided in Appendix 1. All electrical work must be completed in accordance with the National Electrical Code and all applicable local codes. A qualified electrician should make all electrical connections, using proper procedures and safety guidelines.

The LooLoop tank submersible pump is 115V, 60 hertz, single phase, fractional horsepower motor of stainless steel and composite resin materials used in all wetted parts. The pump is expected to operate for at least 60,000 hours or about 9 years.

CAUTION: Prior to performing any service or maintenance, first shut off and lock the lockable disconnect switch for the electrical circuit. Next shut off the power switch to the LooLoop controller. Failure to do so could result in serious personal injury or equipment damage.

LooLoop Operating Instructions

Upon completion of the installation of the system components, the LooLoop tank is filled with clean water to allow the operating system to establish a high oxygen concentration in the water to develop the biological process to treat the wastewater. This procedure will minimize the potential for any odors to be present. The startup and maturation of the biological processes can take from 3 weeks to 2 months, depending on the time of the year. Initially, odors, if any, should be confined to immediate vicinity around the BioFilter Cabinet during start up. Once the biological processes have matured, no noticeable odors should be present. Contact a LooLoop representative if a strong septic system odor is present in the vicinity of the BioFilter Cabinet.

In the event that a problem arises with the system or service is required, please contact SOSystems, 175 Admiral Cochrane Blvd Suite 112, Annapolis, MD 21401, phone (703)609-6715. You can also refer to the LooLoop system data plate located conveniently inside the door of the BioFilter Cabinet where the system piping and LooLoop controller are located. A service data plate is also located adjacent to the visible alarm located on the exterior of the BioFilter Cabinet.

During the startup of the LooLoop System, the recirculating pump cycle time will be set using the repeat cycle flow controller. The cycle timer should only be adjusted by a LooLoop representative.

The LooLoop system is designed for minimal and ease of maintenance. The responsibility of the owner for the LooLoop wastewater treatment system is limited to the following:

The septic system tank (Tank 1) and LooLoop tank should be pumped every three years. The BioFilter Cabinet has 16 vents, eight on the upper part of the BioFilter Cabinet (4 vents on each side) and eight on the lower part of the BioFilter Cabinet (4 vents on each side). The vents can be opened or closed from the outside of the BioFilter Cabinet using the toggle attached to the movable closure of each vent. All vents should be open from April 1 through October 31. From November 1 through March 31, one vent on each side of the BioFilter Cabinet (both top and bottom) should be open and the others closed.

Intermittent or extended periods of non-use:

- The LooLoop system performance is robust and not affected by vacations and extended periods of little or no use. The system can continue to operate without damage.
- If the period of non-use is foreseeable, the LooLoop representative should be contacted to adjust the pump cycle time to reduce electricity consumption and pump

wear to a minimum.

- If the period of non-use is expected to be 6 months or more, the system can be turned off without damage to the equipment. Prior to restarting the system after a long period of being off, contact a LooLoop representative to restore power to the system and the reset the controller one week prior to initiating use of the wastewater system.
- Should the house be vacated for 5 or more days, the alarm can be silenced to avoid annoying neighbors if the alarm were to sound during your absence.

Power Outage:

- If a power outage occurs at the house, the only thing that will happen is the pump in the LooLoop tank will not pump the wastewater to the BioFilter Cabinet. Instead, any wastewater that flows from the house will displace effluent in the septic tanks to the drain field - operating as a standard septic system until power is restored. There is no chance for back-ups or overflows.

Alarm:

- Should an alarm occur, signaling the pump is not operational, silence the alarm using the silencing switch on the alarm box located on the exterior of the BioFilter Cabinet and notify the LooLoop representative.
- Similar to the conditions of a power outage, the only thing that will happen is the pump in the LooLoop tank will not pump the wastewater to the BioFilter Cabinet. Instead, any wastewater that flows from the house will displace effluent in the septic tanks to the drain field - operating as a standard septic system until power is restored. There is no chance for back-ups or overflows.
- If the alarm were to sound in the middle of the night or on a holiday or weekend, do not worry. An alarm condition is not an emergency. The LooLoop representative can be contacted on the next business day.

Maintain the plumbing and septic system:

- Be aware of the do's and don'ts regarding the home septic system.
- Have the septic tank and LooLoop tank pumped every 3 years.
- Repair plumbing leaks promptly. Unless the leak is large, most leaks will not affect the LooLoop system; however, the leak may overload the drain field system. Note, the most expensive component of the home wastewater septic system is the drain field system.

Routine Cleaning and Maintenance

The LooLoop system is designed for minimal and ease of maintenance - four inspection/service visits are required during the first two years and annual visits after that. Completion of the required inspection/service visits are required to maintain the LooLoop system warranty. See Table 1 and Table 2 for maintenance schedule summary.

