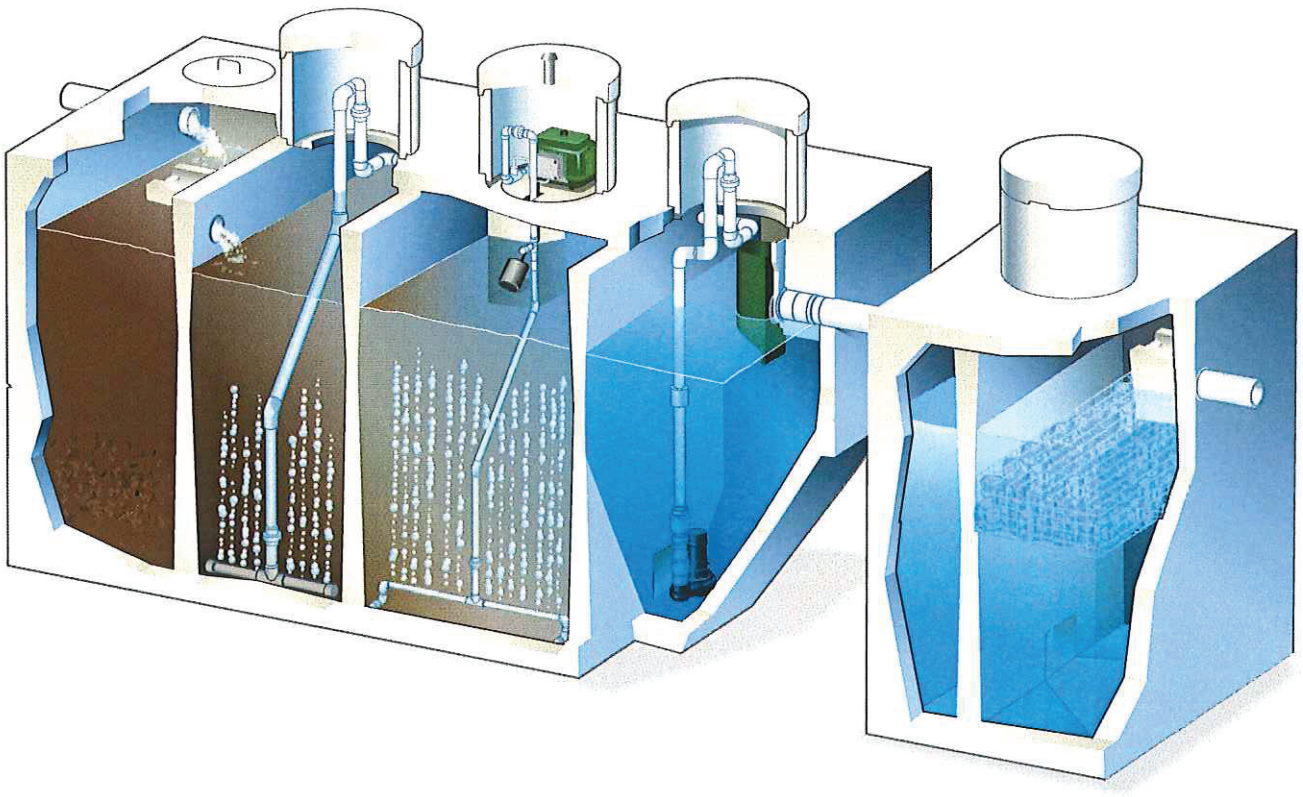
20130385

norweco®

HYDRO-KINETIC®

WASTEWATER TREATMENT SYSTEM
MODEL 600 FEU



INSTALLATION AND OPERATION MANUAL

Hydro-Kinetic® Installation and Operation Instructions

Before You Start

Installation procedures, equipment and personnel should always comply with applicable safety regulations as well as all federal, state and local codes. The Hydro-Kinetic system must be installed according to these instructions to insure safe, reliable and efficient operation. The system must be installed by an authorized representative of Norweco. Carefully unpack and inspect the Hydro-Kinetic system components. Make sure you have received all components in good condition. Read all instructions before beginning installation.

The Hydro-Kinetic system components include:

1. Service Pro Model 801P Control Center
2. Model A100 Air Pump (with power wire junction box)
3. Alarm Float (with alarm wire junction box)
4. Flow Equalization Device
5. Primary Recirculation Assembly
6. Model SD103 Recirculation Pump
7. Intermediate Recirculation Assembly
8. Diffuser
9. Mixing Bar
10. Mixing Bar Drop Pipe Assembly
11. Diffuser Drop Pipe Assembly
12. Primary Air Assembly

