

HYDRO-ACTION[®] **INDUSTRIES**

**Class I NSF/ANSI Standard 40
Wastewater Treatment Plant**

AP Series Operation & Maintenance Manual

On-Site Wastewater Products

Dealer Inquiries, Product & Technical Questions:

2522 Pidco Drive / P.O. Box 640

Plymouth, IN. 46563

Phone: 800.462.6072

Fax: 574.936.5811

www.hydro-action.com

Table of Contents

Introduction

Section 1.0 Plant Routine Inspection and Service Instructions

Section 2.0 Operating Instructions

Section 3.0 Diffuser Stone Replacement

Section 4.0 Plant Troubleshooting Guide

Section 5.0 Hydro-Action[®] Industries AP-Series Plant Specifications

Section 6.0 Process Description

Section 7.0 Safety

Appendix 1: Drawings

Appendix 2: Electrical Controls Schematics

Appendix 3: Operations & Maintenance Technical Manual for Air Pumps

Appendix 4: OPS Explanation Guide

Appendix 5: Misc. Forms & Documents

AP Series Wastewater Treatment Plants

INTRODUCTION

The AP Series Aerobic Treatment Units (ATUs) are now available through **Hydro-Action® Industries**. Please read this introduction before reviewing this manual.

Earth's environment has purified water through natural processes since the beginning of time. Only recently, beginning in the Twentieth Century, has man developed a system to accelerate the processes that Mother Nature uses. **Hydro-Action® Industries'** AP Series ATUs is just such a system.

In 1916, the City of Houston, Texas, was the first to use the activated sludge wastewater treatment process as an accepted, full-scale system process to purify domestic wastewater. Since that time, the United States and many other nations have utilized this process and variations to properly treat sewage. Federal Law 92-500 supports our nation's commitment to provide secondary treatment for all domestic wastewater.

This commitment is presently being extended to on-site sewage treatment facilities. **Hydro-Action® Industries** has been a visible part of this effort since 1989. We have manufactured numerous products to provide individuals with a means of proper, effective, efficient, and affordable on-site wastewater treatment. Our professional commitment to market needs and customer service has enabled us to reach our goal of providing effective products that assure a safe, reusable effluent. We are helping Mother Nature protect our environment and our most valuable natural resource: water.

Our continuing mission is to develop and manufacture individual on-site wastewater treatment facilities that meet society's needs in the field. This manual is a part of that dedication to customer service.

Hydro-Action® Industries' AP Series Aerobic Treatment Units are among the most advanced

on-site products available today. They are state-of-the-art extended aeration, activated sludge wastewater treatment facilities. The improvements in these units make them not only extremely efficient operational units but also the most easily maintainable system in the industry.

By following the instructions in this manual, you will be providing yourself with the best on-site wastewater treatment and service. We invite you to share our pride of the AP Series Treatment Units.

This manual includes information on the AP-500, AP-600, AP-750, AP-1000G & AP-1500G wastewater treatment plants. These units may be installed with either a platform mounted OPS® (operations/control center) or a Remotely Located OPS®. Installation needs vary, so your on-site wastewater system may contain some of the following auxiliary components along with the treatment plant:

- Pretreatment tank
- Pump/holding tank
- Alarm systems
- Equipment for chosen effluent disposal method (drip irrigation, spray irrigation, gravel-filled drain field, pressure dosing, etc.)
- Chlorinator

The certified **Hydro-Action® Industries** dealer who installs your **Hydro-Action® Industries** AP Series wastewater treatment plant is responsible for completing and submitting to us the Installation Warranty Sheet found in this manual under Appendix 4. to activate your **Hydro-Action® Industries** Product Warranty.

We are eager to assist you with any questions or problems. Please contact **Hydro-Action® Industries** at **800.462.6072** to request assistance from our Customer Service or Engineering Departments.

SECTION 1.0:

Plant Routine Inspection and Service Instructions

1.1: Each site should be inspected and serviced by following these simple instructions. As each site may have differences due to selected disposal options, inspect each site facility to determine which options are present then proceed with the following instructions.

1.1.1: Upon arrival at the site, remove the tamper-resistant screws from the **Hydro-Action® Industries** plant access cover and the Platform Mounted OPS® or Remotely Located OPS® enclosure. Then remove the access cover and enclosure. Set the security screws and covers in a protected place for later reassembly.

1.1.2: Collect an activated sludge sample from the aeration compartment. The sample size should be approximately one quart. Collect the sample as soon as possible; you can perform other work while the solids are settling and thereby reduce your inspection time at the site.

Use this sample to run the sludge volume test (15 minutes settleable solids ml/L test). To perform this test a one-liter graduated cylinder or any tall, straight-sided, clear glass container, about one-quart in capacity, will be needed. Divide the container into 10 equal parts using a waterproof marker, thus signifying 0 to 100%.

- a. Immediately after sample is collected, fill graduated container to 100% mark.
- b. Allow sample to stand for 15 minutes.
- c. Measure sludge volume by locating interface between clarified effluent and settled sludge on graduations. Interface should be between the 20% and 60% marks, indicating a well-functioning plant. Values less than 20% or greater than 60% indicate there is a problem. Sludge layer should be chocolate in color and full of very small particles resembling small pieces of sponge. Refer to **Hydro-Action® Industries** Plant Condition Chart, section 4.12.

1.1.3: As turbulence in the aeration compartment caused by the rising fine air bubbles can be seen, observe any significant changes in mixing and aeration characteristics. If insufficient mixing or poor aeration are observed, refer to Section 1.1.4a. Both diffuser assemblies should appear to have equal turbulence. This is an indication of proper diffuser assembly and diffuser operation.

1.1.4: Proper aeration in the AP-Series is maintained by performing the following maintenance operations:

- a. Clean or replace the air pump inlet filter during routine inspections; inspect the aeration compartment surface through the access port to determine the amount of turbulence caused by air coming from each diffuser assembly. Both diffuser assemblies should appear to have equal turbulence. This is an indication of proper diffuser assembly and diffuser operation.
- b. Locate the Schrader air pressure valve on the PVC air pump discharge line (refer to drawing AIR-3). Unscrew the protective cap and connect the quick-chuck pressure gauge. Read and record the pressure. If the pressure equals or exceeds 3.5 psig, it is time to replace the air diffuser stones on the diffuser assemblies (refer to Section 3). After pressure reading is complete, remove the quick-chuck pressure gauge and replace the protective cap on the Schrader air pressure valve.

Note: Whenever replacing the **Hydro-Action® Industries** diffuser stones, replace all stones—not just a few. Replacement parts can be obtained from **Hydro-Action® Industries**.

1.1.5: To replace air diffuser stones, refer to Section 3.0.

1.1.6: Using a clean, clear sample bottle catch an effluent sample from the pump tank or other discharge point. Effluent should have a non-offensive odor and be clear in color. If results

differ from these refer to section 4.0, Plant Troubleshooting Guide.

1.1.7: Check the surface of the clarification compartment for floating solid or scum build-up. If build-up is found, remove it using a small net with very fine mesh and dispose of off-site according to all federal, state, and local regulations. (Material may be returned to system upstream of plant through cleanout.) Using a garden hose, spray a high-pressure stream of water into clarifier, breaking up any remaining floating solids. Clean any overspray from the general area.

1.1.8: Activate liquid level alarm by raising and lowering float in clarifier to test both audible and visible alarms. Disrupt the air pressure by disconnecting the air pressure tubing from the electrical enclosure inside OPS® to test air pressure alarms. If any problem is experienced with alarm functions, make necessary adjustments, corrections, and/or repairs. If optional remote alarm has been installed, be sure that its audible and visual alarms are also working correctly.

1.1.9: The switch indicated “normal/silence” on OPS® models 50-20, -30 & -32 is used to test the alarms, silence an alarm condition, or is left in the normal on position. The normal position of the mode is for normal operation of the plant and silence is a mode that will disrupt both the audible and visual alarm. Move the switch to the left and hold to test the alarms. To test OPS® model 50-11, remove the OPS® enclosure and shut off the air pump by moving the air pump switch to the “off” position. You should hear and see the audible and visual alarms when this mode is selected. These alarms should always be tested before leaving the site to assure they are operational. On OPS® model 50-11 the air pump switch must be returned to the “on” position after testing. On OPS® models 50-20, -30, & -32 the switch will reset itself automatically.

1.1.10: If optional effluent pump is included on system, activate pump float switch to assure effluent pump is operational; set and adjust timers as required (if installed).

1.1.11: Reinstall **Hydro-Action® Industries** access cover being sure to install and tighten tamper-resistant screws to prevent unauthorized plant entry.

1.2: Each site visit requires an investigation of the solids inventory within the wastewater treatment plant and a determination of when excess solids need to be removed from the system. Follow these procedures in evaluating solids inventory:

- a. **Hydro-Action® Industries** plant inspection and service should be performed a minimum of every six (6) months. This inspection and service includes performing a sludge volume test, which is an indicator of plant performance. (Refer to section 4.0, Plant Troubleshooting Guide.)
- b. When sludge volume in plant aeration compartment reaches 60% to 80% it is time to pump the plant and pretreatment tank (if included). This is usually necessary every two (2) to six (6) years.

1.3: Follow these procedures to pump the sludge solids from the treatment tanks. A qualified service technician should oversee the work performed.

1.3.1: Remove the plant access cover.

1.3.2: Refer to installation worksheet to determine which tanks and auxiliary equipment are included on this particular installation (i.e., pretreatment tank, surge tank, pump tank, access covers of different units). Remove pump tank access cover (if included). If necessary, use a shovel to dig down and expose the pretreatment tank access covers and remove them. Remove the clean-out adapter plug from the outlet tee fitting. Refer to drawing PFD-1. The tanks are now ready to be pumped.

1.3.3: The suction hose should be positioned to be very near the bottom of the tanks. Care should be taken not to damage internal components. The plant and other tanks should be washed and cleaned while they are being

pumped. The waste from the tanks should be disposed of in compliance with local, state, and federal laws.

1.3.4: It is important that care is taken when pumping plant and any other tank to assure that hydraulic displacement of tanks (floating of tanks) does not occur. Tank flotation may occur whenever water and solids are removed from the tank when high groundwater conditions exist. Any source of water in the soil around the plant installation could cause the tank to float. Water sources may include rainfall, springs, creeks, bayous, rivers, lakes, and coastal areas. Proper precautions are therefore required to prevent tank flotation due to hydraulic displacement.

These precautions include, but are not limited to, the following:

- Plant location — choose a site that will minimize possible groundwater saturation. Consider seasonal water table and soil conditions in the area of installation. Do not locate the plant in a low spot in the ground where water tends to pool or at the edge of any natural body of water. If such a location cannot be avoided, call **Hydro-Action® Industries** for technical advice.
- Whenever a tank is pumped, do not remove more than one-half of the capacity of the tank. It is recommended that you pump the tank during dry seasons only. However, if tank must be pumped during the wet season, watch for upward movement of the tank while pumping is being done. If upward movement is detected during pump, **immediately stop pumping water out of the tank and refill the tank to stop flotation.** Each site must be evaluated on a case by case basis to determine the best time to remove water from the tank and prevent flotation.

1.3.5: Reinstall the clean-out adapter plug in the outlet tee fitting of the pretreatment tank and reinstall and seal the access covers.

1.3.6: Replace the plant access cover and pump tank access cover (if included), being

sure to reinstall and tighten the **Hydro-Action® Industries** tamper-resistant screws to prevent unauthorized plant entry.

Note: Plant and other tanks should be filled with water before leaving site.

1.4: Normal maintenance on the **Hydro-Action® Industries** AP Series plant will include:

- a. Maintaining aeration system and air diffusers
 - Check every six (6) months
- b. Maintaining air pump
 - Check every six (6) months
- c. Removing scum from clarifier
 - Check every six (6) months
- d. Inspecting and testing plant alarms
 - Check every six (6) months
- e. Pumping excess sludge from plant
 - Usually every two (2) to six (6) years

Note 1: The owner has been informed that replacement parts can be obtained from **Hydro-Action® Industries**.

Note 2: Pumping the plant is usually necessary every two (2) to six (6) years; however, there is no set time because loadings vary from household to household. Access to the plant is accomplished through the access opening, which is at surface grade. When a **Hydro-Action® Industries** plant is being pumped, a qualified service technician should oversee the job. Care should be taken not to damage internal components. The plant should be washed and cleaned while it is being pumped. The waste from the plant must be disposed of in compliance with all federal, state, and local laws.

SECTION 2.0: Operating Instructions

2.1: The **Hydro-Action® Industries** AP Series plant has been designed and built to provide efficient, dependable, and reliable service. However, as with any individual wastewater treatment plant, routine periodic service is required. When proper preventive maintenance is performed, the **Hydro-Action® Industries** plant will operate at designed performance levels to give years of satisfactory treatment of domestic wastewater.

2.2: Local **Hydro-Action® Industries** dealers are required to perform all routine inspections for the first two (2) years from the original date of installation. At the time of inspection the plant will be checked for proper operation. If a problem exists, service will be performed at no charge to the owner, unless the required maintenance is not warranty related. At the end of the two (2) year initial service period, the local dealer will make available a continuing service policy. This extended service is available for a nominal fee.

2.3: The **Hydro-Action® Industries OPS®** (operations/control center) is equipped with an alarm beacon and an audible horn alarm. Also on the OPS® should be the name, address, and telephone number of the local servicing dealer. An optional remote alarm with audible and visual alarms may also be present. Should either alarm come on, the owner is instructed to call the local dealer. After a power failure, if an alarm remains on for more than 30 minutes the owner is instructed to call the local dealer immediately. To silence audible alarm while waiting for service technician to arrive, owner should locate the switch on outside face of the OPS® enclosure labeled “normal/silence” and push it to the “silence” (right) position. Visual alarm beacon will remain illuminated. (Remember that some OPS® may also be equipped with an optional timer for effluent pumping control.)

2.4: The **Hydro-Action® Industries AP-Series** plant will handle all domestic wastewater. The term domestic wastewater refers to rapidly biodegradable material. To keep maintenance at a minimum and to prevent the plant from malfunctioning, the following guidelines need to be followed:

- Since aerobic bacteria are responsible for treating the wastewater, inorganic or nonrapidly biodegradable materials should not be put into the plant. Examples of improper items are: plastic products, rubber products, sanitary napkins or tampons, washcloths, cigarette butts, melon seeds,

coffee grounds, egg shells, matches, some food items such as corn husks, grape vines, etc.

- Do not introduce cooking grease or large amounts of oil into plant; instead pour it into a container and dispose of it properly.
- To minimize pump-out frequency, limit use of garbage disposals.
- Lint from lint catchers, hair, etc., should be disposed of in the trash and not washed down the drain.
- Water softener backwash should not be routed through the system. Another source of disposal should be used.
- Diapers can be rinsed out in the toilet; however, do not flush cloth or disposable diapers down the toilet.
- Large amounts of harsh chemicals, high-sudsing detergents, disinfectants or any substance that kills bacteria must not be discharged into the plant.
- The plant will not perform to its fullest capabilities if volumetric overload is allowed to occur. This occurs whenever excessive water, above the designed flow rate, is allowed into the plant. Excessive water use or leaking plumbing fixtures may cause this condition.

2.5: Other than for the mechanical and structural working of the plant itself, **Hydro-Action® Industries** is not responsible for the in-field operation of a plant. The proper operation of this or any other individual wastewater plant depends upon proper organic and hydraulic loading of the plant. We cannot control the loading and thereby control the amount of harmful substances that may be discharged into the plant. Only the users of a plant can control what enters the unit. Therefore, we provide a comprehensive owner’s manual that outlines substances that should be kept out of the plant.

2.6: The AP-Series must be installed and maintained according to factory specifications.

No modifications of equipment or design are allowed. Modification of the plant will void warranty and invalidate NSF certification of plant.

2.7: OPS® models 50-30 or 50-32 include a timer, which may need to be reset. The 50-30 is a 24-hour time clock w/ 15 min. increment settings. The captive trippers change the SPDT relay state when pushed toward the outside. This is a two-step process. See drawing TIMER.

- **Setting time of day**

- (a) Synchronize the timer by aligning arrow at the 2:00 position of inner face with the corresponding time of day printed on the outer ring.

- Note:** Power must be **on** to keep time synchronization.

- **Setting “on” time and duration**

- Locate desired activation time(s) on outer ring (**b**) and push trippers to the outside (**c**). Each tripper represents 15-minutes activation time. Push as many trippers back as desired for duration time. When the timer reaches the first tripper, the timer SPDT contacts will change state and turn on. It will remain on for as long as the following trippers are pushed out. When timer goes past last tripper, the timer will return to the **OFF** mode. The timer has a selector for (**d**) **OFF** (O), **AUTOMATIC** (blank) and **MANUAL OVERRIDE** (I) modes.

SECTION 3.0: Diffuser Stone Replacement

3.1: With plant access cover removed, reach in and disconnect the flexible airline hoses from retainer clamps. Then remove diffuser assemblies through the plant access opening.

3.2: Disconnect and remove diffuser assemblies from the flexible airline hoses. Next remove check valves and gaskets from diffuser assemblies. Remove diffuser assembly locknuts, gaskets, and diffuser stones. Now wash and clean all diffuser assembly components. Discard original diffuser stones and replace with new ones. Reassemble and reconnect the diffuser assemblies in reverse order, lubricating

all gaskets and making sure all gaskets and check valves are in the proper place and in good condition before tightening. Refer to drawing DIF-500-1.

3.3: Reattach the diffuser assemblies to flexible airline hoses and reattach flexible airline hoses to retainer clamps. Replace diffuser assemblies into **Hydro-Action® Industries** plant by lowering the diffuser assemblies with attached anchor to the bottom of aeration tank. See drawings AIR-2, DIF-500-1, and Plant Detail Drawings.

Note: Securely tighten all connections by hand being sure not to overtighten and not to push the gaskets out of the gasket seat areas. All connections must be properly sealed to assure trouble-free diffuser operation.

Note: Diffuser stones are to be replaced whenever the pressure reading at the Schrader valve on the discharge side of the linear air pump equals or exceeds a reading of 3.5 psig on AP Series.

SECTION 4.0: Plant Troubleshooting Guide

4.1: The **Hydro-Action® Industries** AP Series plant has proven to be very effective and reliable in the treatment of domestic wastewater. The problems outlined here occur only in a very small percent of total installations. They can all be corrected and most can be prevented.

4.2: When the owner/user calls, ask him or her to describe the problem in detail and determine the plant age and service history from your records. Ask the owner to give you the model numbers of the plant and OPS® (operations/control center). This information is then used in preparation for the service call.

4.3: First perform a routine service call as described in section 1.0, Plant Routine Inspection and Service Instructions.

4.4: If routine servicing does not solve the problem, go through the steps listed below.

4.5: Verify model number of plant and OPS® with those supplied by owner. To determine

which model of OPS[®] and electrical controls are being used, see model number on outside of OPS[®] (example: OPS[®] model 50-20). If this is a new installation, you should verify that the plant and all its components were installed correctly and in accordance with manufacturer's and regulatory agency requirements. See *AP Series Installation Manual*, available from **Hydro-Action[®] Industries**.

4.5.1: Inspect plant to verify that **Hydro-Action[®] Industries** plant is installed properly and is not damaged. Plant should be level and internal components should be in proper place and correct working order.

4.5.2: Check to see that effluent disposal method is allowing for proper level to be maintained in plant. High level in plant can adversely affect performance.

4.6: After confirming that **Hydro-Action[®] Industries** plant is installed properly and is not damaged, check the operational and maintenance conditions of the plant to determine if it is performing correctly. To do this run a sludge volume test as described in section 1.0. Compare your findings with the conditions given in the **Hydro-Action[®] Industries** Plant Condition Chart, section 4.12. Follow the recommended actions required to return the plant to its proper operating conditions.

4.7: The alarms supplied with this wastewater treatment plant provide the owner with a secure, reliable, dependable, and economical means of notification for most malfunctions of the plant that would lead to producing an unsatisfactory effluent. These alarms include notification for problems of air pump failure, aeration piping malfunctions, and high water level. These alarms need to be inspected and tested during each plant operation and maintenance site visit. If an optional remote alarm has been installed, it should also be inspected and tested during each site visit.

4.8: To gain access to the electrical controls and air pump, remove the security screws

holding the OPS[®] enclosure to the base. Remember that each model offers different control and alarm functions.

4.9: The switch indicated "normal/silence" on OPS[®] models 50-20, -30, & -32 is used to test the alarms, silence an alarm condition, or is left in the normal on position. The normal position of the mode is for normal operation of the plant and silence is a mode that will disrupt the audible alarm. Move the switch to the left and hold to test the alarm. To test OPS[®] model 50-11, remove the OPS[®] enclosure and shut off the air pump by moving the air pump switch to the "off" position. You should see and hear the visible and audible alarms when this mode is selected. On OPS[®] model 50-11, the "normal/silence" switch must be returned to the normal position after plant conditions have returned to normal. On OPS[®] models 50-20, -30, & -32 the switch will reset itself automatically.

4.10: If the audible and visual alarms on the outside face of the **Hydro-Action[®] Industries** OPS[®] enclosure are indicated the problem might be failure in power supply or air pump, or an electrical short in the line between electrical controls and air pump. See Appendix 2, *Electrical Controls Schematics*, for details of each model. See Appendix 3, *Operation & Maintenance Technical Manual for Air Pumps* for details on working with air pumps.

4.11: The AP-Series plant is equipped with a high-level float switch and alarm. If the system also includes a pump/holding tank to remove effluent, the **Hydro-Action[®] Industries** electrical controls may include a second high-level alarm. If the owner reports high-level alarm light on, service technician should be sent to correct the problem. A malfunctioning water pump or level float or a plugged discharge could cause the high level conditions. A malfunctioning high-level sensor float could give a false high-level alarm. This problem left uncorrected will lead to system failure and improper wastewater treatment and therefore requires immediate attention.

4.12: Hydro-Action® Industries Plant Condition Chart

| Hydro-Action® Condition | | Organic Overloading | Organic Under Loading | Toxic Influent | Volumetric Overloading | Well Functioning Plant |
|-----------------------------------|------------------------------------|--|--|--|--|---|
| Mixed Liquor Aeration Compartment | Sludge Volume Test Characteristics | <ul style="list-style-type: none"> • Black particles in sludge. • Sludge does not settle well. • Chunks of floating material above main sludge layer. | <ul style="list-style-type: none"> • Solids do not separate from liquids well. • Very little settling 5%-10% | <ul style="list-style-type: none"> • Septic odor • Very little settling • Sludge particles are very small | Same as organic under loading. | <ul style="list-style-type: none"> • 20%-60% Particles • Particles resemble small pieces of sponge. |
| | Color | Gray Black | Light Muddy Gray | Grayish Black | Same as organic under loading. | Chocolate |
| Needed Action | | Diffuser stones may need to be changed to increase dissolved oxygen level and maintain chocolate color. If chocolate color cannot be maintained, pump the plant. *(3) | Look for ways to increase organic load. | Refrain from or reduce the use of toxic substances. *(2) | Reduce flow of liquid to designed GPD. *(1) | None |

*(1). Volumetric overloading (flow rate exceeds designed flow rate) could be caused by a number of things. The most common are leaky toilets or faucets. Only sanitary waste (sinks, tubs, washing machines, toilets, etc.) should be allowed in the **Hydro-Action® Industries** plant. To check if excess water is entering the plant, observe plant discharge point when house facilities are not in use.

*(2). Find out if owner is using large amounts of chemicals such as unusual amounts of bleach, disinfectants, photographic wastes, etc. Also check to see that water softener backwash is not allowed in plant. This can cause a chemical imbalance and destroy needed bacteria. Backwash should be routed to a separate disposal area. Any unusual types of waste not normally associated with a household should be kept out.

*(3). When **Hydro-Action® Industries** plant and pretreatment tank are being pumped, a qualified service technician should oversee the job. Care should be taken not to damage internal components. Plant and pretreatment tank should be washed and cleaned as they are being pumped. The waste from the tanks should be disposed of in compliance with state and federal law. **Hydro-Action® Industries** recommends pumping the plant every 2 to 6 years; however, there is not a set time because loading varies from household to household. Care should be taken when pumping plant and pretreatment tank. Empty tanks can be hydraulically displaced (float tank) by ground water. If soil is water saturated tanks should not be completely emptied. Wasting sludge (solids) can be accomplished without completely empty tanks.

