



**BIOCLERE<sup>™</sup>**  
**Pre-equalization**

**TECHNICAL MANUAL**

**SITE/CLIENT:**

**AQUAPOINT**  
**241 Duchaine Blvd.**  
**New Bedford, MA 02745**

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**Fax 508-998-7177**

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**NOTE:** This Technical Manual is for the use of the owner/operator and is applicable only to the specific Bioclere installation for which it is provided.

The specifications in this manual are subject to change by the manufacturer any time.

## BIOCLERE™ BIOLOGICAL TREATMENT SYSTEM

Congratulations on your purchase of a Bioclere™ biological treatment system. The Bioclere is a modification of the classic trickling filter. The trickling filter has been used over one hundred years for the treatment of wastewater due to its reliability and simplicity of operation.

Naturally occurring microorganisms break down waste (organic matter) in the Bioclere to harmless byproducts, mainly: water, carbon dioxide and additional microorganisms (sludge). The sludge created in the Bioclere is automatically returned and stored in your septic tank. Therefore, the Bioclere unit(s) do NOT require pumping.

However, regular pumping of your grease traps (if applicable) and septic tanks are required. Failure to maintain a regular pumping schedule will have an adverse impact on the biology in the Bioclere system. If pumping is ignored for an extended period it may become costly to get the system back to efficient operation.

Aquapoint Inc., recommends that the grease trap and septic tank are checked every 3 to 6 months respectively by a certified operator or septic hauler and pumped as needed. For seasonal applications, pumping of the tanks should occur during mid-season to protect the microbiology in the filter. Failure to adhere to this pumping schedule will result in compromised treatment and void the Bioclere warranty.

The Bioclere units are designed to reduce the effects of toxic substances that may enter the system from your facility. However, it is in your best interest to evaluate what is discharged to the system. Be aware of daily/weekly/monthly/annual activities and the quantities of chemicals that are being discharged. While the bacteria are resistant to many forms of toxic chemicals discharged in small quantities, large volumes or a combination of chemicals may have detrimental effects. Some items to be aware of include: cleaning agents, floor strippers, harsh chemicals, paints and solvents, as well as abnormal quantities of soaps and milk. If at any time you are unsure about using a particular chemical please call Aquapoint Inc. If necessary, we will arrange a site meeting to evaluate your products.

Remember that Aquapoint Inc. wants you to have a good experience with your new Bioclere treatment system. If you treat the Abugs≡ with respect, they will treat you to decades of clean water while preserving the environment.

Please call our office if you have ANY questions concerning your new system.

Sincerely,

AQUAPOINT  
(508)-998-7577

PLEASE INSERT SECTION 1.0

**2.0 SPECIFICATIONS FOR:**

2.1 **Bioclere**                      **Model**                      **Media**                      **Media Qty.**  
Stage 1

2.2 Bioclere equipment supplied:

<b><u>Item</u></b>	<b><u>Quantity Per Unit</u></b>
Filter media	(see Section 2.1 above)
Dosing assembly	1 each
Dosing pumps	2 each
Recycle pump	1 each
Fan module assembly	1 each
Control panel	1 combined
2.3 Technical Manual	3 each

2.4 Pump timer settings:

Upon commissioning of the Bioclere system the following pump timer settings are to utilized.

	<b><u>Stage 1</u></b>			
Dosing pump on				
Dosing pump off				
Recycle pump on				
Recycle pump off				
Pre-equalization	<b><u>On</u></b>	<b><u>Off</u></b>	@ ± 35 gpm =	gpd

Subsequent to the start-up period, the pump timer settings may need re-adjusting to provide proper treatment for the actual flow and influent characteristics.

Please contact Aquapoint before modifying the pump timers.

2.5 OTHER ITEMS SUPPLIED BY AQUAPOINT:

<u>Item</u>	<u>Quantity</u>
A. Equalization Assembly	One (1)
Barnes SE 411 Pumps w/ 4.25" impeller	Two (2)
Slide Rail Assembly	Two (2)
SJE Rhombus Float Switches	Three (3)
PLC Control Panel	One (1)

2.6 Primary Tank:

This Bioclere system was designed with primary tank capacity of ( ) gallons.

Aquapoint recommends that the septic tank(s) be inspected quarterly or semi-annually by a certified operator or septic hauler for sludge and scum and pump if needed.

2.7 Aquapoint recommends, if applicable, the grease trap be inspected and pumped every 3 months.

NOTE: Inadequate pumping of grease traps and primary tanks will have a detrimental effect on biological treatment. Therefore, it is imperative that pumping schedules are followed.

### **3.0 INSTALLATION**

#### **3.1 INTRODUCTION:**

This document establishes the installation procedures for the Bioclere secondary wastewater treatment system. It is recommended that these procedures be reviewed and approved by the engineer of record to ensure compatibility with specific site characteristics.

Aquapoint Inc. assigns a project manager for each installation. Aquapoint can also arrange for the transportation of the system if it is desired.

Aquapoint provides onsite supervision of the installation, the fresh water commissioning of the Bioclere system and certification that the system is operational. Effective execution of these procedures requires coordination with the site contractor.

We request that the site contractor contact Aquapoint at 508-998-7577 to coordinate delivery, installation schedule and fresh water commissioning of the system. For a general flow schematic see drawing UK.1265-8

#### **3.2 PROCEDURE:**

- A. Locate Bioclere inlet/outlet inverts from site engineering plans.
- B. Excavate to 12" below base of mounting pad. De-water excavation if required.
- C. Add 12" (1.00 ft.) of clean 3/8" crushed stone.
- D. Install pre-cast mounting pad approximately centered to Bioclere location. Anchoring points on pad must not be in direct alignment with inlet/outlet of Bioclere. (See dwg. PMW/AWT 3014)
- E. Check to ensure mounting pad is level and elevation is correct. If pad is rough and uneven, smooth and level an area at least 18" in diameter in the center of the pad.
- F. Carefully lower Bioclere into position with proper rigging and lifting techniques.
- G. Orient and align Bioclere to inlet and outlet directions. Check if Bioclere is level.
- H. Fill Bioclere with clean fresh water to bottom of outlet pipe to stabilize unit.
- I. If Bioclere is installed in groundwater refer to anchoring requirements on site plan and/or contact site engineer.
- J. If Bioclere is not installed in groundwater backfill excavation with clean 3/8" peastone and/or sand to within 12" of the inlet pipe. Check level of Bioclere.  
NOTE: Use care while backfilling to prevent Bioclere movement and/or damage to Bioclere.
- K. Install inlet, outlet and vent/test port piping.  
NOTE: Some installations specify vent piping back through building.
- L. Install recycle piping from Bioclere back to the inlet end of primary (septic) tank. The recycle line is 1.5" Schedule 40 PVC from the Bioclere to the outside of septic tank and Schedule 80 PVC inside the septic tank. Schedule 80 PVC to be installed against inside wall and at 1/2 the septic tanks liquid depth terminating with a 90° elbow. (see dwg. PMW/1256-10)
- M. Install wiring with watertight conduit from control location to Bioclere.
- N. Back fill around Bioclere with sand and/or peastone to final grade.
- O. Install control box in protected location, connect power feed and Bioclere wiring. (See Appendix B, drawing AWT1005 Rev. F)

The following items are performed by Aquapoint unless otherwise specified:

- P. Install dosing and recycle pumps with safety ropes to the appropriate pipes.
- Q. Install pump wiring by feeding wires through the filter and fan box feed-thrus. (See Appendix B, drawing AWT1005 Rev. F)

### 3.3 BIOCLERE SYSTEM DESIGN CHECKLIST:

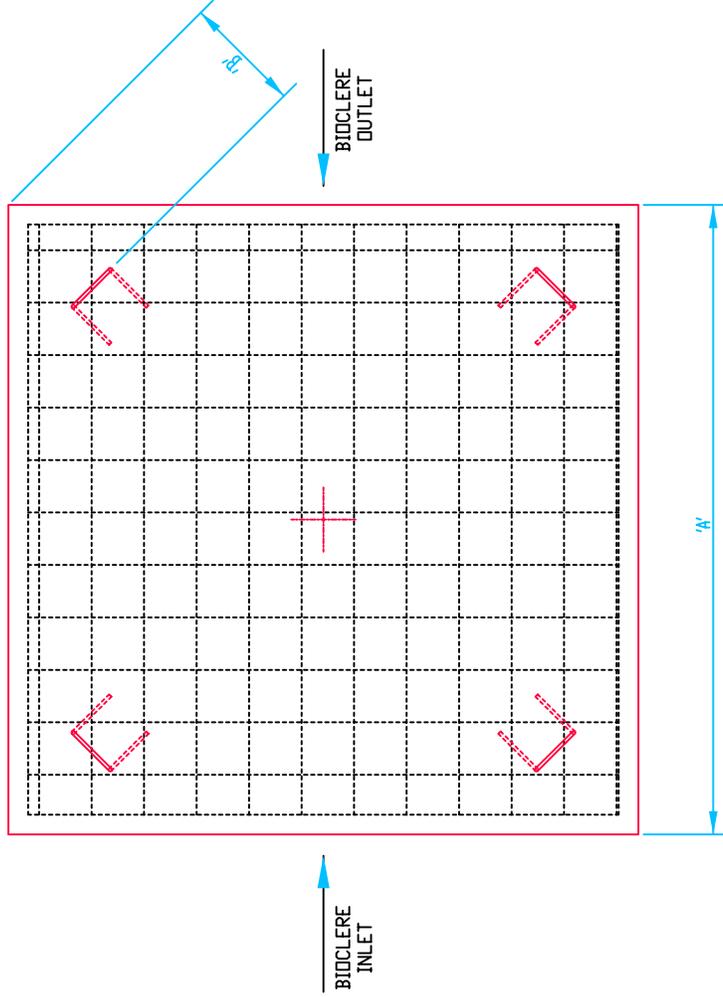
The following is a checklist for the design of an onsite wastewater treatment system that includes **Model 22, 24 or 30 Series Bioclere Unit(s)**.

**NOTE: *The following details should be shown on the site plan to facilitate installation.***

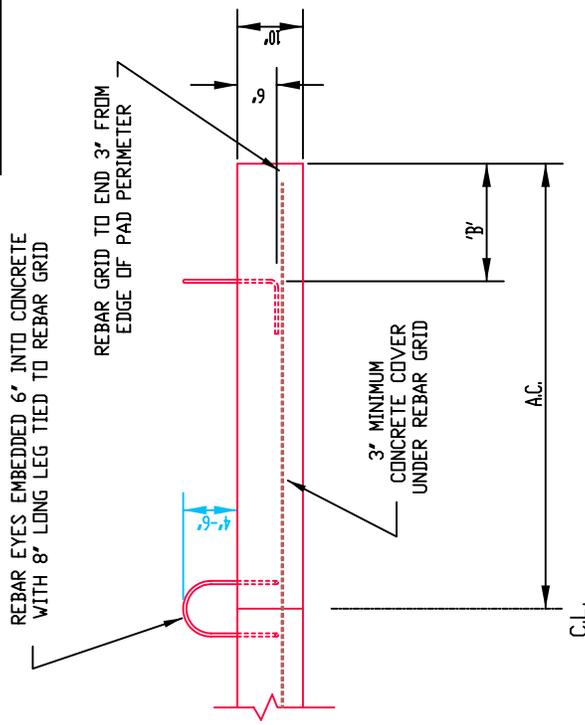
- Bioclere unit must be installed on a contractor supplied concrete mounting pad ([Lg\\_pad.dwg](#)). The pad should be installed on 12 inches of crushed stone.
- The recycle line is a 1.5" diameter PVC coupling originating over the Bioclere inlet ([BioRecyc.dwg](#)).
- Inlet and outlet on the Bioclere unit(s) are 6" diameter PVC couplings located 180 degrees apart. Any changes in direction between tanks should be made with pipe couplings.
- A 4" diameter PVC vent must be installed after each Bioclere ([General Flow Schematic.dwg](#)).
- Volume of concrete to be poured around the base of the Bioclere must be specified on the site plan if the unit(s) is installed in groundwater (see appropriate clarifier displacement curve). For a Bioclere model 24 series and 30 series, the concrete must extend 4 feet and 5 feet above the top of the mounting pad respectively. **If the high groundwater table will extend above the flange, please notify Aquapoint prior to manufacturing the unit(s).**
- Provide 4 feet of backfill (minimum) above the recycle line outlet on the Bioclere. Backfill to grade must be clean sand or pea stone.
- If necessary provide provisions for sampling the septic tank effluent and/or the effluent D-box/ final pump chamber.
- If wastewater is pumped into the primary tank or Bioclere unit(s), it is critical to provide a reduced flow rate to prevent short-circuiting. Please consult with and provide Aquapoint applicable pump details. Aquapoint can provide an equalization package to maximize treatment in the Bioclere unit(s).

Finally, Aquapoint would appreciate reviewing the site plan as it becomes available. Please send a copy of the local permits applicable to this installation. Feel free to contact office personnel if you have questions or need additional information. Drawings of the Bioclere system are available on AutoCAD LT 2000 for Windows (Version 14 compatible).

PLAN ON SQUARE PAD  
(SEE NOTE 5)



PAD ELEVATION  
(ACROSS CORNERS)



NOTES: UNLESS OTHERWISE SPECIFIED:

1. CONCRETE MINIMUM STRENGTH: 4,000PSI @ 28 DAYS.
2. DEFORMED REINFORCING BARS TO BE 60,000 PSI YIELD STRENGTH
3. EYES (4) 1/2" DIAMETER REBAR CAST IN PLACE AS SHOWN.
4. PAD TO BE SUPPLIED AND INSTALLED BY CONTRACTOR.
5. CIRCULAR PADS WITH "A" = DIAMETER, CAN BE SUBSTITUTED FOR SQUARE PADS. CIRCULAR PAD REBAR EYES INSTALLED 6" FROM PAD PERIMETER.

BIDCLERE MODEL	'A'	'B'	STEEL REINFORCEMENT GRID	APPROX PAD WEIGHT
24	8'	1'6"	#3 REBAR @ 8" D.C.	8,000 lbs
30	10'	2'0"	#3 REBAR @ 6" D.C.	12,500 lbs
36	12'	2'6"	#4 REBAR @ 10" D.C.	18,000 lbs

# AqualPoint

Performance Based Wastewater Treatment Systems

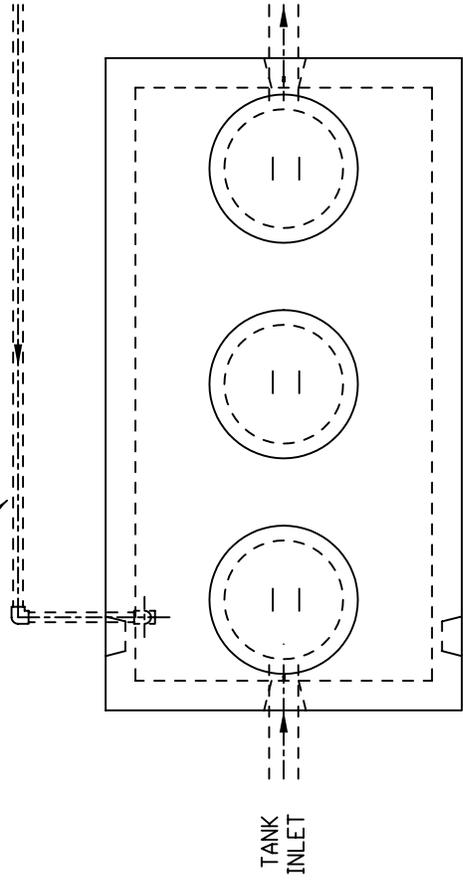
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Bidclere Base Pad 24, 30, 36.dwg

TITLE:	PRECAST MOUNTING PAD for BIDCLERE MODELS 24, 30 & 36.
DRAWING NO:	1244-9
REVISION:	--
DATE:	11 April 2006
DWN BY:	P.VILLEY
SCALE:	(1 : 20)
SHEET #:	SIZE: B (A3)

# 2" Biofilter Recycle Line Installation at Primary Tank.

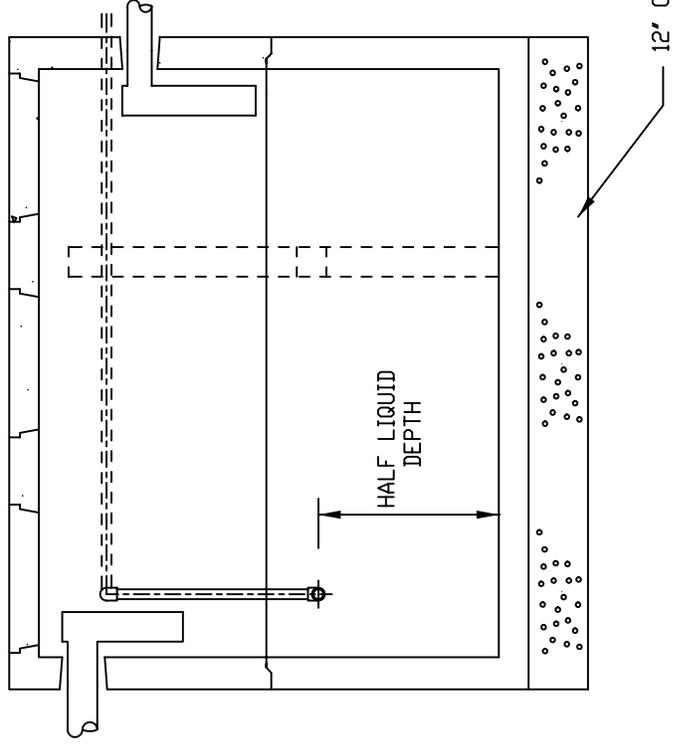
2" PVC SCHD 40 RECYCLE LINE FROM BIODECLERE UNIT(S)



## NOTES FOR CONTRACTOR:

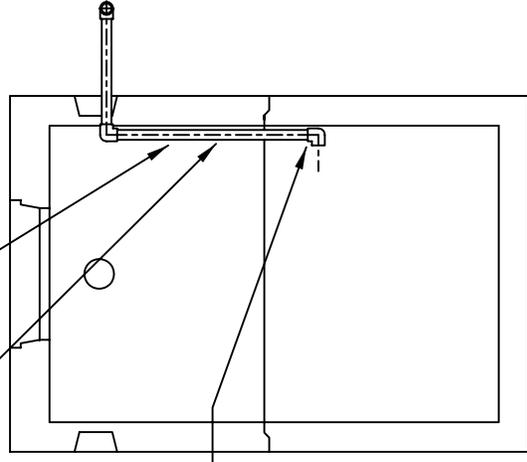
1. SLOPE PIPE BACK TO SEPTIC TANK WITH NO LOW POINTS.
2. USE PRESSURE FITTINGS ONLY.

## TYPICAL PRIMARY (SEPTIC) TANK



SCHD 80 PVC PIPE TO BE USED INSIDE TANK

PIPE TO BE INSTALLED AGAINST TANK WALL



PVC 90° ELBOW INSTALLED AT CENTRE OF LIQUID DEPTH (<math>\frac{1}{2}</math> DISTANCE FROM OUTLET INVERT TO TANK BOTTOM) (FOR COMMERCIAL APPLICATIONS, AN EXTENSION MAY BE REQUIRED)



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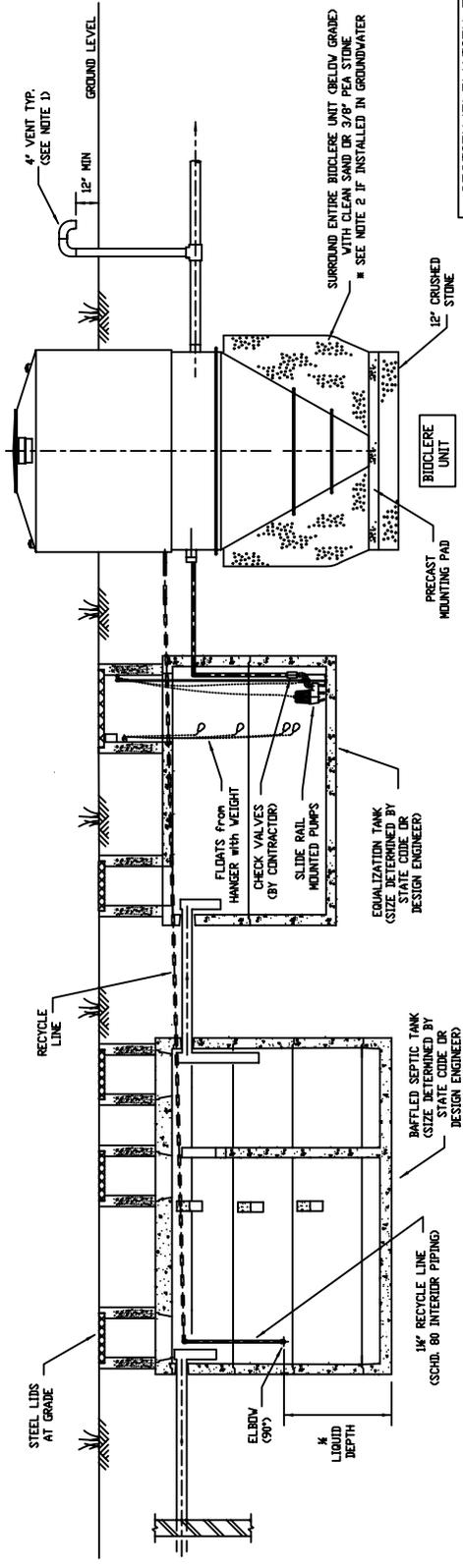
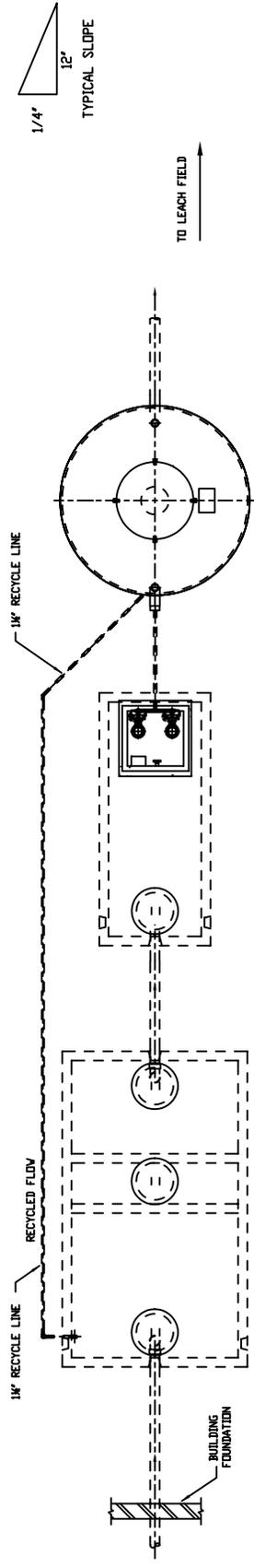
TITLE: 2" Recycle Line Installation. (Primary Tank)	
DRAWING NO:	PMW/1256-7
REVISION:	A
DATE:	01/19/01
DWN BY:	P. WILLEY
SCALE:	1 : 40 SIZE: A / A4
SHEET #:	1 of 1

**NOTES: UNLESS OTHERWISE SPECIFIED:**

1. VENT MAY BE RUN UP TO THE ROOF OF THE BUILDING.
2. IF INSTALLED IN GROUND WATER CONTACT SITE ENGINEER FOR ANCHORING REQUIREMENTS.
3. CONTRACTOR IS TO SUPPLY ALL CONCRETE STRUCTURES AND PERFORM INSTALLATION.

