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POTOMAC ROCK ESTATES

Berkeley County, West Virginia

Operation and Maintenance Manual

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I. INTRODUCTION

A. GENERAL

The following operation and maintenance manual is for the wastewater treatment plant that serves the Potomac Rock Estates subdivision in Berkeley County, West Virginia.

The treatment plant was designed to ultimately serve 35 single family homes at 280 gpd/home for a total flow rate of 9,800 gpd. However, the current system installed will only serve approximately 23 single family homes, or 6,600 gpd. There are plans for a second phase to install additional treatment units to increase the capacity to 9,800 gpd, if needed.

The construction of the wastewater treatment plant was completed in February 2017 and operates in accordance with a West Virginia Department of Environmental Protection (WVDEP) Pollution Discharge Elimination System Permit (WVPDES Permit No. WV0103110).

B. PURPOSE

The purpose of this manual is to provide guidelines, procedures, and objectives to assist the operator in operating the wastewater treatment at peak efficiency.

C. SCOPE

This manual contains general information on the plant and its components, and information on the operation of the treatment works, operational and water

quality testing, test procedures, personnel responsibilities, records and reports, maintenance, and safety/emergency assistance.

D. DEFINITIONS AND TERMINOLOGY

Activated Sludge - Sludge particles produced in raw or settled wastewater (primary effluent) by the growth of organisms in aeration tanks in the presence of dissolved oxygen. The term "activated" comes from the fact that the particles have bacteria, fungi, and protozoa, which digest organic matter in the wastewater.

Aerobic Bacteria - Bacteria which live and reproduce only in an environment containing "free" oxygen which is available for their respiration (breathing), such as atmospheric oxygen or oxygen dissolved in water. Oxygen combined chemically, such as in water molecules, H_2O, cannot be used for respiration by aerobic bacteria.

Bacteria - Bacteria are living organisms, microscopic in size, which consist of a single cell. Most bacteria utilize organic matter for their food and produce waste products as a result of their life processes.

Biochemical Oxygen Demand (BOD) - A standard test used in assessing wastewater strength. Also, the quantity of oxygen used in the biochemical oxidation of oxygen matter in a specified time, at a specified temperature, and under specified conditions.

Department – West Virginia Department of Environmental Protection (WVDEP).

pH - An expression of the intensity of the alkaline or acidic strength of a water. Mathematically, pH is the negative logarithm (base 10) of the reciprocal of the hydrogen ion concentration: $pH = -\log_{10} [H+]$ The pH may range from 0 to 14, where 0 is the most acidic and 14 the most alkaline. Neutral waters usually have a pH between 6.5 and 8.5.

Septic - A condition produced by the growth of anaerobic organisms in a low or no dissolved oxygen environment. If severe, the wastewater turns black, giving off foul odors and creating a heavy oxygen demand.

Suspended Solids - (1) Solids that either float on the surface of, or are in suspension in water, wastewater, or other liquids, and which are largely removable by laboratory filtering. Suspended matter - (2) The quantity of material removed from wastewater in a laboratory test, as prescribed in "Standard Methods for the Examination of Water and Wastewater" and referred to as non-filterable residue.

E. PROCESS DESCRIPTION

The wastewater is collected by a grinder pump located at each single-family home. The grinder pumps discharge to a low pressure forcemain collection system that transfers wastewater to an influent manhole immediately preceding the treatment plant. Prior to treatment, the wastewater enters a 10,000-gallon septic tank for settling. From there, the wastewater flows by gravity to a 6,500-gallon equalization tank, where the flow is equalized to provide a constant daily flow to the treatment units. From the equalization tank, the wastewater is distributed equally between two (2) 4.5 MicroFAST treatment units. After treatment, effluent flows by gravity into a 550-gallon recirculation tank with

pump, and then through an ultraviolet disinfection system prior to being discharged to the Potomac River.

F. PERMIT REQUIREMENTS

1. The wastewater treated by the wastewater treatment system is non-hazardous, domestic wastewater and it is discharged to the Potomac River according to requirements listed in the Certificate to Operate and the West Virginia Department of Environmental Protection (WVDEP) Pollution Discharge Elimination System Permit (WVPDES Permit No. WV0103110).

2. Any spills of raw or inadequately treated sewage must be immediately reported to the WVDEP at (800) 642-3074, the West Virginia Department of Health & Human Resources (DHHR) at (304) 558-0684, and the Berkeley County Health Department at (304) 263-5131. An example of an emergency spill response form is shown below on page I-6.

3. Please see Section V of this manual for more information regarding permit expiration, upgrading, renewal, legal penalties, operator requirements, etc.

See Discharge Permit and the Certificate to Operate provided in Appendix A.

Figure 1: Hydraulic Profile and Treatment System Layout

EMERGENCY SPILL RESPONSE FORM

Name of Facility: _____

Name of Operator: _____

Date of Spill: _____

Approximate Volume (Gallons) of Spill: _____

Reason for Spill: _____

_____

_____

_____

_____

_____

Actions Taken to Clean Up Spill: _____

_____

_____

_____

_____

Agencies Contacted: _____

_____

_____

_____

II. TREATMENT SYSTEM COMPONENT DESCRIPTION

A. SEPTIC/SETTLING TANK

A 10,000-gallon pre-cast concrete septic tank is provided for settling. The tank is provided with a 6" thick baffle wall equipped with 6" diameter holes approximately 8'-9" off the bottom of the tank.

B. FLOW EQUALIZATION TANK

After settling, the wastewater flows by gravity into the 6,500-gallon pre-cast concrete equalization tank.

The equalization tank is provided with two equalization pumps to transfer the wastewater to the treatment units. The pumps are sized to handle the wastewater flow plus the recirculated flow of one tenth to one half of the wastewater flow. Each pump is rated for 64 gpm @ 15' TDH.

Each pump is a Zoeller Model 137 submersible effluent pump equipped with a ½ hp, 230V, single phase motor. The starting and stopping of the equalization pumps is controlled by float switches in the equalization and the Equalization Pump Control Panel.

C. INFLUENT FLOW METER AND DISTRIBUTION BOX

From the equalization tank, the wastewater is pumped through a 2" forcemain, a flow meter, and then to a distribution box.

The flow meter is a 1" Carlon Meter Co. "Car-Logger" model FL100 (B or D).

After the flowmeter, the wastewater discharges to a distribution box that evenly splits the flow between two (2) FAST treatment units. From the distribution box, the wastewater flows to the treatment units via 6" gravity lines.

D. WASTEWATER TREATMENT UNIT

The Fixed Activated Sludge Treatment (FAST) system consists of two (2) treatment units, each with their own air blower. Each treatment unit is suspended in a concrete tank and is comprised of honeycomb media onto which the biomass grow. The attached growth system assures that more organisms remain inside the system instead of being flushed out, even during times of peak hydraulic flows. During times of low usage, the large volumes of thriving organisms prevent a dying-off of the system, making FAST equally well suited to intermittent use applications. The air blower provides continuous air to the treatment tank, and assures that the air is mixed with the wastewater to enhance the biological process.

Each treatment unit consists of a MicroFAST 4.5 unit, which has a capacity of approximately 3,300 gpd of wastewater at the treatment level required to meet the permitted discharge limits. The treatment unit is inside a 5,000-gallon pre-cast concrete tank. The blower has a capacity range of 90-140 cfm.

E. RECIRCULATION TANK

The effluent from the FAST treatment units flows by gravity into the 550-gallon pre-cast concrete recirculation tank.

The recirculation tank is provided with one recirculation pump to transfer the treated effluent to either the influent manhole or to the flow equalization tank. The recirculation line is 2 inches. Prior to the line being split between the manhole and flow equalization tank, there is a flowmeter that monitors the recirculation rate. The flowmeter is a ¾" Master Meter positive displacement meter.

The pump is sized to handle one tenth to one half of the wastewater flow. Therefore, each pump is rated for 64 gpm @ 15' TDH.

The pump is a Zoeller Model 137 submersible effluent pump equipped with a ½ hp, 230V, single phase motor. The starting and stopping of the pump is controlled by float switches in the recirculation tank and the Recirculation Pump Control Panel.

F. ULTRAVIOLET (UV) DISINFECTION SYSTEM

Four (4) Salcor model 3G Ultraviolet disinfection units are mounted in a manifold system designed to ultimately hold six units and provide disinfection of the treated wastewater prior to discharge to the Potomac River. Each unit has the capacity of 6 gpm.

G. CONTROL AND ALARM SYSTEM

1. Equalization Pump Control Panel

The Equalization Pump Control Panel is a duplex timed dosing controller, model DEPRAB124-AJLP(C)R, manufactured by American Manufacturing Company, Inc.

The pumps are controlled by a series of three (3) float switches and timers. Once the water reaches the "pump on" level and sufficient time has elapsed, the lead pump will go through one cycle and pump until the timer runs out or until the water level drips to the pump off elevation. The two pumps shall alternate. A high-water alarm level float switch is provided to indicated critical water levels in the tank. The float will activate a locale audible and visual alarm.

2. Recirculation Pump Control Panel

The Recirculation Pump Control Panel is a simplex timed dosing controller, model SEPRAB124-AJLRX(PW), manufactured by American Manufacturing Company, Inc.

The pump is controlled by a series of three (3) float switches and timers. Once the water reaches the "pump on" level and sufficient time has elapsed, the lead pump will go through one cycle and pump until the timer runs out or until the water level drips to the pump off elevation. The two pumps shall alternate. A high-water alarm level float switch is provided to indicated critical water levels in the tank. The float will activate a local audible and visual alarm.

3. FAST Blower Control Panel

The blower control panel shall be equipped with a local alarm light and horn to indicate blower failure. A manual silence switch is included. Remote alarm contacts are provided to send an alarm signal to the Alarm Control Panel.

A relay is also included in the panel to monitor incoming power. Upon power failure or under voltage, the relay will send an alarm to the Alarm Control Panel.

4. UV Control Panel

Each unit is controlled by a manual on-off switch and is provided with an individual control system with alarm. A central alarm panel to signal UV unit or power failure is also provided and located above grade at the UV units.

H. GRINDER PUMPS

The collection system consists of an E-One grinder pump unit located at each single-family home. The grinder pumps discharge to a 2 inch PVC low pressure forcemain to transport the wastewater to the wastewater treatment plant.

III. OPERATION OF TREATMENT SYSTEM

A. GENERAL

It is important that the operator refer to Section I-B: Definitions and Terminology prior to reading this section.

B. WASTEWATER CHARACTERISTICS

For design purposes, the following wastewater influent characteristics were assumed:

	INFLUENT
BOD	240 mg/l
TSS	240 mg/l
TKN	50 mg/l
Water Temperature	Min. 10 degrees C, Max. 26 degrees C
Air Temperature	Min. -20 degrees C, Max 38 degrees C

The treatment plant was designed to ultimately serve 35 single family homes at 280 gpd/home for a total flow rate of 9,800 gpd. However, the current system installed will only serve approximately 23 single family homes, or 6,600 gpd. There are plans for a second phase to install additional treatment units to increase the capacity to 9,800 gpd, if needed.

C. FAST START-UP PROCEDURES

The start-up procedure is as follows:

1. Turn on blower and observe operation of the airlift. A robust splash should occur.
2. Check for proper water level over the media. The normal water line should be approximately 2 inches over the media.
3. Check for proper alarm function. Turn off blower circuit breaker and wait for the alarm to sound. Alarm should sound within 30 seconds.

D. TANK PUMPING PROCEDURE

The FAST system requires periodic removal of the sludge that accumulates in the septic and treatment tanks. To determine the sludge depth accurately, open the access cover and insert a sludge measuring instrument and take samples. If sludge is more 18 inches deep in the septic tank, the tank should be pumped out. If sludge is more than 14 inches deep in the treatment tank, the tank should be pumped out. Always pump out both tanks even if only one tank may require it. Once the tanks are pumped out, immediately refill the tanks with clean water to reduce the risk of the tank floating and to minimize the impact on treatment. The solids must be disposed of in compliance with local and state regulations.

E. OPERATOR'S RESPONSIBILITIES

1. General Description of Routine Operational Duties

   a. Operator Responsibility

      The operation of the treatment system is a matter of observing the effluent for any deterioration of quality, regular inspection,

and maintenance of the mechanical equipment. Other operational requirements include periodic maintenance of grounds and periodic removal of sludge from the septic and treatment tanks.

The operator's first action on arrival at the treatment system is to make a quick visual survey of the tanks. The effluent discharging into the drainfield dosing tank should be relatively clear, free of solids and free of odor.

All motors and mechanical devices should be operating in a normal manner and the air in the treatment tank should be robust. Where indications of abnormal conditions are found, such corrective action should be undertaken promptly.

When operation appears to be normal, the operator should then proceed with routine inspection and lubrication of mechanical devices in accordance with the equipment manufacturer's maintenance instructions. A log of the operation providing a written record of all repairs, adjustment, lubrications, and unusual operation conditions is strongly recommended.

b. Sludge Removal

The operator must check the level of sludge in the septic and treatment tanks on a quarterly basis as discussed in Section III.D.

The sludge producer is responsible for the sludge leaving the plant. Records shall be kept indicating the date and time of collection and the amount (volume) removed. The operator shall obtain a ticket from the hauler and the receiver once sludge is transported off the premises. Sludge hauling records shall be kept for a minimum of 5 years.

c. UV System

The operator shall check the UV system for any alarms. A log shall be kept to indicate when the lamps were last replaced. The manufacturer recommends replacing the lamps every two years.

2. Summary

<u>Routine</u>

a. Visually check performance

(1) Is the effluent clear and free of odor?

(2) Is aeration in the treatment tank robust?

(3) Are there any alarms?

b. Inspect the mechanical equipment. (See maintenance instructions of the manufacturer.)

(1) Are blowers operating without overheating or unusual noise?

c. Lubricate mechanical equipment in accordance with maintenance instruction of the manufacturer.

d. Make entries in operating and maintenance logs, as required.

e. Measure sludge depth in septic and treatment tanks as discussed in Section III.D.

Non-Routine

a. Operate all valves and other non-regularly used equipment to be sure they are in good working condition.

b. Maintain site so that it presents an attractive appearance.

c. Replace UV lamps as required.

F. TREATMENT SYSTEM OPERATION TROUBLESHOOTING

The following illustrate some typical problems encountered with the types of equipment associated within this plant.

1. Pumps

The submersible pumps are also nearly problem-free, provided that they are properly maintained. The impellers may need to be occasionally adjusted if head loss is apparent.

2. Blower

If the blower makes an abnormal sound or over heats, the impeller may need to be cleaned or the bearings may need to be replaced.

3. UV Units

If there is an alarm, pull the lamps out to check if working. Lamps may need to be clean or replaced.

IV. OPERATIONAL AND WATER QUALITY SAMPLING AND MONITORING

A. WASTEWATER TREATMENT PLANT EFFLUENT SAMPLING AND MONITORING

Per the WVPDES permit, the wastewater treatment plant is subject to the monitoring requirements of Treatment Category I of the General Permit. The test results shall be submitted electronically to DEP on a quarterly basis.

The treated effluent shall be monitored for the following parameters at the following frequencies at a point after all the treatment but prior to discharge.

Parameter	Frequency	Type	Limitations
Flow	1/quarter	Estimate	0.0098 MGD Max. Daily
BOD_5	1/quarter	Grab	30 mg/L Avg. Daily
			60 mg/l Max. Daily
			75 Inst. Max.
TSS	1/quarter	Grab	30 mg/L Avg. Daily
			60 mg/l Max. Daily
			75 Inst. Max.
Coliform, Fecal	1/quarter	Grab	200/100 ml Mon. Geo. Mean
			400/100 ml Max. Daily
			500/100 ml Inst. Max.
pH	1/quarter	Grab	6.0 - 9.0

1. Sampling and Analysis Methods

a. Samples and measurements taken as required shall be representative of the volume and nature of the monitored discharge.

b. The permittee shall periodically calibrate and perform maintenance procedures on all monitoring and analytical instrumentation at intervals that will insure accuracy of measurements.

c. Grab samples are samples taken individually in less than 15 minutes.

2. Test Procedures

Test procedures for the analysis of pollutants shall conform to the applicable test procedures identified in 40 CFR Part 136 unless otherwise specified.

3. Recording the Results

For each measurement or sample taken pursuant to the requirements of this permit, the permittee shall record the following information:

a. The date, exact place, and time of sampling or measurements;
b. The person(s) who performed the sampling or measurements;
c. The date analyses were performed;

d. The person(s) who performed each analysis;

e. The analytical techniques or methods used; and

f. The results of such analyses and measurements.

4. Sample Preservation

Regarding sample preservation, various preservation techniques are used, making it possible to limit the physical-chemical and bacteriological evolution of the water being analyzed. The choice of materials of the bottles should limit losses due to absorption or prevent the release of substances depending on the desired measurement. Samples, especially if being sent off-site, should be marked with the following minimal information: site name, sampling date, sampling time, & sampling location. It is also helpful to describe the physical characteristics of the samples (i.e. color, smell, turbidity, floc, etc.) Samples should be sealed appropriately and tightly. The use of local testing facilities is highly suggested due to the limited shelf life of the samples. In some instances, samples may be considered hazardous material, use the appropriate care when sampling, storing, and transporting.

a. Off-site Samples:

BOD_5, suspended solids (TSS), and Fecal Coliform samples shall be performed in a laboratory off-site.

b. On-Site Samples:

Analyses should be performed immediately after sampling. Changing any parameters (i.e. temperature) should be avoided as much as possible.

pH	Refer to EPA Method References – Section 150.1 Refer to Standard Methods, 19th edition – Section 4500-H

5. Laboratory Records

The purpose of the laboratory records is to keep a detailed history of the operating conditions of the treatment system. For this reason, it is very important that the records be kept in a neat and orderly manner.

All records and information resulting from the monitoring activities required by this permit including all records of analyses performed and calibration and maintenance of instrumentation and recording from continuous monitoring instrumentation shall be retained for three (3) years. This period of retention shall be extended automatically during the course of any unresolved litigation regarding the regulated activity or regarding control standards applicable to the permittee, or as requested by the Department.

6. Additional Monitoring

If the permittee monitors any pollutant at the location(s) designated herein more frequently than required by the permit, using approved analytical methods as specified above, the results of such monitoring

shall be included in the calculation and reporting of the values. Such increased frequency shall also be indicated.

C. SLUDGE MANAGEMENT REPORT

Per the WVPDES permit, a sewage sludge management report shall be submitted annually. A copy of the report is included in Appendix A.

V. PERSONNEL RESPONSIBILITIES

A. MANAGEMENT\STAFFING

The treatment works is owned and operated by the Berkeley County Public Service Sewer District. The contact information for the Owner is as follows:

Curtis B. Keller
General Manager
P.O. Box 944
Martinsburg, WV 25402
(304) 263-8566

The operator class required shall be as required by the discharge permit.

B. OPERATOR RESPONSIBILITIES

The operator must have a working knowledge of how the system is intended to operate to keep it in working order and to recognize problems.

The operator is responsible for the daily caretaking, periodic services to keep it in working order, and daily testing monitoring.

He must work in a manner that avoids hazards to himself.

C. WORK SCHEDULE

The operator is required to visit the site on a daily basis.

VI. RECORDS AND REPORTS

A. OPERATOR'S INSPECTION CHECKLIST (SEE APPENDIX B)

An Operating Checklist will be provided with the following information:

1. Routine operational parameters for each unit process
2. Unusual conditions (operation and maintenance)
3. Accidents to personnel
4. Complaints
5. Personnel on duty

B. LABORATORY RECORDS

Laboratory records shall be maintained and shall include the following information:

1. Lab tests run, test results, and summaries
2. Weather conditions
3. Chemicals used
4. Analyst's name or initials
5. Laboratory worksheet

C. REPORTS TO THE STATE AGENCIES

1. The permittee shall submit all correspondence regarding the permit to the West Virginia Department of Environmental Protection (DEP) at the following addresses:

West Virginia Department of Environmental Protection
Division of Water and Waste Management
Permitting and Engineering Branch
601 57th Street SE
Charleston, WV 25304-2345

Department of Environmental Protection
Environmental Enforcement
HC 63, Box 2545
Romney, WV 26757

2. DEP requires the permittee to use their login ID for the electronic discharge monitoring report (eDMR) system. The permittee is not required to submit hard copies of the DMRs to the addresses listed above when using the eDMR. However, the records shall be readily available at the site for inspection by DEP personnel either in electronic or hard copy format.

VII. MAINTENANCE

A. EQUIPMENT RECORD SYSTEM

An equipment record system should be established to maintain the following information on each item of operating equipment:

1. Name
2. Manufacturer
3. Equipment Number (per equipment numbering system)
4. Maintenance Requirements

Equipment information and maintenance records are provided in **Appendices C and D.**

B. EQUIPMENT NUMBERING SYSTEM

A numbering system (see **Table 1: Equipment Numbering System**) has been provided for each item in the equipment catalogue (see **Table 2: Equipment Catalogue**) that requires maintenance to ensure that all equipment receives the proper attention.

C. STOREROOM AND SPARE PARTS INVENTORY SYSTEM

The proper inventory should be determined by periodic review of the maintenance records. The amount and type of spares can only be determined by the experience of the personnel. As a recommendation, **Table 3** lists the

spare parts of the major pieces of equipment that should be maintained on-hand.

The inventory should be checked at least quarterly. Annual maintenance records should be reviewed to increase or decrease the inventory in order to ensure that the minimum amount of money is invested in spare parts.

To organize the inventory, a system should be established to record information, such as quantity, item number, description, when last purchased, cost, date, vendor, etc.

TABLE 1: EQUIPMENT NUMBERING SYSTEM

Name	Number
Equalization Pump #1	1
Equalization Pump #2	2
FAST Blower #1	3
FAST Blower #2	4
Recirculation Pump	5
UV Unit #1	6
UV Unit #2	7
UV Unit #3	8
UV Unit #4	9
Influent Flowmeter	10
Recirculation Line Flowmeter	11

TABLE 2: EQUIPMENT CATALOGUE

THE OPERATOR SHOULD INSERT NUMBERS OF LOCAL SERVICE REPRESENTATIVES OR MANUFACTURERS NUMBERS HERE.

Component	Number	Model/Type	Manufacturer/Service Rep.
FAST Treatment System	2	FAST 4.5	Bio-Microbics, Inc. (800) 753-3278 Local Rep.: Michael Burch Nature Works, Inc. 372 Coles Road Burgess, VA 22432 (804) 453-7946
Flow Equalization Pumps	2	Zoeller Model 137	Zoeller Engineered Products 3649 Cane Run Road Louisville, KY 40211 (800) 928-7867
Recirculation Pumps	1	Zoeller Model 137	Zoeller Engineered Products 3649 Cane Run Road Louisville, KY 40211 (800) 928-7867
Flow EQ Pump Control Panel	1	Model DEPRAB124-AJLP(C)R	American Manufacturing Company, Inc. P.O. Box 97 Elkwood, VA 22718 (800) 345-3132
Recirculation Pump Control Panel	1	Model SEPRAB124-AJLRX(PW)	American Manufacturing Company, Inc. P.O. Box 97 Elkwood, VA 22718 (800) 345-3132
UV Units	4	Salcor Model 3G	Salcor, Inc. 447 Ammunition Road #D Fallbrook, CA 92028 (760) 731-9960
Influent Flowmeter	1	1” Car-Logger Model FL100 (B or D)	Carlon Meter 1710 Eaton Drive Grand Haven, MI 49417 (616) 842-0420
Recirculation Flowmeter	1	¾” Master Meter Positive Displacement	Master Meter 101 Regency Parkway Mansfield, TX 76063 (800) 765-6518

TABLE 3: RECOMMENDED SPARE PARTS LIST

Item	Quantity
For Each Blower	
Set of Bearings	1
For Each Submersible Pump Model	
Spare Pump	1
For Each UV Unit	
Lamp	1

D. PREVENTIVE MAINTENANCE SCHEDULES AND EQUIPMENT SERVICE RECORDS

Preventive maintenance schedules are supplied for each piece of equipment that requires regular maintenance.

The equipment service form is intended to be a record of any work performed on a piece of equipment.

Using the schedules and equipment service forms, a preventive maintenance file should be organized. The schedules provided in this manual are divided into six categories; quarterly, semi-annually, and annually. There should be a binder prepared for each category with the appropriate schedules filed inside. In addition, the equipment service forms should be filed with each schedule. When the equipment service cards are completed, they should be placed in the permanent file for future reference.