SECTION 5.0: Hydro-Action® Industries AP Series Plant Specifications

| Plant Capacities | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|-------------------|-------------|---|----------|----------|----------|----------|-----------------|--|--|---------|-----|---------|---------|------|---------|-------|-------|---------|-----------|-------|-------|-------|--|-----|------|------|---------|
| Model | | AP-500 | AP-600 | AP-750 | AP-1000G | AP-1500G | | | | | | | | | | | | | | | | | | | | | |
| Design Flow | Gallons/Day | 500 | 600 | 750 | 1000 | 1500 | | | | | | | | | | | | | | | | | | | | | |
| CBOD ₅ | Pounds/Day | 1.25 | 1.50 | 1.88 | 2.50 | 3.75 | | | | | | | | | | | | | | | | | | | | | |
| Plant Component | | 1/4 HP | | | 3/4 HP | | | | | | | | | | | | | | | | | | | | | | |
| Rotary Air Pump | | HAR 0608 | HAR 0608 | HAR 0608 | HAR 1023 | HAR 1023 | | | | | | | | | | | | | | | | | | | | | |
| Number of Pump(s) | | 1 | 1 | 1 | 1 | 1 | | | | | | | | | | | | | | | | | | | | | |
| | | <table border="1"> <thead> <tr> <th colspan="3">HAR 0608 / 1023</th> </tr> </thead> <tbody> <tr> <td>Voltage</td> <td>VAC</td> <td>115/220</td> </tr> <tr> <td>Current</td> <td>Amps</td> <td>7.8/3.9</td> </tr> <tr> <td>Power</td> <td>Watts</td> <td>120/560</td> </tr> <tr> <td>Frequency</td> <td>Hertz</td> <td>60/50</td> </tr> <tr> <td>Phase</td> <td></td> <td>1/1</td> </tr> <tr> <td>Flow</td> <td>SCFM</td> <td>4.3/8.2</td> </tr> </tbody> </table> | | | | | HAR 0608 / 1023 | | | Voltage | VAC | 115/220 | Current | Amps | 7.8/3.9 | Power | Watts | 120/560 | Frequency | Hertz | 60/50 | Phase | | 1/1 | Flow | SCFM | 4.3/8.2 |
| HAR 0608 / 1023 | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Voltage | VAC | 115/220 | | | | | | | | | | | | | | | | | | | | | | | | | |
| Current | Amps | 7.8/3.9 | | | | | | | | | | | | | | | | | | | | | | | | | |
| Power | Watts | 120/560 | | | | | | | | | | | | | | | | | | | | | | | | | |
| Frequency | Hertz | 60/50 | | | | | | | | | | | | | | | | | | | | | | | | | |
| Phase | | 1/1 | | | | | | | | | | | | | | | | | | | | | | | | | |
| Flow | SCFM | 4.3/8.2 | | | | | | | | | | | | | | | | | | | | | | | | | |

SECTION 6.0: Process Description

6.1: The Hydro-Action® Industries AP Series individual wastewater treatment plant is a self-contained, extended aeration, aerobic treatment facility utilizing the activated sludge process. The plant consists of a cylindrically shaped aeration tank with an offset service access, a unique cone shaped clarification compartment and an outlet tee-assembly. Two fine-bubble air diffuser assemblies with ceramic stone diffusers and Hydro-Action® Industries' efficient rotary air pump are combined to provide effective, efficient, and economical aeration.

6.2: Domestic wastewater enters the aeration compartment and is mixed thoroughly with the already present mixed liquor suspended solids (MLSS) activated sludge. The injection of air through the porous ceramic air diffusers placed near the bottom of the aeration chamber is responsible for this complete mixing. The fine-bubble diffusers and the vortex area between diffuser assemblies produce a high magnitude of air diffusion and therein provide ample mixing and a more than generous quantity of dissolved

oxygen to maintain the aerobic environment even under extreme conditions.

6.3: Hydraulic displacement causes the mixed liquor to enter the clarification compartment and move upward toward the outlet tee-assembly. Due to the calm conditions in the clarifier, suspended solids settle to the bottom where they are remixed with the Mixed Liquor Suspended Solids (MLSS) for additional biological treatment. The remaining clarified effluent leaves the plant via the outlet tee-assembly and discharge line.

6.4: The AP Series is operated by the new OPS® (operations/control center). The OPS® integrates the electrical controls, visible and audible alarms, and linear air pump in a protective polyethylene enclosure. The OPS® can be either platform mounted on the plant or remotely located. These features plus offset service access and flexible airhose anchored diffuser assemblies make the plant extremely reliable and easy to service and install. An additional optional alarm may be used to locate visible and audible alarms at a remote location.

6.5: The technology used in the **Hydro-Action® Industries** plant allows it to produce excellent effluent quality which thereby meets all ANSI/NSF International Standard 40 Class I and the Environmental Protection Agency's requirements of a secondary treatment process. NSF requires that a Class I plant shall be shown to meet EPA secondary treatment guidelines for CBOD₅, TSS, and pH. The **Hydro-Action® Industries** AP Series satisfies all these requirements.

SECTION 7.0: Safety

7.1: Safety is an important issue when considering the nature of our business. We deal with one of the most potentially health hazardous materials known: raw sewage. Domestic wastewater carries in it members of a specialized group of life known as microbes. Such microorganisms as bacteria, viruses, algae, actinomycetes, protozoa, fungi, rotifers, crustaceans, and other members of both the plant and animal worlds. The function of a wastewater treatment plant is to treat the water to a degree where the effluent is relatively free of pathogenic bacteria and nuisance microorganisms. Until the wastewater entering the plant has had sufficient time for treatment and disinfection, it may contain any number of the harmful organisms that cause disease.

7.2: As raw wastewater may and usually does contain some level of unsafe microorganisms, proper respect and care must be given to safety. Whenever one comes into contact with raw sewage, **do not fear** the contact, but **do take proper precautions** to avoid potential danger.

7.3: Follow these simple safety precautions whenever exposed to wastewater:

- Always wash with soap and water after handling any contaminated item. The use of a good bactericide soap is strongly recommended.
- Wear disposable rubber gloves when handling wastewater-contaminated items or chlorine tablets.

- Always dispose of scum, rags, trash, debris, or soiled material in a proper waste container.
- If a wastewater spill or leak occurs in a yard, flush area with plenty of clean water and disinfect. If a spill or leak occurs in the house, clean with a dilute solution of bleach.
- Protect any injury, wound, open cut, etc. from exposure to wastewater. Prevention is always better and easier than the curing of a disease.
- If an illness or disease is suspected as coming from exposure to sewage, get proper medical attention immediately. When proper treatment is given the remedy and cure will be rapid and less of a problem. There are some serious diseases that could be transmitted by contact with raw sewage — **take the proper precautions, be safe!**
- Report all accidents relating to sewage exposure to the proper supervisory personnel.

7.4: Follow these safety precautions when performing any excavation or construction work:

- Follow electrical safety procedures during installation.
- No "horse-play" on the job site.
- No controlled substances on the job site.
- Fill all holes and depressions in and around wwtp installation area, remove and dispose of all debris from construction/installation.

Appendix 1: Drawings

| | |
|--|--|
| AP Series PVC Air Header Tee Assembly | |
| AP Series Schrader Air Pressure Valve & Quick Chuck Pressure Gauge | |
| AP Series Hydro-Action® Industries Rotary Air Pump | |
| AP Series WWTP Installation Details | |
| AP Series OPS® Data Plate | |
| AP Series Data Plate | |
| AP Series Anchored Diffuser Assembly | |
| AP Series 6" Riser | |
| AP Series WWTP Process Flow Diagram | |
| AP-500, AP-600, AP-750 Plant Detail | |
| AP-1000G, AP-1500G Plant Detail | |
| OPS® Models 50-30 and 50-32 Timer | |
| Float Setting Diagram..... | |
| Lifting Bar Assembly..... | |

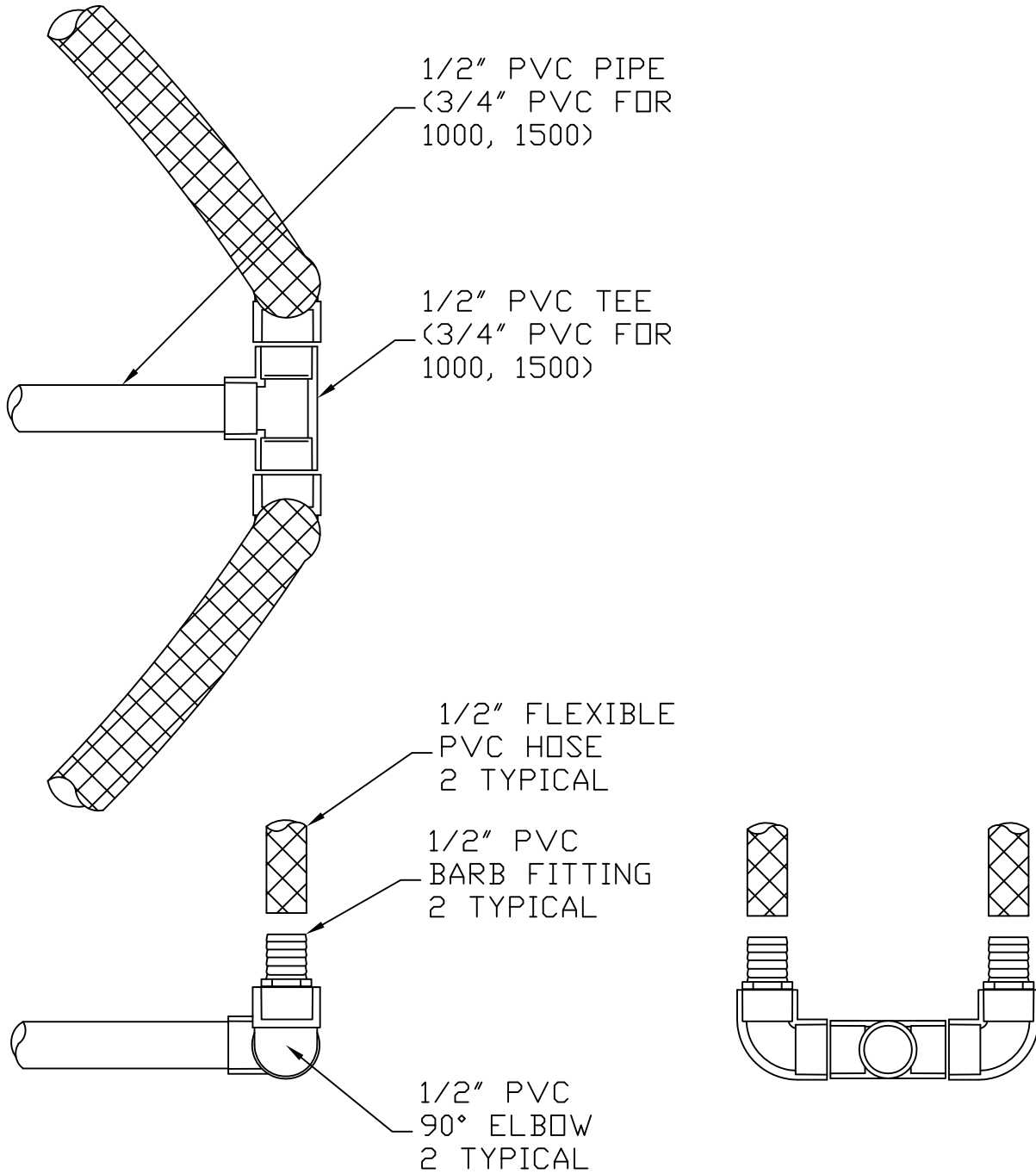
PART/PRINT NO.

PART DESCRIPTION

AP SERIES PVC AIR HEADER TEE ASSEMBLY

DATE

1/1/08



DRAWN
A.DAVIS

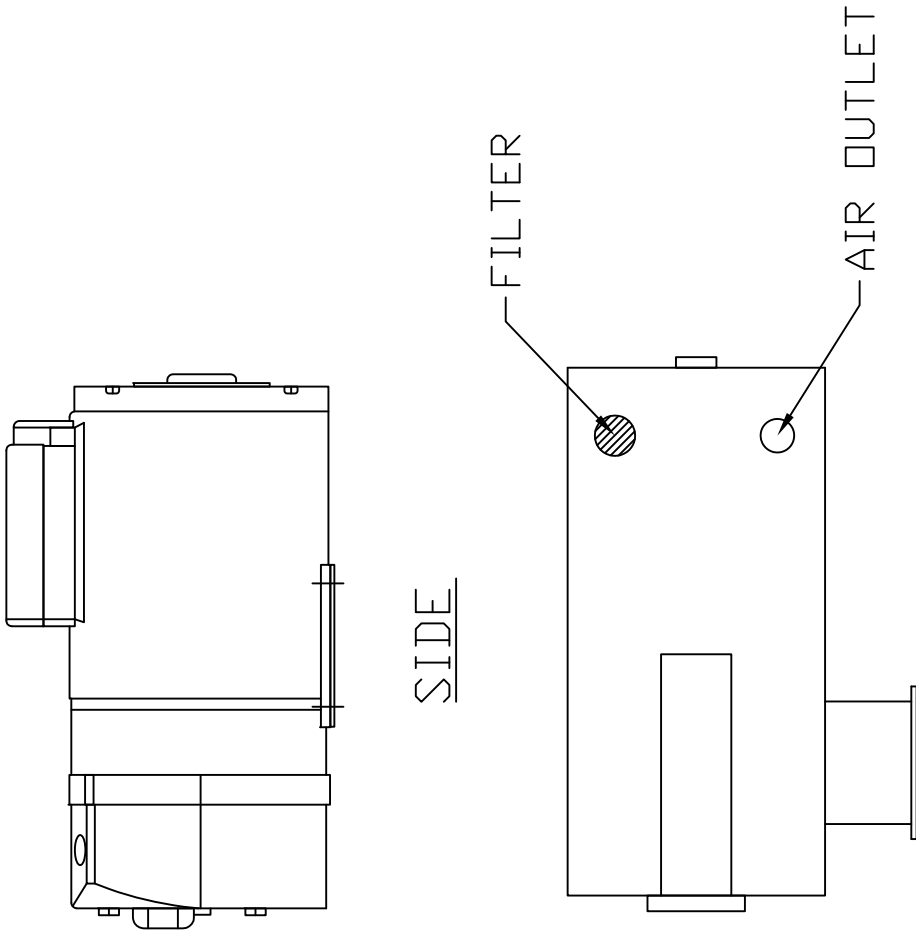
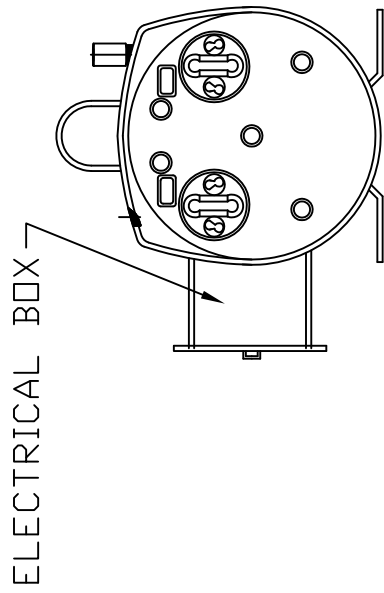
APPROVED BY

SIGNATURE

PART/PRINT NO.

PART DESCRIPTION
GAST ROTARY MOTOR

DATE
1/1/08



DRAWN BY:
A. DAVIS

APPROVED BY

SIGNATURE

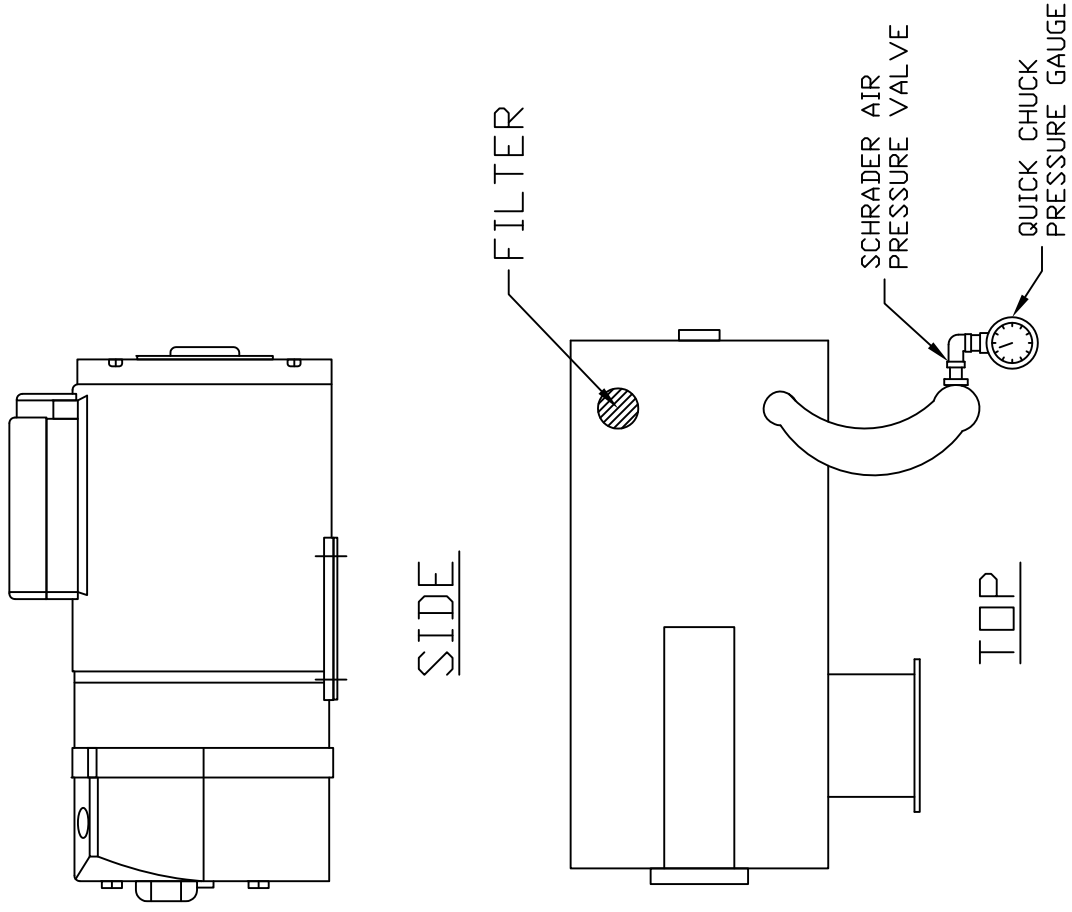
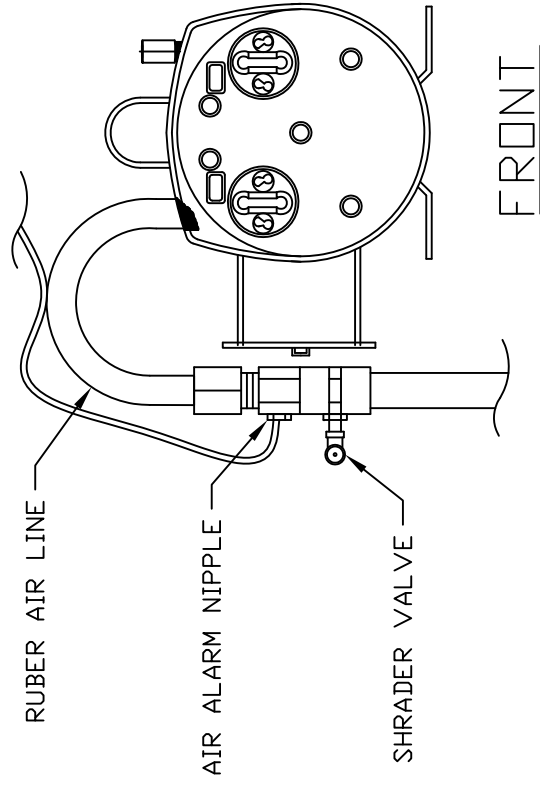
PART/PRINT NO.

PART DESCRIPTION

AP SERIES SCHRADER VALVE & QUICK CHUCK PRESSURE GAUGE

DATE

1/1/08



DRAWN BY:
A. DAVIS

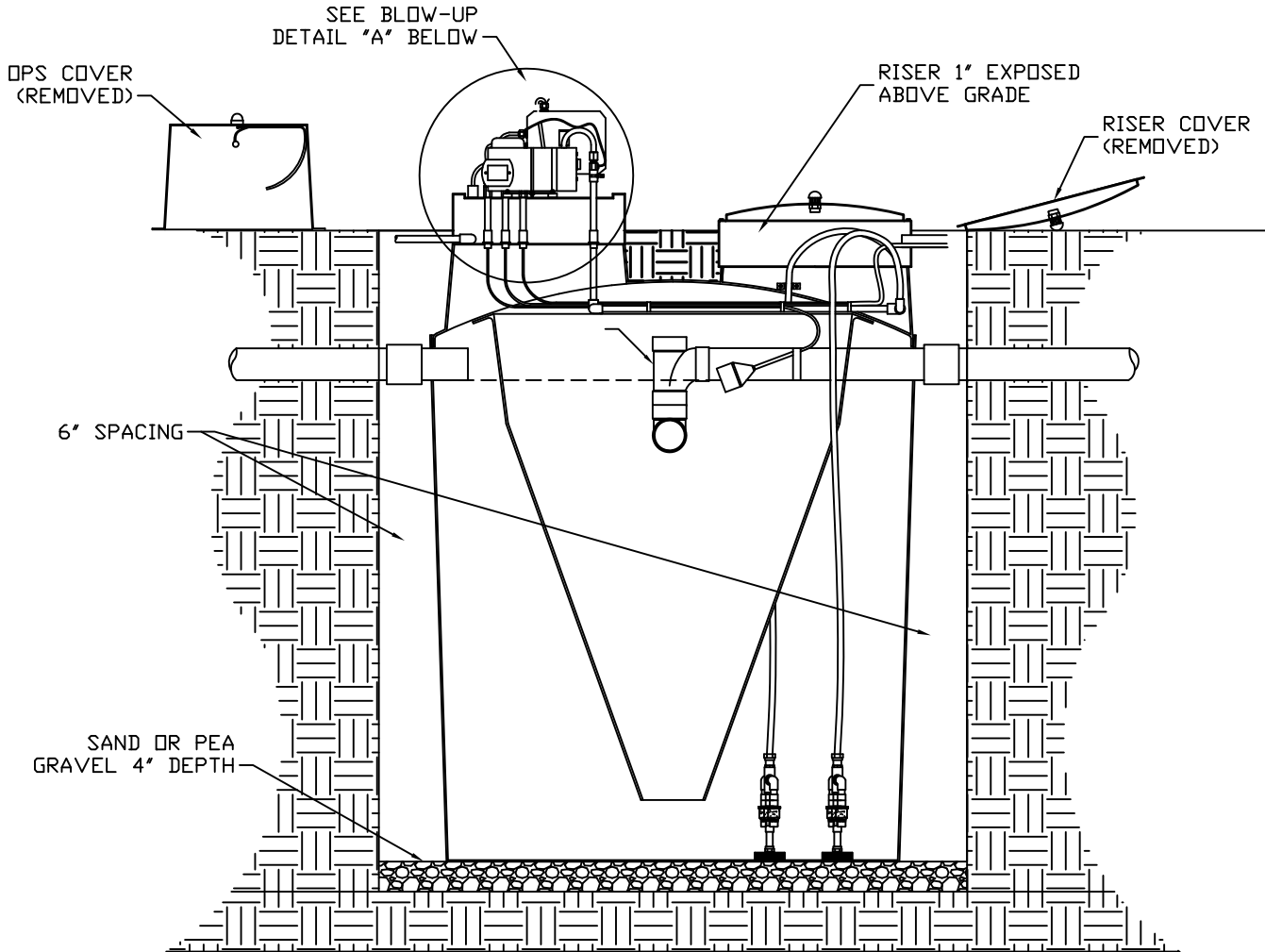
APPROVED BY

SIGNATURE

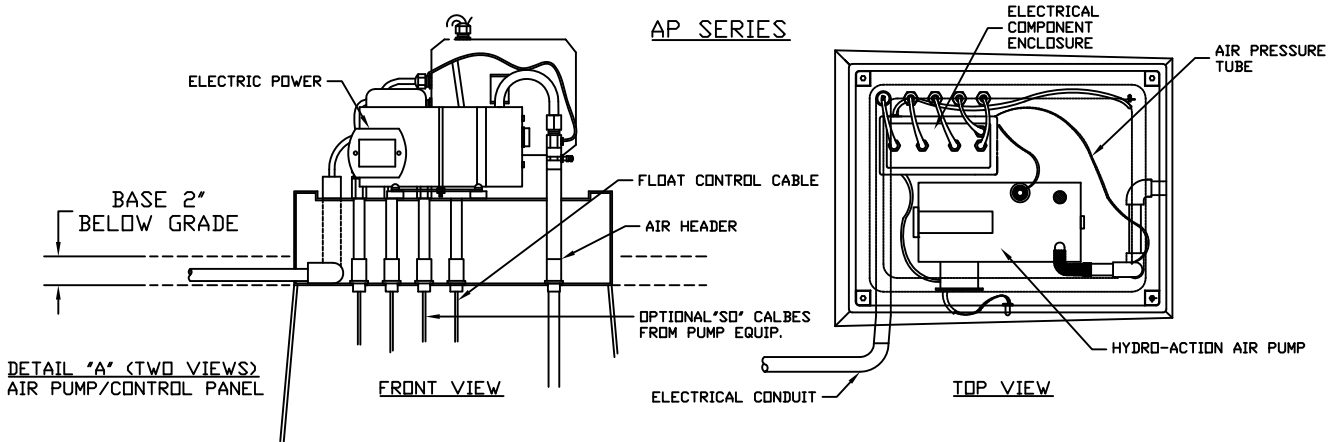
PART/PRINT NO.
AP SERIES

PART DESCRIPTION
WWTP INSTALLATION DETAILS

DATE
1/1/08



AP SERIES



DRAWN
A.DAVIS


APPROVED BY

SIGNATURE

PART/PRINT NO.

