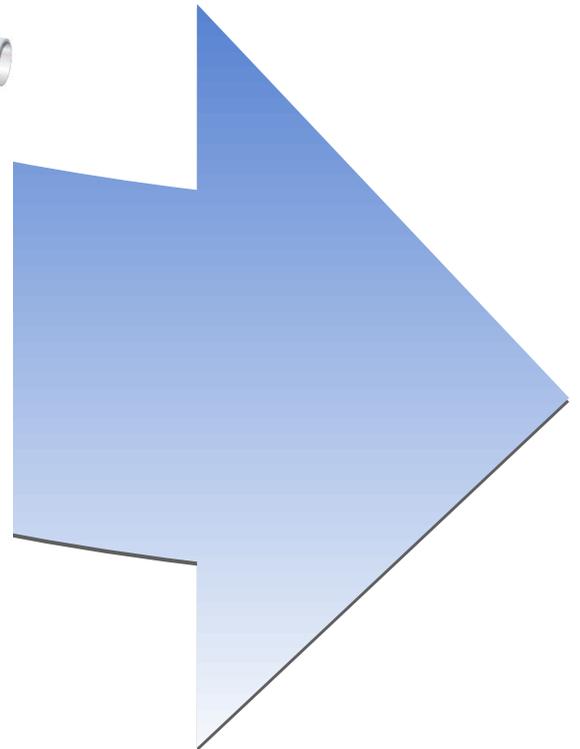


# AP SERIES O&M MANUAL



**hydro-action**<sup>®</sup>  
*green from the ground up*



# **Operation & Maintenance Manual**

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## Introduction

The AP Series Aerobic Treatment Units (ATUs) are now available through **Hydro-Action**<sup>®</sup>. 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**<sup>®</sup> AP Series ATUs are just such systems.

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**<sup>®</sup> 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 have 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.

**Hydro-Action**<sup>®</sup> 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 in our pride of the AP Series Treatment Units.

This manual includes information on the AP-500, LPA 500, AP-600, AP-750, AP-1000G & AP-1500G wastewater treatment plants. These units may be installed with either a platform mounted OPS<sup>®</sup> (operations/control center) or a Remotely Located OPS<sup>®</sup>.

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 / UV Disinfection Unit

The certified **Hydro-Action**<sup>®</sup> dealer or installer of your **Hydro-Action**<sup>®</sup> AP Series wastewater treatment plant is responsible for completing and submitting to us the Installation Warranty Information to properly activate your **Hydro-Action**<sup>®</sup> Product Warranty.

We are eager to assist you with any questions or problems. Please contact **Hydro-Action**<sup>®</sup> at 800.370.3749 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**<sup>®</sup> plant access cover and the Platform Mounted OPS<sup>®</sup> or Remotely Located OPS<sup>®</sup> 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 the **Hydro-Action**<sup>®</sup> 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 is observed, refer to Section 1.1.4a. All 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 **Hydro-Action**<sup>®</sup> 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. All 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. 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, a high pressure condition exists. After pressure reading is complete, remove the quick-chuck pressure gauge and replace the protective cap on the Schrader air pressure valve.

**1.1.5:** To inspect, clean, or replace air diffuser assemblies, 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 buildup. 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 over spray 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 50-11, 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. The test switch will reset itself automatically. These alarms should always be tested before leaving the site to assure they are operational.

**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**® access covers 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**® 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. 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**® 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:** Replace the pre-treat, plant access, and pump tank access cover (if included), being sure to reinstall and tighten the **Hydro-Action®** tamper-resistant screws to prevent plant entry of unauthorized personnel. **Note:** Plant and other tanks should be filled with water before leaving site.

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

**Every Six (6) Months:**

- a. Maintaining aeration system and air diffusers.
- b. Maintaining air pump.
- c. Removing scum from clarifier.
- d. Inspecting and testing plant alarms.

**Every Two (2) to Six (6) Years:**

- e. Pumping excess sludge from plant.

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

**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®** plant is being pumped, a qualified service technician should oversee the job. 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®** AP Series Plant has been designed and built to provide efficient, 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®** plant will operate at designed performance levels to give years of satisfactory treatment of domestic wastewater.

**2.2:** Local **Hydro-Action®** 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®** OPS® 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.

**2.4:** The **Hydro-Action®** 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 non-rapidly 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 foaming 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.

**Hydro-Action®** Dealers & Certified Technicians are asked to inform homeowner of these guidelines. Too often a malfunctioning treatment unit is due to abuse that can be avoided with simple education.

**2.5:** Other than for the mechanical and structural working of the plant itself, **Hydro-Action®** 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 **Hydro-Action®** 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, and the 50-32 is a micro-dose timer. See the Technical Manual section of timers in Appendix 3.

### **SECTION 3.0: Teflon Diffuser Inspection**

**3.1:** With plant access cover removed, look through the plant access opening. Inspect system to insure even flow of diffused bubbles are coming from each diffuser.

**3.2:** Locate the Schrader air pressure valve on the PVC air pump discharge line. 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, a high pressure condition exists.

**Note:** Whenever a high pressure condition exists in the **Hydro-Action®** diffuser airline assembly it is usually due to a blockage. This could be either inside the lines or bacterial growth on the diffusers themselves.

**3.3:** To remedy a high pressure condition first try to pressurize the airline with a high pressure air compressor. This will displace any bacterial growth on the diffusers themselves.

**3.4:** If the pressurizing of the lines does not improve the pressure condition then the diffusers may need to be replaced.

**Note 2:** Diffuser assemblies are normally not replaced on the newer AP Series with the Teflon diffusers. Older models will need retro-fit.

## SECTION 4.0: Plant Troubleshooting Guide

**4.1:** The **Hydro-Action**<sup>®</sup> 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. 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<sup>®</sup> with those in records. If this is a new installation, you should verify that the plant and all its components were installed correctly and in accordance with manufacturers and regulatory agency requirements. See **Hydro-Action**<sup>®</sup> AP Series Installation Manual, available from **Hydro-Action**<sup>®</sup>.

**4.5.1:** Inspect plant to verify that the **Hydro-Action**<sup>®</sup> 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**<sup>®</sup> 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**<sup>®</sup> 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 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<sup>®</sup> enclosure to the base.

**4.9:** The switch indicated “normal/silence” on all OPS<sup>®</sup> models 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. You should see and hear the visible and audible alarms when this mode is selected. The OPS<sup>®</sup> switch will reset itself automatically.

**4.10:** If the audible and visual alarms on the outside face of the **Hydro-Action**<sup>®</sup> OPS<sup>®</sup> 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 & 5 for electrical schematics and pump manuals.

**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**<sup>®</sup> 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® Plant Condition Chart

Hydro-Action® Condition	Organic Over loading	Organic Under loading	Toxic Influent	Volumetric Overloading	Well Functioning
<b>Sludge Volume Test Characteristics</b>	Black particles In sludge.  Sludge does not settle well.  Chunks of floating material above main sludge layer.	Solids do not separate from liquids well.  Very little settling usually 5-10 %.	Septic odor.  Very little settling.  Sludge particles are very small.	Same as organic under loading.	20-60% particles.  Particles resemble small pieces of sponge.
<b>Color</b>	Gray Black	Light Muddy Gray	Grayish Black	Light Muddy Gray	Chocolate
<b>Action needed</b>	Diffuser stones may need to be changed to increase dissolved O <sub>2</sub> level and maintain chocolate color.  If chocolate color cannot be maintained, then the plant will have to be pumped. (*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®** 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®** 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®** 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® AP Series Plant Specifications.

Plant Capacities						
Model	AP-500	LPA-500	AP-600	AP-750	AP-1000	AP-1500
Design Flow (Gallons/Day)	500	500	600	750	1000	1500
CBOD <sub>5</sub> (Pounds/Day)	1.25	1.25	1.50	1.88	2.50	3.75
CBOD <sub>5</sub> (mg/l)	290	290	290	290	290	290
TSS (mg/l)	360	360	360	360	360	360

Hydraulic Capacity (Gallons)						
Aeration Compartment	663	663	800	1002	1280	1895
Clarifier Compartment	173	173	219	273	352	518
Total Hydraulic Capacity	836	836	1019	1275	1632	2413

Hydraulic Retention Time (Hours)						
Aeration Compartment	32	32	31	29	29	25
Clarifier Compartment	8	8	9	9	8	8
Total Retention Time	40	40	40	38	37	33

Tank Dimensions						
Diameter (in)	66	72	66	72	66	88
Height to Water Line (in)	64	46	64	64	70	82
Height with OPS Installed (in)	103.5	88	103.5	103.5	109	118

Compressor Usage						
Rotary Compressor	1/4 HP	1/4 HP	1/4 HP	1/4 HP	3/4 HP	3/4 HP
Voltage (VAC)	115	115	115	115	115/120	115/120
Current (Amps)	3.9	3.9	3.9	3.9	7.8/3.9	7.8/3.9
Power (Watts)	120	120	120	120	120/560	120/560
Frequency (Hertz)	60	60	60	60	50	50
Flow (CFM)	4.3	4.3	4.3	4.3	8.2	8.2
Max Pressure (Psi)	5.0	5.0	5.0	5.0	7.0	7.0
Linear Compressor	HP80	HP80	HP100	HP120	HP150	HP200
Voltage (VAC)	120	120	120	120	120	120
Current (Amps)	0.059	0.59	1.55	2.1	2.1	1.75
Power (Watts)	71	71	186	252	252	210
Frequency (Hertz)	50	50	60	60	60	50
Flow (CFM)	2.9	2.9	4.5	4.5	4.5	8.2
Max Pressure (Psi)	5.0	5.0	5.0	5.0	7.0	7.0

## SECTION 6.0: Process Description

**6.1:** The **Hydro-Action**<sup>®</sup> 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. Three fine-bubble Teflon diffuser assemblies and the **Hydro-Action**<sup>®</sup> 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 Teflon 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 ATUs are operated by the OPS<sup>®</sup>. The OPS<sup>®</sup> integrates the electrical controls, visible and audible alarms and air pump in a protective polyethylene enclosure. The OPS<sup>®</sup> can be either platform mounted on the plant or remotely located. These features plus; the offset access, flexible air hose, and Teflon diffuser assemblies make the plant extremely reliable and easy to service. An optional visible and audible alarm may be added to remotely locate to an area of your choice.

**6.5:** The technology used in the **Hydro-Action**<sup>®</sup> 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**<sup>®</sup> AP Series ATUs satisfy all these requirements.

## SECTION 7.0: Safety

**7.1:** Safety is an important issue in our business since we deal with one of the more potentially health hazardous materials known: raw sewage. Domestic wastewater carries in it members of a specialized group of life known as microorganisms. Such microorganisms are 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 that 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. When coming 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:

- Wear disposable rubber gloves when handling wastewater contaminated items or chlorine tablets.
- Always wash with soap and water after handling any contaminated item. The use of good bactericide soap is strongly recommended.
- 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.
- Treated effluent from a **Hydro- Action**<sup>®</sup> or other treatment unit may still contain harmful microorganisms. Careful attention must be used when dealing with any form of wastewater or effluent.
- If an illness or disease is suspected to have come 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 and be safe!
- Report all accidents relating to sewage exposure to the proper supervisory personnel.

# Appendix 1: OPS® Explanation Guide

## 50-11 Series OPS® Gravity

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 – Air Pump
- 1 – Polyethylene OPS® Base & Enclosure
- 1 – Electrical Control Panel

### 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® On Demand

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 – 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® 24 Hr. Time

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 – 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® Micro-Dose

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 – 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 2: Hydro-Action® AP Series Pump Selection

Note: Please see **Hydro-Action®** Pump Manual for each manufacturer OEM Manual

### Description of AP Series Compressor Pumps

The **Hydro-Action®** AP Series ATU's have several approved types of compressor pumps available. NSF has approved these models and by no means does **Hydro-Action®** condone the use of any other replacement pump not included on this list. **Hydro-Action®** uses three which are; Hi-blow Linear, Gast Linear, and Gast Rotary Vane...

AP Series Model	Hi-Blow Linear	Gast Linear	Gast Rotary
AP500	HP-80	DBMS80	AT05-101
LPA500	HP-80	DBMS80	AT05-101
AP600	HP-100 LL	DBMS100	AT05-101
AP750	HP-120LL	DBMS120	AT05-101
AP1000	HP-150	DBMX150	1023-101
AP1500	HP-200	DBMX200	1023-101

### Description of AP Series Effluent Pumps

The **Hydro-Action®** AP Series utilize many effluent pumps. NSF does not regulate the pump tank component of NSF std. 40 systems unless it is a component of treatment. Therefore, any comparable pump may be used. **Hydro-Action®** currently uses Barnes for its standard pump and the mid-suction Hydromatic for all drip irrigation applications. See manuals below for information.

AP Series Model	Barnes	Hydromatic
Standard	SP-33	HE 20-51
<b>Drip Application</b>		
High Head 1/2 HP		HE 12-51
High Flow 1/2 HP		HE 30-51
High Head 1 HP		HE 25-10
High Flow 1 HP		HE 35-10

## **Appendix 3: Technical Manual for Timers**

**Grasslin 24 Hr. Timer**

**Omeron Micro-Dose Timer**

## FM/1 Series Time Switches



### TECHNICAL DATA

Supply Voltage:	24, 120 and 240VAC, 60Hz models Quartz: 24V AC/DC, 120 and 240VAC 50/60 Hz
Switch Type:	SPDT
Switch Rating:	21A/250VAC resistive 1350 watt tungsten 1HP @ 125VAC 2HP @ 240VAC
Power Consumption:	<b>24V:</b> 0.1VA; <b>120V:</b> 0.5VA; <b>240V:</b> 1.0VA
Ambient Temp. Range:	-40°F to 180°F, synchronous units -20°F to 140°F, quartz units
Terminals:	1/4" spade terminals
Reserve Carryover:	7 days for quartz units
Weight:	Approximately 3 oz.

**NOTE:** 24V quartz unit will operate on 6VDC, 12VDC, or 24VDC

### APPLICATIONS

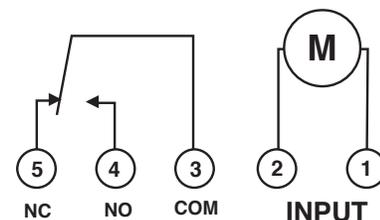
The FM/1 series of time switches are designed for control of heating, ventilating, air conditioning, refrigeration, lighting, security, circulating pumps, spas or any electrical load requiring 24-hour or 7-day scheduling.

### WIRING

Verify input voltage stated on back of unit. Use 1/4" quick connects and make connections in accordance with the wiring diagram shown and applicable code requirements. When using 24V units, it is important to use transformers that will supply the required 24 volts AC to terminals 1 & 2.

#### Terminal Connections

Contacts shown in "Off" position (trippers pushed inward)  
"On" position (trippers pushed outward) will close contacts 3 & 4

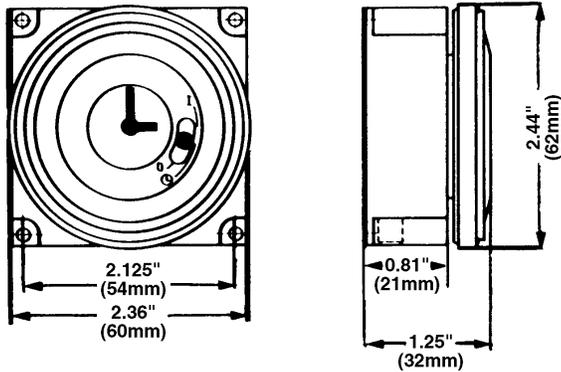


### MOUNTING

The standard FM/1 units can be flush mounted (mounting kit with screws available) or surface mounted inside a panel. A printed circuit board mounting base is also available. An indoor or outdoor enclosure is available for stand-alone mounting. In addition, unit is also available in DIN housing for flush or surface mounting (see MIL72, Digi 20 or Digi 42 data sheets). Optional clear plastic dust cover is available.

## Dimensions

FM/1 synchronous/quartz



## TIME SETTING

**TO SET THE CURRENT TIME (AND DAY OF WEEK ON 7 DAY UNITS), TURN THE MINUTE HAND CLOCKWISE. DO NOT SET THE TIME BY ROTATING "OUTER" DIAL.**

Turn the minute hand clockwise until the day of the week (7-day timer) and the time of day on the outer dial is aligned with the triangle marker on the inner dial (two o'clock position).

Example for 7-day program dial Monday 10:30 AM. Turn the minute hand clockwise until Monday 10:30 AM is aligned with the triangle on the inner dial. The hour and minute hand will show exactly 10:30.

Example for 24-hour program dial 10:30 AM. Turn the minute hand clockwise until 10:30 AM is aligned with the triangle on the inner dial. The hour and the minute dial will show exactly 10:30.

## PROGRAMMING

### 7-Day (SW, QRW Models)

The weekly program dial reflects the seven days of the week and AM/PM imprints for each day.

The time switch is programmed by pushing the captive trippers to the outer ring position for the entire period that the load is to be turned "ON", i.e., two hours for each tripper on the 7-Day dial. When the tripper is pushed to the inside, the switch is in the "OFF" position.

### 24-Hour (ST, QRT Models)

The 24-Hour dial has quarter-hour divisions and AM/PM indications.

The time switch is programmed by pushing the captive trippers to the outer ring position for the entire period that the load is to be turned "ON", i.e., fifteen minutes for each tripper on the 24-Hour dial. When the tripper is pushed to the inside, the switch is in the "OFF" position.

## PROGRAMMING WITH MANUAL OVERRIDE SWITCH

### AUTOMATIC MODE

In order to operate the time switch module in the automatic mode, the manual switch must be in the center position (automatic) - see diagram.

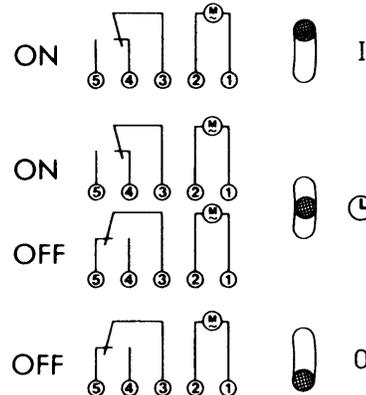
### MANUAL MODE

With the manual switch selector lever the selected programs can be overridden. In the lower position, marked "O", terminals 3 and 5 are permanently closed. In the upper position, marked "I", terminals 3 and 4 are permanently closed (see diagram).

## Override Mode

3-way manual  
override switch

I = permanent ON  
⌚ = automatic  
O = permanent OFF



# Electromechanical Timer Modules



## FM/1 Series

### 24 Hour, 7 Day

**APPLICATION:** The FM/1 series electromechanical timer modules are designed to be placed inside a machine control panel, circuit board, or other equipment. It offers up to 21A switching designed for control of heating, ventilating, air conditioning, refrigeration, lighting, security, circulating pumps, spas or any electrical load requiring 24-hour or 7-day scheduling.