The following is a suggested schedule for when the tasks should be performed:

Maintenance	Day
Quarterly	Second Thursday of January, April, July, and October
Semi-annual	Second Thursday of February and August
Annual	Second Thursday of June

When the maintenance staff utilizes the daily preventative maintenance binder, the list of what work needs to be completed is listed in the schedule. When the particular task is done, the equipment service form is recorded with the date of the work, work item number, remarks, and their signature. The procedure is the

same for all six categories. Following these procedures will provide a complete maintenance program.

E. WORK ORDER SYSTEM

To handle the non-routine (corrective) maintenance jobs, a work order system should be established. The intent of this system is to aid the personnel in identifying the task to be completed, priority of the work, and any special requirements, such as tools or parts needed. These work orders will also provide information on when the work order was initiated and when the job was finished.

Work orders should be numbered in order to provide a means of accountability. The records of these work orders may give information as to the possibility of future non-routine maintenance for the equipment.

F. PURCHASE ORDERS

When equipment, supplies, parts, etc. are to be order, a purchase order form should be completed in duplicate. The first copy will be used to order the material while the second copy will be saved for future use.

These forms can be used to calculate the costs of the equipment bought and the information is necessary to control expenses and prepare budgets.

G. MAINTENANCE ISSUES

1. Treatment Basins

There should be minimal maintenance to the basins. At each quarterly visit, the operator should check the settling and treatment tanks for sludge accumulation.

2. Aeration System

There should be minimal maintenance to the aeration system. The blower should be checked at each quarterly visit for proper operation, excessive noise, and vibration.

3. Pumps

There should be minimal maintenance to the pumps. At each quarterly visit, the operator should check pumps for proper operation and excessive noise, heat, or vibration. The check valves should be checked to ensure proper they are not clogged.

On an annual basis, pump draw down tests should be performed for each pump to confirm the pump flow rate and adjust the pump run timers.

4. Alarm System

The units of the alarm system should be inspected quarterly for proper operation.

In the event of a malfunction, the unit should be sent to the manufacturer's service department or a field visit arranged with a manufacturer representative. If the equipment is to be fixed at the site, only trained technicians should attempt to correct the problem. However, it is recommended that the manufacturer be contacted.

On an annual basis, the system should be inspected, calibrated, and serviced.

5. UV Units

There should be minimal maintenance to the pumps. At each quarterly visit, the operator should check the lamps to see if they are working. Lamps should also be cleaned on a quarterly basis.

The manufacturer recommends replacing the lamps every two years.

VIII. SAFETY AND EMERGENCY ASSISTANCE

The following are general guidelines to follow regarding safety and hygiene. Please refer to and always follow State and Local regulations (such as VOSH and OSHA where possible and the employee manual. Any personal injury must be reported to the employer regarding Workers Compensation.

A. DESCRIPTION OF HAZARDS

There are a number of hazards present in the treatment system, including physical injuries, body infections and dangers from noxious gases or vapors and oxygen deficiency. They, and some precautions to avoid them, are discussed below.

Oxygen Deficiency: Air normally contains approximately 21 percent oxygen. Air containing less than 13 percent oxygen is dangerous to humans. This condition can exist in large trunk sewers; sewers located in the vicinity of gas mains or gasoline storage tanks; sewers on flat grade where solids may settle and decompose; sewers with manholes more than 300 feet apart; all sewers and manholes more than 10 feet deep; any tightly covered pit, tank or valve chamber; deep tanks, sludge digestion tanks and pump wells. Self-contained breathing equipment should be located on-site, and the operator must be trained in the use of the equipment.

Manholes: The sewer gases in manholes and the collection well are explosive and poisonous. Use explosive proof lighting and equipment. Never work alone. Be sure there is adequate fresh air, through forced ventilation if necessary. A gas mask does not provide protection. Be sure electricity is cut off before working on the motors or pumps and assume it will be inadvertently turned on. Keep electrical boxes closed.

Tanks: The tanks are deep enough to drown in. Care should be taken when operating around tanks with open covers.

Electrical Hazards: Electrical shock hazards are reduced by the installation of enclosed switchgear, but are still a consideration. A rubber mat on the floor further reduces the chances of injury due to electrical shock. Grounding of all equipment is essential. Portable power tools should be equipped with ground wire and special outlet and plug.

Infections: Workers who come into contact with sewage are exposed to all the hazards of water-borne diseases, including typhoid fever, para-typhoid fever, amoebic dysentery, infectious jaundice and other intestinal infections. Tetanus and skin infections must also be guarded against. Wear rubber gloves when sampling - keep hands out of

the bacteria-laden water. Wash hands with Chlorox, rinse well with tap water.

Smoking: Smoking should not be done in or around sewage treatment plants as the practice transmits harmful bacteria from the cigarette, pipe, cigar or smoker's hands to the mouth. Also, it is a potential source of ignition for any flammable vapors which may be present.

Food Consumption: The operator should avoid eating food while working at the site. After working at the site, the operator should cleanse his hands and other exposed areas with anti-bacterial soap and warm water.

Arc Flashes: An arc flash is an electrical explosion that results from a low impedance connection to ground or another voltage phase in an electrical system. To prevent injury from arc flashes, personnel should wear arc flash personal protective equipment (PPE) when necessary, and to de-energize circuits when personnel are working on exposed conductors.

B. ONGOING SAFETY PROGRAM

Many hazards are involved in the day to day operation of a sewage treatment facility. To reduce the potential for injury to personnel and/or loss of property, all personnel must be familiar with the following list of safety rules:

1) When removing a manhole cover, always lift with your legs, not your back.
2) Never work in a manhole alone.
3) Never enter a wetwell or sump alone.
4) Always use explosion-proof lights whenever explosive gases are suspected.
5) All electrical switch boxes shall be kept closed.
6) Always make sure equipment power switch is shut off and properly tagged before any maintenance is performed.
7) Always be alert for hydrogen sulfide gas (rotten egg odor).
8) Always have two or more people to lift heavy equipment. Always lift heavy equipment with your legs, not your back.
9) Be aware of slick surfaces potentially caused by liquid on the ground or the edge of tanks that could pose a slipping hazard.

A first aid kit and manual are part of the standard equipment issued to the operator and are kept in the truck at all times. A list of emergency numbers is posted at the site.

Measures are taken to keep unauthorized persons out of the facility by keeping the gate locked, maintaining the fence and taking additional measures as required.

It is important that the operator is familiar with the OSHA regulations associated with sewer systems. OSHA Standard 1910.146 Appendix E pertains to sewer system entry and is as follows:

“Sewer entry differs in three vital respects from other permit entries; first, there rarely exists any way to completely isolate the space (a section of a continuous system) to be entered; second, because isolation is not complete, the atmosphere may suddenly and unpredictably become lethally hazardous (toxic, flammable or explosive) from causes beyond the control of the entrant or employer, and third, experienced sewer workers are especially knowledgeable in entry and work in their permit spaces because of their frequent entries. Unlike other employments where permit space entry is a rare and exceptional event, sewer workers' usual work environment is a permit space.

(1) Adherence to procedure. The employer should designate as entrants only employees who are thoroughly trained in the employer's sewer entry procedures and who demonstrate that they follow these entry procedures exactly as prescribed when performing sewer entries.

(2) Atmospheric monitoring. Entrants should be trained in the use of, and be equipped with, atmospheric monitoring equipment which sounds an audible alarm, in addition to its visual readout, whenever one of the following conditions are encountered: Oxygen concentration less than 19.5 percent; flammable gas or vapor at 10 percent or more of the lower flammable limit (LFL); or hydrogen sulfide or carbon monoxide at or above 10 ppm or 35 ppm, respectively, measured as an 8-hour time-weighted average. Atmospheric monitoring equipment needs to be calibrated according to the manufacturer's instructions. The oxygen sensor/broad range sensor is best suited for initial use in situations where the actual or potential contaminants have not been identified, because broad range sensors, unlike substance-specific sensors, enable employers to obtain an overall reading of the hydrocarbons (flammables) present in the space. However, such sensors only indicate that a hazardous

threshold of a class of chemicals has been exceeded. They do not measure the levels of contamination of specific substances. Therefore, substance-specific devices, which measure the actual levels of specific substances, are best suited for use where actual and potential contaminants have been identified. The measurements obtained with substance-specific devices are of vital importance to the employer when decisions are made concerning the measures necessary to protect entrants (such as ventilation or personal protective equipment) and the setting and attainment of appropriate entry conditions. However, the sewer environment may suddenly and unpredictably change, and the substance-specific devices may not detect the potentially lethal atmospheric hazards which may enter the sewer environment.

Although OSHA considers the information and guidance provided above to be appropriate and useful in most sewer entry situations, the Agency emphasizes that each employer must consider the unique circumstances, including the predictability of the atmosphere, of the sewer permit spaces in the employer's workplace in preparing for entry. Only the employer can decide, based upon his or her knowledge of, and experience with permit spaces in sewer systems, what the best type of testing instrument may be for any specific entry operation.

The selected testing instrument should be carried and used by the entrant in sewer line work to monitor the atmosphere in the entrant's environment, and in advance of the entrant's direction of movement, to warn the entrant of any deterioration in atmospheric conditions. Where several entrants are working together in the same immediate location, one instrument, used by the lead entrant, is acceptable.

(3) Surge flow and flooding. Sewer crews should develop and maintain liaison, to the extent possible, with the local weather bureau and fire and

emergency services in their area so that sewer work may be delayed or interrupted and entrants withdrawn whenever sewer lines might be suddenly flooded by rain or fire suppression activities, or whenever flammable or other hazardous materials are released into sewers during emergencies by industrial or transportation accidents."

The operator should also be familiar with OSHA regulations 1910.132 which pertain to personal protective equipment (PPE).

C. EMERGENCY CONTACTS

If an emergency occurs, contact safety personnel - rescue squad, fire department - whoever is needed. After insuring personnel safety or treatment, notify the Berkeley County Health Department, the West Virginia Department of Health & Human Resources (DHHR), and the West Virginia Department of Environmental Protection (DEP) and tell them the nature of the emergency, how it affects the plant and how long it will take to correct the problem.

A LIST OF EMERGENCY CONTACTS IS ON PAGE IX-1 OF THIS MANUAL

D. SAFETY EQUIPMENT

Probably the most frequent cause of accidents in a wastewater treatment facility is the failure to use the proper safety equipment. OSHA requires safety equipment to be provided by the management and the plant operator should use it in accordance with established OSHA safety standards. The standards require use of safety equipment where there is a reasonable probability of injury that can be prevented by such equipment.

1. Protective Clothing: Protective equipment and garments reduce the possibility of injury to personnel. Protective clothing is required to be available for specific hazards and jobs under OSHA standards. The operator should keep the following protective items in their truck.

   a. Safety Helmets: Safety helmets are required to provide head protection from impact and penetration from falling or flying objects and from limited electric shock and burns while working in manholes or construction areas.

   b. Ear Protectors: These are required to protect ears in areas of high level noise.

   c. Goggles: Protective eye and face equipment is required where there is a reasonable probability of injury that can be prevented. Goggles are recommended to be used for work involving air tools, grinding operations, and welding, as well as in areas where corrosive chemicals are used.

   d. Protective Creams: These creams are recommended to protect the skin from contamination by oils, greases, paints and dust.

   e. Gloves: Impervious hand protection is required to be provided at all work sites to prevent injuries while handling pipe, tools, chemicals, solvents and similar materials. Synthetic rubber or composition protective gloves, sleeves and finger pads should be

provided for use in cleaning clogged pumps or for handling grit, sewage, or sludge with the hands.

f. Boots: Special foot protection with metal floor guards is required for working air equipment, manholes, and other heavy equipment. Non-sparking footwear is required in areas where there is danger of explosion and rubber boots are required in wet or damp areas.

g. Miscellaneous Garments: Rubber aprons, coats, frocks, and coveralls are required for specific jobs where clothes need to be protected and kept dry. All garments should be kept clean to protect against dermatitis. Knee pads are recommended for protection against bruises acquired on jobs which require kneeling for extended periods of time.

2. Safety Devices: In addition to the protective clothing outlined above, the following safety devices are recommended and should be available to the operator, either at the treatment plant or in the operator's truck.

a. Oxygen Deficiency Indicator: OSHA requires that confined spaces be ventilated and tested for low oxygen levels before entering. If the oxygen level in the tank is low, it must be ventilated until the oxygen reaches a safe level. The oxygen deficiency indicator should be kept at the pump station. OSHA defines a confined space as a space that:

(1) Is large enough and so configured that an employee can bodily enter and perform assigned work; and

(2) Has limited or restricted means for entry or exit (for example, tanks, vessels, silos, storage bins, hoppers, vaults, and pits are spaces that may have limited means of entry.); and

(3) Is not designed for continuous employee occupancy.

b. Portable Air Blower: This unit can be used for ventilating manholes and other subterraneous structures before entering. The portable air blower should be kept in the operator's truck.

c. Hose mask: OSHA requires that the correct respirator be used for the specific job. Hose masks or self-contained breathing apparatus are used in atmospheres immediately hazardous to life or health. A standby man is required to be present with the proper rescue equipment in case of respirator failure. The individual issuing masks is required to instruct the user of the mask at to its selections, operation and maintenance. All respirators are required to be inspected regularly to ensure they retain their original effectiveness. The hose mask should be kept in the operator's truck.

d. Safety Harness: A safety harness is required where individuals are exposed to hazardous atmospheres. The only type that should be used is that consisting of a body belt with buckle and a shoulder

harness. The belt should be made of harness leather and be equipped with tested hardware. In addition, the lifeline should be at least 3/4 inch manila rope. The safety harness should be kept in the operator's truck.

e. Warning Signs: Warning signs are required to be placed in strategic areas around dangerous or potentially dangerous areas. A "Danger-Chlorine" sign on the entrance to the chlorination room is an example. These danger signs should be red, black and white. Caution signs are used to warn against potential hazards or caution against unsafe practices. A "Caution-Working on Machine - Do Not Start" and "Caution-Watch Your Step" are examples. These signs are required to be yellow and black. Directional signs are required to mark fire exits, fire extinguisher and first aid rooms. The way to the exit and the exit itself must be marked in a way that is readily seen. These signs are to be black and white.

f. Accident Prevention Tags: The tags are used as temporary means of warning all concerned of a hazardous condition or defective equipment. The tags should not comprise a total warning but should be used until a positive means of warning can be employed. Examples are "Do Not Start" sign on power equipment being worked on, and a "Defective Equipment" sign on damaged equipment.

g. Tools: The following special tools are recommended to be accessible at the facility for routine maintenance.

Large Skimmer (12" Square Mesh Basket)

Small Skimmer (3" Maximum Rectangular basket)

Stiff Bristle Brush

Garbage Pail

Hose

Grease Gun

Short Handled Brush

Rake

h. Fire Extinguisher: A fire extinguisher approved by the Underwriter's Laboratories should be placed in areas prone to fire hazards. For example, there should be a type for electrical fires near the major electrical control panels and units. A fire extinguisher shall be located at the water reclamation facility at all times.

i. Medical Aid: The employer is required by OSHA to ensure the ready availability of medical personnel. If no medical facilities are in the nearby area, some employee trained in first aid should be available, as should a first aid kit. A first aid kit shall be located at the water reclamation facility at all times.

E. EMERGENCY PLANS AND OPERATING PROCEDURES

This section outlines emergency procedures and plans for responding to various types of disasters. Effective emergency planning requires considerable coordination and forethought by the operating staff; therefore, this section is

meant to serve as a guide to identify the major considerations in each type of emergency. Detailed plans should be worked out by the operating staff who can best assess their own capabilities for dealing with emergencies and who have fuller knowledge of emergency resources available in the area.

It is necessary for the operator to have an ideal of what his procedures should be in the event of an emergency. Emergency conditions are of varying degrees of seriousness. In any event the operator should be concerned with:

1. Safety of personnel both within the facility and in the surrounding area.
2. The safety of equipment within the facility.
3. Continuation of the plant functioning to assure proper treatment of wastewater.

A list of emergency telephone numbers should be posted in a conspicuous place near each telephone at the site. This list should be checked for accuracy at least quarterly and changes in names and telephone numbers should be noted on posted lists. One person should be given the responsibility for maintaining the accuracy of this list.

This list should contain names and current phone numbers of every person or organization, which the operating personnel might need to contact on a moment's notice. As an absolute minimum, the list should include physicians, fire department, police and utility companies. Considerable thought should be given to foresee all skills and services that might be required in an emergency when preparing the list to be posted.

For the sake of coordination, it is good practice for the responsible personnel to personally call all persons and organizations listed to notify them that they have been included on the emergency list and ask that they respond rapidly if they are notified. Also, it might be wise to post a duplicate list at the Maintenance Department headquarters and bus shop. If an emergency occurs in which several persons must be notified immediately, then the operating personnel can call the holder of the duplicate list first and split up the calls to be made. The time saved might be critical.

F. GENERAL RESPONSE PATTERN TO EMERGENCIES

There is a logical sequence of steps in responding to emergencies, which should be followed by the operator on duty. This sequence includes identifying the emergency, investigating extent of emergency, deciding on proper initial course of action, taking corrective action to rectify the situation, and following up with a post-emergency investigation.

The necessary steps to be taken in each of several emergency operating conditions are detailed in this section. Included in these emergencies are the ways to identify the emergency, the initial investigative measures, the initial action to be taken, and the necessary corrective action. Finally, it will be necessary to propose protective measures to be initiated in preventing and dealing with each emergency in the future. In developing contingency plans, it is first necessary to attempt to foresee as many different types of emergencies as possible. A list of those emergencies includes power failures, floods, fires, windstorms, ice and freezing temperatures, explosions, equipment breakdowns and process failures, and personnel injuries.

1. **Power failure**

The operation of this facility is almost totally dependent on electrical power. The results of a power failure are obvious; all or part of the facility will cease to function. The cause of power failure will be relatively easy to trace since plant circuit breakers can be checked quickly.

Identification

When a power failure occurs, electrical equipment will shut off and remain off.

Initial Investigation

Upon suspecting that a power failure has occurred, the operator should take initial action.

Initial Action

The operator should consult the Power Company to determine whether the failure was the fault of the company or if the failure occurred within the plant. If an accident or a condition outside the plant caused the failure, the operator should switch over to the stand-by power source. The operator should find out from the Power Company how long the power is expected to be off. He should also request that the plant be placed on a priority list for resumption of power.

Corrective Action

If the failure was the result of a malfunction inside the plant, then most likely it was due to an overload of the circuit, or due to a problem in the main switchboard. If the circuit was overloaded, the breaker must be

reset to supply normal power again. If a problem with the wiring in the main switchboard is to blame, an electrician should be contacted to inspect the electrical equipment. Once the problem is found and corrected, and normal power resumed, the operator should make a check of the electrical equipment to see that everything is running properly.

Methods to Reduce System Vulnerability

An electrician should inspect the wiring of the main switchboards, control panels, and all electrical connections. If any potential hazard areas exist, he should amend them immediately. Future power failures in the plant can be prevented by making sure electrical connections are safe and by operating electrical equipment in accordance with the manufacturer's recommendations only.

2. **Flood**

It is unlikely that a flood will occur at this facility. However, in the event that a possibility of a pending flood presents itself, certain safety measures can be taken to minimize damage to the plant.

Identification

The operator will be able identify possible flood situations by visual contact or by weather reports received. Communication should be maintained with the Department regarding the forecast of severe flooding. This information will serve as an early warning system on potential floods.

Initial Investigation

When the potential high water level at the plant site is known, the operator should determine if this will flood the grounds. If it has the potential to flood the grounds, the open tanks and electrical equipment should receive initial attention in preparing protection for the plant.

Initial Action

If flooding in the area of the plant is expected, dams made of sandbags should be made around the equipment in danger, including the electrical equipment at the treatment plant. Motors and other equipment that is in danger of flooding should be removed where possible. A circle of sandbags around the lowest elevated equipment could be erected. The HOA and county offices should be notified of the problem and of any assistance that will be needed.

Corrective Action

As soon as flood waters begin to recede, the operator should inspect the plant for damage, clean up the damage using hoes, shovels, etc. or any necessary heavy equipment, replace equipment removed or damaged, and get the plant running normally as soon as possible.

Methods to Reduce System Vulnerability

Floods are acts of nature, which cannot be prevented. However, the operator can prepare for them by recalling the procedures followed in a previous flood and creating a plan of action around the measures that worked then. At the same time, actions taken in the past resulting in failure should be discarded. If notification of a previous flood was slow in reaching the plant, the operator should take note of the fact that he must

call the proper agencies sooner than before. Being alert and ready for the next high flood is his only defense. Pumping equipment and necessary tools, sufficient sandbags and damming material, and providing a means of bypassing treatment units endangered by the flood should be considered.

3. **Fire**

It is unlikely that a fire of any significance will occur at this facility because there is very little combustible material used in the construction of any of the units. If they occur, fires will probable be limited to burning motors or gasoline or cleaning solvent fires.

Identification

The operator should be prepared to identify a fire immediately by the sight of smoke or flames in the plant. The fire may be identified by the scent of smoke or the heat it gives off. At this time, the operator should have an immediate impression as to the extent of the fire.

Initial Investigation

The operator should determine for certain that there is no immediate threat of the fire spreading throughout and outside the limits of the plant. He should determine whether or not he is able to extinguish the fire himself or if he should notify the local fire department for help.

Initial Action

Using the fire extinguisher and other tools available at the plant, the operator must make an attempt to put the fire out. If his initial attempts

fail at containing the fire, he should call the fire department. Before help arrives he should continue in his attempts to control the fire. Explosive of flammable materials should be moved to a safe place where they will be out of the reach of the flames, providing the action does not endanger the operator. If the fire is widespread, it may be necessary for the operator to move to safety.

Corrective Action

If the fire is large, efforts at putting it out should be made only by the fire department. If the fire is small and the operator is able to control it, he should act swiftly. Probably, a fire extinguisher could handle the fire. Shovels, dirt or sand, or water could be used in situations where an extinguisher is not readily at hand. If the fire is in an enclosed area, the operator should be aware of the possibility of smoke inhalation. After the fire is out, the operator should water down the ashes or remains until the area is cool and smoke free.

Damage to the WRF units, if any, should be addressed as soon as possible after the fire. If the fire is of major consideration, VDEQ should be informed of the extent of the damage. Steps should then be taken to provide interim treatment to the highest degree possible until complete repairs have returned the plant to its original treatment efficiency.

Methods to Reduce System Vulnerability

The cause of the fire should be determined and steps taken to prevent it from happening again. If the fire was due to improper storage of flammable materials, then a different arrangement for storage of these materials should be made. If the fire was at a motor or electrical

connection, then the wiring at the location will assuredly have to be replaced and repositioned so as not to present a possible hazard again. If fire extinguishers are spaced too far apart and one area constitutes a potential danger area, then an extinguisher must be stored nearby.

4. **Windstorm**

If a severe windstorm should strike the plant, damage most likely will be limited to fallen power lines, fences, and trees and the damage to the plant equipment caused by branches and debris in the storm.

Identification

The operator will be able identify the storm by visual contact or by weather reports received. Communication should be maintained with the Department on the forecasted severity of the approaching storm. This information will serve as an early warning system on potentially damaging storms.

Initial Investigation

After receiving reports of the weather forecast, the operator should keep an alert watch on the weather conditions at the plant. If reports received indicate that the storm will not be severe, he should maintain a close watch, to be prepared in the event that reports were inaccurate.

Initial Action

The operator will have little or no defense against a violent windstorm. Protective measures will be limited to securing outside equipment so that they will not be blown away. Windows should be closed on all buildings.

Corrective Action

If power lines are blown down in the windstorm, electric power to the plant will be lost, in which case all or part of the plant will cease to function. As soon as the storm has ceased, the operator should assess the damage and inform the maintenance department and DEQ of the nature and extent of the damage. Then steps should be made to get the plant back into running order as soon as possible. This will probably necessitate cleaning open tanks of debris, sticks, etc. and repairing equipment that was damaged by flying debris.

Methods to Reduce System Vulnerability

Windstorms are acts of nature which cannot be prevented. The only measure to be taken in guarding against them will be to secure all light material and equipment that may be blown away in the storm.

5. **Ice and Freezing Temperatures**

The formation of ice due to extended periods of subfreezing weather can cause several problems effecting the equipment and treatment processes at the facility. Among these are ice formation on overhead power lines to the plant causing loss of power, ice formations on the various tank surfaces, and the contents of pipes and valves freezing. Because there is flow through most of the treatment units and piping at all times, the winter climate conditions due to subfreezing temperatures are not anticipated to be a harsh problem. However, the operating personnel should recognize the potential problems, anticipate their occurrence, and be prepared to respond to the potential problems.

