

Product information presented here reflects conditions at time of publication. Consult factory regarding discrepancies or inconsistencies.



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Fusion® Series Treatment Systems

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OWNER'S MANUAL Large Commercial Models ZFL-2800 & ZFL-4000

Thank you for choosing a Fusion® Series Treatment System. High-quality workmanship and easy maintenance have been incorporated into the Fusion® system. The system will provide years of trouble-free service when maintained according to the manufacturer's recommendations. Please read this manual in its entirety before using the Fusion® and follow all instructions to ensure proper operation. Keep this manual for future reference along with other important onsite documents. Should further assistance be necessary, please contact Zoeller Pump Company at 1-800-928-7867.

Warning Labels

You will find warning labels on the Fusion®, riser lids, blower, and the alarm control panel. It is very important to follow the information on these labels to ensure your safety. Please do not remove these labels.



WARNING

SEE LIST AT RIGHT FOR WARNINGS

1. DO NOT attempt to service the Fusion® unit yourself. Contact your authorized maintenance provider for all service related issues.
2. There are buried electrical cables and piping near and around the Fusion®. Please consult with your authorized maintenance provider to locate these utilities before excavation.
3. DO NOT bury or cover the Fusion® lids with soil or other debris. This is necessary to allow access for operation and maintenance of the unit.
4. The Fusion® blower must be unobstructed and vented for proper operation. Care must be taken that no grass clippings or other materials accumulate on or around the blower and block ventilation.
5. DO NOT place heavy objects over the Fusion® or drive heavy equipment over the Fusion®, as damage may occur. Damage of this kind is not covered by the warranty.
6. DO NOT plant trees within 15 feet (4.6 m) of the Fusion® Series Treatment System.

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Fusion® Model: ZFL-2800 ZFL-4000

Serial No. _____

Installing Contractor _____

Phone Number _____

Installation Date _____

Maintenance Provider's Name _____

Phone Number _____

LIMITED WARRANTY

Manufacturer warrants, to the purchaser and subsequent owner during the warranty period, every new product to be free from defects in material and workmanship under normal use and service, when properly used and maintained, for a period of two years from date of purchase by the end user. No allowance will be made for shipping charges, damages, labor or other charges that may occur due to product failure, repair or replacement.

This warranty does not apply to and there shall be no warranty for any material or product that has been disassembled without prior approval of Manufacturer, subjected to misuse, misapplication, neglect, alteration, accident or act of nature; that has not been installed, operated or maintained in accordance with Manufacturer's installation instructions; that has been exposed to outside substances including but not limited to the following: sand, gravel, cement, mud, tar, hydrocarbons, hydrocarbon derivatives (oil, gasoline, solvents, etc.), or other abrasive or corrosive substances, wash towels or feminine sanitary products, etc. in all pumping applications. The warranty set out in the paragraph above is in lieu of all other warranties expressed or implied; and we do not authorize any representative or other person

to assume for us any other liability in connection with our products. Contact Manufacturer at, 3649 Cane Run Road, Louisville, Kentucky 40211, Attention: Customer Support Department to obtain any needed repair or replacement of part(s) or additional information pertaining to our warranty.

MANUFACTURER EXPRESSLY DISCLAIMS LIABILITY FOR SPECIAL, CONSEQUENTIAL OR INCIDENTAL DAMAGES OR BREACH OF EXPRESSED OR IMPLIED WARRANTY; AND ANY IMPLIED WARRANTY OF FITNESS FOR A PARTICULAR PURPOSE AND OF MERCHANTABILITY SHALL BE LIMITED TO THE DURATION OF THE EXPRESSED WARRANTY.

Some states do not allow limitations on the duration of an implied warranty, so the above limitation may not apply to you. Some states do not allow the exclusion or limitation of incidental or consequential damages, so the above limitation or exclusion may not apply to you.

This warranty gives you specific legal rights and you may also have other rights which vary from state to state.

HOW A FUSION® SERIES TREATMENT SYSTEM WORKS

The Fusion® is simple in design, yet advanced in its wastewater treatment ability. The design has been refined over many years of intense research and development in an effort to perfect this superior treatment system. Fusion® systems are 90% - 95% efficient at treating wastewater. This is nearly twice as effective as a traditional septic tank, which is approximately 50% efficient. This high degree of treatment helps to protect both your personal property and the environment.

The Fusion® utilizes a combination of anaerobic (without oxygen) and aerobic (with oxygen) biological processes to treat wastewater. As wastewater enters the Fusion®, it is broken down and becomes food for biological organisms operating within the unit. The first chamber serves to separate some grease and large solids from the liquid. In the second chamber, plastic media with large surface areas are used to increase contact between water and beneficial bacteria to optimize treatment. A small linear air blower is used to move air (oxygen) into the third chamber for the aerobic process. The final effluent leaving the system will have been treated to secondary quality effluent.

Figure 1 - The following diagram will help you to better understand the process:

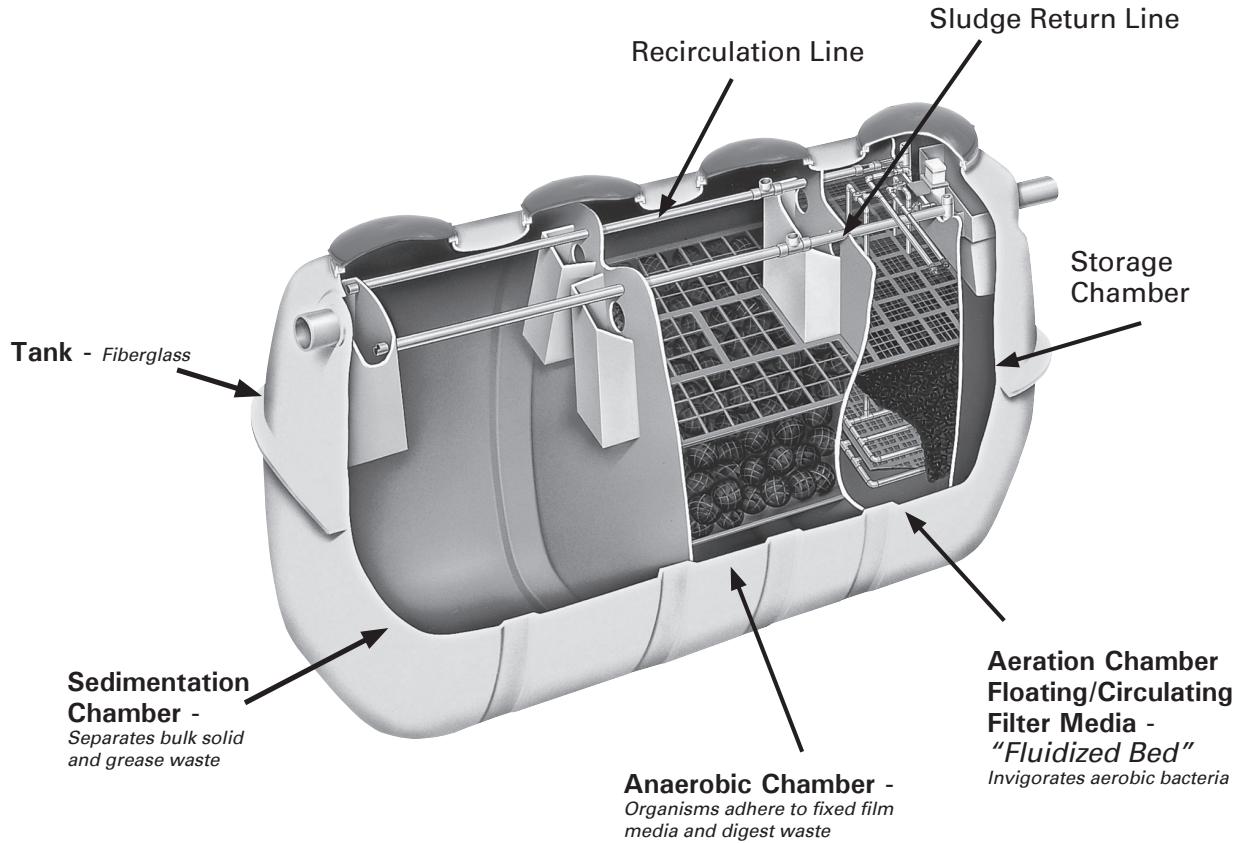
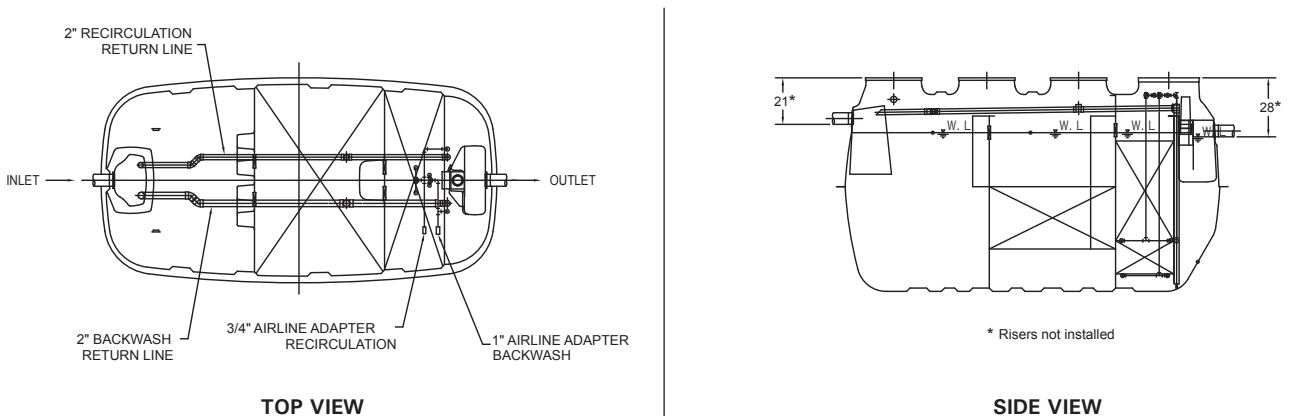