**GENERAL EQUALIZATION WITH BIDCLERE**

**PLAN ON TREATMENT PLANT**



**SECTION/ELEVATION OF TREATMENT PLANT**

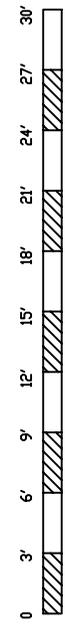
General Est with Bidding

TITLE	TYPICAL GROUND INSTALLATION
DRAWING NO.	UK.1265-15
REVISION	D
DATE	10/11/01
DWN BY	P. WILLEY
SCALE	1 : 75
SIZE	B / A3
SHEET #	1 OF 1

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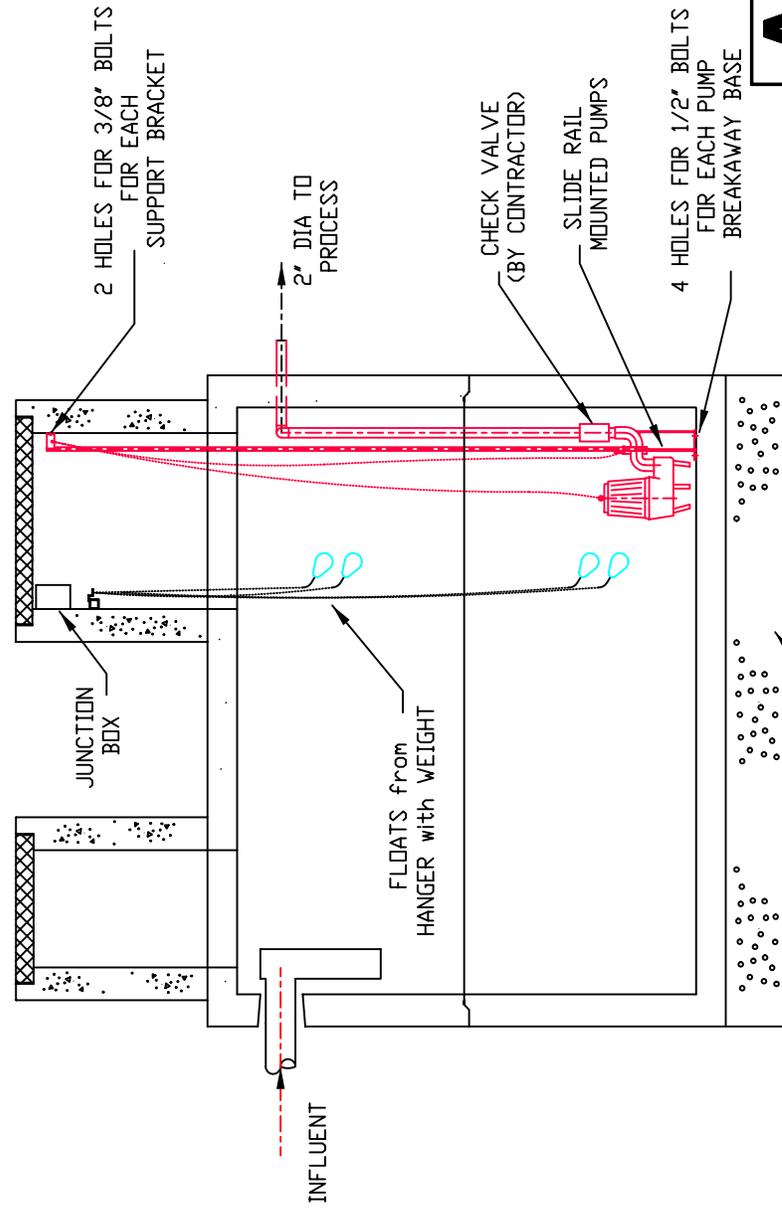
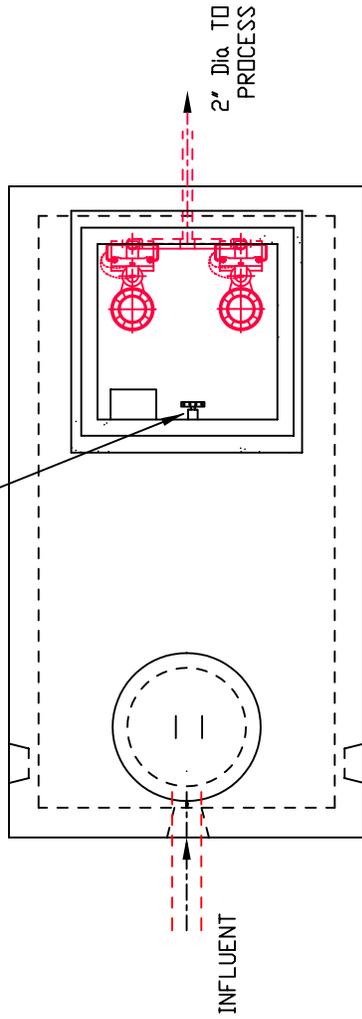
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FLOAT SWITCH BRACKET (ATTACHED TO MANHOLE)

TOP VIEW (OPEN HATCH)



SIDE VIEW

12' CRUSHED STONE

NOTES FOR CONTRACTOR:

1. PUMPS, FLOATS, SLIDE RAIL ASSEMBLIES AND CONTROLS BY AQUAPOINT, HARDWARE BY CONTRACTOR. TO BE INSTALLED BY GENERAL CONTRACTOR.
3. PROVIDE 3' x 3' (min) ALUMINIUM HATCH OVER PUMP ASSEMBLIES.
4. INSTALL JUNCTION BOX AND FLOAT HANGER AT TOP OF CONCRETE RISER.

FLOAT SWITCH ELEVATION SETTINGS

- 1) LOW LEVEL ALARM FLOAT SWITCH (OPEN) 6 INCHES BELOW THE LOW FLOAT
- 2) LOW FLOAT SWITCH (OPEN): 3 TO 6 INCHES ABOVE TOP OF FEED PUMPS,
- 3) MID LEVEL FLOAT SWITCH (CLOSED) : 12 INCHES BELOW INLET TEE INVERT,
- 4) HIGH LEVEL FLOAT SWITCH (CLOSED): 6 INCHES BELOW INLET TEE INVERT. (UNLESS SPECIFIED ON THE SITE PLANS)

Equalization Feed Assembly

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EqualFeed+Roll\_4f.dwg

TITLE	Equalization Feed with slide rail pumps.
DRAWING NO.	1287-6
REVISION	--
DATE	MarCh. 1, 2006
DWN BY	P.WILLEY
SCALE	1 : 40
SIZE	A / A4
SHEET #	1 of 1

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#### 4.1 START-UP (BOCLERES WITH PLC CONTROLS)

- NOTES: 1. During installation the Bioclere sump(s) should have been filled with potable water. Care should be taken to prevent foreign matter/debris from entering the unit(s).
2. Bioclere Plant needs to be commissioned prior to start-up.
3. If the Bioclere Plant was shut down, reinstall the fan into fan module prior to start-up. Remember to verify power is locked/tagged out prior to plugging fan in.
4. Verify the Fan Module Toggle Switch is in the "ON" position.

- A. Check that the Bioclere sump is full of water to the outlet invert and verify all plumbing unions are connected.
- B. See Appendix B for PLC (programmable logic controller) Operating Instructions prior to turning on the system.
- C. Turn Bioclere control main power disconnect switch to "ON". The green power light should be "ON".
- D. At the Bioclere HMI PLC screen set the timers to a "test cycle" as follows:

<u>TEST CYCLE SETTINGS</u>	<u>ON</u>	<u>OFF</u>
Dosing Pump(s)	1 min	1 min
Recycle Pump	1 min	2 min

After the test cycle is complete refer to Section 2.0 of the Bioclere Technical Manual for Timer Settings.

- E. Verify the Tank(s) are set to **ON** using the control screen (HMI), then set the dosing pump(s) to **AUTO** in the Tank Control Screen. Each dosing pump should be set to pump for a minute and rest for a minute. Leave both dosing pumps in **AUTO**.
- F. Turn recycle pump to **AUTO**. The recycle pump should be set to pump for 1 minute and rest for 2 minutes. Leave the recycle pump in **AUTO**.
- G. Turn the alarm to **TEST**. The alarm should sound. Press the alarm silence, audio alarm should silence, the red alarm light should remain illuminated. Turn alarm to OFF, red alarm light should turn off. Set the alarm to **AUTO** and unsilence the alarm.
- H. Proceed to the Bioclere, the fan should be on continuously. Remove the Bioclere lid. Dosing pump(s) should alternate on 1 minute, off 1 minute. Verify a uniform spray pattern. The recycle pump should be on 1 minute, off 2 minutes. Verify the recycle pump operation by observing the spray out of the telltale hole near the recycle pipe union at the top of the central shaft. Leave fan module switch "ON".
- I. At the Bioclere, now turn the fan module switch to "OFF". This disconnects the pumps and fan which should activate the audio/visual alarm. Return the fan module switch to the "ON" position and alarm should stop.
- J. Close and secure the fan module box and Bioclere lid.
- K. Return to the control panel to set the dosing pump(s) and recycle pump timers to the settings specified in Section 2.4 "PUMP TIMER SETTINGS".
- L. Close/secure control panel.

## 4.2 START-UP (EQUALIZATION SYSTEM WITH PLC CONTROLS)

- NOTES:
1. During tank installation care should be taken to prevent foreign matter/debris from entering the tank.
  2. Equalizaion system needs to be commissioned prior to start-up.

- A. Check that the electrical connections have been made inside the control panel and that there is power to the panel.
- B. See Appendix B for PLC (programmable logic controller) Operating Instructions prior to turning on the system.
- C. Turn Equalization control main power disconnect switch to "ON". The green power light should be "ON".
- D. At the Equalization control panel use the control screen (HMI) to set the PLC timers to a "test cycle" as follows:

<u>TEST CYCLE SETTINGS</u>	<u>ON</u>	<u>OFF</u>
Pump(s) 1 & 2	1 min	1 min

After the test cycle is complete refer to Section 2.0 of the Bioclere Technical Manual for Timer Settings.

- E. Verify the Tank(s) are set to **ON** using the control screen (HMI), then set the pump(s) to **AUTO** in the Tank Control Screen. Each pump should be set to pump for a minute and rest for a minute. Leave both pumps in **AUTO**.
- F. Four control float switches located in the tank govern the following functions:
1. Low level Alarm float: The low level alarm float will act as a redundant pump shut off and will activate an audio/visual alarm signal when the float switch is in the extended position (open circuit).
  2. Low level float: In the extended position this float switch shall create an open circuit and prevent operation of the pumps. When the circuit is closed the float switch shall allow activation of the timer and the pumps shall alternate between cycles, transferring wastewater to the downstream treatment reactor(s).
  3. Mid level float: Upon closure the mid level float switch shall activate the lag pump and the two pumps shall draw down the liquid in the equalization tank until the mid level float is open. Upon this occurrence, a counter shall be triggered to alert the operator of a high level condition has occurred and the timer "on" setting for the pumps may need adjusting.
  4. High level float: The high level float switch shall activate the audio/visual alarm when the circuit is closed.

- G. Test each float for proper function. Make sure each float is producing the correct given response
- H. Check to make sure that the junction box and Float switch hanger are within 18" of finished grade.
- I. Check that the slide rails have been installed properly. Pull up each pump to ensure the rails have been installed properly and that the pumps seal seats back on the slide rail assembly piping.
- J. Check that the effluent piping was piped correctly.
- K. At the panel turn the alarm to **TEST**. The alarm should sound. Press the alarm silence, audio alarm should silence, the red alarm light should remain illuminated. Turn alarm to OFF, red alarm light should turn off. Set the alarm to **AUTO** and unsilence the alarm.
- L. Close and secure the lid.
- M. Return to the control panel to set the pump(s) and timers to the settings specified in Section 2.4 "PUMP TIMER SETTINGS".
- N. Close/secure control panel.

## 5.1 PLANT SHUTDOWN

- A. No action need be taken if flow is not discharged to the system for up to 12 weeks. Leave the plant in operation with power "ON".
- B. If no flow is anticipated to be discharged to the plant for more than 12 weeks, the following shut down procedure will apply.
  - A. On Bioclere PLC control panel turn the recycle pump to the **ON** position for 2 minutes. Return recycle pump to **AUTO** mode.
  - B. Measure sludge level in each Bioclere unit using a sludge judge. If the sludge level is > 18" repeat step A.
  - C. Turn the main power disconnect switch off.
  - D. At the unit, verifying the power is off, remove the fan from the fan module and store in a safe dry location.
- C. Upon resumption of wastewater flow to the plant the Bioclere should be re-started as described in Section 4.

## 5.2 SHUTDOWN (EQUALIZATION SYSTEM WITH PLC CONTROLS)

- A. The following shut down procedure will apply.
  - A. On PLC control panel turn both pumps to the **ON** position and pump manually until the tank has been pumped down to the low float. Return pumps to **AUTO** mode.
  - B. Fill out an equalization field report and document the timer settings and pump amperages at the time of shut down.
  - C. Turn the equalization control panel main power disconnect switch off.
  - D. At the junction box, verifying the power is off.
- C. Upon resumption of wastewater flow to the plant the equalization tank should be re-started as described in Section 4.2

## **6.0 MAINTENANCE PROCEDURES**

### **6.1 BIOCLERE MAINTENANCE**

NOTE: Turn the main power switch to "OFF" before servicing the pump, fan or electrical panel box. The Aquapoint Field Service Report is provided to facilitate Bioclere maintenance and to provide a thorough check of Bioclere components.

Standard Quarterly Maintenance:

1. Check general condition/appearance of unit.
2. Check vent flow, odor.
3. Check general condition of fan box including internal and external wiring, lock, latch, gaskets, etc.
4. Check quiet fan operation.
5. Check condition of cover locks, latches, gaskets.
6. Check and characterize biomass.
7. Check recycle pump operation, timing, effluent clarity and spray pattern.
8. Check dosing pumps operation, timing, effluent clarity and spray pattern.
9. Check general condition of dosing assembly.
10. Check general condition of control box including locks, gaskets, etc.
11. Check control box switches, alarms, timers, etc.
12. Complete and maintain service report file.

### **6.2 Pre Equalization Tank:**

1. Check general condition/appearance of components.
2. Check and record high level counter in control panel.
3. Measure flow rate discharged by the pumps and adjust as necessary.
4. Check condition of junction box in the tank.
5. Check pumps, operation and timing.
6. Check condition of piping assembly in the tank.
7. Check condition and function of control panel.

See attached Equalization field report for complete O&M procedures

#### 6.4 PROCESS CONTROL for CARBONACEOUS BIOCHEMICAL OXYGEN DEMAND (CBOD<sub>5</sub>) REMOVAL with the BIOCLERE SYSTEM:

Wastewater flows from the primary settling tank into a baffled chamber in the clarifier of the Bioclere. Dosing pumps located in this clarifier intermittently dose the PVC filter media bed with the wastewater.

In the Bioclere trickling filter the organic material in the wastewater is reduced by a population of microorganisms, which attach to the filter media and form a biological slime layer. Aerobic microorganisms accomplish treatment in the outer portion of the slime layer. As the microorganisms multiply the biological film thickens and diffused oxygen and organic substrate are consumed before penetrating the full depth of the slime layer. Consequently the biological film develops aerobic, anoxic and anaerobic zones.

Absent oxygen and a sufficient organic carbon source (CBOD<sub>5</sub>) the microorganisms near the media surface lose their ability to cling to the media. The wastewater flowing over the media washes the slime layer off the media and a new slime layer begins to form. This process of losing the slime layer is called "sloughing" and it is primarily a function of organic and hydraulic loading on the filter. This natural process allows a properly designed media bed to be self-purging and maintenance free.

The sloughed biomass settles to the bottom of the clarifier as sludge. This secondary sludge is periodically pumped back to the primary tank to enhance the digestion and denitrification processes, which is further discussed in **Section 6.3.2 below**.

##### 6.4.1 **Bioclere Trickling Filter Dosing Rates:**

The Bioclere uses two alternating dosing pumps to distribute wastewater over the trickling filter. It is critical to periodically clean the nozzles of excess biomass using a bottlebrush to ensure uniform distribution. The Bioclere dosing rates that were set at the time of commissioning are listed in **Section 2.0** of this manual. The dosing rates are set so that the flow of water and pollutants (CBOD<sub>5</sub> and ammonium) over the biofilm are maximized. This in turn, will maximize the pollutant removal efficiencies and facilitate biomass sloughing through the filter. Therefore, it is **not necessary** to adjust the dosing timers. In fact, the dosing timers should only be adjusted if the Bioclere receives little or no flow for extended periods.

##### 6.4.2 **Bioclere Recirculation Rates:**

Recirculation of sludge and treated effluent is accomplished in each unit using a submersible stainless steel pump controlled by a fully adjustable timer. The biological solids generated in the filter are returned to the sludge storage facility at regular intervals, typically every hour. Therefore, the sludge will not collect in the secondary settling tank and a sludge blanket will not form.

The benefits of sludge and treated effluent re-circulation are numerous and include: 1) removal of biological sludge from the Bioclere so that only the primary tank(s) need periodic pumping, 2) dilution of the influent pollutant concentrations, which results in a thinner and more effective biofilm on the media bed, 3) reduction or near elimination of odors in the primary tanks and the treatment components, 4) dilution of biological inhibitors (cleaning agent, sanitizers, etc.) that may exist in the wastewater, 5) attainment of nitrogen removal through denitrification due to the recirculation of nitrate to the primary tank.

The recirculation rates that were set at the time of commissioning are listed in **Section 2.0** of this manual. These rates may need adjusting depending on the 1) actual average daily flow, and 2) actual measured strength of the wastewater (concentrations of influent BOD<sub>5</sub>, TKN etc.). Please contact AQUAPOINT prior to adjusting the recirculation rates.

In a two stage Bioclere system the first unit is typically set to return only the biological sludge generated in the reduction of CBOD<sub>5</sub>. The second stage unit is set to run several minutes each hour to return biological sludge and treated effluent in order to maximize treatment efficiency.

## 6.5 PROCESS CONTROL for NITROGEN REMOVAL with the BIOCLERE SYSTEM (if applicable):

Below is a brief description of how nitrogen removal is accomplished in the Bioclere units. Generally BOD removal occurs in the first stage Bioclere unit and a majority of nitrification in the second stage Bioclere. However, if the actual wastewater flow is less than the design flow, significant nitrification will occur in the first stage Bioclere unit.

### 6.5.1 **Nitrification:**

Nitrification is the sequential biological oxidation of  $\text{NH}_4\text{-N}$ , first to nitrite ( $\text{NO}_2\text{-N}$ ) by *Nitrosomonas* bacteria then to nitrate ( $\text{NO}_3\text{-N}$ ) by *Nitrobacter* bacteria according to the following overall equation:  $2\text{NH}_4^+ + 2\text{O}_2 \rightarrow \text{NO}_3^- + 2\text{H}^+ + \text{H}_2\text{O}$

Oxidation of 1 mg/l of  $\text{NH}_4\text{-N}$  requires approximately 4.6 mg/l of dissolved oxygen and produces acid resulting in the consumption of approximately 7.1 mg alkalinity as  $\text{CaCO}_3$ /mg  $\text{NH}_4\text{-N}$  oxidized. Alkalinity is the inorganic carbon source nitrifying bacteria required to oxidize ammonia. **Therefore it is critical that alkalinity is monitored on a regular basis to ensure complete nitrification.** Alkalinity concentrations in the Bioclere effluent must remain above 75 mg/l as  $\text{CaCO}_3$  to allow nitrification to proceed. If the alkalinity drops below this value, it is likely that nitrification will be inhibited and the effluent will not meet permit requirements. It is best to measure the alkalinity in the Bioclere effluent using a field test kit each time you are onsite to inspect the treatment system. Bioclere effluent can be collected from the final pump chamber or the sampling port that is located on top of the Bioclere unit (see the Bioclere general arrangement drawing located in Appendix A for the sampling port location). The sampling port is a 4" diameter PVC pipe that extends approximately 10' through the trickling filter to the effluent in the clarifier. Effluent can be collected with a bailer.

Alkalinity is generally added in the form of baking soda (sodium bicarbonate). It can be purchased as a powder in 50-pound bags. A solution can be mixed using the alkalinity mixing setup that has been included with the treatment equipment. Solution dosing is accomplished using a variable speed Masterflex chemical feed pump, which is controlled with a timer in the Bioclere control panel. Dosing should be set to run several minutes each hour. For a detailed description of the chemical feed installation and operational requirements refer to the site plans and **Appendix E** of this manual. Contact Aquapoint if assistance is required to determine the alkalinity-dosing rate.

Please note that nitrifying bacteria require a stable and consistent environment because of their sensitivity to numerous inhibitory and toxic substances and an array of environmental factors including temperature, pH, dissolved oxygen, and alkalinity. If nitrification is not being achieved then it will be necessary to verify the influent average daily flow, pH, BOD<sub>5</sub>, TSS, TKN. It may also be necessary to conduct an inventory of the type and quantity of any and all cleaning and process solutions that are used that may impact the microorganisms in the Bioclere units.

### 6.5.2 **Denitrification:**

Dissimilating denitrification, the biological reduction of nitrate ( $\text{NO}_3\text{-N}$ ) to nitrite ( $\text{NO}_2\text{-N}$ ) and ultimately nitrogen gas in an anoxic environment (dissolved oxygen <0.5 mg/l), involves the transfer of electrons from a reduced electron donor (organic carbon substrate) to an oxidized electron acceptor ( $\text{NO}_3\text{-N}$ ). It is an important reaction as it restores approximately 3.57 mg alkalinity/mg of  $\text{NO}_3\text{-N}$  reduced, and partially offsets the effects of nitrification in a combined nitrification/denitrification process. The microorganisms responsible for completing the reaction are facultative heterotrophic aerobes contained in the wastewater that are also responsible for CBOD<sub>5</sub> oxidation in the Bioclere.