### Specifications:

**Size:** 2.36" x 2.36" x 1.25"

**Supply Voltage:** 24, 120, 240VAC

**Power Consumption:** 1 VA

**Switch Rating:** SPDT

Resistive: 21A

Tungsten: 1350W

Inductive: 1HP @ 120VAC

2HP @ 240VAC

**Wiring Connections:** 1/4" quick-connects

**Installation:** Stand Alone: With indoor or outdoor enclosure

**Panel:** Surface mounting



### Features:

- 21A SPDT switch
- Captive Trippers
- 1/4" quick terminals
- Noise Immune—Ideal for robust applications

FM/1 Series Ordering Data<sup>†</sup>

Grasslin Model	Intermatic Model	Override	Switch Program	Carryover	Program On/Off Every	Minimum On/Off Time	Switch Output Type	Switch Output Rating
FM/1 STuZ-120	FM1STUZ-120U	No	24 Hr.	No	15 Minutes	15 Minutes	SPDT	21A. Res.
FM/1 STuZ-24	FM1STUZ-24U	No	24 Hr.	No	15 Minutes	15 Minutes	SPDT	21A. Res.
FM/1 STuZ-240	FM1STUZ-240U	No	24 Hr.	No	15 Minutes	15 Minutes	SPDT	21A. Res.
FM/1 SWuZ-120	FM1SWUZ-120U	No	7 day	No	2 Hours	2 Hours	SPDT	21A. Res.
FM/1 SWuZ-24	FM1SWUZ-24U	No	7 day	No	2 Hours	2 Hours	SPDT	21A. Res.
FM/1 SWuZ-240	FM1SWUZ-240U	No	7 day	No	2 Hours	2 Hours	SPDT	21A. Res.
FM/1 STuZH-120	FM1STUZH-120U	Yes	24 Hr.	No	15 Minutes	15 Minutes	SPDT	21A. Res.
FM/1 STuZH-24	FM1STUZH-24U	Yes	24 Hr.	No	15 Minutes	15 Minutes	SPDT	21A. Res.
FM/1 STuZH-240	FM1STUZH-240U	Yes	24 Hr.	No	15 Minutes	15 Minutes	SPDT	21A. Res.
FM/1 SWuZH-120	FM1SWUZH-120U	Yes	7 day	No	2 Hours	2 Hours	SPDT	21A. Res.
FM/1 SWuZH-24	FM1SWUZH-24U	Yes	7 day	No	2 Hours	2 Hours	SPDT	21A. Res.
FM/1 SWuZH-240	FM1SWUZH-240U	Yes	7 day	No	2 Hours	2 Hours	SPDT	21A. Res.
FM/1 SWuZH-277	FM1SWUZH-277U	Yes	7 day	No	2 Hours	2 Hours	SPDT	21A. Res.
FM/1 QTuZH-120	FM1QTUZH-120U	Yes	24 Hr.	7 day	15 Minutes	15 Minutes	SPDT	21A. Res.
FM/1 QTuZH-24	FM1QTUZH-24U	Yes	24 Hr.	7 day	15 Minutes	15 Minutes	SPDT	21A. Res.
FM/1 QWuZH-120	FM1QWUZH-120U	Yes	7 day	2 Hr.	2 Hours	2 Hours	SPDT	21A. Res.
FM/1 QWuZH-240	FM1QWUZH-240U	Yes	7 day	2 Hr.	2 Hours	2 Hours	SPDT	21A. Res.

Available with 24V, 120V, 240V, 277VAC input



# Solid-state Twin Timers

# H3CR-F

## DIN 48 × 48-mm Twin Timers

- Wide power supply ranges of 100 to 240 VAC and 48 to 125 VDC respectively.
- ON- and OFF-times can be set independently and so combinations of long ON- or OFF-time and short OFF- or ON-time settings are possible.
- Fourteen time ranges from 0.05 s to 30 h or from 1.2 s to 300 h depending on the model to be used.
- Models with a flicker ON start or flicker OFF start are available.
- Easy sequence checks through instantaneous outputs for a zero set value at any time range.
- Length, when panel-mounted with a Socket, of 80 mm or less.
- 11-pin and 8-pin models are available.



## Model Number Structure

### Model Number Legend

H3CR - F     -    

1   2   3   4   5

#### 1. Classification

F: Twin timers

#### 2. Configuration

None: 11-pin socket

8: 8-pin socket

#### 3. Twin Timer Mode

None: Flicker OFF start

N: Flicker ON start

#### 4. Time Range

None: 0.05 s to 30 h models

300: 1.2 s to 300 h models

#### 5. Supply Voltage

100-240AC: 100 to 240 VAC

24AC/DC: 24 VAC/VDC

12DC: 12 VDC

48-125DC: 48 to 125 VDC

## Ordering Information

### List of Models

Operating modes	Supply voltage	0.05 s to 30 h models		1.2 s to 300 h models	
		11-pin models	8-pin models	11-pin models	8-pin models
Flicker OFF start	100 to 240 VAC	H3CR-F 100-240AC	H3CR-F8 100-240AC	H3CR-F-300 100-240AC	H3CR-F8-300 100-240AC
	24 VAC/DC	H3CR-F 24AC/DC	H3CR-F8 24AC/DC	H3CR-F-300 24AC/DC	H3CR-F8-300 24AC/DC
	12 VDC	H3CR-F 12DC	H3CR-F8 12DC	H3CR-F-300 12DC	H3CR-F8-300 12DC
	48 to 125 VDC	H3CR-F 48-125DC	H3CR-F8 48-125DC	H3CR-F-300 48-125DC	H3CR-F8-300 48-125DC
Flicker ON start	100 to 240 VAC	H3CR-FN 100-240AC	H3CR-F8N 100-240AC	H3CR-FN-300 100-240AC	H3CR-F8N-300 100-240AC
	24 VAC/DC	H3CR-FN 24AC/DC	H3CR-F8N 24AC/DC	H3CR-FN-300 24AC/DC	H3CR-F8N-300 24AC/DC
	12 VDC	H3CR-FN 12DC	H3CR-F8N 12DC	H3CR-FN-300 12DC	H3CR-F8N-300 12DC
	48 to 125 VDC	H3CR-FN 48-125DC	H3CR-F8N 48-125DC	H3CR-FN-300 48-125DC	H3CR-F8N-300 48-125DC

**Note:** Specify both the model number and supply voltage when ordering.

Example: H3CR-F 100-240AC

Supply voltage

## ■ Accessories (Order Separately)

Name/specifications		Models
Flush Mounting Adapter		Y92F-30
		Y92F-73
		Y92F-74
Mounting Track	50 cm (l) × 7.3 mm (t)	PFP-50N
	1 m (l) × 7.3 mm (t)	PFP-100N
	1 m (l) × 16 mm (t)	PFP-100N2
End Plate		PFP-M
Spacer		PFP-S
Protective Cover		Y92A-48B
Track Mounting/ Front Connecting Socket	8-pin	P2CF-08
	8-pin, finger safe type	P2CF-08-E
	11-pin	P2CF-11
	11-pin, finger safe type	P2CF-11-E
Back Connecting Socket	8-pin	P3G-08
	8-pin, finger safe type	P3G-08 with Y92A-48G (See note 1)
	11-pin	P3GA-11
	11-pin, finger safe type	P3GA-11 with Y92A-48G (See note 1)
Hold-down Clip (See note 2)	For PL08 and PL11 Sockets	Y92H-7
	For PF085A Socket	Y92H-8

**Note:** 1. Y92A-48G is a finger safe terminal cover which is attached to the P3G-08 or P3GA-11 Socket.

2. Hold-down Clips are sold in sets of two.

## Specifications

### ■ General

Item	H3CR-F	H3CR-F8	H3CR-FN	H3CR-F8N
Operating mode	Flicker OFF start		Flicker ON start	
Pin type	11-pin	8-pin	11-pin	8-pin
Operating/Reset method	Time-limit operation/Time-limit reset or self-reset			
Output type	Relay output (DPDT)			
Mounting method	DIN track mounting, surface mounting, and flush mounting			
Approved standards	UL508, CSA C22.2 No.14, NK, Lloyds Conforms to EN61812-1 and IEC60664-1 (VDE0110) 4kV/2. Output category according to EN60947-5-1.			

### ■ Time Ranges

#### 0.05 s to 30 h Models

Time unit	s (sec)	×10 s (10 sec)	min (min)	h (hrs)
Setting	1.2	0.05 to 1.2	1.2 to 12	0.12 to 1.2
	3	0.3 to 3	3 to 30	0.3 to 3
	12	1.2 to 12	12 to 120	1.2 to 12
	30	3 to 30	30 to 300	3 to 30

**Note:** Instantaneous output is available at any time range. To obtain instantaneous output, set to below 0.

#### 1.2 s to 300 h Models

Time unit	×10 s (10 sec)	×10 min (10 min)	h (hrs)	×10 h (10 hrs)
Setting	1.2	1.2 to 12	1.2 to 12	0.12 to 1.2
	3	3 to 30	3 to 30	0.3 to 3
	12	12 to 120	12 to 120	1.2 to 12
	30	30 to 300	30 to 300	3 to 30

**Note:** Instantaneous output is available at any time range. To obtain instantaneous output, set to below 0.

## ■ Ratings

<b>Rated supply voltage (See notes 1, 2, and 3.)</b>	100 to 240 VAC (50/60 Hz), 12 VDC, 24 VAC/DC (50/60 Hz), 48 to 125 VDC
<b>Operating voltage range</b>	85% to 110% of rated supply voltage; 90% to 110% with 12-VDC models
<b>Power reset</b>	Minimum power-opening time: 0.1 s
<b>Power consumption</b>	100 to 240 VAC: approx. 10 VA (2.1 W) at 240 VAC 24 VAC/VDC: approx. 2 VA (1.7 W) at 24 VAC approx. 1 W at 24 VDC 48 to 125 VDC: approx. 1.5 W at 125 VDC 12 VDC: approx. 1 W at 12 VDC
<b>Control outputs</b>	Contact output: 5 A at 250 VAC/30 VDC, resistive load ( $\cos\phi = 1$ )

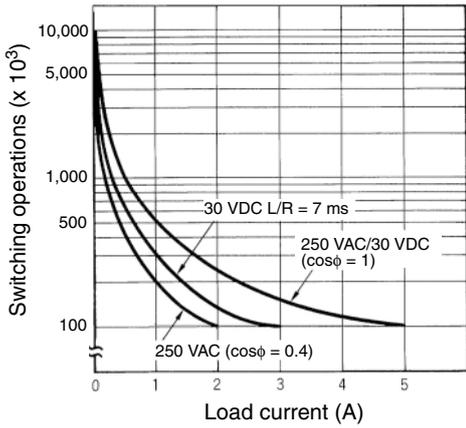
- Note:** 1. A power supply with a ripple of 20% max. (single-phase power supply with full-wave rectification) can be used with each DC Model.  
2. Do not use an inverter output as the power supply. Refer to *Safety Precautions for All Timers* for details.  
3. Refer to *Safety Precautions for All Timers* when using the Timer together with a 2-wire AC proximity sensor.

## ■ Characteristics

<b>Accuracy of operating time</b>	±0.2% FS max. (±0.2% FS ±10 ms max. in ranges of 1.2 and 3 s)	
<b>Setting error</b>	±5% FS ±50 ms max.	
<b>Reset time</b>	0.1 s max.	
<b>Reset voltage</b>	10% max. of rated voltage	
<b>Influence of voltage</b>	±0.2% FS max. (±0.2% FS ±10 ms max. in ranges of 1.2 and 3 s)	
<b>Influence of temperature</b>	±1% FS max. (±1% FS ±10 ms max. in ranges of 1.2 and 3s)	
<b>Insulation resistance</b>	100 MΩ min. (at 500 VDC)	
<b>Dielectric strength</b>	2,000 VAC, 50/60 Hz for 1 min (between current-carrying metal parts and exposed non-current-carrying metal parts) 2,000 VAC, 50/60 Hz for 1 min (between control output terminals and operating circuit) 2,000 VAC, 50/60 Hz for 1 min (between contacts of different polarities) 1,000 VAC, 50/60 Hz for 1 min (between contacts not located next to each other)	
<b>Impulse withstand voltage</b>	3 kV (between power terminals) for 100 to 240 VAC, 48 to 125 VDC 1 kV for 12 VDC, 24 VAC/DC 4.5 kV (between current-carrying terminal and exposed non-current-carrying metal parts) for 100 to 240 VAC, 48 to 125 VDC 1.5 kV for 12 VDC, 24 VAC/DC	
<b>Noise immunity</b>	±1.5 kV (between power terminals), square-wave noise by noise simulator (pulse width: 100 ns/1 μs, 1-ns rise) ±400 V for 12 VDC	
<b>Static immunity</b>	Malfunction: 8 kV Destruction: 15 kV	
<b>Vibration resistance</b>	Destruction: 10 to 55 Hz with 0.75-mm single amplitude for 2 hrs each in three directions Malfunction: 10 to 55 Hz with 0.5-mm single amplitude for 10 min each in three directions	
<b>Shock resistance</b>	Destruction: 980 m/s <sup>2</sup> three times each in six directions Malfunction: 98 m/s <sup>2</sup> three times each in six directions	
<b>Ambient temperature</b>	Operating: -10°C to 55°C (with no icing) Storage: -25°C to 65°C (with no icing)	
<b>Ambient humidity</b>	Operating: 35% to 85%	
<b>Life expectancy</b>	Mechanical: 20 million operations min. (under no load at 1,800 operations/h) Electrical: 100,000 operations min. (5 A at 250 VAC, resistive load at 1,800 operations/h) (See note)	
<b>EMC</b>	(EMI)	EN61812-1
	Emission Enclosure:	EN55011 Group 1 class A
	Emission AC Mains:	EN55011 Group 1 class A
	(EMS)	EN61812-1
	Immunity ESD:	IEC61000-4-2: 6 kV contact discharge (level 3) 8 kV air discharge (level 3)
	Immunity RF-interference from AM Radio Waves:	IEC61000-4-3: 10 V/m (80 MHz to 1 GHz) (level 3)
	Immunity RF-interference from Pulse-modulated Radio Waves:	IEC61000-4-3: 10 V/m (900±5 MHz) (level 3)
	Immunity Conducted Disturbance:	IEC61000-4-6: 10 V (0.15 to 80 MHz) (level 3)
	Immunity Burst:	IEC61000-4-4: 2 kV power-line (level 3) 2 kV I/O signal-line (level 4)
	Immunity Surge:	IEC61000-4-5: 1 kV line to line (level 3) 2 kV line to ground (level 3)
<b>Case color</b>	Light Gray (Munsell 5Y7/1)	
<b>Degree of protection</b>	IP40 (panel surface)	
<b>Weight</b>	Approx. 100 g	

**Note:** Refer to the *Life-test Curve*.

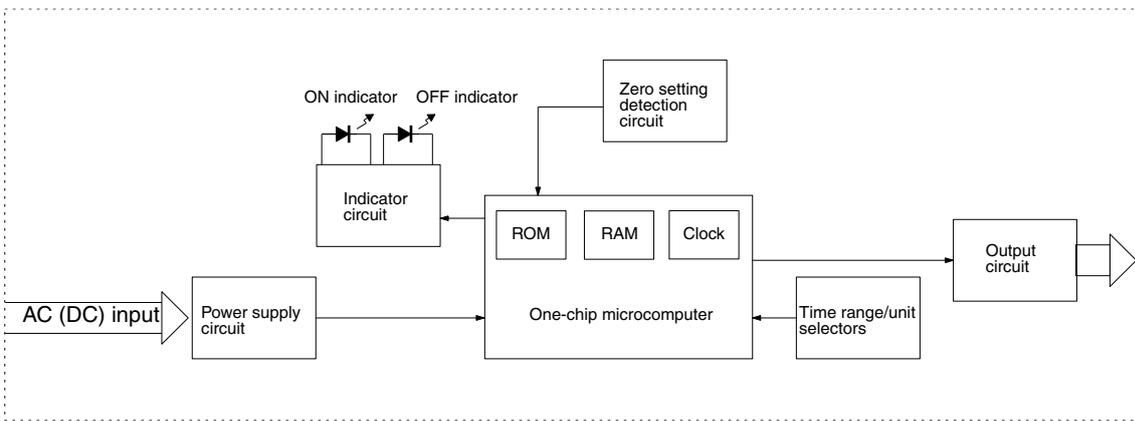
## Life-test Curve



Reference: A maximum current of 0.15 A can be switched at 125 VDC (cosφ = 1) and a maximum current of 0.1 A can be switched if L/R is 7 ms. In both cases, a life of 100,000 operations can be expected. The minimum applicable load is 10 mA at 5 VDC (failure level: P).

## Connections

### Block Diagrams

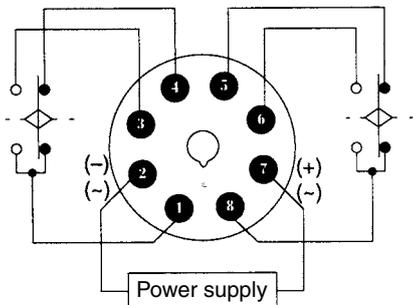


### I/O Functions

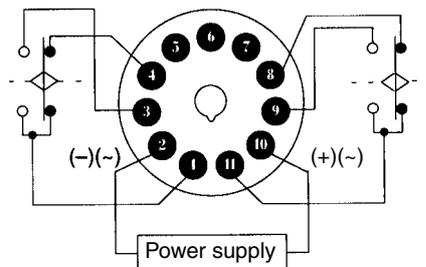
<b>Inputs</b>	---
<b>Outputs</b>	<b>Control output</b> Outputs are turned ON/OFF according to the time set by the ON- and OFF-time setting knob.

### Terminal Arrangement

H3CR-F8  
H3CR-F8  
NH3CR-F8-300  
H3CR-F8N-300



H3CR-F  
H3CR-FN  
H3CR-F-300  
H3CR-FN-300

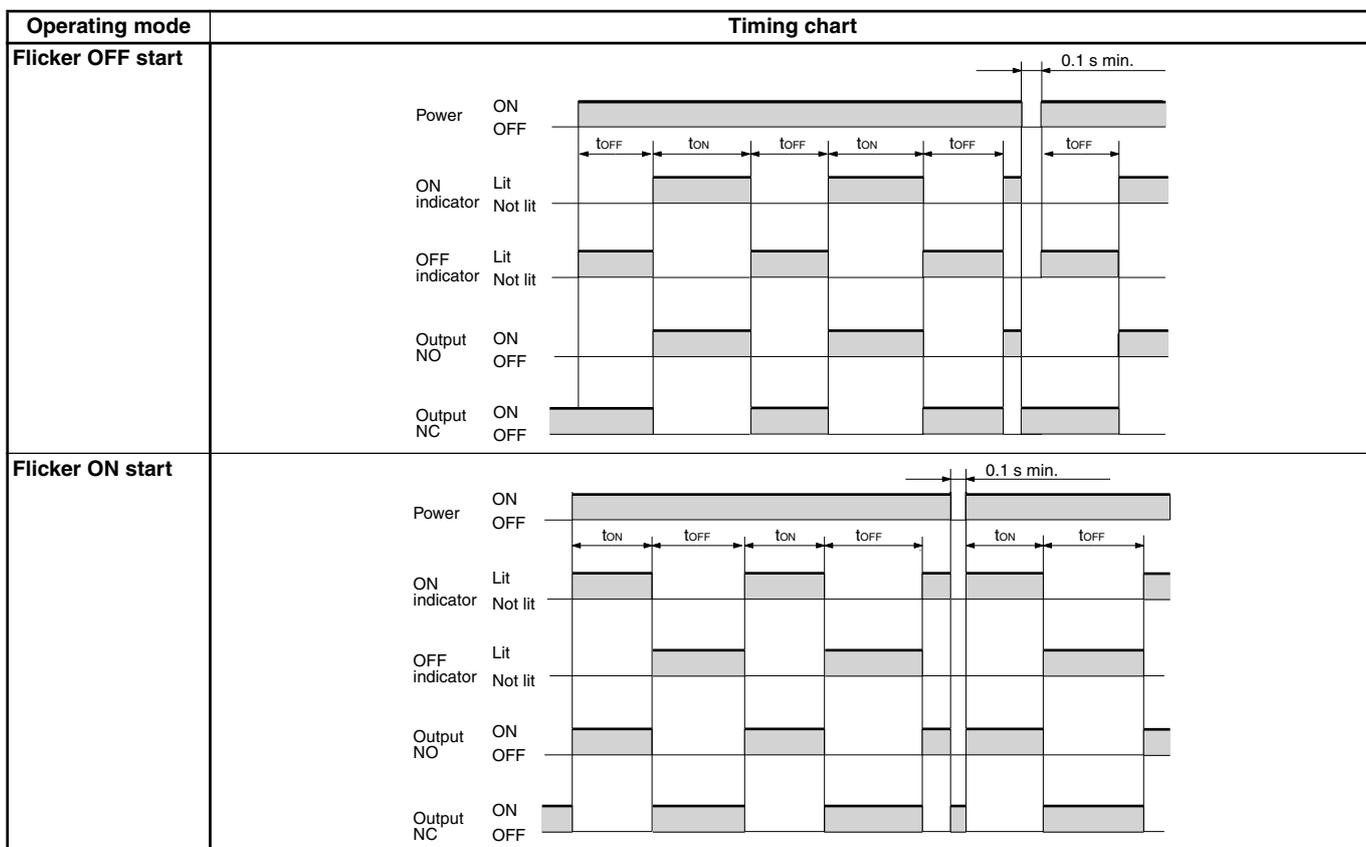


**Note:** Leave terminals 5, 6, and 7 open. Do not use them as relay terminals.

# Operation

## ■ Timing Chart

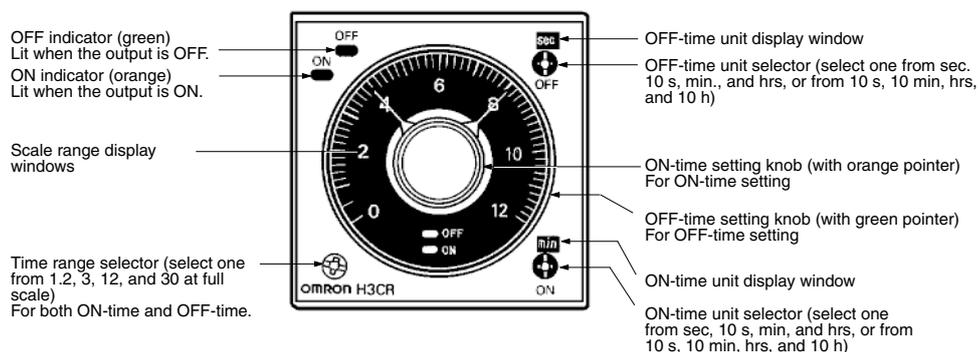
t<sub>ON</sub>: ON set time  
t<sub>OFF</sub>: OFF set time



**Note:** 1. The reset time requires a minimum of 0.1 s.

2. When power is supplied in flicker ON start mode, the OFF indicator lights momentarily. This, however, has no effect on the performance of the Timer.