Figure 2 - Schematic diagram of the Fusion® Treatment System



PROCESS DESCRIPTION

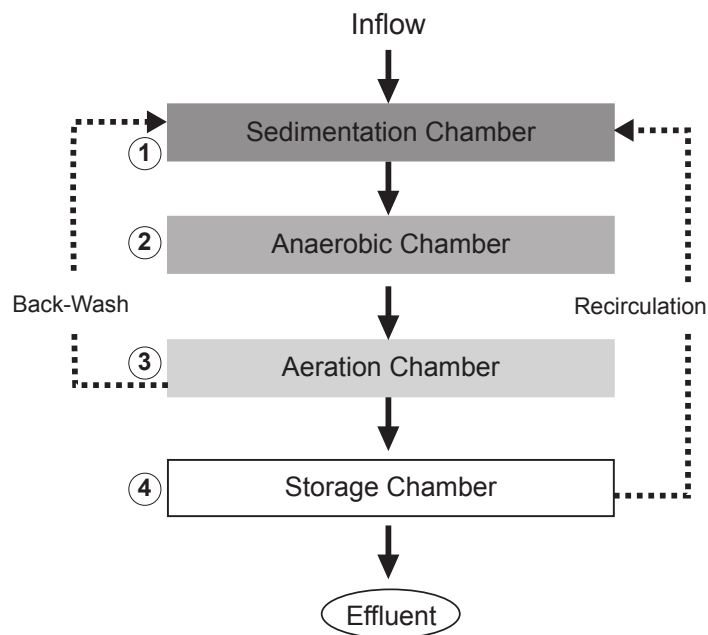
1. **Sedimentation Chamber**
This chamber is designed to physically separate solids from the incoming water. Scum is the floating material and sludge is the material that has settled at the bottom.
2. **Anaerobic Chamber**
This chamber contains a spherical skeleton-type of filter media, 4.3 inch diameter (109 mm). Through bacterial growth processes on the surface of the filter media, biological anaerobic treatment thrives while suspended solids are captured. Furthermore, the microorganisms in this chamber convert nitrates in the recirculated water returning from the aerobic chamber to gaseous nitrogen. The gaseous nitrogen then escapes to the atmosphere.
3. **Aeration Chamber**
The aeration chamber consists of an aerated upper section and a filter media lower section. The chamber is filled with

hollow, cylindrical filter media 0.6 inch diameter (15 mm) and 0.55 inches long (14 mm). Biological treatment takes place on the filter media surface. Aeration is continuous. Residual suspended solids are captured by the filter media circulating in this section. During normal operation, a recirculation line transfers water back to the sedimentation chamber by way of an air lift pump.

The filter media in the aeration chamber are backwashed regularly (twice a day, 5 or 10 minute cycle) by the backwash system located at the bottom of the chamber. The accumulated sludge is transferred by an air lift pump back into the sedimentation chamber for further digestion.

4. **Storage Chamber**
This chamber is designed to temporarily store treated water exiting the aeration chamber. This treated water is ready for discharge.

Figure 3 - Treatment Flow of the Fusion® System.



SYSTEM COMPONENTS

The complete wastewater treatment system will typically consist of the Fusion® treatment components and a soil absorption field for final disposal of the liquid effluent. Some states or counties may require the addition of a septic tank before the Fusion® to increase the sedimentation chamber capacity and retain more solids. Please see Figure 9 for a typical Fusion® system. Variations to the typical system will be made to suit your particular site and system design needs. Please contact your authorized Fusion® installer or maintenance provider for further information about your system design.

ALARM PANEL

The Fusion® alarm panel (see Figure 4) is designed to activate an audible buzzer and red beacon light on top of the panel if there is a drop in air pressure, if a high water alarm condition occurs, or if the blower does not cycle between recirculation and backwash modes within the preset time. (Note: Alarm panel can only function as long as there is electrical power supplied to the panel)

You may from time to time check the proper operation of the alarm panel by toggling the black switch on the side of the panel to “test”. The buzzer will sound and the red beacon will light as long as you hold the switch in the test position. Release the switch for normal operation.

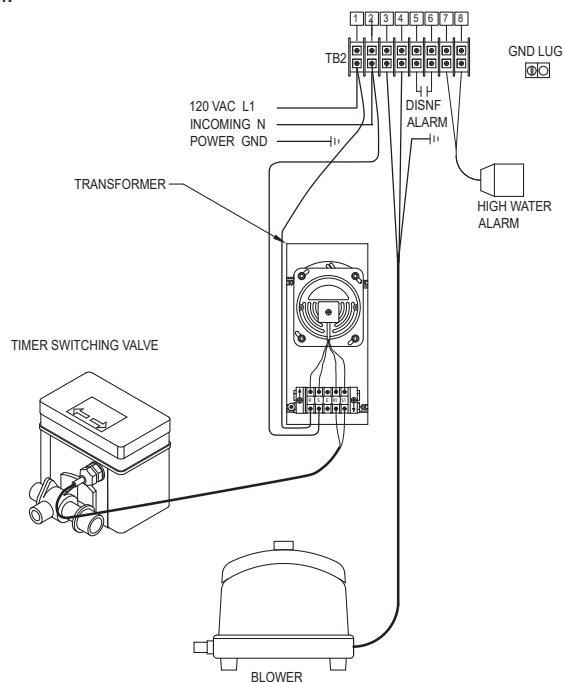


Figure 4 BLOWER FOR LARGE ZFL FUSION MODELS

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SYSTEM CARE

The Fusion® system is designed to continuously operate automatically with little direct maintenance from the owner. Periodically, a check of the blower area is recommended to ensure no debris obstructs the ventilation or intake areas of the blower. Also, periodically test the control panel as outlined under the alarm panel section. The owner should closely monitor the types and amounts of substances and products used. Water use should also be closely monitored to ensure proper operation of the Fusion® system.

Periodically, more extensive maintenance must be performed. Your authorized Fusion® maintenance provider will oversee this service. The name of the maintenance provider can be recorded on the front of this document and should also be located on the alarm panel. For more information see the Operation and Maintenance section of the manual.

The owner should only perform minimal routine maintenance on the Fusion® such as clearing debris from around blower housing (leaves, snow, and grass clippings). The Fusion® should also be protected from excessive weight such as vehicular traffic. Trees and bushes should not be planted in close proximity to the Fusion®. The Fusion® should be accessible to maintenance personnel and the riser lids must never be buried.

HIGH USE WATER DEVICES

The draining of hot tubs and swimming pools into your Fusion® system could cause hydraulic overloading and may reduce the treatment efficiency. Please drain these devices to another location. Contact your local regulatory authorities or authorized Fusion® maintenance provider for more information. The use of large capacity single fill and drain whirlpool bathtubs may also cause hydraulic overloading of your Fusion®. Please limit the use of these types of tubs.

LEAKY FIXTURES

It is very important to monitor all water fixtures in the home for leaks and drips and repair them immediately. Excessive water use may hydraulically overload your Fusion® system and reduce its treatment efficiency. Excessive water use may also overload your soil absorption field and cause failure.

HARMFUL SUBSTANCES

The Fusion® is designed to treat household type waste and can treat most common substances introduced into the system. However, certain harmful substances may reduce the efficiency or stop the treatment process by reducing or destroying the beneficial bacterial populations responsible for treatment. In general, if a chemical substance is considered harmful to humans then it should also be considered harmful to the Fusion® treatment system. If you have any questions concerning the use of any of these substances, please contact your Fusion® maintenance provider. **The introduction of any substance on the “Do Not List” into the Fusion® will void the warranty.**

- THE "DO NOT" LIST -

DO NOT introduce the following substances into the Fusion® treatment system:

- Motor oil
- Brake fluid
- Paint thinner
- Solvents
- Herbicides
- Strong caustic drain cleaners in excess
- Excess pharmaceuticals
- Anti-freeze
- Paint
- Gasoline
- Pesticides
- Strong disinfectants
- Toilet tank disinfection chemicals
- Chemicals & chemical waste

Not Recommended: Trash and excess food products will likely increase frequency of pumping.

Trash

- Sanitary napkins and feminine products
- Diapers
- Paper products such as paper towels & baby wipes
- Condoms
- Cat litter
- Dental floss
- Cigarette butts
- Plastic/rubber products

Food Products

- Coffee filters and grounds
- Fruit and vegetable peels
- Meat products
- Garbage disposal waste
- Greases or lards
- Seeds
- Bones
- Egg shells

Limited Use Products

Certain products in small or moderate amounts should not disrupt the Fusion® treatment process. You should always use the minimum quantities of these substances as recommended by the manufacturer.

1. Liquid laundry bleach only as needed per load
2. Liquid laundry detergents without added bleach
3. Liquid dishwashing detergents
4. Household cleaners in moderation

EFFLUENT QUALITY

Fusion® Series systems are compact, efficient, and designed to be installed in a typical residential/light commercial environment. The final effluent leaving the system will typically be treated to the secondary quality strength.

WATER SOFTENERS

If water softeners are present in the home, Zoeller Pump Company recommends the use of water and salt conservative models that are installed and operated correctly. If you have questions about softeners, contact the Water Quality Association at www.wqa.org. Contact factory for installation details.

EXTENDED MAINTENANCE POLICY

An extended maintenance policy is available for purchase from your authorized Fusion® distributor. The extended maintenance policy will include the same system checks, schedule, and adjustments as the initial maintenance policy. Please contact your Fusion® distributor or maintenance provider for further information regarding the extended maintenance policy.

AUTHORIZED MAINTENANCE PROVIDER

Your authorized maintenance provider will perform many system checks and adjustments as needed during the maintenance inspection. Two inspections per year will be made for a total of four inspections during the initial service policy. Please see the Operation and Maintenance section of this manual for further details.

Should there be any operational deficiencies with your Fusion®, the maintenance provider will notify the owner in writing when the deficiencies will be corrected. If the maintenance provider does not correct the deficiencies or the service calls are not completed, please contact Zoeller Pump Company at 1-800-928-7867.

INSPECTION AND MAINTENANCE FREQUENCY

Fusion® Series systems are to be inspected and maintained every six months under normal usage. The inspection and maintenance are only to be performed by personnel trained and authorized by Zoeller Pump Company. A Maintenance & Service Report (CL0059) is to be completed for each inspection and maintenance visit.

ALARM CONDITION

If an alarm condition occurs, please check the air intake area around the blower and make sure no debris blocks the blower intake. Remove the air filter cap. Remove the filter and gently tap against your other hand. If it is very clogged wash it in warm, soapy water and dry well before replacing. Reassemble filter and cap on top of blower. Do not attempt to remove the blower housing or any other parts from the blower. If the blower is operating properly, there may be a high water condition within the Fusion®. It may be necessary to discontinue water use until the alarm condition has been resolved. If the buzzer continues to sound or the red light stays on, please contact your authorized Fusion® maintenance provider. The buzzer may be silenced by toggling the black switch on the side of the alarm panel to "silence". The red beacon light will remain on until the problem has been resolved.