Denitrification in the Bioclere system is accomplished by periodically recirculating secondary sludge and treated nitrified effluent to the septic tank which provides an anoxic environment. Recirculation typically occurs several minutes every hour via a timer in the control panel. See **Section 2** of this manual for Bioclere recycle and dosing rates. For typical residential strength wastewater, recirculation of treated effluent from the Bioclere to the septic tank will achieve <12 mg/l of total nitrogen. This is due to the fact that weight ratios of carbon to

nitrate, measured as **BOD:NO<sub>3</sub>-N** in the influent wastewater are usually greater than the generally accepted ratio of **2:4** in which denitrification has been proven to proceed without an external carbon source such as methanol.

However, many commercial applications will require a carbon source such as methanol. If required, a carbon dosing rate of approximately 3:1 (COD carbon source: NO<sub>3</sub> in wastewater) is required to complete denitrification.

Carbon is often added in the form of methanol or a 20% methanol solution. However many other organic carbon sources can be used including glucose (sugar), sodium acetate, soda syrup etc. If the carbon source is not purchased in pre-mixed drums, a solution can be made-up using the mixing setup that has been included with the treatment equipment. Carbon dosing is accomplished using a variable speed Masterflex chemical feed pump, which is controlled with a timer in the Bioclere control panel. Dosing should be set to run several minutes each hour. For a detailed description of the chemical feed installation and equipment operational requirements refer to the site plans and **Appendix E** of this manual. Contact Aquapoint if assistance is required to determine the carbon-dosing rate.

If the effluent dissolved oxygen concentrations from the anoxic reactor exceed 0.5 mg/l, denitrification may be inhibited. In isolated instances, this has been documented to occur during extreme cold weather periods. If this occurs, the Bioclere fan size can be reduced to compensate for the increased dissolved oxygen levels. If the condition persists, an oxygen scavenging agent can be dosed into the Post Equalization tank to uptake the residual dissolved oxygen. Please contact Aquapoint if this condition is experienced.

***How do I know when a carbon source is needed?***

You must monitor the nitrate in the septic tank effluent tee with a nitrate field test kit. When nitrate is consistently >3 mg/l in the septic tank effluent, it is necessary to add an organic carbon source to the influent side of the septic tank to achieve denitrification. You should also measure the dissolved oxygen. For denitrification to proceed a dissolved oxygen level of <0.5 mg/l is required in the septic tank effluent.

<b>AQUAPOINT</b>		
<b>241 DUCHAINE BLVD.</b>		
<b>NEW BEDFORD, MA 02745</b>		
<b>TEL. 508 998-7577 / FAX. 508 998-7177</b>		
<b>BIOCLERE FIELD REPORT</b>		
Date:	Installation:	Tested:
Client:	Service:	Commissioned:
Address:	Other:	Scheduled Maint.
Inspector:		
Bioclere Model Number(s)		
1) Odor around site? Y / N, Source of odor?		
Check all that apply:	Mild: Med: Strong:	
	Musty: Septic:	
2) Take influent/effluent samples as required.		
Please fax analytical results to Aquapoint for review.		
3) a) Measure sludge in primary tanks and grease traps as required:		
b) Sludge depth in primary tank:	scum depth:	sludge depth:
c) Does grease trap need pumping?	Y / N	
	<b>UNIT 1</b>	<b>UNIT 2</b>
<b>4) BIOCLERE VENTS</b>		
a) Is air passing through the vent?	Y / N	Y / N
If in doubt put a small plastic bag around vent and allow to fill		
b) Is the fan operating and in good condition?	Y / N	Y / N
<b>5) GENERAL</b>		
a) Any external damage to the unit(s)? If yes, then provide details on back	Y / N	Y / N
b) Are cover, fan box and control panel securely locked?	Y / N	Y / N
c) Any filter flies in the unit?	Y / N few / many	Y / N few / many
Location of flies:		
d) Locks / Latches / Handles, OK?	Y / N	Y / N
e) Lid Gasket, OK?	Y / N	Y / N
f) Does the fan box contain standing water?	Y / N	Y / N
If yes, then remove water and clean drain holes if necessary.		
<b>6) BIOMASS CHARACTERIZATION</b>		
a) Color of biomass?		
1)white 2)white/grey 3)grey 4)grey/brown 5)brown 6)red/brown 7)black 8)other		
b) Thickness of biomass 6 - 12 inches below media surface		
1) light 2) medium 3) heavy		
<b>7) NOZZLE SPRAY PATTERN</b>		
a) Does spray cover the entire surface area of media?	Y / N	Y / N
If not then clean each nozzle with a bottle brush		
Does the spray now cover the entire surface area?	Y / N	Y / N
If not then:		
1) remove nozzles and soak them in a bleach solution		
2) manually engage both dosing pumps for 2 minutes		
3) replace nozzles		
Does the spray now cover the entire surface area?	Y / N	Y / N
If not then consult AQUAPOINT		

<b>8) PUMPS AND CONTROL PANEL</b>			
a) Record dosing and recycle pump timer settings from control panel			
Dosing pump 1 and 2:	min on/	min off	min on/ min off
Recycle pump:	min on/	hrs off	min on/ hrs off
In Bioclere control panel set dosing and recycle timers to a test cycle:			
a) Measure amperage of dosing pump 1:	amps		amps
b) Measure amperage of dosing pump 2:	amps		amps
c) Measure amperage of recycle pump:	amps		amps
Are the dosing pumps alternating?	Y / N		Y / N
Are the timers operating properly?	Y / N		Y / N
Visually inspect relays for wear and record problems below.			
*If spare components are needed contact Aquapoint			
If an ammeter is not available, set the timers to a test cycle as above and physically at the Bioclere, check the pumps operation as follows:			
Dosing pumps: check that pump(s) are operating, alternating and the designated rest cycle is occurring.	pump 1: OK? Y / N		pump 1: OK? Y / N
	pump 2: OK? Y / N		pump 2: OK? Y / N
Recycle pump(s):check that pump(s) are operating and the designated rest cycle is occurring.	OK? Y / N		OK? Y / N
*If pumps or control components are not operating properly record below and consult AWT Environmental, Inc.			
<b>RESET TIMERS TO ABOVE SETTINGS: Note any changes here:</b>			
<b>*Do not change timers without consulting Aquapoint</b>			
<b>9) PLUMBING</b>			
a) Are the unions in the Bioclere leaking?	Y / N		Y / N
If yes then tighten with pipe wrench			
<b>10) FINAL CHECK</b>			
a) Main power "on" and toggle for all pumps set to "normal" position	Y / N		Y / N
b) Alarm toggle set to the "on" position	Y / N		Y / N
c) Lock control panel, Bioclere cover and fan box			
d) If possible, record the water meter reading:			
<b>11) REPORT SUMMARY:</b>			
<b>SIGNATURE:</b>			



**3) FLOAT SWITCH OPERATION**

a) **LOW FLOAT** - In extended position (open circuit) float is a low level pump shut off  
- In closed position float activates Serlac timer and dosing cycle

b) **MIDDLE FLOAT** - In extended position (open circuit) float allows normal operation  
- In closed position float trips the counter and activates lag pump until tank is empty

c) **HIGH FLOAT** - In extended position (open circuit) float allows normal operation  
- In closed position float will activate the audio/visual alarm

**4) FLOW RATE MEASUREMENT (gpm)**

- Measure flow rate in (gpm) from tank by measuring the draw down volume over a specified time (i.e. 5 minutes)
- Refer to Bioclere Technical Manual for process description and maximum flow rate (gpm)
- Flow rate may be adjusted using the 2" brass ball valves in the tank

**5) FINAL CHECK**

- a) Main power "on" and toggle for pumps set to "normal" position Y / N
- b) Alarm toggle set to the "on" position Y / N
- c) Lock control panel
- d) If possible, record the water meter reading:

**6) REPORT SUMMARY**

**SIGNATURE:**

## 7.0 TROUBLE SHOOTING

7.1 Before conducting any repair work on the fan or pump, replacing fuses, or doing any work on the panel or fan module:

**SWITCH THE MAIN POWER PANEL SWITCH TO “OFF”**- and follow applicable “lock out”, “tag out” procedures.

<u>FAULT</u>	<u>POSSIBLE CAUSE</u>	<u>CORRECTIVE ACTION</u>
Fan not working	Power failure	Check fuse and replace if necessary.
	Fan motor failure	Check wiring and terminal connections. Replace fan if necessary.
Dosing pump not working	Power failure	Check circuit breaker.
	Pump not submerged	Check that pump is fully submerged.
	Timer control failure.	Check that power switch is “ON”. Replace timer if necessary.
	Pump failure	Replace pump.
Excessive build-up of biomass	Plant overload	Check that hydraulic and organic load are within design limits. Contact Aquapoint Inc. if capacity is to be increased.
	High sludge or grease levels in primary tanks.	Check sludge levels in each unit and de-sludge as necessary.
Elevated solids concentration in final effluent.	High sludge level in Bioclere sump.	Check pump and timer control. De-sludge by pumper if necessary.
	Excess shedding of biomass.	investigate and eliminate any source of biofilm poisoning such as disinfectant, household bleach, acids, etc. showing up in waste.
Odorous	Inefficient treatment.	Check that dosing assembly sprinkles evenly over media surface. Clean dosing assembly.
	Inadequate air supply	Check fan and air intake. See “fan not working” above.

<u>FAULT</u>	<u>POSSIBLE CAUSE</u>	<u>REMEDIAL ACTION</u>
	Primary tank clogged.	Check inlet and outlet pipes and sludge level. De-sludge as necessary.

## **8.0 FINAL EFFLUENT QUALITY PROBLEMS**

### **8.1 HIGH SUSPENDED SOLIDS.**

If effluent solids concentrations are exceeded, carry out the following checks:

1. Check operation of recycle pump from telltale near the top of the central shaft.
2. Examine primary settlement tank. If excessive sludge or floating matter in the chamber is discharging to the Bioclere arrange for the primary tank to be de-sludged. (See Section 2.6, 2.7)
3. If the sludge recycle pump has been out of operation for more than 8 weeks, the Bioclere sump should be de-sludged.

### **8.2 HIGH B.O.D. ( BIOCHEMICAL OXYGEN DEMAND)**

If effluent levels are exceeded carry out the following checks:

1. Check for signs of excessive sludge in the primary tanks. (See Section 2.6, 2.7)
2. Check that the fan is operating continuously and that the air inlet to the fan is unobstructed. Clean and replace as necessary.
3. Check that the dosing assembly is clean and that the effluent is being distributed evenly to the filter media.
4. Check whether the loading to the plant has increased beyond the design basis. Consult Aquapoint Inc. if loading has increased.
5. Ensure that there are no toxic or concentrated cleansing chemicals being discharged to the plant.

### **8.3 HIGH NH<sub>3</sub>N (AMMONIA-NITROGEN)**

Carry out check procedure as for Item 8.2 B.O.D.

For additional assistance contact:

**AQUAPOINT**  
**241 Duchaine Blvd.**  
**New Bedford, MA 02745**  
**Tel. 508-998-7577**  
**Fax 508-998-7177**

**E-mail: [aquapoint@aquapoint.com](mailto:aquapoint@aquapoint.com)**



## **WASTEWATER TREATMENT SYSTEM TOXICITY WARNING**

The wastewater treatment system at this facility has been designed to treat the waste stream generated by the facility and maintain compliance with the facilities discharge permit. Its biological treatment process is very stable.

**HOWEVER, TOXIC SHOCK LOADING WILL ADVERSLY  
IMPACT THE EFFLUENT QUALITY FROM THE SYSTEM.**

Therefore, none of the following biologically toxic substances should be introduced into the system:

1. Gasoline, kerosene, benzene, naphtha, fuel oil or other flammable or explosive liquid, solid or gas.
2. Oil based latex paints, paint thinners, paint removers or strippers.
3. Organic solvents or any liquid containing organic solvents.
4. **Quaternary ammonium compounds**, sanitizers or chemical solutions containing Dimethyl Benzyl Ammonium Chloride.
5. Photographic fluids including waste developer, fixer and rinse water.
6. Pesticides including insecticides, fungicides, rodenticides, and herbicides of any sort.
7. Water or waste containing toxic poisonous solids, liquids or gases in sufficient quantity to interfere with the sewage treatment process, constitute a hazard to humans or animals, create a public nuisance or create any hazard in the ground water.
8. Water or waste having a pH higher than 8.5 or lower than 6.5
9. Solid or viscous substances in quantities capable of causing obstruction to the flow in sewers or other interference with the proper operation of the sewage works such as but not limited to, ash, cinders, sand, mud, straw, shavings, metal, glass, rags, feathers, tar, plastics, wood, un-ground garbage, whole blood, manure, hair, fleshing, entrails, paper dishes, cups, milk cartons, etc... either whole or in parts.
10. Water or waste containing fats, wax, grease or oils whether emulsified or not, in excess of 100 mg/l or containing substances which may solidify or become viscous at temperatures between 32 and 150 degrees Fahrenheit (0-65 degrees Celsius).
11. Garbage that has not been properly shredded.
12. Storm water, surface water, roof runoff or subsurface drainage.
13. Rubber gloves, gauze pads, etc... which are typically from medical facilities.

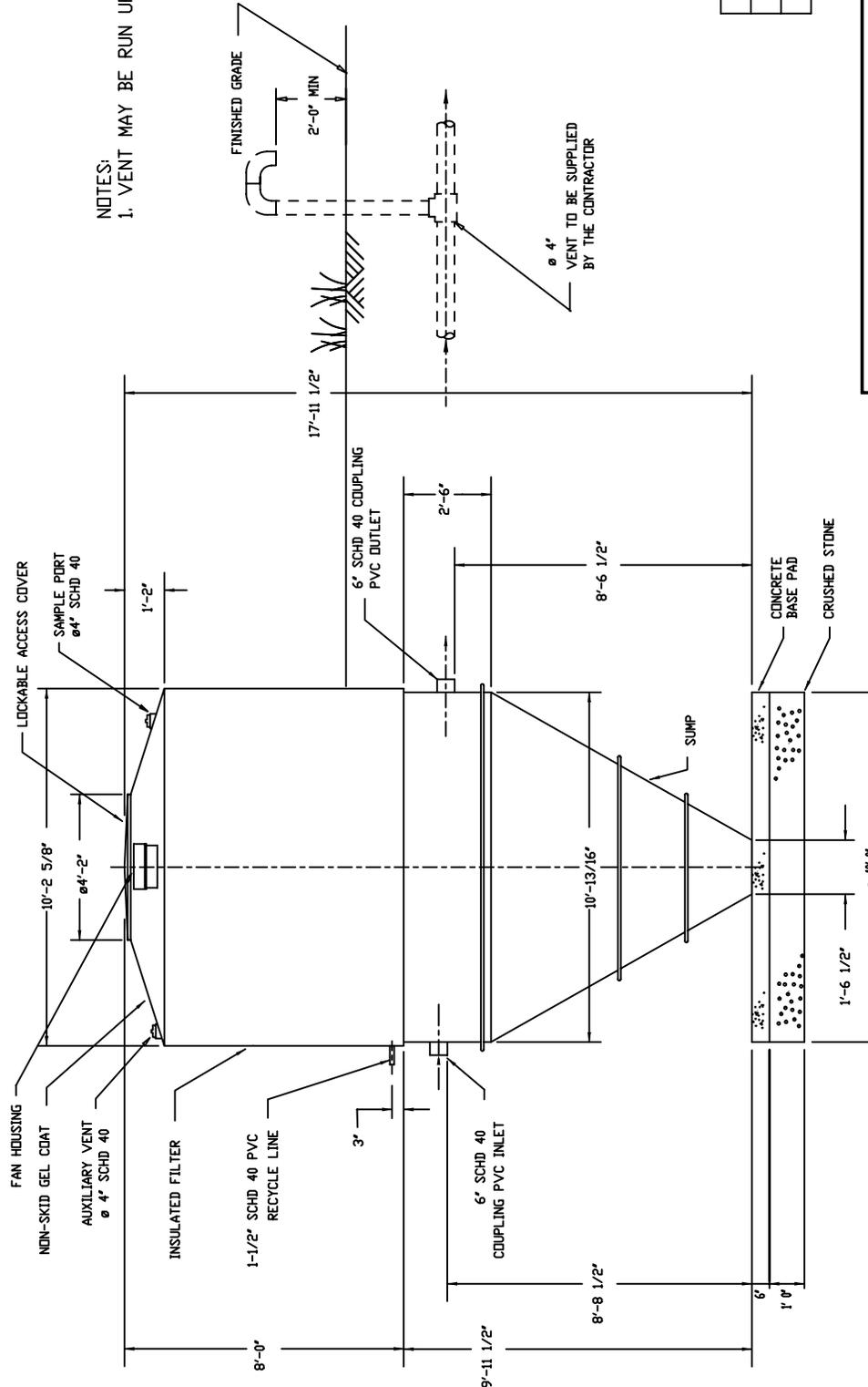
**IN THE EVENT THAT THESE OR OTHER INHIBITIVE SUBSTANCES INADVERTENTLY  
ENTER THE WASTE STREAM, CONTACT AQUAPOINT IMMEDIATELY (508)998-7577  
ext.20**

## **APPENDIX TABLE OF CONTENTS**

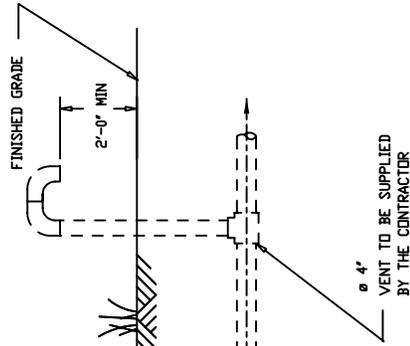
<b>APPENDIX A:</b>	<b>DRAWINGS:</b>	<b>ENVELOPE ISOMETRIC</b>
<b>APPENDIX B:</b>	<b>CONTROL PANEL FOR OPERATION OF EQUIPMENT</b>	
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<b>APPENDIX E:</b>	<b>PUMP CURVES</b>	

## **APPENDIX A**

## **DRAWINGS**



NOTES:  
1. VENT MAY BE RUN UP THE SIDE OF BUILDING.



SHIPPING WEIGHTS
WEIGHT DRY WITH MEDIA = 4250 lbs
WEIGHT DRY WITH NO MEDIA = 2800 lbs

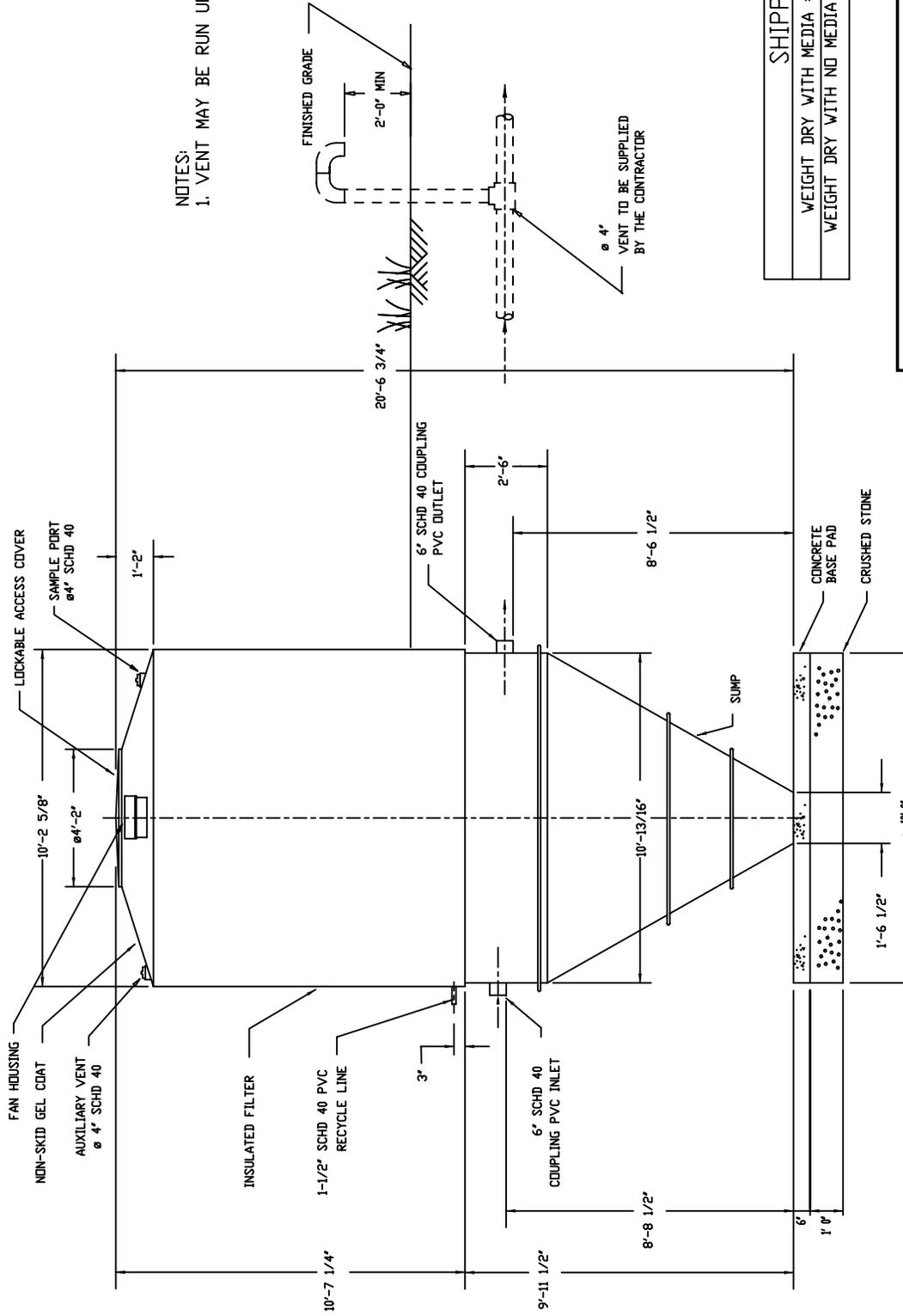
# Aquapoint

241 DUCHAINE BLVD.  
P.O. BOX 50120  
NEW BEDFORD, MA 02745  
(508) 998-7577 FAX (508) 998-7177

TITLE:	BIOCLERE 30/24 GENERAL ARRANGEMENT
DRAWING NO.:	UK1262-4
REVISION:	
DATE:	10/26/00
DWN BY:	P.Wiley
SCALE:	1 : 40
SIZE:	B
SHEET #:	1 of 1

MODEL 30/24

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NOTES:  
 1. VENT MAY BE RUN UP THE SIDE OF BUILDING.