PART DESCRIPTION
AP SERIES OPS DATA PLATE

DATE
1/1/08

| | | |
|-------------------|----------------|--|
| ○ | NORMAL/SILENCE | ○ |
| AP _____ | CAP: _____ | GPD |
| MODEL _____ | - - | OPS |
| FOR SERVICE CALL: | |  |
| ○ | | ○ |

U.S. PATENT NOS.
6,224,751
6,106,704



DRAWN
A.DAVIS

APPROVED BY

SIGNATURE

PART/PRINT NO.

PART DESCRIPTION
AP SERIES DATA PLATE

DATE
1/1/08

○ MODEL AP-500 CAPACITY 500GPD ○

HYDRO-ACTION[®]



○ SERIAL # _____ ○

U.S. PATENT NOS.

6,224,752
6,180,004
6,106,704
6,096,203
5,266,239
D 426,866
D 424,659
D 423,638



DRAWN
A.DAVIS

APPROVED BY

SIGNATURE

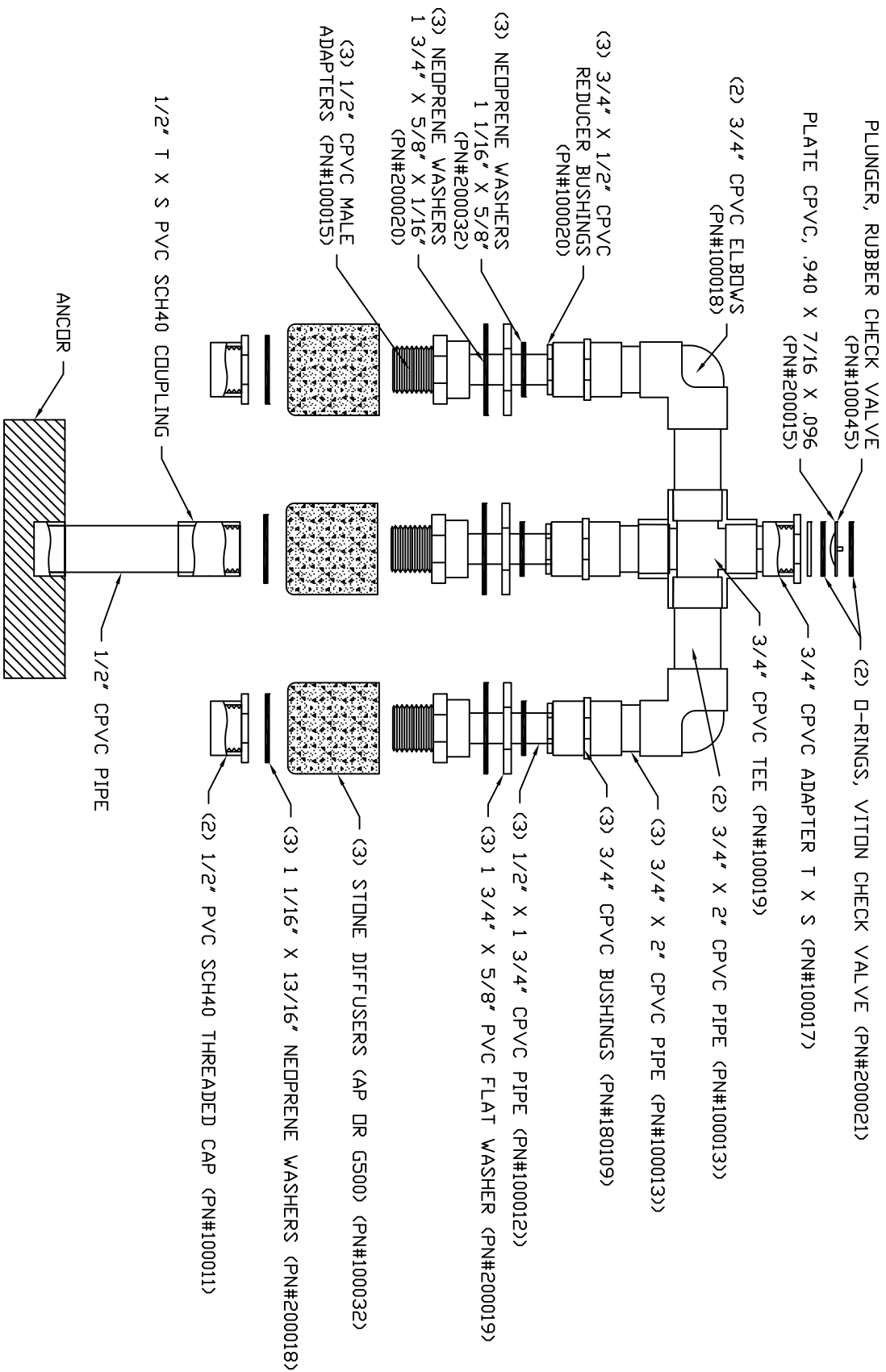
PART/PRINT NO.

PART DESCRIPTION

AP SERIES ANCHORED DIFFUSER ASSEMBLY

DATE

1/1/08



DRAWN BY:
A. DAVIS

APPROVED BY

SIGNATURE

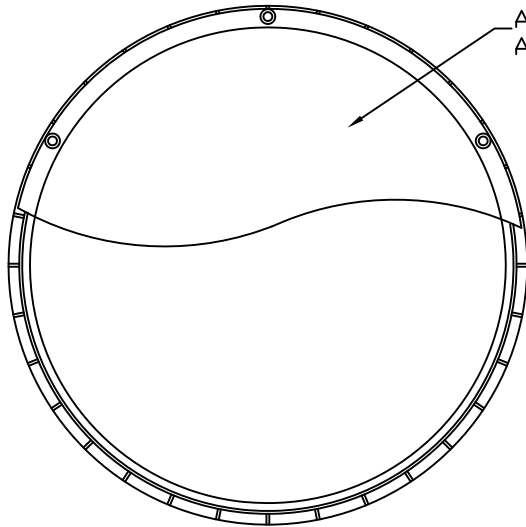
PART/PRINT NO.

PART DESCRIPTION

AP SERIES 6" RISER

DATE

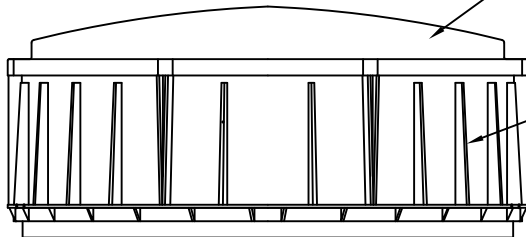
1/1/08



AP-500, AP-600, AP-750 HAVE DN 24" RISER
 AP-100G & AP-1500 HAVE TWO 20" RISERS

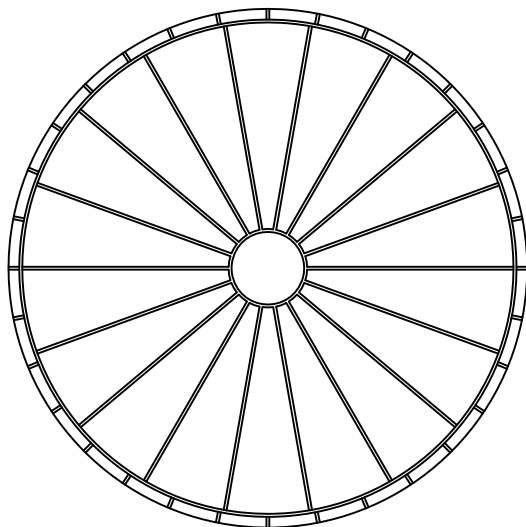
TOP

ACCESS COVER



REINFORCING RIBS

BOTTOM



BOTTOM

NOTES:

1. COVER HAS MOLDED IN GASKET.
2. INTERLOCKING DESIGN FOR STACKING RISERS.
3. 6" RISER



DRAWN
A.DAVIS

APPROVED BY

SIGNATURE

PART/PRINT NO.

PART DESCRIPTION
AP SERIES WWTP PROCESS FLOW DIAGRAM

DATE
1/1/08

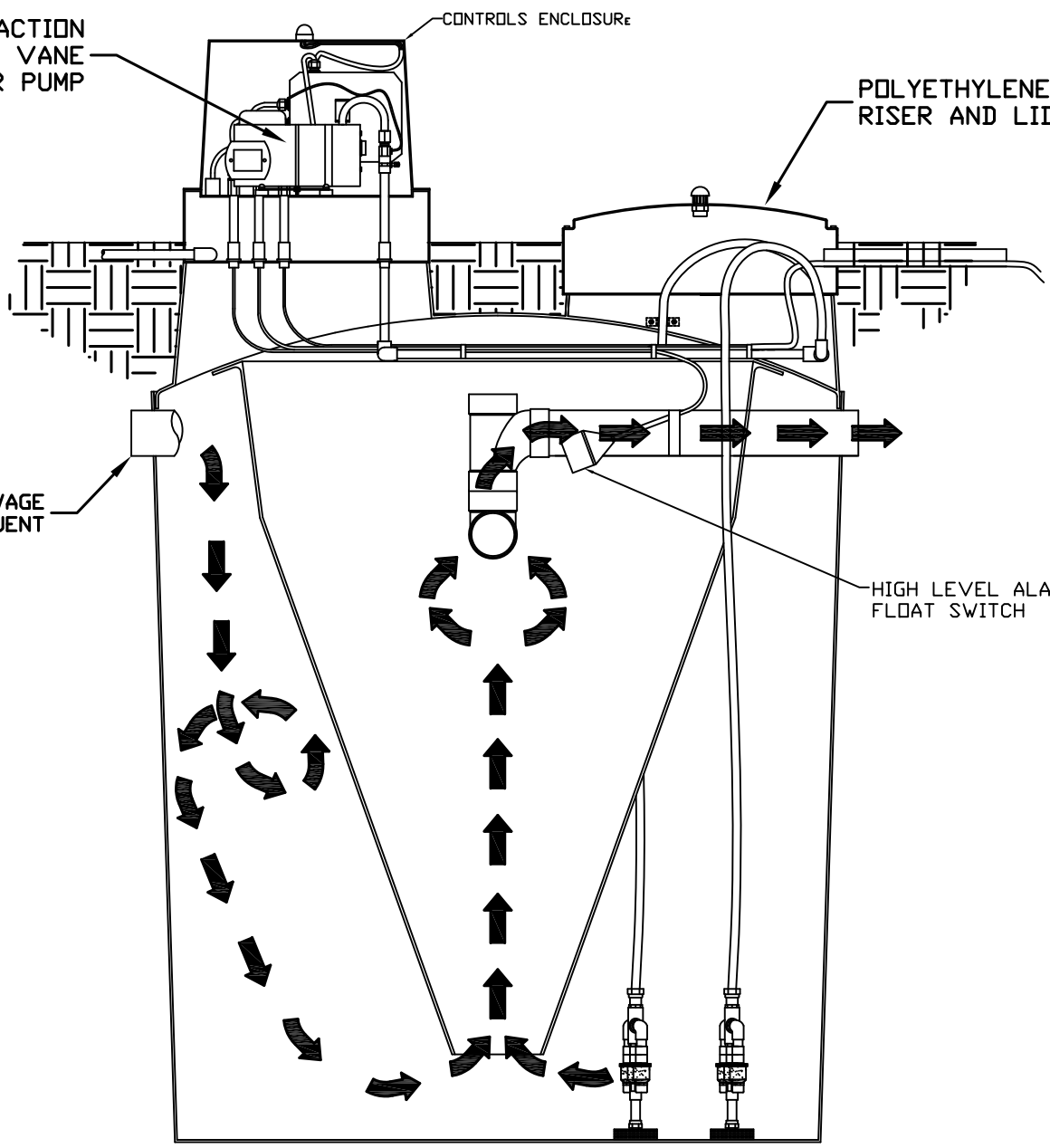
HYDRO-ACTION
ROTARY VANE
AIR PUMP

CONTROLS ENCLOSURE

POLYETHYLENE
RISER AND LID

RAW SEEWAGE
INFLUENT

HIGH LEVEL ALARM
FLOAT SWITCH



**HYDRO-ACTION AP SERIES
CLASS 1 AEROBIC PLANT**



DRAWN
A.DAVIS

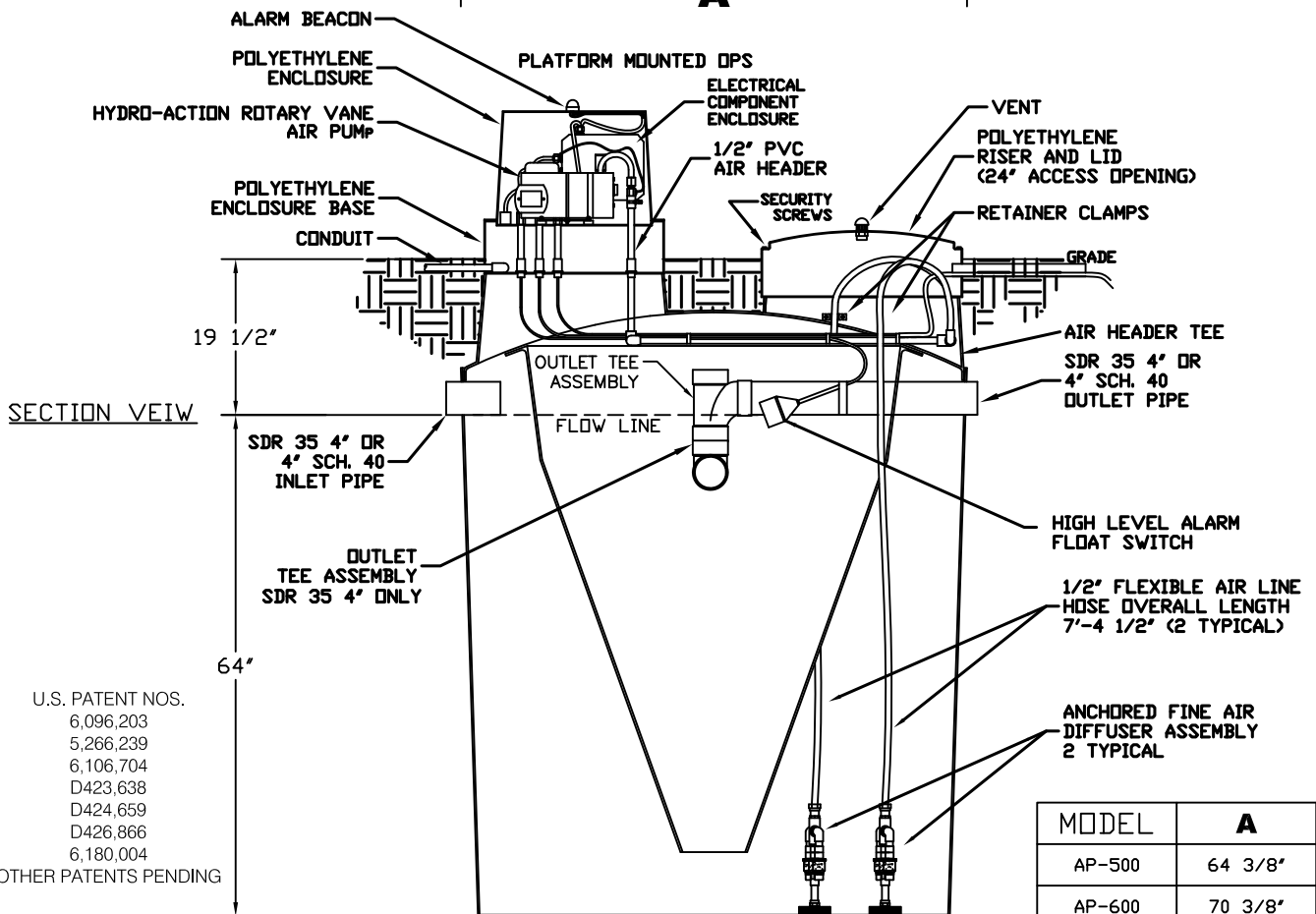
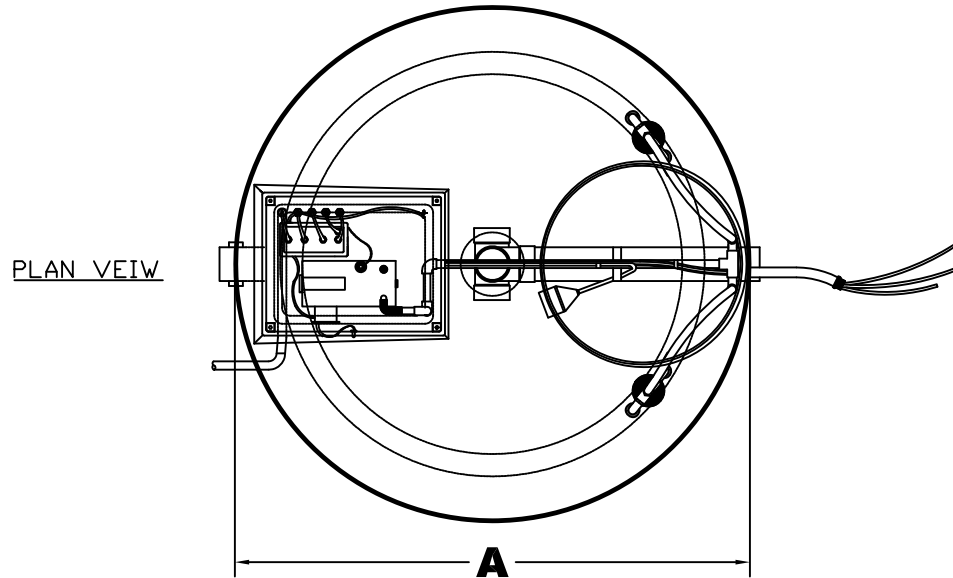
APPROVED BY

SIGNATURE

PART/PRINT NO.
AP SERIES

PART DESCRIPTION
AP-500, AP-600 & AP-750 WASTEWATER TREATMENT PLANT DETAILS

DATE
1/1/08



U.S. PATENT NOS.
6,096,203
5,266,239
6,106,704
D423,638
D424,659
D426,866
6,180,004
OTHER PATENTS PENDING

| MODEL | A |
|--------|---------|
| AP-500 | 64 3/8" |
| AP-600 | 70 3/8" |
| AP-750 | 76 1/8" |



DRAWN
A.DAVIS

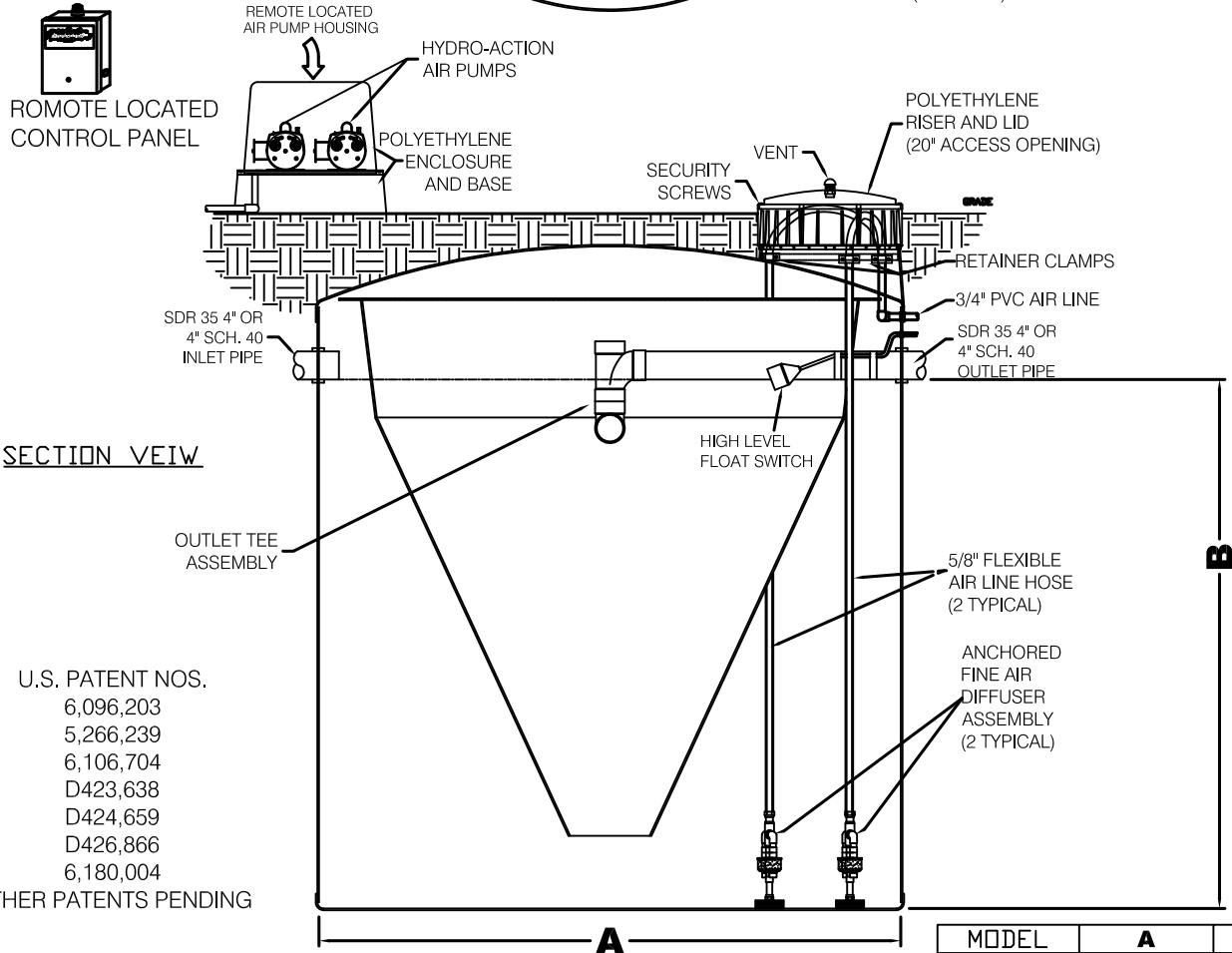
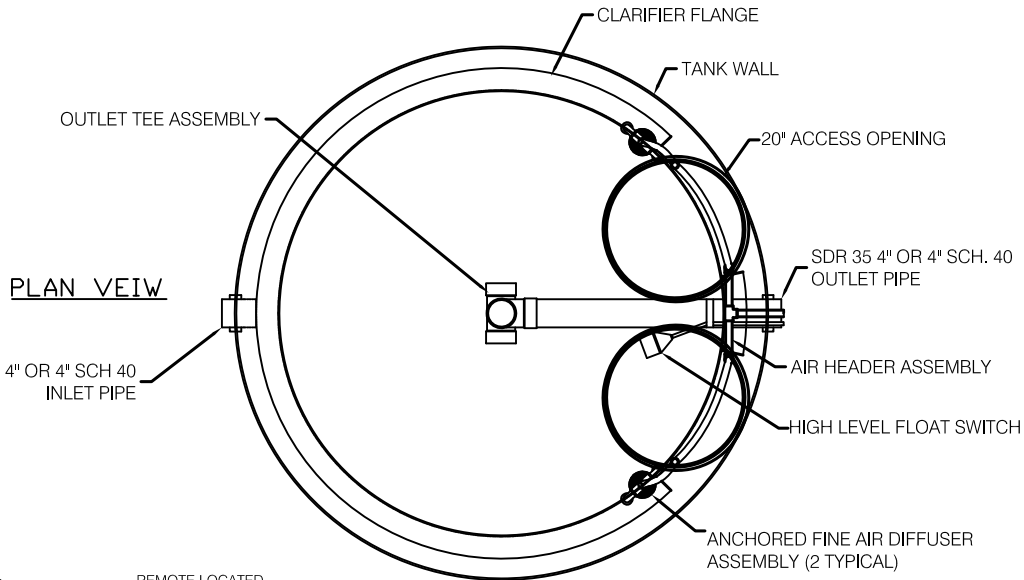
APPROVED BY