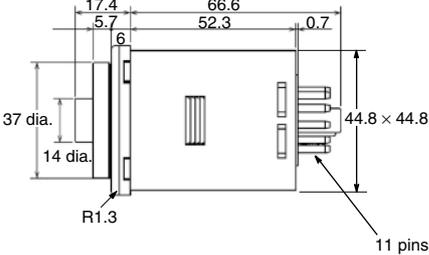
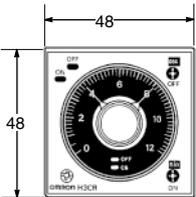
## Nomenclature



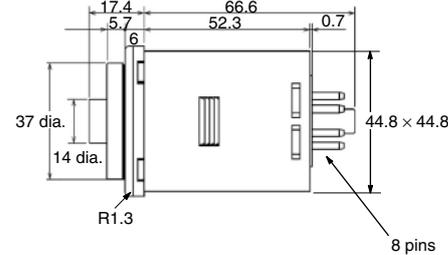
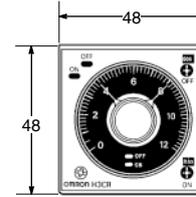
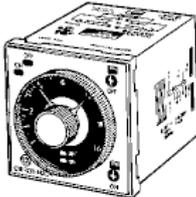
# Dimensions

Note: All units are in millimeters unless otherwise indicated.

H3CR-F  
H3CR-FN  
H3CR-F-300  
H3CR-FN-300

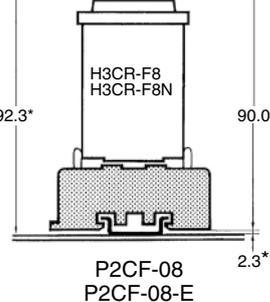
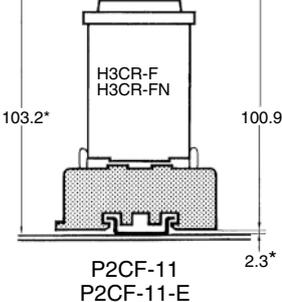


H3CR-F8  
H3CR-F8N  
H3CR-F8-300  
H3CR-F8N-300



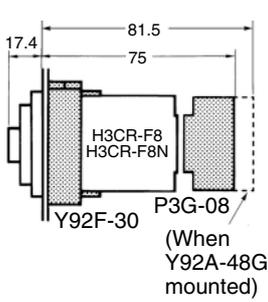
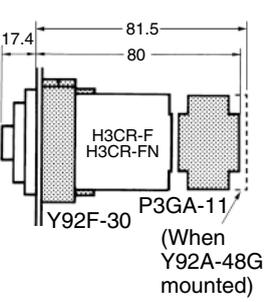
### Dimensions with Front Connecting Socket

P2CF-08-□/ P2CF-11-□



### Dimensions with Back Connecting Socket

P3G-08/P3GA-11



\*These dimensions vary with the kind of DIN track (reference value).

ALL DIMENSIONS SHOWN ARE IN MILLIMETERS.  
To convert millimeters into inches, multiply by 0.03937. To convert grams into ounces, multiply by 0.03527.

In the interest of product improvement, specifications are subject to change without notice.

# Safety Precautions for All Timers

Refer to the *Safety Precautions* for individual Timers for precautions specific to each Timer.

## ⚠ WARNING

The following Timers contain lithium batteries that are not explosion proof.



1. Timers with Built-in Batteries: H5L  
The Timer contains a lithium battery, which may occasionally ignite or rupture. Do not disassemble, deform under pressure, heat to 100°C or higher, or incinerate the Timer.
2. Timers with Replaceable Batteries: Y92S-20 (for H5CN-M)  
The battery may occasionally rupture, ignite, or leak fluid. Do not short the positive and negative terminals. Do not charge, disassemble, deform under pressure, or throw the battery into a fire. If a non-specified battery is used, the battery may leak fluid or rupture, occasionally resulting in equipment failure or minor injury. Use only the specified battery.

## ⚠ CAUTION

The following Timers contain lithium batteries that are explosion proof.



Timers with Built-in Batteries: H5BR, H5AN-4DM, H5S, H5F, and H4KV

The Timer contains a lithium battery, which may occasionally ignite or rupture. Do not disassemble, deform under pressure, heat to 100°C or higher, or incinerate the Timer.

## ■ Precautions for Safe Use

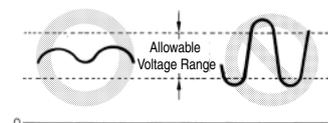
### Operating Environment

- Use the Timer within the ratings specified for ambient operating temperature and ambient operating humidity for each model.
- Store the Timer with the specified temperature range for each model. If the Timer has been stored at a temperature of less than -10°C, allow the Timer to stand at room temperature for at least 3 hours before using it.
- Use the Timer within the performance specified for water and oil exposure for each model.
- Do not use the Timer in locations subject to shock and vibration. Long-term usage in such locations may damage the Timer due to stress.  
Magnetic contactors generate a shock of 1,000 to 2,000 m/s<sup>2</sup> when switching a load. When mounting to DIN Track, separate magnetic contactors from the Timer so that the Timer is not subjected to vibration and shock. Use anti-vibration rubber.
- Do not use the Timer in locations subject to excessive dust, corrosive gases, or direct sunlight.
- Do not use organic solvents (such as paint thinner or benzene), strong alkalis, or strong acids because they will damage the external finish of the Timer.
- Separate the input devices, input wiring, and Timer as far as possible from sources of noise and power lines carrying noise.
- When using the Timer in environments subject to large amounts of static electricity (e.g., pipes carrying molding materials, powders, or fluid materials), separate the Timer as far as possible from the sources of static electricity.
- Do not remove the external case from the Timer.
- Do not use the Timer in locations where condensation may occur due to high humidity or sudden temperature changes. Condensation inside the Timer may result in malfunction or damage to Timer elements.
- The life of internal parts may be reduced if Timers are mounted in close proximity to each other.
- Resin and rubber parts (e.g., rubber packing) may deteriorate, shrink, or harden depending on the operating environment (e.g., subjected to corrosive gases, ultraviolet light, or high temperatures). We recommend periodic inspection and replacement.

- Normal operation may not be possible in locations subject to sulfidizing gas, such as in sewer systems or waste incinerators. OMRON does not market any Timers or other control devices for operation in atmospheres containing sulfidizing gas. Seal the Timer so that sulfidizing gas will not enter it. If sealing is not possible, OMRON does provide special Timers with improved resistance to sulfidizing gas. Ask your OMRON representative for details.

### Power Supply

- Be sure that the voltage applied is within the specified range, otherwise the internal elements of the Timer may be damaged.
- Install a switch or circuit breaker that allows the operator to immediately turn OFF the power, and label it to clearly indicate its function.
- Maintain voltage fluctuations in the power supply within the specified range.



- Use a commercial power supply for the power supply voltage input to models with AC inputs. Inverters with an output frequency of 50/60 Hz are available, but the rise in the internal temperature of the Timer may result in ignition or burning. Do not use an inverter output for the power supply of the Timer.
- The Timers listed below cannot be directly turned ON and OFF by using an AC 2-wire proximity sensor to turn the Timer's power supply ON and OFF. Use the following countermeasure when using an AC 2-wire proximity sensor with the Timer. (The power supply circuit in the Timer uses half-wave rectification. Only a half AC wave is supplied to the proximity sensor, which may cause operation to be unstable.)

#### Applicable Models

H3Y, H3YN, H3RN, H3CA-8, RD2P, and H3CR(-A, -A8, -AP, -F, and -G)

#### Countermeasure

- Wire through a relay and use the relay contacts to turn the power supply ON and OFF.  
Confirm the stability of operation after making the connections.
- Install protective measures (such as earth leakage breakers, wiring breakers, or fuses) on the power supply side according to any applicable laws or regulations.

## Correctly Handling Input Signals

Malfunction due to noise may occur if input wiring is placed in the same duct or conduit as power lines or high-voltage lines. Separate input wiring from power lines and wire them in a separate system. Also, use shielded cables, use metal conduits, and keep wiring distances as short as possible.

## Timers with Relays

- Do not connect a load that exceeds contact ratings, such as the switching capacity (contact voltage or contact current). Insulation faults, contact welding, contact faults, and other failures to achieve specified performance may occur and the relay may be damaged or may burn.
- Continued use with deteriorated performance may ultimately result in insulation breakdown between circuits or relay burning. The life of the built-in relay is greatly affected by switching conditions. Before using the Timer, test operation under actual application conditions and confirm that the switching frequency presents no problems in performance.
- Electrical life depends on the type of load, switching frequency, and ambient environment. Observe the following precautions when using the Timer. When switching a DC load, contact transfer may cause the contacts to stick or may cause contact failure. Confirm applicability and consider using a surge absorbing element. When switching at high frequencies, heat generated by arcing may cause contacts to melt or may cause metal corrosion. Consider connecting an arc absorbing element, reducing the switching frequency, or lowering the humidity.
- The surge current depends on the type of load, which also affects contact switching frequency and the number of operations. Check the rated current and the surge current, and design the circuits with sufficient margin.

Resistive load	Solenoid load	Motor load	Incandescent lamp load
Rated current	10 to 20 times the rated current	5 to 10 times the rated current	10 to 20 times the rated current

Sodium light loads	Capacitor loads	Transformer loads	Mercury light loads
1 to 3 times the rated load	20 to 40 times the rated load	5 to 15 times the rated load	1 to 3 times the rated load

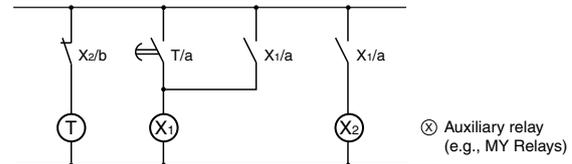
- Arcing when switching and relay heating may result in ignition or explosion. Do not use the Timer in atmospheres subject to inflammable or explosive gases.
- Contact faults may occur. Do not use the Timer in atmospheres subject to sulfidizing gas, chloride gas, or silicon gas.
- The switching capacity for DC voltage loads is lower than that for AC voltage loads.

## Timers with Non-contact Outputs

- Short faults or open faults may occur due to destruction of the output element. Do not use the Timer for a load that exceeds the rated output current.
- Short faults or open faults may occur due to destruction of the output element from reverse electromotive force. When using the Timer for a DC inductive load, always connect a diode as a countermeasure against reverse electromotive force.

## Other Precautions

- Confirm that you have the correct model before using it.
- Be sure that all terminals are wired correctly.
- Always test the output status with a tester before using a Timer with a built-in keep relay (e.g., the H3CR-H and H3DE-H). Shock resulting from dropping the Timer during transport or handling may cause the output contacts to reverse or to be in a neutral status.
- Leaving the Timer with outputs ON at a high temperature for a long time may hasten the degradation of internal parts (such as electrolytic capacitors). Use the Timer in combination with relays and avoid leaving the Timer with the output turned ON for an extended period of time (e.g., for more than a month). Reference Example (Use the Timer as shown below.)



- Be sure that only a qualified worker (e.g., an electrical engineer) performs electrical work for the Timer.

ALL DIMENSIONS SHOWN ARE IN MILLIMETERS.

To convert millimeters into inches, multiply by 0.03937. To convert grams into ounces, multiply by 0.03527.

In the interest of product improvement, specifications are subject to change without notice.

## Read and Understand This Catalog

Please read and understand this catalog before purchasing the products. Please consult your OMRON representative if you have any questions or comments.

## Warranty and Limitations of Liability

### WARRANTY

OMRON's exclusive warranty is that the products are free from defects in materials and workmanship for a period of one year (or other period if specified) from date of sale by OMRON.

OMRON MAKES NO WARRANTY OR REPRESENTATION, EXPRESS OR IMPLIED, REGARDING NON-INFRINGEMENT, MERCHANTABILITY, OR FITNESS FOR PARTICULAR PURPOSE OF THE PRODUCTS. ANY BUYER OR USER ACKNOWLEDGES THAT THE BUYER OR USER ALONE HAS DETERMINED THAT THE PRODUCTS WILL SUITABLY MEET THE REQUIREMENTS OF THEIR INTENDED USE. OMRON DISCLAIMS ALL OTHER WARRANTIES, EXPRESS OR IMPLIED.

### LIMITATIONS OF LIABILITY

OMRON SHALL NOT BE RESPONSIBLE FOR SPECIAL, INDIRECT, OR CONSEQUENTIAL DAMAGES, LOSS OF PROFITS, OR COMMERCIAL LOSS IN ANY WAY CONNECTED WITH THE PRODUCTS, WHETHER SUCH CLAIM IS BASED ON CONTRACT, WARRANTY, NEGLIGENCE, OR STRICT LIABILITY.

In no event shall responsibility of OMRON for any act exceed the individual price of the product on which liability is asserted.

IN NO EVENT SHALL OMRON BE RESPONSIBLE FOR WARRANTY, REPAIR, OR OTHER CLAIMS REGARDING THE PRODUCTS UNLESS OMRON'S ANALYSIS CONFIRMS THAT THE PRODUCTS WERE PROPERLY HANDLED, STORED, INSTALLED, AND MAINTAINED AND NOT SUBJECT TO CONTAMINATION, ABUSE, MISUSE, OR INAPPROPRIATE MODIFICATION OR REPAIR.

## Application Considerations

### SUITABILITY FOR USE

OMRON shall not be responsible for conformity with any standards, codes, or regulations that apply to the combination of products in the customer's application or use of the product.

At the customer's request, OMRON will provide applicable third party certification documents identifying ratings and limitations of use that apply to the products. This information by itself is not sufficient for a complete determination of the suitability of the products in combination with the end product, machine, system, or other application or use.

The following are some examples of applications for which particular attention must be given. This is not intended to be an exhaustive list of all possible uses of the products, nor is it intended to imply that the uses listed may be suitable for the products:

- Outdoor use, uses involving potential chemical contamination or electrical interference, or conditions or uses not described in this catalog.
- Nuclear energy control systems, combustion systems, railroad systems, aviation systems, medical equipment, amusement machines, vehicles, safety equipment, and installations subject to separate industry or government regulations.
- Systems, machines, and equipment that could present a risk to life or property.

Please know and observe all prohibitions of use applicable to the products.

NEVER USE THE PRODUCTS FOR AN APPLICATION INVOLVING SERIOUS RISK TO LIFE OR PROPERTY WITHOUT ENSURING THAT THE SYSTEM AS A WHOLE HAS BEEN DESIGNED TO ADDRESS THE RISKS, AND THAT THE OMRON PRODUCT IS PROPERLY RATED AND INSTALLED FOR THE INTENDED USE WITHIN THE OVERALL EQUIPMENT OR SYSTEM.

## Disclaimers

### CHANGE IN SPECIFICATIONS

Product specifications and accessories may be changed at any time based on improvements and other reasons.

It is our practice to change model numbers when published ratings or features are changed, or when significant construction changes are made. However, some specifications of the product may be changed without any notice. When in doubt, special model numbers may be assigned to fix or establish key specifications for your application on your request. Please consult with your OMRON representative at any time to confirm actual specifications of purchased product.

### DIMENSIONS AND WEIGHTS

Dimensions and weights are nominal and are not to be used for manufacturing purposes, even when tolerances are shown.

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The information in this catalog has been carefully checked and is believed to be accurate; however, no responsibility is assumed for clerical, typographical, or proofreading errors, or omissions.

### PERFORMANCE DATA

Performance data given in this catalog is provided as a guide for the user in determining suitability and does not constitute a warranty. It may represent the result of OMRON's test conditions, and the users must correlate it to actual application requirements. Actual performance is subject to the OMRON Warranty and Limitations of Liability.

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## Appendix 4: Electrical Controls Schematics

### SPI Panels: Used '08 to Present

Model 11 Electrical Controls Schematics.....EC-11 / CP-11

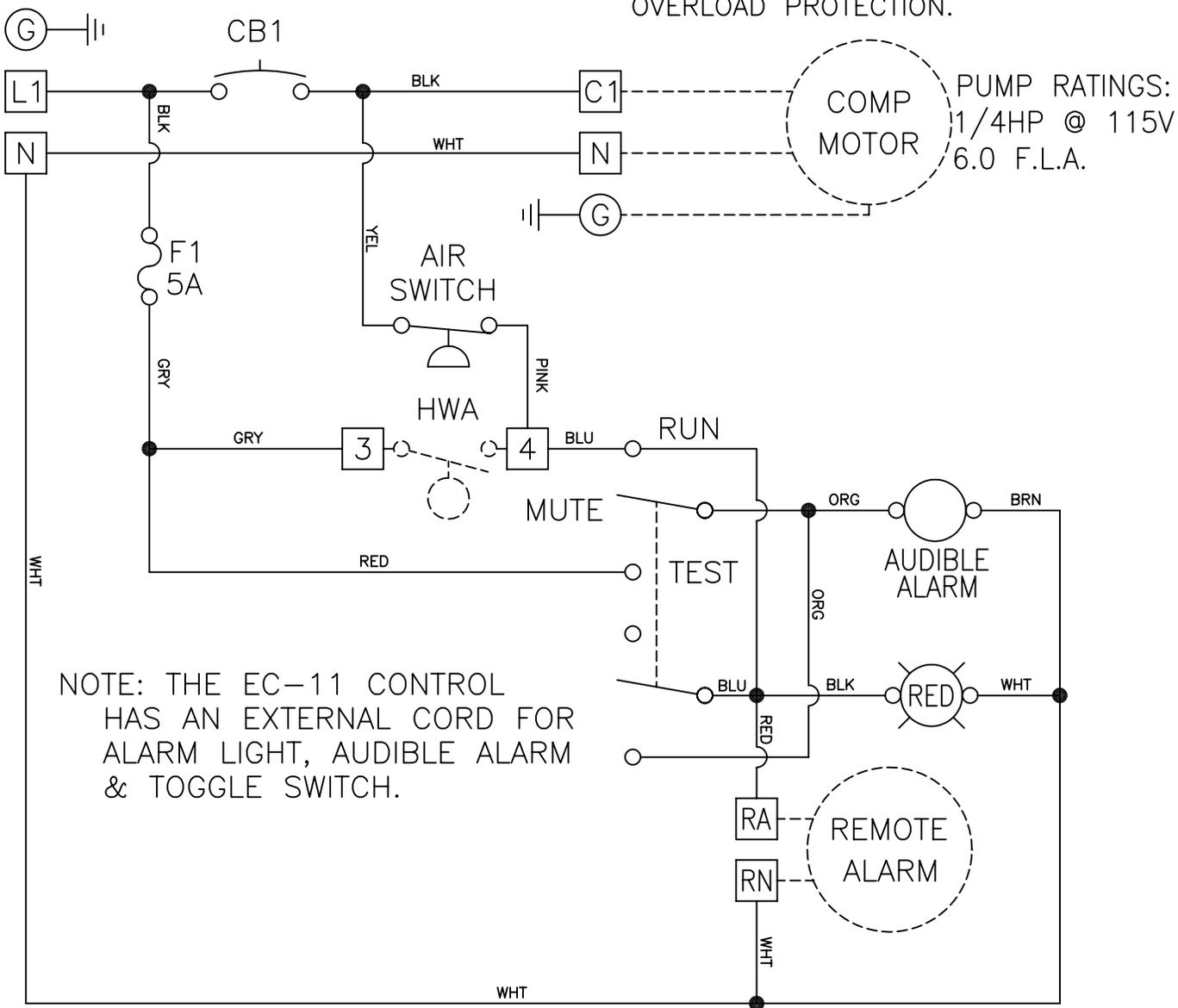
Model 20 Electrical Controls Schematics.....EC-20 / CP-20

Model 30 Electrical Controls Schematics.....EC-30 / CP-30

Model 32 Electrical Controls Schematics.....EC-32 / CP-32

PUMP POWER CIRCUIT  
115V - 1PH

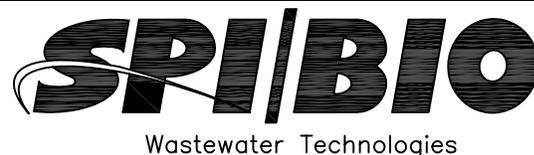
NOTE: MOTOR MUST HAVE INTERNAL OVERLOAD PROTECTION.