ø 4"  
 VENT TO BE SUPPLIED  
 BY THE CONTRACTOR

SHIPPING WEIGHTS	
WEIGHT DRY WITH MEDIA = 5200 lbs (FRP) or 10800 lbs (Steel)	
WEIGHT DRY WITH NO MEDIA = 3400 lbs (FRP) or 9000 lbs (Steel)	

*Aquapoint*

241 DUCHAINE BLVD.  
 P.O. BOX 50120  
 NEW BEDFORD, MA 02745  
 (508) 998-7577 FAX (508) 998-7177

TITLE: BIOCLORE 30/32	GENERAL ARRANGEMENT
DRAWING NO. UK1262-5	REVISION:
DATE: 10/26/00	DWN BY: P.Wiley
SCALE: 1 : 40	SIZE: B
SHEET #: 1 of 1	

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MODEL 30/32

**APPENDIX B**

**CONTROL PANEL FOR OPERATION**

**OF**

**BIOCLERE**

**Wastewater Treatment System**

## **BIOCLERE ELECTRICAL INFORMATION**

### 1. **ELECTRICAL SUPPLY REQUIREMENTS:**

- A. The control panel requires a separate 115/1/60 supply rated for 40 amps.
- B. The pre-equalization control panel requires a separate 115/1/60 supply rated for 45 amps.

### 2. **WIRING:**

A licensed electrical contractor is responsible for wiring to meet local, state and federal codes as applicable.

Grounds are provided in both the Bioclere main control panel and fan module which must be wired to earth ground.

All fittings, connections, etc. are to be weatherproof, watertight construction.

#12 wire is sufficient for all motor connections.

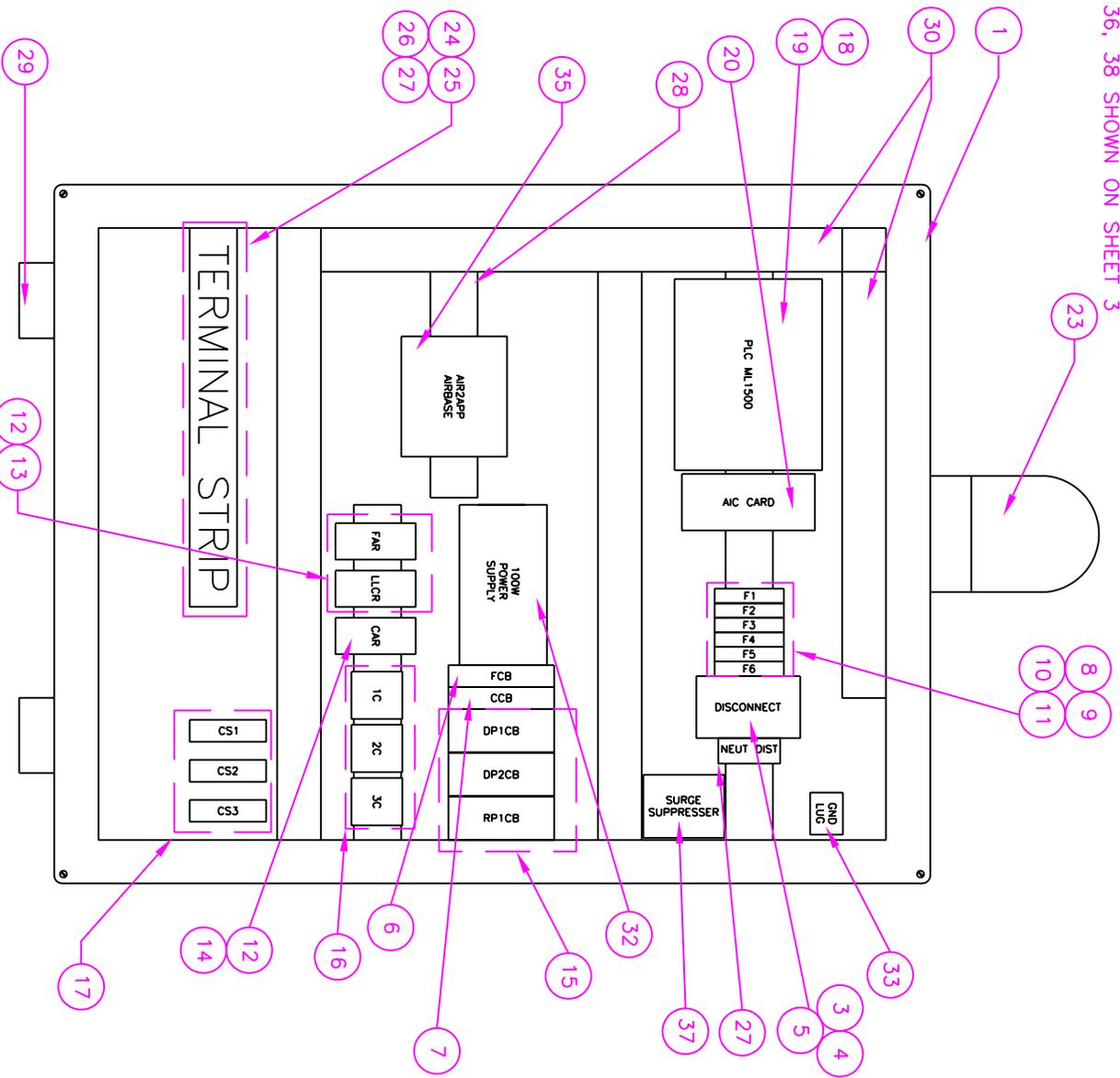
In the event more than one system is located in an enclosure, wire numbers are prefixed by AA≡ on the first system, "B" on the second, etc. Aquapoint would recommend care be taken not to mix wires between systems.

### 3. **OPERATION:**

- A. Normal Operation: The Bioclere unit will normally operate without any need for supervision. However, from time to time conditions may occur which activate the audible/visual alarms and require correction.
- B. Alarms provided: Each Bioclere system has a separate set of alarms which consist of a flasher light on top, and an "ON/OFF/TEST" switch on the front panel. The "ON/OFF/TEST" switch should always be in the "ON" position, otherwise the alarms are disabled. The "TEST" position is for test of the visual/audible alarms. The "OFF" position should only be used during servicing by authorized personnel.



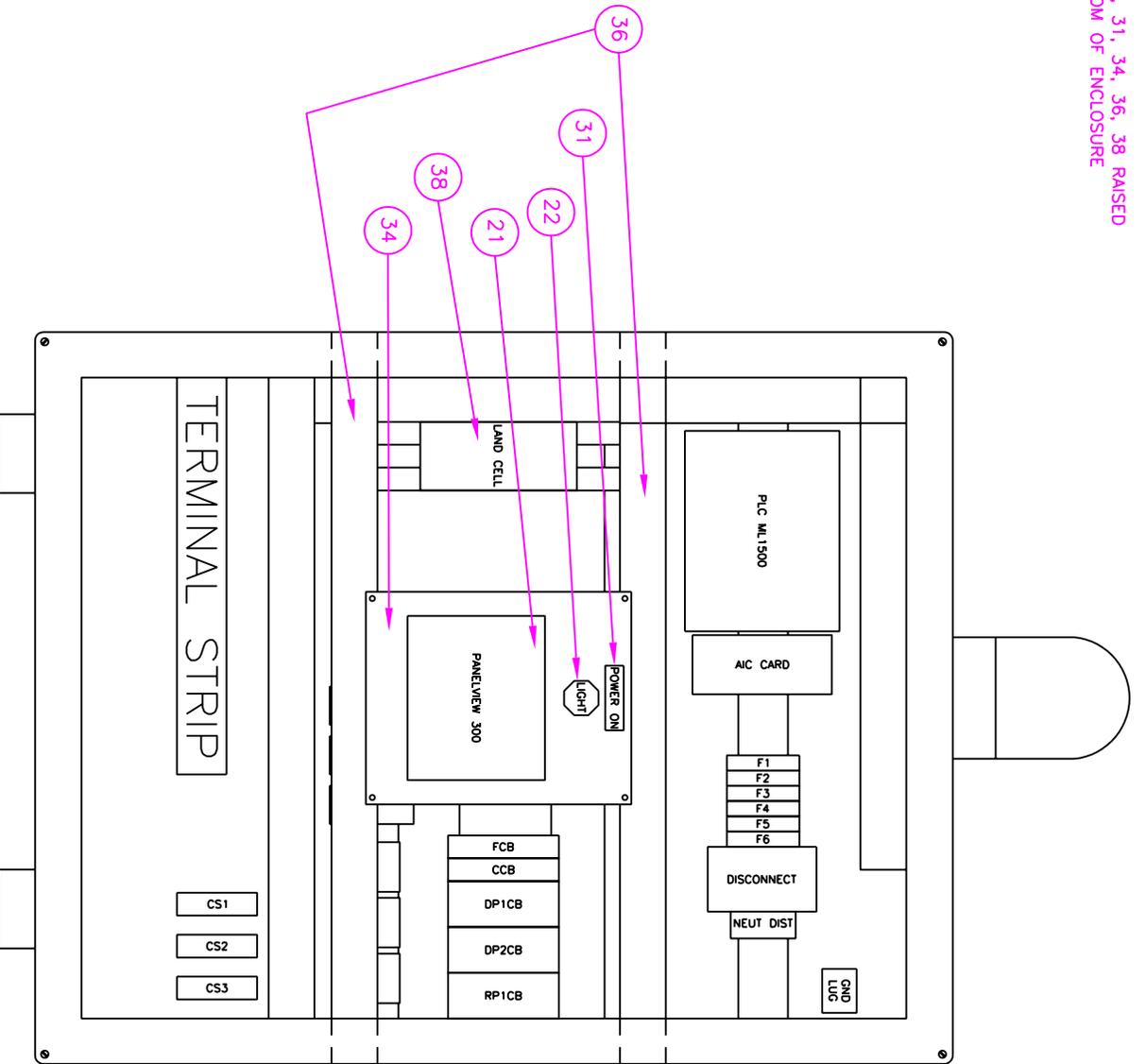
NOTES: ITEMS 21, 22, 31, 34, 36, 38 SHOWN ON SHEET 3



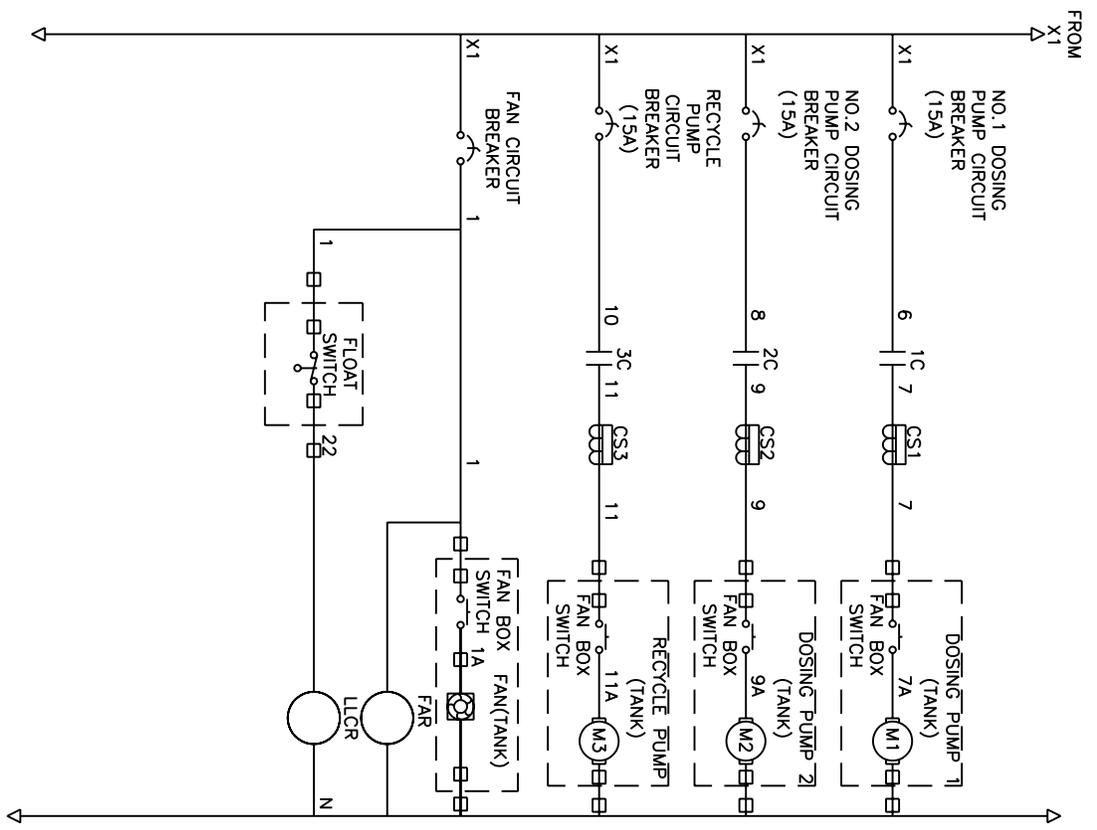
ITEM NO.	QTY	MANUFACTURE	DESCRIPTION	PART NO.
38	1	AIRZAPP	LAND CELL UNIT	CDM-819s
37	1	SQUARE D	SURGE SUPPRESSOR	AS9003
36	2	CONTROLER	ALUMINUM CHANNEL	
35	1	AIRZAPP	MOBILE AIRBASE UNIT	AS9003
34	1	WCKINSTRY	7" X 6-3/4" WHITE PANEL	4Z/108
33	1	ILSCO	GROUND LUG	AU-0
32	1	IDEC	100W 24V POWER SUPPLY	PS5R-E24
31	1	ARVIN	NAMEPLATES	
30	6	VARIOUS	PANEL DUCT	
29	2	VARIOUS	LEGS	
28	6	VARIOUS	DIN RAIL	
27	3	ENTRELEC	TERMINAL END BLOCKS	10300206
26	2	ENTRELEC	TERMINAL BARRIERS	211831618
25	6	ENTRELEC	TERMINALS 50A/48 AWG	011511811
24	20	ENTRELEC	TERMINALS 30A/410 AWG	11511607
23	1	PATLITE	120V RED BEACON W/ HORN	RH8120 AULR
22	1	IDEC	120V AMBER LIGHT	APW199A120
21	1	ALLEN BRADLEY	MICRO 300 PANELVIEW DISPLAY	2711M3A19L1
20	1	ALLEN BRADLEY	INTERFACE CONVERTER	1761-NET-AIC
19	1	ALLEN BRADLEY	MICROLOGIX 1500 BASE UNIT	1764-288XB
18	1	ALLEN BRADLEY	PROCESSOR	1764 LRP
17	3	DIVERSIFIED	CURRENT SENSING RELAYS	CMG 010020
16	3	ABB	CONTACTORS 24VDC 19A 1 NO	LS0710NSW
15	3	ABB	2 POLE CIRCUIT BREAKERS	TS272K8
14	1	IDEC	2 POLE RELAY LIGHTED 24VDC	RH2BUAC24
13	2	IDEC	2 POLE RELAYS LIGHTED 120V	RH2BUACT20
12	3	IDEC	2 POLE RELAY SOCKETS	SH2B-05
11	1	BUSSMAN	TIME DELAY FUSE	MDL5
10	2	BUSSMAN	TIME DELAY FUSES	MDL3
9	3	BUSSMAN	TIME DELAY FUSES	MDL1
8	6	ALTECH	DIN RAIL MOUNTED FUSEHOLDER	11022
7	1	ABB	3A 1 POLE CIRCUIT BREAKER	SZ71K3A
6	1	ABB	5A 1 POLE CIRCUIT BREAKER	SZ71K0.5A
5	1	ABB	HANDLE	0H62AJ1
4	1	ABB	SHAFI	OK55X180
3	1	ABB	45 AMP DISCONNECT SWITCH	0145E3
2	1	WCKINSTRY	27 x 21 WHITE SUBPANEL	4Z/5024
1	1	ROBROY	30 X 24 X 10 ENCLOSURE	N302410HWT

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NOTE: ITEMS 21, 22, 31, 34, 36, 38 RAISED  
 9-3/4" FROM BOTTOM OF ENCLOSURE



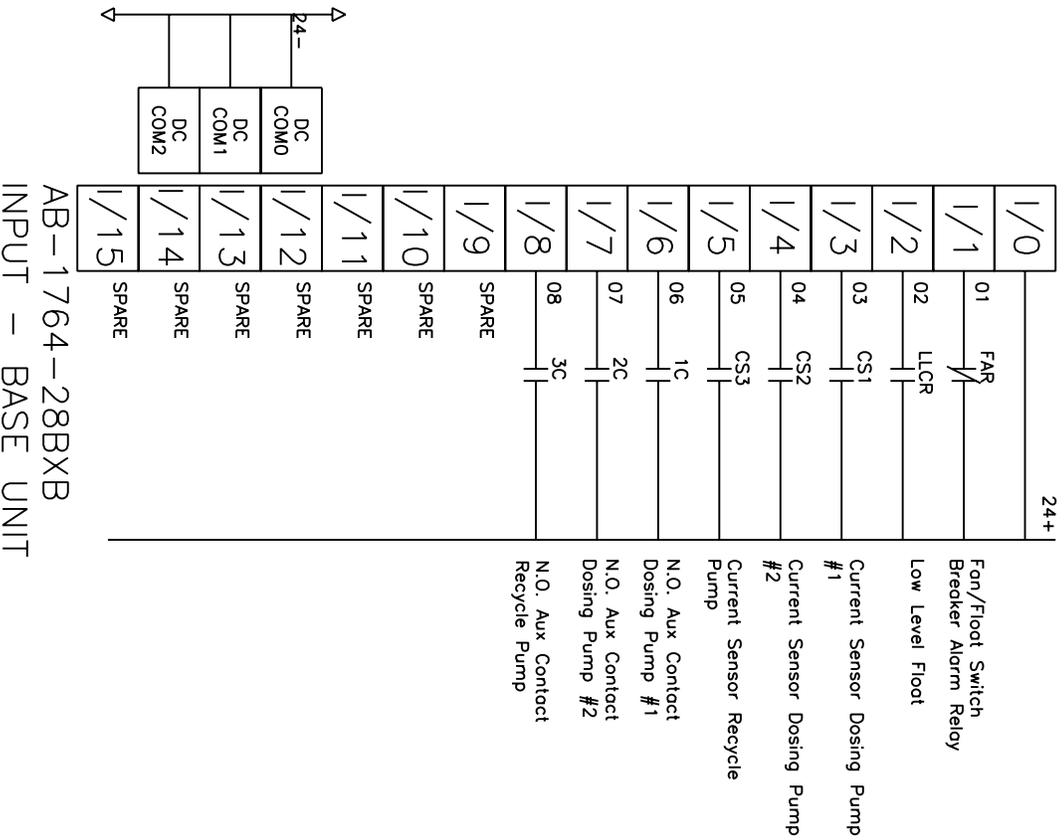
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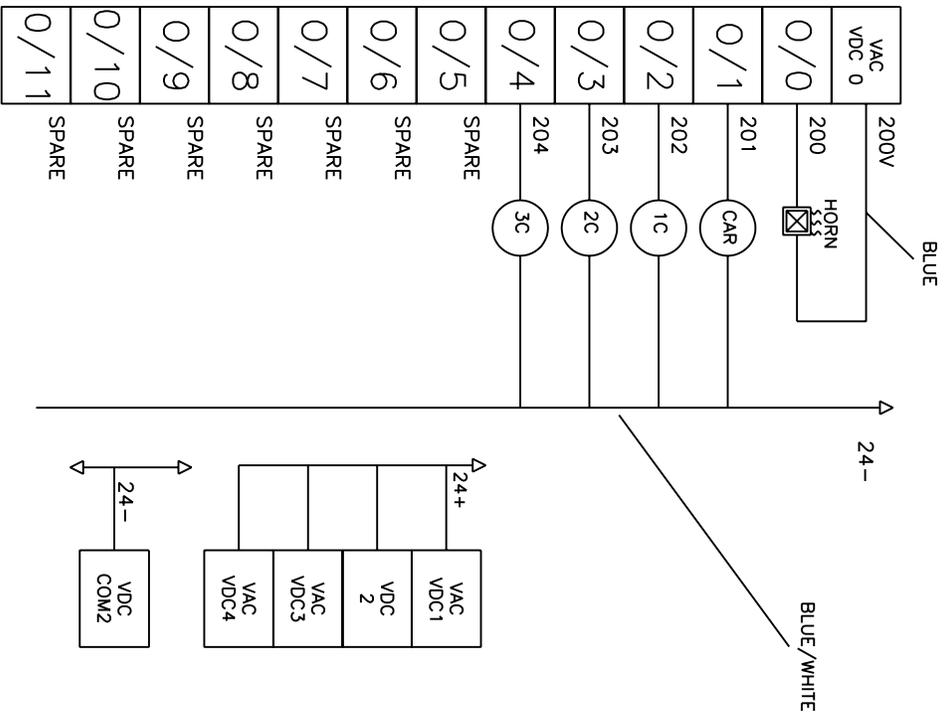
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AB-1764-28BxB  
INPUT - BASE UNIT



AB-1764-28BxB  
OUTPUT - BASE UNIT

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# Aquapoint Control Systems

## Single Bioclere PLC Operating Instructions

### System Description

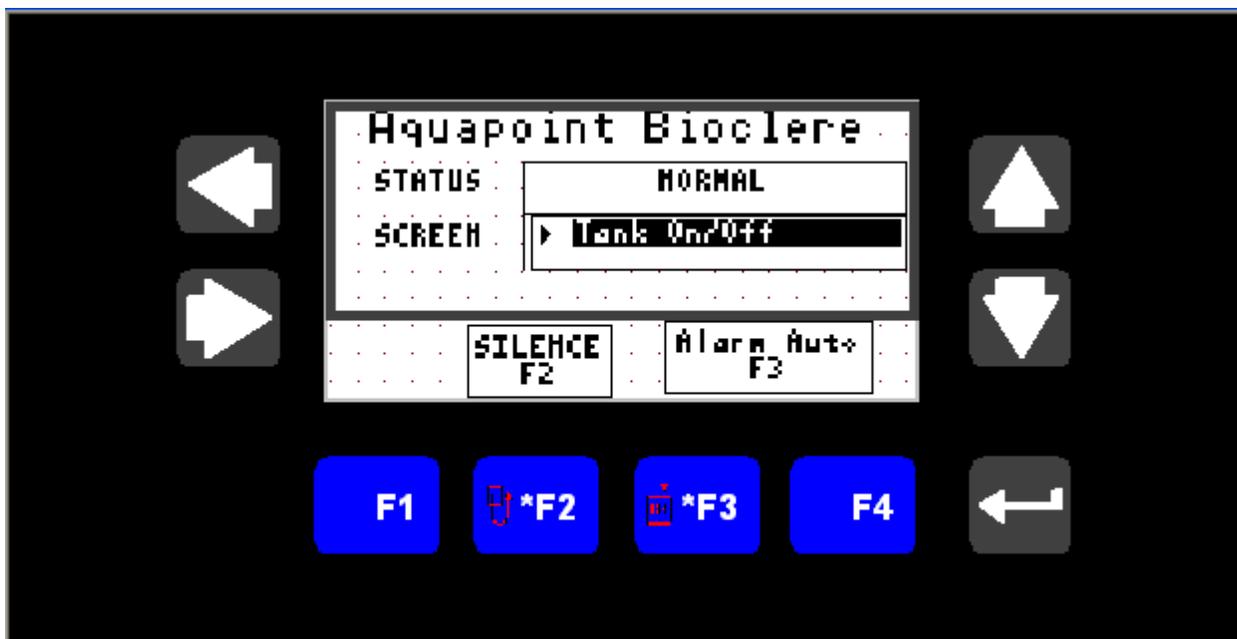
The Single Bioclere Wastewater Treatment Plant PLC System controls the operations of the pumps and alarms in a Single Bioclere. A MicroLogix 1500 Programmable Logic Controller (PLC) is used to control all system functions if the system includes wireless remote telemetry. Non-telemetry systems use a Micrologix 1200 PLC. A Panel View 500 Human Machine Interface (HMI) is provided to allow access to pump timer settings and to manually control the operation of pumps. The HMI also provides the operator access to tank status, pump cumulative run times, as well as system and alarm status.