Identification

Ice formations on treatment unit tank surfaces will be obvious and should indicate a warning to the operating personnel to watch for indications of freezing of pipe and valve contents throughout the plant, especially where pipes and valves are located in exposed above-ground locations and where they pass through unheated vaults or pump wells. Emergency conditions caused by ice formations and subfreezing temperatures can be anticipated by staying in close communication with the appropriate weather forecasting agencies. The information gained through this communication will serve as an early warning system.

Initial Investigation

The operator should observe all plant units, equipment, piping, and valves that are susceptible to freezing conditions at the first sign of ice formations.

Initial Action

For freezing on tank surfaces, the operator should break up ice block formations and remove them before they damage treatment unit appurtenances by wind action or expansion forces. In anticipation of extended periods of subfreezing temperatures, the operator should ensure that any features, which were designed into the plant to prevent ice formations in pipes have received the necessary attention. This could include operating the necessary valves that would drain certain pipes above ground and also check to make sure that all pipe heating tape systems are operating where they have been provided. In addition, the

operator should inspect other piping systems that may be susceptible to freezing.

Corrective Action

After clearing ice and ensuring that pipe contents are not freezing, the operator must get the plant back into running order, as necessary, as soon as possible. If damage has occurred, it should be assessed and reported to the maintenance department and to VDEQ.

Methods to Reduce System Vulnerability

Extended periods of subfreezing weather is an act of nature and is not preventable. However, measures taken within the plant such as keeping heating cable systems in good operating condition and quick action at the first signs of ice formations will guard against the potential emergency situations which could occur due to freezing temperatures.

6. **Explosions**

It is unlikely that explosions will occur at this facility. However, the possibility exists in areas where a fire hazard is present and flammable materials are stored.

Identification

The operator will unmistakably be able to determine when an explosion has occurred. Immediately he should determine where the explosion has taken place.

Initial Investigation

The operator should immediately assess the damage to the plant. He should investigate for possible flames and for further damage they could cause. If the explosion has affected the treatment process, he should determine this at once.

Initial Action

If the explosion has ignited smaller fires, they should be extinguished at once. If the treatment process has been affected, it may be necessary to make immediate corrections by bypassing or turning off units in the area of the explosion. The operator should assess the extent of the damage, notify the maintenance department and VDEQ and make arrangements for plant repairs necessary to return the plant to full efficiency.

Corrective Action

The operator will need to the report to the maintenance department the supplies and equipment he will need to repair the damaged units. If additional personnel are required to make the repairs, he should notify the maintenance department of this need also. Corrective action should be prompt to return the plant to full efficiency as soon as possible.

Methods to Reduce System Vulnerability

The cause of the explosion should be determined and action taken to prevent the same mishap from recurring. If signs are required in an area to warn personnel of flammable materials, the correct sign should be posted to read "No Smoking" or "Danger-No Open Flame-Flammable Material".

7. **Equipment Breakdown and Process Failures**

There are exceptions to the rule that failing equipment gives forewarning. Blowers and pumps may suddenly become clogged without warning; pumps may fail without giving off any unusual noises, heat, or vibration prior to failure. Therefore, frequent inspection of the equipment may not prevent equipment breakdowns in certain cases. The operator must be prepared to act in the event of equipment of process failure by employing alternate or emergency modes of operation and utilizing auxiliary plant equipment.

Identification

For most pieces of equipment at the plant, breakdown will be obvious when it occurs. Some equipment is furnished with warning devices such as lights or alarms to warn the operator of the failure. For failures that are not instantly identifiable, the operator's daily inspection of the equipment will detect the malfunction.

Initial Investigation

If equipment suddenly ceases to function, then a quick check for electrical circuit failure should be made first before "digging" into the affected unit. If the power is on, then a check for cause of breakdown should be made. Power should be turned off before disassembling electrical equipment.

If the plant units fail to accomplish their treatment functions at the expected efficiency, process failure has occurred. The operator should conduct lab tests on the flow through the plant and use the results to pinpoint the location of the process failure. Then, the operator should

determine why the unit is not running properly and assisting the treatment process efficiently (clogged pump, failing blower, improperly run flow meter, etc.)

Initial Action

At once the operator must take the necessary steps to return the plant to normal operation. He can do this by using standby equipment such as auxiliary pumps, or by channeling the wastewater flow through bypass routes around the broken equipment. In some cases, it may be necessary to bring in additional equipment such as portable pumps to carry out the operations.

Corrective Action

Once the operator has restored the plant to some mode of efficient operation, he should proceed to repair or replace the broken equipment. If the malfunction involves a serious breakdown, such as in the failing of an electric motor, it may be necessary to call in an outside repairman, specializing in that type of equipment. Equipment that cannot be repaired should be replaced immediately.

Methods to Reduce System Vulnerability

Frequent inspections of all plant equipment and processes is the best defensive measure in guarding equipment breakdowns. If the operator follows the maintenance schedules as well as the regular lubrication schedules of the plant equipment regularly, chances of breakdowns are minimized.

Since any and all mechanical and electrical equipment is subject to breakdowns, it is important that a good spare parts inventory is maintained. This will make repairs possible in the event of equipment failure.

8. **Personnel Injury**

The operator should become familiar with first aid procedures. Hazardous areas of the plant should be recognized and preventive measures should be obeyed as methods of preventing injuries.

Identification

At once the operator and the injured person should identify the seriousness of the injury. Steps in identifying injuries can be found in standard texts on first aid procedures.

Initial Investigation

Whether or not the injury will require assistance beyond the first aid equipment in the plant should be determined. Scratches or cuts should be immediately treated with supplies from the first aid equipment. More serious injuries may require that the person be taken to the hospital for treatment.

Initial Action

First aid procedures should be followed. If further attention is necessary, the injured person should be taken to the hospital. In extreme cases, an ambulance or doctor should be summoned.

Corrective Action

If first aid measures are sufficient in treating the injured person, no further attention may be necessary. For observation purposes, the injured person may have to be taken to the hospital to have the injury examined and treated additionally.

Methods to Reduce System Vulnerability

Employees should be instructed in first aid procedures, and inoculated with tetanus and typhoid shots on a regular schedule to protect against infection complications. Signs should be put up in hazardous areas warning employees of the potential dangers.

G. FORMAL ACTION PLANS AND PREPAREDNESS

It is important that an action plan be made for responding to each type of foreseeable emergency. This plan can be either a formal outline of steps to be taken, noting specific responsibilities of all parties participating in the action in the case of large scale disasters or, in the case of "routine" emergencies, by a mental note made by the operator in charge.

H. PERSONNEL RESPONSIBILITIES

In a plant such as this, it is not likely that many extensive formal action plans will be required. It is strongly recommended, however, that at the very minimum, the operator should devote a little time periodically to mentally "walk through" steps he would take to correct various emergency situations. An occasional afternoon spent walking though the plant and thinking about what to do if this or that piece of equipment failed, or this or that disaster occurred would serve as

a good self-training program for the operator. During such exercises, questions will inevitably arise, and if the operator will immediately seek answers from the engineer, technical representatives, etc., a reasonably good action plan will develop in the operator's mind. There are many instances on record to show that this type of mental exercise will serve the operators well during emergencies. The operator should also share with any other employees or interested party the procedure to follow in an emergency.

I. MUTUAL AID AGREEMENTS

Agreements can be made with police, fire, sewer and water departments in neighboring cities and towns as possibilities for giving mutual aid in case of an emergency. Assistance is also available from the Civil Defense, Red Cross, State Police, EPA, etc. These departments and agencies should be kept informed of operations and changes in the plant. The operator should list their addresses and phone numbers and post them.

J. EMERGENCY EQUIPMENT INVENTORY

From his day-to-day operation and maintenance routine, the operator should be aware of what materials would be critical during emergencies and should either have these items on hand or know exactly where to get them on a moment's notice. Along with his stock of routine spare parts, the operator should also consider stocking critical parts, which are not available locally or which require considerable lead time to order from the factory.

Since many emergencies can be corrected temporarily, it would be wise to have miscellaneous items stored neatly away on the plant grounds. Such items as

scrap lumber for shoring and bracing, wire of different types, old angle iron and plate steel for emergency welding, bolts, screws, nails, canvas, and various sizes of scrap pipe might all prove to be valuable during the stress of emergency repair work.

Other materials to consider in preparing for emergencies include routine hand tools, special tools, weight lifting equipment, etc. The operator should also consider which pieces of heavy mechanized equipment might be required for each emergency. For example, backhoes and bulldozers would be useful for fighting floods or forest fires.

The operator should also accurately assess his own capabilities for dealing with emergencies. If, for example, his not a trained electrician, his emergency phone list should include the name and number for someone having this skill. Also, the need for extra labor should be considered and sources of labor noted on the emergency list.

K. RE-EVALUATION OF EMERGENCY RESPONSE PLANS

The actions to be taken during an emergency situation, as suggested in this section, should be appraised and re-evaluated each year. The plant personnel should get together to discuss possible changes in the emergency response plans. The changes should be based on the past experiences of the personnel and the changing circumstances at the plant.

L. EMERGENCY EQUIPMENT TESTING

Emergency equipment should be tested regularly to ensure that the equipment will work in an emergency. A periodic testing schedule should be set up with preventive maintenance.

IX. LIST OF EMERGENCY CONTACTS

Police 911

Berkeley County Sheriff Department.....(304) 267-7000

Rescue Squad 911

Fire 911

Berkeley County Health Department.....(304) 263-5131

WV Department of Environmental Protection (WVDEP) .....(304) 926-0440

Emergency Spill Hotline.....1-800-642-3074

Potomac Edison West Virginia 1-800-686-0011

To report a power outage 1-888-544-4877

Emergencies:

If an emergency occurs, contact safety personnel - rescue squad, fire department - whoever is needed. After insuring personnel safety or treatment, notify the Berkeley County Health Department and WVDEP, tell them the nature of the emergency, how it affects the treatment process, and how long it will take to correct the problem.

X. APPENDICES

APPENDIX A – WVPDES PERMIT AND THE CERTIFICATE TO OPERATE

Ardeshir Sassan
Potomac Rock Estates, LLC
9425 Atwood Rd.
Vienna, WV 22182

Physical Site Location: Clyde Dr. & Whitings Neck Rd in Martinsburg

Please be advised that this e-mail constitutes approval for your sewage disposal system and your Registration No. is WVG551450. You are now authorized to operate under WV/NPDES General Water Pollution Control Permit No. WV0103110, issued on October 1, 2015. You should carefully read the contents of the General Permit that was attached to your registration package and become familiar with all requirements needed to remain in compliance with your permit.

You are subject to the monitoring requirements of Treatment Category 1 of the General Permit. The maximum flow from your facility is limited to 9,800 gallons per day.

Facilities permitted to discharge pollutants to the waters of the State under Chapter 22, Article 11 of the West Virginia Code are required to test their effluent in order to verify permit compliance. This testing is the responsibility of the permittee and these test results are to be submitted electronically to this office on the attached Discharge Monitoring Report on a quarterly basis. Failure to submit required eDMRs is a violation of the permit and can lead to enforcement actions being taken by this agency for noncompliance. Your first eDMR is due on or before 20 days following your reporting period.

Also, Section C of this permit requires the annual submission of your sewage sludge management report on the attached Small

Facility Sewage Sludge Management Report. Please be advised that if you are using ultraviolet disinfection, you do not need to monitor Total Residual Chlorine. If you decide in the future to chlorinate this discharge as the means of disinfection, you need to apply for a permit modification.

Finally, note that copies of all future correspondence regarding the permit registration must be sent to the following addresses:

WV Department of Environmental Protection
Division of Water & Waste Management
Permitting and Engineering
Branch
601 57th Street SE
Charleston, WV 25304-2345

Department of Environmental Protection
Environmental Enforcement
HC 63, Box 2545
Romney, WV 26757

The agency requires the permittee to utilize their login id for the electronic discharge monitoring report (eDMR) system. The permittee is not required to submit hard copies of the DMRs to the addresses listed above when using eDMR. Please be advised that these records must be readily available at the site for inspection by DEP personnel either in electronic or hard copy format.

This general permit registration e-mail approval supercedes general permit registration number WVG551450 dated December 06, 2010 .

This permit registration expires on September 30, 2020. Please refer to Appendix A, Items I.2 and I.16 for information relative to

the next reissuance.

Please note, monitoring for semi-Annual Total Phosphorous and Total Nitrogen is no longer required for this permit registration.

Your annual permit fee has been assessed as $50.00. You will be invoiced by this agency one month prior to the anniversary date of your original approval date. Failure to submit the annual fee within ninety (90) days of the due date will render your permit void upon the date you are mailed a certified written notice to that effect.

When Berkeley County PSSD is ready to take over operations, a transfer form and agreement of responsiblity will need to be submitted to WV DEP - Permitting.

If you have any questions, please do not hesitate to contact Brian Bailey at (304) 926-0499 Ext. 1021 or by email at Brian.D.Bailey@wv.gov .

Scott G. Mandirola
Director
WV DEP-Division of Water & Waste Mgt.
601 57th St SE
Charleston, WV 25304-2345
Phone: (304) 926-0495
Fax: (304) 926-0463

WRD 2A-82

LIMITATION CATEGORY: 1

GEN. PMT. REGISTRATION NO. WVG551450

STATE OF WEST VIRGINIA
NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM
DISCHARGE MONITORING REPORT

Final Limitations

FACILITY NAME: (Potomac Rock Estates, LLC) POTOMAC ROCK ESTATES, LLC
LOCATION OF FACILITY: BERKELEY COUNTY; Berkeley County
PERMIT NO.: WV0103110 OUTLET NO.: 001
WASTELOAD FOR THE MONTH OF:

CERTIFIED LABORATORY NAME:
CERTIFIED LABORATORY ADDRESS:
INDIVIDUAL PERFORMING ANALYSIS:

Parameter		Quantity				Other Units						Measurement Frequency	Sample Type
				Units	N.E.				CEL*	Units	N.E.		
50050 (ML-1) RF-B	Reported												
Flow,in Conduit or thru plant	Permit Limits	N/A	N/A			N/A	N/A	0.0098 Max. Daily	N/A	mgd		1/quarter	Estimated
Year Round													
00310 (ML-B) RF-B	Reported												
BOD, 5-Day 20 Deg.C	Permit Limits	Rpt Only Avg. Monthly	Rpt Only Max. Daily	Lbs/Day		30 Avg. Monthly	60 Max. Daily	75 Inst. Max.	N/A	mg/l		1/quarter	Grab
Year Round													
00530 (ML-A) RF-B	Reported												
Total Suspended Solids	Permit Limits	Rpt Only Avg. Monthly	Rpt Only Max. Daily	Lbs/Day		30 Avg. Monthly	60 Max. Daily	75 Inst. Max.	N/A	mg/l		1/quarter	Grab
Year Round													
74055 (ML-A) RF-B	Reported												
Coliform, Fecal	Permit Limits	N/A	N/A			200 Mon. Geo. Mean	400 Max. Daily	500 Inst. Max.	N/A	Cnts/100m		1/quarter	Grab
Year Round													
00400 (ML-A) RF-B	Reported												
pH	Permit Limits	N/A	N/A			6 Inst. Min.	N/A	9 Inst. Max.	N/A	S.U.		1/quarter	Grab
Year Round													
									N/A				
									N/A				
									N/A				

* CEL = Compliance Evaluation Level

Name of Principal Executive Officer	I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information including the possibility of a fine and imprisonment for knowing violations.	Date Completed
Title of Officer		Signature of Principal Executive Officer or Authorized Agent

STATE OF WEST VIRGINIA
NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM
SMALL FACILITY SEWAGE SLUDGE MANAGEMENT REPORT

FACILITY NAME (Potomac Rock Estates, LLC)POTOMAC ROCK ESTATES, LLC
ADDRESS 9425 Atwood Rd, Vienna, WV 22182
DESIGN FLOW 9,800 gpd
REGISTRATION NO. WVG551450
REPORT YEAR

LIQUID SLUDGE

Amount Removed From Facility This Year(Gallons)
Frequency of Removal(Occurrences per Year)
Liquid Sludge Removed By
Septage Hauler Registration Number

DRY SLUDGE AND SAND

Amount of Dry Sewage Sludge, Sand, or Other Filter Media Removed This Year(Tons)
Method of Disposal
Location of Disposal

POLISHING POND CLEANING

Amount Removed This Year(Gallons)
Liquid Sludge Removed By
Method of Disposal
Location of Disposal

ADDITIONAL COMMENTS OR EXPLANATION

I certify under penalty of law that the sewage management practices are requirements of Federal regulations 40 CFR Part 503 and state sludge regulations Title 33, Series 2 have been met and that all sewage sludge disposed from this facility during this reporting period is reconciled and accounted for in this sewage sludge management report. This determination has been made under my direction and supervision in accordance with the system designed to ensure that qualified personnel properly gather and evaluate the information used to determine that these requirements have been met.

I also certify that this document and all the attachments were prepared under my direction or supervision, and that this information is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that these are significant penalities for false certification including the possibility of fine and imprisonment.

OFFICIAL
TITLE
SIGNATURE
DATE

APPENDIX B – OPERATOR INSPECTION CHECKLIST

OPERATOR INSPECTION CHECKLIST

	Date	Date	Date	Date	Date	Date	Date
DATE/OPERATORS INITIALS							
Equalization Pumps							
FAST Blower							
Recirculation Pump							
D-Box Flow per Gravity Line							
Settling Tank Sludge Level							
FAST Tank Sludge Level							
Effluent Clean and Odor Free							
Check for Alarms (list any alarms)							
Equipment Operating Normally (list any suspected problems)							
Any Accidents/Complaints/Problems							
Lab Work Performed/ Samples Taken							

APPENDIX C – MANUFACTURER'S EQUIPMENT INFORMATION

MANUFACTURER'S EQUIPMENT INFORMATION

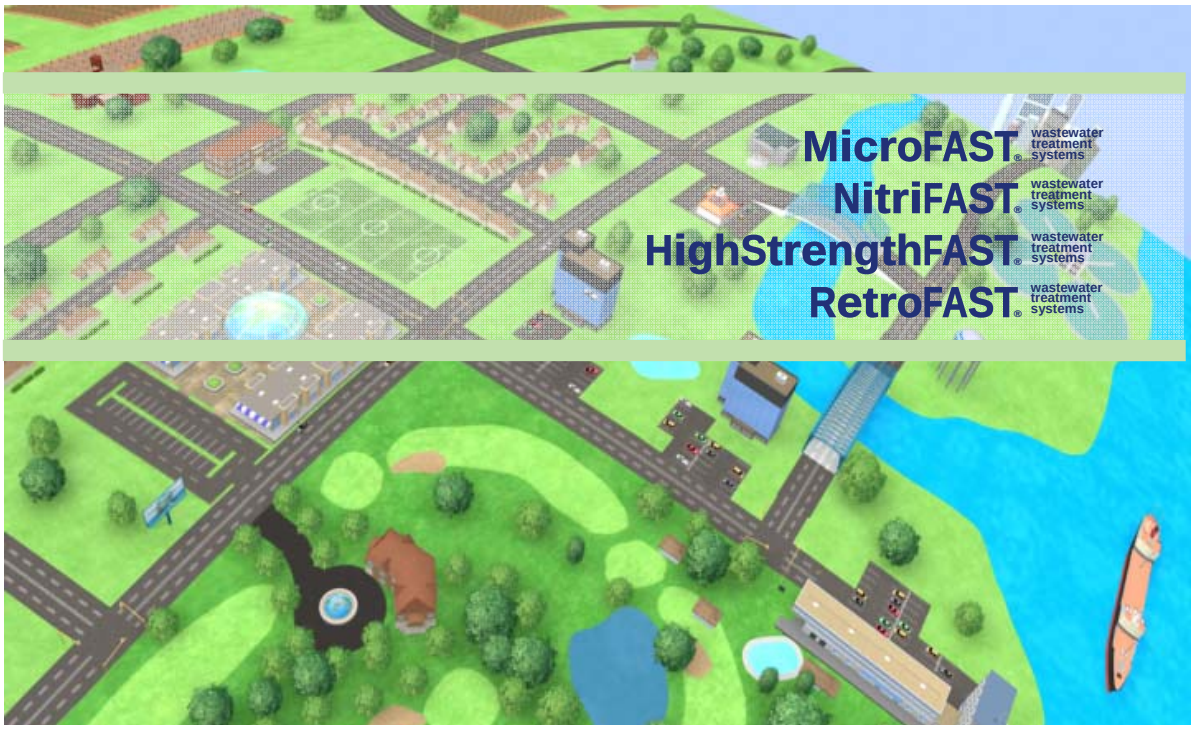
It is important that the operator refer to the following listed and provided operational and maintenance (O&M) manuals in conjunction with the design and technical specifications.

1. FAST System Operation and Maintenance Manual
2. Operation and Maintenance Manual for Pumps
3. Miscellaneous Submittals

FAST® Owner's Manual

FOR USE WITH

(NSF Std 40 & 245)	**MicroFAST® 0.5, 0.625, 0.75, 0.9, 1.5**
(non-NSF certified)	**MicroFAST® 3.0, 4.5, 9.0**
(ETV/EPA tested)	**RetroFAST® 0.150, 0.250, 0.375**
	NitriFAST® 0.5, 0.625, 0.75, 0.9, 1.5, 3.0, 4.5, 9.0
	HighStrengthFAST® 1.0, 1.5, 3.0, 4.5, 9.0



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Dear FAST® System Owner

Congratulations! You have a FAST® wastewater treatment system installed on your property.

At the forefront of green technology, the FAST® System by Bio-Microbics meets the highest industry treatment standards. Based on environmentally sound and simple scientific principles, the FAST® process is our continued commitment to improve small onsite treatment capabilities. You can take pride in knowing that, with the FAST® system, you will help ensure a clean environment for future generations.

Please take time to read this FAST® Owner's Manual, you will learn important safety precautions, review detailed information on proper use and care of your system. Designed for minimal operator attention, the FAST® System contains only one moving part – the blower. By consistently following a maintenance schedule and being mindful of what can go down your drains, you can enjoy the lasting benefits FAST® Wastewater Treatment System for decades to come.

Top things you can do to prolong the life of your system:

1. **Have the FAST® system inspected and tank pumped as necessary.**
2. **Keep track of the substances entering your system, please review the list of Do's & Don'ts (see other side for poster).**
3. **Keep the FAST® System operating - do not turn off the blower.**
4. **Care for your drain field or irrigation system (if incorporated into your FAST® System).**

If you should desire any further assistance, please contact Bio-Microbics at sales@biomicrobics.com or call us at 800-753-FAST (3278).

Thank you again for using FAST®!

Sincerely, *Bio-Microbics Team*

Certified to NSF/ANSI Standard 40

NSF INTERNATIONAL

CERTIFIED SYSTEMS SERVICE POLICY

All NSF (National Sanitation Foundation) Standard 40 Class I and 245 certified wastewater treatment systems (MicroFAST® 0.5, 0.75, 0.9, 1.5) have an initial two-year service agreement included with the system's initial purchase price (two service calls per year). The NSF service calls ONLY cover NSF Standard 40 certified systems; other components of the septic system are NOT covered.

If there are any deficiencies in the FAST® system's operation or components, the service person will notify the owner in writing and detail when these deficiencies can be fixed.

The company listed on the blower housing or control panel label performs this service. During an NSF service call, the service company shall inspect the blower for proper operation, visually inspect the system's effluent for clarity, clean the blower air filter and assure proper function of the control panel. If these service calls are not performed on your NSF certified system, or not all of the items are checked, please call Bio-Microbics at:

800-753-FAST (3278) or (913)422-0707

For continual service of NSF certified systems beyond the first two years, an extended service agreement is available through your local Distributor or current service provider. This policy should provide the same services and may include any additional service that are required by local regulation.