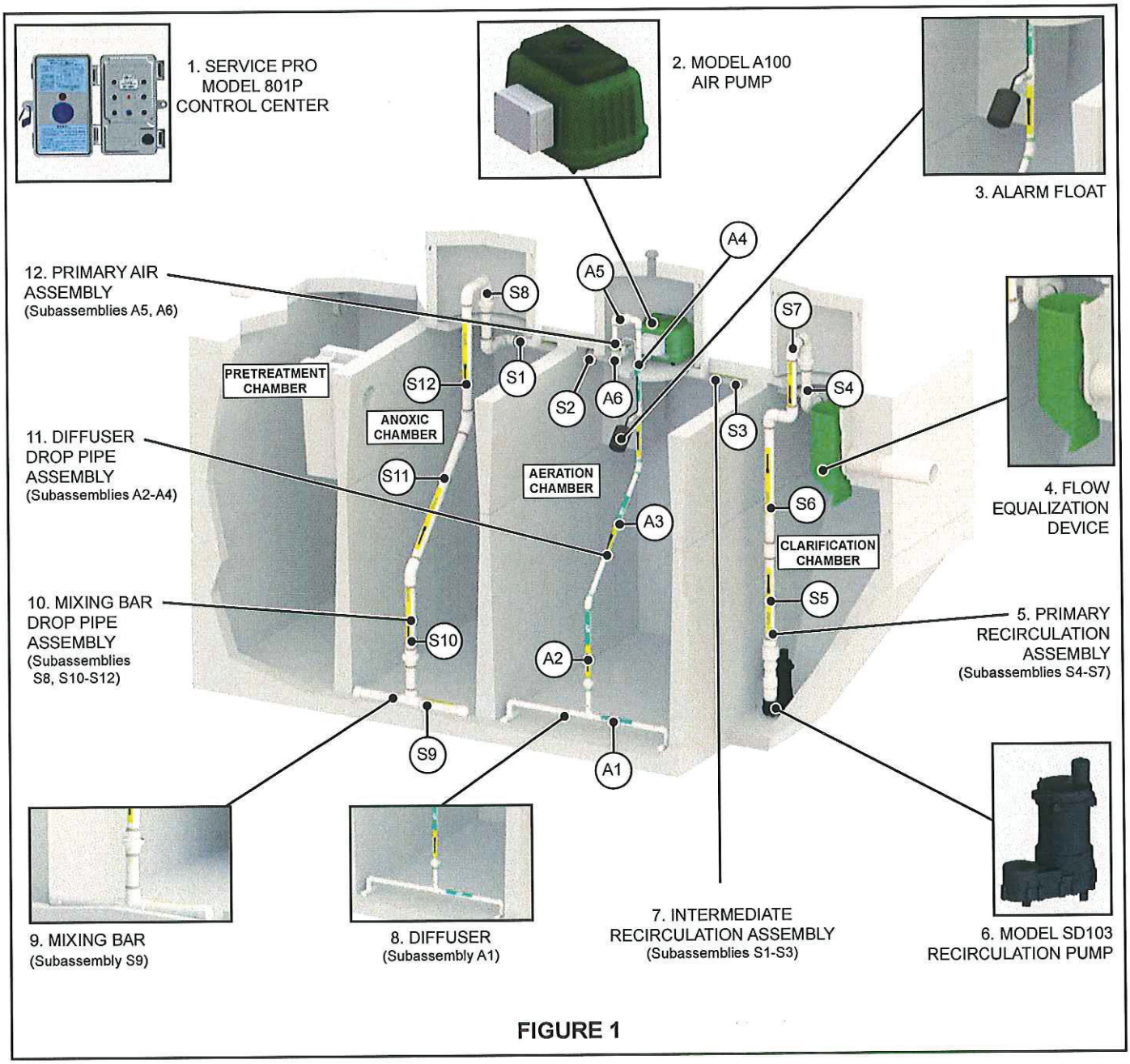


FIGURE 1

Pre-Delivery Tank Preparation

The Hydro-Kinetic tank equipment package contains some components that are cast-in the tank during the manufacturing process, and other components that are installed after the casting process is complete. In the standard two-piece tank, the only component that needs to be installed prior to delivery is the intermediate recirculation assembly. In a one-piece tank, the distributor will need to provide a pretreatment outlet tee, an aeration chamber inlet elbow and a Hydro-Kinetic filter outlet tee. Norweco recommends assembling all of these components, as well as the Kinetic Bio-Film reactors, before the tank is delivered to the installation site. Install components according to the following steps:

1. For a one-piece tank, solvent weld the 4" Schedule 40 PVC pretreatment outlet tee to the coupling that was cast-in the outlet of the pretreatment chamber (distributor to provide). Solvent weld the 4" Schedule 40 PVC aeration chamber transfer elbow into the coupling cast-in the inlet of the aeration chamber (distributor to provide).

2. For all systems, begin in the anoxic chamber and solvent weld subassembly S1 into the coupling that was cast-in the wall between the anoxic and aeration chambers. The elbow should be oriented as shown in Figure 2, with the short stub of pipe parallel to the floor and ceiling of the tank.

3. Solvent weld subassembly S2 into the aeration chamber side of the same cast-in coupling. See Figure 2.

4. Starting in the aeration chamber, pass subassembly S3 through the wall into the clarification chamber. Solvent weld the coupling on subassembly S2 to subassembly S3. See Figure 2.

5. Place both Kinetic Bio-Film reactors into the Hydro-Kinetic filter. They will rest on the support rib cast into the outlet chamber. The Kinetic Bio-Film reactors should be installed with the media service hatch oriented toward the middle of the tank and facing up. See Figure 3.

6. Using the universal tool, rotate the two round lugs clockwise on each Kinetic Bio-Film reactor so that they lock into the recesses cast into the tank.