### Operating Instructions

Before starting the System, it must be installed according to the installation instructions provided, and by a qualified person.

The System is controlled entirely from the HMI. Upon power up the Main HMI screen will automatically appear.

### Main Screen



The system status indicator will inform the operator whether the system is running normally or not.

Control screens for different system functions are accessed from the main screen. To select a screen use the UP/DOWN arrow keys until the desired screen appears in the list box, then use the enter key (left pointing arrow at lower right of HMI).

REVISION DATE: 04/18/06

### Main Screen (cont.)

The **F2** key will silence the alarm horn, but will not clear the fault causing the alarm.

The **F3** allows the operator to choose from the following alarm modes:

**Alarm Auto:** The alarm will sound normally in any alarm condition.

**Alarm Off:** The alarm will not sound, regardless of whether an alarm condition occurs.

**Alarm Test:** The alarm will sound for as long as the alarm is left in test mode.

Under normal operation the alarm should be set in Alarm Auto.

### Tank On/Off Screen



The Tank On/Off Screen allows the operator to turn all pumps in the tank on or off. If the tank is off, all pumps in the tank will stay off regardless of individual pump settings and float conditions. Note: the pumps will be turned off, but the power is still on and the fan should be running.

If the tank is on, all pumps in that tank will operate according to their individual settings and float conditions.

The **F1** key turns all pumps in the tank on or off.

The **F4** key returns the operator to the Main Screen.

## Tank Control Screen



REVISION DATE: 04/18/06

## Tank Control Screen (cont.)

The Tank Control Screen allows the operator to control the recycle pump (RP), dosing pump #1 (DP1) and dosing pump #2 (DP2). Each pump may be placed in **AUTO**, **OFF**, or **ON** mode. In **AUTO** mode the pump will be controlled by the control system logic using the timer settings made in the **TIMER** screen. When placed in **OFF** the pump will be off and unaffected by the control system logic. When placed in **ON**, the pump is on continuously and is unaffected by the control system logic.

The **F1** key allows the operator to change the Recycle Pump mode from **AUTO**, **OFF** or **ON**.

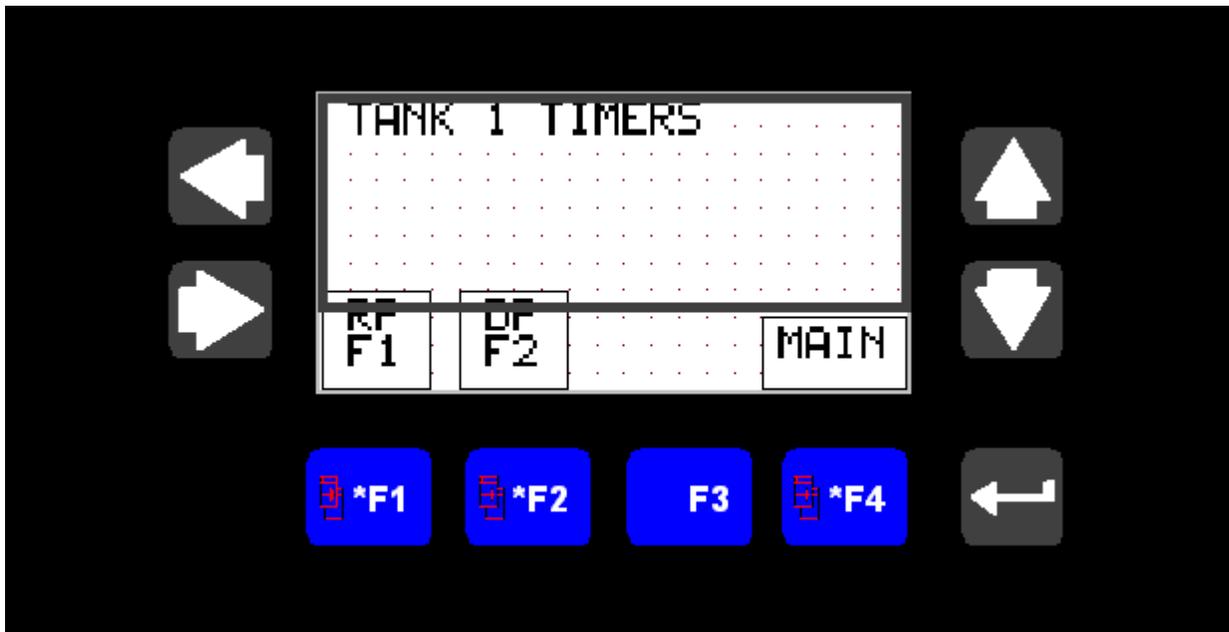
The **F2** key allows the operator to change the Dosing Pump #1 mode from **AUTO**, **OFF** or **ON**.

The **F3** key allows the operator to change the Dosing Pump #2 mode from **AUTO**, **OFF** or **ON**.

Note: If a pump is set to **OFF** and the tank is set to **ON**, the alarm will sound, notifying the operator the pump is not set in **AUTO** mode.

The **F4** key returns to the main screen.

## Timer Screen



The Timer screen allows the operator to select the timer screen for the Recycle Pump or Dosing Pump #1 and #2.

The **F1** key selects the Recycle Pump timer screen.

The **F2** key selects the Dosing Pump timer screen.

The **F4** key returns to the main screen.

REVISION DATE: 04/18/06

## **RP Timer, DP Timer Screens**

These screens allow the operator to make adjustments to the pump timer values. There is a separate screen for each pump.

The **F1** key allows the operator to adjust the pump **ON** time. Time is set in minutes.

Use the left and right arrow keys to select the digit to change.

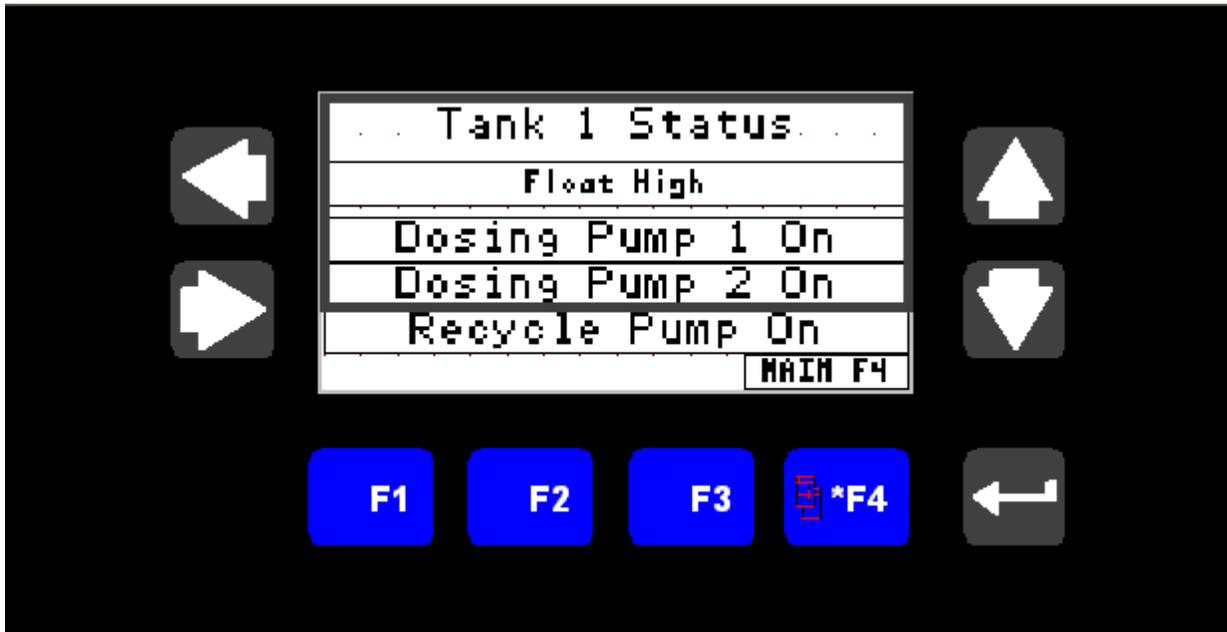
Use the Up/Down keys to change the digit from 0 to 9.

The **F2** key allows the operator to adjust the pump **OFF** time. Time is set in minutes.

The **F4** key returns to the main screen.

## Tank # Status

(added 6/07/05)



These screens show the status of all pumps and floats in the tank.

The **F4** key returns the operator to the main screen.

## Elapsed Time Meters (ETMS)



This screen shows the cumulative run time (in hours) for each pump in the tank.

The **F1** key resets the DP1 ETM

The **F2** key resets the DP2 ETM

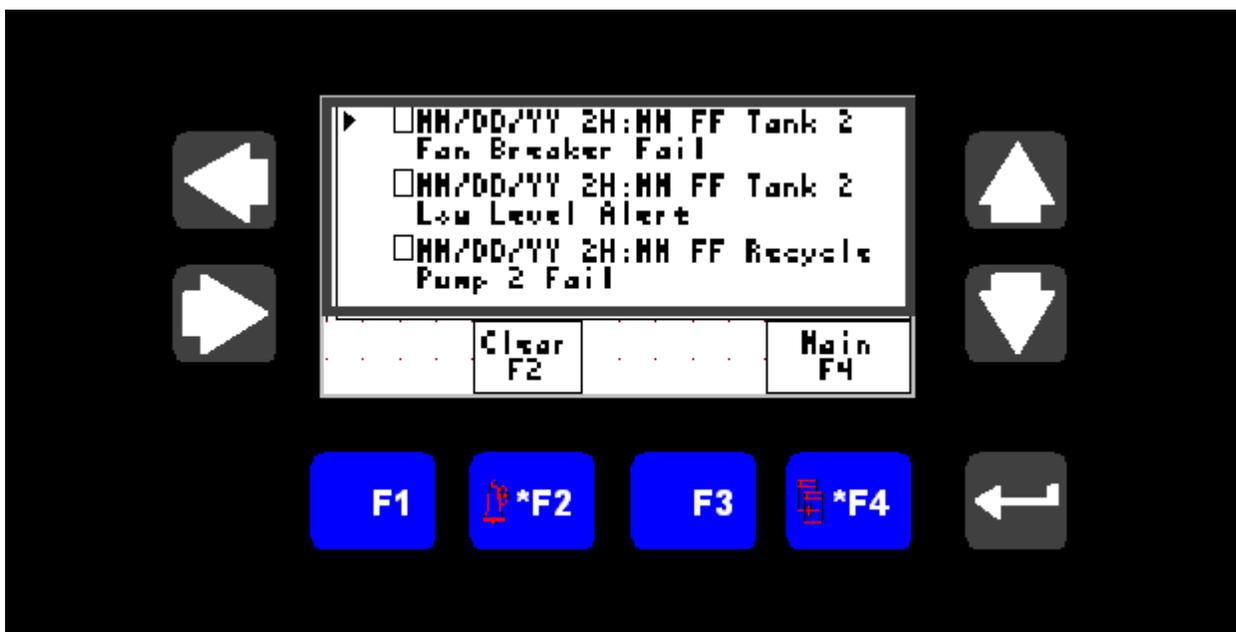
The **F3** key resets the RP ETM

The **F4** key returns the operator to the main screen.

Remember to record and reset all pump ETMS when replacing a pump.

## Alarm Log

(Added 6/07/05)



The screen is a record of all alarms that have occurred, with the time and date the alarm was triggered.

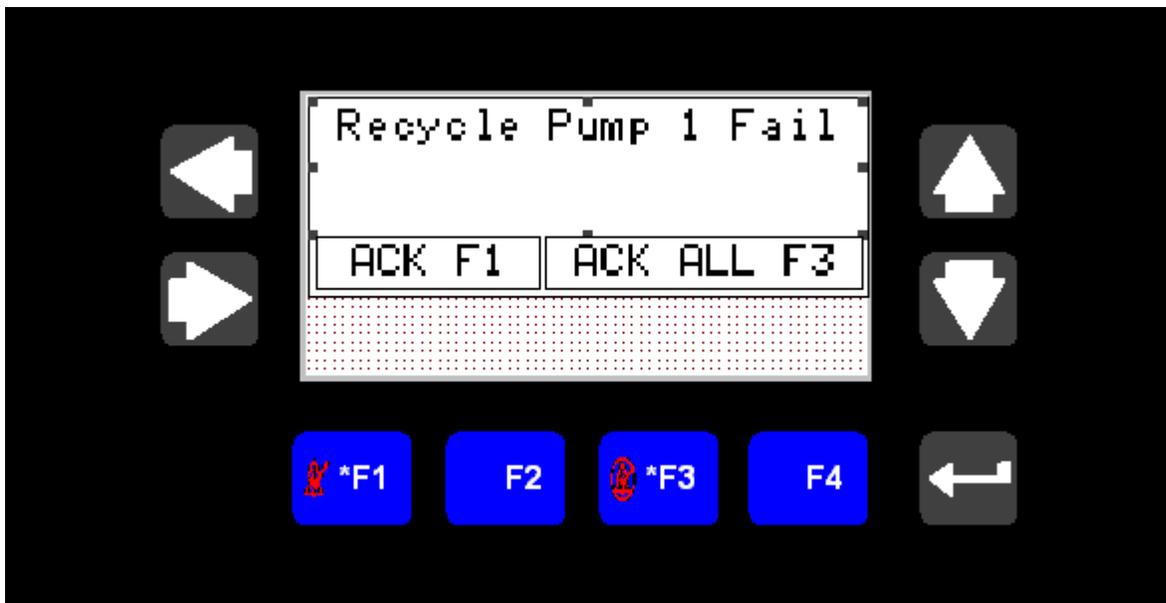
The up and down arrow keys will scroll through the alarm list.

The **F2** key will view the alarm list clear confirmation window, press **F1** to abort, press **F2** to confirm clearing the alarm list.

The **F4** key returns to the main screen.

REVISION DATE: 04/18/06

## **Alarm Screen**



The alarm screen is not a normal screen, and is not selectable from the main menu. It will only appear if an alarm condition occurs.

The alarm screen will show the alarm conditions that have occurred one at a time.

The **F1** key acknowledges the current alarm. The **F1** key must be pressed once for each alarm, and for each instance of the same alarm.

The **F2** key acknowledges all alarms, and all instances of the same alarm.

(Added 6/07/05)

## **Alarm Conditions/Troubleshooting**

**Caution: Turn off disconnect switch, lock out and tag out power, and verify before servicing!**

Fan/Float Circuit Breaker Fail: The fan/float switch circuit breaker has tripped

Solution: Reset fan/float switch circuit breaker. Check float and fan for proper operation.

Pump # Fail: Pump # is not running when it should be.

Solution: Possible problems or failure conditions consist of the following: pump clogged, pump internal thermal switch tripped, faulty current sensor, wire malfunction or loose connection, toggle switch at junction box off or malfunctioning, contactor malfunction, or circuit breaker tripped/malfunction.

Low Level Alert: The tank level has fallen below the Low Level Float Switch.

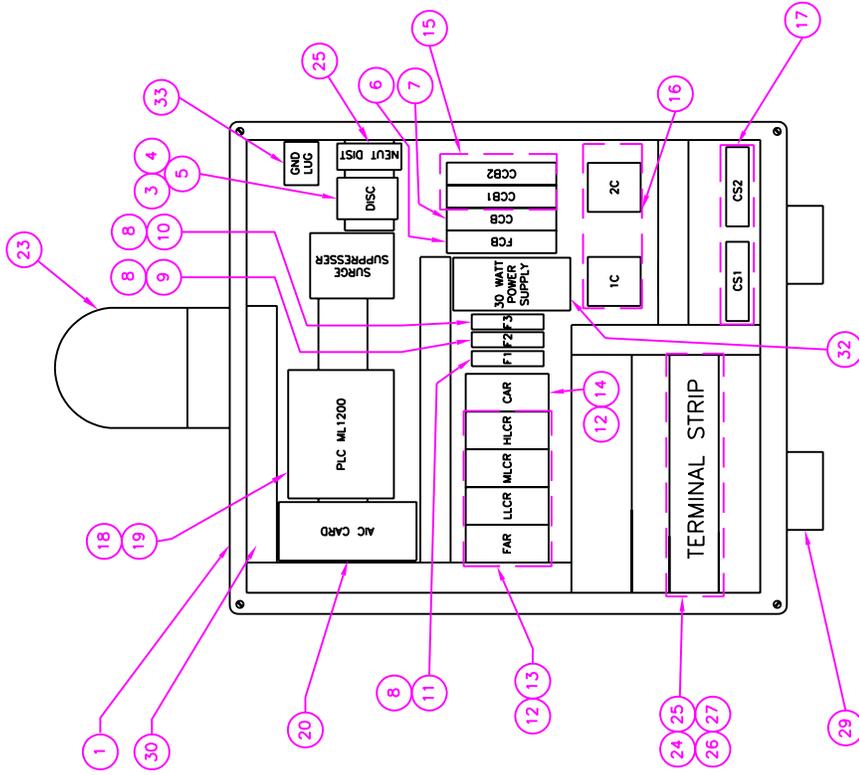
**This is not an alarm condition!** In this condition the recycle pump will not run until the clarifier level in the tank returns to normal.

REVISION DATE: 04/18/06

REVISION DATE: 04/18/06



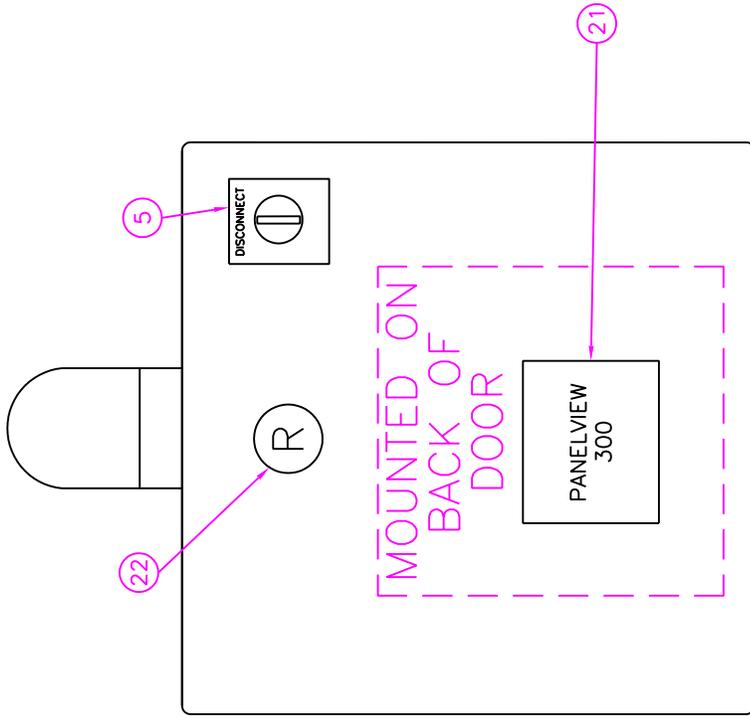
NOTES: ITEM 21 MOUNTED ON BACK OF DOOR



ITEM NO.	QTY	MANUFACTURE	DESCRIPTION	PART NO.
33	1	ILSCO	GROUND LUG	AU-0
32	1	IDEC	25W 24V POWER SUPPLY	PSSR-E24
31	3	ARVIN	NAMEPLATES	
30	6	VARIOUS	PANEL DUCT	
29	2	VARIOUS	LEGS	
28	6	VARIOUS	DIN RAIL	
27	3	ENTRELEC	TERMINAL END BLOCKS	10300206
26	2	ENTRELEC	TERMINAL BARRIERS	211831618
25	6	ENTRELEC	TERMINALS 30A/#8 AWG	011511811
24	20	ENTRELEC	TERMINALS 30A/#10 AWG	11511607
23	1	PATLITE	120V RED BEACON W/ HORN	RHB120 AJLR
22	1	IDEC	120V AMBER LIGHT	APW199A120
21	1	ALLEN BRADLEY	MICRO 300 PANELVIEW DISPLAY	2711M3A19L1
20	1	ALLEN BRADLEY	INTERFACE CONVERTER	1761-NET-AIC
19	1	ALLEN BRADLEY	MICROLOGIX 1200 BASE UNIT	1764-L24BXB
18	1	ALLEN BRADLEY	PROCESSOR	1764 LRP
17	2	DIVERSIFIED	CURRENT SENSING RELAYS	CMG 010020
16	2	AGC	CONTACTORS 24VDC 16A 1 NO	LS07-10.NSW
15	2	ABB	1 POLE CIRCUIT BREAKERS	TS272K8
14	1	IDEC	2 POLE RELAY LIGHTED 24VDC	RH2BULAC24
13	5	IDEC	2 POLE RELAYS LIGHTED 120V	RH2BULAC120
12	6	IDEC	2 POLE RELAY SOCKETS	SH2B-05
11	1	BUSSMAN	TIME DELAY FUSE	MDL5
10	2	BUSSMAN	TIME DELAY FUSES	MDL3
9	3	BUSSMAN	TIME DELAY FUSES	MDL1
8	6	ALTECH	DIN RAIL MOUNTED FUSEHOLDER	11022
7	1	ABB	3A 1 POLE CIRCUIT BREAKER	S271K3A
6	1	ABB	.5A 1 POLE CIRCUIT BREAKER	S271K0.5A
5	1	ABB	HANDLE	OHB2AJ1
4	1	ABB	SHAFT	OX55X180
3	1	ABB	45 AMP DISCONNECT SWITCH	0T45E3
2	1	MCKINSTRY	17 x 15 SUBPANEL	42/3024
1	1	ROBROY	30 X 24 X 10 ENCLOSURE	N302410HWT