OWNER'S MANUAL

FOR USE WITH FAST® SYSTEMS:

(**NSF®** Std 40/245 cert.)	**MicroFAST® 0.5, 0.625, 0.75, 0.9, 1.5**
(Non-NSF cert.)	**MicroFAST® 3.0, 4.5, 9.0**
(ETV/EPA tested)	**RetroFAST® 0.150, 0.250, 0.375**
	NitriFAST® 0.5, 0.625, 0.75, 0.9, 1.5, 3.0, 4.5, 9.0
	HighStrengthFAST® 1.0, 1.5, 3.0, 4.5, 9.0

GENERAL INFORMATION

All FAST® products are ETL certified for safety (electrical, environmental, etc.). One or more of the following patents protects this process: 3,966,599; 3,966,608; 3,972,965; 5,156,742. Certified by NSF International, the MicroFAST® 0.5, 0.625, 0.75, 0.9 and 1.5 systems meets NSF Standard 40, Class 1 and Standard 245 certifications for wastewater treatment devices. If you have questions regarding any Bio-Microbics products, please contact us:

800-753-FAST (3278) or (913) 422-0707
e-mail: onsite@biomicrobics.com

About FAST®: The FAST® (Fixed Activated Sludge Treatment) system uses naturally occurring bacteria (biomass) to treat sewage for dispersal into the environment. This continuous process provides the biomass with waste (food) and air in a suitable environment. Dead bacteria and non-biodegradable waste settle and accumulate in the bottom of the tank for periodic removal.

The FAST® process consists of the treatment module and blower. The blower provides air to the system via the air supply pipe. The air supply pipe and draft tube create an air lift. The air lift mixes oxygen and waste throughout the media inside the tank. Bacteria grows on the media and digests the waste. A vent pipe expels harmless vapors created by the process.

INTRODUCING SUBSTANCES INTO THE SYSTEM: While the FAST® wastewater treatment system will process most waste produced by the average household, introducing large amounts of subatances into the system may reduce the efficiency of the system or stop the treatment process by destroying the biomass. These substances can be grouped as: prohibited substances and limited-use substances. Please refer to the "*DO'S AND DON'TS"* list to get familiar with ***What You Can Put Down the Drain*** to maximize the system's efficiency and reduce the time period between septic tank pump-outs.

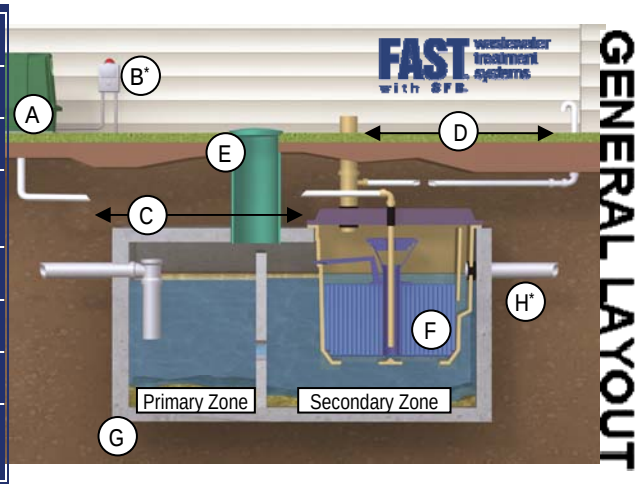
In general: *IF A SUBSTANCE IS HARMFUL TO HUMANS OR IS ANTI-BIOTIC IN NATURE, IT SHOULD NOT BE PUT INTO ANY SEPTIC SYSTEM - INCLUDING FAST®.*

IF YOU HAVE A QUESTION REGARDING THE EFFECT OF A PARTICULAR SUBSTANCE ON THE FAST® SYSTEM, CALL YOUR BIO-MICROBICS SERVICE TECHNICIAN.

SYSTEM COMPONENTS

The FAST® wastewater treatment system typically includes the following components:

- A. Blower & Housing
- B. Control Panel
- C. Air Piping
- D. Vent(s) and Observation Port
- E. Access
- F. FAST® Unit
- G. Tank
- H. Outlet to Drain field



***PLEASE NOTE**: Adequate pump out must be provided for primary and secondary zones. There may be ancillary equipment associated with your system: pump(s) (before and/or after the FAST® unit), a distribution box, a disinfection system, an irrigation system, a remote alarm, or auto dialer, etc.*

WARNING ***DO NOT ENTER THE SEPTIC TANK.*** *Hazards exist in a septic system. All precautions must be followed when inspecting the system. Keep tank openings covered at all times. Failure to do so could result in severe sickness or death. Lethal gases, high voltage electricity, and other deadly hazards can be associated with the system. DO NOT use an open flame or cause a spark near a septic tank's access points. Gases emanating from septic tanks can explode if ignited or deadly if inhaled.*

WARNING *Only authorized, qualified service personnel should service a septic system; open access ports; and/or open covers to a septic tank. Infectious organisms exist in a septic tank. If any contact with wastewater occurs, immediately wash and disinfect all exposed areas and contact personal physician.*

MAINTENANCE & SERVICE

WARNING *Only qualified service staff should open access ports and/or covers. Infectious organisms exist in a septic tank. If any contact with wastewater, immediately wash and disinfect all exposed areas and contact personal physician. Failure to do so could result in severe sickness or death.*

CAUTION *Avoid pumping down a tank after periods of heavy rain or when the ground water is likely to be above the bottom of the concrete tank. Emptying the tank under these conditions could cause the tank to float up and become dislodged.*

As the FAST® system processes the raw domestic waste (producing sludge and sloughed-off bacteria), the dead bacteria and non-biodegradable waste settle and accumulate in the bottom of the septic tank for periodic removal. The periodic removal time interval will change depending on the size of the system and varying load conditions.

Tank Pumping Procedure: As Required by Measurement of Sludge Depth

To determine the sludge depth accurately, open up the access ports/cover(s) to the primary zone (settling compartment), insert a sludge-measuring instrument, and take samples. If sludge is 18" (inches) deep or takes up 75% of the area below the port connecting settling compartment to secondary zone (which contains the FAST system), have the tank pumped out. All stricter, applicable regulations supersede these operational directions.

Also, check the sludge depth of the secondary zone. Open the access ports/cover(s) to the secondary zone and measure sludge depth. If sludge depth in the secondary zone is greater than 14" (inches), it is necessary to pump the bio-solids out.

CAUTION *Always pump out both zones of the system even if only one zone may require it.*

Continued - Tank Pumping Procedure: As Required by Measurement of Sludge Depth

1. Open the access ports/cover(s) and insert the hose. Be sure to **pump out both settling and treatment chambers** of the system.
2. Once the unit has been pumped out, **immediately refill the tank with clean water** to reduce the risk of the tank floating and to minimize the impact on treatment. Close the access ports/cover(s) making sure it is watertight.
3. **Properly dispose of the solids** in compliance with local and state regulations.

SEASONAL/INTERMITTENT USE PROPERTIES FAST® wastewater treatment system will function normally during short periods of inactivity, even if there is no wastewater flowing to the system. The power to the system should be left on during this time. Typical examples of extended periods of intermittent use and suggested operational procedures:

- **Summer use property** (shut down all winter) - blower should be turned off at end of summer and restarted upon return.
- **Weekend property** (used at least once every three weekends) - maintain normal operation or utilize FAST's SFR® blower timer feature on control panel. Consult your service provider and local regulations prior to any system changes.

Check with local regulations before attempting: If property is seldom used and blower is shut down completely for an extended period of time (i.e. summer use only), we suggest to arrange through your local service provider restarting the blower a week or two prior to returning to the property.

WARNING ***Only authorized service personnel should service a septic system and its components. Deadly hazards such as lethal gases and high voltage electricity are associated with the system.***

CAUTION ***Introducing harmful or damaging substances into the FAST system may void the warranty.***

LIMITED WARRANTY

Bio-Microbics, Inc. warrants every new residential FAST® system against defects in materials and workmanship for a period of two years after installation or three years from date of shipment, subject to the following terms and conditions, (Commercial FAST system for a period of one year after installation or eighteen months from date of shipment, whichever occurs first, subject to the following terms and conditions):

During the warranty period, if any part is defective or fails to perform as specified when operating at design conditions, and if the equipment has been installed and is being operated and maintained in accordance with the written instructions provided by Bio-Microbics, Inc., Bio-Microbics, Inc. will repair or replace at its discretion such defective parts free of charge. Defective parts must be returned by owner to Bio-Microbics, Inc.'s factory postage paid, if so requested. The cost of labor and all other expenses resulting from replacement of the defective parts and from installation of parts furnished under this warranty and regular maintenance items such as filters or bulbs shall be borne by the owner. This warranty does not cover general system misuse, aerator components which have been damaged by flooding or any components that have been disassembled by unauthorized persons, improperly installed or damaged due to altered or improper wiring or overload protection. This warranty applies only to the treatment plant and does not include any of the structure wiring, plumbing, drainage, septic tank or disposal system. Bio-Microbics, Inc. reserves the right to revise, change or modify the construction and/or design of the FAST system, or any component part or parts thereof, without incurring any obligation to make such changes or modifications in present equipment. Bio-Microbics, Inc. is not responsible for consequential or incidental damages of any nature resulting from such things as, but not limited to, defect in design, material, or workmanship, or delays in delivery, replacements or repairs.

THIS WARRANTY IS IN LIEU OF ALL OTHER WARRANTIES EXPRESS OR IMPLIED. BIO-MICROBICS SPECIFICALLY DISCLAIMS ANY IMPLIED WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. NO REPRESENTATIVE OR PERSON IS AUTHORIZED TO GIVE ANY OTHER WARRANTY OR TO ASSUME FOR BIO-MICROBICS, INC., ANY OTHER LIABILITY IN CONNECTION WITH THE SALE OF ITS PRODUCTS.

Contact your local distributor for parts and service.

EXTENDED SERVICE AFTER THE FIRST TWO YEARS

An Extended Service Policy is available and may be purchased through your local Bio-Microbics distributor. The extended service policy should provide the same service checks as the initial NSF service policy, sludge accumulation levels in the septic and FAST tanks, and perform any additional service required by local regulation. Extended service on NSF certified systems should be performed twice per year.

Keep for Your Records

FAST® System Serial Number: _____

System Designer Name: _____

Designer Phone: _____

Health Official Name: _____

Health Official Phone: _____

Manufacturer Name: Bio-Microbics, Inc.

Manufacturer Phone: 1-800-753-FAST (3278)

Installed By: _____

Installer Phone: _____

Maintenance Provider Name: _____

Maintenance Provider Phone: _____

BIO MICROBICS
BETTER WATER. BETTER WORLD.®

8450 Cole Parkway • Shawnee, KS 66227 • USA
Ph: 913-422-0707 • Fax: 913-422-0808
800-753-FAST (3278) • www.biomicrobics.com

BIO-MICROBICS INCORPORATED
Better Water. Better World.®

FAST® wastewater treatment systems with SFR®

FAST® Service Manual

FOR USE WITH

(NSF Std 40 & 245) **MicroFAST® 0.5, 0.625, 0.75, 0.9, 1.5**
(non-NSF certified) **MicroFAST® 3.0, 4.5, 9.0**
(ETV/EPA tested) **RetroFAST® 0.150, 0.250, 0.375**
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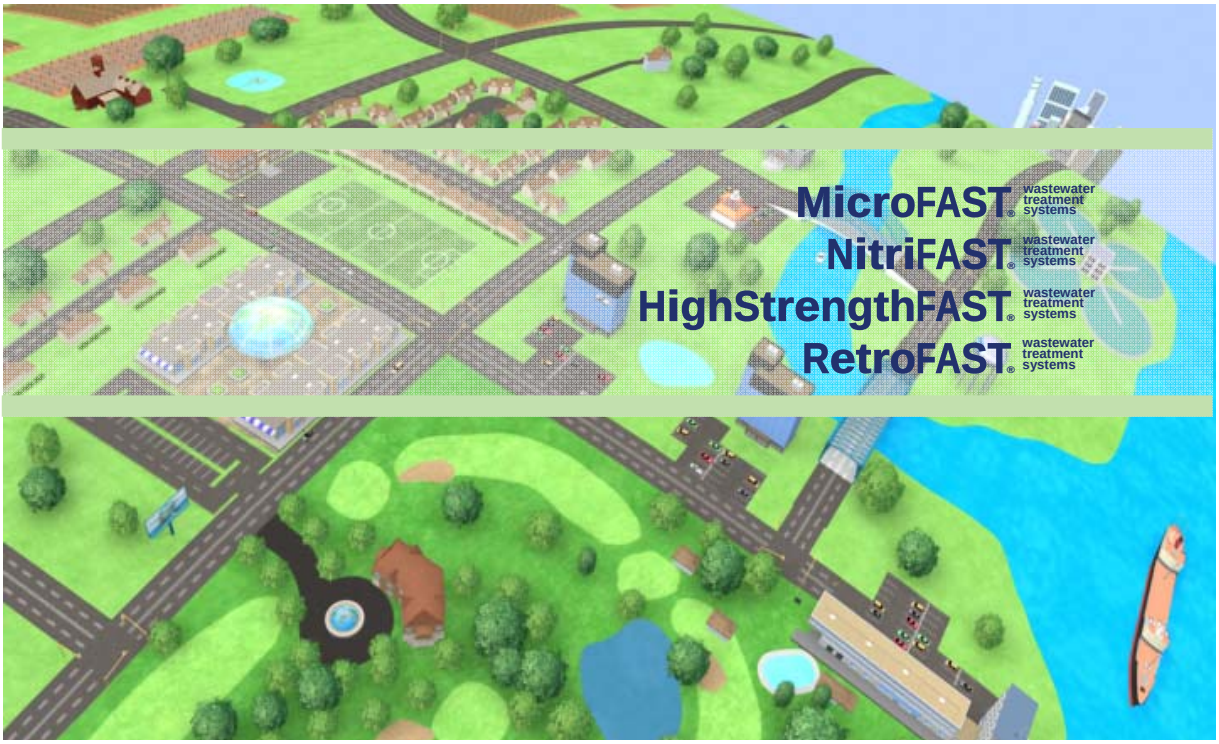

SERVICE MANUAL

FOR USE WITH FAST® SYSTEMS:

(**NSF**® Std 40/245 cert.)	**MicroFAST® 0.5, 0.625, 0.75, 0.9, 1.5**
(Non-NSF cert.)	**MicroFAST® 3.0, 4.5, 9.0**
(ETV/EPA tested)	**RetroFAST® 0.150, 0.250, 0.375**
	NitriFAST® 0.5, 0.625, 0.75, 0.9, 1.5, 3.0, 4.5, 9.0
	HighStrengthFAST® 1.0, 1.5, 3.0, 4.5, 9.0

GENERAL INFORMATION

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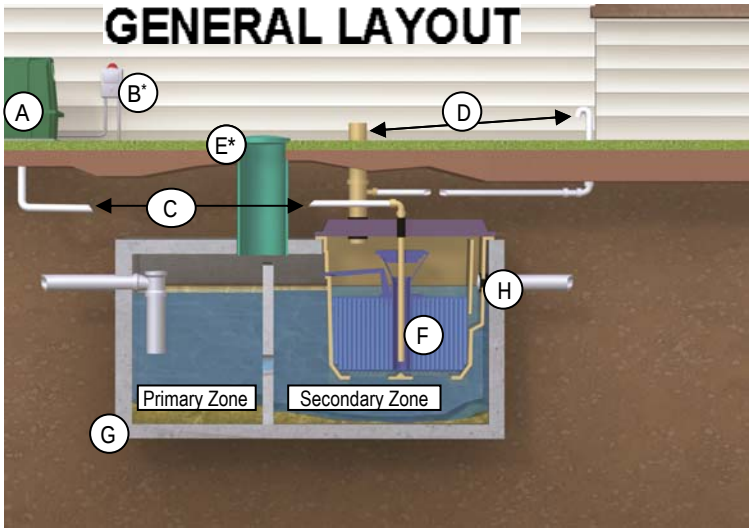
800-753-FAST (3278) or (913) 422-0707

e-mail: onsite@biomicrobics.com

About FAST®: The FAST® (Fixed Activated Sludge Treatment) system uses naturally occurring bacteria (biomass) to treat sewage for dispersal into the environment. This continuous process provides the biomass with waste (food) and air in a suitable environment. Dead bacteria and non-biodegradable waste settle and accumulate in the bottom of the tank for periodic removal.

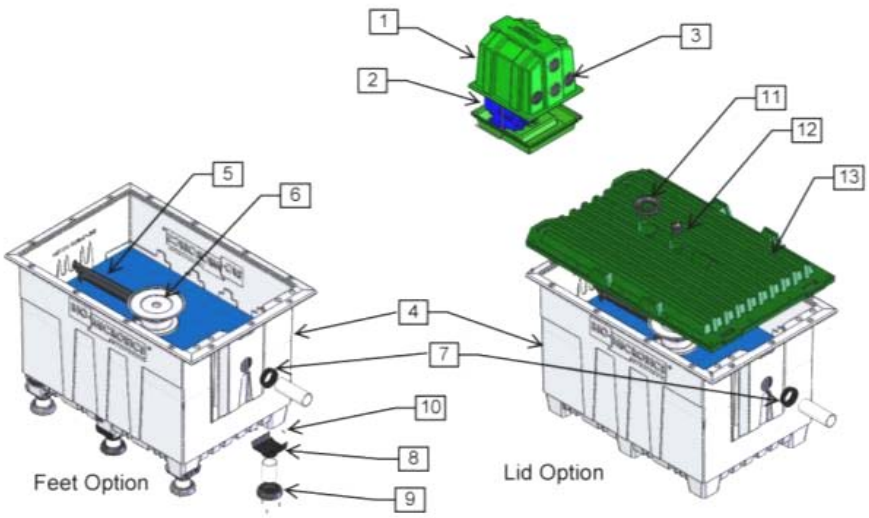
The FAST® process consists of the treatment module and blower. The blower provides air to the system via the air supply pipe. The air supply pipe and draft tube create an air lift. The air lift mixes oxygen and waste throughout the media inside the tank. Bacteria grows on the media and digests the waste. A vent pipe expels harmless vapors created by the process.

- A. Blower and Housing
- B. Control Panel
- C. Air Line Piping
- D. Vent(s) and Observation Port
- E. Access
- F. FAST® Unit
- G. Tank
- H. Outlet to Drain field



**PLEASE NOTE: Adequate pump out must be provided for primary and secondary zones. There may be ancillary equipment associated with your system: pump(s) (before and/or after the FAST® unit), a distribution box, a disinfection system, an irrigation system, a remote alarm, or auto dialer, etc.*

SYSTEM COMPONENTS



SUPPLIED EQUIPMENT

Please refer to the Installation Manual for a list of your system's original supplied parts. Picture shown is the MicroFAST® standard parts diagram.

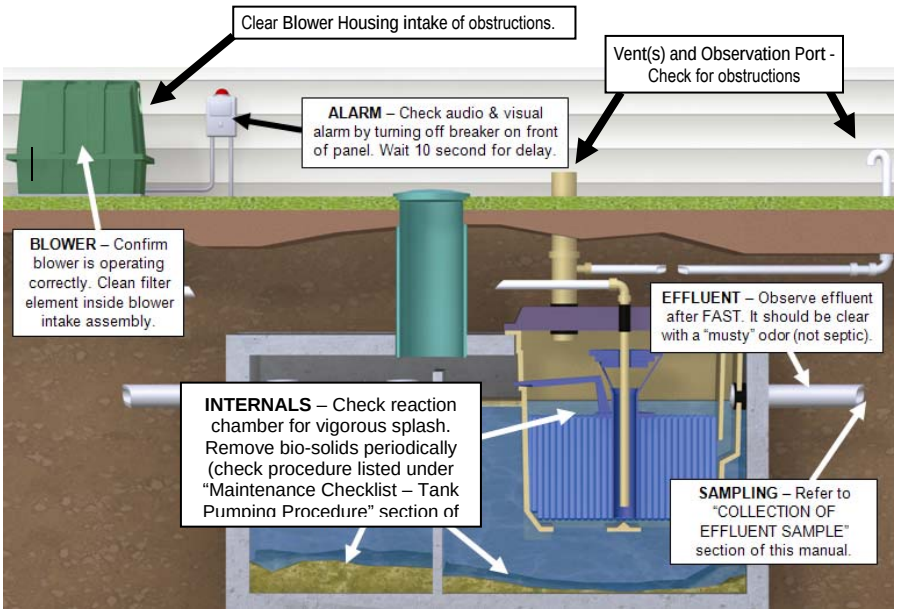
If replacement parts are needed please have the serial number ready and call the local distributor listed on the control panel or Bio-Microbics.

COMMON NAME

1. Blower Housing
2. Blower (with blower I/O piping, Inlet Filter Assembly, blower and housing screws not shown)
3. Louver
4. Liner
5. Recirculation Trough
6. Air Lift
7. 4" Outlet Gasket
8. Foot Top (foot option)
9. Foot Bottom (foot option)
10. Foot Screws (foot option)
11. 6" Observation Port Gasket (lid option)
12. 2" Air Line Gasket (lid option)
13. Lid *(Optional)* (Not with MCF 4.5 or 9.0)

REGULAR SERVICE MAINTENANCE

WARNING *Always secure all access covers to prevent unauthorized people from entering the tank. Only qualified service personnel should open access ports and/or covers. Infectious organisms exist in a septic tank. If any contact with wastewater occurs, immediately wash and disinfect all exposed areas and contact personal physician. Failure to do so could result in severe sickness or death. DO NOT use an open flame or cause a spark near a septic tank's access points. Gases emanating from septic tanks can explode if ignited or deadly if inhaled.*



NORMAL OPERATING CONDITIONS

SOUND	The FAST® system's blower makes a constant humming noise, much like a household refrigerator. Under normal conditions, the blower should last 5+ years without need for replacement. If an unusual noise is heard, refer to the Trouble-Shooting Guide.
ODOR	A musty, earthy-type of odor is normal. However, if a sewage odor (rotten egg smell) is detected, refer to the Trouble-Shooting Guide.
SIGHT	A properly loaded and operated FAST® system will produce effluent that looks like tap water. If the effluent is turbid, opaque, or suddenly changes, refer to the Trouble-Shooting Guide.

DO'S & DON'TS*.....What can I put down the drain?*

Please refer to the list below for important information on how to help keep your treatment system performing as it should.

⚠CAUTION *Introducing harmful or damaging substances into the FAST system may void the warranty.*

Do not put these items down the drain:

FOOD WASTES	ANIMAL BONES / COFFEE GROUNDS / CORN COBS / EGG SHELLS / SKIN / FRUIT PEELS / MELON RINDS / HOME BREWERY WASTE
PERSONAL PRODUCTS	BANDAGES / CONDOMS / SANITARY NAPKINS / WET WIPES / DISPOSABLE DIAPERS
CHEMICALS/TOXINS	AUTOMOTIVE FLUIDS / CAUSTIC CLEANERS / DRUGS / FLOOR STRIPPER / HARSH DETERGENTS / HERBICIDES / MEDICATIONS / PAINTS (OIL-BASED) / PESTICIDES / AMMONIUM CHLORIDE CLEANERS / SOLVENTS / THINNERS
OTHER PRODUCTS	CAT LITTER / CIGARETTE BUTTS / CLOTH TOWELS / FILM DEVELOPING WASTE / METAL OBJECTS / MODELING CLAY / PAPER TOWELS / SCRAPS / PLASTIC BAGS / PLASTIC OBJECTS / RAGS / RV WASTE

RECORD KEEPING

Keep copies of all system drawings/plans of the site/installed equipment/service records with all other home appliance documents. *Record all applicable information.*

LAUNDRY

Spread wash loads throughout the week. Instead of liquid fabric softener, dryer sheets should be used. Use low-suds, biodegradable and low phosphate detergents, like Mighty Mike® from Scienco/FAST (www.sciencofast.com).

LEAKY FIXTURES

Large quantities of water are added to your wastewater system when you have leaking fixtures. Timely detection and repair can help to maximize the life of your system, especially the drain field.

WATER SOFTENERS

The FAST® process may tolerate discharge from properly operating softeners that backwash as needed based on water usage (DIR) vs. timer operated systems, if allowed by your local regulatory authority. However, these discharges can possibly damage other parts of the septic system.

FOOD WASTES

Garbage disposal waste is acceptable - if allowed by your local regulatory authority. However, it may lead to more frequent removal of solids from your septic tank. Please dispose of large quantities of food in the garbage.

FATS, OILS & GREASE

Too much grease (i.e. animal fats, vegetable oils, lard, etc) put down the drain may overload the system and prevent the bacteria from fully breaking down the waste.

DISINFECTANTS / CLEANERS

Use citric acid, chlorine, or biodegradable cleaners according to the manufacturer's recommendations. Products containing ammonium chloride compounds or pine oil-based cleaners should not be used. Use drain cleaners as a last resort to unclog pipes.

GARAGE AND WORKROOM

Drains from these areas should be diverted away from your septic system. Petroleum-based products and saw dust should not enter the system.