Check the circuit breaker and make sure the blower circuit is on. Reset the breaker switch if it has been tripped. If it continues to trip or the alarm continues to remain on, contact your Fusion® maintenance provider.

POWER OUTAGE

Should you experience a power outage, the blower will not operate and air (oxygen) will not be supplied to the Fusion®. If the blower is off for more than 24 hours, the lack of fresh air will cause the treatment efficiency to decrease. During a power outage, the Fusion® will still allow effluent to flow, and will not create a backup in the home. You may, however, have a pump or dose tank with a pump on the outlet of the Fusion®, which requires power to pump the effluent to the soil absorption field. If you have a system such as this, please be aware of this condition and conserve water accordingly.

FLOODING

▲ NOTICE If flooding of the Fusion® occurs and the blower or the alarm panel is submerged, please disconnect power at the circuit breaker. DO NOT try to reconnect power to either the blower or alarm panel once it has been submerged. Immediately contact your authorized Fusion® maintenance provider to inspect the Fusion®, the blower, and the alarm panel. Your maintenance provider will repair or replace the components as needed.

INTERMITTENT USE

The Fusion® system is designed to function even if wastewater does not enter it for extended periods of time. The power to the blower must remain on during this time for the system to function properly. Weekend use will not harm the system as long as the blower is on. Should seasonal use require a complete shut down of the property, then it is recommended that the blower be turned off. It is important to start up the system in advance of actual occupancy to allow for normal treatment to resume. Please contact your authorized Fusion® maintenance provider for further information concerning shut down and startup of the Fusion®. You may also contact your maintenance provider for the shut down and startup services.

EXCAVATION AND INSTALLATION

1. Excavate an area large enough for the Fusion® Series unit to be installed. See Figure 5 and Table 2 for the actual dimensions of the unit. In areas where high groundwater is not a concern, excavation dimensions are calculated by adding 12-18" (305-457 mm) to the length and width of the Fusion®. This will allow sufficient room for proper backfilling. If it is reasonable to expect a seasonally high water table, consult the Anti-Flotation Procedures section below.
2. Construct a 6" (152 mm) thick stone or concrete pad and level to within 1/8" (3 mm).
3. **▲ NOTICE** If the unit is not level, it will cause uneven water flow as well as unbalanced aeration, which will result in poor performance.
4. Gently lift the unit at all four lifting points with a harness and install it on leveled stone pad (Figure 11).
5. Check unit to make certain it is level by placing a level at several locations on the riser. (riser covers removed) (Figure 11).

BACKFILLING

1. If groundwater is present, anti-flotation measures must be used to stabilize the unit prior to backfilling. Please follow the procedures in the Anti-flotation section to properly anchor the Fusion®.
2. Fill the unit with clean water to the normal operating depth prior to backfilling. Partition walls between chambers are water-tight and will fill in succession beginning on the inlet side of the unit. Therefore, it is best to alternate chambers when filling with water so the unit remains level. Check for leakage around the unit.
3. See riser instructions page 7. See Table 1 for number and size of access openings. Riser extensions are available for deeper burial. Make certain risers are sealed properly and watertight.
4. Install riser covers.
5. Backfill with good quality granular soil around the unit that is free of organic matter, rock, stone, tree roots, or other debris that could damage the unit. Unit can be backfilled partially before risers are installed to aid in riser installation.
6. Tamp soil around perimeter of the unit as it is backfilled to stabilize the unit and to reduce settling.
7. Finalize backfill with a mounded contour so that surface water is shed away from the unit. Under no circumstances should surface water be allowed to accumulate around unit.
8. **▲ CAUTION** **MAXIMUM** soil burial depth over the unit is **36 inches (914 mm)**.

Table 1

NUMBER OF ACCESS RISERS IN FUSION® SERIES		
	ZFL-2800	ZFL-4000
24" (61 CM) DIAMETER	4	4

COLD WEATHER INSTALLATION

When installing Fusion® in cold climates, the blower must be protected from snow drifts by installing it either inside a garage, home, basement, crawlspace or riser. If installed in a riser, the blower must be protected from inundation and must have a vent pipe installed to above the maximum snow depth with a 180 degree angle at the end to prevent snow and water entry. Also, the top and sides of the Fusion® must be insulated with insulation sheeting or other means to provide a minimum insulation value of R-8, along with the risers and lids. Please contact the factory for further information.

ANTI-FLOTATION PROCEDURES

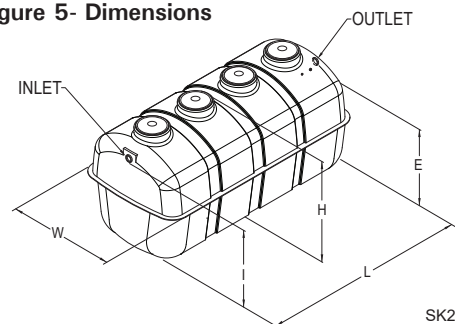
It is necessary to anchor the Fusion® in high ground water conditions to prevent flotation. If groundwater rises above the rock or concrete pad that the Fusion® sits on, anchoring is required. Please consult a design engineer, soil scientist or other qualified individual to determine high groundwater conditions.

1. Follow the procedures outlined in the Excavation and Installation Section items 1-5 to properly prepare and level the Fusion® excavation.
2. Follow the procedures outlined in the Backfilling Section items 1-4 to properly fill the Fusion® with water and add risers if needed.
3. Refer to Figure 12, Anchoring Schematic to determine the minimum amount of backfill to be placed around the Fusion® in the excavation. Tamp the fill to prevent settling.
4. Refer to Table 3, Concrete Anchoring Dimensions to determine the amount of concrete needed for the concrete anchor collar that is poured around the entire circumference of the Fusion®. Pour concrete to the specified dimensions to fully engage the mid-seam of the Fusion®, which will anchor it once the concrete cures. Make certain to pour the concrete in a manor to minimize trapped air within the concrete. Agitating or lightly mixing the concrete with a metal rod or other similar device once poured will help release trapped air. Be careful not to puncture or crack the unit.
5. Allow the concrete to harden before final backfilling.
6. Complete the procedures outlined in the Backfilling Section, items 5-8.

Table 2

FUSION® DIMENSIONS					
SYSTEM	L	W	H	I	E
ZFL-2800	14' 8" (4.5 m)	7' 0" (2.1 m)	7' 10" (2.4 m)	6' 1" (1.9 m)	5' 7" (1.7 m)
ZFL-4000	15' 6" (4.7 m)	8' 0" (2.4 m)	8' 4" (2.5 m)	6' 7" (2.0 m)	6' 1" (1.9 m)

Figure 5- Dimensions



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RISER INSTALLATION

All large Fusion® units are shipped without risers attached due to size restraints, therefore all units will need to have the chosen risers attached in the field. Please see the riser installation instructions below. Risers are 24 inches in diameter and 6 inches in height. Do not install more than two riser heights together for a maximum of 12 inches burial depth.

Riser Installation Instructions

Install Fusion® unit in the ground and fill with water checking for any leaks. Backfill with dirt up to a reasonable working level for safety and ease of installation of risers. Be careful not to get any backfill material into Fusion® unit.

24" Riser Installation Process

Risers extensions are 24 inches in diameter by 6 inches in height. Do not install more than two riser heights together for a maximum of 12 inches burial depth. Prepare risers by applying two complete circular beads of silicone or other like sealant around riser flange in order to seal risers and make the installation watertight. Install the 24 inch diameter riser onto the already installed riser adapters with the provided stainless steel screws. Install additional risers into the previous riser flange as above. No sealant should be used between last riser and lid since the lid is equipped with a seal. Be sure to fasten lids with provided stainless steel screws for safety.

Figure 6

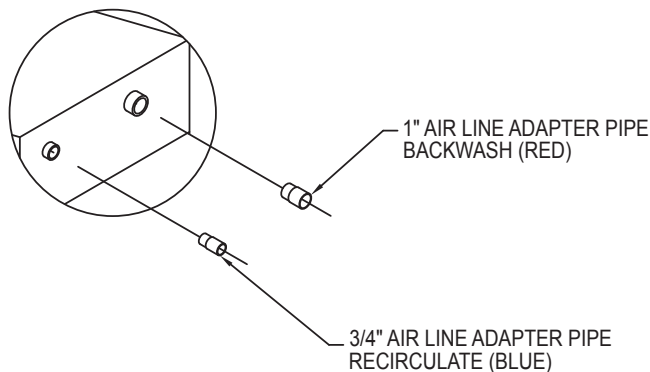
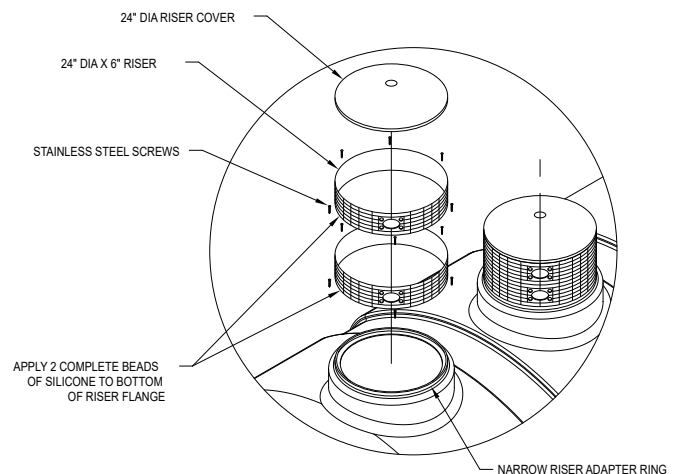