NOTE: THE EC-11 CONTROL HAS AN EXTERNAL CORD FOR ALARM LIGHT, AUDIBLE ALARM & TOGGLE SWITCH.

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.

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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'		

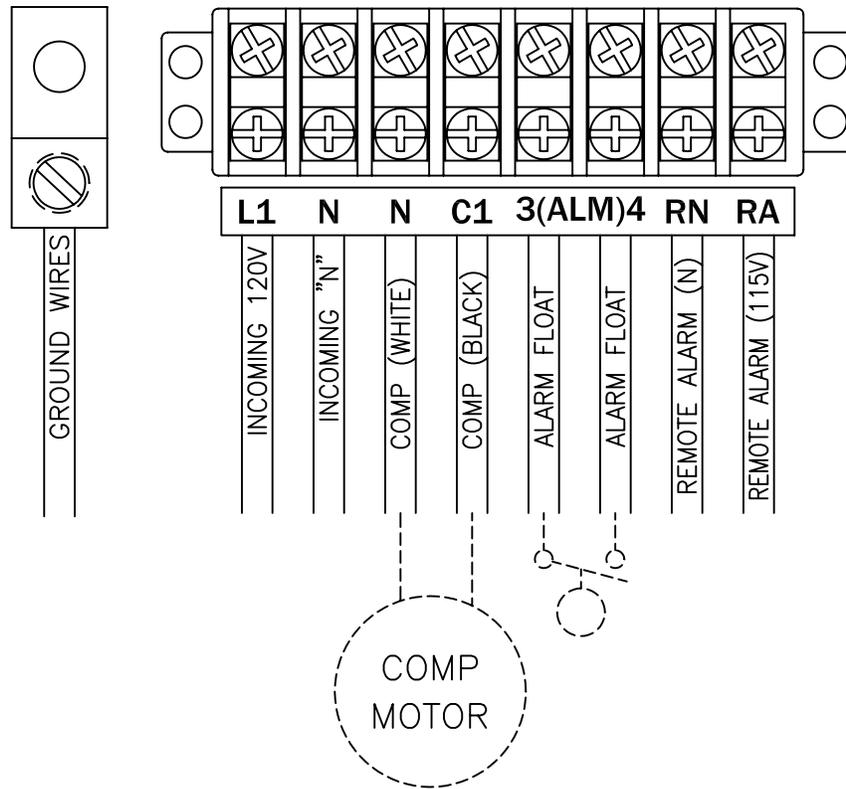
SCHEMATIC, ELECTRICAL  
COMP ALARM W/HWA

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



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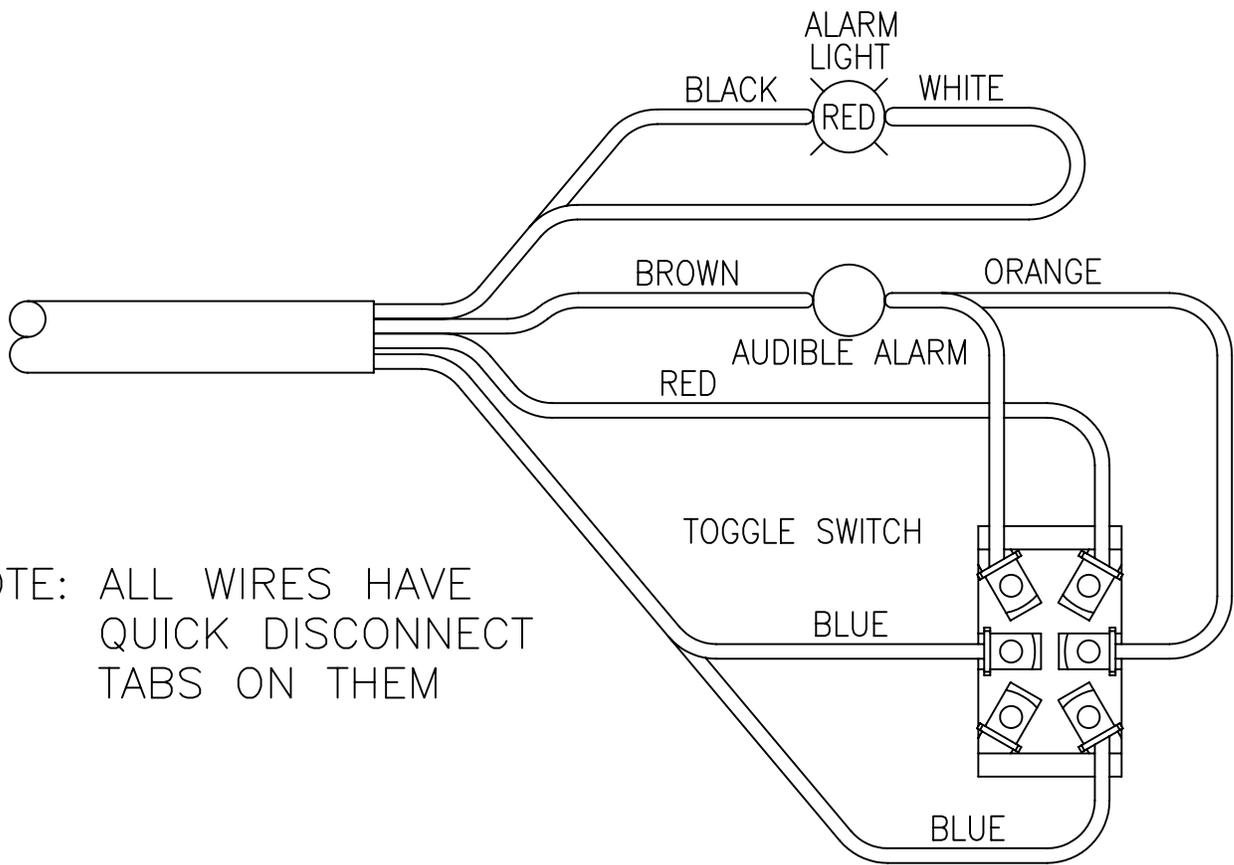
Wastewater Technologies

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:			
D		AS NOTED			
C		AS NOTED			
B		AS NOTED			
A	AS NOTED				

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

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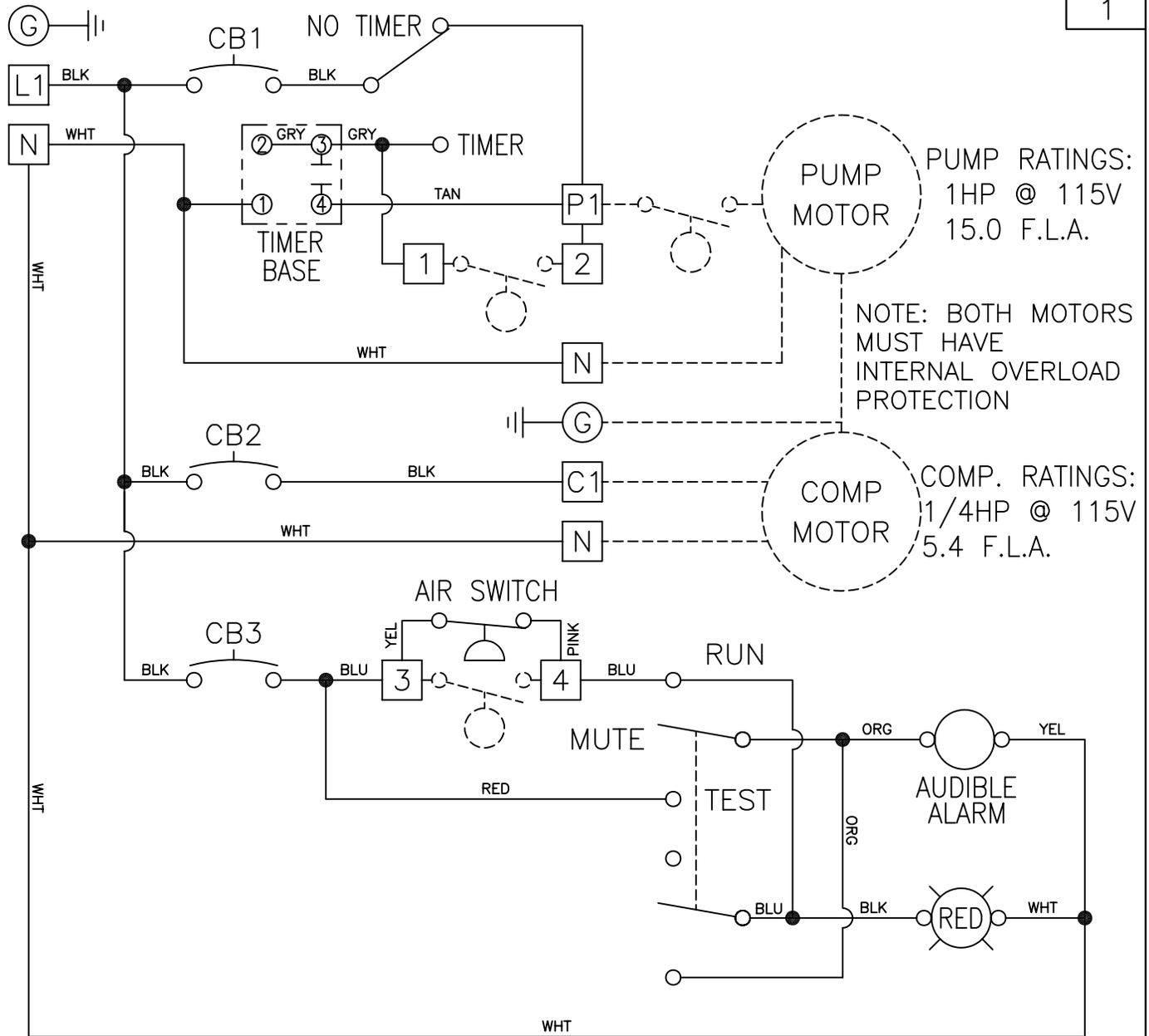
Wastewater Technologies

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				SCALE:
D				FULL	EC-11/CP-11	
C						
B						
A						

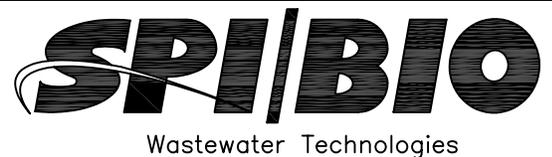
PUMP/COMPRESSOR POWER CIRCUIT  
115V - 1PH

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.  
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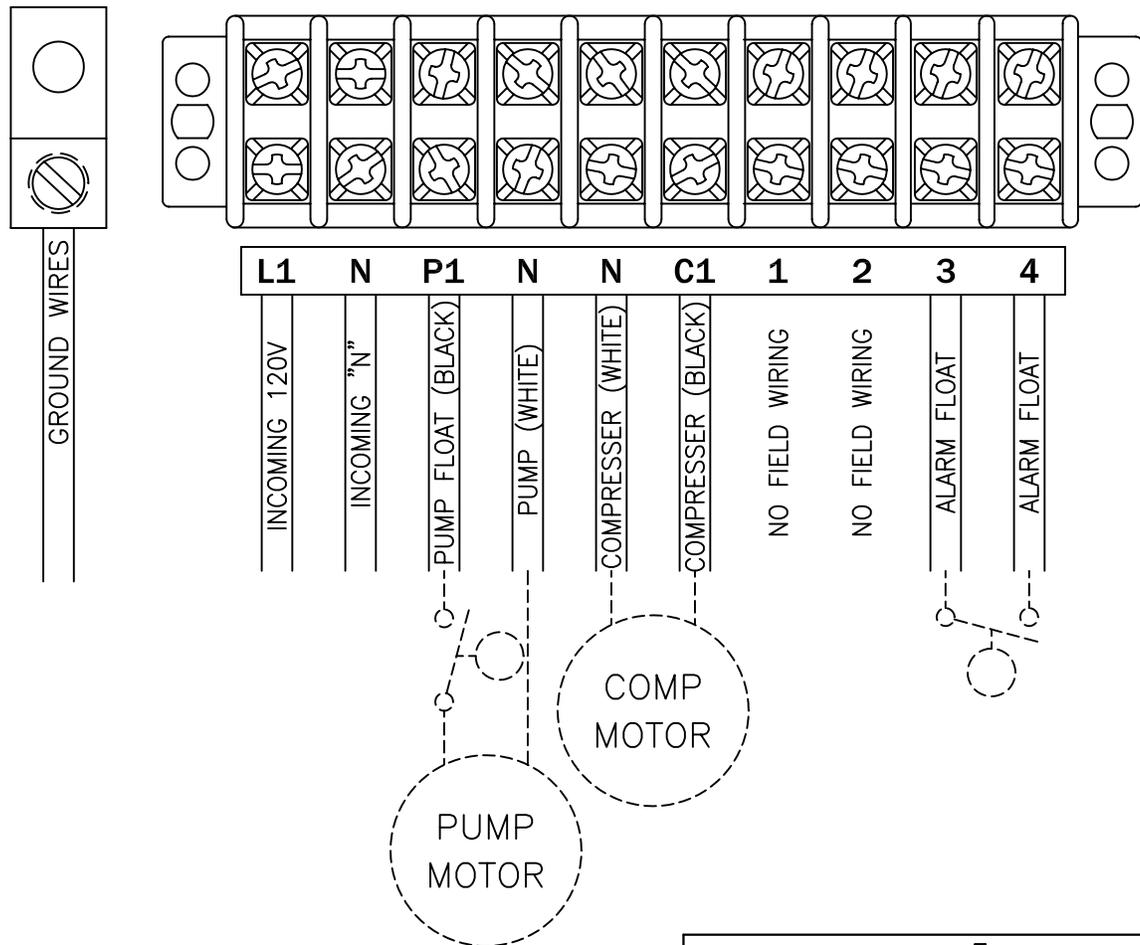


CHANGES	TOLERANCES	DRAWN BY	DATE	SCHEMATIC, ELECTRICAL W/TIMER & AIR SWITCH	
F	DECIMALS	D. MIDDLETON	06/20/04	SCALE:	PART NO.
E	.XXX = ±.005	MATERIAL SPECIFICATION:  AS NOTED		FULL	CP-20/EC-20
D	.XX = ±.010				
C	FRACTIONAL				
B	X/X = ±.1/64				
A	ANGLES X' = ±1/2'				

TIGHTENING TORQUE FOR TERMINAL BLOCK IS 9 in-lbs.

HYDRO-ACTION

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



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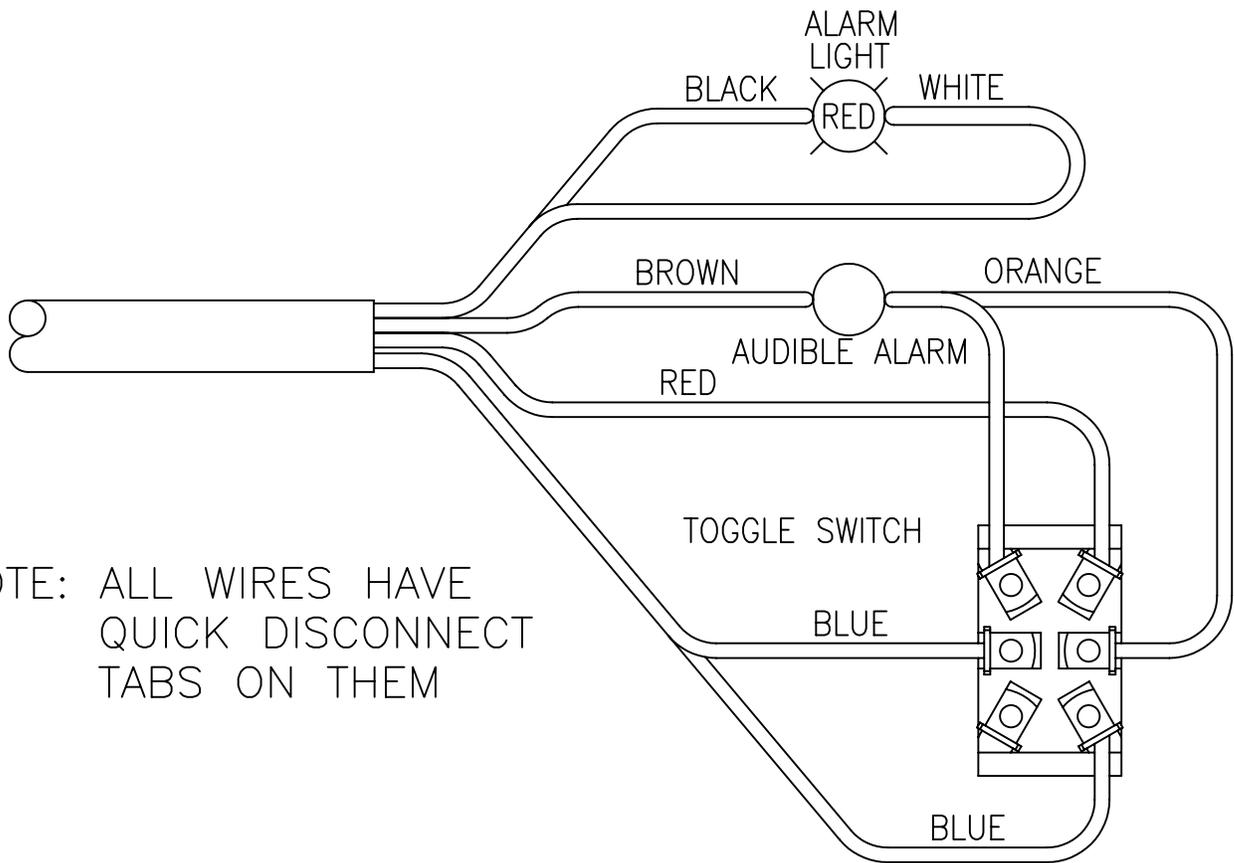