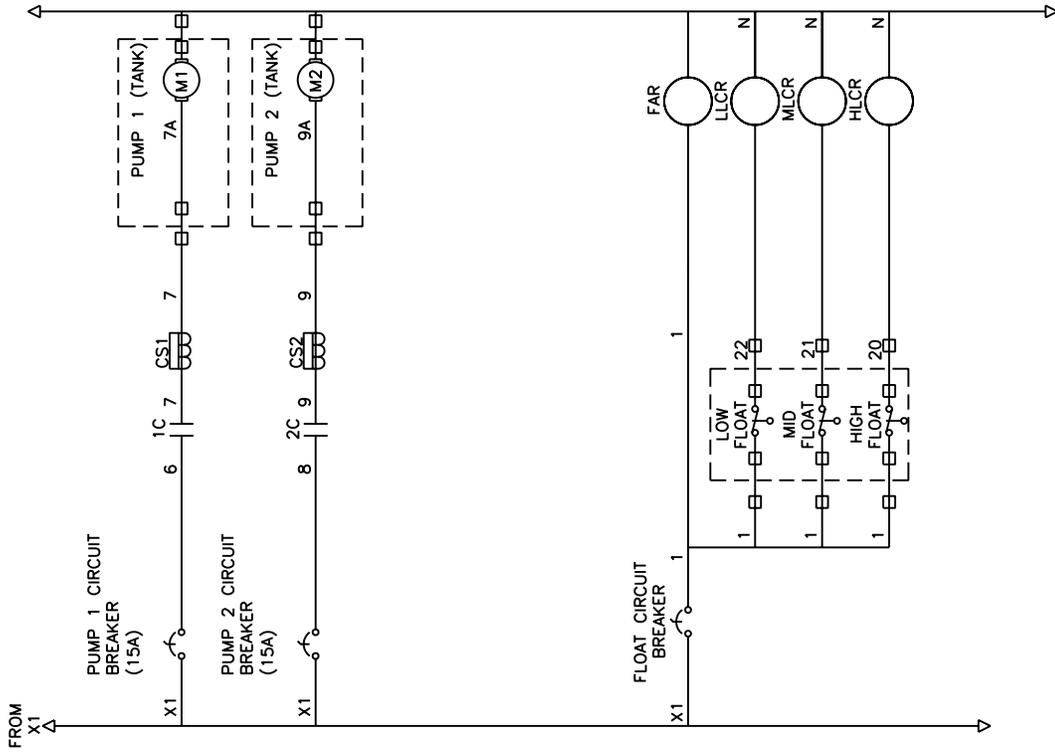
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NOTES:



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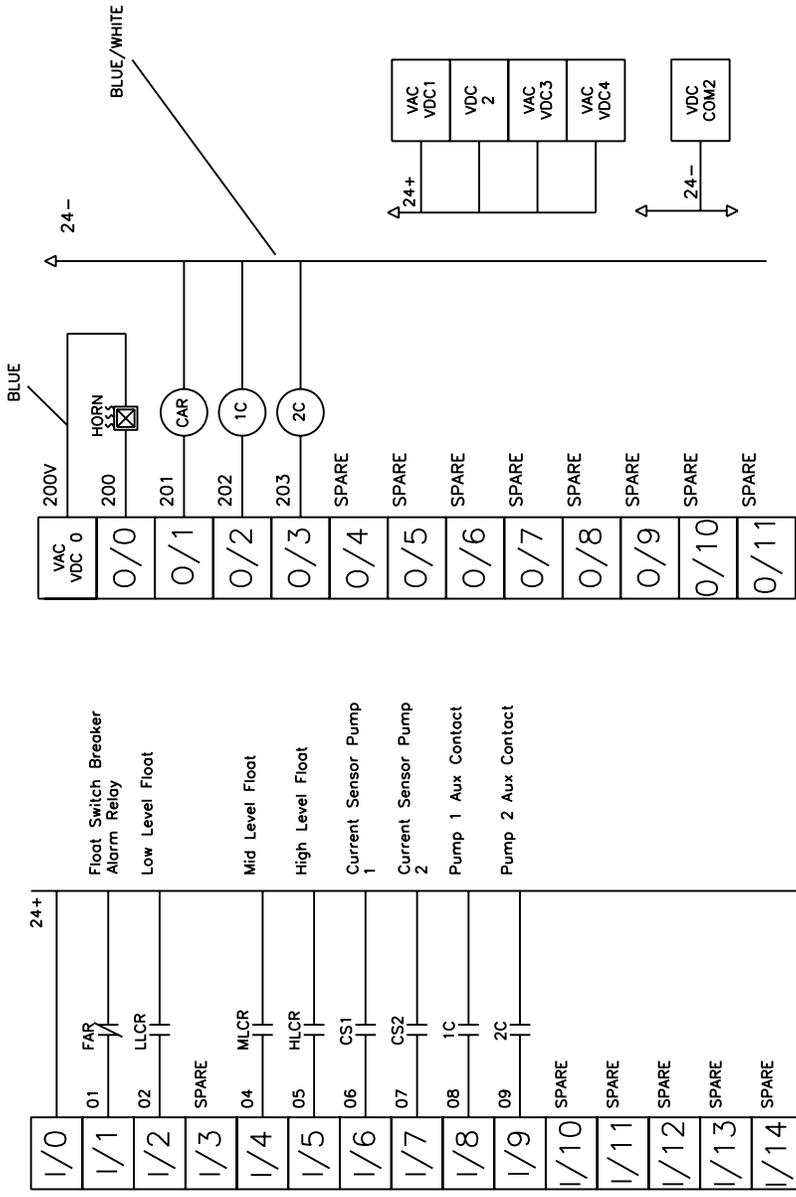
NOTES:



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NOTES:



AB-1764-28BXB  
OUTPUT - BASE UNIT

AB-1764-28BXB  
INPUT - BASE UNIT

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# Aquapoint Control Systems Equalization Programmable Logic Control (PLC) System

## System Description

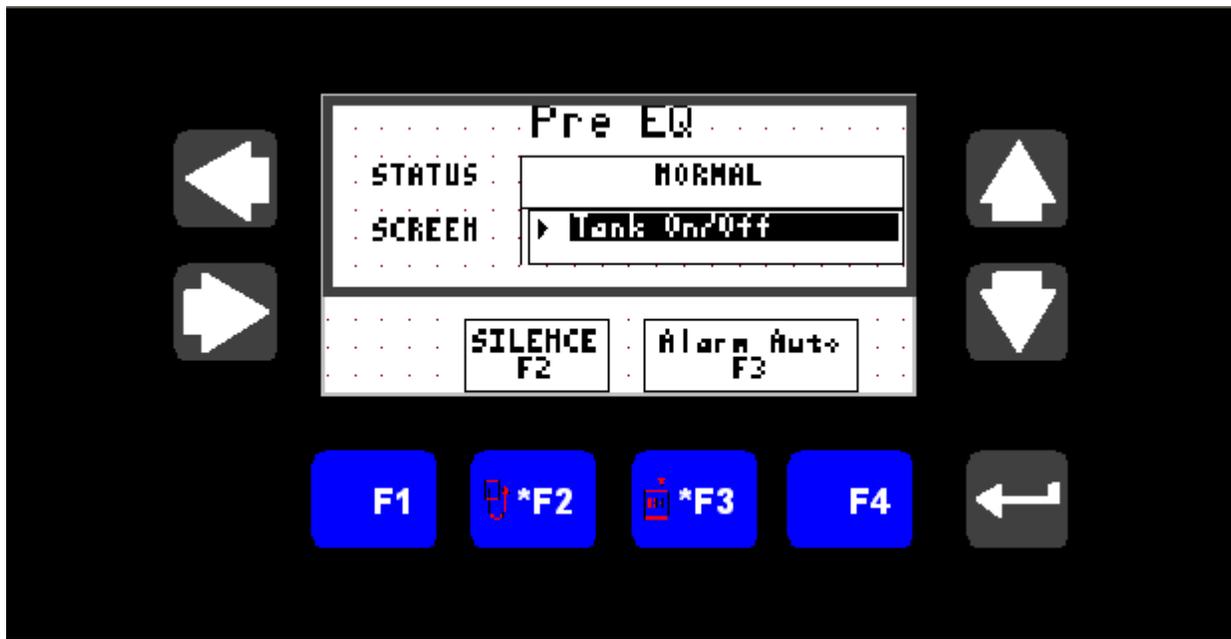
The Equalization Tank PLC System controls the operations of the pumps and alarms in an equalization tank. A MicroLogix 1500 Programmable Logic Controller (PLC) is used to control all system functions if the system includes remote wireless telemetry. Non-telemetry systems use a Micrologix 1200 PLC. A PanelView 500 Human Machine Interface (HMI) is provided to allow access to timer values and to manually control the pump operation. The HMI also provides the operator access to pump cumulative run times, as well as system and alarm status.

## Operating Instructions

Before starting the system, it must be installed according to the installation instructions provided, and by a qualified person.

The system is controlled entirely from the HMI. Upon power up the Main HMI screen will automatically appear.

## Main Screen



The system status indicator will inform the operator whether the system is running normally or not.

Screens to view different system functions are accessed from the main screen. To select a screen, use the UP/DOWN arrow keys until the desired screen appears in the list box, then press the enter key (left pointing arrow at lower right of HMI).

Revision Date 04/24/06

### Main Screen (cont.)

The **F2** key will silence the alarm horn, but will not clear the fault causing the alarm.  
The **F3** key will let the operator switch between the following alarm modes:

**Alarm Auto:** The alarm will sound normally in any alarm condition.

**Alarm Off:** The alarm will not sound, regardless of whether an alarm condition occurs.

**Alarm Test:** The alarm will sound for as long as the alarm is left in the test mode.

Under normal operation the alarm should be set to **Alarm Auto**.

### Tank On/Off Screen



The Tank On/Off Screen allows the operator to turn an equalization tank control on or off. If a tank is **OFF**, all the pumps in that tank will stay off regardless of individual pump settings

and float conditions.

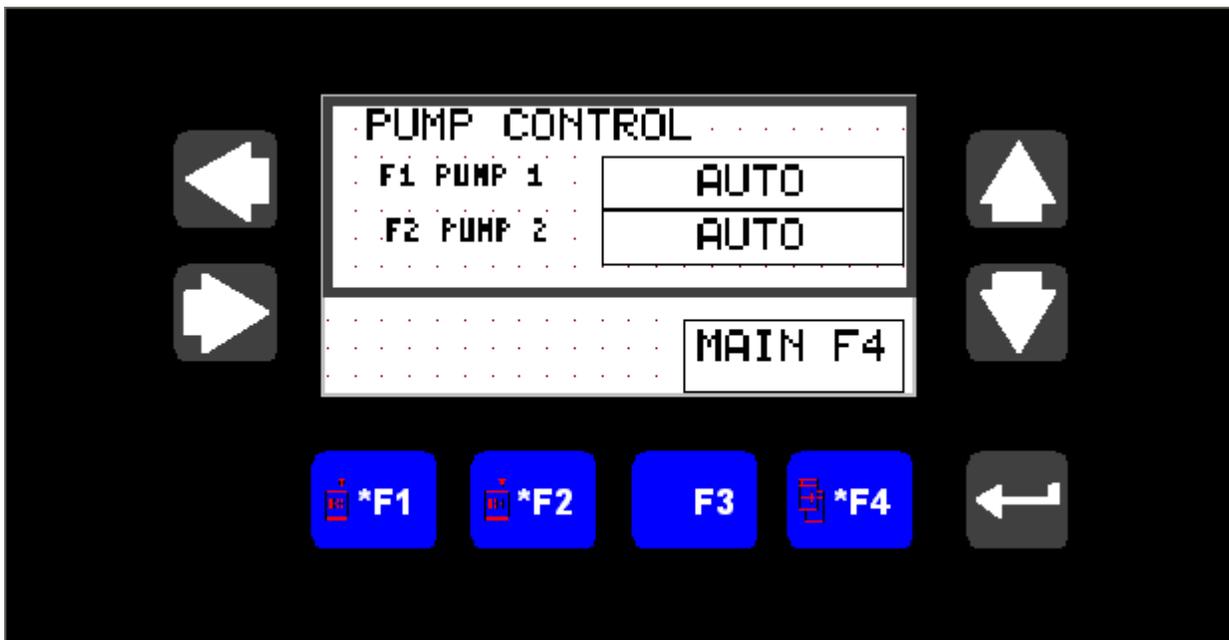
If a tank is **ON**, all the pumps in that tank will operate according to their individual settings and float conditions.

The **F1** key will turn an equalization tank control on or off.

The **F4** key will return the operator to the Main Screen.

Revision Date 04/24/06

## Pump Control Screen



The Pump Control Screen allows the operator to change the operation of the equalization pumps. Each pump may be placed in **AUTO**, **OFF**, or **ON** mode.

In **AUTO** mode the pump will be controlled by the floats and the control system logic using the timer settings made in the TIMER screen.

When placed in **OFF** the pump will be off and unaffected by the control system logic. When placed in **ON**, the pump is on continuously and is unaffected by the control system logic.

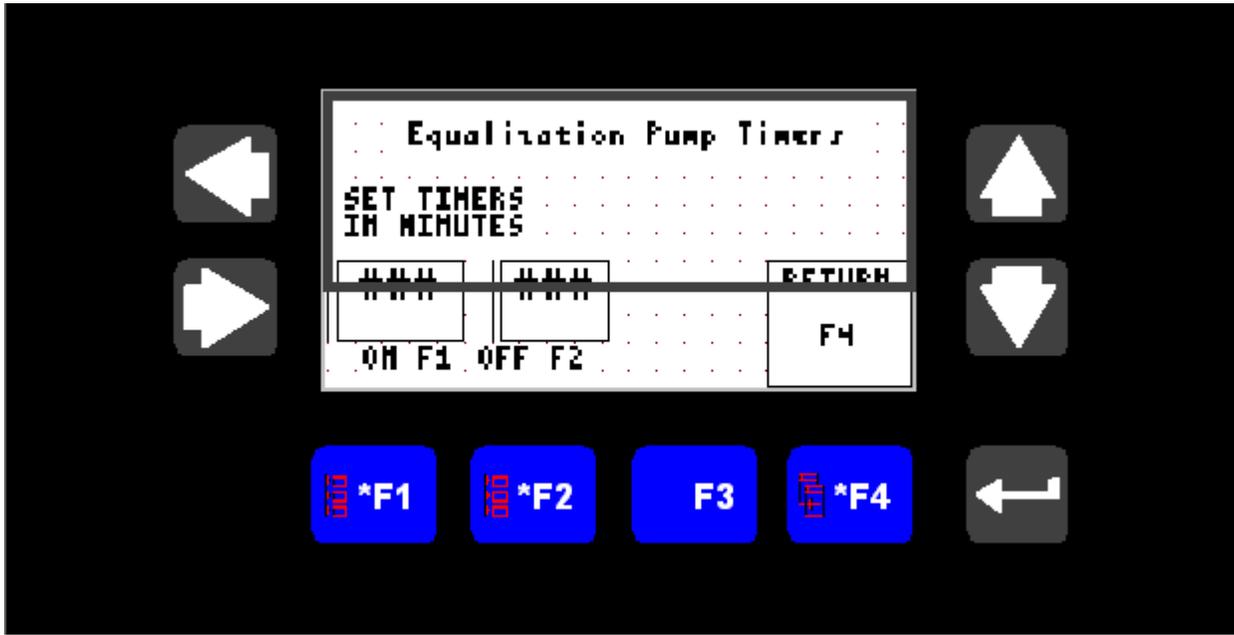
The **F1** key changes Pump #1 from **AUTO**, **OFF** or **ON** mode.

The **F2** key changes the Pump #2 from **AUTO**, **OFF** or **ON** mode.

Note: If a tank is set to **ON** and a pump is set to **OFF**, the alarm may sound to notify the operator all pumps are not set to **AUTO**.

The **F4** key returns to the main screen.

## Pump Timer Screen



The Pump Timer screen allows the operator to adjust the timers for the Equalization pumps.

The **F1** key allows the operator to adjust the pump **ON TIME**. After pressing F1 press enter to set **ON TIME**. Enter an **ON TIME** value by using the up/down arrows. Enter a value between 1 and 999 then press the enter key. Press the F1 key to Escape (ESC).

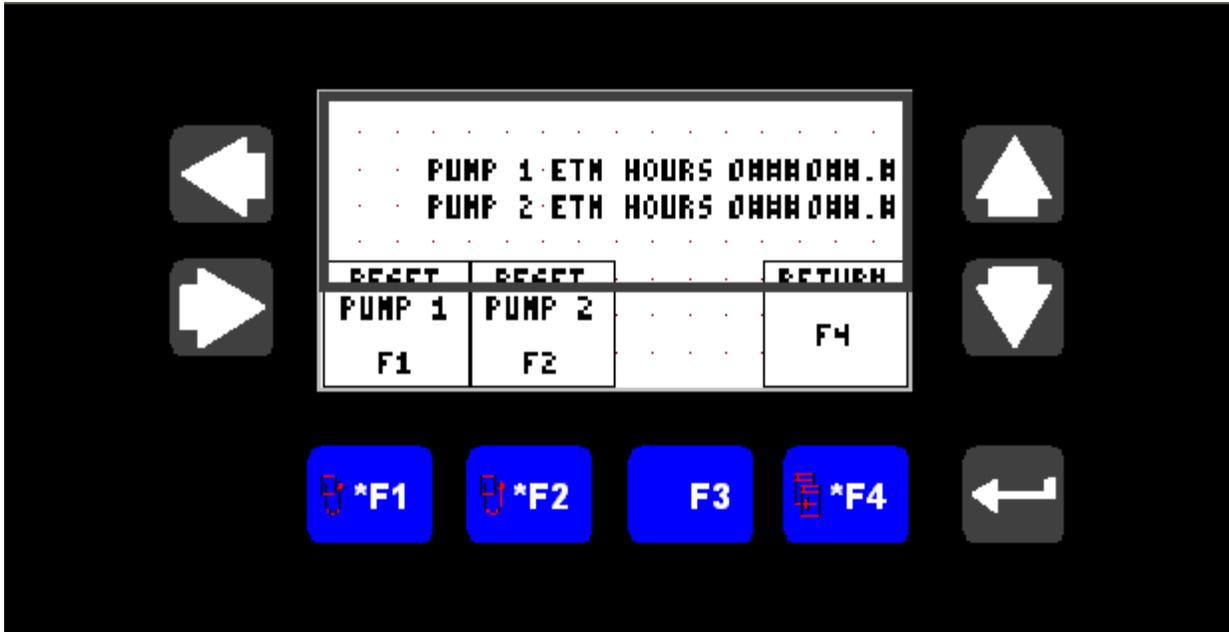
Revision Date: 04/24/06

## Pump Timer Screen (cont.)

The **F2** key allows the operator to adjust the pump **OFF TIME**. After pressing F2 press enter to set the **OFF TIME**. Enter an **OFF TIME** value between 1 and 999 then press the enter key. Press the F1 key to Escape (ESC).

The **F4** key returns to the main screen.

## Elapsed Time Meters (ETMS) Screen



These screens show the cumulative run time (in hours) for each pump.

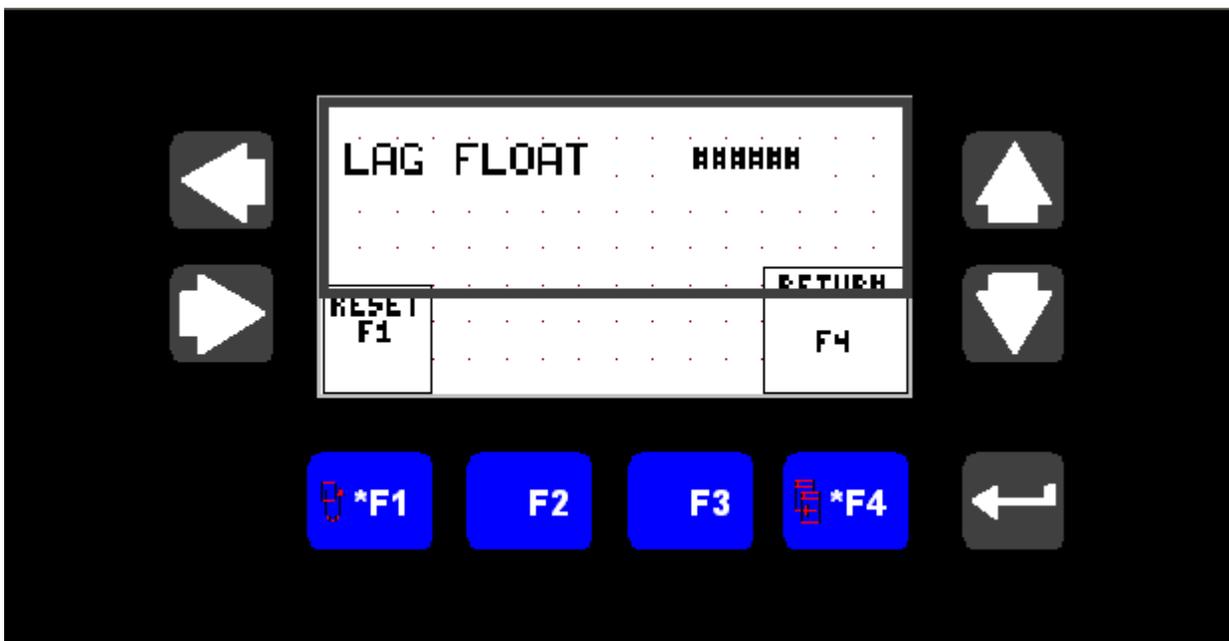
The F1 key resets the Pump 1 ETM

The F2 key resets the Pump 2 ETM

The F4 key returns to the main screen.

If a pump is replaced record ETM readings and reset **ALL** ETMS to zero.