Table 1: LooLoop System Maintenance Schedule Years One and Two

LooLoop System Component	Maintenance Frequency
Spray Piping and Nozzle	Semi-annual inspection and cleaning
Pump/Controller/Alarms	Inspect Semi-annually
BioFilter Cabinet	Inspect Semi-annually
Trickling Filter Media	Inspect Semi-annually
Existing Septic Tank (Tank 1)	Inspect Semi-annually
LooLoop Tank (Tank 2)	Inspect Semi-annually

**Table 2. LooLoop Maintenance Schedule Year
Three and Beyond**

LooLoop System Component	Maintenance Frequency
Spray Piping and Nozzle	Annual cleaning
Pump/Controller/Alarms	Inspect Annually
BioFilter Cabinet	Inspect Annually
Trickling Filter Media	Inspect Annually
Existing Septic Tank (Tank 1)	Inspect Annually and Pump every 3 years
LooLoop Tank (Tank 2)	Pump every 3 years

Trouble Shooting and Repair: LooLoop Treatment System

This trouble shooting and repair section is written to help you identify the cause of system problems that may occur at times. Whenever a problem is identified, it is important to take steps to eliminate the cause. Note that all areas of installation, including those typically the responsibility of the contractor, excavator, electrician, plumber, and owner are covered. It is possible that many problems have root causes other than the system or its components.

The trouble shooting guide provides efficient solutions to most wastewater treatment problems when used with the recommended inspection and service procedures performed by a LooLoop representative.

LooLoop System Operational Trouble Shooting

Problem	Possible Cause	Potential Solutions
Mud or Silt in the System	Influent sewer line separated at a joint or fitting	Have contractor excavate and repair
	Sewer line crushed	Have contractor excavate and replace
Septic Odor	Incomplete treatment due to hydraulic overloading	See "Hydraulic Overloading"
	Insufficient flow from pump to BioFilter Cabinet	<ul style="list-style-type: none"> - Clean spray nozzle - Open all valves - Clear pump intake - Restore pump operation
Hydraulic Overloading	Ground water entering system	<ul style="list-style-type: none"> - Install curtain drain to lower water table - Install new water tight septic tank - Repair defective valves in building - Disconnect sump pump from sewer line - Raise or regrade around tank risers to shed water - Disconnect roof leaders, footing drains, garage drain, basement floor drain, yard drains from septic system

Problem	Possible Cause	Potential Solutions
Controller Pump Alarm Activated	Pump fails to start	- Check pump wire connections - Replace pump
	Pump motor failure	Replace pump
	High water level in LooLoop tank	Blockage in leaching system
No Electrical Power from Electrical Disconnect to Controller	Circuit breaker tripped	Turn breaker to "off" position, then turn "on"
	Defective circuit breaker	Replace circuit breaker
	Power connection from disconnect to controller severed	Locate break and repair
No Electrical Power from Controller to Pump	Loose wiring connection	- Check all connections - Pump plug not inserted in controller receptacle properly

RecoSept Service Program

The SOSystems contact information, address and phone number, is conveniently located inside the door of the BioFilter Cabinet.

Included with your purchase of a LooLoop system is a 5-year operations and maintenance contract that includes four inspection/service visits during the first two years by a certified LooLoop service provider to test and verify system performance, and annual visits for the next three years. Verification of system performance will include evaluation of effluent quality including color, turbidity, scum overflow, and odor. A copy of the Field Inspection and Service Form will be provided to the owner, including any system operation issues that cannot be remedied at the time of inspection.

An extended service policy for annual inspection/service visits is available for purchase by the owner through SOSystems.

Service and Maintenance Agreement

The following represents an example of a LooLoop O&M Agreement

Agreement for Operating and Maintenance (O&M) Services for a LooLoop Wastewater

Treatment System is made on _____(date) between

_____(name) and **SOSystems Inc.** for the duration of

this contract beginning _____(date), and concluding

_____(date)(5 years). SOSystems shall operate and maintain the

wastewater treatment systems installed at _____(site).

1. Service Provider agrees to submit biannually, in years one and two, and annually, in years three through five, to the Owner, a report including an operation and maintenance summary and analysis of effluent quality sampling (color, turbidity, scum overflow, and color), as required.
2. Service Provider shall perform on a regularly scheduled biannual service inspection (years 1 and 2) and annually (years 3 through 5) including the following procedures:
 - A. Observe the general condition of the area over the LooLoop components to identify potential under- ground leaks.
 - B. Open all manways and observe the condition of the contents for unusual conditions.
 - C. Open the cover of the BioFilter Cabinet to assess the condition of the filter media, the uniformity of the spray, and to remove and clean the spray nozzle.
 - D. Check all valves for proper operation
 - E. Connect a hose to the faucet on the feed pipe and flush the media.
 - F. Collect a sample of the treated wastewater for analysis.
 - G. Samples shall be analyzed for the following:
 - a. COD
 - b. TSS
 - c. Total Nitrogen (TN)
 - d. Color
 - e. Turbidity
 - f. Scum overflow
 - g. Odor

LooLoop System Limited Warranty

All components of the LooLoop system are warranted to be free from defects in material and workmanship, under normal use and service, for two years from the date of installation. The two year limited warranty is included in the original purchase price of every LooLoop system.