CHANGES	TOLERANCES	DRAWN BY	DATE	<b>POWER CONNECTION DIAGRAM</b>	
F	DECIMALS .xxx = ±.005 .xx = ±.010 FRACTIONAL x/x = ±.1/64 ANGLES x° = ±1/2°	D. MIDDLETON	12/15/04		
E		<b>AS NOTED</b>		<b>FULL</b>	<b>CP-20/EC-20</b>
D					
C					
B					
A					

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

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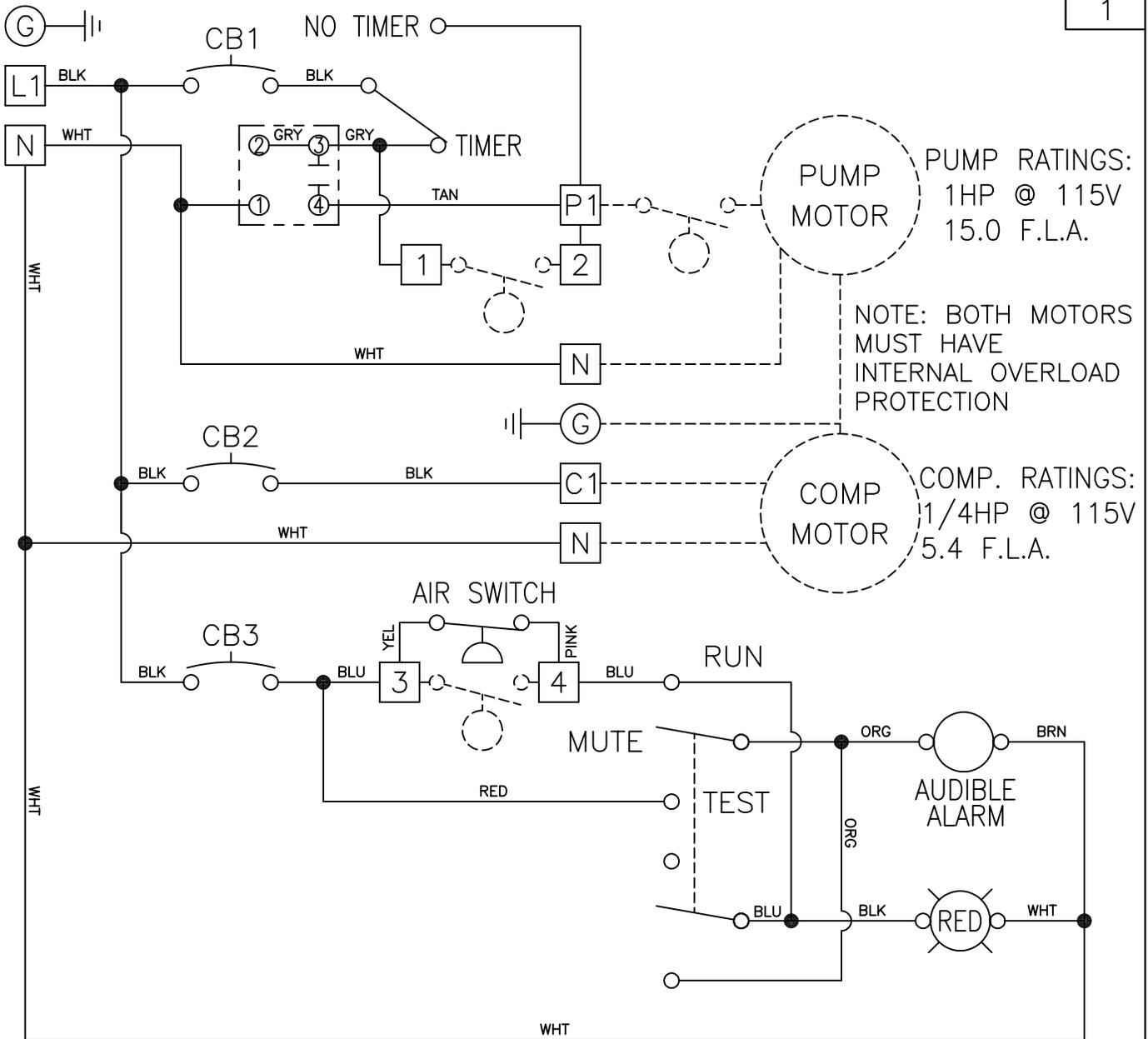


CHANGES	TOLERANCES	DRAWN BY	DATE	POWER CONNECTION DIAGRAM	
F	DECIMALS	D. MIDDLETON	5/20/04	SCALE: PART NO. FULL CP-20/EC-20	
E	.XXX = ±.005	MATERIAL SPECIFICATION:  AS NOTED			
D	.XX = ±.010				
C	FRACTIONAL				
B	X/X = ±.1/64				
A	ANGLES				
	X' = ±1/2'				

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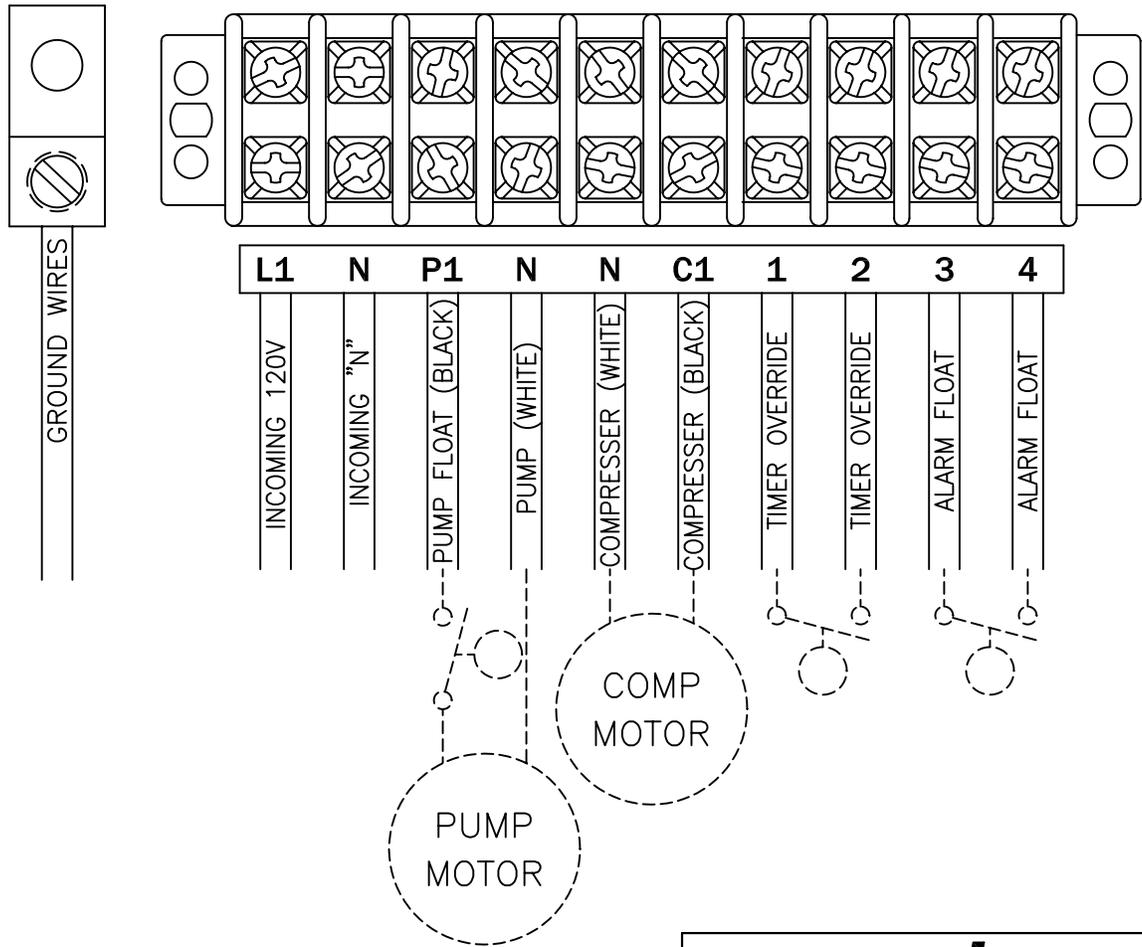
CHANGES	TOLERANCES	DRAWN BY	DATE
F	DECIMALS .xxx = ±.005	D. MIDDLETON	06/20/04
E	.xx = ±.010	MATERIAL SPECIFICATION:  AS NOTED	
D	FRACTIONAL		
C	x/x = ±.1/64		
B	ANGLES		
A	x' = ±1/2'		

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



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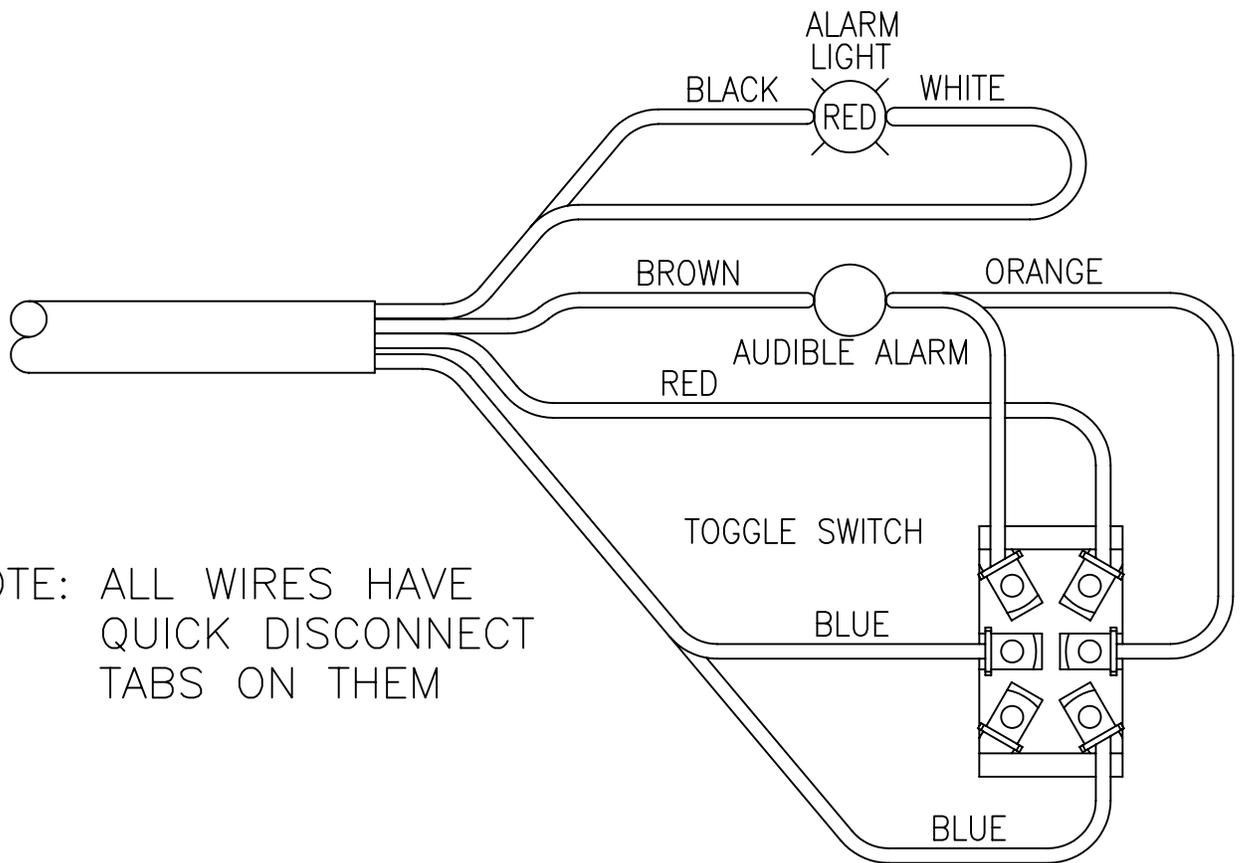
Wastewater Technologies

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		
E		MATERIAL SPECIFICATION:  AS NOTED		CP-30A/EC-30A	
D					
C					
B		FULL		PART NO. CP-30A/EC-30A	
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

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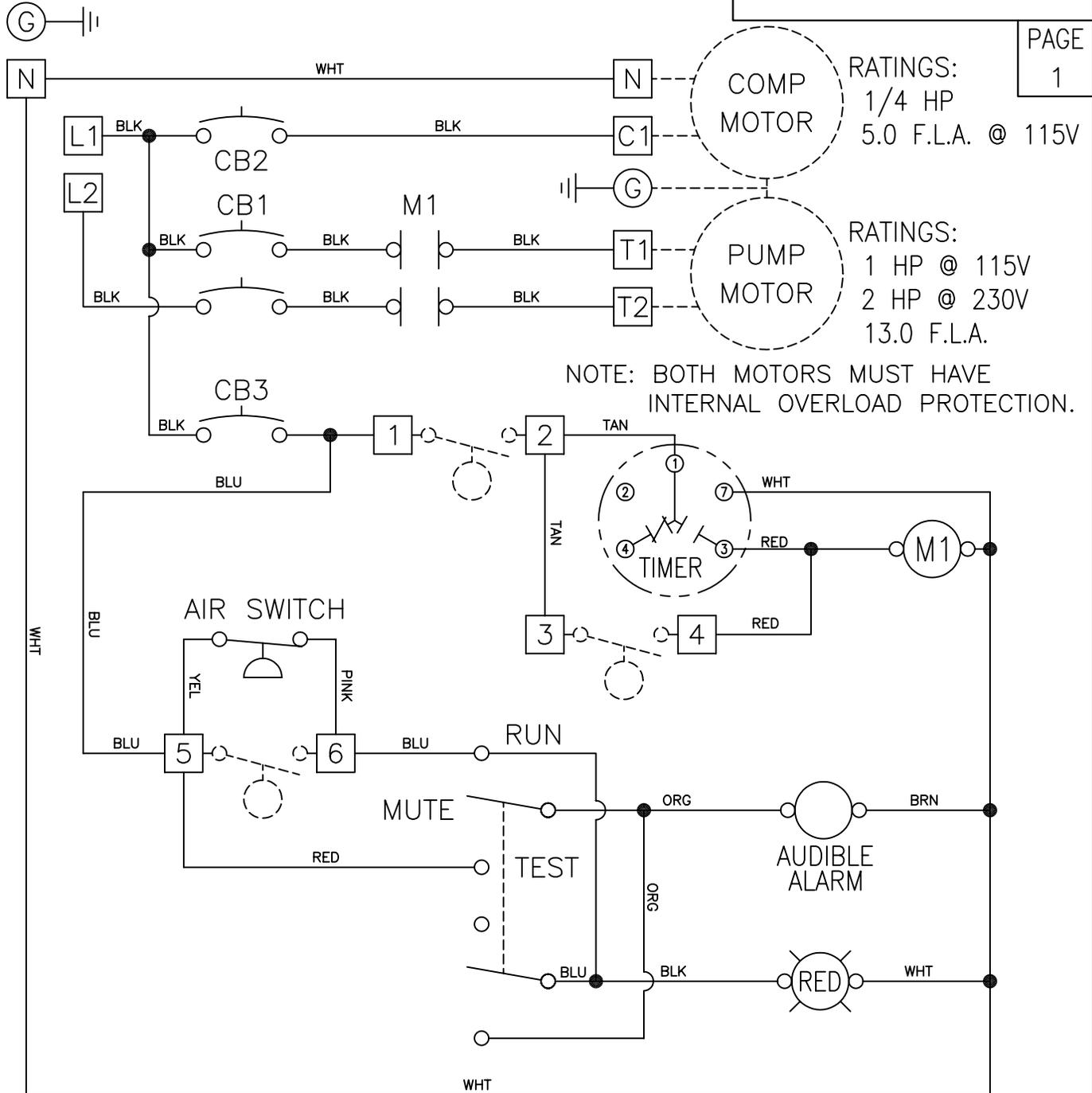


CHANGES	TOLERANCES	DRAWN BY	DATE	POWER CONNECTION DIAGRAM	
F	DECIMALS .XXX = ±.005 .XX = ±.010 FRACTIONAL X/X = ±.1/64 ANGLES X° = ±1/2°	D. MIDDLETON	5/20/04		
E		MATERIAL SPECIFICATION:  AS NOTED		FULL	CP-30A/EC-30A
D					
C					
B					
A					

PUMP POWER CIRCUIT  
115/230V - 1PH

50B124

PAGE  
1



NOTE: BOTH MOTORS 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.



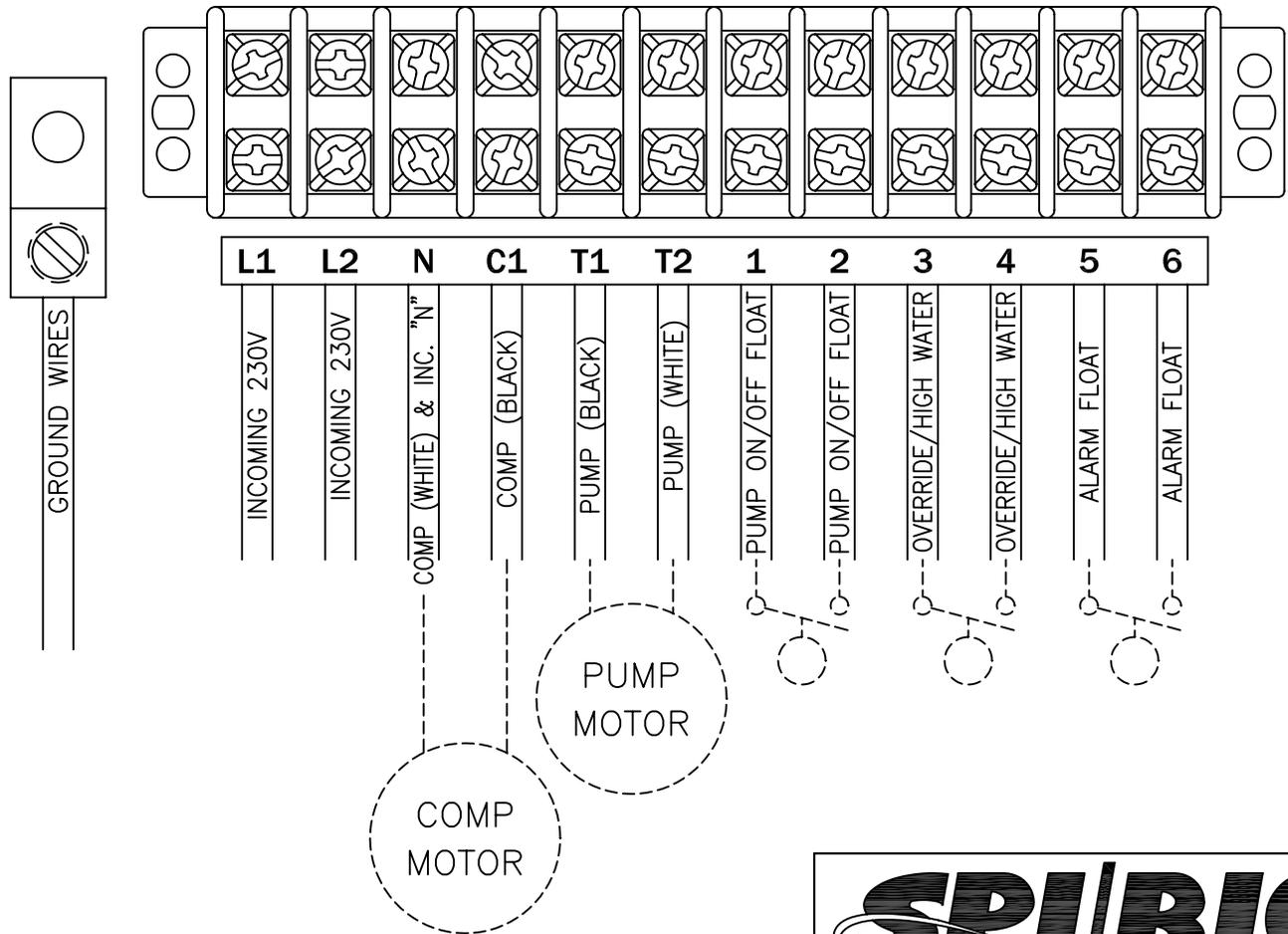
CHANGES	TOLERANCES	DRAWN BY	DATE
F	DECIMALS .XXX = ±.005	D. MIDDLETON	06/20/04
E	.XX = ±.010	MATERIAL SPECIFICATION:  AS NOTED	
D	FRACTIONAL X/X = ±.1/64		
C	ANGLES X° = ±1/2°		
A			