MEDICATIONS

DO NOT FLUSH UNUSED MEDICATIONS DOWN THE DRAIN. Unused medications should be returned to the pharmacy, doctor, or thrown away in the trash. *NOTE: As the human body absorbs ≤20% of these medications, please notify your service provider of medications taken frequently or used intermittently in the house. This could reduce troubleshooting efforts and possibly your maintenance bill.*

SEPTIC TANK ADDITIVES / ENZYMES

The wastewater in the system typically contains all the required bacteria for proper operation. Commercial additives are most often unnecessary; and may do more harm than good.

PAPER PRODUCTS

Use single- or double-ply, non-quilted, white toilet paper products. Some color dyes in the paper cannot be eaten by natural bacteria. Non-bleached paper (brown in color) takes longer to break down and can therefore increase the pump out frequency of your tank. Avoid flushing paper towels, napkins, wipes, or other thicker paper material.

WARNING *Always secure all access covers to prevent unauthorized people from entering the tank. Only qualified service personnel should open access ports and/or covers. Infectious organisms exist in a septic tank. If any contact with wastewater occurs, immediately wash and disinfect all exposed areas and contact personal physician. Failure to do so could result in severe sickness or death. DO NOT use an open flame or cause a spark near a septic tank access points. Gases emanating from septic tanks can explode if ignited or deadly if inhaled.*

MAINTENANCE CHECKLIST

☐ TRAFFIC Ensure that the FAST® system has not been damaged due to excessive weight loading (>1,750 lb. point load.) Only normal yard traffic (lawn mowers, etc.) is acceptable. Traffic bearing (H-20) tanks can be made for use with FAST® (w/ feet). Consult local distributor or the factory for guidance.

☐ BLOWER OPERATION DO NOT turn off the blower (unless testing alarm). Treatment quality and drain field life could be reduced. Check the blower for proper function. Clean the blower's inlet air filter element. The blower can be operated by a timer in certain situations. Contact your local Bio-Microbics distributor for more information. If the blower is malfunctioning please refer to the "Troubleshooting Guide" or Blower Replacement Section located in this manual.

☐ ALARM PANEL AND ALARM SOUNDS The alarm has a ~10 second built-in delay. Test the audible alarm by turning the blower OFF. To silence the alarm, use the "RESET" button on the panel's front. If the alarm is activated for an unknown reason, please refer to the "Troubleshooting Guide" located in this manual.

☐ VENTS, ODORS, AND INTAKES Clear the vent(s) and blower housing intakes of any obstructions. Please refer to the "Troubleshooting Guide" located in this manual if you detect septic odors coming from the FAST® vent as this may indicate a problem with the system.

☐ WATER QUALITY effluent should be clear and odorless. All FAST® systems are capable of exceeding the USEPA standard for secondary wastewater treatment (40CFR, part 133.102) depending on how they are applied, sized, installed and operated. If samples are required please refer to the "Collection of Effluent Sample" section below.

☐ BIO-SOLIDS (SLUDGE) LEVELS Scheduling sludge removal depends on the size and design of the septic tank. Check the sludge levels in both tanks/compartments by inserting a sludge-measuring instrument and taking measurements in multiple locations in each compartment of the tank(s). Pump both compartments/tanks if the sludge is:

1. 18" deep in the primary settling tank or is within 6" of the connection point between the settling tank and the secondary/treatment zone; and/or
2. Within 3"-4" of the bottom of the FAST® unit in the treatment tank.

To determine the proper measurement for #2 above, measure the total liquid depth of the treatment tank (containing the FAST® unit) using a sludge-measuring instrument. Take that value and subtract the height of the FAST® product (in the table below). The result is the total sludge storage height available in the tank.

FAST® Models	Module Height
ALL RetroFAST®	27" [68.5 cm]
FAST® Models 0.5, 0.625, 0.75, 0.9, 1.5, & 4.5	31" [79 cm]
FAST® models 3.0 & 9.0	55" [140cm]

All stricter, applicable regulations supersede these operational directions. Always pump out both zones, even if only one zone may require it.

TANK PUMPING PROCEDURE:

WARNING *Only qualified service personnel should open access ports/covers. If any contact is made with wastewater, immediately wash and disinfect all exposed areas and contact personal physician. Failure to do so could result in severe sickness or death.*

CAUTION *Avoid pumping down after periods of heavy rain or when the ground water is likely to be above the bottom of the concrete tank. Emptying the tank under these conditions could cause the tank to float up and become dislodged.*

1. Open the access ports/cover(s) and insert the hose. Always pump out both settling and treatment chambers of the system, even if only one side requires it.
2. Once the unit has been pumped out, immediately refill the tank with clean water to reduce the risk of the tank floating and to minimize the impact on treatment. Close the access ports/cover(s) making sure it is watertight.
3. Properly dispose of the solids removed in compliance with local and state regulations.

COLLECTION OF EFFLUENT SAMPLE

Please contact your local distributor or Bio-Microbics for a copy of the "Testing Protocol" document. *Important:* All samples must be collected, stored, transported and tested according to the "Testing Protocol" document by Bio-Microbics and the most current version of Standard Methods.

OTHER SYSTEM COMPONENTS (if applicable)

☐ Check LIXOR® PRE-AERATION DEVICE blower, inlet filter, blower housing, and air delivery system for proper function.

☐ Check INFLUENT BIOSTEP® PUMP(S) for proper function. Clean the screening device by using built in swab or other method.

☐ Check SANITEE® EFFLUENT SCREEN (FILTER) or other screening device. Clean by using the built in swab or other method.

☐ DISPERSAL SYSTEM (not by Bio-Microbics) Follow manufacturer's recommendation.

TROUBLESHOOTING GUIDE

Contact factory or local distributor for all other issues: (913) 422-0707

PROBLEM	SITUATION	POSSIBLE CAUSE / SOLUTION
Alarm is activated (sounding)	Blower is NOT running *Please check the following. If problem persists, call service provider*	➢ Breaker has tripped – turn blower switch ON. If the switch will not stay ON, s*ee next steps…*
		➢ Breaker trips after 2-3 seconds – blower is over amping – electrician needs to check blower wiring.
		➢ Breaker trips immediately – electrical system has a short – electrician must investigate
		➢ Blower is seized – cooling fan will not spin freely with power OFF – replace blower – call service provider
	Blower is running *Please check the following. If problem persists, call service provider*	➢ Water Level is high – check the water level in the unit. Water level should be 2-3 inches above the media. Water level high? YES: consult distributor. NO: Go to next step.
		➢ Liquid Level Switch Present – NO: Go to next step. YES: Check if wired in the same conduit as 90 VAC or higher wires (a violation of electric code NEC/IEC). If YES: Wires will need to be separated.) – If NO: Switch may need adjusting. Turn switch's Allen screw clockwise, wait ~10 seconds for alarm to "catch up".
		➢ Current Sensor Present – YES: Open panel and find "Diagnostic LED's" in the upper right hand corner. Note which light is lit and consult the distributor. NO: Consult distributor
		➢ Vent is undersized or Vent(s) or airline is blocked or broken – Check specifications for vent sizing requirements. Remove blockage or repair vent(s) or airline.
Waste is backing up from tank	Blockage in pipe network.	➢ Check all piping for blockage, including all interior tank piping and effluent piping.
	Mechanical failure of ancillary equipment	➢ Pump is not running – have qualified person check pumping system for mechanical and/or electrical failures.
		➢ Pump's Level Controls are improperly set, have failed, or pump too much volume per dose. Have service provider check/adjust pumping system.
System emits odor (rotten egg smell)	Mechanical failure/ Air line break	➢ Blower operating – NO, check "blower is not running" above, YES *see next step*
		➢ Proper splash in reaction chamber – NO – air line is broken, YES *see next steps*
	Multiple issues can contribute; the cause is usually due to oversized settling tank. Multiple solutions possible.	➢ Decrease settling tank volume – easiest done with a pumping system which can then pump the tank
		➢ Move vent – re-locate the vent to a location where the prevailing winds will catch odor.
		➢ Place a carbon filter on the end of the vent pipe – only use a filter that will create less than 0.1 psi of back pressure.
		➢ Create bio-filter vent - create a remote vent by placing a well perforated vent line in a trench with shredded bark mulch - contact local installer
Blower runs backwards	3-Phase installed incorrectly power out of phase or	➢ Switch any two "hot legs" at the panel or blower AFTER turning OFF the power. Only a QUALIFIED electrician can do this work. After rewiring, it may be necessary to dry the blower's internal parts.
	Single-Phase (which can run counter-clockwise) installed incorrectly	➢ Some blowers have wires numbered "5" and "8". After turning OFF the power, switch these two wires. Only a QUALIFIED electrician can do this work. After re-wiring, it may be necessary to dry the blower's internal parts.
Blower is noisy	Blower noise is an annoyance at site	➢ Blower housing can be supplemented with additional sound reducing measures, contact your service provider.
		➢ Blower may be re-located from its current location and can be placed up to 100 ft away from unit.
	Blower is shaking or makes a loud, whiny noise	➢ Vibration between the blower and housing – tighten or place rubber washers in mounting screws between blower and housing
		➢ Blower bearings are going bad - replace blower now or wait for it to seize up
Effluent is dirty	Many solids detected in effluent	➢ Toxic substance in system, check for even growth in reaction chamber
		➢ Pump out required – refer to "Bio-Solids Levels" under "Maintenance Checklist" section
		➢ Other – call service provider
Water in blower/ housing	Water entry from outside	➢ Move blower above flood level
	Blower is siphoning	➢ Check blower rotation – see "Blower runs backwards" section above
		➢ Move blower to location higher than the FAST® system

BLOWER OFF: SEASONAL / INTERMITTENT / SFR® CYCLE USE

The FAST® System will function normally even if there is no wastewater flowing during short periods of vacancy. FAST® wastewater treatment systems allow the blower to be turned on and off in certain situations (normal FAST operation employs a continuously operating blower). This feature has been tested and successfully incorporated into the FAST system design for several years and has proven very beneficial in certain circumstances. Examples of suggested operational procedures:

- Summer use property (shut down all winter) - blower should be turned off at end of summer and restarted at least seven days prior to returning. Please contact your local service provider to restart the system and check with local regulations.
- Weekend property (used at least once every three weekends) - maintain normal operation or utilize FAST's SFR® blower timer feature on control panel.
- SFR® (Sequencing Fixed Reactor) feature (blower timers) feature found in every FAST® panel allows the blower to be cycled "off" and "on" for a period of time. These settings can be used to save power or to enhance the denitrification performance. If a FAST system is providing satisfactory reductions in BOD5 and TSS (<30/30 mg/L) then the SFR® (equipped on all FAST® control Panels) feature can be employed.

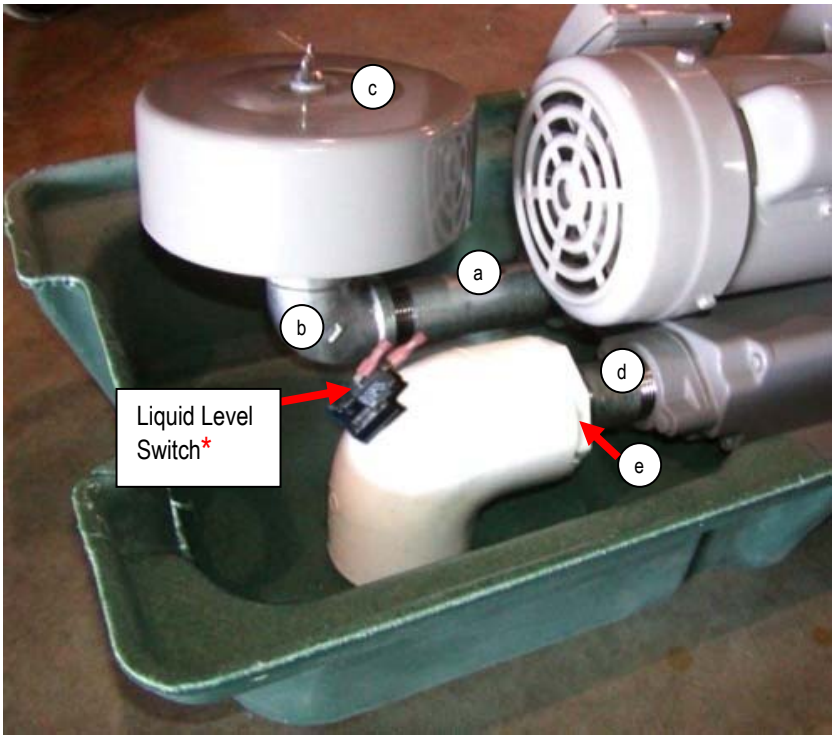
Important: Consult your service provider and local regulations prior to any system changes.

BLOWER REPLACEMENT

WARNING *All electrical work shall be properly performed by a qualified electrician per all applicable codes. Failure to do so may result in severe bodily injury or death.*

WARNING *Hazards exist in confined spaces such as a septic tank. All confined space precautions must be followed if entering a tank. Always keep tank openings covered during storage and installation*

When replacing a blower follow the steps below. If relocating the blower run the electrical supply conduit from the control panel to the desired blower location. Air line piping from the blower to the FAST® unit may NOT exceed 100 ft [30.5m] in total length and must have ≤ 4 elbows. The total electrical supply should NOT exceed 150 ft [45 m]. The blower and blower housing must be mounted on a solid base such as concrete to avoid settling.



CONNECT SUPPLIED PIECES (refer to picture)

a. Longest steel pipe
b. Steel elbow
c. Air filter assembly
d. Shortest steel pipe
e. PVC reducer bushing

SECURE BLOWER ASSEMBLY to housing base using four supplied #14 x 1½" self-tapping screws. Drill screws directly into blower base.

RECONNECT AIR LINE from FAST® unit to blower outlet using required piping. A "quick disconnect" is highly recommended to be installed in this location if it is not currently in place.

NOTE: ALL CONNECTIONS MUST BE AIR AND WATER TIGHT

CONNECT INCOMING POWER to the blower at junction box. Follow the FAST® Installation Manual for further instruction. Common wiring diagrams are located at the end of this manual.

LIQUID LEVEL SWITCH – NOT required for most new systems. AMI control panel with current sensor replaces this switch. To replace this switch:

a) Drill a 3/8" hole in the blower outlet pipe.
b) *IMPORTANT*: Connect low voltage wires to switch before mounting in pipe.
c) Insert the switch into the 3/8" hole (nipple first), then glue into place with PVC glue.
d) Install low voltage pressure switch wiring back to the control panel according to applicable codes (must not be inside high voltage blower wiring).

CONTROL PANEL REPLACEMENT

CAUTION *Always have all utility lines and equipment marked by a locating service prior to performing any work.*

WARNING *All electrical work shall be properly performed by a qualified electrician per all applicable codes. Failure to do so may result in severe bodily injury or death.*

The FAST® systems, including all electrical parts, are ETL (UL equivalent) certified for electrical safety. The control panel meets NEMA4X standards for all weather use (not explosive or submerged environments). The total electrical supply should NOT exceed 150 ft [45m].

Bio-Microbics also manufactures control panels that can control other systems, such as UV and sewage pumps. Call your distributor or Bio-Microbics for more information.

When replacing a panel follow the steps below. If relocating the panel run the electrical supply conduit from the control panel to the blower location. Keep in mind the electrical supply line should NOT exceed 150 ft [45 m] total.

1. Examine wiring directions inside the supplied FAST® control panel (also found at the end of this Manual).
2. A dedicated breaker is required in the building's master electrical panel. Make connections between the master panel and FAST® control panel.
3. Make connections between the blower and FAST® control panel per the electrical diagram.
4. For systems requiring the Liquid Level Switch- connect the switch to the control panel terminals labeled "FLOAT" or "HI Press Input". The newest AMI control panel with current sensor can be used to replace this switch.

CERTIFICATIONS

WARNING *Only authorized service personnel should service a septic system and its components. Deadly hazards such as lethal gases and high voltage electricity are associated with the system.*

MicroFAST® 0.5, 0.625, 0.75, 0.9, and 1.5 systems are tested and certified to NSF®/ANSI® Standards 40 (Class I) and 245

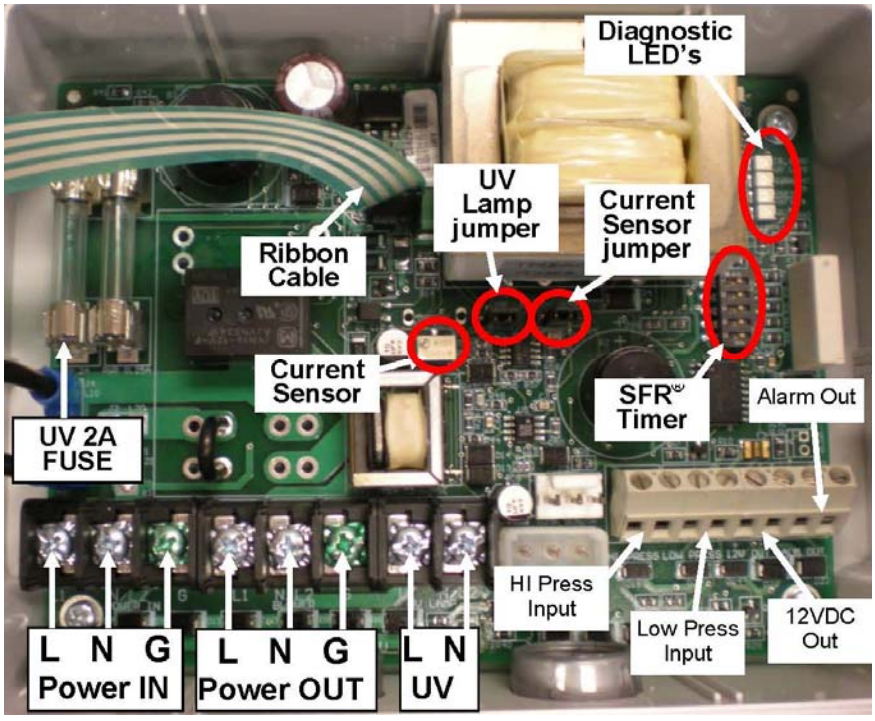
Certified to NSF/ANSI Standard 40

PARAMETER		LIMIT
CBOD5	30 day avg. 7 day avg.	25 mg/L 40 mg/L
TSS	30 day avg. 7 day avg.	30 mg/L 45 mg/L
pH		6-9 s.u.
Total Nitrogen		50% reduction of influent

ELECTRICAL WIRING DIAGRAMS

Only the MicroFAST® 0.5, 0.625, 0.75, and 0.9 system diagrams are displayed here.
Information for larger FAST® systems ships with those units or can be obtained from Bio-Microbics.

AMI 110/220 PANEL



TIMING MODES DIP SWPOS. (S1)					BLOWER MINUTES	
5	4	3	2	1	ON	OFF
Off	Off	Off	Off	Off	30	15
Off	Off	Off	Off	On	15	15
Off	Off	Off	On	On	30	30
Off	Off	On	Off	Off	60	15
Off	Off	On	Off	On	60	30
Off	Off	On	On	Off	120	30
On	On	On	On	Off	TEST	
On	On	On	On	On	∞	
TEST = 15 SEC ON, 20 SEC OFF						
∞ = ALWAYS ON						

BLOWER DIAGRAMS

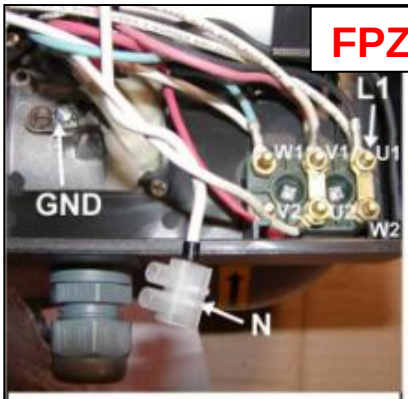
ATTENTION: Please refer to side of shipping box for correct Blower.

Fuji

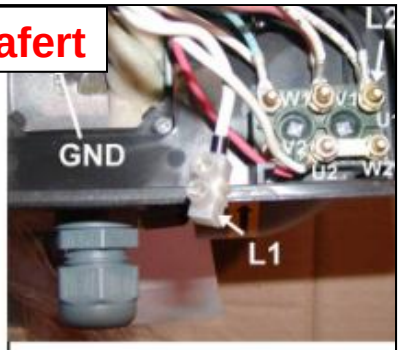
Model: FUJI VFC 209, 100P, 300P
Power: 110VAC
- L1 to P1
- N to T2, T4
- T1 & T3, cap together

Model: FUJI VFC 209, 100P, 300P
Power: 220V 1ø
- L1 to P1
- L2 to T4
- T2 & T3, cap together
- T1, cap off

FPZ/Lafert

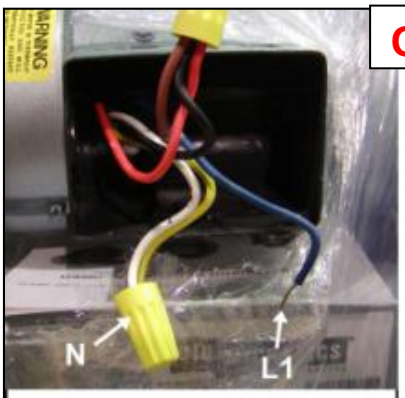


Model: FPZ SCL06
Power: 110VAC
- Jumper U2 to V1
- Jumper W2 to U1
- L1 to “terminal block”
- N to white connector

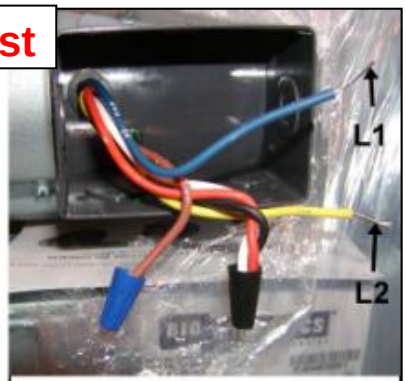


Model: FPZ SCL06
Power: 220VAC, 1ø
- L1 to "terminal block"
- L2 to V1
- Jumper W2 to U2

Gast



Model: GAST R2103, R4P115, R1102
Power: 110VAC
- L1 to P1
- N to 2,4
- P2,5,3 cap together



Model: GAST R2103, R4P115, R1102
Power: 220VAC 1ø
- L1 to P1
- L2 to 4
- 5, 3 and 2, cap together
- P2 cap off

LIMITED WARRANTY

Bio-Microbics, Inc. warrants every new residential FAST® system against defects in materials and workmanship for a period of two years after installation or three years from date of shipment, subject to the following terms and conditions, (Commercial FAST system for a period of one year after installation or eighteen months from date of shipment, whichever occurs first, subject to the following terms and conditions):

During the warranty period, if any part is defective or fails to perform as specified when operating at design conditions, and if the equipment has been installed and is being operated and maintained in accordance with the written instructions provided by Bio-Microbics, Inc., Bio-Microbics, Inc. will repair or replace at its discretion such defective parts free of charge. Defective parts must be returned by owner to Bio-Microbics, Inc.'s factory postage paid, if so requested. The cost of labor and all other expenses resulting from replacement of the defective parts and from installation of parts furnished under this warranty and regular maintenance items such as filters or bulbs shall be borne by the owner. This warranty does not cover general system misuse, aerator components which have been damaged by flooding or any components that have been disassembled by unauthorized persons, improperly installed or damaged due to altered or improper wiring or overload protection. This warranty applies only to the treatment plant and does not include any of the structure wiring, plumbing, drainage, septic tank or disposal system. Bio-Microbics, Inc. reserves the right to revise, change or modify the construction and/or design of the FAST system, or any component part or parts thereof, without incurring any obligation to make such changes or modifications in present equipment. Bio-Microbics, Inc. is not responsible for consequential or incidental damages of any nature resulting from such things as, but not limited to, defect in design, material, or workmanship, or delays in delivery, replacements or repairs.

THIS WARRANTY IS IN LIEU OF ALL OTHER WARRANTIES EXPRESS OR IMPLIED. BIO-MICROBICS SPECIFICALLY DISCLAIMS ANY IMPLIED WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. NO REPRESENTATIVE OR PERSON IS AUTHORIZED TO GIVE ANY OTHER WARRANTY OR TO ASSUME FOR BIO-MICROBICS, INC., ANY OTHER LIABILITY IN CONNECTION WITH THE SALE OF ITS PRODUCTS.

Contact your local distributor for parts and service.

Module System Serial Number: _____

System Designer Name: _____

Designer Phone: _____

Health Official Name: _____

Health Official Phone: _____

Manufacturer Name: Bio-Microbics, Inc.