SIGNATURE

PART/PRINT NO.
AP SERIES

PART DESCRIPTION
AP-1000G & AP-1500G WASTEWATER TREATMENT PLANT DETAIL

DATE
1/1/08



U.S. PATENT NOS.
6,096,203
5,266,239
6,106,704
D423,638
D424,659
D426,866
6,180,004

OTHER PATENTS PENDING

| MODEL | A | B |
|----------|-----|-----|
| AP-1000G | 80' | 70' |
| AP-1500G | 88' | 80' |



DRAWN
A.DAVIS

APPROVED BY

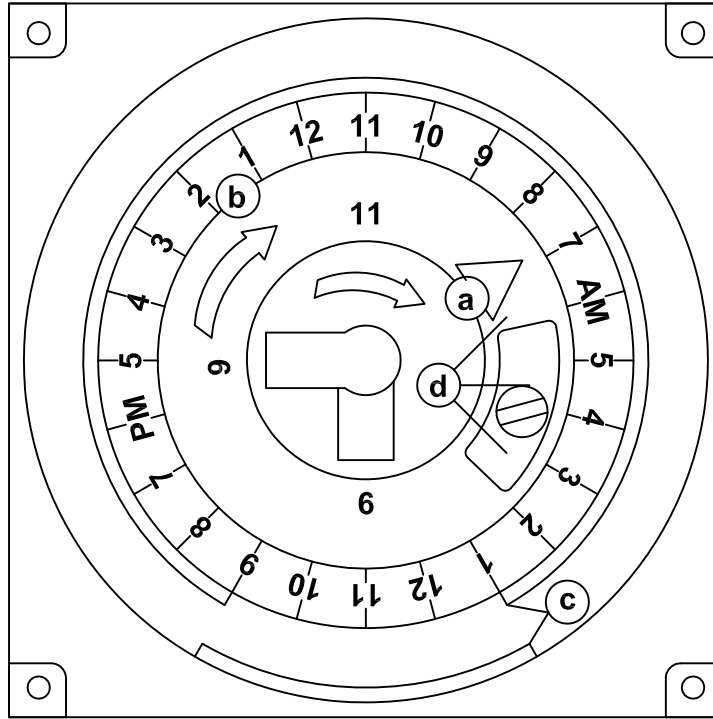
SIGNATURE

PART/PRINT NO.

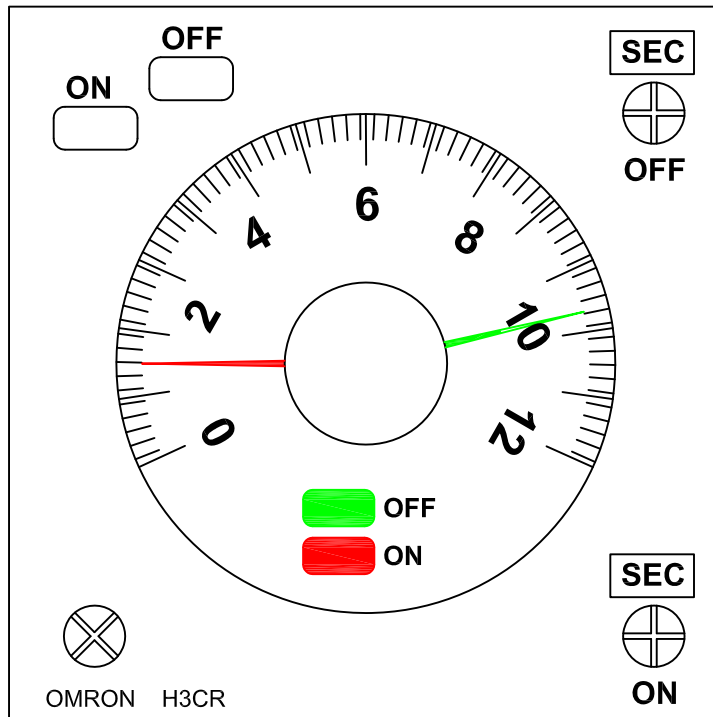
PART DESCRIPTION
TIMER FOR OPS MODELS 50-30 & 50-32

DATE
1/1/08

MODEL
50-30



MODEL
50-32



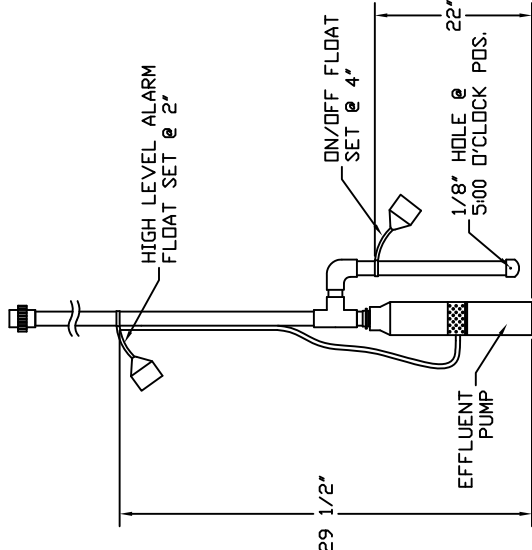
DRAWN
A.DAVIS

APPROVED BY

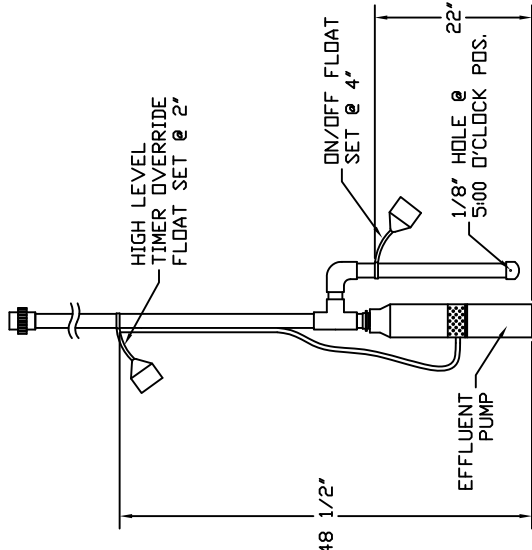
SIGNATURE

| | | |
|-------------------------|--|-----------------------|
| PART/PRINT NO. ----- | PART DESCRIPTION FLOAT SET CHART | DATE 1/1/08 |
|-------------------------|--|-----------------------|

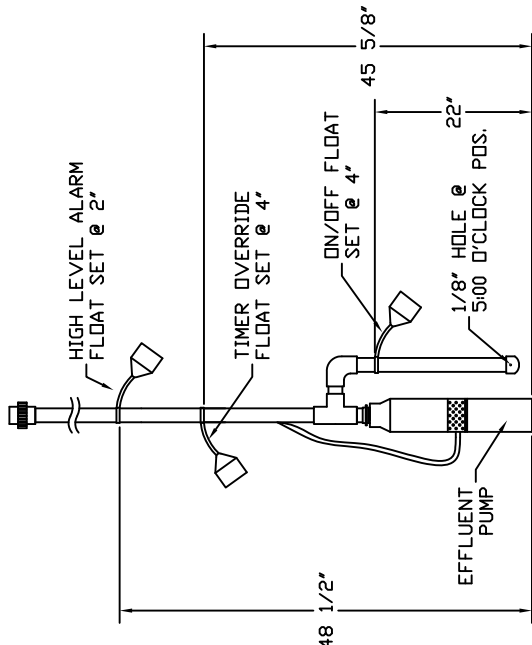
50-20 DPS



31-31A-32 DPS



50-30A DPS

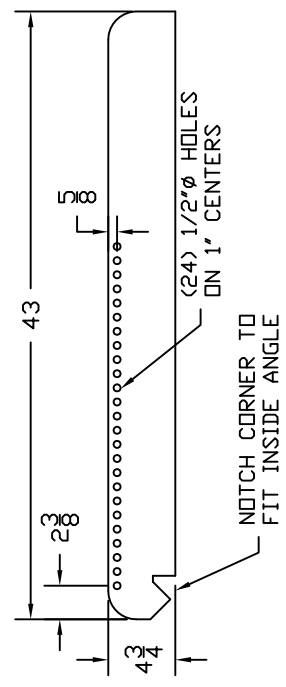


DRAWN BY:
A. DAVIS

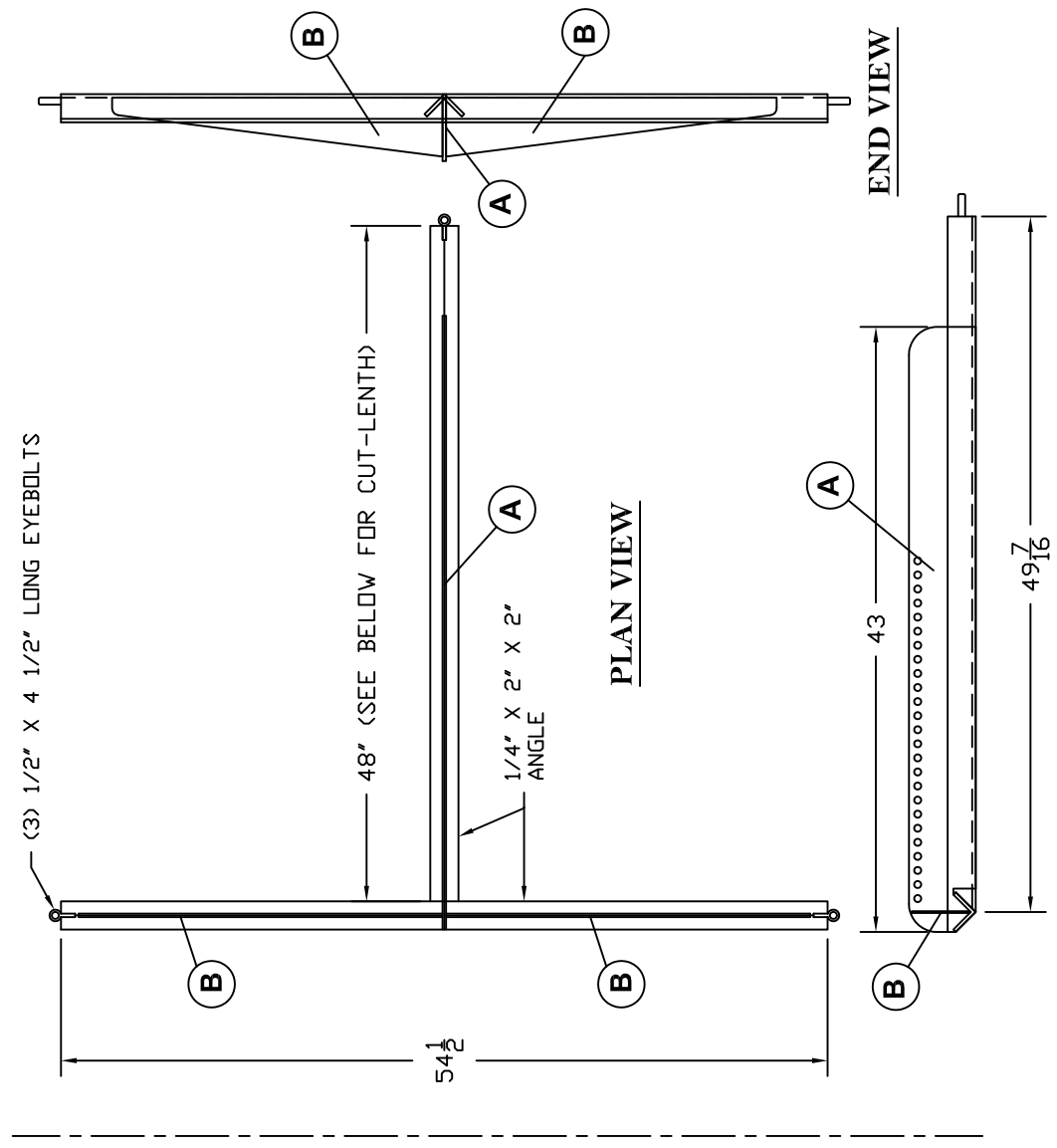
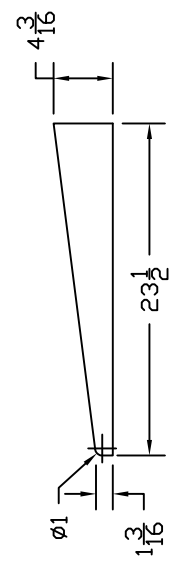
APPROVED BY

SIGNATURE

DETAIL A
3/16" PLATE (1) REQD.



DETAIL B
3/16" PLATE (2) REQD.



NOTE:
BEST IF USED W/
A SWIVEL HOOK W/
A SAFETY LATCH.



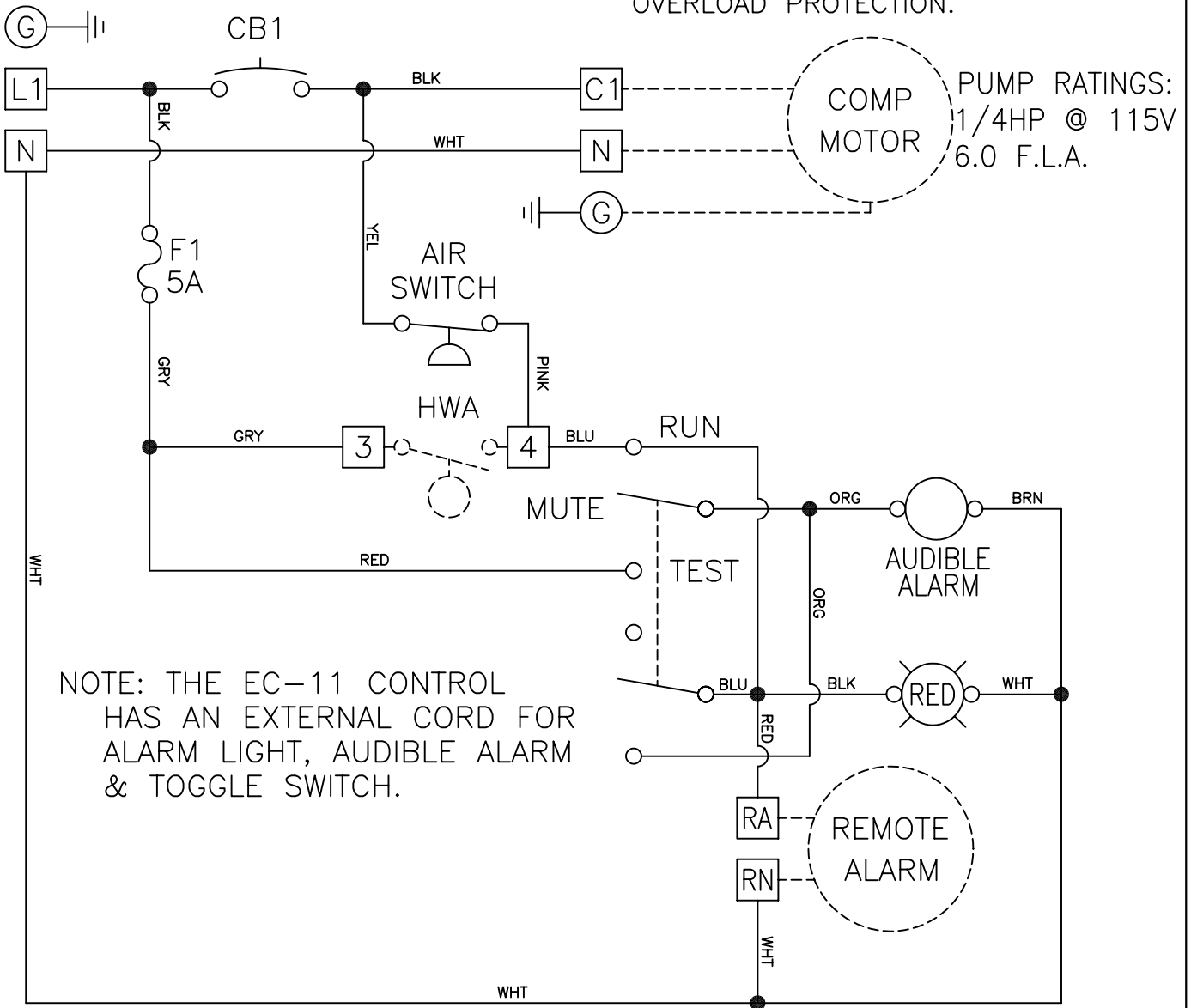
Appendix 2:

Electrical Controls Schematics

| | |
|--|---------------|
| Model 11 Electrical Controls Schematics..... | EC-11 / CP-11 |
| Model 20 Electrical Controls Schematics..... | EC-20 / CP-20 |
| Model 30 Electrical Controls Schematics..... | EC-30 / CP-30 |
| Model 32 Electrical Controls Schematics..... | EC-32 / CP-32 |

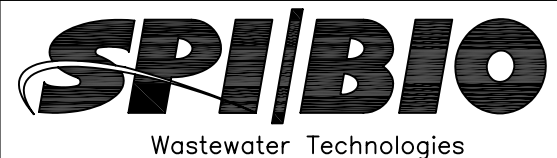
PUMP POWER CIRCUIT
115V - 1PH

NOTE: MOTOR MUST HAVE INTERNAL OVERLOAD PROTECTION.



NOTES: MAIN PANEL DISCONNECT MUST BE PROVIDED BY INSTALLER.
DASHED LINES INDICATE ITEMS NOT CONTAINED IN THE PANEL.
FIELD WIRING MUST BE A MINIMUM OF 60°C COPPER WIRE.
REQUIRED TORQUE FOR TERMINAL BLOCK SCREWS IS 9 in-lbs.

ALL INFORMATION CONTAINED IN THIS DRAWING IS CONFIDENTIAL AND PROPRIETARY TO SEPTIC PRODUCTS, INC.



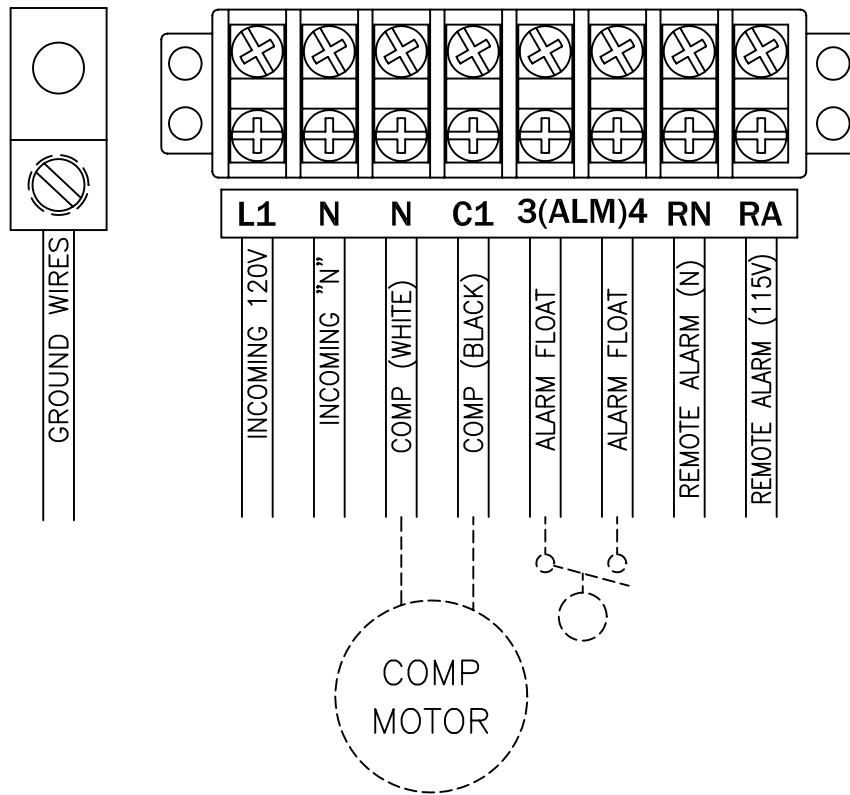
| CHANGES | TOLERANCES | DRAWN BY | DATE |
|---------|--------------------------|---|----------|
| F | DECIMALS .xxx = ±.005 | D. MIDDLETON | 06/20/05 |
| E | .xx = ±.010 | MATERIAL SPECIFICATION: AS NOTED | |
| D | FRACTIONAL | | |
| C | x/x = ±.1/64 | | |
| B | ANGLES | | |
| A | x' = ±1/2' | | |

| | |
|---|-------------|
| SCHEMATIC, ELECTRICAL COMP ALARM W/HWA | |
| SCALE: | PART NO. |
| FULL | EC-11/CP-11 |

TIGHTENING TORQUE FOR TERMINAL BLOCK IS 9 in-lbs.

HYDRO-ACTION

CONNECTION DIAGRAM EC-11 & CP-11 ALARM PANEL



ALL INFORMATION CONTAINED IN THIS DRAWING IS
CONFIDENTIAL AND PROPRIETARY TO SEPTIC PRODUCTS INC.