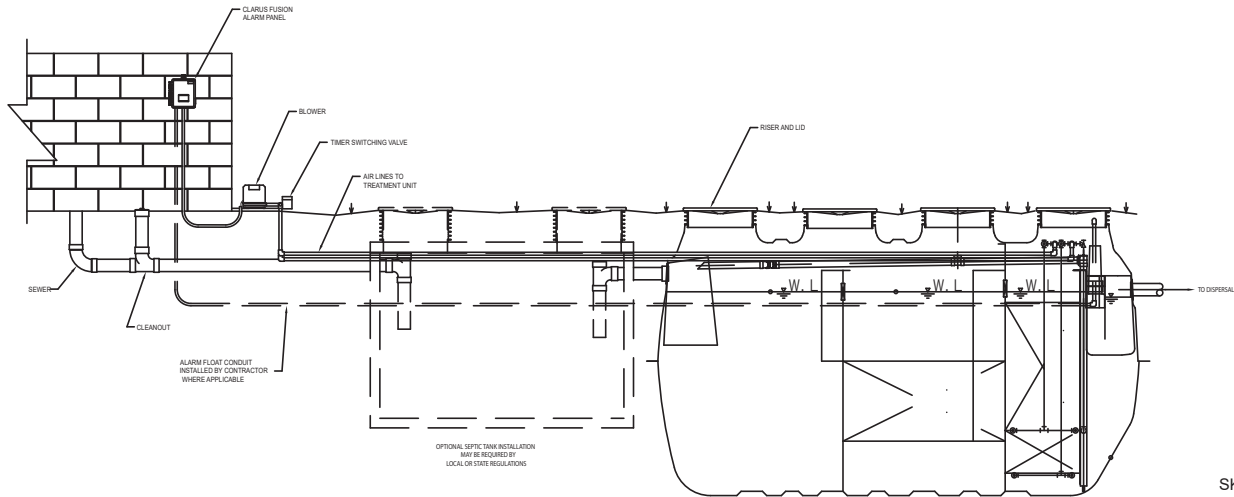
Figure 7



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BLOWER INSTALLATION AND PLACEMENT



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Figure 8

1. This product must be connected to a grounded, metallic, permanent wiring system, or an equipment-grounding terminal or lead on the product.
2. Place the blower where it is easily accessible for maintenance and inspection.
3. Install the blower in an area where it will be protected from damage and flooding. Also make certain the location has good ventilation. DO NOT place the blower below water level as back-siphoning can occur.
4. Install the blower on a foundation that is level and solid.
5. Excavate trench for air line from blower to the switching valve, and trench for air lines from switching valve to Fusion® unit.
6. Install one 1" (25.4 mm) air line from the blower to the timer in front of switching valve switching valve. Piping should be less than 17' (5 m) from blower to Fusion® unit. The recirculation line is 3/4" (19 mm) and the backwash line is 1" (25.4 mm).
7. The blower is provided with one discharge port. Install the included air line PVC tees in the backwash and recirculation lines.
8. Attach the small diameter black air tubing (included in the blower box) to barbed fitting on PVC tee. Black air tubing and blower cord should be routed to the control panel through conduit. Attach the black air tubing line to the air pressure sensor barbed fittings in the panel. (Figure 10) If air tubing is not connected to backwash and recirculation lines, the panel will alarm.
9. Connect the remaining end of the PVC tee to the airline installed in Step 6.
10. The switching valve is 100V and must be connected to the panel through the use of the supplied transformer. See included transformer timer installation instructions.

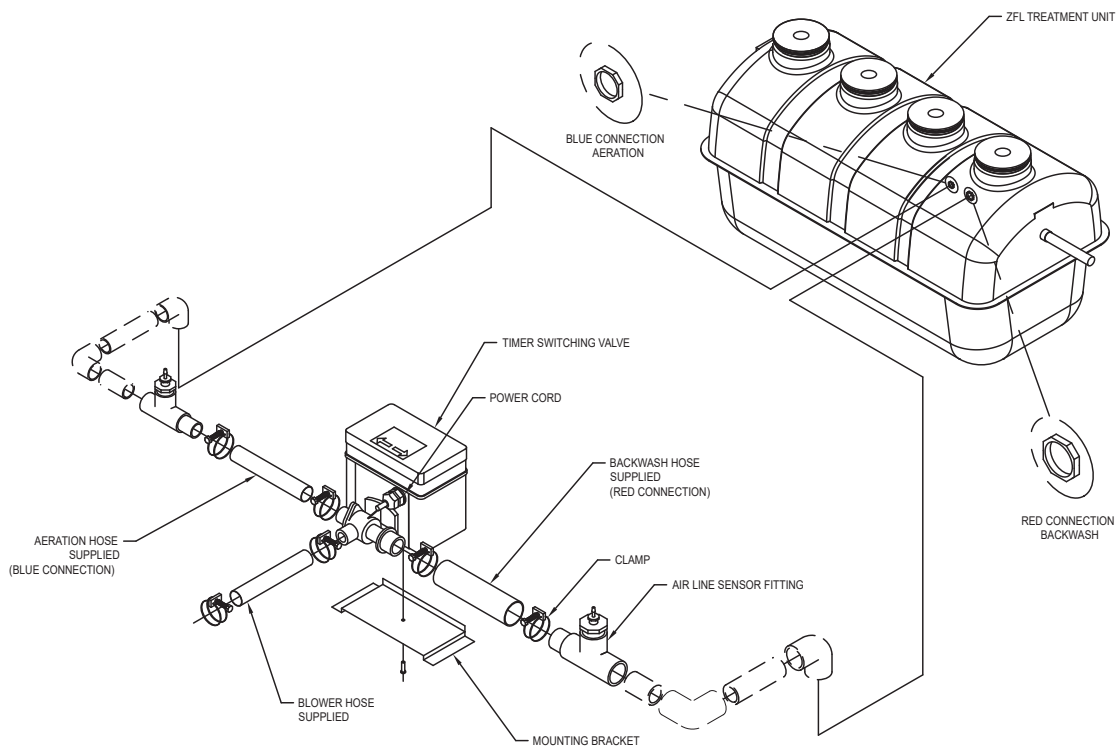


Figure 9

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Figure 10 - Lifting & Positioning

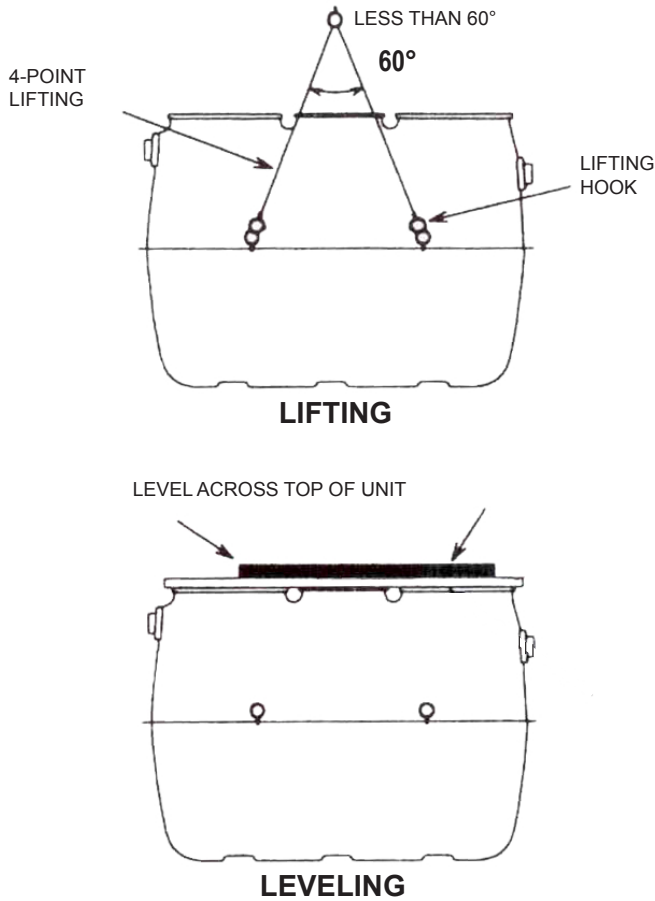


Figure 11 - Concrete Anchoring

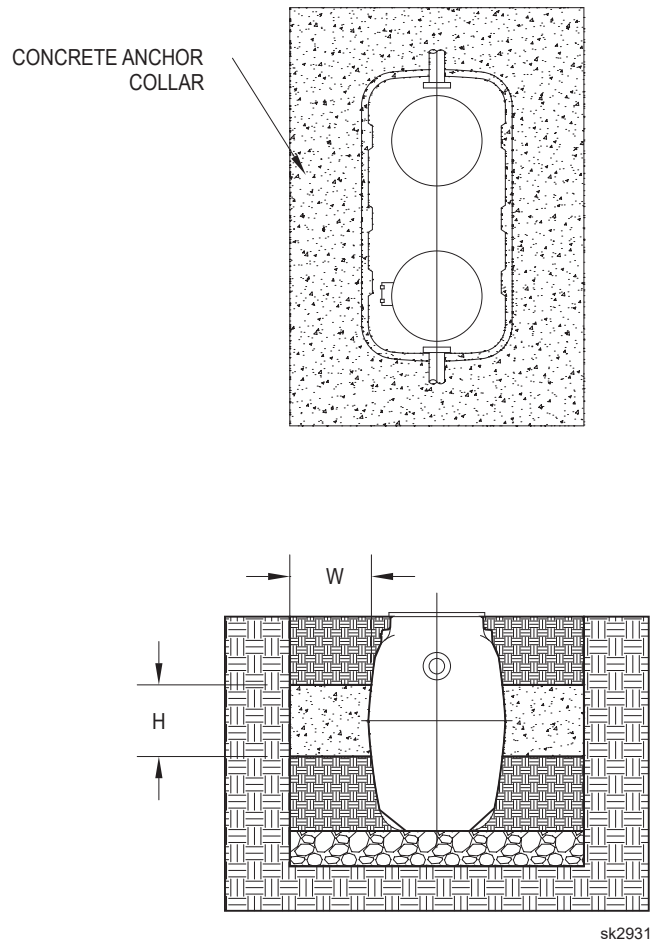


Table 3 - Concrete Anchoring Dimensions

MODEL	No COVER				6" COVER				12" COVER				18" COVER			
	W (FT)	H (FT)	CONCRETE VOLUME (FT ³) (CY)		W (FT)	H (FT)	CONCRETE VOLUME (FT ³) (CY)		W (FT)	H (FT)	CONCRETE VOLUME (FT ³) (CY)		W (FT)	H (FT)	CONCRETE VOLUME (FT ³) (CY)	
ZFL-2800	2' - 8"	3' - 0"	432	16	2' - 7"	2' - 8"	370	14	2' - 6"	2' - 5"	323	12	2' - 3"	2' - 10"	334	13
ZFL-4000	3' - 0"	3' - 0"	531	20	3' - 0"	2' - 6"	443	16	2' - 10"	2' - 5"	400	15	2' - 6"	2' - 11"	416	16

MODEL	24" COVER				30" COVER				36" COVER			
	W (FT)	H (FT)	CONCRETE VOLUME (FT ³) (CY)		W (FT)	H (FT)	CONCRETE VOLUME (FT ³) (CY)		W (FT)	H (FT)	CONCRETE VOLUME (FT ³) (CY)	
ZFL-2800	2' - 3"	2' - 3"	265	10	2' - 2"	2' - 0"	226	9	2' - 0"	2' - 2"	223	9
ZFL-4000	2' - 6"	2' - 4"	333	13	2' - 5"	2' - 1"	286	11	2' - 3"	2' - 2"	273	10

PIPING INSTALLATION

1. Connect house sewer pipe or septic tank outlet, if required, to the unit inlet. Make certain only household waste enters the unit (no foundation drains, gutter drains, etc.).
2. Connect the outlet pipe to the outlet of the unit.