Manufacturer Phone: 1-800-753-FAST (3278)

Installed By: _____

Installer Phone: _____

Maintenance Provider Name: _____

Maintenance Provider Phone: _____

BIO-MICROBICS® INCORPORATED

8450 Cole Parkway • Shawnee, KS 66227 • USA
Ph: 913-422-0707 • Fax: 913-422-0808
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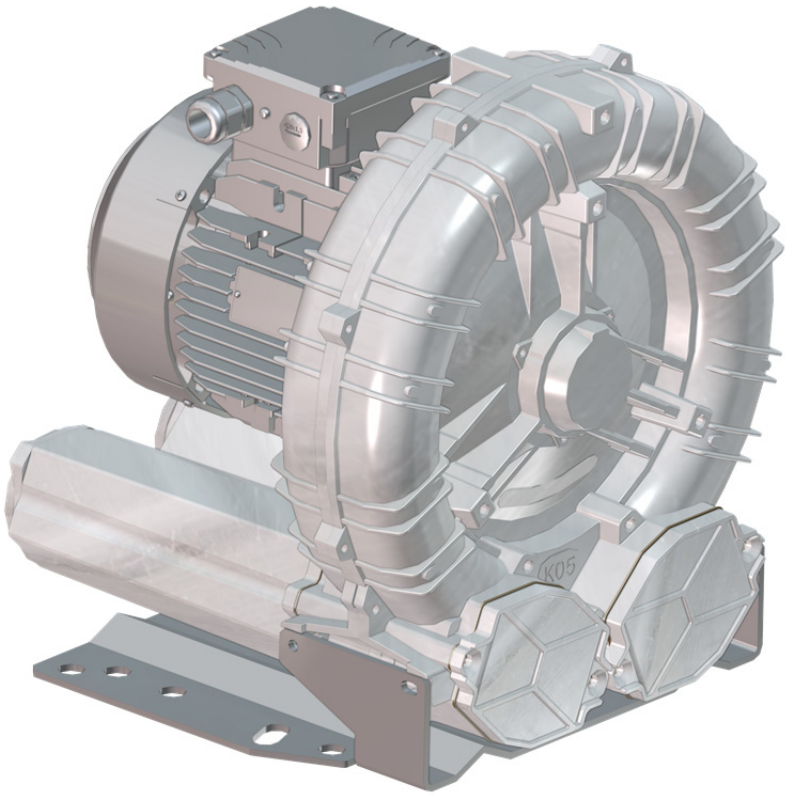
info@fpz.com www.fpz.com

COMPRESSORI-ASPIRATORI A CANALE LATERALE	**ISTRUZIONI**	**I**
LATERAL CHANNEL BLOWERS-EXHAUSTERS	**INSTRUCTIONS**	**GB**
COMPRESSEURS – ASPIRATEURS A CANAL LATERAL	**INSTRUCTIONS**	**F**
COMPRESORES – ASPIRADORES DE CANAL LATERAL	**INSTRUCCIONES**	**E**
SEITENKANALVERDICHTER-VAKUUMPUMPEN BAUREIHE	**BETRIEBSANLEITUNG**	**D**
COMPRESSORES - EXAUSTORES DE CANAL LATERAL	**INSTRUÇÕES**	**PB**

LEGGERE ATTENTAMENTE TUTTE LE ISTRUZIONI E CONSERVARLE	*I*
PLEASE READ CAREFULLY ALL INSTRUCTIONS AND KEEP THEM FOR FUTURE REFERENCE	*GB*
LIRE ATTENTIVEMENT TOUTES LES INSTRUCTIONS ET LES CONSERVER	*F*
SIRVASE LEER CUIDADOSAMENTE TODAS LAS INSTRUCCIONES Y CONSERVARLAS PARA FUTURA REFERENCIA	*E*
ALLE ANLEITUNGEN SIND SORGFÄLTIG ZU LESEN UND AUFZUBEWAHREN!	*D*
LEIS DILIGENTEMENTE TODAS ESTAS INSTRUÇÕES E CONSERVE-AS	*PB*

SCL K03 / K04 / K05 / K06 / K07 / K75 / K08 / K09 / K10 / K11 / K12 MS-MOR



COMPANY WITH QUALITY MANAGEMENT SYSTEM CERTIFIED BY DNV
= ISO 9001:2008 =

FPZ S.p.A.
Via F.lli Cervi 16
20863 Concorezzo (MB), ITALIA
Tel. +39 039 69 06 811
info@fpz.com www.fpz.com

FPZ BLOWER TECHNOLOGY

DICHIARAZIONE DI CONFORMITÁ
DECLARATION OF CONFORMITY

Il Fabbricante — *The manufacturer*: FPZ S.p.A., Via F.lli Cervi, 16

Dichiaria che la macchina — *Declares that the machineries*: SOFFIANTE A CANALE LATERALE — *Lateral channel blowers-exhausters*

Modello *Models*	Serie *series*	Esecuzione *Execution*	Versione *Version*
K03, K04, K05, K06, K07, K75, K08, K09, K10, K11, K12	MS	MOR	EU, USA, TMS, BPA
K07R, K08R, K09, K10, K11, K12	MD		

al quale questa dichiarazione si riferisce è conforme alla seguente Direttiva:
to which this declaration relates complies with the following Directives:

- Direttiva Macchine 2006/42/CE — *- Machinary directive 2006/42/EC*

E' conforme alle disposizioni pertinenti delle seguenti altre direttive:
It fulfils also the relevant provisions of the following Directives:

- Direttiva Compatibilità Elettromagnetica 2004/108/CE — *- Electromagnetic compatibility (EMC) directive EC 2004/108*
- Direttiva Bassa Tensione 2006/95/CE — *- Low voltage directive 2006/95/EC*

Inoltre dichiara che sono state applicate le seguenti norme armonizzate:
Also declares that the following Harmonised standards have been applied:

- UNI EN ISO 12100
- ISO/TR 14121 – 2

Nome ed indirizzo della persona autorizzata a costituire il Fascicolo Tecnico:
Name and address of the person authorised to compile the Technical File:

- Andrea Lazari Via F.lli Cervi 16 – 20863 Concorezzo (MB)

Concorezzo (MB), *data 01.08.2013*

Amministratore Delegato
Managing Director
Sergio Ferigo

Direttore Tecnico
Technical Manager
Andrea Lazari

COMPRESSIONE	**DATI CARATTERISTICI**	**I**
COMPRESSION	**PERFORMANCE TABLE**	**GB**
COMPRESSION	**CARACTÉRISTIQUES TECHNIQUES**	**F**
COMPRESIÓN	**DATOS CARACTERÍSTICOS**	**E**
KOMPRESSION	**LEISTUNGDATEN**	**D**
COMPRESSÃO	**DADOS CARACTERÍSTICOS**	**PB**

Mod	N 2900 rpm [kW]	N 3500 rpm [kW]	Q max 2900 rpm [m³/h]	Q max 3500 rpm [m³/h]	ΔP max 2900 rpm [hPa] (mbar)	ΔP max 3500 rpm [hPa] (mbar)	Leq[1] 2900 rpm (Lp) [dB(A)]	Leq[1] 3500 rpm (Lp) [dB(A)]	Peso[2] Weight[2] Poids[2] Gewicht [kg]	Ps max A [bar]
K03-MS	**0,37**	0,43	74	89	130	120	59,7	61,7	11	1,8
	0,55	0,63	74	89	180	200	60	62	12	1,8
K04-MS	**0,75**	0,9	137	166	140	120	62,6	64,6	15,8	1,8
	1,1	1,3	137	166	200	175	62,8	64,8	16,5	1,8
	1,5	1,75	137	166	250	250	63	65	19,5	1,8
K05-MS	**1,1**	1,3	219	265	130	100	68,2	70,2	22,5	2
	1,5	1,75	219	265	175	160	68,5	70,5	23,5	2
	2,2	2,55	219	265	270	260	68,8	70,8	26,5	2
	3	3,45	219	265	300	350	69,1	71,1	30,5	2
K06-MS	**2,2**	2,55	304	366	180	150	71	73	31,2	2
	3	3,45	304	366	250	220	71,3	73,3	32,5	2
	4	4,6	304	366	340	325	71,6	73,6	41	2
K07-MS	**2,2**	2,55	414	499	130	100	76,4	78,4	46,5	2,8
	3	3,45	414	499	200	175	76,7	78,7	47,5	2,8
	4	4,6	414	499	280	250	77	79	51	2,8
	5,5	6,3	414	499	400	375	77,3	79,3	61,5	2,8
K75-MS	**4**	4,6	477	576	150	100	77,4	79,4	51,5	2,8
	5,5	6,3	477	576	250	200	77,7	79,7	62	2,8
	7,5	8,7	477	576	325	300	78	80	67	2,8
K08-MS	**3**	3,45	536	647	125	100	77,4	79,4	49	2,8
	4	4,6	536	647	180	150	77,7	79,7	52,5	2,8
	5,5	6,3	536	647	275	250	78	80	63	2,8
	7,5	8,7	536	647	400	375	78,3	80,3	68	2,8
	9,2	10,6	536	647	450	450	78,6	80,6	77,5	2,8
K09-MS	**4**	4,6	663	800	130	85	78	80	62	2,8
	5,5	6,3	663	800	210	150	78,2	80,2	72,5	2,8
	7,5	8,7	663	800	290	250	78,5	80,5	77,5	2,8
	9,2	10,6	663	800	350	325	78,7	80,7	87	2,8
	11	12,7	663	800	450	400	79	81	87,5	2,8
K10-MS	**5,5**	6,3	782	944	160	115	78,1	80,1	75	2,8
	7,5	8,7	782	944	250	200	78,5	80,5	80	2,8
	9,2	10,6	782	944	300	270	79	81	89,5	2,8
	11	12,7	782	944	400	375	79,4	81,4	90	2,8
	15	17,4	782	944	500	500	79,6	81,6	95	2,8
K11-MS	**7,5**	8,7	915	1105	175	130	80	82	83,5	2,8
	9,2	10,6	915	1105	230	175	80,1	82,1	93	2,8
	11	12,7	915	1105	300	250	80,4	82,4	93,5	2,8
	15	17,4	915	1105	400	350	80,7	82,7	98,5	2,8
	18,5	21,5	915	1105	500	500	83,6	85,6	128,5	2,8
K12-MS	**9,2**	10,6	1022	1234	150	100	80,6	82,6	96,5	2,8
	11	12,7	1022	1234	200	150	80,9	82,9	97	2,8
	15	17,4	1022	1234	300	275	81,2	83,2	102	2,8
	18,5	21,5	1022	1234	425	375	84,1	86,1	132	2,8

[1] Rumorosità misurata alla distanza di 1 m con aspirazione e mandata canalizzate, secondo la Normativa ISO 3744
Noise measured at 1 m distance with inlet and outlet ports piped, in accordance to ISO 3744
Niveau de bruit mesuré a 1 m de distance, conduits d'aspiration et refoulement raccordés selon la norme ISO 3744
Rumorosidad medida a 1 m de distancia de los puertos de admisión y descarga, según la Normativa ISO 3744.
Schalldruckpegel, mit angeschlossener Schlauchleitung am Ein- und Auslass, im Abstand von 1 m gemäß ISO 3744 gemessen
Nível de rumor medido à distancia de 1 m. com aspiração e fluxo canalizados de acordo com a Normativa ISO 3744.

[2] Il valore indicato è riferito alla macchina con motore trifase per esecuzione MOR, senza il motore elettrico per esecuzioni GOR e GVR.
Value refers to the weight of the machine with 3 Phase motor if MOR range, without motor if GOR or GVR range.
Le valeur se refère à la turbine 3-phasé en execution MOR et GOR/GVR pour la turbine sans moteur.
El valor indicado se refiere al equipo con motor trifásico para la ejecución MOR. Sin el motor eléctrico para las ejecuciones GOR y GVR.
Die Angaben zum Gewicht beziehen sich bei der Baureihe MOR auf die Ausführung mit 3-phasigen Motoren und bei den Baureihen GOR und GVR auf die Verdichteraggregate ohne Motoren.
O valor refere-se à máquina com motor trifásico para a execução de MOR, sem o motor elétrico para execuções GOR e GVR.

N: Potenza installata
N: Installed motor power
N: Puissance installé
N: Potencia instalada
N: Installierte motorleistung
N: Capacidade instalada

Q: Portata
Q: Flow rate
Q: Débit
Q: Caudal
Q: Volumenstrom
Q: fluxo

ΔP: Pressione differenziale
ΔP: Differential pressure
ΔP: Pression différentielle
ΔP: Presión diferencial
ΔP: Druckdifferenz
ΔP: pressão difFerencia

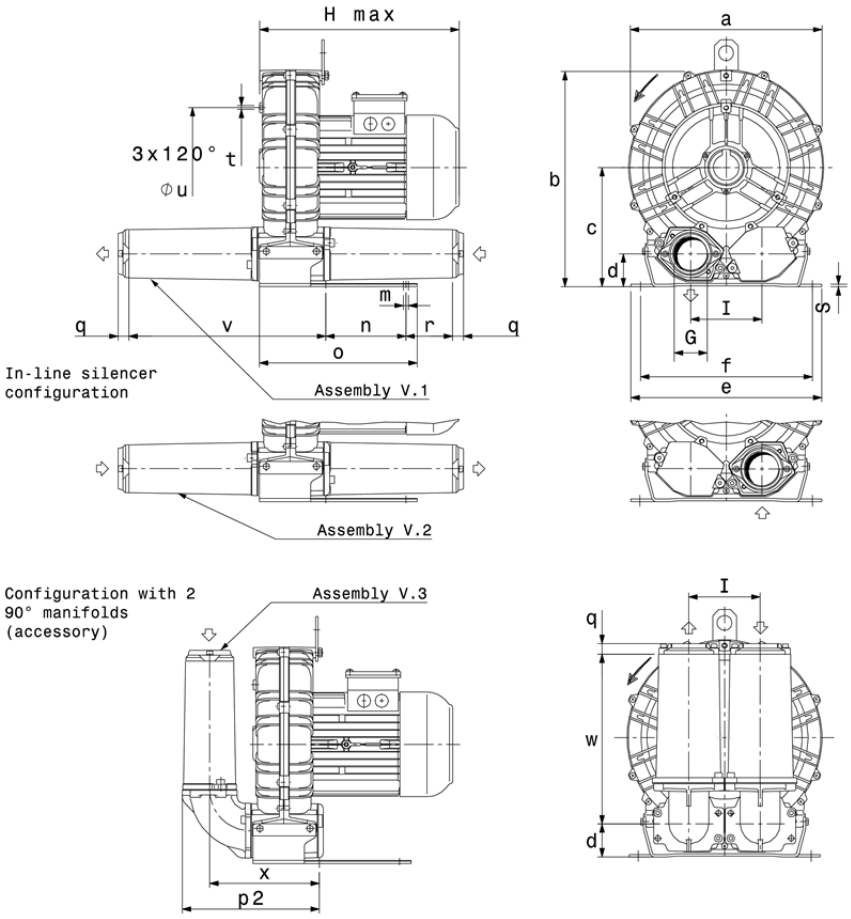
Leq: Rumorosità
Leq: Noise
Leq: Niveau sonore
Leq: Rumorosidad
Leq: Schalldruckpegel
Leq: Rumor

ASPIRAZIONE	**DATI CARATTERISTICI**	**I**
ASPIRATION	**PERFORMANCE TABLE**	**GB**
ASPIRATION	**CARACTÉRISTIQUES TECHNIQUES**	**F**
ASPIRACIÓN	**DATOS CARACTERÍSTICOS**	**E**
VAKUUMBETRIEB	**LEISTUNGDATEN**	**D**
ASPIRAÇÃO	**DADOS CARACTERÍSTICOS**	**PB**

Mod	N 2900 rpm [kW]	N 3500 rpm [kW]	Q max 2900 rpm [m³/h]	Q max 3500 rpm [m³/h]	ΔP max 2900 rpm [hPa] (mbar)	ΔP max 3500 rpm [hPa] (mbar)	Leq¹ 2900 rpm (Lp) [dB(A)]	Leq¹ 3500 rpm (Lp) [dB(A)]	Peso² Weight² Poids² Gewicht² [kg]	Ps max A [bar]
K03-MS	**0,37**	0,43	74	89	120	120	58,7	60,7	11	1,8
	0,55	0,63	74	89	160	200	59	61	12	1,8
K04-MS	**0,75**	0,9	137	166	140	120	61,6	63,6	15,8	1,8
	1,1	1,3	137	166	200	175	61,8	63,8	16,5	1,8
	1,5	1,75	137	166	225	250	62	64	19,5	1,8
K05-MS	**1,1**	1,3	219	265	130	100	67,2	69,2	22,5	2
	1,5	1,75	219	265	175	160	67,5	69,5	23,5	2
	2,2	2,55	219	265	240	260	67,8	69,8	26,5	2
	3	3,45	219	265	-	275	-	70,1	30,5	2
K06-MS	**2,2**	2,55	304	366	180	150	70	72	31,2	2
	3	3,45	304	366	250	220	70,3	72,3	32,5	2
	4	4,6	304	366	270	325	70,6	72,6	41	2
K07-MS	**2,2**	2,55	414	499	130	100	75,4	77,4	46,5	2,8
	3	3,45	414	499	200	175	75,7	77,7	47,5	2,8
	4	4,6	414	499	280	250	76	78	51	2,8
	5,5	6,3	414	499	325	375	76,3	78,3	61,5	2,8
K75-MS	**4**	4,6	477	576	150	100	76,4	78,4	51,5	2,8
	5,5	6,3	477	576	250	200	76,7	78,7	62	2,8
	7,5	8,7	477	576	-	300	-	79	67	2,8
K08-MS	**3**	3,45	536	647	125	100	76,5	78,5	49	2,8
	4	4,6	536	647	180	150	76,8	78,8	52,5	2,8
	5,5	6,3	536	647	275	250	77,1	79,1	63	2,8
	7,5	8,7	536	647	350	375	77,4	79,4	68	2,8
	9,2	10,6	536	647	-	-	-	-	77,5	2,8
K09-MS	**4**	4,6	663	800	130	85	77,1	79,1	62	2,8
	5,5	6,3	663	800	210	150	77,3	79,3	72,5	2,8
	7,5	8,7	663	800	290	250	77,6	79,6	77,5	2,8
	9,2	10,6	663	800	350	325	77,8	79,8	87	2,8
	11	12,7	663	800	-	375	-	80,1	87,5	2,8
K10-MS	**5,5**	6,3	782	944	160	115	77,4	79,4	75	2,8
	7,5	8,7	782	944	250	200	77,7	79,7	80	2,8
	9,2	10,6	782	944	300	270	78,2	80,2	89,5	2,8
	11	12,7	782	944	350	375	78,5	80,5	90	2,8
	15	17,4	782	944	-	-	-	-	95	2,8
K11-MS	**7,5**	8,7	915	1105	175	130	80	82	83,5	2,8
	9,2	10,6	915	1105	230	175	80,5	82,5	93	2,8
	11	12,7	915	1105	300	250	81	83	93,5	2,8
	15	17,4	915	1105	350	350	81,8	83,8	98,5	2,8
	18,5	21,5	915	1105	-	-	-	-	128,5	2,8
K12-MS	**9,2**	10,6	1022	1234	150	100	81	83	96,5	2,8
	11	12,7	1022	1234	200	150	81,5	83,5	97	2,8
	15	17,4	1022	1234	300	275	82,3	84,3	102	2,8
	18,5	21,5	1022	1234	325	350	85,2	87,2	132	2,8

INGOMBRI
DIMENSIONS
DIMENSIONS
DIMENSIONES
ABMESSUNGEN
DIMENSÕES EXTERIORES

(K03-MS/K04-MS/K05-MS/K06-MS)



Misure in mm, Dimensions in mm, Dimensions en mm, Medidas in mm, Abmessungen in mm, Dimensões em mm

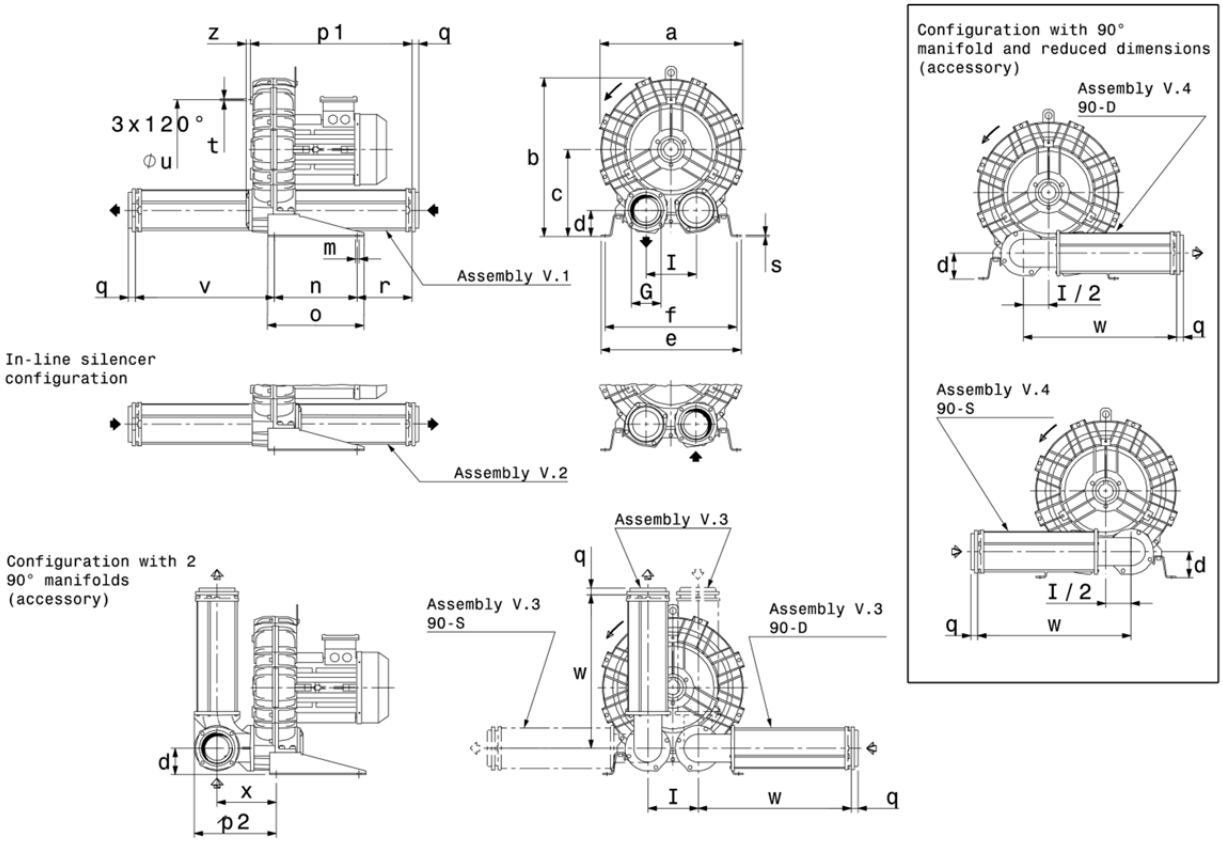
Mod	a	b	c	d	e	f	G	H
K03-MS	241	268	147	43	230	205	G 1" ¼	241
K04-MS	285	315	172	49	255	225	G 1" ½	310
K05-MS	327	365	200	54	320	260	G 2"	375
K06-MS	376	393	205	54	325	290	G 2"	400

Mod	i	m	n	o	p1	p2	q
K03-MS	86	10	83	142	205	140	18
K04-MS	102	12	95	171	222	160	18
K05-MS	120	15	115	265	320	230	18
K06-MS	125	15	140	272	334	244	18

Mod	r	s	t	u	v	w	x	z
K03-MS	75	4	M6	140	180	188	106	12
K04-MS	70	4	M6	175	195	188	120	18
K05-MS	98	4	M8	200	330	285	184	19
K06-MS	85	4	M8	240	332	285	198	19

INGOMBRI
DIMENSIONS
DIMENSIONS
DIMENSIONES
ABMESSUNGEN
DIMENSÕES EXTERIORES

(K07-MS/K75-MS/K08-MS/K09-MS/K10-MS/K11-MS/K12-MS)