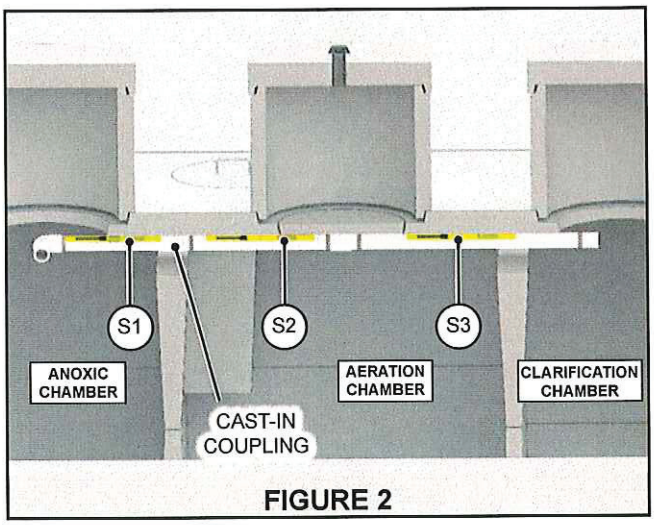


FIGURE 2

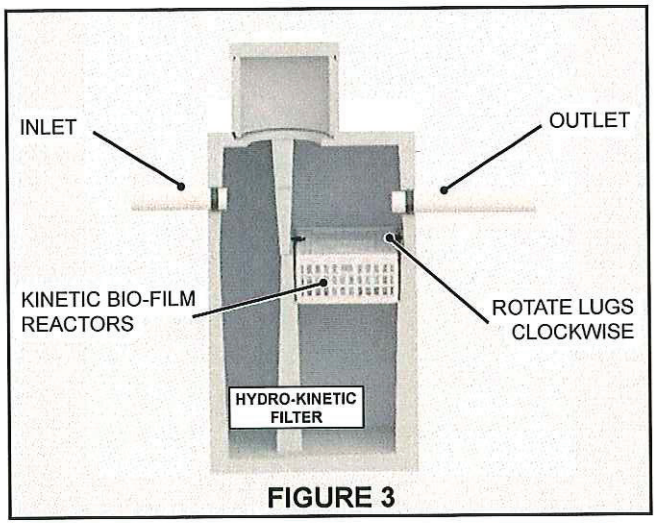


FIGURE 3

Tank Delivery and Setting

1. When installing a Hydro-Kinetic system, first check the length, width and depth of the excavation. If installing a Model 600 FEU system, insure the excavation is long enough to allow at least 2' between the treatment tank and the Hydro-Kinetic filter for installation of the interconnect plumbing and backfill between the tanks. Cut a 4" Schedule 40 PVC pipe (distributor to provide) 6" longer than the distance between the tanks for the interconnect plumbing. Insert the interconnect pipe into the inlet of the Hydro-Kinetic filter prior to tank placement. This allows the interconnect pipe to be backed straight out, and solvent welded into the cast-in outlet coupling of the clarification chamber when the tank is set. The excavation should have sufficient overdig to allow for a minimum of 6" clearance around the entire perimeter of the system. Additional overdig will be required on deep installations or where unstable soil conditions exist. Safe working conditions must be established and maintained during the entire installation procedure.

2. Prepare the excavation to the appropriate depth based on the elevation of the building sewer line. Allow ⅛" of fall per foot from the building to the system. Fall through the Model 600 system is 4" from inlet invert to outlet invert. In the Model 600 FEU that includes the Hydro-Kinetic filter, fall through the system is 5" from inlet invert to outlet invert. Therefore, the outlet line from the system must be installed either 4" or 5" lower than the inlet sewer line. The bottom of the excavation must be level and smooth. A 4" layer of gravel, sand or fine crushed stone should be installed and leveled to within ¼" from side to side and end to end.

3. Using extreme caution, place the treatment tank into the excavation. If installing a Model 600 FEU system, place the Hydro-Kinetic filter in the excavation allowing at least 2' between the treatment tank and the Hydro-Kinetic filter. Insure tanks are installed square and level.

4. Connect the building sewer line to the pretreatment chamber inlet. The inlet line must be laid continuously and unspliced from the tank to undisturbed earth beyond the limits of the tank excavation.

5. If installing a Model 600, connect the discharge sewer line to the tank outlet coupling continuously and unspliced from the tank to undisturbed earth beyond the limits of the tank excavation. Solvent weld the discharge sewer line to the tank outlet coupling.

6. If installing a Model 600 FEU, back the interconnect pipe out of the Hydro-Kinetic filter and solvent weld the pipe to the outlet coupling of the clarification chamber. Then, connect the discharge sewer line to the Hydro-Kinetic filter outlet continuously and unspliced from the tank to undisturbed earth beyond the limits of the tank excavation. If using a one-piece tank, insert discharge sewer line through tank outlet seal, leaving 4" to 6" protruding inside the tank. Solvent weld the 4" Schedule 40 PVC outlet tee (distributor to provide) to the discharge sewer line.

7. Install risers as required to bring the access covers to grade.

Plant Wiring and Control Center Installation

1. Electrical work must be performed in accordance with the latest edition of the National Electrical Code as well as applicable local codes.

2. All electrical service cable used with the Hydro-Kinetic system must be UL and CSA approved, type UF, #14/2 AWG minimum and must have a full-size center ground. Larger cable is required if the length of the underground service is greater than 80 feet. Consult your electrician for details.

3. An approved cable must be installed from the air pump to the junction box provided for connection to the control center. If installing the air pump in a location other than the aeration chamber riser, insure the air line is no more than 75' in length and the air pump is protected from the elements in a clean, dry, well-ventilated area and proceed to step 6.

4. Inspect the power cable entrance in the side of the aeration riser. Remove any sharp edges or flash. Insert the free end of the power cable through a pre-formed ½" conduit ell (2' by 1'), then into the power cable entrance of the aeration riser. Guide the power cable into the riser. Pull enough cable through the riser to reach 36" above the riser top. Coil and secure the cable in the aeration riser so that it will not hang down into the tank.

5. Lay the conduit ell with cable directly across the top and down the tank side. Do not allow the power cable to be laid across the end of the tank or any removable access cover. Seal the connection between the conduit and the aeration riser with mortar or approved sealant.

6. A second underground cable must be installed unspliced from the Service Pro control center into the clarification chamber riser to supply power to the recirculation pump.

7. Inspect the power cable entrance in the side of the concrete clarification riser. Remove any sharp edges or flash. Insert the free end of the power cable through a pre-formed ½" conduit ell (2' by 1'), then into the power cable entrance of the clarification riser. Guide the power cable into the riser. Pull enough cable through the riser to reach 36" above the riser top. Coil and secure the cable in the clarification riser so that it will not hang down into the tank.

8. Lay the conduit ell with cable directly across the top and down the tank side. Do not allow the power cable to be laid across the end of the tank or any removable access cover. Seal the connection between the conduit and the clarification riser with mortar or approved sealant.

9. Two alarm leads must be installed from the air pump pressure switch to the Service Pro control center. The alarm leads should be #16 AWG minimum and installed in conduit where contact with concrete may occur. IMPORTANT: Alarm leads and power leads must always be installed in separate conduits.

10. Two alarm leads must be installed from the high water float switch to the Service Pro control center. The alarm leads should be #16 AWG minimum and installed in conduit where contact with concrete may occur. IMPORTANT: Alarm leads and power leads must always be installed in separate conduits. If the air pump will be installed in the aeration riser, the high water and air pump alarm leads should be installed in the same conduit. Properly seal the conduit opening in the riser with mortar or approved sealant.

11. Check the excavation and sewer line trenches to be sure they are free of debris, rocks, and any sharp or abrasive objects that could damage electrical cables or alarm leads during backfill or settling.

12. Uncoil the electrical service cables and alarm leads into the excavation and influent sewer line trench. Leave sufficient slack in the cables so they will not be stressed or pulled tight during backfill or settling.

13. Always encase the electrical cables and alarm leads in conduit any time they are above finished grade. Route the conduits and cables as directly as possible to the control center mounting location.

Required Prior to Backfilling

1. For installations where the air pump will not be located in the aeration riser, install a ¾" Schedule 40 PVC air line from the air pump to the system. The air line should be buried in a trench at a recommended depth of at least 12 inches. Protect the air line in a casing pipe if heavy loading is anticipated. The air line must be run into the aeration riser and the opening in the riser sealed with mortar or approved sealant.