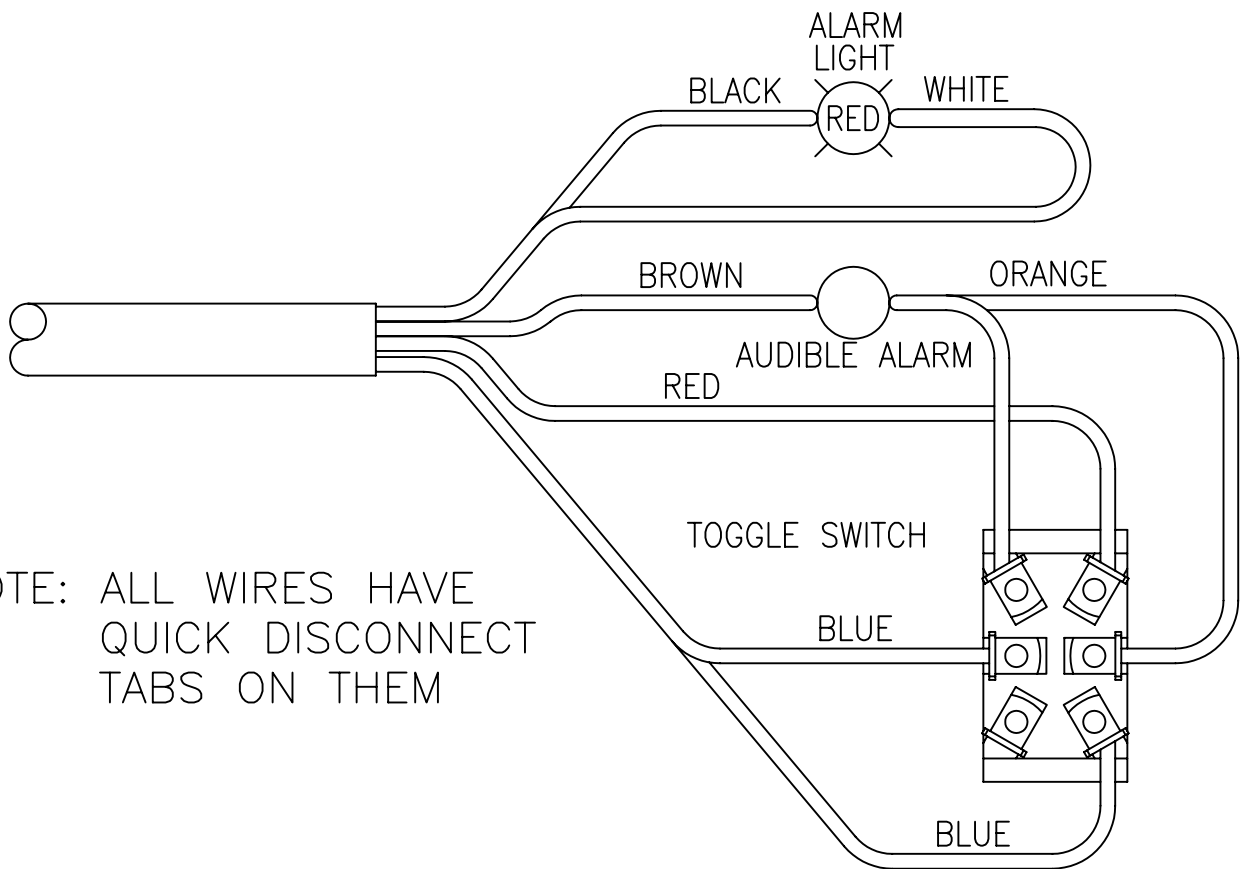
Wastewater Technologies

| CHANGES | TOLERANCES | DRAWN BY | DATE | POWER CONNECTION DIAGRAM | |
|---------|---|---|---------|-----------------------------|--|
| F | DECIMALS .XXX = ±.005 .XX = ±.010 FRACTIONAL X/X = ±.1/64 ANGLES X° = ±1/2° | D. MIDDLETON | 5/20/04 | | |
| E | | MATERIAL SPECIFICATION: AS NOTED | | | |
| D | | | | | |
| C | | | | | |
| B | | | | | |
| A | | | | | |

TIGHTENING TORQUE FOR TERMINAL BLOCK IS 9 in-lbs.

HYDRO-ACTION

CONNECTION DIAGRAM EC-11 EXTERNAL COMPONENTS



NOTE: ALL WIRES HAVE QUICK DISCONNECT TABS ON THEM

ALL INFORMATION CONTAINED IN THIS DRAWING IS CONFIDENTIAL AND PROPRIETARY TO SEPTIC PRODUCTS INC.



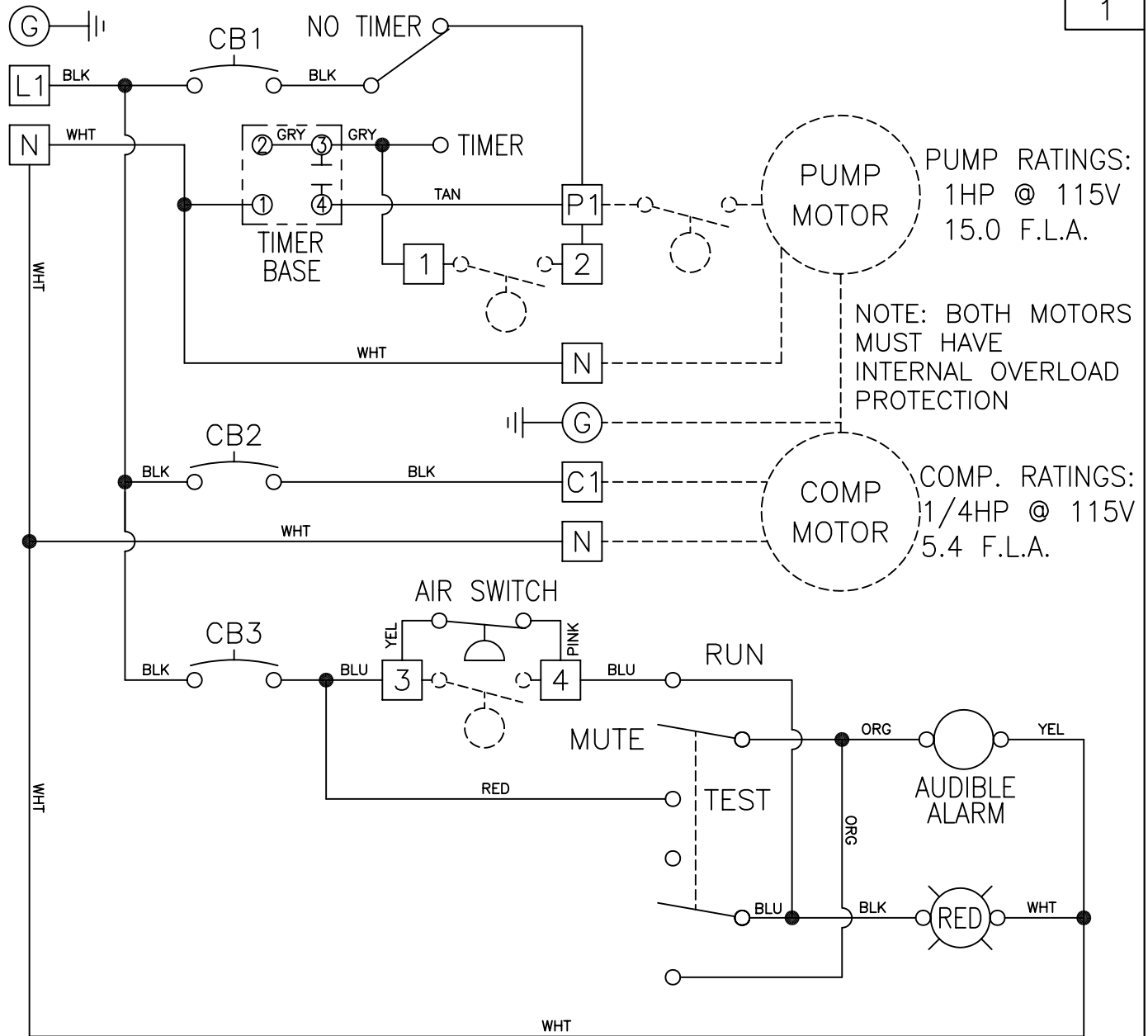
Wastewater Technologies

| CHANGES | TOLERANCES | DRAWN BY | DATE | POWER CONNECTION DIAGRAM | |
|---------|---|---|---------|-----------------------------|--|
| F | DECIMALS .XXX = ±.005 .XX = ±.010 FRACTIONAL X/X = ±.1/64 ANGLES X° = ±1/2° | D. MIDDLETON | 5/20/04 | | |
| E | | MATERIAL SPECIFICATION: AS NOTED | | | |
| D | | | | | |
| C | | | | | |
| B | | | | | |
| A | | | | | |

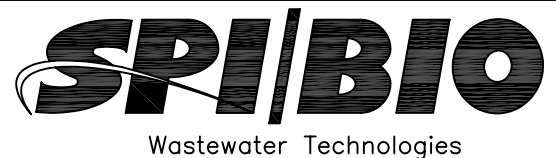
PUMP/COMPRESSOR POWER CIRCUIT
115V - 1PH

HYDRO-ACTION

PAGE
1



NOTES: MAIN PANEL DISCONNECT MUST BE PROVIDED BY INSTALLER.
DASHED LINES INDICATE ITEMS NOT CONTAINED IN THE PANEL.
FIELD WIRING MUST BE A MINIMUM OF 60°C COPPER WIRE.
REQUIRED TORQUE FOR TERMINAL BLOCK SCREWS IS 9 in.-lbs.
ALL INFORMATION CONTAINED IN THIS DRAWING IS
CONFIDENTIAL AND PROPRIETARY TO SEPTIC PRODUCTS, INC.

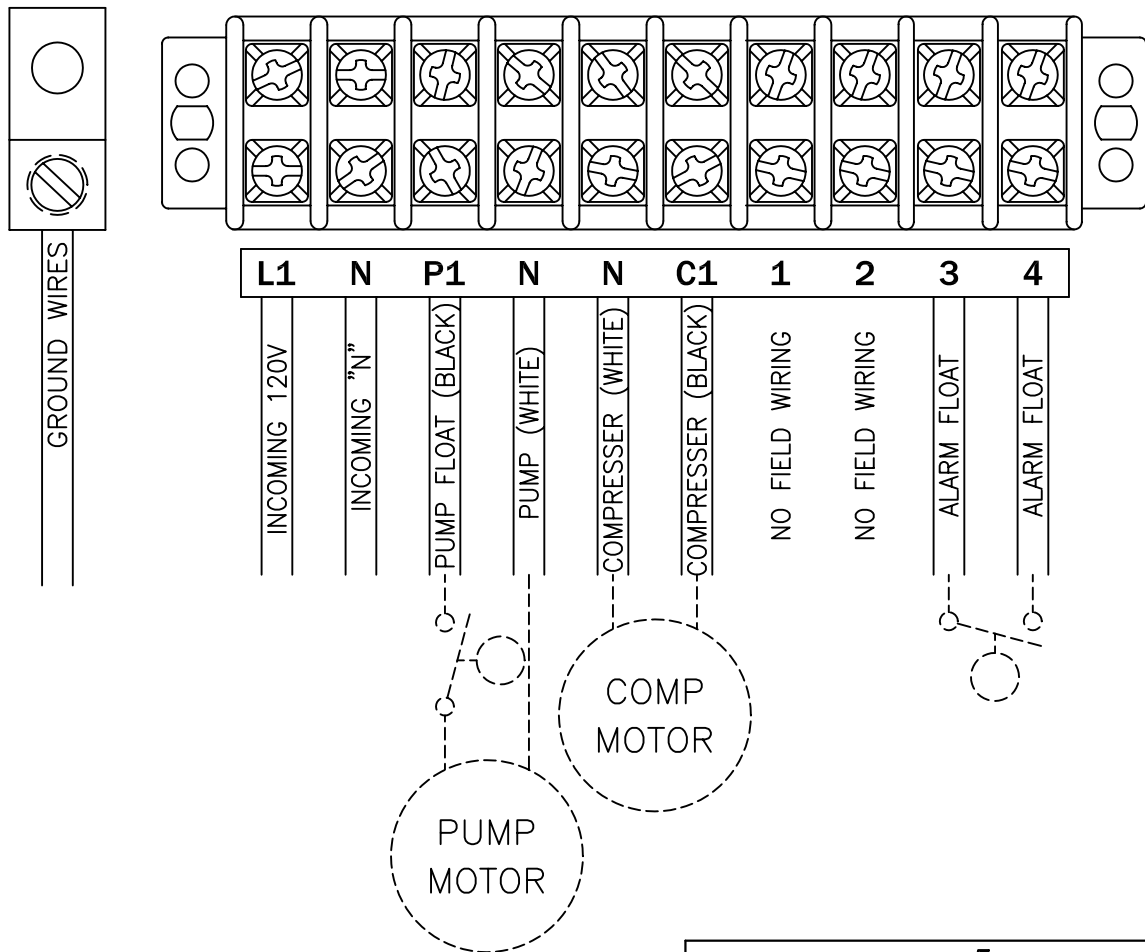


| CHANGES | TOLERANCES | DRAWN BY | DATE | SCHEMATIC, ELECTRICAL W/TIMER & AIR SWITCH | |
|---------|----------------------|---|----------|---|-------------|
| F | DECIMALS | D. MIDDLETON | 06/20/04 | SCALE: | PART NO. |
| E | .XXX = ±.005 | MATERIAL SPECIFICATION: AS NOTED | | FULL | CP-20/EC-20 |
| D | .XX = ±.010 | | | | |
| C | FRACTIONAL | | | | |
| B | X/X = ±.1/64 | | | | |
| A | ANGLES X' = ±1/2' | | | | |

TIGHTENING TORQUE FOR TERMINAL BLOCK IS 9 in-lbs.

HYDRO-ACTION

CONNECTION DIAGRAM FOR HYDRO-ACTION CP-20 & EC-20 CONTROL PANEL



ALL INFORMATION CONTAINED IN THIS DRAWING IS CONFIDENTIAL AND PROPRIETARY TO SEPTIC PRODUCTS INC.

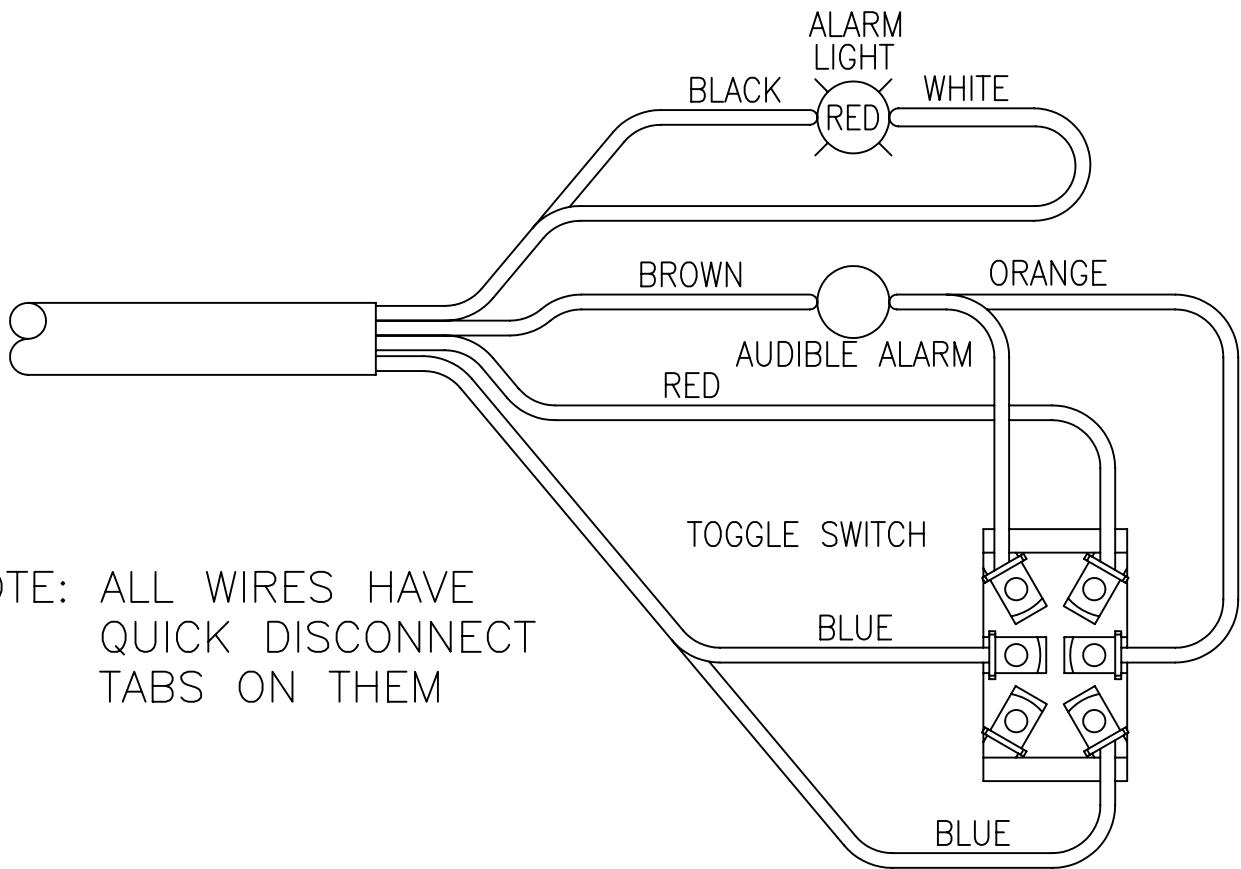


| | | | | |
|---------|---|-------------------------|-------------|-----------------------------|
| CHANGES | TOLERANCES | DRAWN BY | DATE | POWER CONNECTION DIAGRAM |
| F | DECIMALS .xxx = ±.005 .xx = ±.010 FRACTIONAL x/x = ±.1/64 ANGLES x° = ±1/2° | D. MIDDLETON | 12/15/04 | |
| E | | MATERIAL SPECIFICATION: | | |
| D | | AS NOTED | | |
| C | | SCALE: | PART NO. | |
| B | | FULL | CP-20/EC-20 | |
| A | | | | |

TIGHTENING TORQUE FOR TERMINAL BLOCK IS 9 in-lbs.

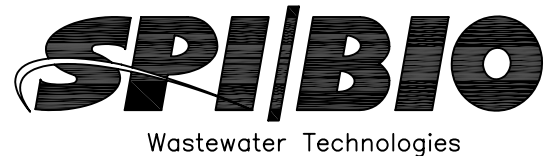
HYDRO-ACTION

CONNECTION DIAGRAM EC-20 EXTERNAL COMPONENTS



NOTE: ALL WIRES HAVE QUICK DISCONNECT TABS ON THEM

ALL INFORMATION CONTAINED IN THIS DRAWING IS CONFIDENTIAL AND PROPRIETARY TO SEPTIC PRODUCTS INC.

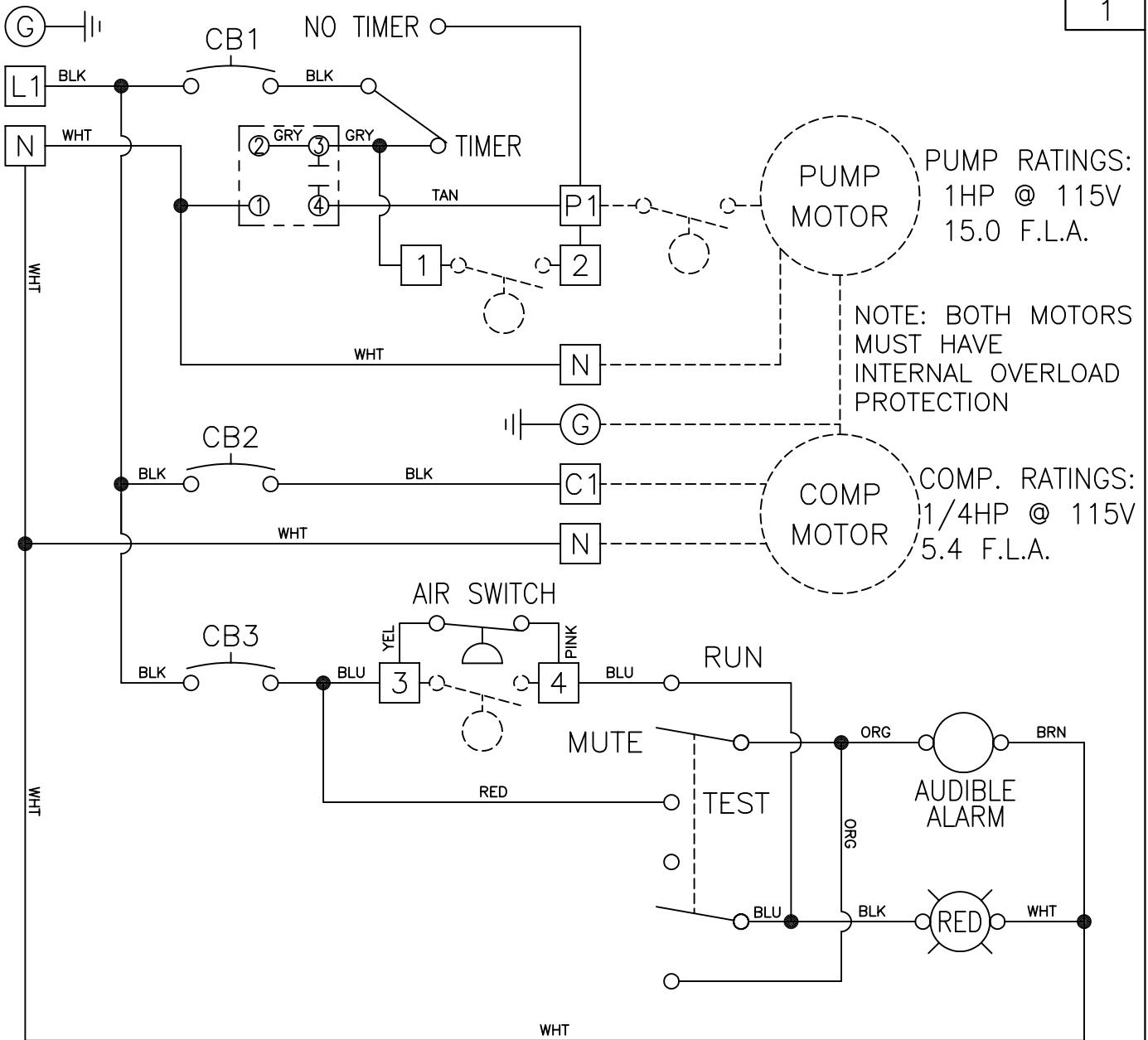


| CHANGES | TOLERANCES | DRAWN BY | DATE | POWER CONNECTION DIAGRAM | |
|---------|---|---|---------|-------------------------------------|--|
| F | DECIMALS .XXX = ±.005 .XX = ±.010 FRACTIONAL X/X = ±.1/64 ANGLES X° = ±1/2° | D. MIDDLETON | 5/20/04 | SCALE: PART NO. FULL CP-20/EC-20 | |
| E | | MATERIAL SPECIFICATION: AS NOTED | | | |
| D | | | | | |
| C | | | | | |
| B | | | | | |
| A | | | | | |

PUMP/COMPRESSOR POWER CIRCUIT
115V - 1PH

50B123/B122

PAGE
1



NOTES: MAIN PANEL DISCONNECT MUST BE PROVIDED BY INSTALLER.
DASHED LINES INDICATE ITEMS NOT CONTAINED IN THE PANEL.
FIELD WIRING MUST BE A MINIMUM OF 60°C COPPER WIRE.
REQUIRED TORQUE FOR TERMINAL BLOCK SCREWS IS 9 in-lbs.
ALL INFORMATION CONTAINED IN THIS DRAWING IS
CONFIDENTIAL AND PROPRIETARY TO SEPTIC PRODUCTS, INC.



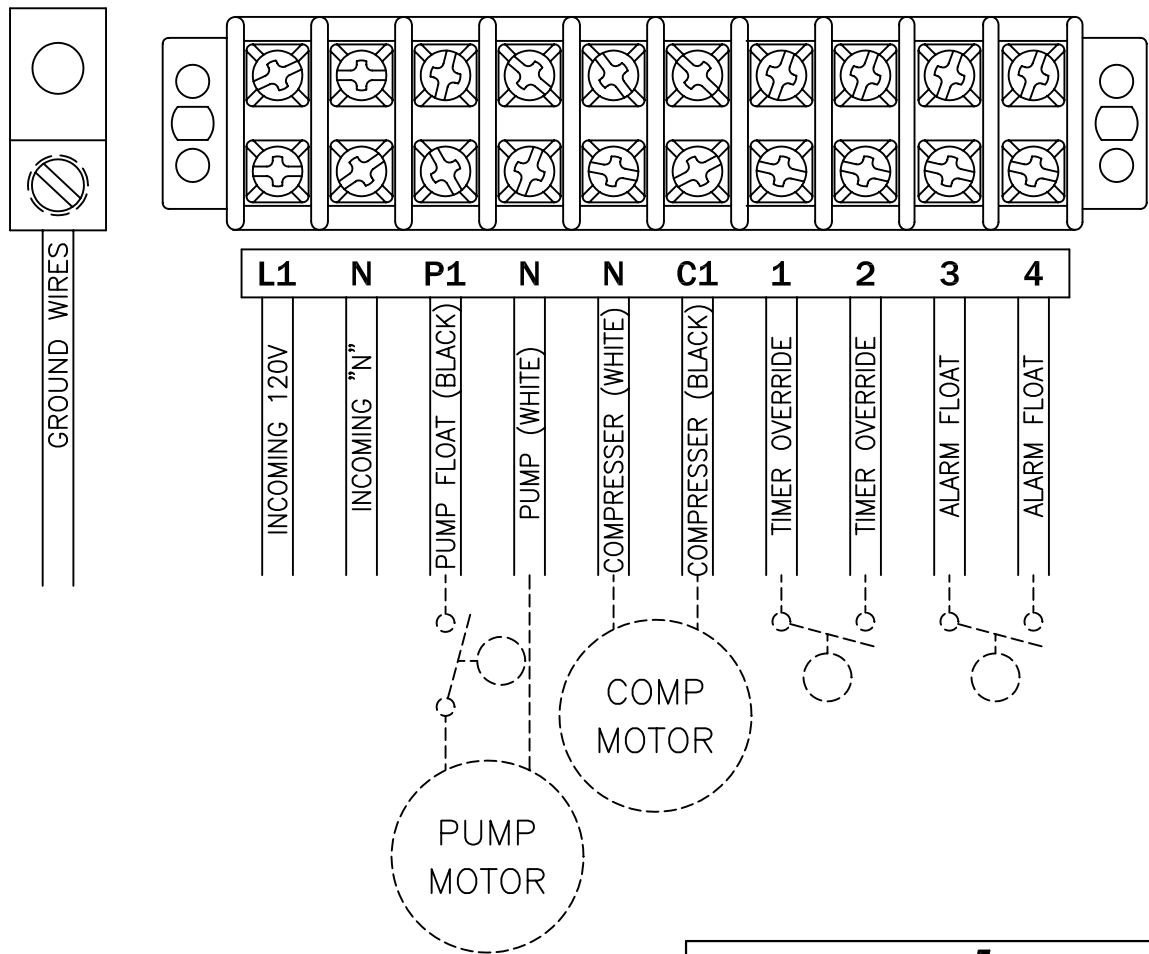
| CHANGES | TOLERANCES | DRAWN BY | DATE |
|---------|--------------------------|---|----------|
| F | DECIMALS .xxx = ±.005 | D. MIDDLETON | 06/20/04 |
| E | .xx = ±.010 | MATERIAL SPECIFICATION: AS NOTED | |
| D | FRACTIONAL | | |
| C | x/x = ±.1/64 | | |
| B | ANGLES | | |
| A | x' = ±1/2' | | |

| | |
|---|---------------|
| SCHEMATIC, ELECTRICAL W/TIMER & AIR SWITCH | |
| SCALE: | PART NO. |
| FULL | CP-30A/EC-30A |

TIGHTENING TORQUE FOR TERMINAL BLOCK IS 9 in-lbs.