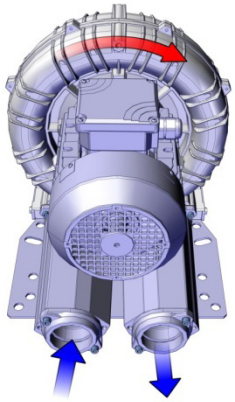
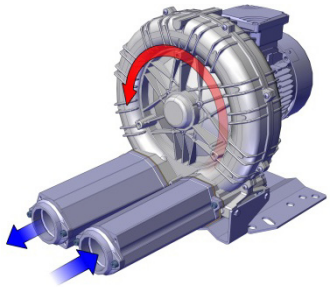
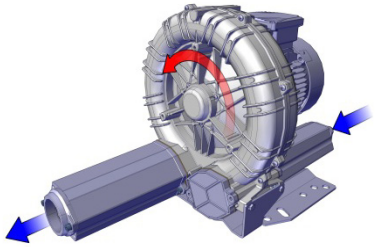
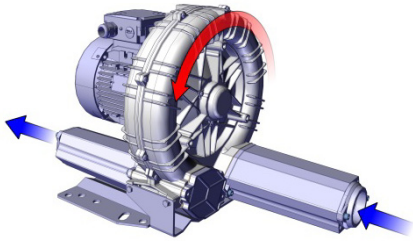
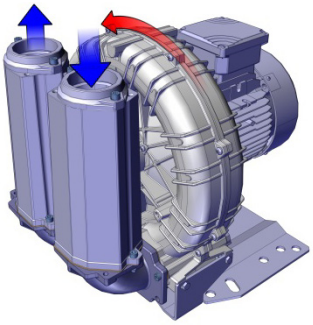
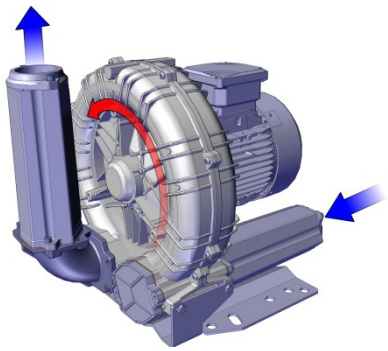
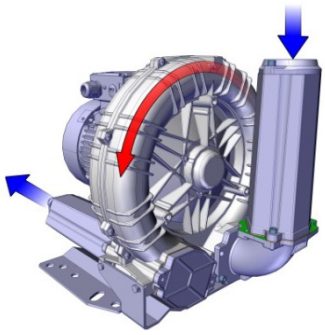
Misure in mm, Dimensions in mm, Dimensions en mm, Medidas in mm, Abmessungen in mm, Dimensões em mm

Mod	a	b	c	d	e	f	G	H
K07-MS	424	481	269	82	468	438	G 3”	445
K75-MS	424	481	269	82	468	438	G 3”	445
K08-MS	457	498	269	82	478	448	G 3”	480
K09-MS	492	561	315	96	508	478	G 4”	490
K10-MS	516	573	315	96	508	478	G 4”	490
K11-MS	542	603	332	91	540	508	G 4”	590
K12-MS	548	605	332	91	540	508	G 4”	593

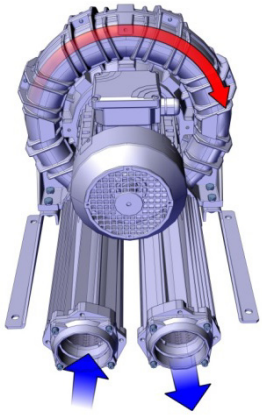
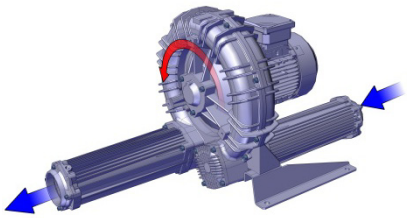
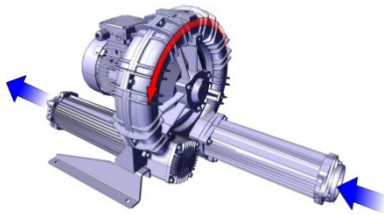
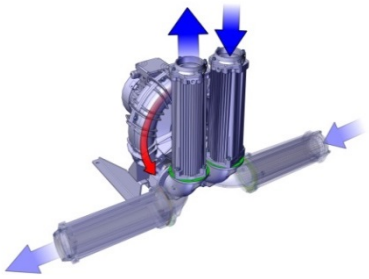
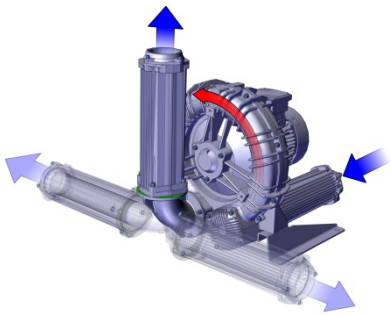
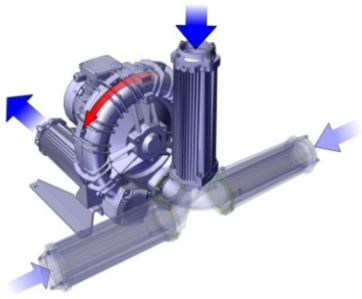
Mod	i	m	n	o	p1	p2	q
K07-MS	155	13	300	350	512	255	25
K75-MS	155	13	300	350	512	255	25
K08-MS	155	13	300	350	512	255	25
K09-MS	182	13	300	350	586	300	25
K10-MS	182	13	300	350	586	300	25
K11-MS	200	13	300	350	599	305	25
K12-MS	200	13	300	350	599	305	25

Mod	r	s	t	u	v	w	x	z
K07-MS	137	5	M8	295	443	481	183	16
K75-MS	137	5	M8	295	443	481	183	16
K08-MS	137	5	M8	310	443	481	183	16
K09-MS	199	5	M8	360	505	556	215	16
K10-MS	199	5	M8	360	505	556	215	16
K11-MS	204	5	M8	390	510	556	220	16
K12-MS	204	5	M8	390	510	556	220	13

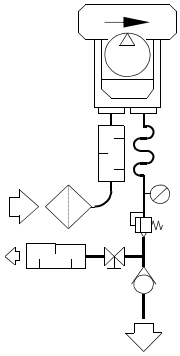
RIPOSIZIONAMENTO SILENZIATORE **(K03-MS/K04-MS/K05-MS/K06-MS)**
REPOSITIONING OF SILENCERS
REPOSITIONNEMENT DES SILENCIEUX
COLOCACIÓN DE LOS SILENCIADORES
EINBAU DER SCHALLDÄMPFER IN ANDERER POSITION
REPOSICIONAMENTO DOS SILENCIADORES

	 Ver. 0	
 Ver. 0-A	 Ver. 1	 Ver. 2
 Ver. 3 - 90°DS	 Ver. 4 - 90°D	 Ver. 4 - 90° S

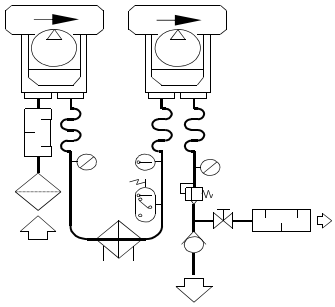
RIPOSIZIONAMENTO SILENZIATORE (K07-MS/K75-MS/K08-MS/K09-MS/K10-MS/K11-MS/K12-MS)
REPOSITIONING OF SILENCERS
REPOSITIONNEMENT DES SILENCIEUX
COLOCACIÓN DE LOS SILENCIADORES
EINBAU DER SCHALLDÄMPFER IN ANDERER POSITION
REPOSICIONAMENTO DOS SILENCIADORES

	 Ver.0	
 Ver. 0-A	 Ver. 1	 Ver. 2
 Ver. 3 - 90°DS	 Ver. 4 - 90°D	 Ver. 4 - 90° S

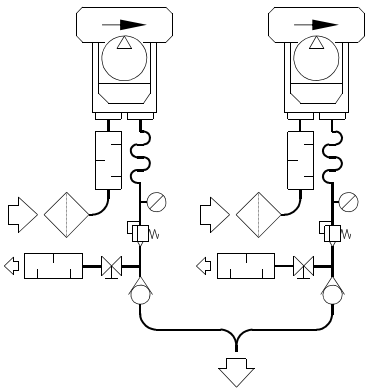
COMPRESSORE
PRESSURE SERVICE
SOUFFLANTE
COMPRESOR
VERDICHTER
COMPRESSOR



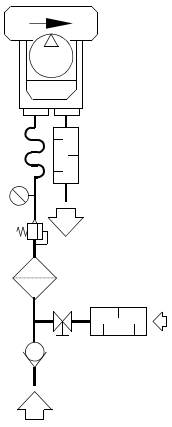
COMPRESSORE IN SERIE
SERIES PRESSURE SERVICE
SOUFFLANTE EN SÉRIE
COMPRESOR EN SERIE
SERIELL ARBEITENDER VERDICHTER
COMPRESSOR EM SÉRIE



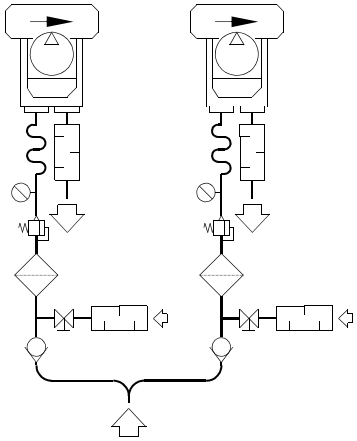
COMPRESSORE IN PARALLELO
PARALLEL PRESSURE SERVICE
SOUFFLANTE EN PARALLÉLE
COMPRESOR EN PARALELO
PARALLEL ARBEITENDER VERDICHTER
COMPRESSOR EM PARALELO



ASPIRATORE
VACUUM SERVICE
POMPE À VIDE
ASPIRADOR
VAKUUMPUMPE
ASPIRADOR



ASPIRATORE IN PARALLELO
PARALLEL VAACUM SERVICE
POMPE À VIDE EN PARALLÈLE
ASPIRADOR EN PARALELO
PARALLEL ARBEITENDER VAKUUMPUMPE
ASPIRADOR EM PARALELO



LEGENDA, KEY – ACCESSORIES, ZUBEHÖRLISTE, LÉGENDE ACCESSOIRES, TABLA DE ACCESORIOS, LEGENDA DOS ACESSÓRIOS

Item Item Composant Item Ítem Item		Denominazione Name Désignation Denominación Kennzeichnung Nome	Item Item Composant Item Ítem Item		Denominazione Name Désignation Denominación Kennzeichnung Nome
1		Filtro - Filtro in linea Filter - Inline filter Filtre - Filtre en ligne Filtro - Filtro en línea Filter – Leitungsfilter Filtro - Filtro da linha	7		Valvola di ritegno Check valve Clapet anti-retour Válvula de retención Rückschlagventil Válvula de retenção
(2)		Silenziatore Silencer Silencieux Silenciador Schalldämpfer Silenciador	8		Valvola Valve Vanne Válvula Ventil Válvula
3		Manicotto flessibile Flexible sleeve Manchon flexible Manguito flexible Flexibles Anschlussstück Luva flexível	(9)		Scambiatore Cooler Échangeur Intercambiador Wärmetauscher Permutador
4		Manometro – Vuotometro Pressure gauge - Vacuum gauge Manomètre – Vacuomètre Manómetro – Vacuómetro Manometer – Vakuummeter Manômetro – Manômetro de vácuo	(10)		Termometro Thermometer Thermomètre Termómetro Thermometer Termômetro
5		Pressostato – Vuotostato Pressure switch – Vacuum switch Pressostat – Vacuostat Presostato – Vacuóstato Druckschalter – Vakuumschalter Pressóstato – Interruptor de vácuo	(11)		Termostato Thermostat Thermostat Termostato Thermostat Termóstato
6		Valvola limitatrice Pressure relief valve Soupape de limitation Válvula limitadora Sicherheitsventil Válvula limitadora	(x) SE NECESSARIO (x) IF NECESSARY (x) SI NÉCESSAIRE (x) SI NECESARIO (x) SOFERN ERFORDERLICH (x) SE NECESSÁRIO		

8 GENERAL INFORMATION

8.1 PURPOSE OF THE MANUAL

- The purpose of the manual is to provide the operator and maintenance personnel with "instructions for use" to prevent and minimise risks during the interaction of man and unit.
- The information was prepared by the manufacturer in the original language (ITALIAN) according to the principles of professional writing and in compliance with the applicable regulations.
- To facilitate its reading and understanding, the principles of communication best suited to the characteristics of the recipients have been adopted as far as possible.
- Keep the manual and enclosed documentation for the entire service life of the unit in a known and easy to access place so that it is always at hand for reference.
- To easily find specific information, see the table of contents.
- Any observations made by recipients can be an important contribution to improving the after-sales services provided by the manufacturer.
- Some information may not entirely match the actual configuration of the work unit delivered.
- Some parts of the text, or those of considerable importance, are indicated by symbols, whose meaning is described:

	These are generic or specific **DANGER** symbols and indicate hazards that can cause even serious **accidents to people** if the required precautions are not taken.
	This is the **PROHIBITED** symbol and indicates operations that must not be carried out because they can result in even serious **accidents to people**.
ATTENTION	The word ATTENTION is used to provide additional information and in particular to point out hazards that can cause **serious damage**.
NOTES FOR THE USER	NOTES are used to provide information allowing the user to make best use of the unit, with best performance, and for safety and respecting the environment.

8.2 UNIT AND MANUFACTURER'S IDENTIFICATION

The nameplate gives all the unit's identification details, which should always appear in all correspondence between the user and manufacturer (e.g. requests for assistance or for replacement parts as described in par. 1.3).
The nameplate is placed on the machine:

It is strictly forbidden to remove or tamper with the nameplate.

8.3 REQUEST FOR ASSISTANCE - AFTER-SALES SERVICE

All requests for After-Sales Service intervention must be sent to the following email address:

- customercare@fpz.com

Specifying:

- Type of unit;
- Serial no.;
- Defect found;
- Use the RMA form enclosed with this manual

8.4 REPLACEMENT PARTS

All requests regarding replacement parts must be sent to the following email address:

- customercare@fpz.com

Specifying:

- Type of unit;
- Serial no.;

- Code of part to be ordered;
- Required quantity;
- Means of shipment;

8.5 TESTING, WARRANTY AND LIABILITY

Testing and inspection

- The entire unit is sent to the customer prearranged for installation, after passing the tests and inspections required by the manufacturer, in conformity with the applicable laws.

Warranty

- Warranties are defined in the general terms and conditions of sale.

Liability

- **FPZ S.p.A.** cannot be held liable for operation faults or generic failures caused by improper use of the unit or operations carried out by persons not authorised by **FPZ S.p.A.**

9 SAFETY RULES

9.1 GENERAL NOTES ON SAFETY AND FOR THE USER

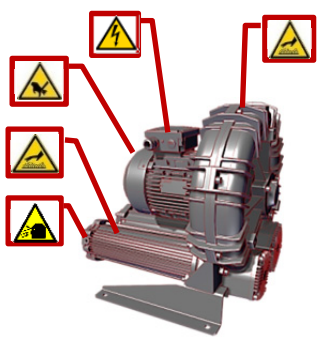
The instructions listed below must be read carefully and become a fundamental part of daily procedures in the use and maintenance of all the equipment, in order to prevent any kind of accident, injury or damage.

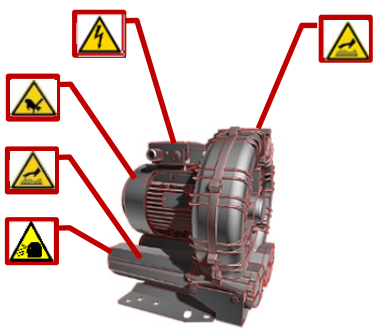
- Do not start the unit until its operation is clearly understood.
- If any doubts arise, despite having read this manual carefully and completely, contact **FPZ S.p.A.**
- Make sure all personnel involved in the use of the unit are informed regarding the safety requirements.
- Before starting the unit, the operator must check the efficiency of the safety devices and for any obvious defects in the unit. In case of any defects, immediately notify **FPZ S.p.A.**
- Check the proper operation of all the safety devices every day.
- The safety devices must never be removed or disabled.
- During maintenance or repair work it may be necessary to exclude some safety devices from the service. This operation must be carried out by authorised personnel.
- Never attempt rash solutions.
- All installation, commissioning and maintenance operations must be carried out exclusively by **qualified personnel**.
- Do not modify the electrical connections on the unit.
- Do not wear clothes, jewellery or accessories that can get caught in moving parts.
- Always keep the area around the unit free of obstructions.
- Use appropriate **PPE** such as boots, gloves, goggles and work clothes.
- Pay attention to all danger and caution signs placed on the unit.
- Always apply and enforce the safety rules; in case of any doubts, always consult this manual before acting.
- The unit must be used only and exclusively for its intended purpose and in accordance with that contractually established with **FPZ S.p.A.**

Non-compliance with the unit's intended use can cause serious accidents

The unit must only be started:

- In conformity with the purposes of use, transport and handling specified in "FORESEEN USE",
- respecting the values given in the "SPECIFICATIONS" and RATING DATA.





9.2 CONDITIONS OF INSTALLATION AND NORMAL OPERATION

Startup and operation must occur only under the following conditions:

- The unit must be completely assembled and intact, i.e. not damaged or tampered with.
- The silencer must be properly connected to the system piping.
- The machine must be securely fixed in place.
- The motor must be connected to a suitable control panel.
- If installed outdoors, protect the unit against the sun and weather.

Risk of injury due to shearing, crushing, entanglement!

During work on the unit there are risks of injury due to shearing, crushing or entanglement!
Therefore it must be carried out by technicians who handle and install the machine, taking the necessary safety measures and following the instructions given in this manual.

Danger due to escaping process fluids!

Danger due to overpressure with sudden release of process fluids (injury to the skin and eyes)!
Start the machine only if properly connected.

Danger due to electricity!

Improper behaviour can cause serious accidents!
Work on the electrical equipment must only be carried out by qualified and authorised electricians!
Before starting work on the unit or system, take the following precautions:

- disconnect the mains power;
- open the terminal box only after making sure the power is disconnected;
- take steps to prevent the power from being reconnected.

Danger of suction!

Danger due to negative pressure: sudden drawing in of hair and clothing! Start the machine only if properly connected.

Danger due to seizing of the impeller caused by performance values being exceeded

Use the blower, making sure the operating conditions comply with the values given in the SPECIFICATIONS.
Never operate the unit even temporarily with the inlet and/or outlet port closed.
Install a pressure-relief valve or equivalent circuit that can prevent excessive vacuum and/or overpressure and that enables compliance with the values given in the SPECIFICATIONS in this manual and the RATING DATA.
Turn the unit off immediately in case of any abnormal impeller noise! Then schedule maintenance.

Danger of burns caused by contact with hot surfaces of the unit!

In operation, in conformity with the values given in the "SPECIFICATIONS" and RATING DATA, the blowers / exhausters can reach high surface temperatures.
Use suitable PPE against the risk of burns. (Also see the section residual risks.)

9.3 FAULT CONDITION AND MAINTENANCE

Before starting routine maintenance on the unit, or for a fault, take the following safety measures:

- Disconnect the unit from the power supply via the main the switch.
- Place a sign: “DANGER! Maintenance work in progress." on the system control and the unit's control elements.
- **Allow the unit to cool**!
- Wait until the unit has completely stopped, i.e. that **the impeller is not rotating**, checking the electric motor fan.
- Ensure the absence of vacuum or overpressure in the unit and in the piping to be disconnected and that no fluid can escape from the unit and/or system!
- Follow the maintenance instructions in this manual.

Danger due to rotating impellers: cutting or shearing.

The rotating impeller can be accessed through the openings of the body and cover of the machine, once the manifolds or blind flanges are removed!
Never put hands or anything through these openings.

Danger due to electricity!

Improper behaviour can cause serious accidents!
Work on the electrical equipment must only be carried out by qualified and authorised electricians!
Before starting work on the unit or system, take the following precautions:

- disconnect the mains power;
- take steps to prevent the power from being reconnected;
- open the terminal box only after making sure the power is disconnected.

9.4 RESIDUAL RISKS

When designing the machines or systems on which the blower is to be installed, the following residual risks must be considered.

Danger due to hot surfaces!

In operation the unit may overheat, exposing the operator to contact with hot surfaces.
Do not touch the unit when in operation.
Before carrying out any operation after shutdown allow the unit to cool by waiting at least 20 minutes.

Danger due to rotating parts: electric motor cooling fan.

Although designed to reduce any danger, the machine has residual risks linked to the rotation of the fan.
Precautions to be taken:

- Do not wear loose fitting clothes
- Do not go near the machine with long and loose hair

Danger due to noise from the unit!

Some machines can produce high noise levels, even exceeding 80 dB(A).
The reference values are given in the specifications, which do not consider environmental reverberation.
Precautions to be taken:
Check the actual sound pressure of the machine in the place, and if necessary:

- Report the foreseen noise risk
- Arrange the use of PPE
- Insulate the place

10 FORESEEN USE

- FPZ side channel blowers / exhausters are designed to generate vacuum and overpressure and for conveying non-explosive, non-flammable, non-toxic and non-aggressive gases and air in continuous duty in a non-explosive environment.
- They consist of a toroidal chamber; between the body and cover there is an impeller with radial peripheral blades.
- FPZ side channel blowers / exhausters are designed and built for use in industrial plants and are equipped with three-phase or single-phase asynchronous bipolar electric motors in compliance with IEC 60034-1.

10.1 CONDITIONS OF USE

Non-compliance with the unit's intended use can cause serious accidents.

- This manual:
  MUST be read carefully and understood before carrying out any operations on the unit;
  MUST be strictly complied with;
  MUST always be at hand in the place where the unit is used.
- Installation must only be carried out by qualified personnel.

ATTENTION!	If installation is outdoors, protect the unit from the sun.

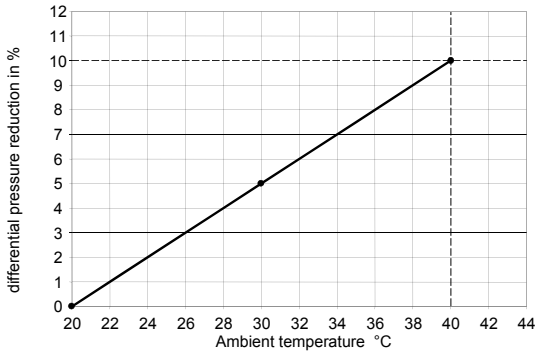
If installation is outdoors, protect the unit from the sun.
The maximum permissible pressure differentials given in the "SPECIFICATIONS" must never be exceeded. They are valid only under the following conditions;

- as a blower:
  gas intake temperature 20°C (+68°F) and atmospheric pressure 1013 mbar (abs.) (29.92 In Hg) measured at the inlet port
- as an exhauster:
  gas intake temperature 20°C (+68°F) measured at the inlet port and atmospheric backpressure 1013 mbar (abs.) (29.92 In Hg).

The ambient **temperature**, and the conveyed gas intake temperature, is permissible inside the range -15°C (+5°F) ÷ +40°C (+104°F) with the following provisions;

- for ambient temperature +30°C (+86°F) **reduce** the maximum pressure differentials given in the "SPECIFICATIONS" by 5%;
- for ambient temperature +40°C (+104°F) **reduce** the maximum pressure differentials given in the "SPECIFICATIONS" by 10%.

The graph to be used to reduce the maximum pressure differentials in case of ambient temperature between +21°C and +40°C (+70°F and +104°F) is given below



The unit should not be installed at more than 1000m a.s.l.; if higher, contact the FPZ after-sales service.

Danger due to limited visibility in the place where the unit is installed!

Make sure to always have the installed unit under control when carrying out any operation in the installation area.
The control elements must be placed so that the installed unit can be seen.
Danger of serious injury!

ATTENTION!	If the flow rate has to be reduced, use a bypass valve instead of throttling the suction or delivery.

- In case of suction in the place, and if on the system, protect the intake pipe using a suitable **filter** with maximum filtration of 100µm and check compliance with the maximum pressure/vacuum data given in the SPECIFICATIONS (max ΔP) :
- for use as a **blower** deduct the pressure loss (P_a) from the maximum compression indicated (max ΔP), i.e. $P_{working} \approx$ max ΔP - P_a (for $T_{ambient}$=20°C and $P_{ambient}$=1013 mbar)
- for use as an **exhauster** make sure the maximum vacuum at the inlet port is not exceeded.