2. On the Kinetic Bio-Film reactors, use the universal tool to insure each of the round, black locking lugs is rotated to the furthest extension point possible. Only rotate the lugs clockwise.

Backfilling

1. The system should be backfilled immediately after sewer lines and underground electrical cables are installed. Fine, loose earth should be used to backfill the tank excavation and sewer line trenches. Be sure it is completely free of rocks, large clumps of earth and construction debris. Use fine granular material when backfilling around electrical cables and conduits. The underground electrical cables should have at least 2' of earth cover. If the proposed finished grade will not permit this coverage, the cables should be installed in approved conduit from the tank to the building foundation. Backfill evenly around the entire perimeter of the tank rather than all at once on each side. Take care to completely fill in the cavity beneath the slanted clarifier end wall.

2. Final grading should be 6" below the top of each access cover and should slope away from the tank so surface runoff will drain away from the treatment system. Use extreme care in backfilling. Do not allow dirt or mud to enter any part of the treatment system or sewer lines. If dirt or mud enters any portion of the system, it must be removed to insure proper system operation. Removing the dirt or mud may require repeated flushing and tank pumping.

3. Immediately after backfilling, fill each chamber of the treatment system with water to the outlet invert. The water must be free of leaves, mud, grit or any other materials that might interfere with system operation.

Air Pump and Piping Installation

1. Remove the contents from red mesh bag with components labeled "AIR". Attach diffuser bar A1 to subassembly A2 at union as shown in Figure 4. Securely tighten union by hand.

2. Solvent weld subassembly A2 to subassembly A3 as shown in Figure 4. Insure red arrows are aligned.

3. Solvent weld subassembly A3 to subassembly A4 as shown in Figure 4. Insure blue arrows are aligned.

4. Install this entire assembly into aeration chamber by bending the flexible tubing. Lower assembly into the tank until the diffuser bar contacts both the floor and side wall of the tank as shown in Figure 4.

5. Remove air pump and components from carton. If the air pump will be installed in the aeration chamber riser, solvent weld subassembly A5 to subassembly A6 as shown in Figure 5. Insure yellow arrows are aligned. Install concrete support base for air pump.

6. Install the air pump in the aeration chamber riser on the support base (or in a clean, dry, well-ventilated area protected from the elements no more than 75' from the tank). Attach subassembly A4 to subassembly A5 at union as shown in Figure 4. Securely tighten union by hand.

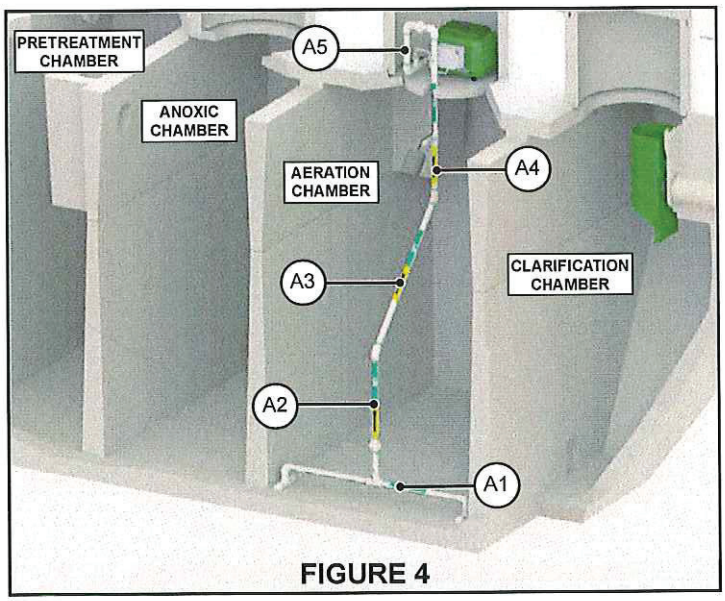


FIGURE 4

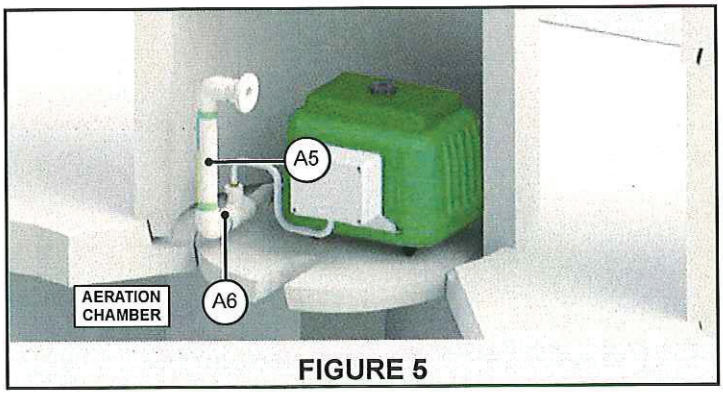


FIGURE 5

12. Uncoil the electrical service cables and alarm leads into the excavation and influent sewer line trench. Leave sufficient slack in the cables so they will not be stressed or pulled tight during backfill or settling.

13. Always encase the electrical cables and alarm leads in conduit any time they are above finished grade. Route the conduits and cables as directly as possible to the control center mounting location.

Required Prior to Backfilling

1. For installations where the air pump will not be located in the aeration riser, install a ¾" Schedule 40 PVC air line from the air pump to the system. The air line should be buried in a trench at a recommended depth of at least 12 inches. Protect the air line in a casing pipe if heavy loading is anticipated. The air line must be run into the aeration riser and the opening in the riser sealed with mortar or approved sealant.

2. On the Kinetic Bio-Film reactors, use the universal tool to insure each of the round, black locking lugs is rotated to the furthest extension point possible. Only rotate the lugs clockwise.

Backfilling

1. The system should be backfilled immediately after sewer lines and underground electrical cables are installed. Fine, loose earth should be used to backfill the tank excavation and sewer line trenches. Be sure it is completely free of rocks, large clumps of earth and construction debris. Use fine granular material when backfilling around electrical cables and conduits. The underground electrical cables should have at least 2' of earth cover. If the proposed finished grade will not permit this coverage, the cables should be installed in approved conduit from the tank to the building foundation. Backfill evenly around the entire perimeter of the tank rather than all at once on each side. Take care to completely fill in the cavity beneath the slanted clarifier end wall.