SCHEMATIC, ELECTRICAL SIMPLEX 115/230V	
SCALE:	PART NO.
FULL	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)



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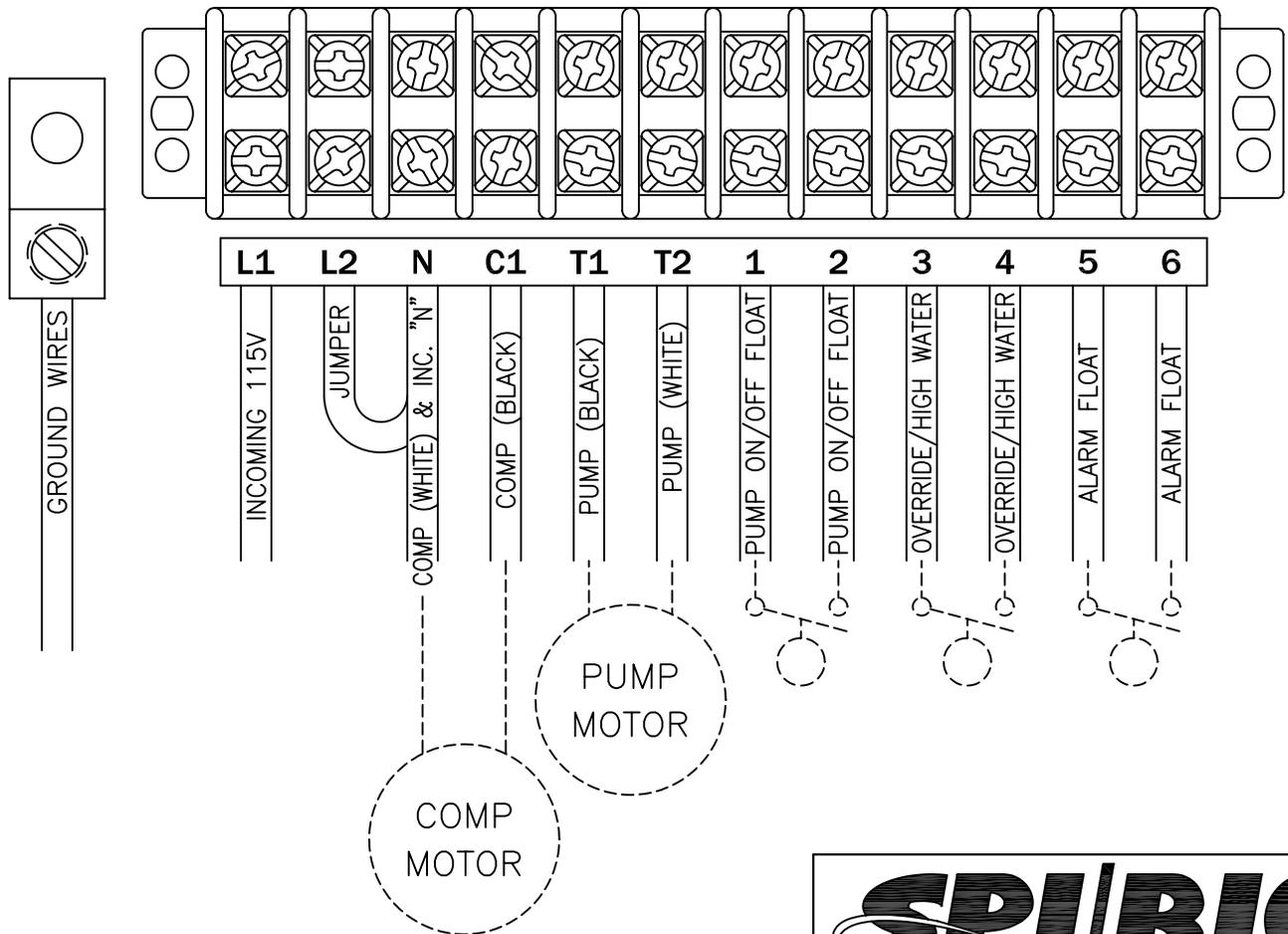
Wastewater Technologies

CHANGES	TOLERANCES	DRAWN BY	DATE	<b>POWER CONNECTION DIAGRAM</b>
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	SCALE: FULL	PART NO. EC-32A2/CP-32A2		

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.



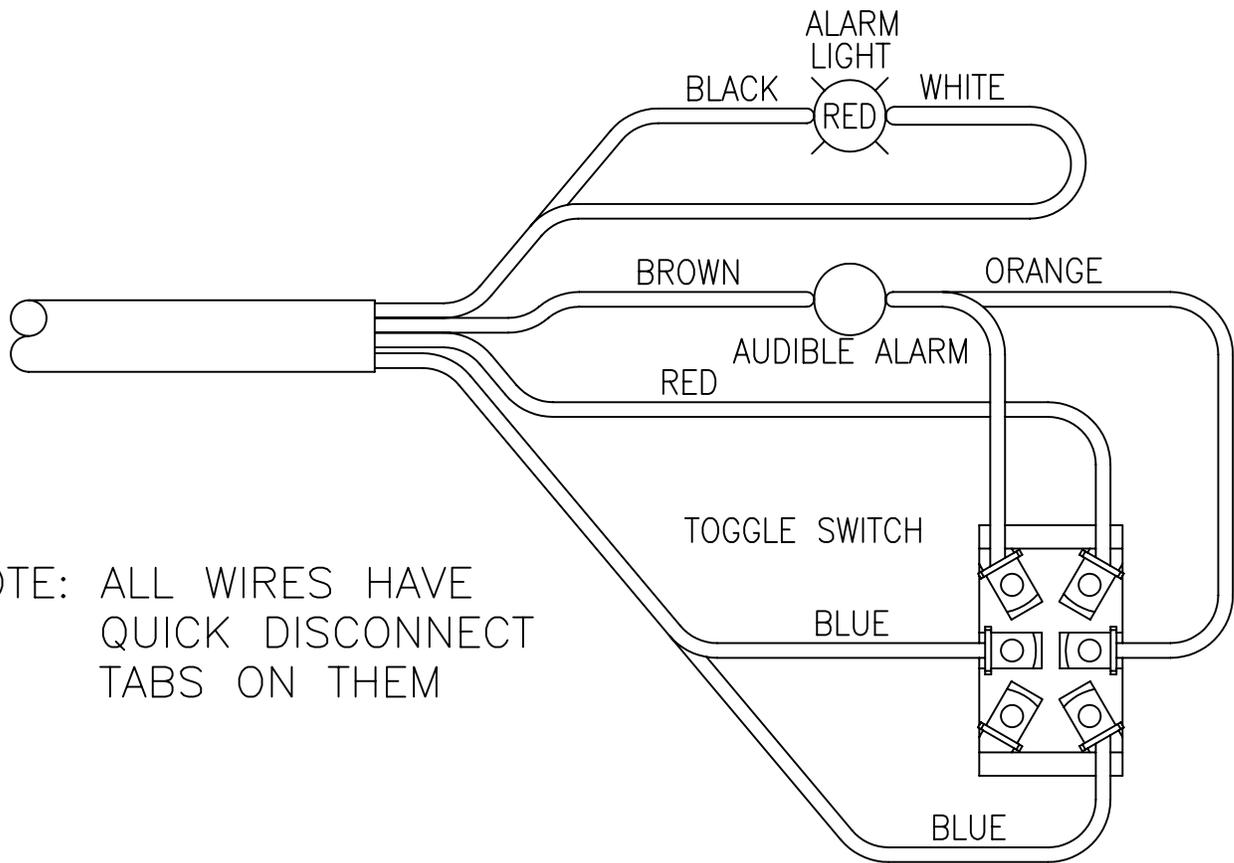
CHANGES	TOLERANCES	DRAWN BY	DATE
F	DECIMALS .XXX = ±.005 .XX = ±.010 FRACTIONAL X/X = ±.1/64 ANGLES X° = ±1/2°	D. MIDDLETON	12/15/04
E		MATERIAL SPECIFICATION:  AS NOTED	
D			
C			
B			
A			

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	
F		DECIMALS		D. MIDDLETON		5/20/04	
E		.XXX = ±.005		MATERIAL SPECIFICATION:  AS NOTED			
D		.XX = ±.010					
C		FRACTIONAL					
B		X/X = ±.1/64					
A		ANGLES					
		X' = ±1/2'				POWER CONNECTION DIAGRAM	
						SCALE:	PART NO.
						FULL	EC-32A2

## Appendix 5: Drawings

AP 500 ATU.....

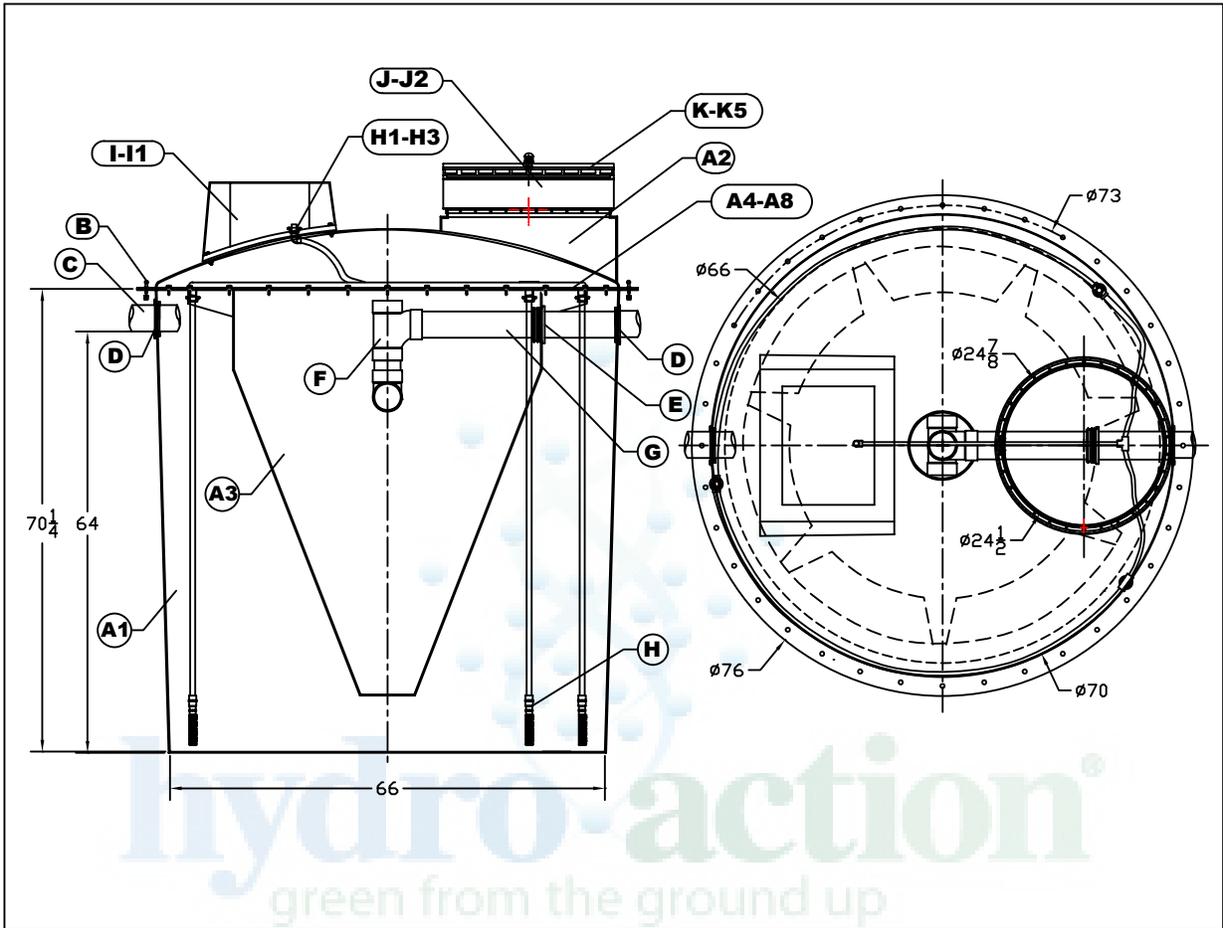
LPA 500 ATU.....

AP 600 ATU.....

AP 750 ATU.....

AP 1000 ATU.....

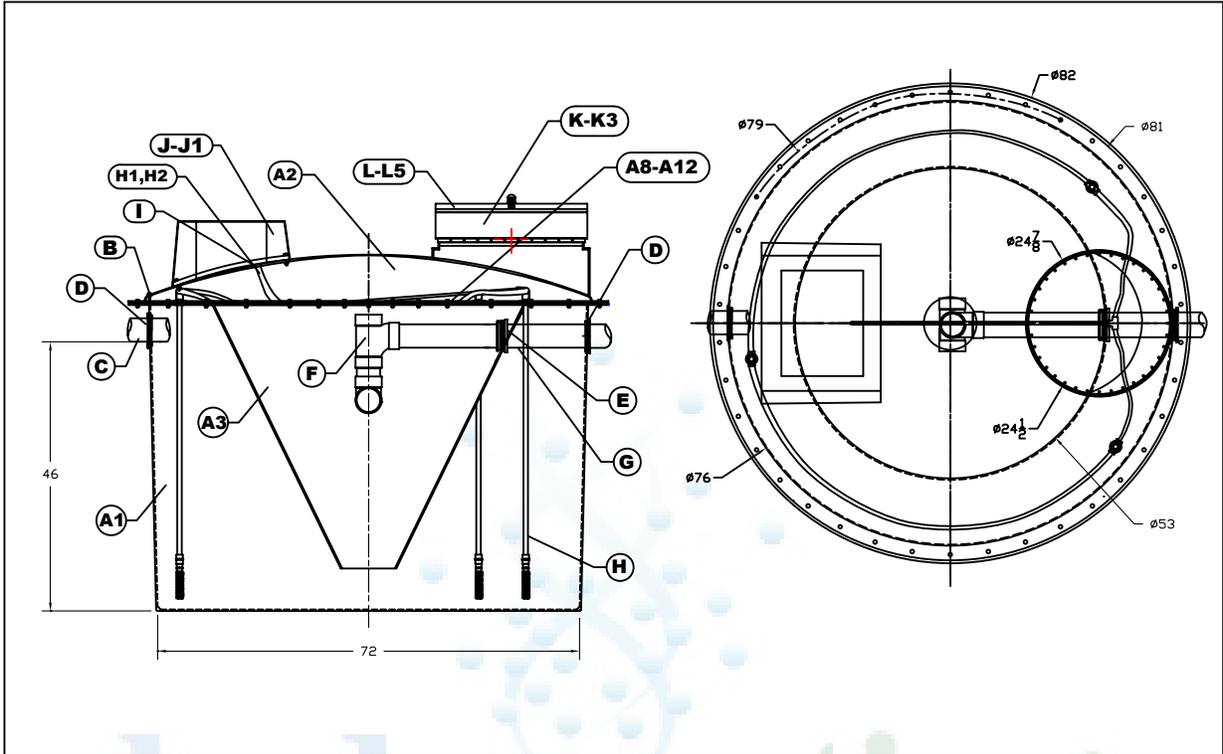
AP 1500 ATU.....



### BILL OF MATERIALS

ITEM	P/N	DESCRIPTION	QTY:
	HA-AP500-P	AP500, W/ PLATFORM COMPLETE	1
A1	180075	TANK, BODY AP500-P	1
A2	180080	DDME, AP500-P RTM	1
A3	240050	CDNE, POLY AP500	1
A4	200095	SCREW, 5/16" X 2" HWH SDS 410	29
A5	760068	BOLT, 3/8"-16 X 1 1/2" TAMPERPROOF	2
A6	200013	NUT, 3/8"-16 SS	2
A7	200006	WASHER, 3/8" STD SS	4
A8	160030	CONSEAL, 3/8" X 1"	1 ROLL
B	120001	ASSEMBLY, EYEBOLT	2
C	100065-35	PIPE STUB, PLUMBING & CONNECTING SCH35	1
D	240062	GROMMET, 4" ADAPT-A-FLEX SCH35	2
E	100010	GROMMET, 4" DUAL TITE	1
F	100103-35	ASSEMBLY, TEE AP SERIES OUTLET SCH35	1
G	100067-35	PIPE STUB, OUTLET AP500 SCH35	1
H	100058-3DRP	ASSEMBLY, DIFFUSER 3 DROP	1
H1	180114	PIPE, .50 PVC SCH40	(1) 5' LONG
H2	180103	ELL, .50 90° PVC SCH40	1
H3	240058	GROMMET, 1/2" ADAPT-A-FLEX	1
I	AKC10052-A	HYDRO-ACTION, PLATFORM DARK GREEN	1
I1	200094	SCREW, 1.50" X #12 SELF-TAPPING	4
J	241022	RISER, TANK 24" X 6" PL	1
J1	200059	SCREW, 1" #10 SELF-TAP PPH SS	6
J2	AKR30505	CONSEAL, 1/2" X 21'	.333
K	241024	LID, TANK RISER 24" PL	1
K1	200070	SCREW, 1 1/2" TRIGROOVE SM	4
K2	N/A	SCREW, LID (SUPPLIED W/LID)	4
K3	120000	ASSEMBLY, MUSHROOM CAP	1
K4	760050	TAG, SERIAL NUMBER AP500	1
K5	200025	RIVET, 1/8" GRIP 1/8" DIA. PDP	4
	N/A	SIKAFLEX	1 TUBE
		AP500 W/PLATFORM COMPLETE	DRAWN BY: ADAVIS
APPROVED BY:	SIGNATURE	DATE: 1/31/13	REV. 4 PART# HA-AP500-P