### Lag Float Count Screen



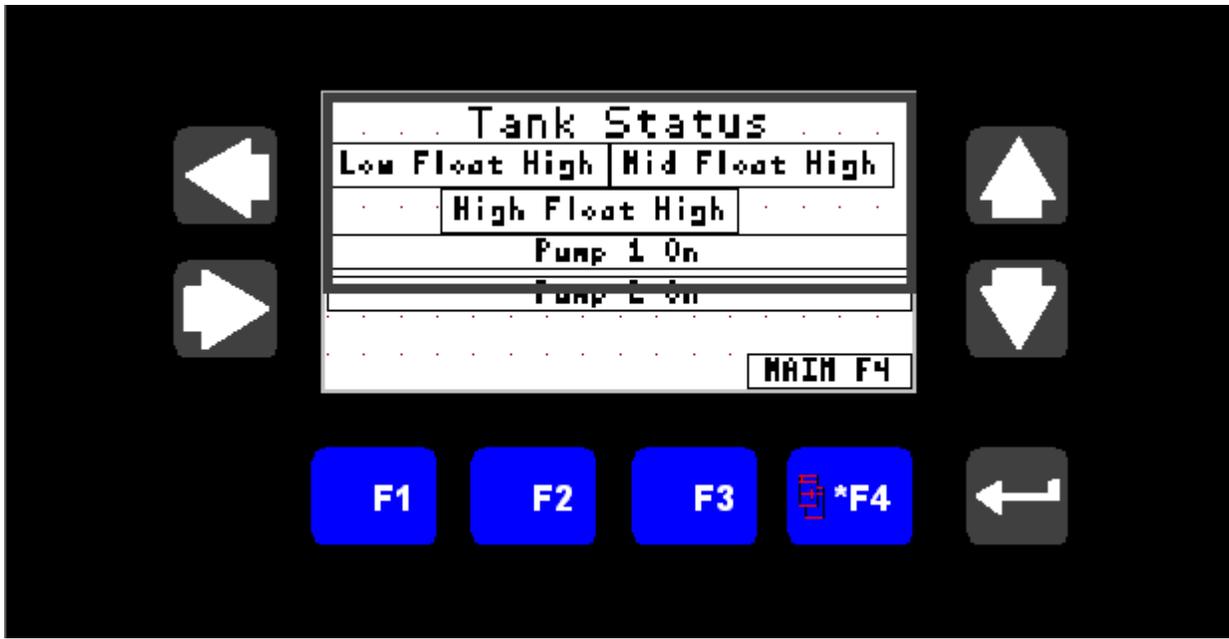
This screen displays the amount of times the water level rose above the lag float.

The **F1** key resets the Lag Float Counter.

The **F4** key returns the operator to the main screen.

Revision Date 04/24/06

### Tank # Status Screen

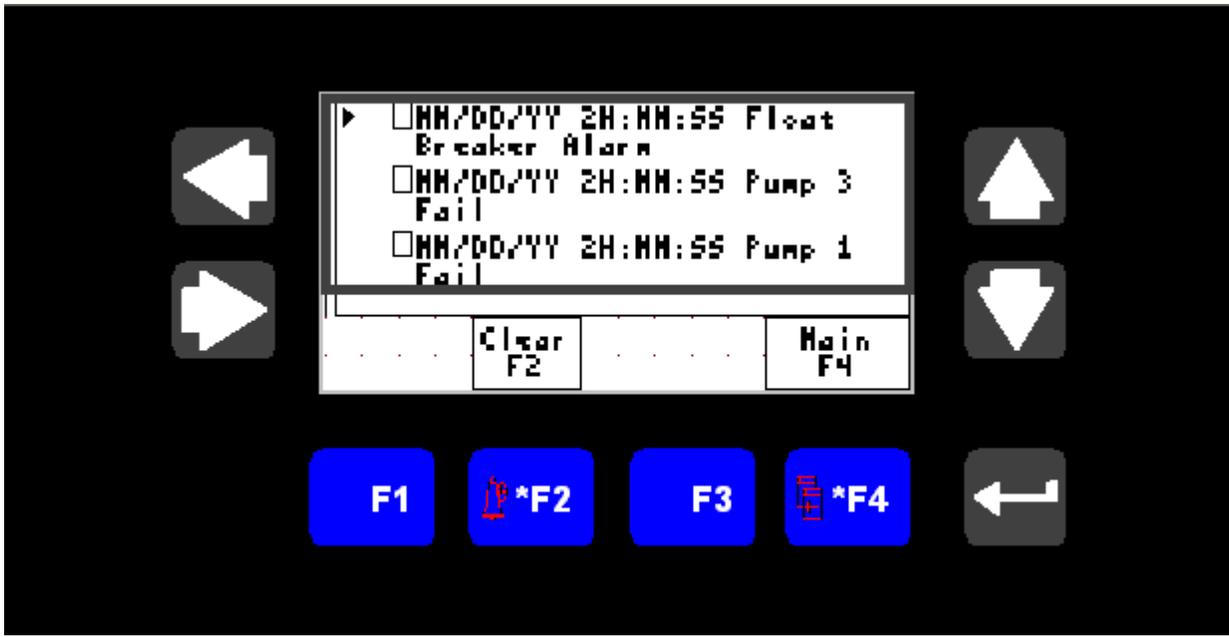


This screen displays the status of the pumps and floats at the present time.

**Note:** These are not records of pump settings but actual present pump conditions. The status of a float is either high or low. High means the float switch is closed and low means the float switch is open.

The **F4** key returns the operator to the main screen.

### Alarm Log



The alarm log is a list of up to the last 40 alarms which occurred, with the time and date they occurred. Use the up and down arrow keys to scroll through the list.

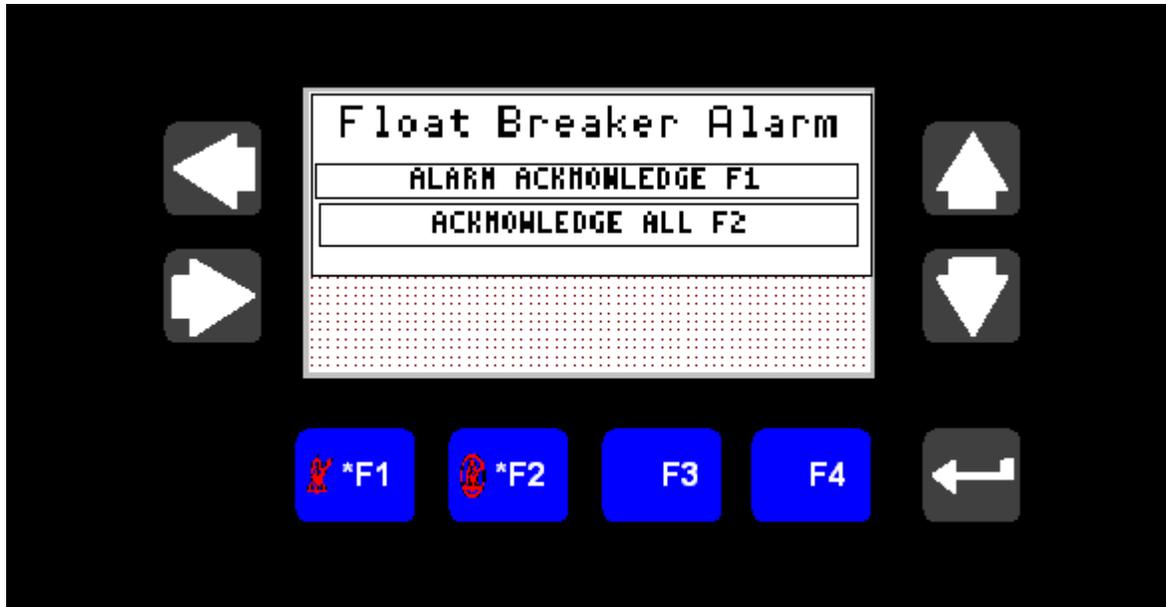
The **F2** key clears the alarm list. (You will be prompted to verify that you want to clear the list, press the **F2** key to confirm, press the **F1** key if you do not want to clear the list.)

The **F4** key returns the operator to the main screen.

(For details regarding each individual alarm see alarm section below.)

Revision Date: 04/24/06

## Alarm Screen



The alarm screen is not a normal screen, and is not selectable from the main menu. It will only appear if an alarm condition occurs.

The alarm screen will show the alarm conditions that have occurred one at a time.

The **F1** key acknowledges the current alarm. The **F1** key **must** be pressed once for each alarm, and for each instance of the same alarm.

The **F2** key acknowledges all alarms, and all instances of the same alarm. (Added 6/07/05)

## **ALARM CONDITIONS/TROUBLESHOOTING:**

### **Caution: Turn off Disconnect Switch, lock out and tag out power, and verify prior to Servicing!**

Float Circuit Breaker Fail: The float switch circuit breaker has tripped.

Solution: Reset float switch circuit breaker. Possible problems consist of the following: faulty float, incorrect wiring, or loose wire connection.

Pump # Fail: Pump # is not running when it should be.

Solution: Determine the cause of failure. Possible problems or failure conditions consist of the following: pump clogged, pump internal thermal switch tripped, faulty current sensor, wire malfunction or loose connection, contactor malfunction, or circuit breaker tripped or failed.

Low Level Alert: The tank level has fallen below the Low Level Float Switch. **This is not an alarm condition!** Depending on the PLC, pumps set to manual may or may not run when the water level in the tank is below the low level float.

High Level Alarm: The tank level has risen above the High Level Float Switch.

Solution: Verify all pumps are working correctly and in **AUTO** mode. Verify all float switches are functioning correctly and represent existing conditions. If all pumps and floats are working correctly then the pump timer **ON** setting might need adjustment.

Revision Date 04/24/06

## ALARM CONDITIONS/TROUBLESHOOTING

NOTE: This is not intended to be an exhaustive list, rather, an aid to solving problems that may occur.

Causes of alarms may be isolated by determining if a breaker has tripped, a fuse has blown, and if any AR contact is opened under power. Below is a list of alarm relays with the components that are effected.

<u>ALARM RELAY</u>	<u>DEVICES AFFECTED</u>	<u>ACTION/REMEDY</u>
AR1*	"POWER ON" light fan in tank F1 C.B.	Check fan for overload/blockage. Replace C.B.
AR2	Dosing pump timer ALT, 1C, 2C	Determine cause of overload. Replace C.B.
AR3	#1 dosing pump, #1 dosing pump light breaker tripped	Check pump, determine cause of overload, reset breaker.
AR4	#2 dosing pump, #2 dosing pump light breaker tripped	Check pump, determine cause of overload, reset breaker.
AR5	Recycle pump, recycle pump light breaker tripped	Check pump, determine cause of overload, reset breaker.
CR1*	#1 dosing pump	Check pump/wiring.
CR2*	#2 dosing pump	Check pump/wiring.
CR3*	Recycle pump	Check pump/wiring.

NOTE:

1. AR1 operate (drop out) when power is interrupted or when fuse/CB is tripped.  
CR1-CR3 operate (drop out) when CSR relays do not sense proper motor load when motor should be running.
2. All pertain to Model 22, 24 and 30 series Bioclere units.
3. \* pertain to Model 36 series Bioclere units only.

## **APPENDIX C**

### **PURCHASERS WARRANTY**

**PURCHASERS WARRANTY**

Re:

Commissioned date:

Aquapoint Inc., a Massachusetts Corporation, warrants to the purchaser that the Bioclere wastewater treatment plant is free from defects in material and workmanship for a period of one (1) year from the date of installation. Date of warranty shall mean the day specified on Installation Report.

Aquapoint Inc. shall fulfill this warranty by repairing or exchanging any component part that in Aquapoint's judgment shows evidence of defect during the warranty period.

This warranty does not cover treatment processes, or Bioclere units which have been flooded by external means, which have been disassembled by unauthorized persons, which have been improperly installed, which have been subjected to external damage or which have not been operated and maintained in accordance with the manufacturers recommended procedures.

This warranty applies only to the Bioclere wastewater treatment plant and does not include any of the building wiring, plumbing, drainage, or disposal systems. Aquapoint Inc. is not responsible for any delay or damages caused by defective components or material, or for loss incurred because of interruption of service, or for any other special or consequential damages or incidental expenses arising from the manufacture, sale or use of this treatment plant.

Aquapoint Inc. reserves the right to revise, change or modify the construction or design of the Bioclere wastewater treatment plant or any component part thereof without incurring any obligation to make such changes or modification in previously sold equipment. Aquapoint Inc. also reserves the right to make replacements of component parts under this warranty, to furnish component parts, which, in its judgment, are equivalent to the component part, replaced.

Under no circumstances will Aquapoint Inc. be responsible for any other direct or consequential damages, including but not limited to lost profits, lost income, labor charges, delays in production and/or idle production, which damages are caused by a defect in material and/or workmanship in parts.

This warranty is expressly in lieu to any other expressed or implied warranty, excluding any warranty of merchantability or fitness, and of any other obligation on the part of Aquapoint Inc.

Please fill out and return no later than ten (10) days after installation to:

**AQUAPOINT**  
**241 Duchaine Blvd.**  
**New Bedford, MA 02745**

**Tel. 508-998-7577 / Fax 508-998-7177**

Signed: \_\_\_\_\_  
Aquapoint Inc. / Date

Signed: \_\_\_\_\_  
Property Owner / Date

## **APPENDIX D**

### **RECOMMENDED SPARE PARTS**

**PLC CONTROL PANELS:**

<b><u>Quantity</u></b>	<b><u>Description</u></b>	<b><u>Part No.</u></b>
One (1)	Contactor 24 VDC Coil	LS07.10NSW
One (1)	Time Delay fuse 1A	MDL1
One (1)	Time Delay fuse 3A	MDL3
One (1)	Time Delay fuse 5A	MDL5
One (1)	3A 1 Pole Circuit Breaker/Control	S201K3
One (1)	30W 24VDC Power Supply	PS5RSC24
One (1)	2 Pole 120V Relay	RH2BULAC120
One (1)	2 Pole 24V Relay	RH2BULDC24V
One (1)	½ A 120V Fan Circuit Breaker	S201K0.5
One (1)	15A 120V Pump Circuit Breaker	S201K15
One (1)	8A Pole 230V Pump Circuit Breaker	S202K8

**Process Equipment Components:**

<b><u>Quantity</u></b>	<b><u>Description</u></b>	<b><u>Part No.</u></b>	<b><u>Reactor</u></b>
One (1)	Pabst Fan	5606S	Bioclere
One (1)	Grundfos 1/2 hp pump (Bioclere Dosing & Recycle)	AP12	Bioclere
One (1)	Barnes pump	SE411	Pre & Post EQ

**APPENDIX E**  
**PUMP CURVES**



# Submersible Dewatering Pump

**SERIES 1DW**

## 1 1/2" Dewatering Pump

### APPLICATIONS

Specifically designed for the following uses:

- Handling dirty waters
- Draining ditches and pits
- Excavating in the building trades
- Water transfer
- Industrial water drainage or transfer

### SPECIFICATIONS

#### Pump:

- Discharge size: 1 1/2" NPT.
- Capacities: up to 110 GPM.
- Total heads: up to 66 feet TDH.
- Max. solids: 3/8" spherical.
- Mechanical seal: Drive lube silicon carbide rotary/silicon carbide stationary, 300 series stainless steel metal parts, BUNA-N elastomers.
- Maximum submergence: 23'.
- Temperature limit: 120°F (50°C) maximum.
- Fasteners: 300 series stainless steel.

#### Motor:

- Single phase: 60 Hz, 3500 RPM, 1/2 HP, 115 and 230 V; 3/4 and 1 HP, 230 V only.
- Three phase: 60 Hz, 3500 RPM, 1/2 to 1 1/2 HP, 230 or 460 V.
- Built-in thermal overload protection with automatic reset on single phase models.

- Three phase: Overload protection must be provided in starter unit with three phase pumps.
- Power cord: 20 feet long. Single phase 115 V and 230 V models are supplied with molded NEMA plugs and built-in capacitors. Three phase models are supplied with bare leads.
- Class F insulation.

### FEATURES

- **Impeller:** AISI 304 SS open impeller.
- **Diffuser Plate:** AISI 304 SS with Polyurethane coating for maximum resistance to abrasion.
- **Casing:** AISI 304 SS.
- **Mechanical Seal:** Drive lube silicon carbide sealing faces, all

metal components of AISI type 300 stainless steel running in protected oil chamber.

■ **Elastomers:** BUNA-N.

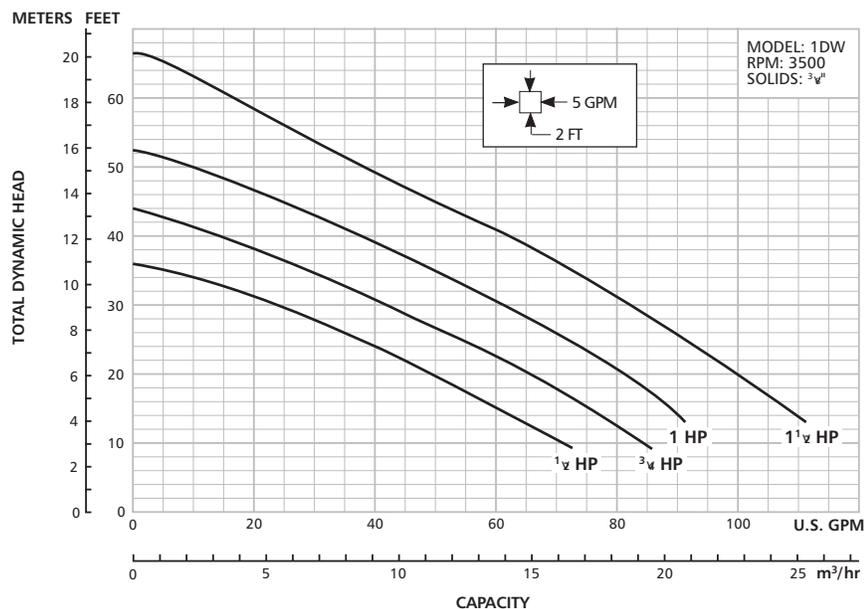
■ **Shaft:** AISI type 304 stainless steel high strength pump shaft with keyed and locking cap screw impeller fastening.

■ **Motor:** Air filled class F insulated design for continuous use.

■ **Designed for Continuous Operation:** Pump ratings are within the motor's working limits and can be operated continuously without damage.

■ **Bearings:** Upper and lower heavy duty ball bearing construction.

Component	Material
Pump body and motor casing	Stainless steel (AISI 304)
Outer sleeve	Stainless steel (AISI 304)
Impeller	Stainless steel (AISI 304)
Motor shaft	Stainless steel (AISI 304)
Suction strainer	Stainless steel (AISI 304)
Front diffuser plate	Stainless steel (AISI 304) coated with polyurethane elastomer
Lower mechanical seal	Silicon carbide/silicon carbide
Upper lip seal	Nitrile rubber
Handle	Stainless steel (AISI 304) coated with polyacetal resin



Goolds Pumps

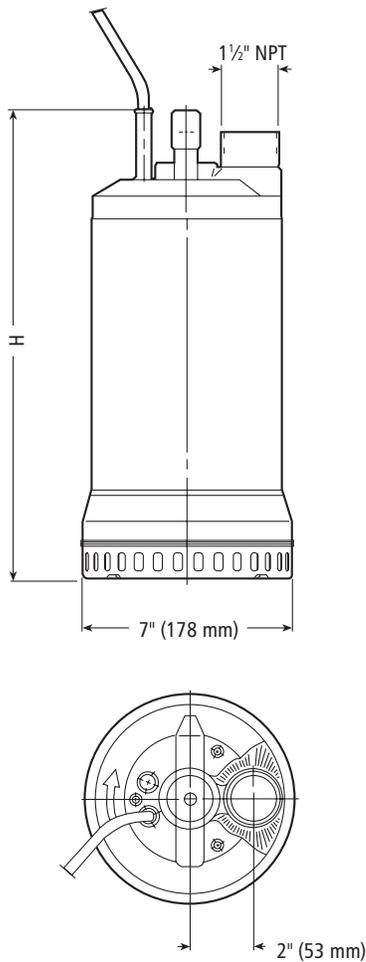


# Submersible Dewatering Pump

**SERIES 1DW**

## 1 1/2" Dewatering Pump

### DIMENSIONS

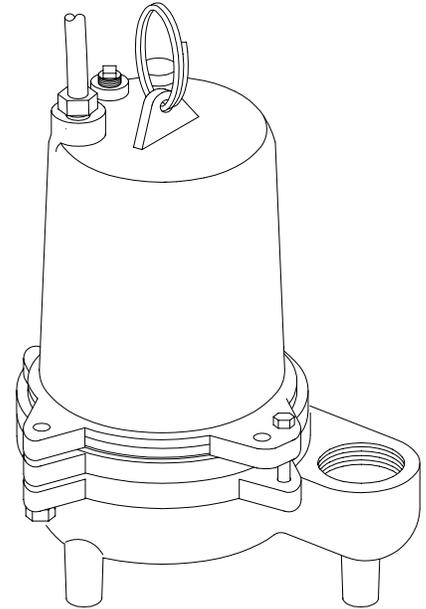


### MECHANICAL DATA

Order No.	HP	Volts	Phase	Max. Amps.	RPM	Weight (lbs.)
1DW51C0EA	1/2	115	1	10.3	3450	29
1DW51C1EA		230		4.5		
1DW51C3EA		3	2.5	27		
1DW51C4EA	1.3					
1DW51D1EA	3/4	230	1	5.7		32
1DW51D3EA			3	3.6		29
1DW51D4EA	1.8					
1DW51E1EA	1	230	1	6.3		38
1DW51E3EA			3	4.0		33
1DW51E4EA		2.0				
1DW51F3EA	1 1/2	230	3	5.6		37
1DW51F4EA				2.7		

Series	HP	Phase	Dimensions in inches (mm)	Discharge Size
			H	
1DW	1/2	1	14 1/8 (363)	1 1/2"
		3	13 5/8 (348)	
	3/4	1	15 1/8 (383)	
		3	14 1/8 (363)	
	1	1	15 7/8 (403)	
		3	15 1/8 (383)	
	1 1/2	3	15 7/8 (403)	