2. Final grading should be 6" below the top of each access cover and should slope away from the tank so surface runoff will drain away from the treatment system. Use extreme care in backfilling. Do not allow dirt or mud to enter any part of the treatment system or sewer lines. If dirt or mud enters any portion of the system, it must be removed to insure proper system operation. Removing the dirt or mud may require repeated flushing and tank pumping.

3. Immediately after backfilling, fill each chamber of the treatment system with water to the outlet invert. The water must be free of leaves, mud, grit or any other materials that might interfere with system operation.

Air Pump and Piping Installation

1. Remove the contents from red mesh bag with components labeled "AIR". Attach diffuser bar A1 to subassembly A2 at union as shown in Figure 4. Securely tighten union by hand.

2. Solvent weld subassembly A2 to subassembly A3 as shown in Figure 4. Insure red arrows are aligned.

3. Solvent weld subassembly A3 to subassembly A4 as shown in Figure 4. Insure blue arrows are aligned.

4. Install this entire assembly into aeration chamber by bending the flexible tubing. Lower assembly into the tank until the diffuser bar contacts both the floor and side wall of the tank as shown in Figure 4.

5. Remove air pump and components from carton. If the air pump will be installed in the aeration chamber riser, solvent weld subassembly A5 to subassembly A6 as shown in Figure 5. Insure yellow arrows are aligned. Install concrete support base for air pump.

6. Install the air pump in the aeration chamber riser on the support base (or in a clean, dry, well-ventilated area protected from the elements no more than 75' from the tank). Attach subassembly A4 to subassembly A5 at union as shown in Figure 4. Securely tighten union by hand.

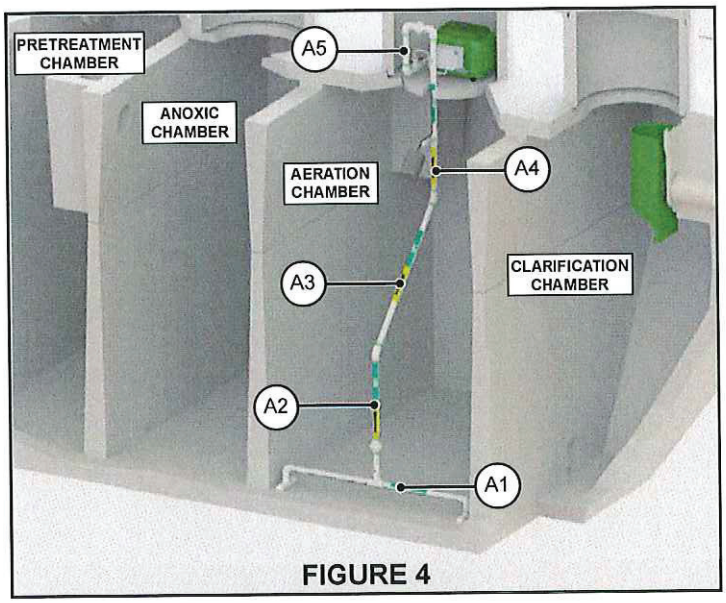


FIGURE 4

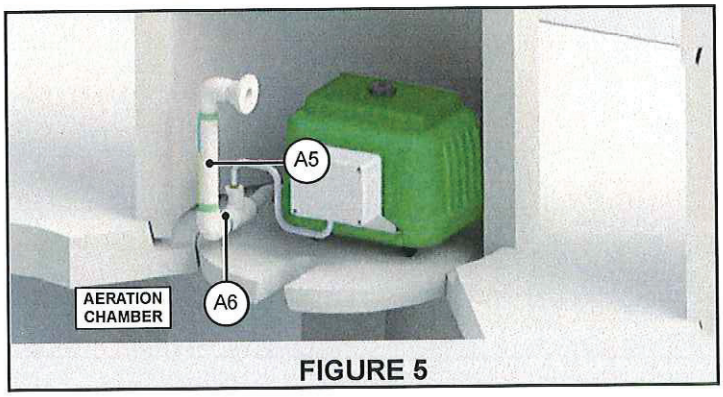


FIGURE 5

12. Wire the recirculation pump female electrical connector. Unscrew the three captive stainless steel screws from the face of the female connector. They will stay in the body of the receptacle. Lift out the rigid internal receptacle body. Unscrew the compression nut on the strain relief connector. Insert the electrical service cable through the compression nut, compression ring and neoprene grommet. Strip the outer insulation back 1¼" on the underground electrical service cable and expose the three individual leads. Use extreme care to insure the insulation jackets on the individual black and white leads are not scarred or damaged while stripping the outer jacket.

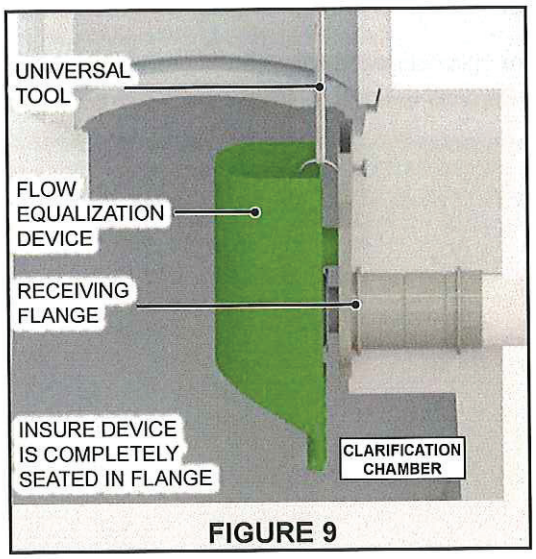


FIGURE 9

13. Strip off the insulation jackets 7/16" from the ends of the individual black and white leads. Insert the black lead into the hole adjacent to the brass-colored screw and tighten the screw securely. Insert the white lead into the hole adjacent to the silver-colored screw and tighten the screw securely. Insert the bare copper ground lead into the hole that is adjacent to the green-colored screw and tighten the screw securely. Align the insert key on the receptacle body with the keyway molded into the rubber sleeve. Press the receptacle body into the sleeve and tighten the three stainless steel screws on the face of the connector. Press the neoprene grommet into the electrical connector and tighten the compression nut.