APPROVED

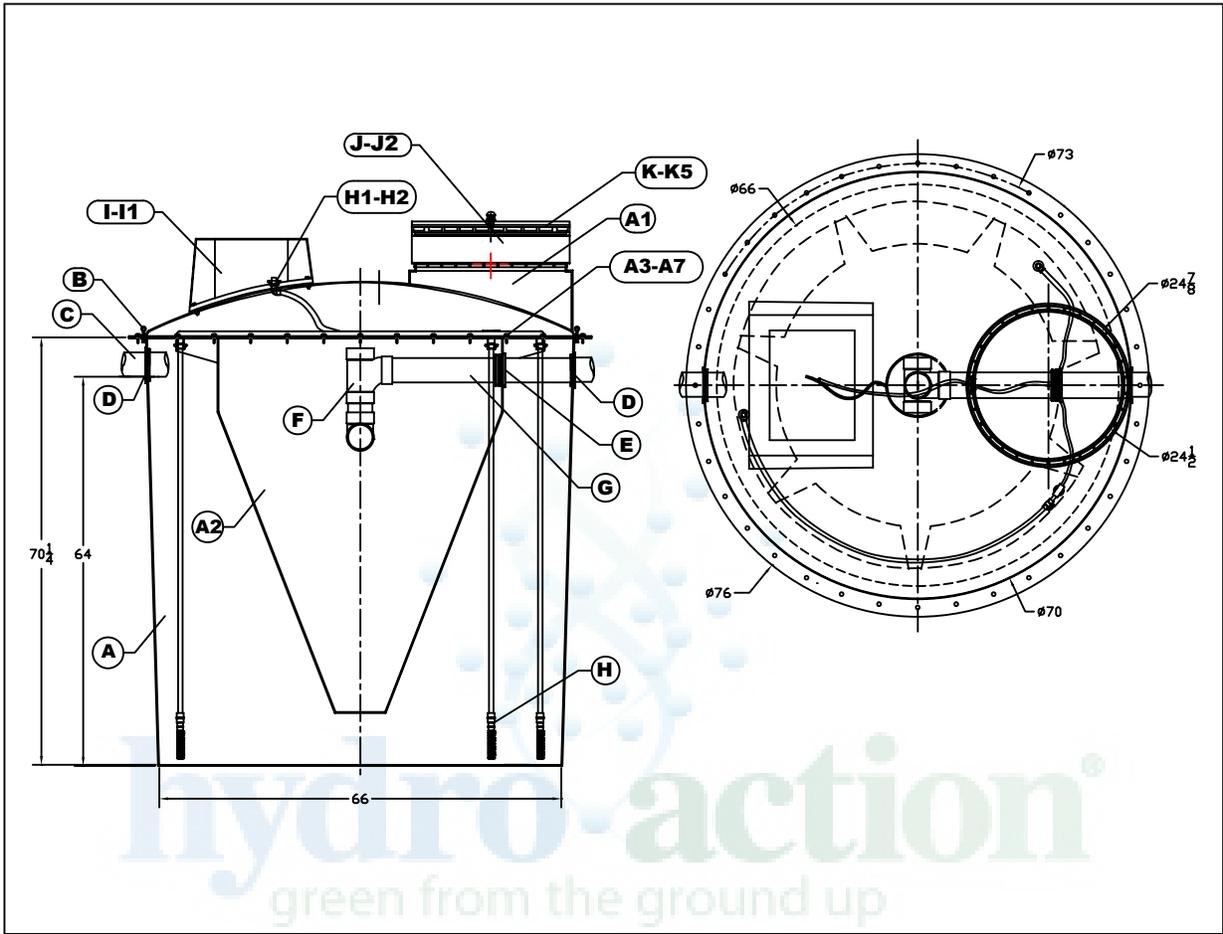


**BILL OF MATERIALS**

ITEM	P/N	DESCRIPTION	QTY:
	180095	LPA500, LDB W/ PLATFORM COMPLETE	1
A1	180071	TANK, BODY LPA500	1
A2	180031	DOME, RTM AP750/LPA500	1
A3	180040	CDNE, FIBERGLASS LPA-500	1
A8	760063	BOLT, 3/8" X 1 1/2"	36
A9	760068	BOLT, 3/8"-16 X 1 1/2" TAMPERPROOF	2
A0	200013	NUT, 3/8"-16 SS	38
A11	200006	WASHER, 3/8" STD SS	74
A12	160030	CONSEAL, 3/8" X 1"	1 ROLL
B	120001	ASSEMBLY, EYEBOLT	2
C	100065	PIPE STUB, 5 1/2" SCH 40	1
D	240059	GROMMET, 4" SCH40 ADAPT-A-FLEX	2
E	100010	GROMMET, 4" DUAL TITE	1
F	100103	ASSEMBLY, OUTLET AP SERIES	1
G	100069	OUTLET, PIPE 4.00 SCH40 AP750	1
H	100058-3DRP-LP	ASSEMBLY, DIFFUSER 3 DROP LOW PRO	1
H1	180114	PIPE, .50" PVC SCH40	(1) 3' LONG
H2	180103	ELL, .50 90" PVC SCH40	1
I	240058	GROMMET, 1/2" ADAPT-A-FLEX	1
J	AKC10052-A	HYDRO-ACTION, PLATFORM BLACK/GREEN	1
J1	----	SCREW, 1 1/2" X #12 SELF-TAP PPH SS	4
K	241022	RISER, TANK 24 X 6 PL	1
K1	200059	SCREW, 1" #10 SELF-TAP PPH SS	6
K2	AKR30505	CONSEAL, 1/2" X 21'	.333
L	241024	LID, TANK RISER 24" PL	1
L1	200070	SCREW, 1 1/2" TRI-GROOVE SM	4
L2	N/A	SCREW, LID (SUPPLIED W/LID)	4
L3	120000	ASSEMBLY, MUSHROOM CAP	1
L4	----	TAG, SERIAL NUMBER LPA500	1
L5	200025	RIVET, 1/8" GRIP 1/8" DIA. PDP	4
	N/A	SIKAFLEX	1 TUBE

	LPA500, LOWER DEPTH OF BURY W/ PLATFORM COMPLETE		DRAWN BY: ADAVIS	
	APPROVED BY:	SIGNATURE	DATE: 10/29/12	REV. 0 PART# HA-LPA500-P

APPROVED

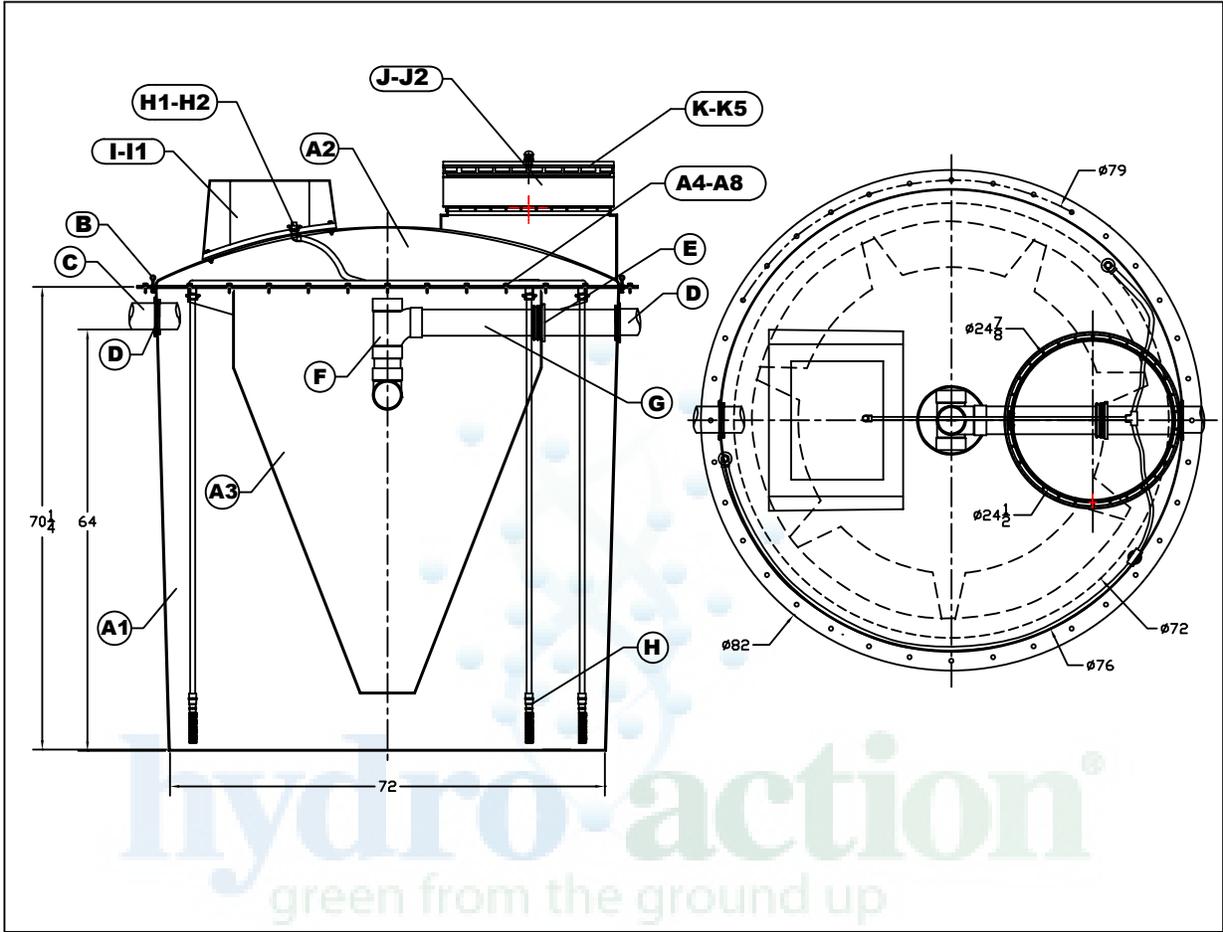


**BILL OF MATERIALS**

ITEM	P/N	DESCRIPTION	QTY:
	AP600-P	AP600, W/ PLATFORM COMPLETE	1
A	180076	TANK, BODY AP600-P	1
A1	180030	IDME, AP600-P	1
A2	180041	CDNE, FIBERGLASS AP600	1
A3	200095	SCREW, 5/16" X 2" HWH SDS 410	33
A4	760068	BOLT, 3/8"-16 X 1 1/2" TAMPERPROOF	2
A5	200013	NUT, 3/8"-16 SS	2
A6	200006	WASHER, 3/8" STD SS	4
A7	160030	CDNSEAL, 3/8" X 1"	1 ROLL
B	120001	ASSEMBLY, EYEBOLT	2
C	100065-35	PIPE STUB, PLUMBING & CONNECTING SCH35	1
D	240062	GROMMET, 4" ADAPT-A-FLEX SCH35	2
E	100010	GROMMET, 4" DUAL TITE	1
F	100103-35	ASSEMBLY, TEE AP SERIES OUTLET SCH35	1
G	100068-35	PIPE STUB, OUTLET AP600 SCH35	1
H	100058-3DRP	ASSEMBLY, DIFFUSER 3 DROP	1
H1	180114	PIPE, .50 PVC SCH40	(1) 5' LONG
H2	240058	GROMMET, 1/2" ADAPT-A-FLEX	1
I	AKC10052-A	HYDRO-ACTION, PLATFORM DARK GREEN	1
I1	200094	SCREW, 1.50" X #12 SELF-TAPPING	4
J	241022	RISER, TANK 24" X 6" PL	1
J1	200059	SCREW, 1" #10 SELF-TAP PPH ZINC	6
J2	AKR30505	CDNSEAL, 1/2" X 21'	.333
K	241024	LID, TANK RISER 24" PL	1
K1	200070	SCREW, 1 1/2" TRIGROOVE SM	4
K2	N/A	SCREW, LID (SUPPLIED W/LID)	4
K3	120000	ASSEMBLY, MUSHROOM CAP	1
K4	160018	TAG, SERIAL NUMBER AP600	1
K5	200025	RIVET, 1/8" GRIP 1/8" DIA. POP	4
	N/A	SIKAFLEX	1/4 TUBE

	AP600 W/PLATFORM COMPLETE		DRAWN BY: ADAVIS	
	APPROVED BY:	SIGNATURE	DATE: 08/27/13	REV. 7 PART# HA-AP600-P

APPROVED



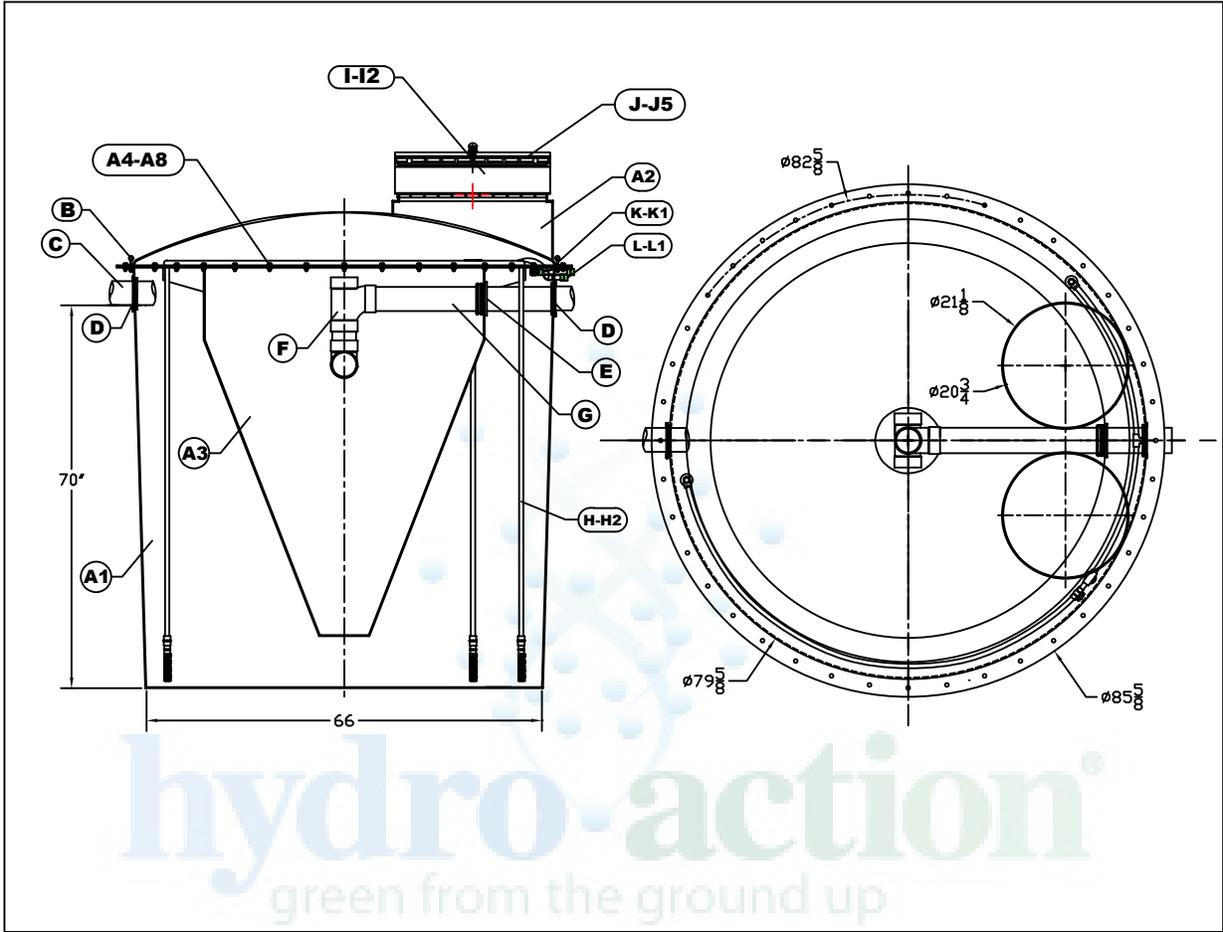
hydro-action  
green from the ground up

**BILL OF MATERIALS**

ITEM	P/N	DESCRIPTION	QTY:
	HA-AP750-P	AP750, W/ PLATFORM COMPLETE	1
A1	180077	TANK, BODY AP750-P	1
A2	760070	IDME, AP750-P RTM	1
A3	180042	CDNE, FIBERGLASS AP750	1
A4	200095	SCREW, 5/16" X 2" HWH SDS 410	34
A5	760068	BOLT, 3/8"-16 X 1 1/2" TAMPERPROOF	2
A6	200013	NUT, 3/8"-16 SS	2
A7	200006	WASHER, 3/8" STD SS	2
A8	160030	CDNSEAL, 3/8" X 1"	2 ROLL
B	120001	ASSEMBLY, EYEBOLT	2
C	100065-35	PIPE STUB, PLUMBING & CONNECTING SCH35	1
D	240062	GROMMET, 4" ADAPT-A-FLEX SCH35	2
E	100010	GROMMET, 4" DUAL TITE	1
F	100103-35	ASSEMBLY, TEE AP SERIES OUTLET SCH35	1
G	100069-35	PIPE STUB, OUTLET AP750 SCH35	1
H	100058-3DRP-750	ASSEMBLY, DIFFUSER 3 DROP AP750	1
H1	180114	PIPE, .50 PVC SCH40	(1) 5' LONG
H2	240058	GROMMET, 1/2" ADAPT-A-FLEX	1
I	AKC10052-A	HYDRO-ACTION, PLATFORM DARK GREEN	1
I1	200094	SCREW, 1.50" X #12 SELF-TAPPING	4
J	241022	RISER, TANK 24" X 6" PL	1
J1	200059	SCREW, 1" #10 SELF-TAP PPH ZINC	6
J2	AKR30505	CDNSEAL, 1/2" X 21'	.333
K	241024	LID, TANK RISER 24" PL	1
K1	200070	SCREW, 1 1/2" TRIGROOVE SH	4
K2	N/A	SCREW, LID (SUPPLIED W/LID)	4
K3	120000	ASSEMBLY, MUSHROOM CAP	1
K4	160019	TAG, SERIAL NUMBER AP750	1
K5	200025	RIVET, 1/8" GRIP 1/8" DIA. POP	4
	N/A	SIKAFLEX	1/4 TUBE

	AP750 W/PLATFORM COMPLETE			DRAWN BY: ADAVIS	
	APPROVED BY:	SIGNATURE	DATE: 04/22/13	REV. 5	PART# HA-AP750-P

APPROVED

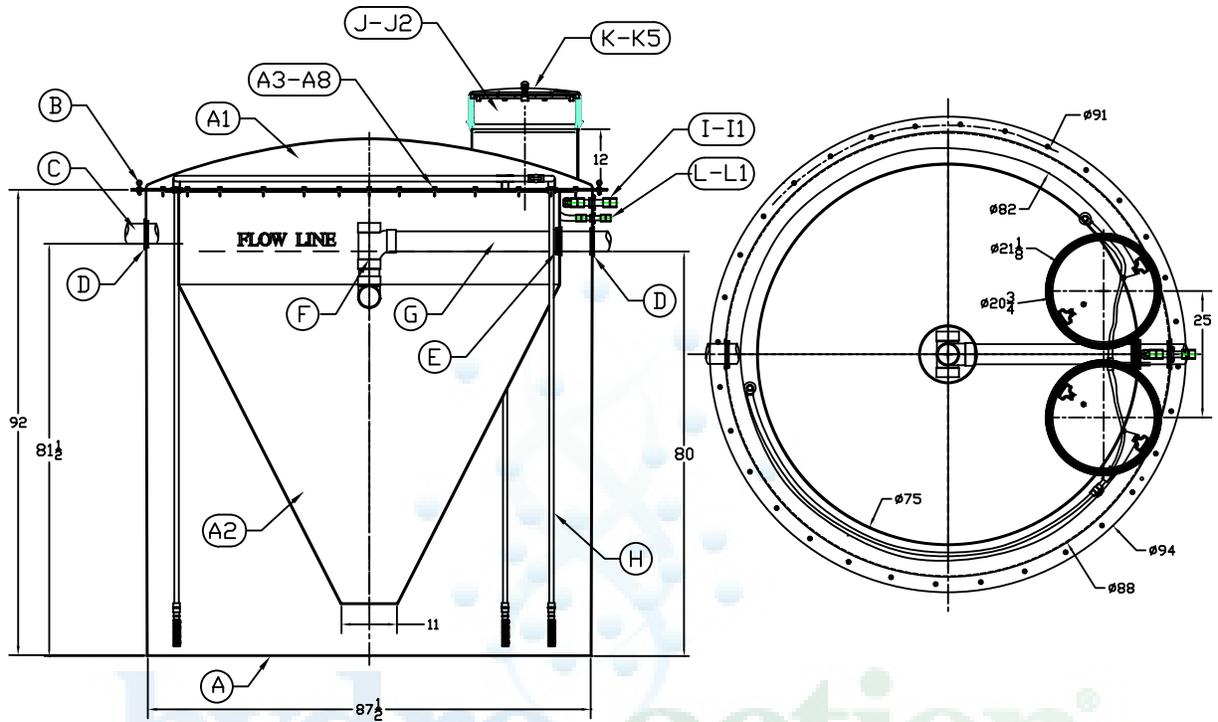


**BILL OF MATERIALS**

ITEM	P/N	DESCRIPTION	QTY:
	HA-AP1000-P	AP1000, W/ PLATFORM COMPLETE	1
A1	180038	TANK, BODY AP1000-P	1
A2	180032	IDME, AP1000-P	1
A3	180043	CDNE, PDLY AP1000	1
A4	200095	SCREW, 5/16" X 2" HWH SDS 410	28
A5	760068	BOLT, 3/8"-16 X 1 1/2" TAMPERPROOF	2
A6	200013	NUT, 3/8"-16 SS	2
A7	200006	WASHER, 3/8" STD SS	2
AB	160030	CONSEAL, 3/8" X 1"	2 ROLL
B	120001	ASSEMBLY, EYEBOLT	2
C	100065-35	PIPE STUB, PLUMBING & CONNECTING SCH35	1
D	240062	GROMMET, 4" ADAPT-A-FLEX SCH35	2
E	100010	GROMMET, 4" DUAL TITE	1
F	100103-35	ASSEMBLY, TEE AP SERIES OUTLET SCH35	1
G	100070-35	PIPE STUB, OUTLET AP1000 SCH35	1
H	100058-3DRP-1000	ASSEMBLY, DIFFUSER AP1000 3 DROP	1
H1	180114	PIPE, .50 PVC SCH40	(1) 5' LONG
H2	240058	GROMMET, 1/2" ADAPT-A-FLEX	1
I	241023	RISER, TANK 20" X 6" PL	1
I1	200059	SCREW, 1" #10 SELF-TAP PPH ZINC	12
I2	AKR30505	CONSEAL, 1/2" X 21'	.667
J	241025	LID, TANK RISER 20" PL	1
J1	200070	SCREW, 1 1/2" TRIGROOVE SM	8
J2	N/A	SCREW, LID (SUPPLIED W/LID)	4
J3	120000	ASSEMBLY, MUSHROOM CAP	1
J4	760050	TAG, SERIAL NUMBER AP1000	1
J5	200025	RIVET, 1/8" GRIP 1/8" DIA. POP	4
K	100075	ASSEMBLY, FLOAT COMMERCIAL	1
K1	240058	GROMMET, 1/2" ADAPT-A-FLEX	1
L	100080	ASSEMBLY, COMMERCIAL AIRLINE	1
L1	240058	GROMMET, 1/2" ADAPT-A-FLEX	1
	N/A	SIKAFLEX	1/4 TUBE