HYDRO-ACTION

CONNECTION DIAGRAM FOR HYDRO-ACTION CP-30A & EC-30A CONTROL PANEL



ALL INFORMATION CONTAINED IN THIS DRAWING IS
CONFIDENTIAL AND PROPRIETARY TO SEPTIC PRODUCTS INC.



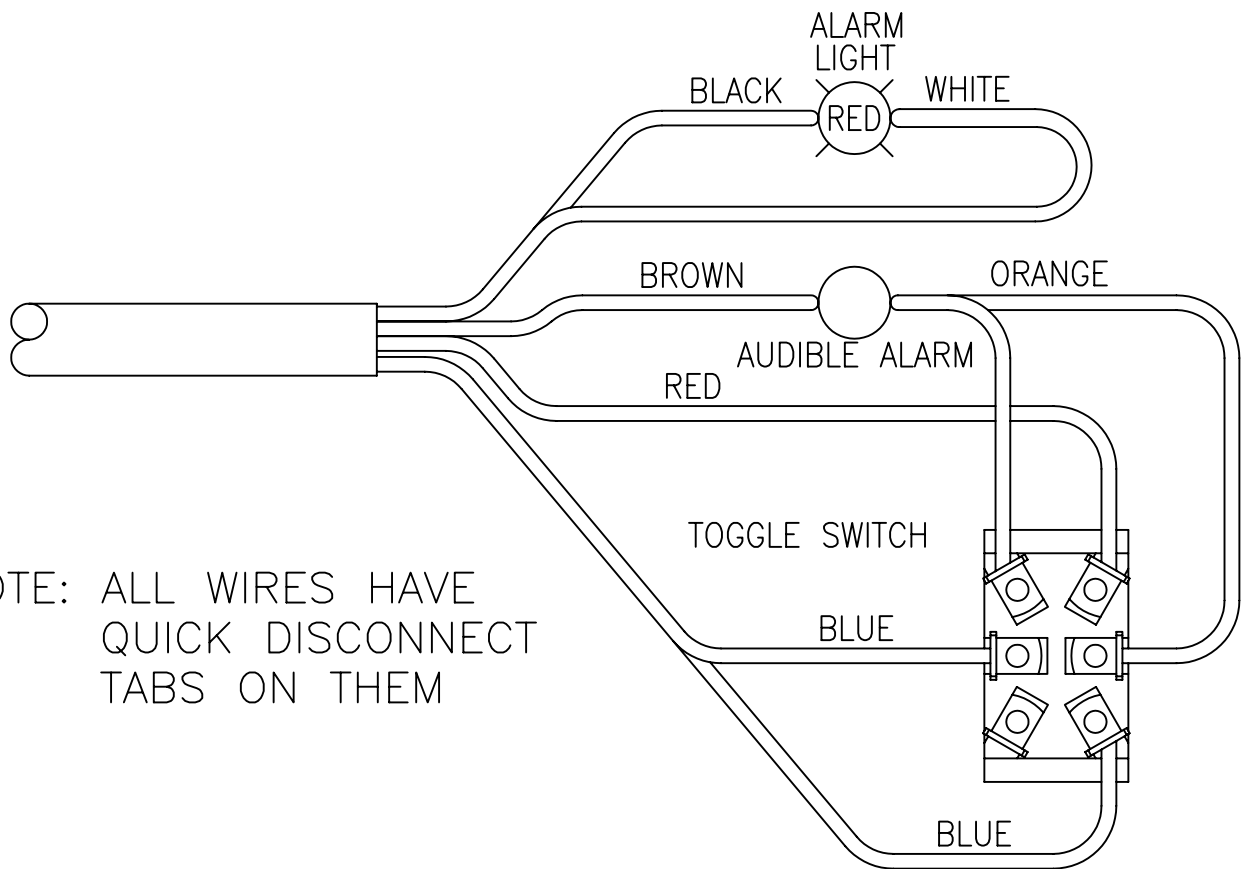
Wastewater Technologies

| CHANGES | TOLERANCES | DRAWN BY | DATE | POWER CONNECTION DIAGRAM | |
|---------|---|---|----------|--------------------------|--|
| F | DECIMALS .XXX = ±.005 .XX = ±.010 FRACTIONAL X/X = ±.1/64 ANGLES X' = ±1/2' | D. MIDDLETON | 12/15/04 | SCALE: PART NO. | |
| E | | MATERIAL SPECIFICATION: AS NOTED | | | |
| D | | | | | |
| C | | | | | |
| B | | | | | |
| A | | | | | |

TIGHTENING TORQUE FOR TERMINAL BLOCK IS 9 in-lbs.

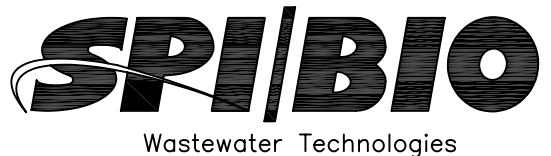
HYDRO-ACTION

CONNECTION DIAGRAM EC-30A EXTERNAL COMPONENTS



NOTE: ALL WIRES HAVE QUICK DISCONNECT TABS ON THEM

ALL INFORMATION CONTAINED IN THIS DRAWING IS CONFIDENTIAL AND PROPRIETARY TO SEPTIC PRODUCTS INC.

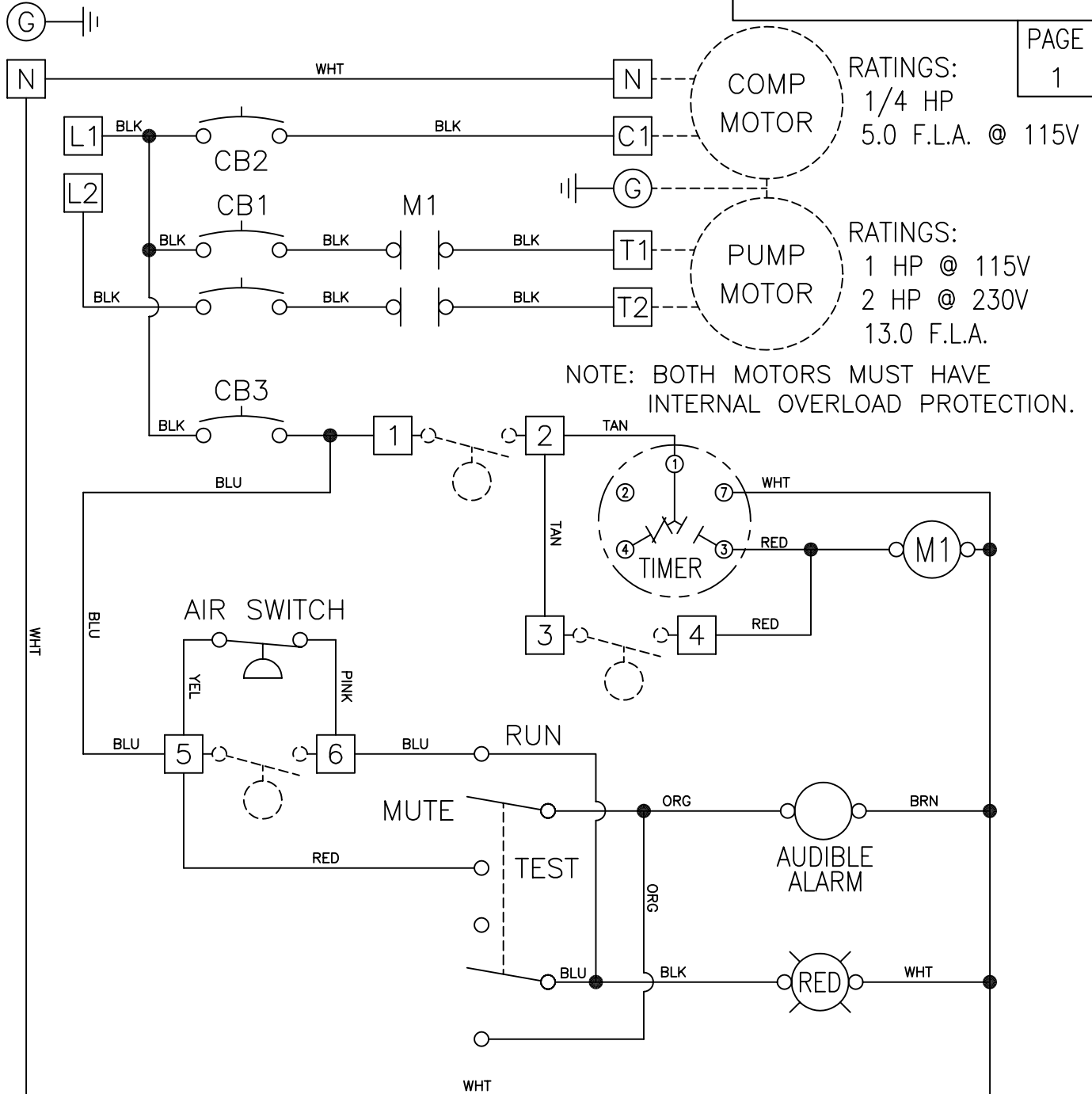


| CHANGES | TOLERANCES | DRAWN BY | DATE | POWER CONNECTION DIAGRAM | |
|---------|---|-------------------------|---------|-----------------------------|--|
| F | DECIMALS .XXX = ±.005 .XX = ±.010 FRACTIONAL X/X = ±.1/64 ANGLES X° = ±1/2° | D. MIDDLETON | 5/20/04 | | |
| E | | MATERIAL SPECIFICATION: | | | |
| D | | AS NOTED | | | |
| C | | | | | |
| B | | | | | |
| A | | | | | |

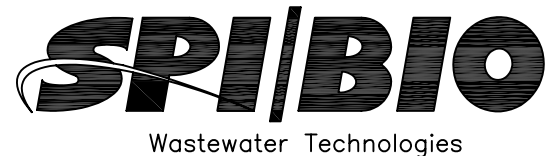
PUMP POWER CIRCUIT
115/230V - 1PH

50B124

PAGE
1



NOTES: MAIN PANEL DISCONNECT MUST BE PROVIDED BY INSTALLER.
DASHED LINES INDICATE ITEMS NOT CONTAINED IN THE PANEL.
FIELD WIRING MUST BE A MINIMUM OF 60°C COPPER WIRE.
REQUIRED TORQUE FOR TERMINAL BLOCK SCREWS IS 9 in.-lbs.



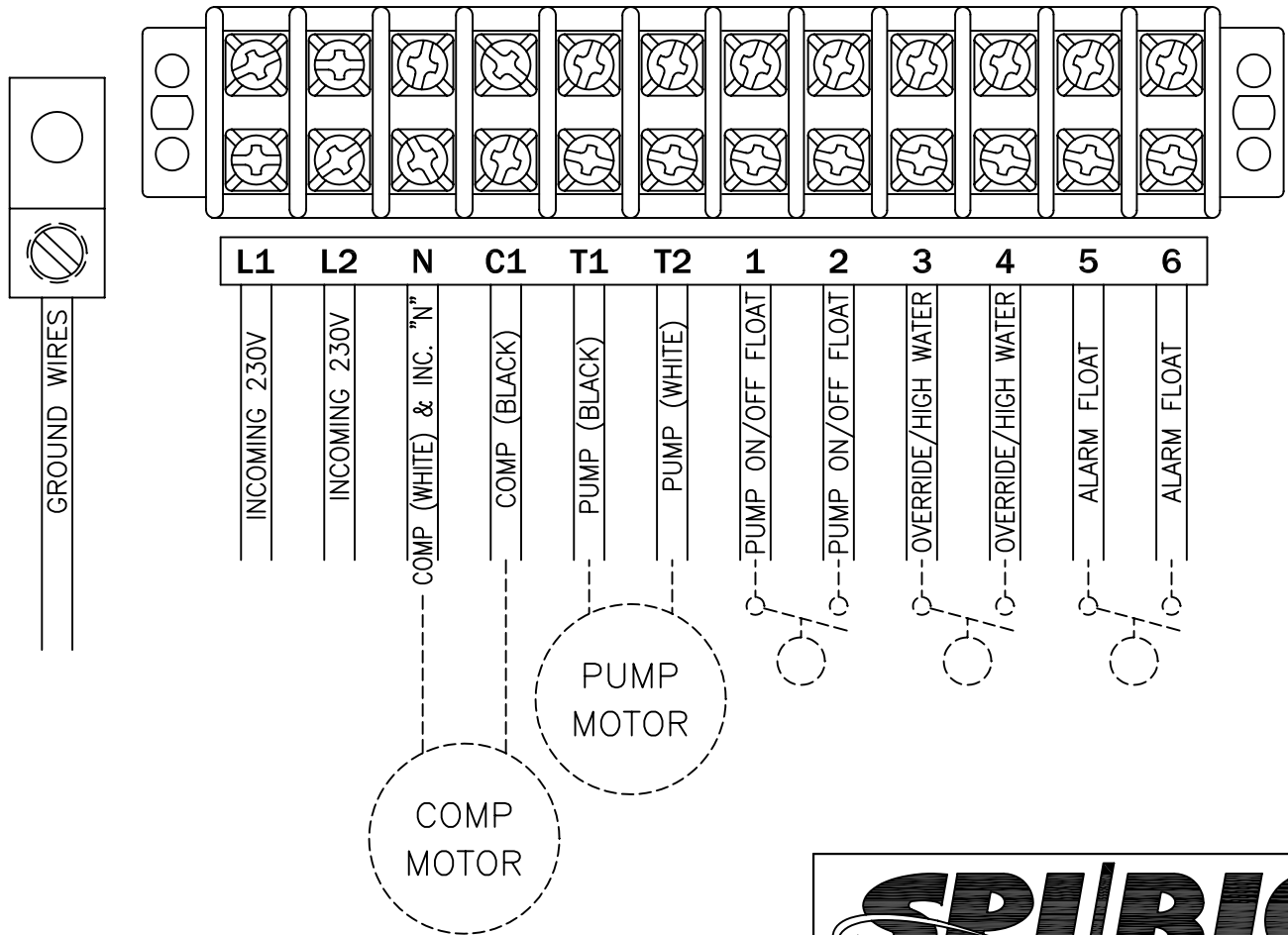
| CHANGES | TOLERANCES | DRAWN BY | DATE |
|---------|----------------------------|---|----------|
| F | DECIMALS .XXX = ±.005 | D. MIDDLETON | 06/20/04 |
| E | .XX = ±.010 | MATERIAL SPECIFICATION: AS NOTED | |
| D | FRACTIONAL X/X = ±.1/64 | | |
| C | ANGLES X° = ±1/2° | | |
| A | | | |

| | |
|---|-----------------------------|
| SCHEMATIC, ELECTRICAL SIMPLEX 115/230V | |
| SCALE: FULL | PART NO. CP-32A2/EC-32A2 |

TIGHTENING TORQUE FOR TERMINAL BLOCK IS 9 in-lbs.

HYDRO-ACTION

CONNECTION DIAGRAM FOR HYDRO-ACTION EC-32A2 & CP32A2 CONTROL PANEL (230V)



ALL INFORMATION CONTAINED IN THIS DRAWING IS CONFIDENTIAL AND PROPRIETARY TO SEPTIC PRODUCTS INC.



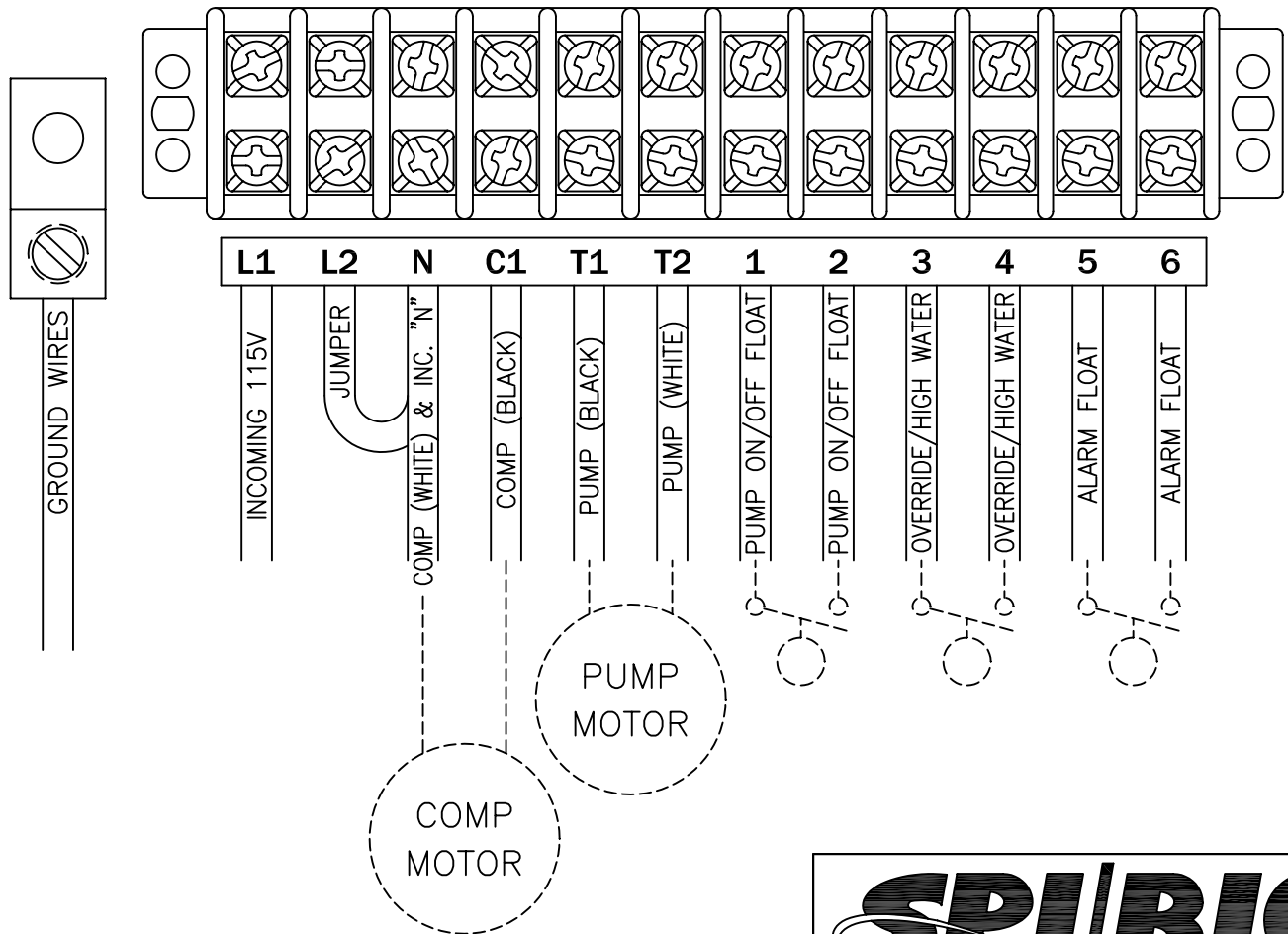
Wastewater Technologies

| | | | | | |
|---------|---|---|----------|---------------------------------------|-----------------|
| CHANGES | TOLERANCES | DRAWN BY | DATE | <h2>POWER CONNECTION DIAGRAM</h2> | |
| F | DECIMALS .xxx = ±.005 .xx = ±.010 | D. MIDDLETON | 12/15/04 | | |
| E | FRACTIONAL x/x = ±.1/64 | MATERIAL SPECIFICATION: AS NOTED | | SCALE: PART NO. | |
| D | ANGLES x° = ±1/2° | | | FULL | EC-32A2/CP-32A2 |
| C | | | | | |
| B | | | | | |
| A | | | | | |

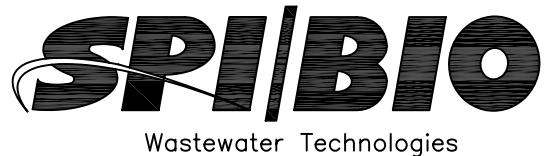
TIGHTENING TORQUE FOR TERMINAL BLOCK IS 9 in-lbs.

HYDRO-ACTION

CONNECTION DIAGRAM FOR HYDRO-ACTION EC-32A2 & CP32A2 CONTROL PANEL (115V)



ALL INFORMATION CONTAINED IN THIS DRAWING IS CONFIDENTIAL AND PROPRIETARY TO SEPTIC PRODUCTS INC.



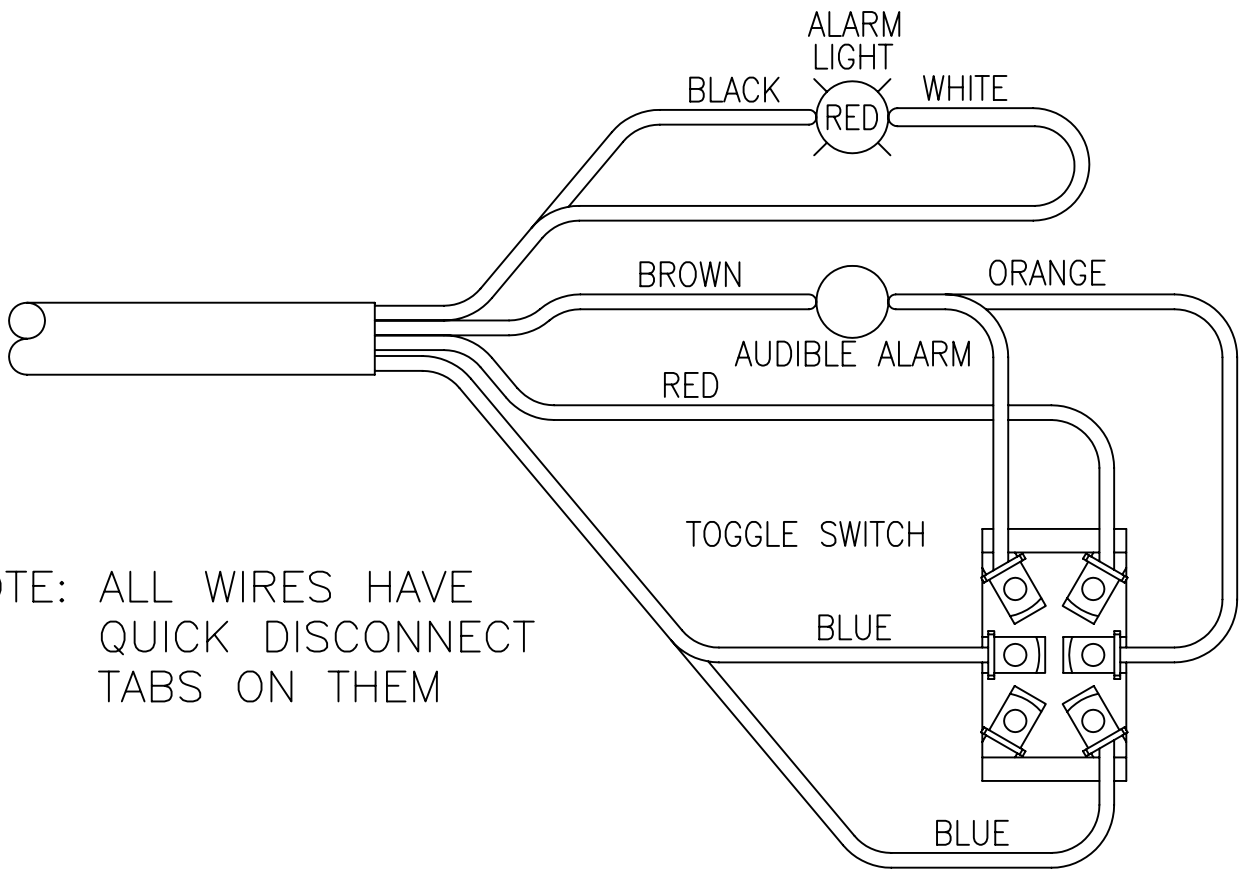
| CHANGES | TOLERANCES | DRAWN BY | DATE |
|---------|---|---|----------|
| F | DECIMALS .XXX = ±.005 .XX = ±.010 FRACTIONAL X/X = ±.1/64 ANGLES X° = ±1/2° | D. MIDDLETON | 12/15/04 |
| E | | MATERIAL SPECIFICATION: AS NOTED | |
| D | | | |
| C | | | |
| B | | | |
| A | | | |

| | |
|---------------------------------------|----------------|
| POWER CONNECTION DIAGRAM (EC-32A2) | |
| SCALE: | PART NO. |
| FULL | EC-32A2/CP32A2 |

TIGHTENING TORQUE FOR TERMINAL BLOCK IS 9 in-lbs.