14. Plug the male connector on the recirculation pump power cord into the female connector.

15. Install the flow equalization device by sliding it into the tank receiving flange in the clarification chamber as shown in Figure 9. Use the universal tool to insure the device is completely seated in the flange.

Completing the Installation

1. The control center should be wired for operation when the tank and underground electrical cables are installed. The control center should be located so that the red warning light can be seen and the audible alarm heard. The mounting location should minimize exposure to direct sunlight, freezing rain or conditions that might prevent routine inspection or access. The control center should always be mounted out of the reach of children.

2. Remove the cover from the alarm wire junction box connected to the float switch. Solvent weld the junction box to the conduit containing the alarm leads, located in the aeration chamber riser.

3. Reference Figure 10 for all wiring instructions. The black and white alarm wires contained in the junction box are provided to connect the float switch to the control center. Connect the black wire in the junction box to either alarm lead from the panel, and secure with a wire nut connector. Connect the white wire in the junction box to the remaining alarm lead from the panel, and secure with a wire nut connector.

4. If the air pump is installed in the aeration chamber riser, solvent weld the conduit connection for the pressure switch alarm cable to the junction box. Connect the black wire in the pressure switch cable to either alarm lead from the panel, and secure with a wire nut connector. Connect the white wire in the pressure switch cable to the remaining alarm lead from the panel, and secure with a wire nut connector.

5. Reinstall and secure the cover on the alarm wire junction box. Plug any unused junction box openings.

6. Proceed to the control center. Detach the cover from the control center enclosure and remove the insert from the mounting posts. Set the control center insert aside. Remove the knockouts in the bottom of the enclosure and install a sealed conduit connector (distributor to provide) in each opening. Exposed wiring to or from the control center should always be encased in conduit. Mount the control center securely using masonry nails, wood screws or common nails as appropriate.

7. Use a dedicated 115 VAC, single-phase circuit at the main electrical service panel. A 15 amp circuit breaker is recommended (10 amp minimum). **CAUTION: MAKE SURE THIS CIRCUIT IS DE-ENERGIZED. CHECK IT WITH AN ELECTRICIAN'S TEST LIGHT BEFORE PROCEEDING. REMEMBER THAT OTHER CIRCUITS IN THE SERVICE PANEL MAY REMAIN ENERGIZED AS YOU ARE WORKING. USE ONLY TOOLS WITH INSULATED HANDLES, STAND IN A DRY LOCATION AND WORK WITH EXTREME CARE.**

8. Open the black electrical insulator on the back of the control center insert for access to power and alarm wiring connections.

9. Install a #14/2 AWG minimum cable with full-size center ground from the control center to the power wire junction box provided for connection to the control center.

10. Wire from the dedicated circuit breaker in the main service panel to the power wire junction box. Use at least #14 AWG black copper wire. Connect the black wire from the main service panel to the black wire in the air pump power cable and the black wire to the control center. Secure with a wire nut connector.

11. Wire from the neutral in the main service panel to the junction box. Use at least #14 AWG white copper wire. Connect the white wire from the main service panel to the white wire from the air pump power cable and the white wire to the control center. Secure with a wire nut connector.

12. Connect the ground wire from the main electrical service panel to the non-insulated ground lead from the air pump and the ground wire to the control center. Secure with a wire nut connector. IMPORTANT: Never allow the white neutral leads and the ground leads to be spliced together.

13. Install the cover on the junction box and proceed to the control center.

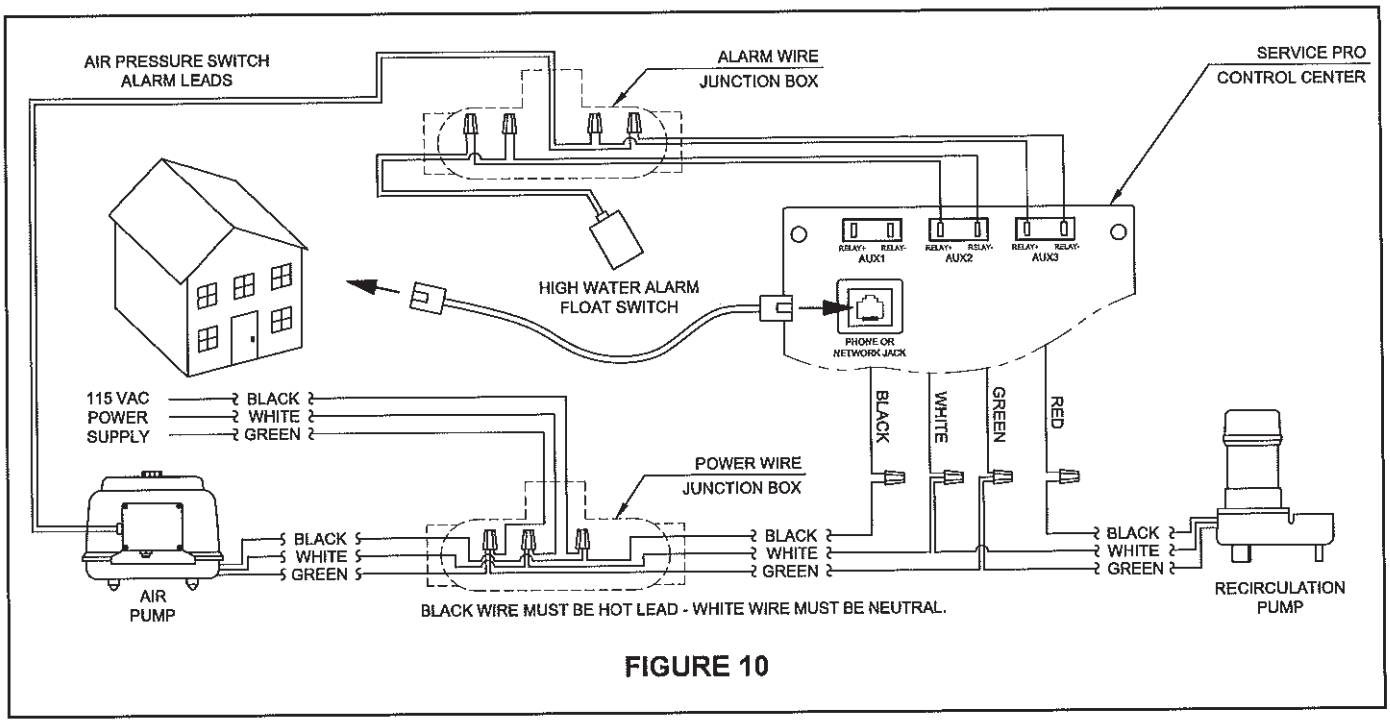


FIGURE 10

14. Connect the black wire from the junction box to the black wire on the control center. Secure with a wire nut connector.