Warranty Registration

Complete the Warranty Registration card and return to SOSystems within thirty days of the installation date for the warranty to be effective from the installation date. The serial number is located on the data plate conveniently inside the door of the BioFilter Cabinet where the system piping and LooLoop controller are located.

LooLoop Warranty Registration

First Name: _____ **Last Name:** _____

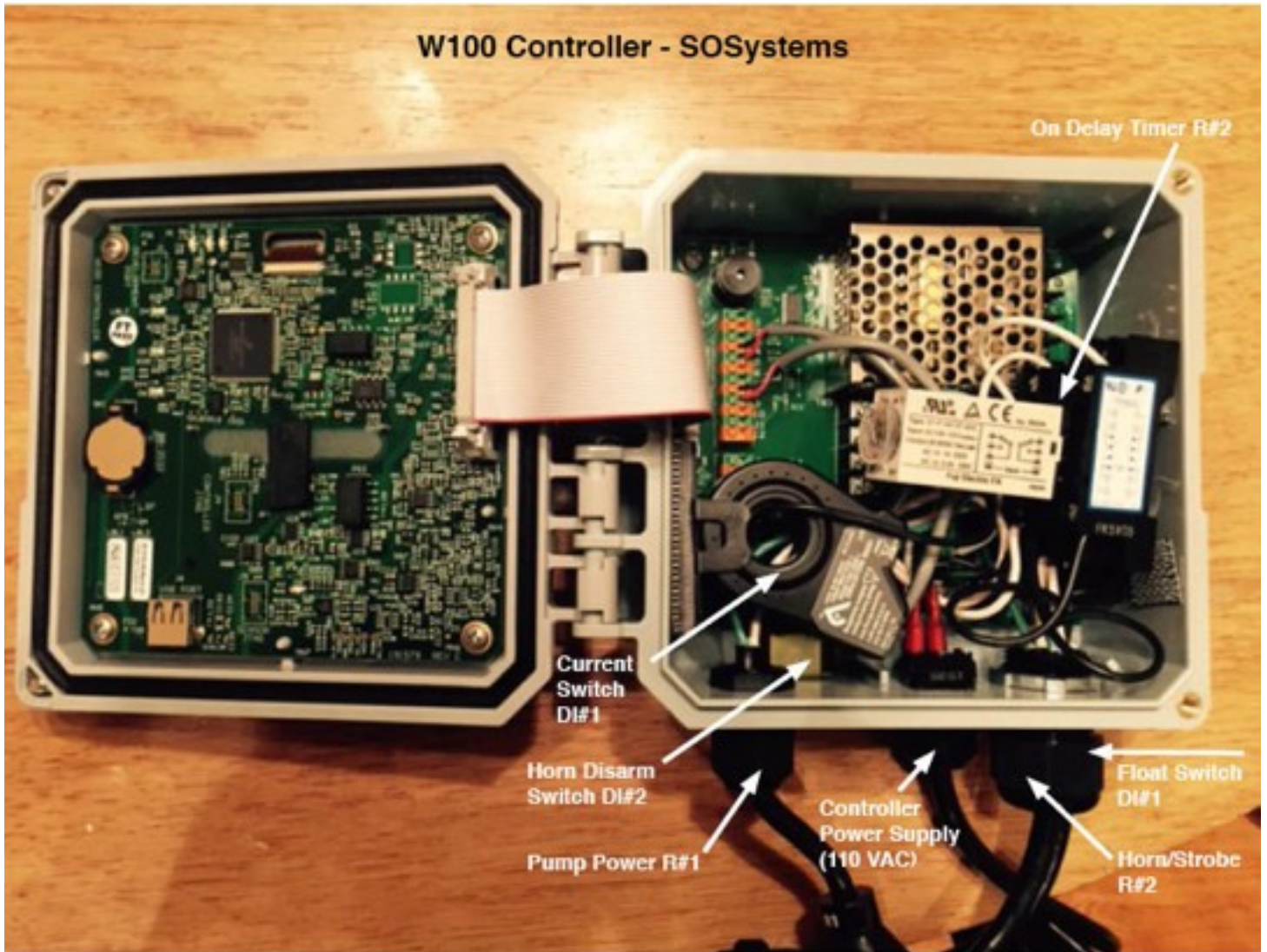
Street Address: _____ **Address 2:** _____

City: _____ **State:** _____ **Zip Code:** _____

Phone Number: _____ **Email:** _____

Serial No.: _____

APPENDIX



APPENDIX