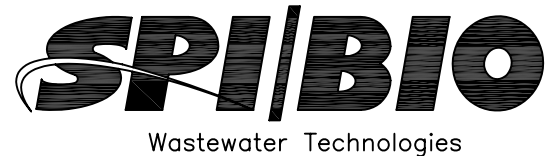
HYDRO-ACTION

CONNECTION DIAGRAM EC-32A2 EXTERNAL COMPONENTS



NOTE: ALL WIRES HAVE QUICK DISCONNECT TABS ON THEM

ALL INFORMATION CONTAINED IN THIS DRAWING IS CONFIDENTIAL AND PROPRIETARY TO SEPTIC PRODUCTS INC.



| CHANGES | TOLERANCES | DRAWN BY | DATE | POWER CONNECTION DIAGRAM | |
|---------|---|---|---------|-----------------------------|---------|
| F | DECIMALS .XXX = ±.005 .XX = ±.010 FRACTIONAL X/X = ±.1/64 ANGLES X° = ±1/2° | D. MIDDLETON | 5/20/04 | | |
| E | | MATERIAL SPECIFICATION: AS NOTED | | FULL | EC-32A2 |
| D | | | | | |
| C | | | | | |
| B | | | | | |
| A | | | | | |

Appendix 3:

Operation & Maintenance Technical Manual for air pumps



Thank you for purchasing this product. It is manufactured to the highest standards using quality materials. Please follow all recommended maintenance, operational and safety instructions and you will receive years of trouble free service.



WARNING



PLEASE READ THIS MANUAL COMPLETELY BEFORE INSTALLING AND USING THIS PRODUCT. SAVE THIS MANUAL FOR FUTURE REFERENCE AND KEEP IN THE VICINITY OF THE PRODUCT.

General information

- **Standard Rebuild Clearances:** Top: 0.0015"
Ends: 0.0025" - 0.005"
- **Model numbers ending in "X"** have automatic thermal protectors which protect the motor by shutting the motor off if it overheats. The motor will automatically restart once the motor has cooled.

Product Use Criteria:

- Pump only clean, dry air.
- Operate at 32°F - 104°F (0°C - 40°C).
- Protect unit from dirt & moisture.
- Do not pump flammable or explosive gases or use in an atmosphere that contains such gases.
- Protect all surrounding items from exhaust air. This exhaust air can become very hot.
- Corrosive gases and particulate material will damage unit. Water vapor, oil-based contaminants or other liquids must be filtered out.
- Consult manufacturer before using at high altitudes.
- Oil-Less rotary-vanes require NO lubrication.
- Sealed bearings are grease packed.
- Use of petroleum or hydrocarbon products will reduce carbon-vane service life.

Your safety and the safety of others is extremely important.

We have provided many important safety messages in this manual and on your product. Always read and obey all safety messages.



This is the safety alert symbol. This symbol alerts you to hazards that can kill or hurt you and others. The safety alert symbol and the words “DANGER” and “WARNING” will precede all safety messages. These words mean:



DANGER

You **will** be killed or seriously injured if you don't follow instructions.



WARNING

You **can** be killed or seriously injured if you don't follow instructions.

All safety messages will identify the hazard, tell you how to reduce the chance of injury, and tell you what can happen if the safety instructions are not followed.

INSTALLATION



WARNING



Electrical Shock Hazard

Disconnect electrical power at the circuit breaker or fuse box before installing this product.

Install this product where it will not come into contact with water or other liquids.

Install this product where it will be weather protected.

Electrically ground this product.

Failure to follow these instructions can result in death, fire or electrical shock.

Correct installation is your responsibility. Make sure you have the proper installation conditions and that installation clearances do not block air flow.

Blocking air flow over the product in any way can cause the product to overheat.

Mounting

This product can be installed in any orientation. Mounting the product to a stable, rigid operating surface and using shock mounts will reduce noise and vibration.

Plumbing

Remove plugs from the IN and OUT ports. Connect with pipe and fittings that are the same size or larger than the product's threaded ports. Install relief valves and gauges at inlet or outlet, or both, to monitor performance. Check valves are required to prevent back streaming through the pump.

Motor Control

It is your responsibility to contact a qualified electrician and assure that the electrical installation is adequate and in conformance with all national and local codes and ordinances.

Determine the correct overload setting required to protect the motor (see motor starter manufacturer's recommendations). Select fuses, motor protective switches or thermal protective switches to provide protection. Fuses act as short circuit protection for the motor, not as protection against overload. Incoming line fuses help to withstand the motor's starting current. Motor starters with thermal magnetic overload or circuit breakers protect motor from overload or reduced voltage conditions.

The wiring diagram attached to the product provides required electrical information. Check that power source is correct to properly operate the dual-voltage motor.

OPERATION



WARNING



Injury Hazard

Product surfaces become very hot during operation, allow product surfaces to cool before handling.

Air stream from product may contain solid or liquid material that can result in eye or skin damage, wear proper eye protection.

Do not pump flammable or explosive gases or use in atmospheres that contain such gases.

Failure to follow these instructions can result in fire, burns, eye injury or other serious injury.

It is your responsibility to operate this product at recommended pressures or vacuum duties and room ambient temperatures.

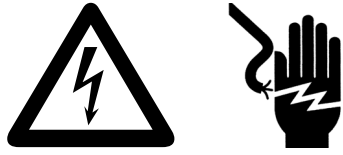
Model numbers ending in “X” have automatic thermal protectors which protect the motor by shutting the motor off if it overheats. The motor will automatically restart once the motor has cooled.

Start Up

If motor fails to start or slows down significantly under load, shut off and disconnect from power supply. Check that the voltage is correct for motor and that motor is turning in the proper direction. Vane life will be drastically reduced if motor is not operating properly. Vanes can break or be damaged if motor/pump runs in the wrong direction.

MAINTENANCE

WARNING



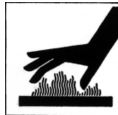
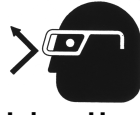
Electrical Shock Hazard

Disconnect electrical power supply cord before performing maintenance on this product.

If product is hard wired into system, disconnect electrical power at the circuit breaker or fuse box before performing maintenance on this product.

Failure to follow these instructions can result in death, fire or electrical shock.

WARNING



Injury Hazard

Wear eye protection when flushing this product.

Air stream from product may contain solid or liquid material that can result in eye or skin damage.

Flush this product in a well ventilated area.

Do Not use kerosene or other combustible solvents to flush this product.

Failure to follow these instructions can result in eye injury or other serious injury.

It is your responsibility to:

- **Regularly inspect and make necessary repairs to product in order to maintain proper operation.**
- **Make sure that pressure and vacuum is released from product before starting maintenance.**

Check intake and exhaust filters after first 500 hours of operation. Clean filters and determine how frequently filters should be checked during future operation. This one procedure will help to assure the product's performance and service life.

General Maintenance

1. Remove end cap and filters. Inspect filters for rips, tears, cuts, brittleness and excessive foreign material.
2. Clean filters if in good condition with compressed air. Re-inspect for wear conditions. Set filters aside.
3. Check both internal and external filter felts (#8 and #11 on exploded view) for foreign material. If felts are dirty or worn, replace with new felts.
4. Check condition of O-ring on internal filter. It should be soft and flexible. Replace if it is not.
5. Remove and inspect muffler box. Clean box. Set box aside. (Not all models have a muffler box.)
6. Check gasket for cracks or tears. Install new gasket if any cracks or tears appear. Replace gasket.
7. Reinstall muffler box. Torque bolts to 90-120 in. lb.
8. Reinstall filters or install new filters if required. Reinstall end cap finger tight.

Flushing

Flushing this product to remove excessive dirt, foreign particles, moisture or oil that occurs in the operating environment will help to maintain proper vane performance. There are 2 options for this operation. If Option 1 does not remedy your problem, go on to Option 2.

Use only Gast AH255B Flushing Solvent or other non-petroleum based flushing solvent. Do Not use kerosene or ANY other combustible solvents to flush product.

Option 1

You will need 2 pipe nipples at least 4 inches long with appropriate thread size for the unit involved. No nipples are needed if the unit does not have a muffler box.

1. Remove filter and muffler cap (#9).
2. Remove 5 bolts. Use a small hammer to tap on muffler box to remove it. Attach pipe nipples where muffler caps were removed.
3. Start product and add flushing solvent to the inlet port. If using liquid solvent, pour several tablespoons directly into the inlet port. If using Gast AH255B, spray solvent for 5-10 seconds into inlet port. Place towel over exhaust port to clean up solvent.
4. Plug inlet port for 20-30 seconds. Listen for changes in the sound of the pump. If pump sounds smooth, go to next step. If pump does not sound like it is running smoothly, installing a Service Kit will be required (See Service).
5. Release vacuum.
6. Repeat steps 3-5 three or four times.

If Option 1 is not successful, remove the end plate and examine.

Option 2

1. Remove six end plate bolts. (See exploded view.)
2. Use a small hammer to carefully tap on end plate to remove. Do not use a screwdriver to pry off.
3. Check that vanes are moving freely in and out of vane slots. Replace vanes if more than 50% of the vane extends past the vane slot.
4. Remove vanes and clean both sides with fine emery cloth. Clean end-plate with fine emery cloth.
5. Flush vanes with AH255B solvent and remove all solvent from vanes.
6. Flush body, rotor and end plate with AH255B solvent, then remove all solvent from each part.
7. Check body, rotor and end plate for scoring. If each part is clean and shows no signs of scoring, re-install parts. If scoring appears, send unit to factory or replace with new part(s).
8. Insert vanes, checking that the bevel edges are in the correct direction.
9. Replace end plate. Torque bolts to 90-120 in. lb.
10. Check gasket for damage.
11. Reinstall muffler box. Torque bolts to 90-120 in. lb.

Check that all external accessories such as relief valves and gauges are attached to cover and are not damaged before re-operating product.

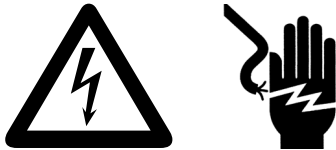
SHUTDOWN PROCEDURES

It is your responsibility to follow proper shutdown procedures to prevent product damage. NEVER ADD OIL TO THIS OIL-LESS PUMP.

1. Disconnect plumbing.
2. Operate product for at least five minutes without plumbing.
3. Run at maximum vacuum for 10-15 minutes.
4. Repeat step 2.
5. Disconnect power supply.
6. Plug open ports to prevent dirt or other contaminants from entering product.

SERVICE KIT INSTALLATION

WARNING



Electrical Shock Hazard

Disconnect electrical power supply cord before installing Service Kit.

If product is hard wired into system, disconnect electrical power at the circuit breaker or fuse box before installing Service Kit.

Vent all air lines to release pressure or vacuum.

Failure to follow these instructions can result in death, fire or electrical shock.

Manufacturer will NOT guarantee field-rebuilt product performance. For performance guarantee, the product must be returned to the manufacturer.

Service Kit contents vary. Most contain vanes, gaskets and filter parts.

1. Remove filter/muffler parts from front of muffler box.
2. Remove the 5 muffler box bolts.
3. Use a small hammer to tap on box to remove. Do not use a screwdriver.
4. Remove the 6 end plate bolts.
5. Remove end plate. Check direction of bevel edges of vanes then remove vanes.
6. Clean body and rotor slots with AH255B or equivalent flushing solvent. Hand turn the rotor to make sure it rotates freely. Any unusual grinding or scraping sound could indicate worn bearings or scored parts.
7. Check end plate, rotor and body for scoring. Severe scoring or worn bearings will require service at the manufacturer.

DO NOT remove rotor or motor bolts.

8. Insert vanes, checking that the bevel edges are in the correct direction. See diagram below.
9. Replace end plate. Torque bolts to 90-120 in. lb.
10. Check gasket for damage.
11. Reinstall muffler box. Torque bolts to 90-120 in. lb.

Check that all external accessories such as relief valves and gauges are attached and are not damaged before re-operating product.

The vanes need to be flush with the curvature of the rotor when installing.

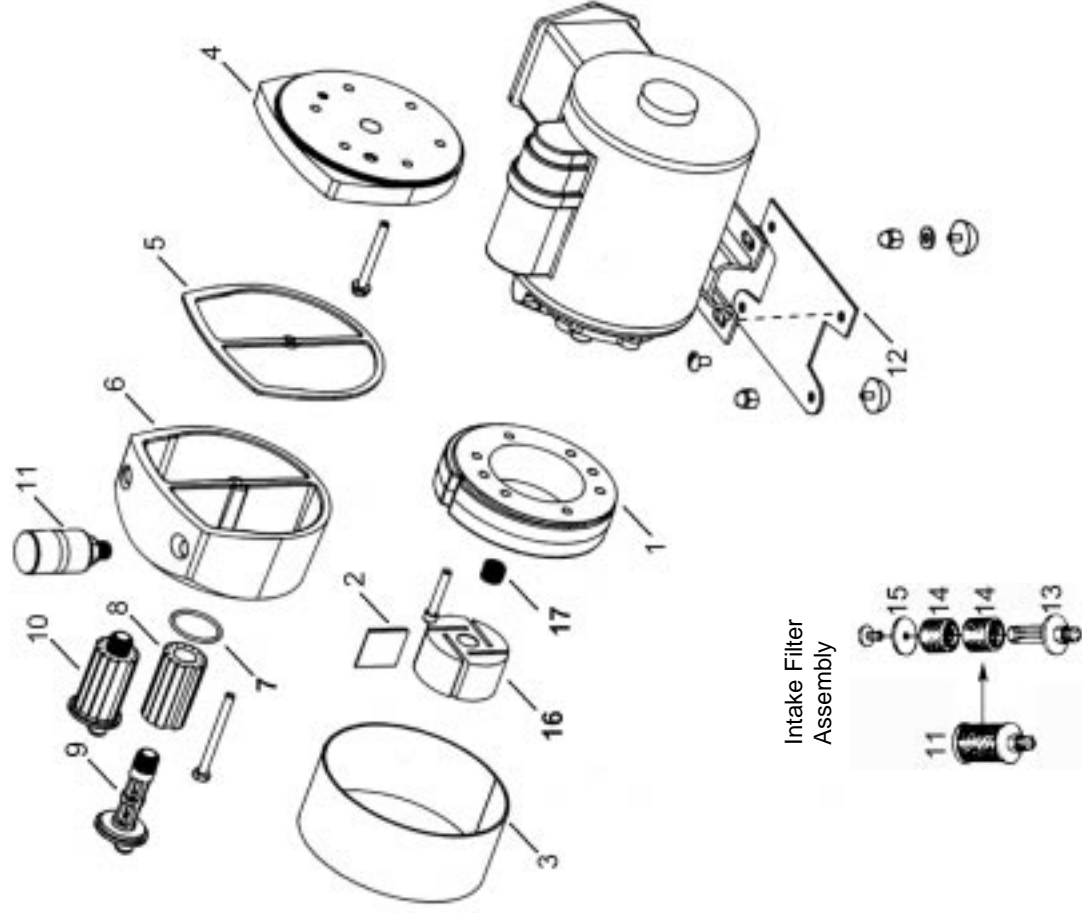


EXPLODED PRODUCT VIEW, PARTS & ORDERING INFORMATION

| REF | DESCRIPTION | QTY | RV03-101 | RV05-101 |
|-----|------------------|-----|----------|----------|
| 1 | BODY | 1 | AK504 | AK500 |
| 2* | VANE | 4 | AH850A | AH850A |
| 3 | SHROUD | 1 | AK502B | AK502B |
| 4 | END PLATE | 1 | AK501 | AK501 |
| 5* | GASKET | 1 | AK521 | AK521 |
| 6 | MUFFLER BOX | 1 | AK519 | AK519 |
| 7* | O-RING | 2 | AK473 | AK473 |
| 8* | FELT | 2 | AK524 | AK524 |
| 9 | END CAP | 2 | AK510 | AK510 |
| 10 | END CAP FILTER | 2 | AK526 | AK526 |
| | ASSEMBLY | | | |
| 11 | FILTER / MUFFLER | 1 | B343B | B343B |
| 12 | FOOT SUPPORT KIT | 1 | AC136 | AC136 |
| 13 | FELT SUPPORT | 1 | B347 | B347 |
| 14* | FELT FILTER | 2 | B344A | B344A |
| 15 | SCREEN CAP | 1 | AJ571 | AJ571 |
| 16 | ROTOR | 1 | AH775B | AH775B |
| 17 | TOLERANCE RING | 1 | AF105 | AF105 |
| | SERVICE KIT | 1 | K882 | K882 |

* Denotes parts included in the Service Kit. Parts listed are for stock models.

** No Service Kit available, order parts separately. For specific OEM models, please consult the factory. When corresponding or ordering parts, please give complete model and serial numbers.



PART NO. 70-299 (REV-A)

TROUBLESHOOTING CHART

| Low | | High | | Pump Overheat | Motor Overload | Reason and remedy for problem. |
|--------|----------|--------|----------|------------------|-------------------|--|
| Vacuum | Pressure | Vacuum | Pressure | | | |
| ● | ● | | | ● | ● | Filter dirty. Clean or replace. |
| | ● | | | ● | ● | Muffler dirty. Clean or replace. |
| ● | | | | ● | ● | Vacuum line collapsed. Repair or replace. |
| | | | ● | ● | ● | Relief valve set too high. Inspect and adjust. |
| ● | ● | | | | | Relief valve set too low. Inspect and adjust. |
| ● | ● | | | ● | ● | Plugged vacuum/pressure line. Inspect and repair. |
| ● | ● | | | | | Vanes sticking. Clean or replace. |
| ● | ● | | | | | Vanes worn. Replace. |
| ● | ● | | | ● | ● | Foreign material- in pump. Inspect and clean. |
| ● | ● | | | ● | ● | Motor not wired correctly. Check wiring diagram and line voltage. |
| | | | | | | |

GAST

A UNIT OF IDEX CORPORATION

BENTON HARBOR, MI U.S.A.

GAST MANUFACTURING INC.
A Unit of IDEX Corporation
Post Office Box 97
Benton Harbor, Michigan
Ph: 269/926-6171
Fax: 269/925-8288

CUSTOMER:

AK/HA MFG.

REV.

PART NUMBER:

1023-101Q-G302X

B

NOTES:

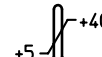
- ALL DIMENSIONS ARE FOR REF. USE ONLY.
- PRODUCT DIMENSIONS: U.S. IMPERIAL (inches) METRIC (mm)
- INSTALLATION: IT IS THE ORIGINAL EQUIPMENT MANUFACTURERS RESPONSIBILITY TO DETERMINE SUITABILITY OF THIS DESIGN IN THEIR APPLICATION.
- PRODUCTION PERFORMANCE DATA MAY HAVE MINOR VARIATIONS FROM THE DATA SHOWN.
- MOTOR INFO:


CONSTRUCTION E47088 VOL 1 UL STD 1004
INSULATION E214391 VOL 1 UL STD 1446
OVERLOAD E14133 VOL 5 UL STD 2111

CUSTOMER SIGN OFF: _____

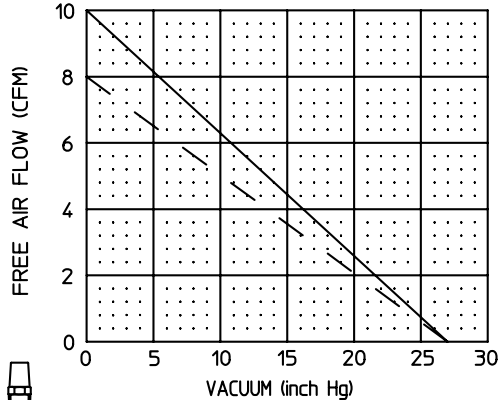
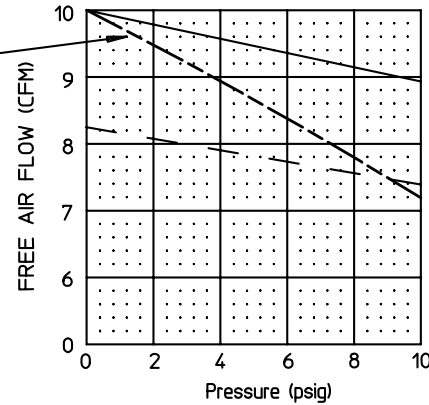
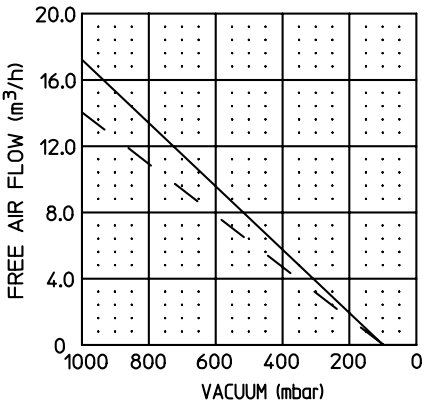
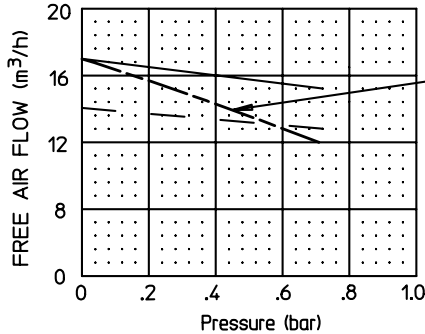
DATE: _____


<40 dBA

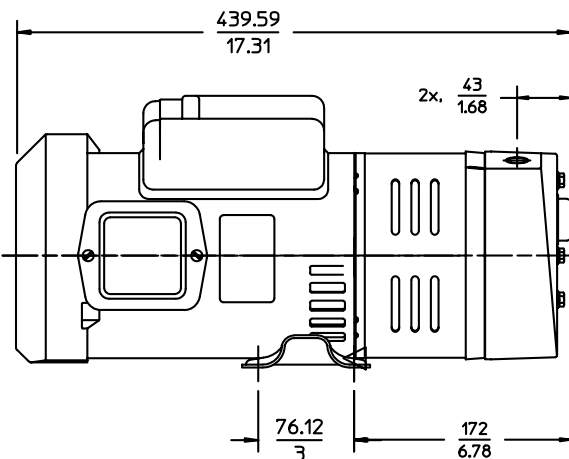
 +40 °C

 20-80 %

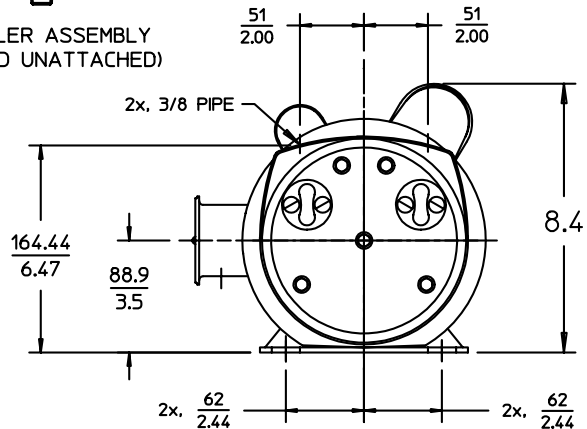
 2.4 kg



THIS LINE FOR MODEL:
2-UNITS IN PARALLEL
RV05-520-G650DAX



MUFFLER ASSEMBLY
(SHIPPED UNATTACHED)



Model/Modèle/Modelo/Modell

REF. XB4601

Product Specifications

| MODEL NUMBER | MOTOR | RPM | | HP | kw | NET WT. | | AMPS |
|-----------------|-----------------|----------|----------|-----|------|---------|------|---------|
| | | 60 cycle | 50 cycle | | | lbs. | kg. | |
| 1023-101Q-G302X | 100-115/208-230 | 1725 | 1425 | 3/4 | 0.56 | 47 | 21.3 | 7.8/3.9 |



TECHNICAL BULLETIN

DATE: 06/15/2004

SUBJECT: Back Pressure Readings for Air Pump Warranties

Hydro-Action Industries' warranty guarantees our system to be free from defects in material and workmanship. Air pumps are sensitive to back pressure, caused by restrictions in the air delivery lines, commonly caused by diffuser stones clogging over time, and failures caused by excessive back pressure are not a warrantable item. Our O&M Manual states that stones must be changed when back pressure reaches 3.5 psi to keep excessive back pressure from harming the air pump.