15. Connect the black lead of the underground electrical cable from the recirculation pump to the red wire on the control center. Secure with a wire nut connector.

16. Connect the white wire from the junction box to the white wire from the recirculation pump and white wire on the control center. Secure with a wire nut connector.

17. Connect the ground wire from the junction box to the non-insulated ground lead from the recirculation pump and the green wire on the control center. Secure with a wire nut connector. IMPORTANT: Never allow the white neutral leads and the ground leads to be spliced together.

18. An auxiliary alarm input (AUX1) is available for connection of optional equipment such as an ultraviolet disinfection system, chemical detection system or effluent pump system. Refer to the Alarm Input section in the Service Pro Model 801P Installation and Operation Instructions for details regarding the connection of auxiliary equipment.

19. Connect the alarm leads from the high water float switch to the AUX2 RELAY terminals on the control center.

20. Connect the alarm leads from the air pump pressure switch to the AUX3 RELAY terminals on the control center.

21. If the remote monitoring features of the control center will be utilized, run the telephone or network cable to the bottom of the control center enclosure. IMPORTANT: Never install the communication cable in a conduit with power lines.

22. Place the communication cable in the electrical grommet provided. The grommet snaps into the control center enclosure. Crimp the appropriate phone or network connector on the end of the communication cable. Plug the connector into the jack on the control center insert. Connect the other end to the telephone or network system.

23. Carefully form all wiring neatly into the lower part of the control center. Do not allow the wires to make contact with other electrical components in the control center. The conduit openings in the enclosure must now be sealed using expanding foam sealant (available from Norweco).

24. Close the black electrical insulator and snap the control center insert into position. Reinstall and close the control center cover. Secure it with the Norweco tamper evident seal.

25. Clearly label the dedicated circuit used for the Hydro-Kinetic system on the door of the main service panel. Replace the service panel deadfront and enclosure cover.

Final Check and System Startup

1. Place the dedicated circuit breaker for the Hydro-Kinetic system in the main service panel in the "on" position.

2. To commission the telemetry system, first insure the phone/network cable is properly installed. Place the control center power switch in the "off" position. While holding in the reset button, place the power switch in the "on" position. Continue to hold the reset button for 5 seconds. Release the reset button and allow the telemetry system up to 60 seconds to call out and complete the commissioning process. The phone/network light will illuminate during the call out process. If commissioning is successful, the alarm light will flash 5 short flashes and stop as verification. If commissioning is unsuccessful, refer to the Service Pro Model 801P Installation and Operation Instructions.

3. If no telemetry system is installed, press and hold the RESET button on the control center for 5 seconds. The audible alarm should sound and the alarm light should illuminate.

4. The system is operational once all installation and startup steps have been completed to this point. It will take 2 to 6 weeks for the system to reach biological maturity, depending upon system loading.

Routine Maintenance

The following should be performed every 12 months (or as required by your local governing regulations) by a qualified service technician:

1. If applicable, inspect the effluent discharge point to make sure there are no restrictions to the effluent flow. If restrictions are present, perform service as needed.

2. If effluent sampling is required, it is recommended that a proper sampling port be installed downstream of the Hydro-Kinetic system.

3. Inspect the vent cap, perimeter vent and air pump for objects, plants, insects or debris that could impede the air intake. Remove these items if present.

4. Check the air pump for proper operation. Check the air filter and clean or replace as required. Check the aeration chamber for odor. A musty odor indicates the presence of aerobic conditions essential for proper treatment. A septic odor indicates inadequate aeration, suggesting that the delivery of air into the aeration chamber has been restricted.

5. Check the aeration chamber and insure the diffuser assembly is creating a rolling motion of the chamber contents. If a rolling motion is not visible, verify air pump operation. Remove and clean diffuser assembly if necessary.

6. Check the anoxic chamber and insure the mixing bar is operational. The recirculation pump operates on a pre-programmed on/off cycle, so press the reset button if necessary to verify operation.

7. Inspect the flow equalization device. Rinse the design flow, sustained flow and peak flow ports with a garden hose and insure they are free of debris. Clean the flow ports with a brush if necessary.

8. Use the hopper scraping tool to gently scrape all surfaces of the clarification chamber hopper.

9. On Model 600 FEU systems, the settled solids should be pumped from the Hydro-Kinetic filter to the pretreatment chamber. With the flow equalization device securely in place, install the outlet blocking tool into the clarifier outlet coupling prior to pumping. Place the intake of the service pump at the bottom of the influent chamber. Pump the contents from the bottom of the Hydro-Kinetic filter until the accumulated solids are withdrawn and the water level is below the bottom of the Kinetic Bio-Film reactors. Approximately 150 gallons will be removed during service. Rinse the media with a hose during tank pumping. After pumping, remove the outlet blocking tool and allow the Hydro-Kinetic filter to refill to normal operating level. Never leave the Hydro-Kinetic filter empty after pumping.

10. Inspect the system to determine if complete pumping may be required. See "System Pumping" section of this document.

11. Upon completion of the inspection, insure that all access covers are properly reinstalled. Any missing or damaged access covers should be immediately replaced. **CAUTION: MAKE SURE ALL ACCESS COVERS ARE REINSTALLED AND IN GOOD CONDITION.**

12. Approved replacement parts are available from the authorized system dealer listed on the control center cover.

System Pumping

1. The Hydro-Kinetic system is a biological treatment device and will not require pumping as often as a septic tank. Pumping of the system will likely be required at 3 to 5 year intervals depending upon system usage, loading, and treatment requirements. If pumping is required more frequently than every 2 years, there is an operational problem with the system and it should be evaluated in greater detail.