HIGH WATER ALARM FLOAT INSTALLATION

The Fusion® alarm panel assembly includes a high water alarm float switch that is used to monitor the liquid level in the Fusion unit. The switch should be tethered to one of the gray, vertical air lines in the aeration chamber. With a 3" (76 mm) tether length, the cord should pass through the opening in the partition wall between the aeration and anaerobic chamber, and allow the float to hang in the outlet baffle of the anaerobic chamber.

1. The float switch should be tethered to one of the gray, vertical pipes in the aeration chamber. When the float is in the horizontal position, the cord should be at least 1" (25 mm) below the top of the partition wall opening in the anaerobic chamber baffle.
2. Place the cord into the clamp and secure to gray aeration pipe. NOTE: Do not install the cord under the hose clamp.
3. Position the float with a 3" (76 mm) tether.
4. Tighten the hose clamp with a screwdriver. Be careful not to overtighten as this may cause damage to the plastic clamp.
5. Make sure the float cord is not allowed to touch the excess hose clamp band during operation as this may cause damage to the cord.

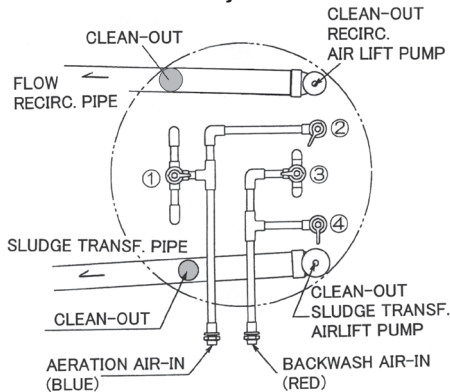
6. The float switch cord should be installed in electrical conduit connecting the control panel to the Fusion® unit. The electrical conduit must be rated for burial.
7. A 1/2" (13 mm) bulkhead fitting (supplied by others) should be used to connect the electrical conduit to the Fusion® unit. A hole must be drilled through the wall of the Fusion® unit between the red and blue bulkhead fittings to facilitate this connection.
8. Please be certain that the bulkhead fitting for the electrical conduit forms a watertight connection with the FRP wall of the Fusion® unit. Silicone may be used to create a watertight seal.
9. Electrical conduit from the Fusion® unit to the alarm panel can be buried in the same trench as the air lines.
10. The high-water alarm float switch is wired directly into the alarm panel.

ELECTRICAL CONNECTIONS

1. **▲ NOTICE** All electrical installations must follow the National Electrical Code and/or your local/state electrical codes.
2. The blower should be directly wired into the alarm panel. The alarm panel must be located in a dry location that is accessible for maintenance. Please see the wiring diagram and instructions enclosed with the alarm panel.
3. Make certain the timer within the control panel is set to the proper time. The timer unit display should be set to 10 hours and the timer dial needle set to 3.6 for 36 hours. This will activate an alarm if the blower doesn't go into backwash cycle within a 36-hour time frame.

START UP

Figure 12 - Aeration Flow Adjustment



▲ NOTICE An installation and start-up check list is furnished with the information package in the blower box. Please use this as a guide and fill out all sections and return to your distributor.

There are two aeration systems provided within the aeration chamber; normal aeration and backwash. Normally valves (1 and 3) are set at 50%. Observe the air flow on each side of the unit to verify equal flow. If there is an obvious discrepancy in air flow between the two sides, adjust the valves (1 and 3) so that the flow is equal.

Valve legend:

1. Aeration	Blue	Balance Aeration	3. Backwash	Red	Balance Backwash
2. Recirculation	Gray	See Table 2	4. Sludge transfer	Gray	See Table 4 and 5

Table 4 - Recirculation Flow Rates

Model	ZFL2800	ZFL4000
Recirculating flow rate (liter/min.)	9.7-15	14-21
Suggested Valve Opening	60-65%	50-55%

Figure 13 - Flow Measurement

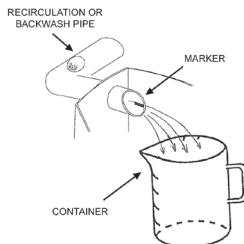
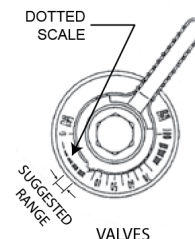


Table 5 - Backwash Flow Rate Setting

Model	ZFL2800	ZFL4000
Backwash flow rate (sec/liter)	50-70	63-89
Valve open (%)	60-70%	60-70%

Figure 14 - Flow Controlling Valve



RECIRCULATION FLOW ADJUSTMENT

The recirculation flow is designed to be 1.2-1.8 times that of the average inflow. Table 4 indicates approximate flow rates for each unit. However, fine adjustments may be necessary to ensure optimum performance.

Setting the flow rate:

- Adjust the flow using rates in Table 4.
- The flow rate is adjusted by rotating the gray recirculation valve (2) and observing the flow at the pipe end.
- There are prescribed lines at the outlet of the recirculation pipe to aid in approximating the correct flow.

Measuring the flow rate:

- The actual flow rates must be measured to verify flow after adjustment of the valve and observation at the pipe end.
- Measure the time in seconds required to fill a 1000 mL container.
- Compare the time to value ranges in Table 4.
- If necessary, adjust the valve again and collect another sample to verify the correct flow rates.

▲ NOTICE It is important not to set the flow rate too high because it can cause excessive agitation within the first chamber (Sedimentation Chamber). This could result in poor performance.

BACKWASH FLOW ADJUSTMENT

In order to prevent plugging in the Aeration Chamber, the backwash cycle activates at a preset schedule. If there is no backwash cycle or too short of a backwash cycle, the unit's performance will be adversely affected. Likewise, if the backwash cycle is too long, performance will be compromised.

The backwash cycle begins at 2:00 AM and lasts for five minutes. One hour later, another five minute backwash cycle occurs. Even with these default settings, the waste water inflow could be too low or too high to optimize the performance and therefore, must be checked during each inspection.

The backwash cycle and sludge transfer from the Aeration chamber take place at the same time. Verify that the air flow is uniform across the Aeration chamber between the two sides during a backwash cycle. If not, adjust the red backwash valve (3) accordingly.

Setting the flow rate:

- Switch to a manual backwash cycle by pressing the pink "Manual Backwash" button on the switching valve control pad.
- Set the backwash flow rate by adjusting the gray sludge transfer valve (4). Use Table 5 to determine the typical setting for each Fusion® model.

Measuring the flow rate:

- Measure the actual backwash flow rate at the outlet of the sludge return pipe in the first chamber the same way the recirculation flow rate is measured.
- Adjust the gray sludge transfer valve (4) if necessary to obtain the proper flow
- Return the switching valve to normal aeration mode by pressing the pink button on the switching valve's control pad.

TIMER SWITCHING VALVE

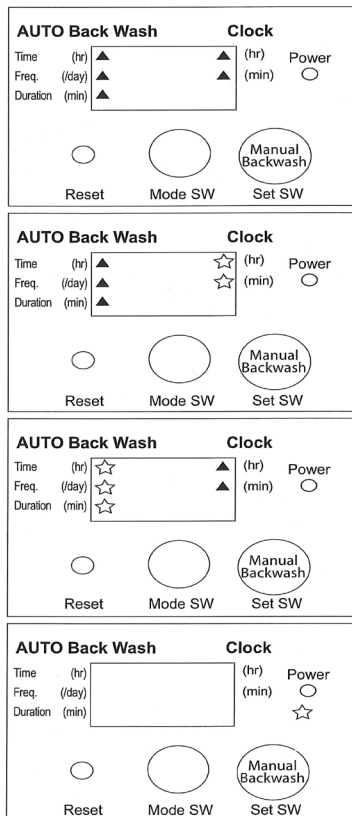


Figure 15

Reset (factory default settings):

1. Press Reset.
Clock is set to 0.00 (midnight).
Backwash Time is set to 2:00 AM.
Backwash Frequency is set to 2 per day.
Backwash Duration is set to 5 mins.

To Adjust Clock & Backwash Settings:

1. Press Mode SW. Note the blinking arrow indicating (hr.) under "Clock" at the right of the screen.
2. Press Set SW to select the current hour of the day.
3. Press Mode SW. Note the blinking arrow indicating (min.) under "Clock" at the right of the screen.
4. Press Set SW to select the current minute of the hour.
5. Press Mode SW. Note the blinking arrow indicating Time (hr.) under "AUTO Back Wash" at the left of the screen.
6. Press Set SW to select the hour that the system will begin to back wash. (A setting of 2 is standard)
7. Press Mode SW. Note the blinking arrow indicating Freq./Day under "AUTO Back Wash" at the left of the screen.
8. Press Set SW to select either 1 or 2 back wash cycles that the system will perform per day. A setting of 2 is standard.
9. Press Mode SW. Note the blinking arrow indicating Duration (min) under "AUTO Back Wash" at the left of the screen.
10. Press Set SW to select either 5 or 10 minute duration for back wash cycle. A 5-minute cycle is standard.

NOTE: A 24-hour clock is used in place of AM/PM designations.