	AP1000 W/PLATFORM COMPLETE		DRAWN BY: ADAVIS	
	APPROVED BY:	SIGNATURE	DATE: 08/27/13	REV. 6 PART# HA-AP1000-P

APPROVED



### BILL OF MATERIALS

ITEM	P/N	DESCRIPTION	QTY:
	HA-AP1500G	AP1500G, SYSTEM COMPLETE	1
A	180040	TANK, BODY AP1500	1
A1	180053	DDME, AP1500	1
A2	180045	CDNE, FIBERGLASS AP1500G	1
A3	200095	SCREW, 5/16" X 2" HWH SDS 410	30
A4	760068	BOLT, 3/8"-16 X 1 1/2" TAMPERPROOF	2
A5	200013	NUT, 3/8"-16 SS	2
A6	200006	WASHER, 3/8" STD SS	2
AB	160032	CDNSEAL, 3/8" X 1 1/2" X 8'	3 1/4 ROLLS
B	120001	ASSEMBLY, EYEBOLT	2
C	100065-35	PIPE STUB, PLUMBING & CONNECTING SCH35	1
D	240062	GROMMET, 4" ADAPT-A-FLEX SCH35	2
E	100010	GROMMET, 4" DUALTITE	1
F	100103-35	ASSEMBLY, TEE AP SERIES OUTLET SCH35	1
G	100073-35	PIPE STUB, OUTLET AP1500 SCH35	1
H	100058-3DRP	ASSEMBLY, DIFFUSER AP1500 3 DROP	1
I	100075	ASSEMBLY, FLOAT COMMERCIAL	1
I1	240058	GROMMET, 1/2" ADAPT-A-FLEX	1
J	241023	RISER, TANK 20" X 6" PL	2
J1	200059	SCREW, 1" #10 SELF-TAP PPH ZINC	16
J2	AKR30505	CDNSEAL, 1/2" X 21'	1.334
K	241025	LID, TANK RISER 20" PL	2
K1	200070	SCREW, 1 1/2" TRIGROOVE SM	8
K2	N/A	SCREW, LID (SUPPLIED W/LID)	8
K3	120000	ASSEMBLY, MUSHROOM CAP	2
K4	160010	TAG, SERIAL NUMBER AP1500	1
K5	200025	RIVET, 1/8" GRIP 1/8" DIA. PDP	4
L	100080	ASSEMBLY, COMMERCIAL AIRLINE	1
L1	240058	GROMMET, 1/2" ADAPT-A-FLEX	1
	N/A	SIKAFLEX	1/4 TUBE
	N/A	RISER STICKER	1
	N/A	CHECK PRODUCT STICKER	1



AP1500G, SYSTEM COMPLETE

DRAWN BY: A.DAVIS

APPROVED BY:

SIGNATURE

DATE: 09/13/13

REV. 7

PART#

HA-AP1500G

APPROVED

## Appendix 6: Misc. Forms & Documents

Do's and Don'ts.....	
Suggested Initial Service Contract.....	
Suggested Service Call Procedure.....	
Service Technician Checklist.....	
Installation Checklist.....	
Limited Warranty.....	
Warranty Registration.....	
Proper use of the Sludge Judge.....	
Compressor Conversion Instructions.....	
Compressor Serial Number Location.....	

# HOME AEROBIC SYSTEM DO's AND DON'Ts

from  
Small Flows, Fall, 1999  
Volume 13, No. 4

## DO:

1. Maintain the contract service arrangement offered by the manufacturer after the initial two-year period has expired (unless your community offers its own management program). It is extremely important that aerobic systems receive regular maintenance at least every three months or six months at the maximum.
2. Keep your system accessible for inspections and pumping yet protected from unauthorized entrance. If access to your system is locked, make sure that you keep a key and that your service contractor has a key.
3. Call a service professional whenever you experience problems with your system, whenever the alarm is activated, or whenever there are any signs of system failure.
4. Keep detailed records about your aerobic system, including a map of where it is, general information such as model name, capacity, state license, date installed, contract service agreement, records of service visits, and maintenance performed.
5. Conserve water to avoid overloading the system. Be sure to repair any leaky faucets or toilets.
6. Divert other sources of water, like roof drains, house footing drains, and sump pumps away from the aerobic system.
7. Become familiar with how your own particular system operates and the way it looks, sounds, and smells when it is working correctly. This way, you may be able to identify problems before they become serious and alert your service provider to anything unusual.
8. Be sure to ask your service provider questions about how to know if your unit is malfunctioning.
9. Check to see if your unit is working properly after a power outage.

## DON'T:

1. Don't allow anyone to drive or park over any part of the system.
2. Don't make or allow unauthorized repairs to your aerobic system without obtaining the required health department permits.
3. Don't use your toilet as a trash can or poison your treatment system and the groundwater by pouring harmful chemicals and cleansers down the drain. Harsh chemicals can kill the beneficial bacteria present in the system that treat your wastewater.
4. Don't use a garbage disposal without checking with your local regulatory agency to make sure that your aerobic system can accommodate this additional waste. If you must use a garbage disposal, the system should be sized appropriately to accommodate the additional waste.
5. Don't attempt to clean or perform maintenance on any part of the aerobic system.

## DO NOT FLUSH:

- coffee grounds;
- dental floss;
- disposable diapers;
- kitty litter;
- sanitary napkins;
- tampons;
- cigarette butts;
- condoms;
- gauze bandages;
- fats, greases, or oils;
- paper towels; and
- panty hose.

## NEVER FLUSH CHEMICALS SUCH AS:

- paints,
- varnishes,
- thinners,
- photographic solutions,
- pesticides, and
- drain cleaners

# **Hydro-Action<sup>®</sup>**

## **Initial Service Policy**

Our company, \_\_\_\_\_ will provide a two-year initial service policy, which will provide for inspection and service of your **Hydro-Action<sup>®</sup>** plant. The policy will include the following:

- Four inspection/service calls (at least one every six (6) months) 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<sup>®</sup>, air pump, air filter, diffuser operation, and cleaning and replacing or repairing any component not found to be functioning correctly.
- An effluent quality inspection consisting of a visual check for color, turbidity, scum overflow and examination for odors.

If any improper operation is observed that cannot be corrected at that time 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:

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Date: \_\_\_\_\_

Date: \_\_\_\_\_

Service Dealer:

## **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 Settable 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 schraeder 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, inspect the diffuser assemblies. 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 diffusers prior to taking air pressure readings; if the diffusers are clogged, the overpressure you will encounter may damage the 5 psi gauge. You may use compressed air to try and blow the diffusers clear.
3. Remove small air pressure tube from barbed fitting beside schraeder 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 settle able 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 Settle able 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 gradable material and level system  
notes: \_\_\_\_\_
- Fill tanks with water and leak check while burying  
notes: \_\_\_\_\_
- Connect inlet and discharge piping  
notes: \_\_\_\_\_
- Install OPS as per instructions and run power conduit  
notes: \_\_\_\_\_
- Install diffuser assembly's  
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 homeowner's manual to homeowner  
notes: \_\_\_\_\_
- Give homeowner copy of service contract and warranty sheet  
notes: \_\_\_\_\_
- Send in installation warranty sheet to Manufacturer  
notes: \_\_\_\_\_

# Hydro-Action<sup>®</sup> Limited Warranty

AK/HA Manufacturing, LLC d/b/a Hydro-Action Industries ("Hydro-Action Industries") warrants to you, the purchaser, that each Hydro-Action Industries aerobic wastewater treatment plant ("Plant"), and its component parts, are free from defects in material and workmanship under the terms and conditions set forth in this Limited Warranty. No employee, dealer, agent or other person is authorized to make any warranty or representation with respect to the Plant, other than as is expressly contained in this Limited Warranty.

## COVERAGE PERIOD

This Limited Warranty is effective for an initial period of 2 years beginning on the date of purchase as evidenced by purchaser's proof of purchase. An additional 3 year, prorated, warranty period will run upon the expiration of the first 2 years if the Plant is maintained by an authorized distributor through a continuous maintenance program.

## HOW TO MAKE A WARRANTY CLAIM

If you believe that the Plant or a component part of the Plant is defective in material or workmanship, you must return it to an authorized Hydro-Action Industries dealer. The dealer will return the Plant or component part to Hydro-Action Industries at 2055 Pidco Drive, Plymouth, Indiana 46563. You must also provide to Hydro-Action Industries a written description of the nature of the defect. No claim will be processed unless you specify the nature of the defect. If a claim is being made during years 3, 4, or 5 of this Warranty, you must also provide proof that the Plant has been maintained by an authorized distributor through a continuous maintenance program. All claims must be made within 30 days of the discovery of the defect.

Upon receipt of the written description of the defect and Plant or component part, Hydro-Action Industries will examine the Plant or component part. If, in Hydro-Action Industries' reasonable judgment, the Plant or component part shows evidence of defects in material or workmanship, Hydro-Action Industries will replace or exchange the component part as set forth in the following schedule. Please note that Hydro-Action Industries reserves the right to revise, change or modify the construction and design of any Plant, or any component part of such Plant, without incurring any obligations to make changes or modifications in previously sold equipment. Hydro-Action Industries reserves the right to furnish a replacement component part, which, in its judgment, is equivalent to the part replaced.

For claims received within 30 days of the expiration of Year 1 and Year 2 of this Warranty, Hydro-Action Industries will replace or exchange the component part at no cost to you.

If the Plant has been maintained by an authorized distributor through a continuous maintenance program:

For component parts of the Plant manufactured by someone other than A.K. Industries, Inc., Hydro-Action Industries will sell such parts to you under the following schedule: (1) claims received within 30 days of the expiration of Year 3 of this Warranty, Hydro-Action Industries will replace or exchange the component part for a cost to you of 25% of the manufacturer's list price of such part and Hydro-Action will pay 75% of the cost; (2) for claims received within 30 days of the expiration of Year 4, Hydro-Action will replace such part for a cost to you of 50% of the manufacturer's list price and Hydro-Action will pay 50% of the cost; and (3) for claims received within 30 days of the expiration of Year 5, Hydro-Action will replace such part for a cost to you of 75% of the manufacturer's list price and Hydro-Action will pay 25% of the cost.

For claims received during years 3, 4, and 5 of this Limited Warranty or within 30 days of the expiration of Year 5, Hydro-Action Industries will replace or exchange any component part manufactured by AK Industries, Inc. at no cost to you.

## **WHAT IS NOT COVERED**

This Limited Warranty does not cover any defects resulting from damage resulting from transit, accidents, misuse, alterations, or acts of God. This Limited Warranty does not apply to Plants or components parts that have not been fully paid for or for which acceptable payments terms have not been arranged. No warranty is made as to the field performance of any systems. This Limited Warranty does not include any costs of labor. This Limited Warranty does not apply to consumables, including, but not limited to, stones, filters, etc. This Limited Warranty does not cover Plants that have been: (1) flooded by external means; (2) disassembled by unauthorized persons; (3) improperly installed; or (4) subjected to external damage or damage due to altered or improper wiring or overload protection.

## CONDITIONS AND LEGAL REMEDIES

This Limited Warranty is governed by the laws of the State of Indiana. The sole remedy under this Limited Warranty is the replacement or exchange of parts. **Hydro-Action Industries SHALL NOT BE LIABLE FOR ANY INCIDENTAL OR CONSEQUENTIAL DAMAGES. THIS LIMITED WARRANTY IS MADE IN LIEU OF ANY OTHER EXPRESS OR IMPLIED WARRANTIES.** Hydro-Action Industries **DISCLAIMS ANY IMPLIED WARRANTIES ARISING IN CONNECTION WITH THE SALE OF THE PLANT, INCLUDING ANY IMPLIED WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE.**

Some states do not allow the disclaimer of warranties or the exclusion or limitation of incidental or consequential damages and so the above limitations may not apply to you.

**Hydro-Action<sup>®</sup>**  
**Warranty Registration**

2055 Pidco Dr. / P.O. Box 640  
Plymouth, IN. 46563  
800.370.3749

**This form must be filed with Hydro-Action<sup>®</sup> by the dealer 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/County/State/Zip \_\_\_\_\_  
Phone \_\_\_\_\_  
Distributor (if applicable) \_\_\_\_\_

Service will be performed by: \_\_\_\_\_  
Name \_\_\_\_\_  
City/County/State/Zip \_\_\_\_\_  
Phone \_\_\_\_\_

Type of Installation: Residential \_\_\_\_\_ Commercial \_\_\_\_\_  
Number of residents or occupants \_\_\_\_\_ Garbage Disposal? Yes \_\_\_\_\_ No \_\_\_\_\_  
Date Installed \_\_\_\_\_  
Plant Model # \_\_\_\_\_ OPS<sup>®</sup> Model # \_\_\_\_\_  
Plant Serial # \_\_\_\_\_ Air Pump Serial # \_\_\_\_\_  
Effluent disposal method & equipment used \_\_\_\_\_

Controlling Regulatory Agency: \_\_\_\_\_  
Agency \_\_\_\_\_  
Sanitarian \_\_\_\_\_  
Address \_\_\_\_\_  
City/County/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**

<b>Tankage</b>	<b>Level Logic</b>	
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.

# Compressor Conversion Instructions

## Linear to Rotary & Rotary to Linear Conversion

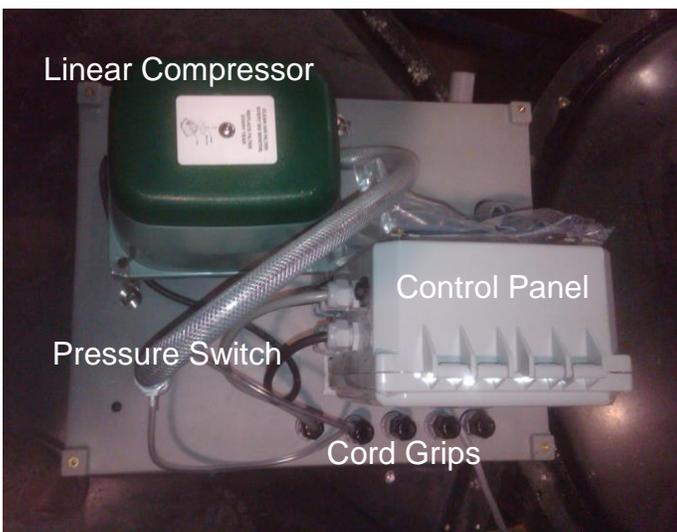
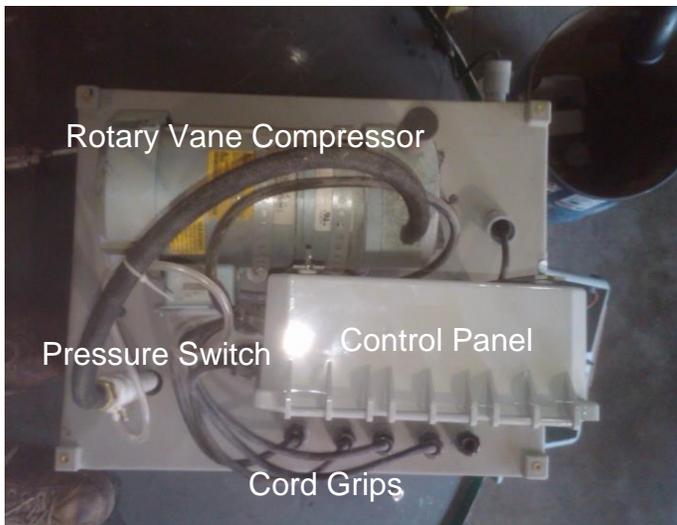
### Removal of Compressor

#### Removal of Compressor

1. Cut Power to system from home breaker.
2. Remove OPS cover, open control panel, and shut-off breakers.
3. Remove air pressure switch by cutting the airline.
4. Disconnect the electrical cord from the pump to control panel.
5. Remove Compressor from base by unscrewing mounts.

#### Installation of Compressor

6. Mount new compressor by banding it to the base with self-tapping screws.
7. Connect electrical cord into control panel.
8. Glue conversion pressure switch onto airline.
9. Connect airline to compressor.
10. Turn breakers on, close control panel, and install OPS cover.
11. Turn power on and test compressor/system for proper function.



## Compressor Serial Number Locations



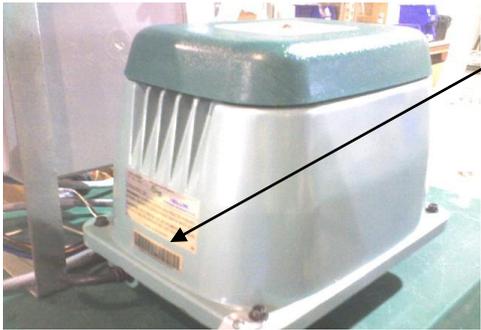
(Barcode)



100884883

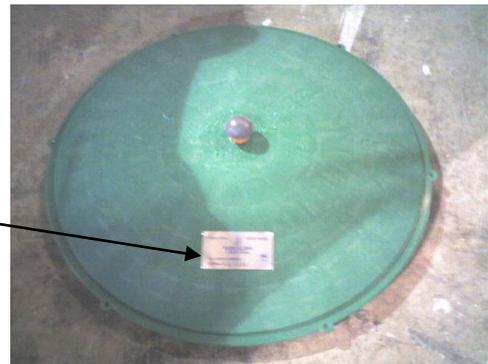
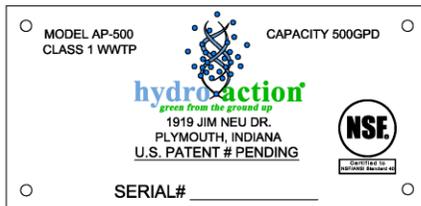
(Serial Number)

(The first 4 numbers indicate year and month for date coding)

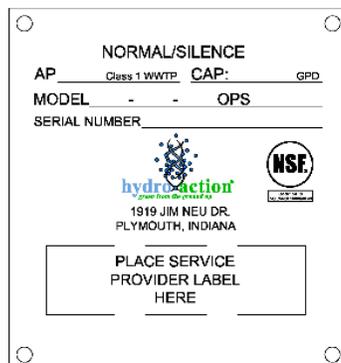


## Data Plate Serial Number Locations

### Data Plate for AP Unit



### Data Plate for OPS





**AK/HA Manufacturing LLC.**

**2055 Pidco Dr. / P.O. Box 640  
Plymouth, IN. 46563-1374**

**Toll Free: 800.370.3749**

**Phone: 574.936.2542**

**Fax: 574.936.2298**

**[www.hydro-action.com](http://www.hydro-action.com)**