2. If the service technician suspects that the system may require pumping, a settleable solids test should be performed on a sample from the aeration chamber. The air pump must be removed from the aeration chamber riser to perform this test.

3. Immediately after removing air pump, dip a graduated cone or other clear container into the aeration chamber to a depth of 2½ feet. Set the container on a level surface and then allow the solids to settle for 30 minutes while you complete the service inspection. Do not disturb the container during the test.

4. After 30 minutes, read the level of solids and compare it with the total liquid volume in the container. Calculate the percentage of settled solids volume (i.e. ½ full of solids equals 50%). If the settled material contains large pockets of clear liquid, estimate the volume of these pockets and reduce the settled solids reading by that amount. A settled solids reading of up to 80% indicates no adjustments are necessary. A settled solids level greater than 80% in the aeration chamber indicates excessive solids and that the system should be pumped.

5. If it is determined that pumping is required, contact a tank pumping service licensed by the local regulatory agency. The septage or biosolids from the system must be removed and disposed of in a manner consistent with federal, state and local regulations. Advise the pumping service that they will be pumping approximately 1,250 gallons for the Model 600 or approximately 1,500 gallons for the Model 600 FEU.

6. Turn off the air pump and recirculation pump before tank pumping.

7. Remove the access cover from the aeration and clarification chambers. Unplug the air pump and disassemble the union located on the primary air connection. Remove the air pump, primary air connection and support base from the aeration riser. Use the universal tool to bend flexible diffuser tubing and remove the diffuser drop pipe assembly. Connect the suction hose to the pump being used to evacuate the chamber.

8. Activate the pump and remove the aeration chamber contents. Pump the aeration chamber from the top down, to remove biologically inactive material. Feed the hose down as the liquid is being evacuated from the aeration chamber. It is not necessary to wash down the sidewalls or tank bottom. Pump only 75% of the volume out of the aeration chamber to facilitate plant re-start. Replace the diffuser drop pipe assembly. Reinstall the support base, primary air connection and air pump. Reassemble the union in the primary air connection and plug in the air pump. Replace the access cover.

9. If a Hydro-Kinetic filter is installed, it should be pumped after the aeration chamber. Remove the Hydro-Kinetic filter access cover. Lower the hose into the influent chamber until it contacts the bottom of the tank. Withdraw the hose approximately 2 inches. Completely pump 100% of the contents from the chamber and rinse the media with a hose during tank pumping. Replace the Hydro-Kinetic filter access cover.

10. Next, pump the anoxic chamber. Remove the anoxic chamber access cover. Use the universal tool to bend flexible mixing bar tubing and remove the mixing bar drop pipe to allow access for the suction hose. Lower the hose until it contacts the bottom of the tank. Withdraw the hose approximately 2 inches. Completely pump 100% of the contents from the chamber. Reinstall the mixing bar drop pipe assembly and replace the access cover.

11. The final chamber to pump is the pretreatment chamber. Remove the pretreatment chamber access cover. Break up the scum mat to facilitate pumping. Lower the hose until it contacts the bottom of the tank. Withdraw the hose approximately 2 inches. Activate the pump and remove 100% of the chamber contents. It is not necessary to wash down the sidewalls or tank bottom. If solids are so concentrated that the suction hose cannot withdraw them, tank contents may be backflushed to break up the solid matter. Replace the pretreatment chamber access cover.

12. After pumping, refill all chambers to capacity with clean water. Return all plumbing and equipment to its proper installed location. Replace any access covers that were removed. Turn on power to the air pump and the recirculation pump. Check for proper operation of all equipment.

Troubleshooting

This troubleshooting section provides efficient solutions to the most common problems encountered in the operation of the Hydro-Kinetic system.

Control Center Alarming

1. **Liquid in tank at level of high water alarm float:** system is flooded due to an obstruction in the flow equalization device, outlet, effluent line or disposal field. Determine cause and remove obstruction, or make repairs as required. Be sure to check effluent disposal system for proper operation.

2. **No rolling action in aeration chamber:**
   - Air pump is pumping air but there is an obstruction in the line between the air pump and diffuser: disassemble air line and remove obstruction.
   - Diffuser is plugged: remove and clean diffuser.
   - Air pump is not running: check power supply to air pump.
   - Air is escaping through a leak in the plumbing assembly between air pump and diffuser: identify and repair air leak. If necessary, remove the diffuser, diffuser drop pipe assembly, and primary air assembly from the aeration chamber and use a soapy water solution to thoroughly coat the plumbing and check for bubbles. Repair any leaking air pipe or fitting and retest.

3. **Air pump is running but does not pump air:** clean or replace air filter. Internal components are worn and the air pump is failing. Rebuild or replace the air pump. Contact the authorized Norweco representative for replacement components.

4. **No mixing action in anoxic chamber:**
   - Recirculation pump is operating but there is an obstruction in the line between the recirculation pump and mixing bar: disassemble mixing bar plumbing and remove obstruction.
   - Mixing bar is plugged: remove and clean mixing bar.
   - Check valve is stuck in closed position: repair or replace check valve.

Septic Odor from System

1. **No power to air pump:** check air pump for proper operation. Insure the breaker is in the "on" position, the air pump is plugged in and power is present (check with test light from Tool Kaddy).

2. **Insufficient air delivery to aeration chamber:** see "Control Center Alarming".

3. **Incomplete treatment due to hydraulic overloading:** see "Hydraulic Overloading of System".

4. **Water softener backwash discharging into system:** notify owner to remove backwash line from system.

5. **Excessive solids in aeration chamber:** evaluate chamber and pump if necessary.

6. **Excessive solids in anoxic chamber:** evaluate chamber and pump if necessary.

Hydraulic Overloading of System

1. **Ground water entering tank through defective inlet or outlet seal:** excavate and repair seal.

2. **Ground water entering system through crack in tank:** excavate and repair crack with hydraulic cement.

3. **Ground water entering system through joint between riser and tank:** excavate and reseal joint with non-shrink grout or mastic.

4. **Roofing down spouts, footer drains or floor drains tied into system:** notify owner to relocate connection downstream of system.

5. **Check valve is stuck in closed position:** repair or replace check valve.

©MMXIII NORWECO, INC. NORWALK, OHIO U.S.A.