FUSION® OPERATION AND MAINTENANCE

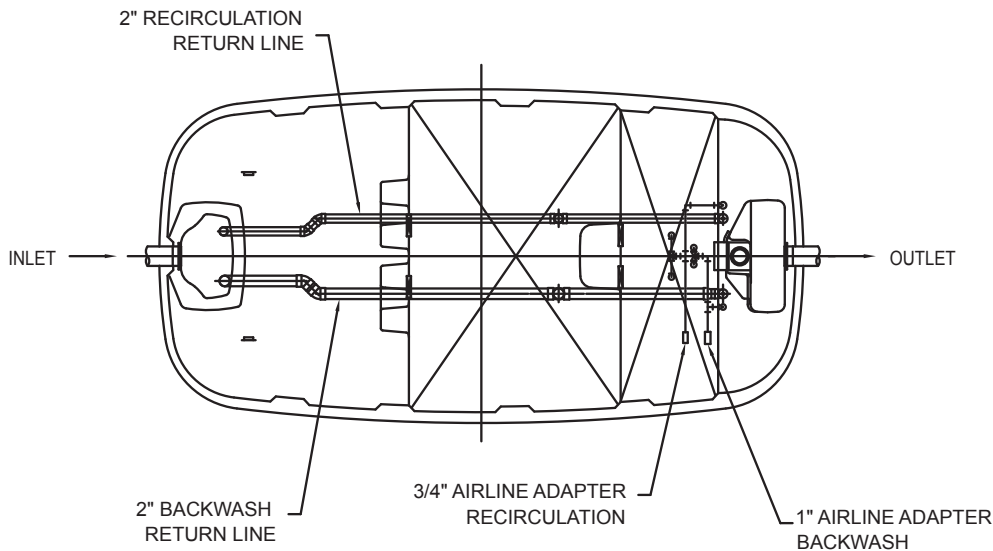


Figure 16 - Inspection details.

SK2801

The following steps are to be completed during each 6-month inspection. All information collected during the inspection is to be recorded on the Maintenance and Service Report (CL0059). Begin the inspection by recording the date, arrival time, weather conditions, purpose of the visit, water use, model number, serial number, the presence or absence of a septic tank, and the system owner and service provider information in the space provided on the report.

GENERAL OBSERVATIONS

1. **Are any odors present?** There should be no odor with the lids closed, if properly sealed. With lids removed, a septic or sewer-like odor is indicative of poor treatment and is common immediately after startup due to hydrogen sulfide and other gases. A well-operating system will have a musty, earthy smell similar to wet peat moss.
2. **Is there evidence of high water?** Typically indicated by a water level above the black wall markings and above the "0" graduation on the partition wall stickers. May also be indicated by debris on partition walls.
3. **Is there excess foam formation?** Foam may be present during an inspection. Brown foam indicates bacterial buildup following startup. White foam is due to detergent use. Neither is a problem if occurring intermittently. Detergent-based foam will often be accompanied by low transparency readings.
4. **Is there residue build-up on piping?** Typically indicated by gray or black residue (dried foam) on aeration chamber piping.
5. **Is there even and vigorous bubbling?** Bubbles surfacing in the aeration chamber should be even across the entire chamber. If uneven, cleaning steps should resolve this issue.

REQUIRED WATER QUALITY ANALYSES

PART A: Clean Water Storage Chamber – Collect samples from the clean water storage chamber to be used for the following analyses

1. **Transparency** – Measures the ability of the water to transmit light. Using the ladle, fill the transparency tube with a water sample collected from the clean water storage chamber. Looking down through the water column, slowly drain the transparency tube using the valve on the flexible hose until you can first distinguish between the black and white colors on the secchi disk in the bottom of the tube. When the secchi disk is visible, close the valve and read the transparency (in centimeters) on the side. Dirty water samples transmit less light and result in a lower transparency. A transparency reading > 20 cm is preferred and 34 cm is average. Low transparency may be due to a lack of biological activity as in a young system, a recirculation rate that is too high, or a system influent high in detergent concentration. To correct low transparency readings not caused by detergent, decrease the recirculation rate. Detergent based problems may require consultation with owner.
2. **Scum** – Very small amounts of scum may accumulate in the corners on the outlet end of the system. This is normal. Scum, should not be present elsewhere in the clean water storage chamber unless the recirculation rate is too high or daily flow exceeds the design capacity. If present, use ladle to transfer to sedimentation chamber.
3. **Sludge** – Test the sludge depth using the sampling device included in the maintenance kit. The bottom section of the sampler includes a check valve, which opens as the unit is lowered into the liquid. When the sampler has reached the bottom of the chamber and the liquid level equilibrated at surface level, lift the sampler and this action will set the check valve and retain the sample in the tubing. Withdraw the sampler and note the depth of settled solids within

FUSION® OPERATION AND MAINTENANCE, continued

the sample. To release the material in the unit, touch the stem extending from the bottom section against a hard surface such as the partition wall in the sedimentation chamber. This opens the check valve to drain the sample. A range of 0" to 4" is preferred. Typically solids are brown and well flocced. More than 4" (0-102 mm) is typically due to high recirculation rates and sludge will appear black in color. To correct sludge depths greater than 4" (0-102 mm), decrease the recirculation rate and increase the backwash rate.

Sludge Descriptions:

Black – septic or sewer-like odor due to hydrogen sulfide and other gases

Brown – undigested sludge is light brown, becomes darker with digestion, lightly settled

Clear – may see a clear water layer beneath solids if gas carries solids upwards

Flocced - settled with texture similar to a tuft of wool

Grainy - gritty or sandy texture

Gray - partially digested sludge

Milky – light in color, cloudy, not transparent

Muddy – typically well settled, often present just after startup, may be due to infiltration

Mustard - an off-color, remnants of digestion are often yellowish in color

White - sometimes present after new construction often due to drywall mud

PART B: Anaerobic Chamber - collect samples from the outlet baffle of the anaerobic chamber to be used for the following analyses:

1. **Transparency** – A transparency reading more than 20 cm is preferred.
2. **Scum** – Should not be present unless recirculation and/or backwash rate is too high or daily flow exceeds design capacity. To correct, reduce the recirculation and or backwash rate.
3. **Sludge** – A range of 0" to 18" (0-46 cm) is preferred. Typically brown and settled, becomes gray to black as depth and digestion increases. More than 18" (46 cm) may require a reduction in recirculation rate. A sludge accumulation of greater than 18" (46 cm) in the anaerobic chamber requires pumping.

PART C: Sedimentation Chamber – collect samples from the outlet baffle of the sedimentation chamber for the following analyses:

1. **Scum** – 0" to 12" (0-30.5 cm) is common, so long as it is not rising above the partition wall. If so, punch down using ladle.
2. **Sludge** – A range of 0" to 36" (0-94 cm) is common. Typically brown and settled, becomes gray or black as depth and digestion increases. A sludge accumulation of > 36" (94 cm) in the sedimentation chamber requires pumping.

SYSTEM DIAGRAM

Refer to sections on the following pages for detailed maintenance item descriptions.

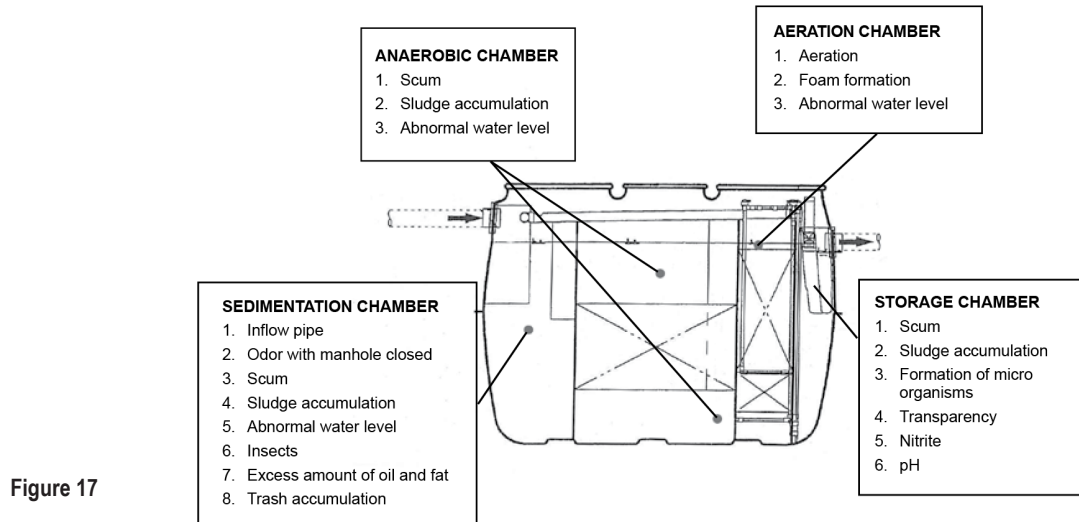


Figure 17

AERATION CHAMBER CLEANING

1. Aeration.

The aeration system must be flushed every maintenance visit. There are two flushing methods; (A) Air flushing and (B) Water flushing. Air flushing must be done every maintenance visit. Water flushing must be done if there is a sign of clogging in the Aeration Chamber (e.g. abnormal increase in recirculation flow).

(A) Air flushing procedure:

- Close gray recirculation valve (2) all the way. (0%)
- Rotate blue aeration valve (1) back and forth from the 0% to the 100% position several times to flush.
- Set valves (1) and (2) back to the appropriate positions. (See Recirculation Flow Adjustment, pg. 10)

(B) Water flushing procedure: (See Fig. 20)

- Make sure that the blower is off.
- Close valve (2) all the way.
- Connect a water line to the aeration line after the switching valve, as shown in Fig. 20.

- Gradually open the water faucet and introduce water into the system.

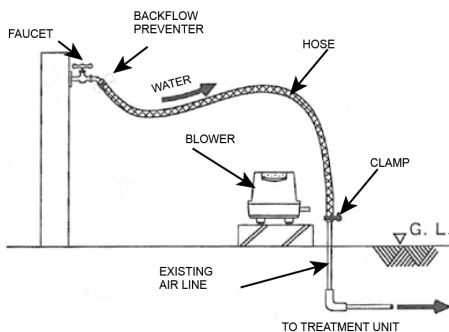


Figure 19

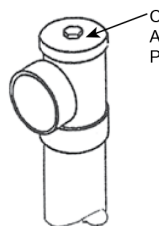


Figure 18

- Rotate valve (1) back and forth from the 0% to the 100% position several times to flush.
 - Turn off the water, remove the water line, and reconnect the airline to the blower.
 - Set valves (1) and (2) back to the appropriate positions.
- (See Recirculation Flow Adjustment, pg. 10)

(C) Cleaning the recirculation line:

- Open the gray recirculation valve (2) to 100%.
- Flush water through the recirculation line for several seconds.
- Turn off the recirculation by rotating the gray valve (2) to 0%.
- Make sure that the blower is off. Allow the system to relax for a few seconds.
- Repeat this cleaning method three times.
- A hose or brush can also be used to clean the recirculation line. See Figure 21.
- Reset the gray valve (2) to its original position.