We now require that an air system back-pressure reading be taken and recorded from each serviced system at each maintenance visit, using a 5psi gauge to insure accurate readings. This is so system back-pressure stays below the prescribed 3.5 psi, protecting air pump life. If any remedial action is taken with the air system during a service visit (filters cleaned, leaks repaired, stones replaced, etc.), a beginning reading (before the remediation) and a final reading (after the remediation) should be taken to document the effect your service had on air pump back pressure.

Because normal operating pressure in our systems are in the 2.5-3.5 psi range, a 5 psi gauge is necessary to accurately measure system back pressure (if a 15 psi gauge is used, an error of as much as .5 psi is possible, an unacceptable variance). We make available a 5psi gauge, complete with locking chuck, for this purpose. The part number is 700191 and the gauge is priced at \$99 list (your multiplier will apply).



Part # 700191

Beginning August 1, 2004, all requests for air pump warranty replacement must be accompanied by a copy of your last inspection report on the subject system, showing proper back-pressure readings taken from the system. This will insure that air pump warranties are properly and fairly applied.

Appendix 4 OPS Explanation

50-11 Series OPS

Wastewater Plant Control

This OPS provides total control of the aerobic unit including air pump and alarms. Other features include separate disconnect switch (which cuts off power to all electrical components) with an optional lockout feature. It requires a single circuit 120 volt / 20 amp feed.

Typical Applications Include:

- Direct Discharge
- Gravity Flow to Gravel Drain Fields
- Gravity Flow to Leaching Chambers or any disposal method where a pump is not required.

Equipment Included:

- 1 – Rotary Vane Air Pump
- 1 – Polyethylene OPS Base & Enclosure
- 1 – Electrical Control

Small Components Include:

Wiring harnesses, electrical connectors, liquid tight compression fittings, air tubing, shraeder valve, audible alarm, visual alarm, and various other components which provide for integration of the OPS.

50-20 Series OPS

Wastewater Plant / Pump Tank Control

This OPS provides total control of the aerobic unit and pump tank including air pump, water pump and alarms. Other features include two-branch circuit breakers, separate disconnect switch (which cuts off power to all electrical components) with an optional lockout feature. It requires a single circuit 120 volt / 30 amp feed.

Typical Applications Include:

- Spray Irrigation
- Pumping to Gravel Drain Fields
- Pumping to Low Pressure Dosing Systems
- Pumping to Leaching Chambers or any disposal method requiring a pump where timed dosing is not required.

Equipment Included:

- 1 – Rotary Vane Air Pump
- 1 – Polyethylene OPS Base & Enclosure
- 1 – Electrical Control

Floats Switches Required:

- 1 – Water Pump On/Off Float
- 1 – Pump Tank High Level Alarm Float

Small Components Include:

Wiring harnesses, electrical connectors, liquid tight compression fittings, air tubing, shraeder valve, audible alarm, visual alarm, and various other components which provide for integration of the OPS.

50-30 Series OPS

Wastewater Plant / Pump Tank Control w/ 24 HR Timer

This OPS provides total control of the aerobic unit and pump tank including air pump, water pump and alarms. Other features include two-branch circuit breakers, separate disconnect switch (which cuts off power to all electrical components) with an optional lockout feature and a 24 hr. timer. It requires a single circuit 120 volt / 30 amp feed.

Typical Applications Include:

- Spray Irrigation
- Pumping to Gravel Drain Fields
- Pumping to Low Pressure Dosing Systems
- Pumping to Leaching Chambers or any disposal method requiring a pump where 24 hr. – 15 minute increment timed dosing is required.

Equipment Included:

- 1 – Rotary Vane Air Pump
- 1 – Polyethylene OPS Base & Enclosure
- 1 – Electrical Control w/ 24 hr. – 15 min. Timer

Floats Switches Required:

- 1 – Water Pump On/Off Float
- 1 – Pump Tank High Level Alarm Float

Optional Float Switch:

- 1 – Pump Tank Timer Override Float

Small Components Include:

Wiring harnesses, electrical connectors, liquid tight compression fittings, air tubing, shraeder valve, audible alarm, visual alarm, and various other components which provide for integration of the OPS.

50-32 Series OPS

Wastewater Plant / Pump Tank Control w/ Micro-dose Timer / For Use w/ Hydro-action Turtle-drip.

This OPS provides total control of the aerobic unit and pump tank including air pump, water pump and alarms. Other features include high-level override, two-branch circuit breakers, separate disconnect switch (which cuts off power to all electrical components) with an optional lockout feature with a fully adjustable repeat cycle (micro-dosing) timer. It requires a single circuit 120 volt / 30 amp feed.

Typical Applications Include:

- Drip Irrigation
- Pumping to Gravel Drain Fields
- Pumping to Low Pressure Dosing Systems
- Pumping to Leaching Chambers or any disposal method requiring a pump where micro-dosing is desired with single float high level override / high level alarm.

Equipment Included:

- 1 – Rotary Vane Air Pump
- 1 – Polyethylene OPS Base & Enclosure
- 1 – Electrical Control w/ Micro-dosing Timer

Floats Switches Required:

- 1 – Water Pump On/Off Float
- 1 – Pump Tank High Level Alarm Float/Timer Override Float

Small Components Include:

Wiring harnesses, electrical connectors, liquid tight compression fittings, air tubing, shraeder valve, audible alarm, visual alarm, and various other components which provide for integration of the OPS.

Appendix 5:

Misc. Forms & Documents

Suggested Initial Service Contract.....

Suggested Service Call Procedure.....

Service Technician Checklist.....

Installation Checklist.....

Limited Warranty.....

Warranty Registration.....

Proper use of the Sludge Judge.....

Technical Bulletin: Disinfection with Chlorine.....

Homeowner Care Instructions.....

INITIAL SERVICE POLICY

Our company, _____, will provide a two-year initial service policy, which will provide for inspection and service of your **HYDRO-ACTION INDUSTRIES** treatment plant. The policy will include the following:

- Four inspection/service calls (at least one every six (6) months) or _____ inspection/service calls every _____ months as per local regulation, over the two (2) year period including inspection, adjustment and servicing of the mechanical, electrical and other applicable component parts to ensure proper function. This includes inspecting OPS, air pump, air filter, diffuser operation, and cleaning and replacing or repairing any component not found to be functioning correctly. (In the state of Texas, this service must be performed three times per year, timed to every four months.)
- An effluent quality inspection consisting of a visual check for color, turbidity, scum overflow and examination for odors.
- Maintenance company will visit the property in response to a complaint by the property owner regarding the operation of the system within _____ hours.
- Disinfection unit (if applicable) will be maintained by:

Property Owner

Maintenance Company

The following person is certified by Hydro-Action to perform service on Hydro-Action systems:

(Certified Hydro-Action Industries Service Technician – Please Print Name)

(HAI Cert. #)

If any improper operation is observed that cannot be corrected at the time of the inspection/service call, you shall be notified immediately in writing of the conditions and the estimated date of correction.

At the conclusion of the initial service policy, our company will make available, for purchase on an annual basis, a continuing service policy to cover labor for normal inspection, maintenance, and repair.

Owner/user operation instructions must be strictly followed or warranties are subject to invalidation.

Pumping of sludge build-up from the plant, if necessary, is not included in these services.

OWNER:

MAINTENANCE COMPANY:

DATE: _____



Suggested Service Call Procedure

Hydro-Action Industries' aerobic treatment systems should be serviced at least every six months per NSF International regulation. Some states require more frequent calls. This service call procedure meets all NSF International requirements for the Aerobic Treatment Unit as well as pretreatment and pump tanks.

Service Procedure:

1. Remove cover from OPS ® Operations Control Center. Open access covers on treatment unit, pre-treatment and pump tanks. Observe the mixed liquor in the mixing chamber of the treatment unit. Note on the inspection report the condition per your Plant Condition Chart. If there is a noticeable odor in either the treatment unit or pump tank, take a Settleable Solids Test sample and set aside. This test may be observed after 45 minutes settling time and read per your Plant Condition Chart.
2. Gauge back pressure in the air system by attaching a 5 psi air gauge to the provided schrader valve. Note the reading on your inspection report. Back pressure should be between 2.75 psi and 3.5 psi for normal operation. If the back pressure exceeds 3.5 psi, replace the diffuser stones. If back pressure is allowed to exceed 4 psi for any length of time, air pump damage may occur. In an initial visit to an existing system, inspect the diffuser stones prior to taking air pressure readings; if the stones are clogged, the overpressure you will encounter may damage the 5 psi gauge.
3. Remove small air pressure tube from barbed fitting beside schrader valve. Low Air Pressure Alarm should sound. Re-attach tube to barbed fitting.
4. Inspect air pump filters, cleaning or replacing as necessary.
5. Remove any surface sludge from the mixing chamber and clarification chamber. Dispose of this sludge as local regulations require.
6. Inspect high level alarm function by lifting the float. Alarm should sound. Note results in your inspection report.
7. Take a sludge level reading from the mixing chamber and note in your inspection report. Read settleable solids test and note results on your inspection report. Pour test sample back into mixing chamber. Close the access cover and secure with security screws.
8. Lift high level alarm (upper) float in pump tank to assure proper operation. Alarm should sound.
9. Remove effluent pump stalk. Lift lower float to test. Pump should start when float is lifted above level. Do not run effluent pump over 5 seconds by this method or effluent pump damage may occur.
10. Remove and clean effluent pump screens. If a Chlorine Residual Test is to be performed, take your sample at this time. If the system is chlorinated, check chlorine level and add chlorine if necessary.
11. Replace pump stalk and replace access cover, securing with security screws. Replace cover on OPS ® unit and secure with security screws.
12. Take a sludge reading from the pretreatment tank and note in your inspection report. Replace cover and secure with security screws.
13. Complete your inspection report and leave a copy with the homeowner.
14. Mail a copy of your inspection report to the local authority and retain the original in your files.



AK/HA Manufacturing, LLC

Service Technician Checklist

Hydro-action Industries' aerobic treatment systems should be serviced at least every six months per NSF requirements. Please consult the Suggested Service Call Procedure and the Operation & Maintenance Manual while performing this checklist.

- Remove covers from OPS, Pre-treat, ATU, and Pump Tank.
notes: _____
- Note condition of ATU by consulting Plant Condition Chart
notes: _____
- Perform Settleable Solids Test
notes: _____
- Gauge back pressure
notes: _____
- Perform Air Pressure Alarm Check by removing tube from barbed fitting
notes: _____
- Inspect pump filters
notes: _____
- Remove any surface sludge from ATU
notes: _____
- Inspect high level alarms (ATU & Pump Tank)
notes: _____
- Measure sludge level w/ Sludge Judge (ATU & Pre-treat Tank)
notes: _____
- Check effluent pump on/off float
notes: _____
- Check chlorinator & chlorine level
notes: _____
- Replace covers w/ supplied security screws
notes: _____
- Complete Inspection Report and make copies for; Homeowner, Local Authority, and Self
notes: _____



AK/HA Manufacturing, LLC

Installation Checklist

Hydro-action Industries' aerobic treatment systems should be serviced at least every six months per NSF requirements. Please consult the Installation Manual while performing this checklist.

- Chose site and soil condition, excavate
notes: _____
- Install gradeable material and level system
notes: _____
- Fill tanks with water and leak check while buring
notes: _____
- Connect inlet and discharge piping
notes: _____
- Install OPS as per instructions and run power conduit
notes: _____
- Install diffuser assemblies
notes: _____
- Install OPS and Tank Covers w/ supplied security screws
notes: _____
- Follow start-up procedure and educate homeowner on their system
notes: _____
- Perform system check to insure proper operation
notes: _____
- Fill out installation / warranty sheet
notes: _____
- Give copy of homeowners manual to homeowner
notes: _____
- Give homeowner copy of service contract and warranty sheet
notes: _____
- Send in installation warranty sheet to Manufacturer
notes: _____

Limited Warranty

AK/HA Manufacturing, LLC, d/b/a **Hydro-Action® Industries** (“**Hydro-Action® Industries**”), warrants each **Hydro-Action® Industries** aerobic wastewater treatment plant (“plant”) to be free from defects in material and workmanship for a period of two (2) years from the date of installation by an authorized **Hydro-Action® Industries** dealer for the end user when properly registered with **Hydro-Action® Industries**. The sole remedy under the LIMITED WARRANTY is as follows: **Hydro-Action® Industries** may, at its sole option, replace or exchange any component part, F.O.B. factory, that in **Hydro-Action® Industries**’ reasonable judgment shows evidence of defects in material and/or workmanship, provided said component part has been paid for and is returned through an authorized **Hydro-Action Industries®** dealer, transportation prepaid, to **Hydro-Action® Industries** at 2055 Pidco Drive Plymouth, IN. 46563. The end user must at that time also specify the nature of the defect, in writing, to **Hydro-Action® Industries** at the same address. The LIMITED WARRANTY does not make any provision for an informal dispute settlement arrangement.

The LIMITED WARRANTY does not cover **Hydro-Action® Industries** aerobic wastewater treatment plants and related components that have been flooded, by external means, or that have been disassembled by unauthorized person, improperly installed, subjected to external damage or damage due to altered or improper wiring or overload protection.

Recommendations for special applications will be based on the best available expertise of **Hydro-Action® Industries** and published industry information. Such recommendations do not constitute a warranty of satisfactory performance under the end user’s specific conditions.

No warranty is made as to the field performance of any systems. The LIMITED WARRANTY applies only to the parts manufactured by **Hydro-Action® Industries** and does not include any portion of the plumbing, drainage, house wiring or installation of the plants. Accessories supplied by **Hydro-Action® Industries**, but manufactured by others, are warranted only to the extent of and by the terms and conditions of the original manufacturer’s warranty. In no event shall **Hydro-Action® Industries** be responsible for delay or damages of any kind or character resulting from, or caused directly or indirectly by, defective components or materials manufactured by others.

The LIMITED WARRANTY extends solely to the end user of this product. The end user is defined as the purchaser who first has the plant installed, or in the case of a plant designed for non-permanent installation, the purchaser who first uses the plant. It is the end user’s obligation to make known to any other consumer the terms and conditions of this LIMITED WARRANTY.

Hydro-Action® Industries reserves the right to revise, change, or modify the construction and design of the **Hydro-Action® Industries** aerobic wastewater treatment plant, or any component part or parts thereof, without incurring any obligations to make such changes or modifications in previously sold equipment. **Hydro-Action® Industries** also reserves the right, in making replacements of component parts under this LIMITED WARRANTY, to furnish a component part, which, in its judgment, is equivalent to the part replaced.

This warranty is a LIMITED WARRANTY. No claim of any nature shall be made against **Hydro-Action® Industries** unless and until the end user, or their legal representative, notifies **Hydro-Action® Industries**, in writing, of the defect complained of and delivers the product and/or defective part(s), freight prepaid, to **Hydro-Action® Industries** at 2055 Pidco Drive Plymouth, IN. 46563.

This LIMITED WARRANTY does not become effective until the installing authorized **Hydro-Action® Industries** dealer completes and submits the warranty sheet found in the manual, with the term of the LIMITED WARRANTY then deemed to have begun immediately upon installation of the plant by the installing dealer.

HYDRO-ACTION[®] **INDUSTRIES** **Warranty Registration**

Hydro-Action[®] Industries

2055 Pidco Drive

Plymouth, IN. 46563

800.462.6072

This form must be filed with Hydro-Action[®] by the dealer and mailed within 30 calendar days after installation or all warranties are void.

Owner/User _____

Address _____

City/County/State/Zip _____

Phone _____

Best time to be reached _____

Dealer/Installer _____

Address _____

City/State/Zip _____

Phone _____

Distributor (if applicable) _____

Service will be performed by: _____

Name _____

City/State/Zip _____

Phone _____

Type of Installation: Residential _____ Commercial _____

Number of residents or occupants _____ Garbage disposal? Yes _____ No _____

Date Installed _____

Plant Model # _____ OPS[®] Model # _____

Plant Serial # _____ Air Pump Serial # _____

Effluent disposal method & equipment used _____

Controlling Regulatory Agency: _____

Agency _____

Sanitarian _____

Address _____

City/State/Zip _____

Phone _____



Proper use of the Sludge Judge in Hydro-Action Industries Systems

A Sludge Judge is a device used to discover tankage sludge levels. Proper use in our systems is as follows:

1. Let the Sludge Judge down into the tank to be tested, being sure to keep the Sludge Judge as close to vertical as possible, until it contacts the bottom of the tank. (As sludge in the ATU tends to assume a dished shape due to mixing currents, two readings should be taken: against the tank wall and the center of the clarifier.)
2. Pull the Sludge Judge vertically out of the tank and inspect.
3. You should find a sludge level indicated in the barrel of the Sludge Judge. Note that the barrel of the Sludge Judge is marked in 1 foot intervals. Using these marks, estimate the depth of sludge indicated to the nearest inch (i.e. halfway between marks would be 6", etc.)
4. Make a note of the sludge levels on your inspection report.

System Tankage Sludge Level Suggestions

| Tankage | Level | Logic |
|------------------------|------------------|---|
| Pretreatment Tank | 18" to 24" | The primary problem with sludge build-up in the pre-treatment (or 'trash') tank is one of obstructed volume. An important role played by this tank is the dilution of chemicals harmful to the bacterial colony. As sludge builds up in this tank, the volume of liquid influent is reduced, thereby reducing the total volume available for dilution. |
| Aerobic Treatment Unit | 6" | The clarifying cone in the center of the ATU extends to within 8" of the bottom of the tank. If the opening at the bottom of this cone is obstructed, cleaned mixed liquor cannot enter the clarifier, leading to poor quality effluent. |
| Pump Tank | 10" | Sludge build-up is almost never a problem in the pump tank, due to the extremely pure effluent produced in the ATU. We use a mid-suction pump in the pump tank, and the intake on that pump is 12" from the bottom of the tank. If sludge is allowed to enter this intake, effluent pump life will at least be greatly shortened, and the pump could possibly fail immediately. Such a failure is not warrantied. |



TECHNICAL BULLETIN

DATE: September 17, 2004

SUBJECT: Disinfection with Chlorine

What type of chlorine should be used for wastewater effluent disinfection?

When disinfection of secondarily treated wastewater effluent is required and you are using chlorine tablets, it is important that you use a chlorine tablet that is made from calcium hypochlorite and is certified for wastewater disinfection by the EPA. Tablets made from this chemical are very reactive and will kill 99% of the bacteria present in the effluent within 10 minutes. Follow all warning and precaution statements of the chlorine tablet manufacturer to protect yourself and the system equipment.

WARNING:

DO NOT use swimming pool chlorine tablets in your disinfection system. The chlorine in these tablets is made by reaction of trichlorisocyanuric acid. Swimming pool tablets dissolve more slowly than calcium hypochlorite and do not thoroughly disinfect the effluent. Additionally, there is a danger of explosion using swimming pool tablets in ATUs, as the tablets will release an explosive gas called nitrogen chloride because they are not totally immersed in water at all times while in use. They are not approved by EPA for wastewater effluent disinfection.



Homeowner Care of a Residential Aerobic Wastewater Treatment System

All Aerobic Wastewater Treatment Systems are suspended growth floating bio-mass systems designed to treat common household sewage only.

In plain language, this means that the systems contain and depend on an aerobic (oxygen-requiring) bacterial colony which, when well cared for, digests and treats household sewage just as aerobic bacteria clean groundwater in nature. This is why aerobic systems have an air pump and air distribution piping – for supplying the aerobic bacteria with oxygen. Bacteria, however, can't eat just anything and everything. For a listing of things to avoid feeding to an aerobic bacterial system, see below.

Normal maintenance is required on all aerobic treatment units, as they are activated sludge sewage treatment systems just like large municipal water treatment plants. Our factory-trained Hydro-Action Industries installers or service technicians regularly service our installations, checking to be sure that these systems are in proper working order.

Aerobic systems are not designed for disposal of solid waste or chemicals. If homeowners stay within the guidelines listed below, their systems should function properly as sewage treatment systems and should not require unscheduled maintenance or frequent expensive pump-outs.

What **NOT** to put in an aerobic treatment system:

- Non-biodegradable items such as cigarette butts, match sticks, disposable diapers, feminine hygiene products, condoms, hair, coffee grounds, rags, paper towels, bandages, etc. These are solid-waste items and should be disposed of in regular trash service.
- Greases, fats or oils. This includes cooking oils and meat or meat grease.
- Pesticides, herbicides, photographic chemicals or other toxins.
- Paints, thinners or household chemicals, including many cleaning compounds, and mop-bucket water.
- Water softener unit backwash.
- Citrus products, oranges, lemons, grapefruit, etc.
- Home-brewery or winemaking wastes.
- Strong medicines, particularly antibiotics.
- Antibacterial soaps and antibacterial laundry detergents should be avoided. These are the current marketing rage, but overuse will only breed resistant strains of bacteria in the home, and kill the aerobic action in the treatment system.
- Strong disinfectants or bleaches, particularly products containing chlorine or ammonia.
- Commercial septic tank additives; they do more harm than good.
- Kitchen garbage grinders (disposals) should be used sparingly, if at all. Dispose of food waste in a solid waste bin or compost heap. Food waste represents additional loading on the aerobic plant, possibly causing organic overloading and more frequent pump-outs of the system.

Volumetric Overload of an Aerobic System

Our system is rated for a maximum volume throughput per day, ie. 500 gallons per day (GPD) for an AP-500, 600 GPD for an AP-600, etc., and only household wastewater (sinks, tubs, washing machines, toilets, etc.) should be allowed into the unit. 'Volumetric overloading' is simply a term used to describe putting more than the rated amount of wastewater through the system during a 24 hour period.

To avoid volumetric overloading of our system, which can result in incomplete treatment conditions, observe the following:

- Avoid multiple wash loads in one day; spread out your laundry during the week.
- Watch for leaking/flowing faucets or toilets and repair immediately.
- Use water flow reducing devices whenever possible.
- Be aware of any excessive water use of any kind.

Home Cleaning Products Guidelines:

- Recommended laundry detergents are: Powdered, low-sudsing, low-phosphate, non-antibacterial and bio-degradable.
- Recommended household cleaning products are: Non-chlorine, non-ammonia, non-antibacterial, non-toxic and bio-degradable.

HYDRO-ACTION[®] **INDUSTRIES**

**2055 Pidco Drive
Plymouth, IN. 46563**

Phone: 800.462.6072

Fax: 574.936.5811

www.hydro-action.com