**DISCHARGE** .....2" NPT, Female, Vertical  
**LIQUID TEMPERATURE**  
**SE411** .....77°F (25°C) Continuous  
**SE421** .....104°F (40°C) Continuous  
**VOLUTE** ..... Cast Iron ASTM A-48, Class 30  
**MOTOR HOUSING** ..... Cast Iron ASTM A-48, Class 30  
**SEAL PLATE** ..... Cast Iron ASTM A-48, Class 30  
**IMPELLER:**  
*Design*.....2 Vane, Open with pump out vanes on back  
side, Dynamically Balanced, ISO G6.3  
*Material* ..... Cast Iron ASTM A-48, Class 30  
**SHAFT** .....416 Stainless Steel  
**SQUARE RINGS** .....Buna-N  
**HARDWARE** .....300 Series Stainless Steel  
**PAINT** .....Air Dry Enamel  
**SEAL:** *Design* ..... Single Mechanical, Oil Filled Reservoir,  
Secondary Exclusion Seal  
*Material* ..... Carbon/Ceramic/Buna-N  
Hardware - 300 Series Stainless  
**CORD ENTRY** ..... 15 ft. (5m) Quick Disconnect Cord with plug  
On 115Volt, Pressure Grommet for sealing  
and strain relief  
**SPEED** ..... 1750 RPM (Nominal)  
**UPPER BEARING**.....Single Row, Ball, Oil Lubricated  
*Load*.....Radial  
**LOWER BEARING**.....Single Row, Ball, Oil Lubricated  
*Load*.....Radial & Thrust  
**MOTOR:** *Design* ..... NEMA L Torque Curve, Oil Filled, Squirrel  
Cage Induction  
*Insulation* ..... Class B  
**SINGLE PHASE**.....Permanent Split Capacitor (PSC)  
Includes Overload Protection in Motor  
**LEVEL CONTROL** ..... "A" - Wide Angle, PVC, Mechanical, 15 ft (5m)  
cord with Piggy-Back Plug, N/O  
"AU"- Wide Angle, Polypropylene,  
Mechanical, N/O, Integral to pump.  
ON and OFF Points are adjustable  
"VF" - Vertical Float, PVC, Snap Action,  
15 ft (5m) cord, with Piggy-Back plug.  
OFF point ONLY is adjustable  
**OPTIONAL EQUIPMENT** .....Seal Material, Additional Cord



**Series: SE (SE411 & SE421)**  
**.4HP, 1750RPM, 60Hz**



Sample Specifications: [Section 1 Page 3.](#)

**DESCRIPTION:**

SUBMERSIBLE NON-CLOG SEWAGE PUMP  
DESIGNED FOR TYPICAL RAW SEWAGE  
APPLICATIONS

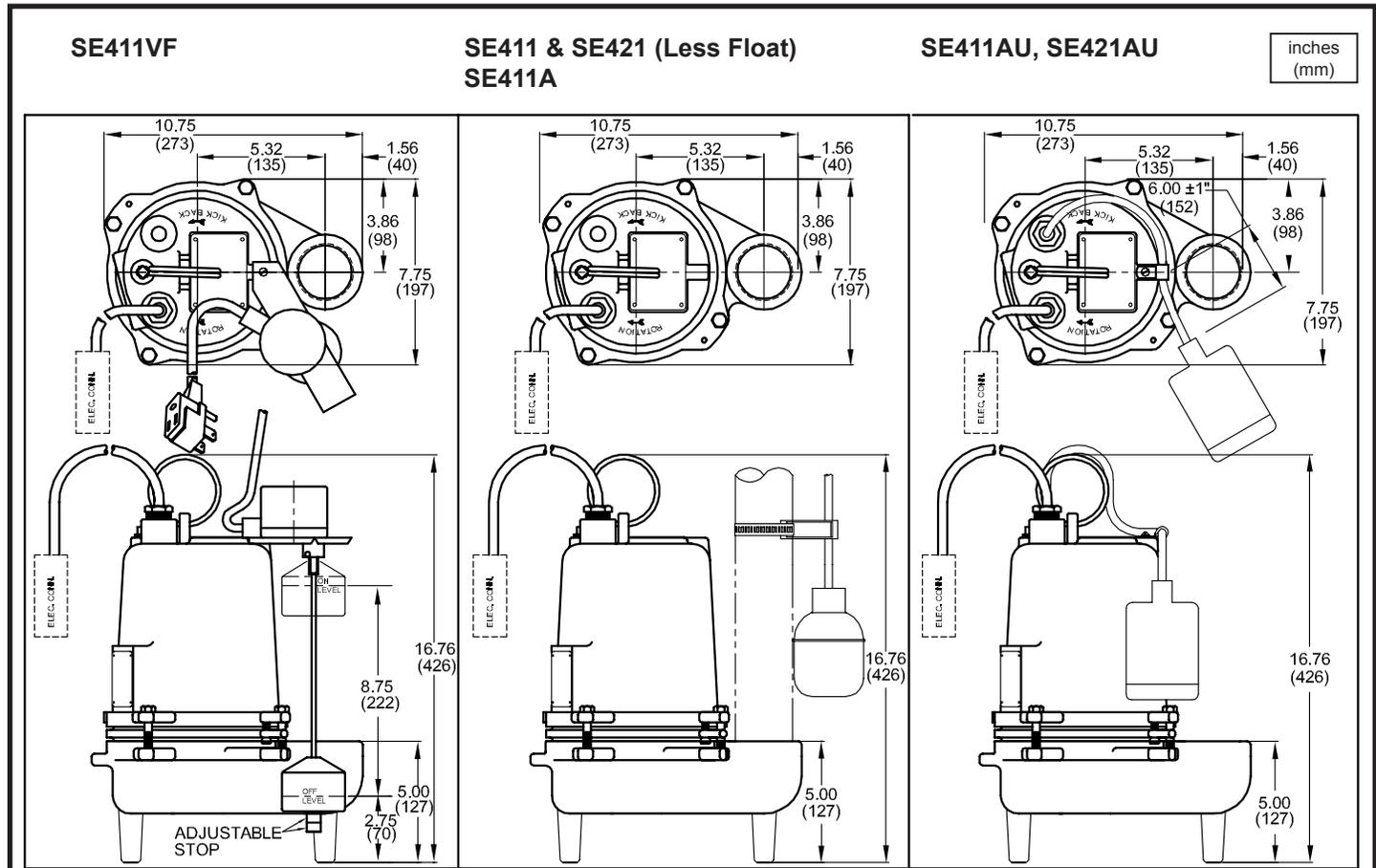
# Series SE

2" Spherical Solids Handling  
Manual & Automatic

# BARNES®

www.cranepumps.com

**1½", 2" & 3" Discharge**



MODEL NO	PART NO	HP	VOLT/PH	Hz	RPM (Nom)	NEMA START CODE	FULL LOAD AMPS	LOCKED ROTOR AMPS	CORD SIZE	CORD TYPE	CORD O.D inch (mm)
SE411	096747	0.4	115/1	60	1750	C	12.0	19.0	14/3	SJTOW	0.375 (9.5)
SE411A	096748	0.4	115/1	60	1750	C	12.0	19.0	14/3	SJTOW	0.375 (9.5)
SE411AU	096749	0.4	115/1	60	1750	C	12.0	19.0	14/3	SJTOW	0.375 (9.5)
SE411VF	100836	0.4	115/1	60	1750	C	12.0	19.0	14/3	SJTOW	0.375 (9.5)
SE421	096750	0.4	230/1	60	1750	C	6.2	13.0	14/3	SJTOW	0.375 (9.5)
SE421AU	096751	0.4	230/1	60	1750	C	6.2	13.0	14/3	SJTOW	0.375 (9.5)

Mechanical Switch on SE-A, cord 16/2, SJOW, Piggy-Back Plug  
 Mechanical Switch on SE-AU, cord 14/2, SJOW, 0.370 (9.4mm) O.D.  
 Vertical Switch on SE-VF, cord 16/2, SJOW, 0.320 (8.1mm) O.D. Piggy-Back Plug

**IMPORTANT !**

- 1.) PUMP MAY BE OPERATED "DRY" FOR EXTENDED PERIODS WITHOUT DAMAGE TO MOTOR AND/OR SEALS.
- 2.) THIS PUMP IS APPROPRIATE FOR THOSE APPLICATIONS SPECIFIED AS CLASS I DIVISION II HAZARDOUS LOCATIONS.
- 3.) THIS PUMP IS NOT APPROPRIATE FOR THOSE APPLICATIONS SPECIFIED AS CLASS I DIVISION I HAZARDOUS LOCATIONS.
- 4.) INSTALLATIONS SUCH AS DECORATIVE FOUNTAINS OR WATER FEATURES PROVIDED FOR VISUAL ENJOYMENT MUST BE INSTALLED IN ACCORDANCE WITH THE NATIONAL ELECTRIC CODE ANSI/NFPA 70 AND/OR THE AUTHORITY HAVING JURISDICTION. THIS PUMP IS NOT INTENDED FOR USE IN SWIMMING POOLS, RECREATIONAL WATER PARKS, OR INSTALLATIONS IN WHICH HUMAN CONTACT WITH PUMPED MEDIA IS A COMMON OCCURRENCE.

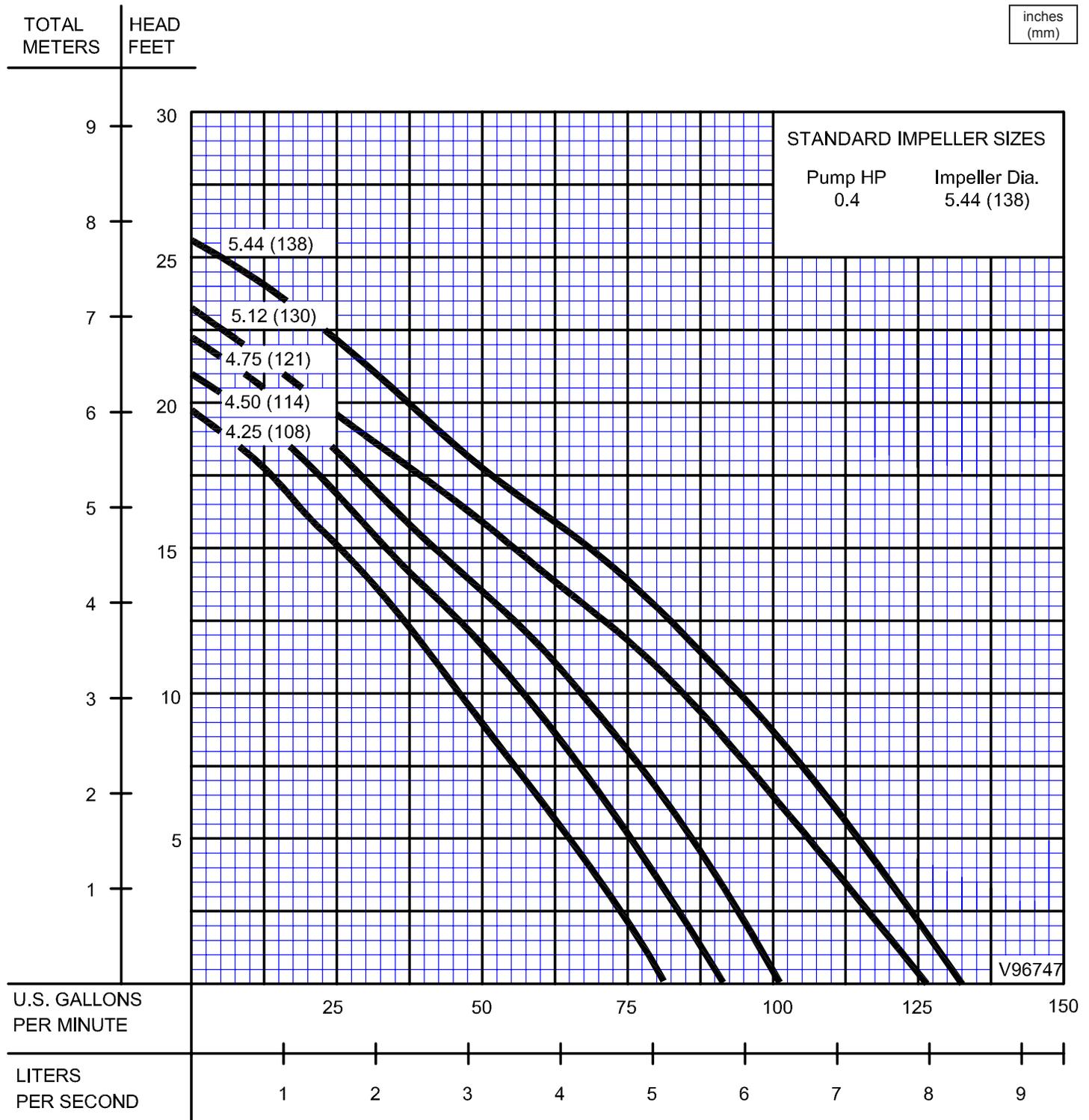
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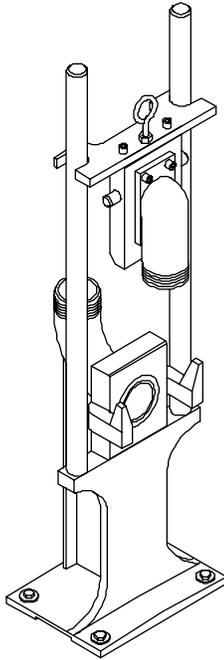


Testing is performed with water, specific gravity 1.0 @ 68° F @ (20°C), other fluids may vary performance

# BARNES<sup>®</sup> 1.25" - 3" BREAK AWAY FITTING

With or Without Check Valve.

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## Models: Without Check Valve

**BAFEZ-1.25x2\***  
**BAFEZ-2x2**  
**BAFEZ-2x3**  
**BAFEZ-3x3**

## Models: With Check Valve

**BAFEZCV-1.25x2**  
**BAFEZCV-2x2**

## Description:

THE BREAK AWAY FITTING IS DESIGNED TO ALLOW THE SUBMERSIBLE PUMP TO BE INSTALLED OR REMOVED WITHOUT REQUIRING PERSONNEL TO ENTER THE WET WELL.

## Specifications:

Each BAFEZ break away fitting consists of a cast iron base elbow which is bolted to the floor of the wet well, lower guide rail supports, cast iron movable elbow (the BAFEZCV's include ball check valve and clean-out cap), which is free to ride up and down the guide rails, A sealing plate with o-ring seat and galvanized guide plate, and a stainless steel upper rail support.

The guide rails (supplied separately) are attached to the base elbow at one end and to a stainless steel Upper Rail support, which is attached to the underside of the wet well cover at the other end. The guide rails serve only to guide, they carry none of the pump weight. 3/4" (19mm) schedule 40 pipe should be used for guide rails.

An optional intermediate guide pipe bracket should be used for depths of 13 feet (4M) or more. See page 31.

The BAFEZ's 1.25" and 2" are for pumps up to 200lbs. which do not generate in excess of 150 ft. of Head.

The BAFEZCV's (with Check Valve), 1.25" and 2" are for pumps up to 200lbs and are recommended for a velocity of 3 Ft. to 5 Ft. per sec. max.

The BAFEZ 3" is for pumps up to 200lbs which do not generate in excess of 150ft. of Head.

Quantity of One (1) each for Simplex and Two (2) for Duplex. Assemblies **DO NOT** include Pump, Discharge piping, Guide Rails, Lifting Chain, nor Gate Valve with Handle.

\* The 1.25 x 2 is supplied with an ultra close adapter. Can be used with Basin Cover 101186 in Section C

**CRANE**<sup>®</sup>

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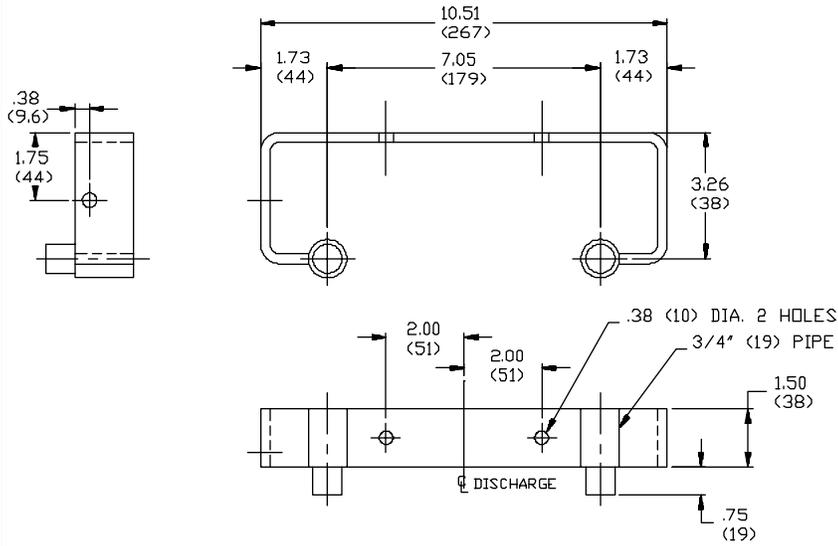
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83 West Drive  
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 Fax: (905) 457-2650

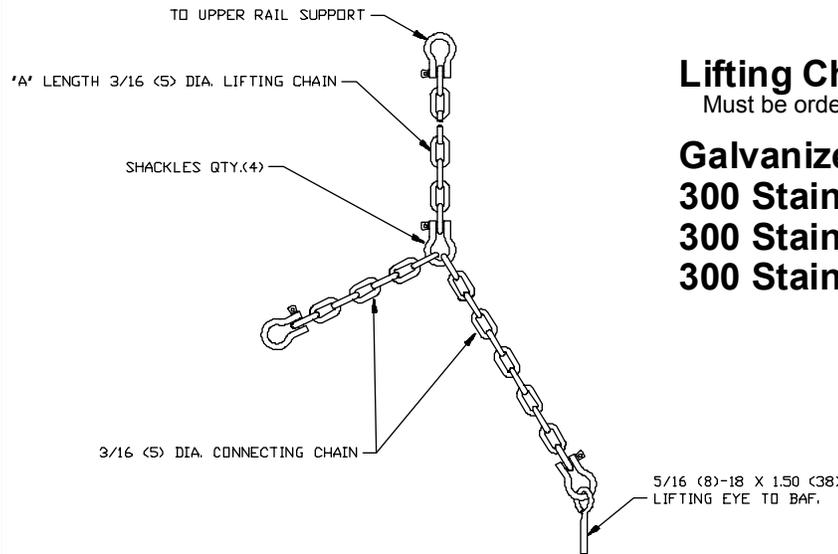
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# 1.25" - 3" BREAK AWAY FITTING Upper Guide Bracket & Lifting Chain.

inches  
(mm)



**Stainless Steel Upper Rail Support, for BAFEZ's (Supplied with BAFEZ's)**



**Lifting Chain Assembly:**  
Must be ordered separately.

- Galvanized Steel 10' (3M) P/N: 100564**
- 300 Stainless 10' (3M) P/N: 100563**
- 300 Stainless 15' (4.6M) P/N: 101312**
- 300 Stainless 20' (6.1M) P/N: 101313**



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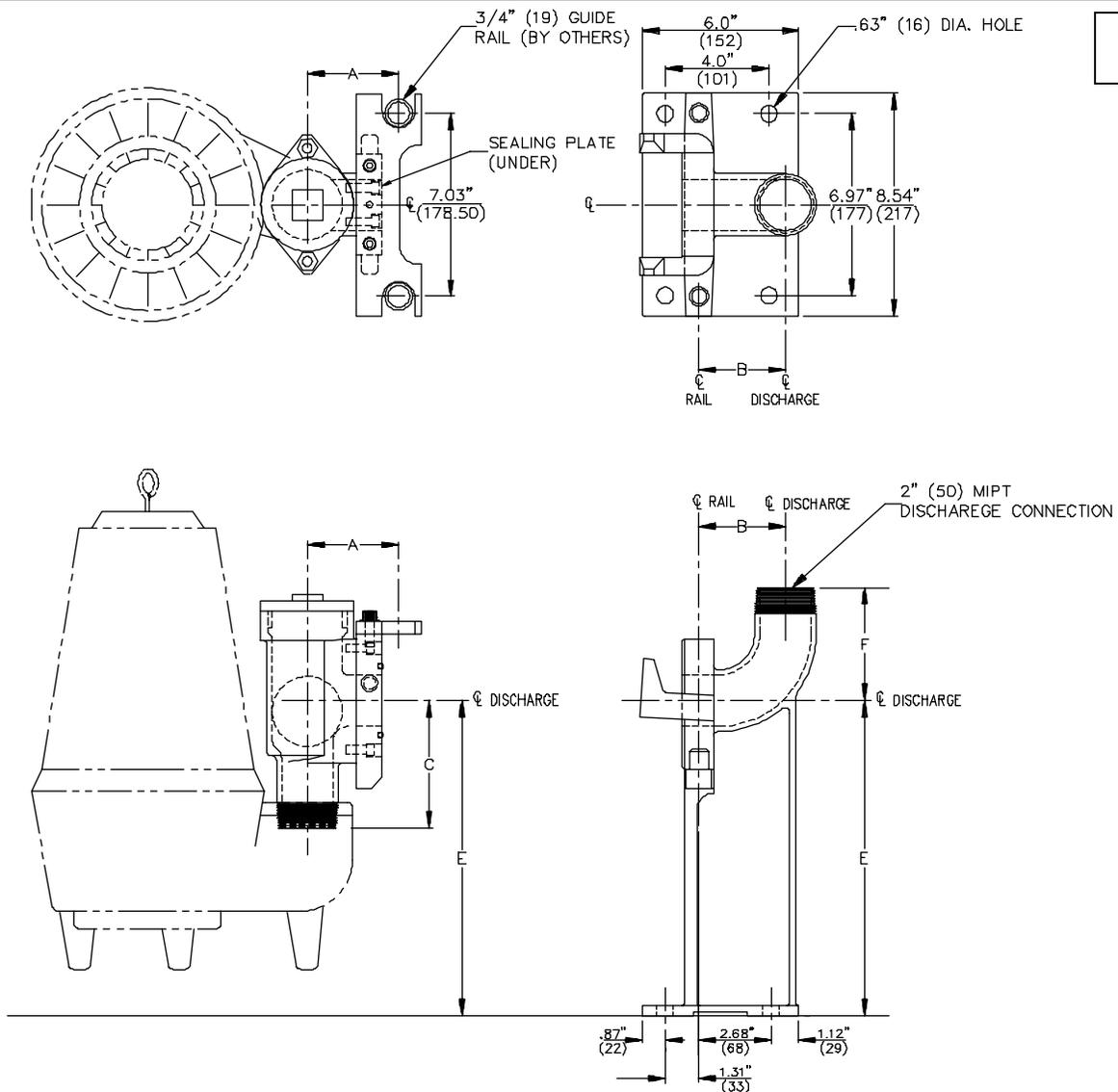
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# 1.25" & 2" BREAK AWAY FITTING With Check Valve, Recommend 3' to 5' per sec. max

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MODEL NO.	PART NO.	PUMP x BAF Disch. x Disch.	A	B	C	D	E	F
BAFEZCV-1.25x2*	114035	1.25" x 2"	3.27 (83)	3.31 (84)	4.69 (119)	7.40 (188)	12.07 (307)	4.33 (110)
BAFEZCV-2x2	114036	2" x 2"	3.50 (89)	3.31 (84)	4.87 (124)	7.20 (183)	12.07 (307)	4.33 (110)

\* **CAN NOT** be used with old generation 2HP SGV Grinder pumps part numbers 105234 thru 105239  
See page 39 for OPTIONAL Intermediate Supports.  
**NOTE:** Lifting Chain Sold Separately.



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