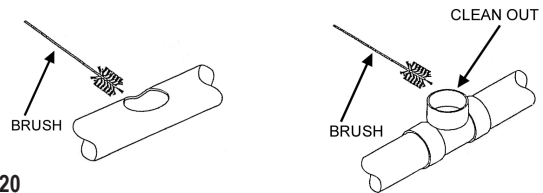


Figure 20

ALARM PANEL & BLOWER INSPECTION AND MAINTENANCE

Inspect the alarm panel for signs of water or odors inside. Toggle the test switch on the side of the box to check that both the alarm horn and the alarm beacon light are operational.

Inspect the blower and switching valve for proper operation. If the blower is not functioning, refer to the troubleshooting section near the end of this guide.

1. Listen for any loud rattling sounds. The blower should hum softly. If a rattle is heard, ensure that all four legs securely contact the ground or base medium.

2. Inspect the filter once the power has been disconnected by removing the filter retention screw. Then, remove the cover by snapping the filter cover off the top of the blower. Clean the filter by knocking the dust out or by rinsing with water to remove accumulated particles. Be sure the filter is dry before reinstalling.

RECOMMENDED METHODS FOR COLLECTING EFFLUENT SAMPLES*

Proper effluent sample collection technique is essential for obtaining an accurate assessment of treatment efficiency. To accurately interpret treatment efficiency, influent as well as effluent samples should be collected. In the event of reduced efficiency, influent composition can be useful in determining system owner practices. Depending upon configuration, effluent samples can be collected at:

1. Disposal pump tank downstream of the Fusion®
2. Fusion® discharge chamber
3. Distribution Box downstream of the Fusion®

Samples should be obtained in clean, one liter bottles. Bottles should be labeled appropriately to denote the sample's original location and kept on ice during transport. Samples should be collected to approximate daily residential sewage flow. When opening the Fusion® lid during sampling, try not to disturb the unit. Also, do not collect the effluent sample from the wall of the tank.

For further information, reference procedure identification number SOP-F-103, Zoeller Pump Company, 1-800-928-7867.

* Consult local rules and regulations to determine jurisdictional effluent sampling requirements.

TROUBLESHOOTING

1. Odor

Offensive odors are often the result of insufficient or inappropriate bacterial growth. Causes may include a young or unestablished system, insufficient air introduction, or the addition of detrimental chemicals or poisons into the system. Ensure the blower and air delivery systems are functioning. Check with the homeowner regarding chemical use and disinfection habits. Check all risers and lids to ensure an airtight seal.

2. Foam Formation

Foam formation is observed in the following situations:

- a) In the early stage of operation when the aerobic bacteria colony is establishing itself,
- b) when an excess amount of air is supplied for aeration,
- c) when the difference between ambient temperature and water temperature is great, and
- d) when an excessive amount of detergent is introduced.

In most cases, foam will disappear with proper operation.

When excessive amounts of detergent have been introduced to the system, remind the homeowner to use appropriate amounts of detergent.

3. Cloudy Treated Water

- Check the amount of scum and sludge: If too much scum or sludge is observed, transfer them to the first chamber and adjust

recirculation flow rate, frequency and duration. (See backwash flow adjustment, pg. 10)

- Check the aeration situation:
If uneven bubble generation is observed, adjust valve (1). If aeration is weak, flush the aeration pipe with air or water.
- Check the recirculation flow rate:
If the recirculation flow rate has increased after the last inspection the aeration pipe may be clogged. Flush the aeration pipe with air or water. If the recirculation flow rate has decreased after the last inspection, the airlift pump or recirculation pipe may be clogged. Clean them with a brush and running water.

4. Blower

Blower Motor Does Not Run, with Power Connected:

- Check the electric supply to the panel, ensuring 120 volt to blower power.
- Check that all breakers and fuses in the panels are on or intact.

Little or No Aeration:

- Check the blower motor is running.
- Check the air line piping connections at the blower and switching valve.
- Check the air filter and clean or replace if necessary.
- Check the diaphragms and replace if necessary.
- Check the air piping for leaks, clogs, or dislocations and fix accordingly.
- Verify check valves (if installed) in supply lines are installed correctly.

INSPECTION AND MAINTENANCE - PUMPING AS NEEDED

Perform all inspection procedures listed in 6-month inspection. Pump out sludge in the first and second chambers (if necessary). If the maximum sludge accumulation has been reached, see description in 6-month inspection. Make sure to remove the scum on top layer first, then pump out the sludge of each chamber.

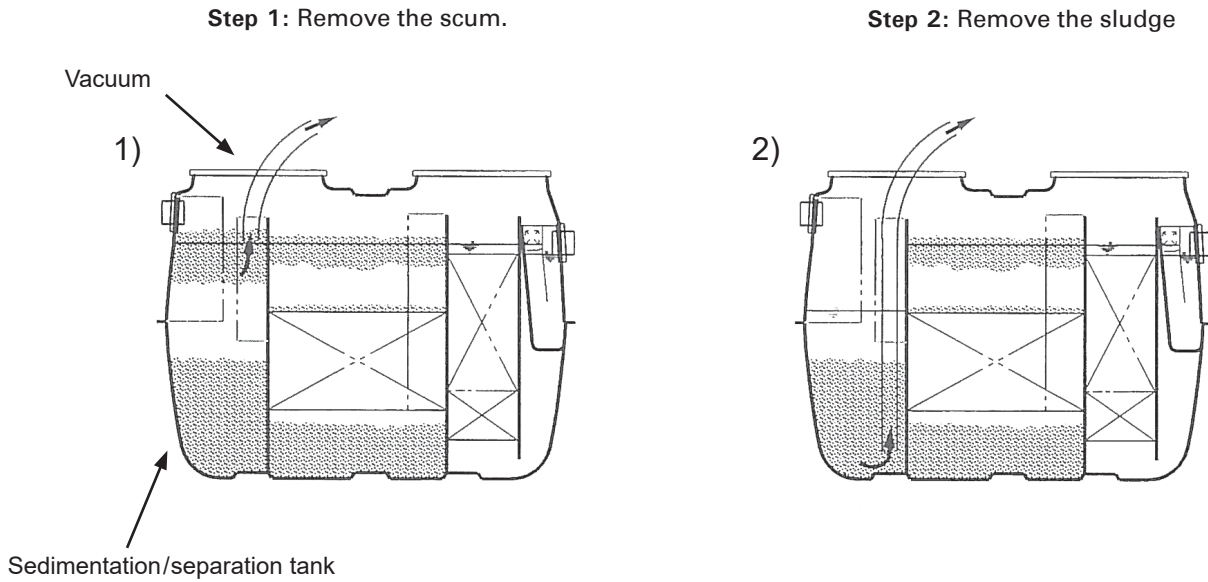


Figure 21 - Pump out procedures

ATTENTION: Remove the scum first. If you remove the sludge first, the water level will decrease and the anaerobic filter will be blocked by the scum.

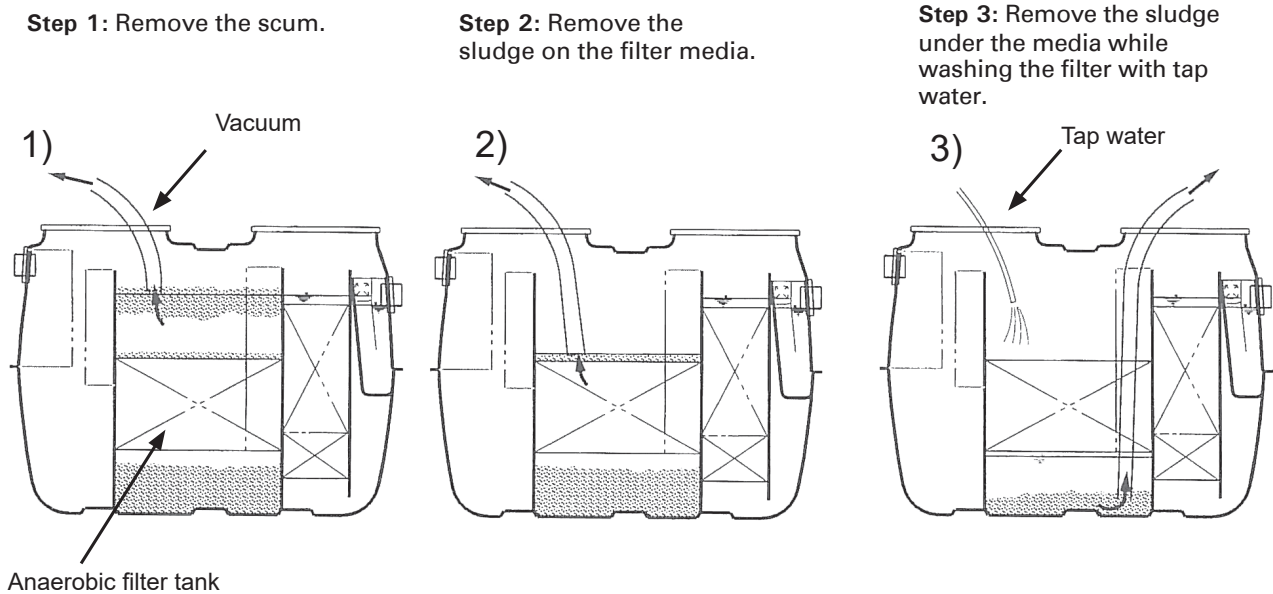


Figure 22 - Cleaning of anaerobic filter tank, remove all scum and sludge.

AIR PUMP MAINTENANCE INSTRUCTIONS

Periodic pump maintenance is required for reliable continuous operation. Any maintenance of the pump other than those described within this manual must be performed by an authorized service facility.

□ Air Filter

Air filter under the filter cover should be cleaned every 3 to 6 months. Wash the filter gently in mild, soapy water then rinse thoroughly. Allow filter to dry completely before reinstalling.

□ Diaphragm Modules

Diaphragm Module Replacement is recommended for every 18 to 24 months of operation. Diaphragm Replacement Kit (DRK) can be acquired from Alita Industries or from your local Alita representative.

CAUTION: Always turn off the power before any pump inspection. Failure to observe this precaution can result in serious accident.

Replacement Procedure

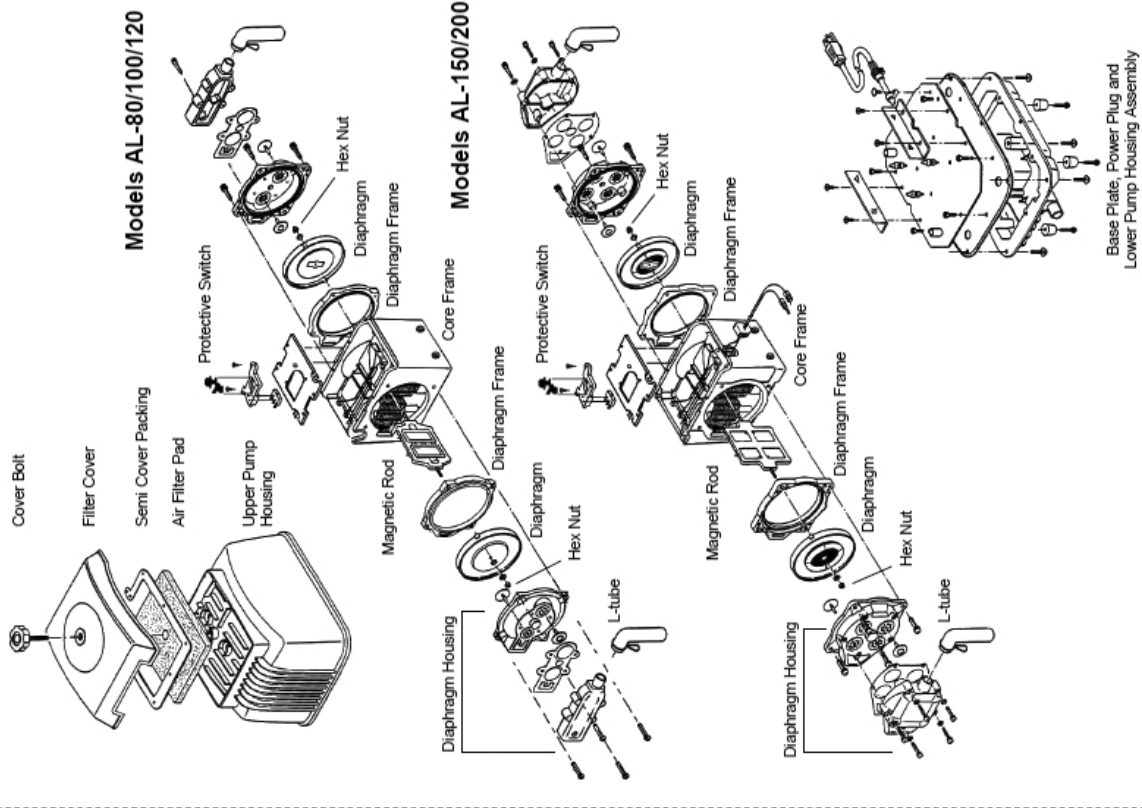
1. Remove Filter Cover, set pump upside-down and remove all corner screws. Then return pump to upright position and lift away Upper Pump Housing.
2. Detach the L-tube from each Diaphragm Housing.
3. Select a Diaphragm Housing on the pump, remove its 4 corner screws then pull away the entire housing. Proceed to remove the Hex Nut from center of the Diaphragm then slide the entire Diaphragm Block away from Magnetic Rod and Core Frame.
4. Select a new Diaphragm Block assembly from the DRK, ensure the rim of new Diaphragm is firmly embedded into the groove of Diaphragm Frame. Then match new Diaphragm Block to the Core Frame and secure to the Magnetic Rod with Hex Nut.
5. Apply 1 or 2 drops of threadlocker (use only removable grade) over the hex nut and the exposed thread of magnetic rod screw.
6. Install new Diaphragm Housing and secure with 4 corner screws.
7. Re-attach L-tube and secure with wire clamp.
8. Repeat procedure #3 through #7 to replace old diaphragm module on the other side of pump.
9. Inspect the position of Magnetic Rod from the top. Confirm that the Magnetic Rod is centered between and NOT in contact with the two Electromagnets.
10. If the pump includes a Protective Switch on top of the Core Frame, rotate the switch to ON position.
11. Install Upper Pump Housing, and secure to pump firmly with all corner screws. Reinstall Filter Cover.

□ MAGNETIC ROD

If the magnetic rod has suffer damages, order a new magnetic rod along with the new diaphragm replacement kit.

In case of unusual noise or odor from the pump, turn off the power immediately, consult the maintenance guide, or contact your nearest pump representative or Alita service department for assistance.

Assembly Diagram for Models AL-80/100/120/150/200



ALITA DIAPHRAGM CHANGE-OUT INSTRUCTIONS

1. Remove plastic air filter cover. (See Figure 24).
2. Flip pump upside down and unscrew 6 screws on the corners and long side of the pump. Flip pump over and proceed to lift upper housing. (See Figure 25).
3. Rotate and slide out of the detection pin knob on top of the pump core. This moves the detection pin out of way when you are pulling the magnetic bar out of the pump. (See Figures 26 and 27).
4. Pick any side, unscrew the 4 corner screws that secure the diaphragm housing to the pump's core frame. **For AL-150/200, ignore all the screws not at the 4 corners.** (See Figure 28).
5. (See pointing arrow in Figure 28) Unclamp and pull the rubber elbow away from -the discharge port of the diaphragm housing. Carefully use a small flat bladed screw driver to unbond / uncouple the rubber tube from the discharge port then pull it away. (See Figure 29).
6. Next pull the diaphragm housing away. (See Figure 30).
7. Unscrew the hex nut at the center of the diaphragm and proceed to pull the diaphragm from the magnetic bar. (See Figure 31).
8. If it is difficult to pull the diaphragm from the magnetic bar, use the handle of the screw driver as a hammer and nail down the protruded rod screw of the magnetic bar from the diaphragm plate. (See Figures 32 and 33).
9. Repeat #5 and #6 on this guide for the diaphragm module on the other side of pump. Then grab on the diaphragm frame than slide and pull the magnetic bar from pump core. (See Figure 34).

Figure 23



Figure 24

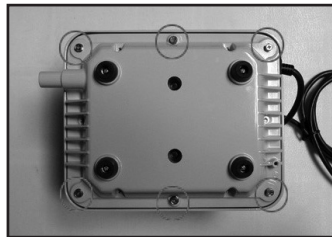


Figure 25

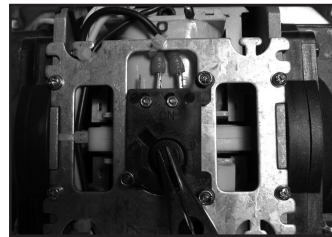


Figure 26

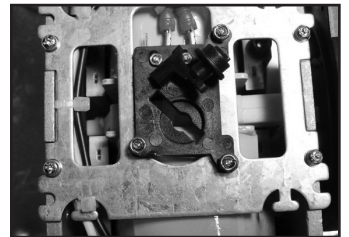


Figure 27

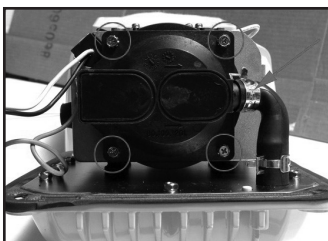


Figure 28



Figure 29



Figure 30

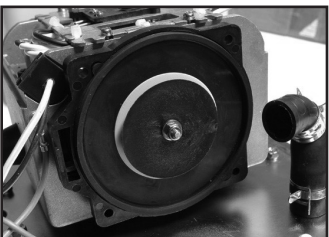


Figure 31

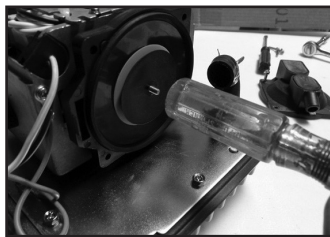


Figure 32

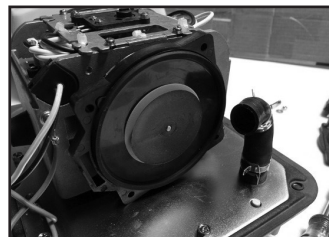
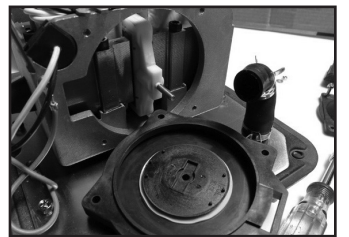


Figure 33



TECHNICAL SPECIFICATIONS

Chambers	Actual Values	
	Volumes (Gallon)	
Model Number	ZFL-2800	ZFL-4000
Clarus P/N	5250-0027	5250-0033
Sedimentation Chamber (Gallons)	1118	1551
Anaerobic Chamber (Gallons)	1146	1560
Aeration Chamber (Gallons)	527	673
Storage Chamber (Gallons)	241	330
Total (Gallons)	3032	4114
Inflow in Gallons/Day	2800	4000
Size: Width in Inches	84	96
Length in Inches	176	186
Height in Inches	94	100
Weight in Pounds	2425	3748
Lids and Access		
24" Diameter	4	4
Blower Information		
Alita AL-250	1	
Alita AL-300		1
Switching Valve (P/N 151438)	1	1
Air Line Size(s)		
3/4" Recirculation	1	1
1" Backwash	1	1
Inlet/Outlet Information		
Influent Invert (inches)	21	21
Effluent Invert (inches)	28	28
Inlet/Outlet Pipe Size (Inches)	4	4

Blower Details	Voltage	Amps	Sound (dB)	Air Flow (L/min.)	Weight
Alita AL-250	120	3.7	46	200	41.5
Alita AL-300	120	4.3	47	300	48.8
Switching Valve (P/N 151438)	100				
Fusion® Size	Length	Width	Height	I (Inlet)	E (Outlet)
ZFL2800	14' 8"	7' 0"	7' 10"	6' 1"	5' 7"
ZFL4000	15' 6"	8' 0"	8' 4"	6' 7"	6' 1"



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