10.2 SPECIAL VERSIONS

FPZ side channel blowers/exhausters can be manufactured in special or custom versions; the instructions given in this manual still apply to some of them.
The special versions manufactured, and for which that given above applies, are:

- **BPA version**
  Machines built to work in harsh environments and/or for conveying aggressive fluids, where aggressive means the presence of elements that can affect standard machine operation, such as humidity; as specified in point 2, conveying flammable, explosive or toxic gases, or installation in potentially explosive places, is not permitted.
- **TMS version**
  Machines that ensure mechanical seal between the parts that convey air or fluids, minimising leakage.
- **Special electric motors**
  On request, blowers/exhausters can be manufactured with motors having one or more of the following characteristics:
  - Special voltages
  - Higher levels of protection against solid bodies and/or liquids (standard IP55)
  - Higher insulation classes (standard Class F)
  - Protection devices such as thermal switches, heaters, PTC, PT100
- **IE2 motor**
  The side channel blowers/exhausters can be manufactured using class IE2 motors.
  Compared to the standard version, the performance and dimensions may vary; this information is given more precisely in the specific Data Sheets of the IE2 version.

Further customisation must be requested and agreed when ordering, subject to a feasibility appraisal by the Technical Department.

ATTENTION!	For maintenance of special version machines, contact FPZ.

10.3 PROHIBITIONS

THE FOLLOWING IS STRICTLY PROHIBITED:

- Using the unit in installations for unforeseen use.
- The suction and conveying of aggressive, corrosive and/or harmful fluids.
- Using the unit in conditions different from the values given in the "SPECIFICATIONS" and RATING DATA.
- Using the unit without having installed the suction filter.
- Operation with inlet and/or outlet port closed.
- Making conversions or changes to the unit, maintenance or repair work on own initiative or not envisaged in the manual. Maintenance work can be carried out only in compliance with that described in this user manual, exclusively by qualified personnel.

IT IS COMPULSORY TO:
- Check and comply with the intended use of the machine.
- Check and comply with the conditions of use specified in this manual.
- Comply with the installation conditions specified in this manual.
- Carry out the preliminary checks as specified in the section "STARTUP".
- Carry out maintenance as specified in section 7.

10.4 REASONABLY FORESEEABLE IMPROPER USE

Non-compliance with the unit's intended use can cause serious accidents.

Failure to comply with the prohibitions/obligations can result in technical faults, damage to the system or accidents.
Danger of serious injury!

- Listed below are some examples of improper use identified by risk analysis and practical experience, according to the conditions they can create.

IMPROPER USE	**CONSEQUENCES**	**RISKS**
IMPROPER USE LINKED TO NORMAL OPERATION		
Failure to comply with the distance for the motor air intake	Motor overheating and possible damage to the blower	RISK FOR THE MACHINE
Presence of operators and possible contact with the machine	Operator coming into contact with hot parts of the machine	RISK FOR THE OPERATOR
Use of loose clothing or untied long hair	Possible catching or suction in the machine or in the motor fan	RISK FOR THE OPERATOR
IMPROPER USE LINKED TO METHODS OF USE		
Failure to comply with the operating conditions (par. 2.2): - Ambient temperature outside the limits or incorrect - Altitude above 1000 m - Failure to consider system and filter pressure losses	Machine performance different from the data given, possible motor faults and seizing of the impeller	RISK FOR THE MACHINE
Failure to install the filter (for use with suction in the place)	Particles entering the blower with seizing of the impeller	RISK FOR THE MACHINE
Operation outside curve (P/Q) (Pressure /Flow rate)	Machine performance different from the data given, possible motor faults and seizing of the impeller	RISK FOR THE MACHINE, SYSTEMS AND OPERATORS
Rigid connection between the machine and system	Abnormal vibrations for the machine and/or system with possible seizing of the impeller.	RISK FOR THE MACHINE, SYSTEMS AND OPERATORS

Use of the unit with current values not corresponding to nominal	Possible overheating of the machine and motor when powered by an inverter.	RISK FOR THE MACHINE
IMPROPER USE LINKED TO MAINTENANCE WORK		
Failure to clean the filter	Seizing of the impeller	RISK FOR THE MACHINE
Failure to eliminate of layers of surface dust	Machine overheating	RISK FOR THE MACHINE, SYSTEMS AND OPERATORS
FAULT CONDITIONS / EMERGENCY CONDITIONS		
Not stopping the machine when making an abnormal noise.	Damage with possible seizing of the impeller, machine overheating and possible motor damage.	RISK FOR THE MACHINE, SYSTEMS AND OPERATORS

11 STORAGE AND TRANSPORT

Danger due to suspended loads.

The tipping over or falling of heavy loads can cause crushing and injury Place the packages in a stable way.
Do not place loads on the packages.

- Store the machine in a dry place, if possible keeping it in its packaging.
- Do not remove the protection from the openings.

Danger due to lifting of heavy loads!

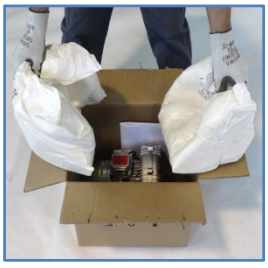
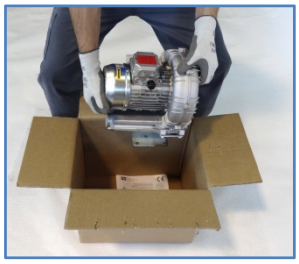
The falling of heavy loads can cause crushing and injury or even death!
Before carrying out handling operations (lifting, moving, carrying, storage) check the weight, or mass (m), of the unit given in the "SPECIFICATIONS" and decide the most suitable method in order to ensure maximum safety.
Therefore, all the risk prevention measures must be met, including any local and/or particular regulations on safe handling:

- by suitably qualified and adequately instructed personnel;
- using appropriate means;
- organising the work so that it is done with minimum risk and in safe and healthy conditions;
- with a safe and stable support surface;
- with the use of suitable work clothes and personal protection equipment (gloves and goggles, safety shoes and helmet);
- on a work area with sufficient space, flat floors, without obstacles;
- avoiding knocking, jerking and jolting.

Units weighting more than 25 kg have lugs for handling.

Different packaging is used, depending on the size and weight; once the package is brought near the installation area, open it, take out the documents and then remove the machine as illustrated below.

m<25 kg

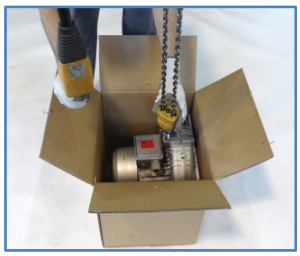
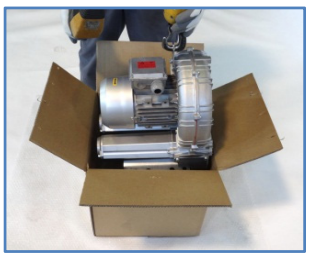




ATTENTION!

Lifting the unit in any way other than that indicated is strictly prohibited. Use the special lugs on the body of the blower, motor or base

m>25 kg



m>25 kg

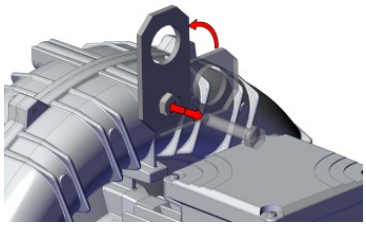



m>25 kg





- In some cases the lifting eye is turned 90°.
- Before lifting the machine, proceed as follows:
- Undo the screw
- Put the lifting eye back in the correct position
- Tighten the screw



12 INSTALLATION

12.1 INSTALLATION CONDITIONS

- Make sure the conditions of use as described in section 3 are complied with, then proceed with installation of the machine as specified below.

Danger due to limited visibility in the place where the unit is installed!

Make sure to always keep an eye on the installed unit when carrying out any operation in the installation area.
The control elements must be placed so that the installed unit can be seen.

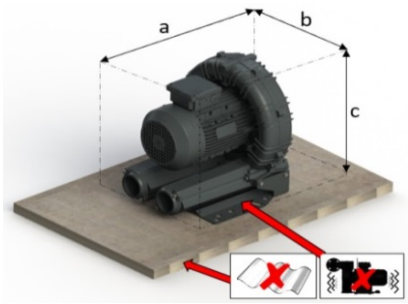
Danger due to vibration!

Regularly check the fixing of the unit to the support structure.
Excessive vibration of the unit can seriously damage the machine.

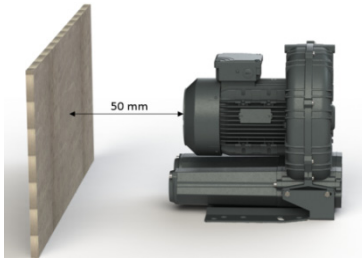
NOTE FOR THE USER

Vibration dampers are supplied with machines from K07 to K12.
On request, vibration dampers are also available on the other machines.

- The unit's support surface must be flat, sturdy, stable and as level as possible.
- The unit must be installed on a structure that does not transmit vibrations. Do not install the unit on structures that can transmit or amplify the noise.
- Installation of the unit must always be done using vibration dampers.
- Installation of the unit must ensure that motor ventilation is not impeded by obstacles placed in the immediate vicinity. Therefore, the motor air intake must remain free, ensuring a distance of at least 50mm between the motor fan cover and any structure.



- Connect the pipes using flexible sleeves, without resting the weight of the pipes on the unit, with the exception of a possible filter in case of suction in the place.
- Determine the dimensions a, b, c to allow adequate space for installation of the unit with its accessories (Dimensions available in the first section).



ATTENTION!	When installed outdoors, protect the unit against the sun and weather.

To avoid overloads caused by pressure fluctuations, install a bypass pressure-relief valve on the suction pipe in case of operation as an exhauster, and on the delivery when operating as a blower.

If the flow rate has to be reduced, use a bypass valve instead of throttling the suction or delivery.

Protect the suction pipe with a suitable filter with degree of filtration less than or equal to 100 µm. Foreign bodies are: dust, sand, gravel, dirt in the pipes, cutting burrs and shavings, welding slag and spatter, metal burrs and sealant residuals produced when connecting the pipes. Replace the filters regularly!

Size the pipes and choose accessories that minimise pressure losses; therefore:

- do not fit pipes narrower than the ports of the machine.
- when installing several machines in parallel, suitably size the manifold and the main line.
- use large-radius curves and not elbows.
- do not install valves with a smaller flow than nominal and check valves with shutter opposed by spring (the check valve with lowest pressure loss is the lightened non-return valve).
- when used for oxygenation, choose diffusers with low flow resistance (low pressure loss).

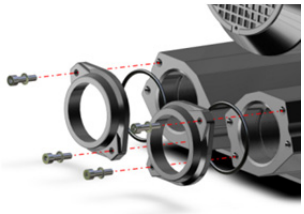
Danger due to foreign bodies and dirt entering the unit!

The ingress of even tiny foreign bodies causes serious damage to the unit with probable breakage of the impeller blades and the danger of debris being thrown out!

See INSTALLATION DIAGRAMS in the first section.

12.2 HORIZONTAL INSTALLATION

- Units supplied with standard set-up are ready to be installed in the horizontal position by means of the feet.
- The feet have holes for fixing; use all the holes and choose the appropriate type of screw.
- Remove the protection on the ports before checking the rotation direction and before final connection.
- To connect the unit to the piping, remove the flanges from the silencer housings to make the appropriate connections using flexible sleeves, thereby avoiding rigid connections which can cause stress and harmful vibrations.
- Refit the flanges on the silencer housings complete with gaskets and tighten.



Check the motor rotation direction (see par. 5.2 ROTATION DIRECTION)

12.3 INSTRUCTIONS FOR REPOSITIONING SILENCER HOUSINGS

- The SCL K MOR series has been designed for maximum flexibility in positioning the silencer housings in order to allow different installation configurations.
- The blower is normally supplied with silencers positioned as shown in figure **A**.
- If this arrangement has to be changed, establish the required arrangement of the silencer housings.

See the diagram provided in the first section of this manual

- Remove and refit the housings and blind flanges according to the following diagram to obtain the desired configuration

Removing the blind flange (B)

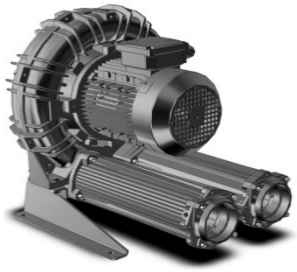
- Place the unit horizontal, resting the feet on a flat and stable surface.
- Undo the screws and remove the blind flange and gasket

Removing the silencer housing (C)

- Undo the screws.
- Remove the silencer housing with gasket.

Removing the flange (D)

- Undo the screws.
- Remove the flange and gasket.
- Reassemble by proceeding in reverse order, remembering the gaskets.



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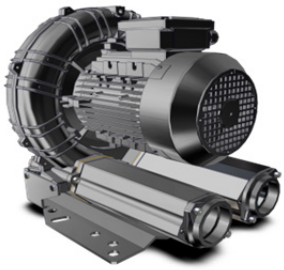

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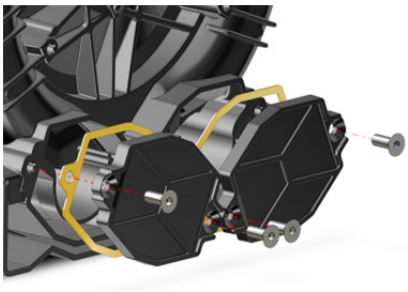

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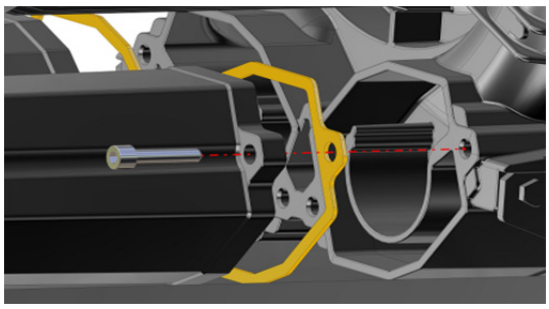

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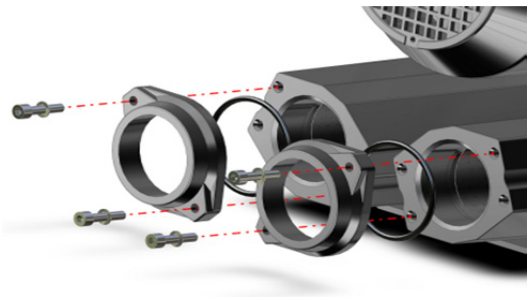


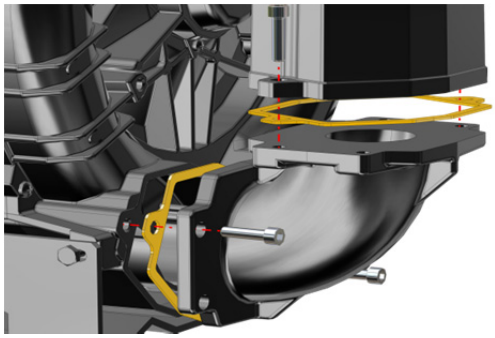
D

Danger due to rotating parts: impeller!

The danger of shearing due to the rotating impeller can exist even when the machine off, if it is started manually.
Therefore use suitable work clothes and personal protection equipment.

12.3.1 CK TYPE 90° MANIFOLD (accessory) USE

- For different connection configurations, use the CK type 90° manifold installed only on the cover openings.
- See the possible configurations as previously illustrated.



Fitting the CK type 90° manifold

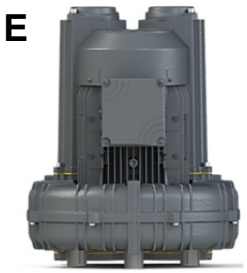
- Remove the silencer as previously described.
- Insert the gaskets between the cover and manifold.
- Tighten the respective screws
- Assemble the silencer by proceeding in reverse order.

See par. 5.1 for INSTALLATION CONDITIONS

12.4 VERTICAL INSTALLATION ON THE COVER

The units can be installed with the working axis vertical, as follows:

- Using vibration dampers fitted directly on the cover (E)
- Using a special foot for vertical fixing, available as an accessory (F).



Non-compliance with the unit's intended use can cause serious injury.

Regularly check the fixing of the unit to the support structure.
Excessive vibration of the unit can seriously damage the machine.

NOTE FOR THE USER	A special foot is available as an accessory for fixing the unit vertically on the cover. The foot has holes for fixing; use all the holes and choose the appropriate type of screw.

NOTE FOR THE USER	Vibration dampers are supplied with machines from K07 to K12. On request, vibration dampers are also available on the other machines.
ATTENTION!	Avoid the possibility of water stagnation, especially in case of installation of the unit with vertical axis.
ATTENTION!	Check the motor rotation direction. (see par. 5.2 ROTATION DIRECTION)

12.5 ELECTRIC MOTOR

Make sure to comply with all the safety measures and instructions given in the electric motor instruction manual.

Danger due to electricity!

- Improper behaviour can cause serious injury.
- Work on the electrical equipment (installation, maintenance) must only be carried out by qualified and authorised electricians!
- Before starting work on the unit or system, take the following precautions:
  - make sure the machine is NOT powered;
  - take steps to prevent the power from being reconnected;
  - open the terminal box only after making sure the power is disconnected!
- The terminal box must not contain:
  - foreign bodies;
  - impurities;
  - moisture.

Close the terminal box with the lid and seal the openings of the cable glands to prevent dust, water and moisture from entering.
Check the seals regularly.

- If a faulty unit is touched there is risk of electric shock!

Install the motor circuit breaker.
Have an electrician regularly check the electrical equipment.

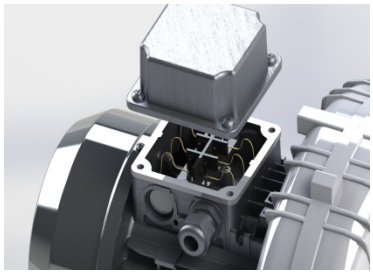
ATTENTION!

In case of various motor starts in the space of an hour, there are limitations which can seriously damage the unit if ignored.
Regarding this, refer to the electric motor instruction manual.

12.5.1 CONNECTION

ATTENTION!

Incorrect connection of the motor can seriously damage the unit.
The power supply of the motor and any auxiliary equipment must use wires of suitable thickness in order to avoid abnormal overheating and high voltage drops.



- Make sure the supply voltage and frequency match the rating data.
- Connect the earth wire of the motor to the terminal marked with the following symbol ⏚ always before connecting to the mains and check the leakage capacity. The earth wire is identified by its colour (yellow/green).
- Connect to the mains by referring to the diagram in the terminal box.
- Use the openings in the cable glands to run the power cables inside the terminal box.
- Once the terminal board connections are done, tighten the cable gland to secure the cables.
- The electrical connection terminals must be tightened to prevent high contact resistances and consequent overheating.
- Ensure the insulation gaps and distances between the different wires as required by the standards.
- All screws used for closing the terminal board must be tightened down. Damaged screws must be immediately replaced with screws of equivalent or better quality.

The connection must ensure:

- lasting safety over time.
- The ends of the wires must not protrude.
- The fuses only protect against short circuits and not the motor.
- Fuse ratings must take account of peak currents, especially in case of direct starting.
- The protection with motor circuit breaker (thermal or amperometric) is essential against the risks of overload, in the absence of a mains phase, excessive voltage fluctuation or stuck rotor.
- Adjust the motor circuit breaker to the rated current as the maximum value.

12.5.2 INVERTER POWERED ELECTRIC MOTOR

ATTENTION!

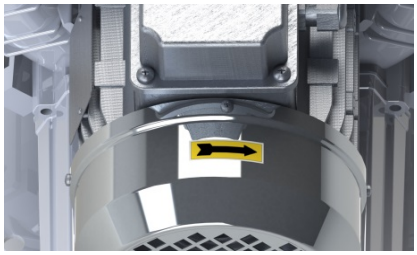
When powered by an inverter, the unit's nominal pressure or vacuum characteristics cannot be maintained.
For the performance of an inverter powered unit, contact the FPZ after-sales service.

The power supply via inverter is always the responsibility of the installer, who must ensure compliance with the standards and:

- checking and any measures necessary to comply with the limits of immunity and emission laid down by the standards;
- checking the suitability of the system and the inverter for operation with standard motors, i.e. class F, or the need for specific motors for these types of operation.

12.5.3 ROTATION DIRECTION

SCL K blowers - exhausters must be used with the rotation direction indicated by the arrow on the electric motor fan cover.



- To check the rotation direction, switch the motor on briefly and observe the fan.
- To change the rotation direction, invert the power cable connections, leaving the earth connection unchanged.

Refer to the connection diagram located in the terminal box

ATTENTION!

The position of the motor does not always allow the rotation direction to be checked, therefore it is advisable to do this check before installation of the system.

13 STARTUP

Non-compliance with the unit's intended use can cause serious accidents.

The unit must only be started:

- after carefully reading, understanding and complying with this user manual ("SAFETY RULES" and "INSTALLATION");
- in conformity with its intended use as prescribed in "FORESEEN USE";
- respecting the values given in the "SPECIFICATIONS".

13.1 PRELIMINARY CHECKS

Before starting the machine for use, carry out the following preliminary checks:

- If the unit has not been started up for some time, check its condition and, if necessary, remove any dust from the external surfaces;
- Deactivate/open any pipe closing devices (shut-off valves, solenoid valves, etc.) before starting the unit.
- **Never start and operate the unit with the inlet and/or outlet port closed!**
- Make sure the ambient and conveyed gas suction temperatures come within the values: -15°C (+5°F)÷ +40°C (+104°F);
- Check correct operation of the pressure-relief valve (not supplied).

13.2 OPERATION

The unit can be started for use after carrying out the preliminary checks.

- Start the unit by switching on the power to the electric motor.
- Check the operating pressure or vacuum and also compliance with the values given in the “SPECIFICATIONS”. Pressure losses in the pipes are often underestimated but are decisive factors for the operating differential pressure.
- Measure the motor absorption and check compliance with the rated value.

13.3 STOPPING

- The unit must be stopped by switching off the power supply to the motor.
- In case of shutdown, make sure to operate the unit with the inlet open for about 20 minutes.
  This operation allows the removal any condensate in the suction chamber.

14 MAINTENANCE

In order to prevent faults and damage it is important to periodically check the units in operation, therefore it is advisable to adopt a maintenance plan in line with this Manual, providing for:

- Periodical checks
- Periodical maintenance and troubleshooting

14.1 PERIODICAL CHECKS

The units in operation should undergo periodical inspections by qualified personnel, in order to prevent failures that can directly or indirectly cause damage.

A) With the unit in operation periodically check the following parameters:

- Delivery temperature
- Operating pressure and/or vacuum
- Electric motor current absorption
- Vibration
- State of the filter and corresponding pressure loss

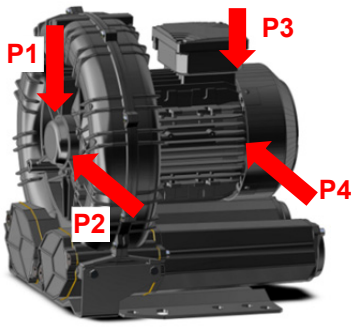
Danger of burns caused by contact with hot surfaces of the unit!!

When in operation the blowers / exhausters can reach high surface temperatures.
Before carrying out any operation after shutdown wait at least 20 minutes for the unit to cool.

Measurement of vibrations

The measurements for determining the vibration velocity [mm/s] must be done with an electronic vibration meter, at the following places:

- **Points P1** and **P2 (front bearing):** place the vibration meter near the front bearing, adopting the highest value.
- **Points P3** and **P4 (rear bearing):** place the vibration meter on the electric motor casing near the bearing housing (not on the fan cover), adopting the highest value.



Legend: Classification of machines: ***Class I*** **= SCL with electric motor of power ≤ 15kW** ***Class II*** **= SCL with electric motor of power > 15kW** **Appraisal zones:** ***Zone A*** **= SCL with vibration (a) inside this zone they are considered acceptable for a long-term duty.** ***Zone B*** **= SCL vibration (a) inside this zone they are considered unsuitable for a continuous long-term duty. The machine can be operated in these conditions for a limited period, as long as there is the opportunity for a suitable corrective action.**	**Effective vibration velocity value [mm/s]**	***Class I*** **(≤ 15kW)**		**Effective vibration velocity value [mm/s]**	***Class II*** **(>15kW)**
	a<1.8	***A***		a<2.8	***A***
	1.8<a<4.5	***B***		2.8<a<7.1	***B***

Danger due to seizing of the impeller caused by excessive vibration!

Vibration values higher than Zone B (table of effective vibration velocity value) are considered NOT permissible and can cause damage to the machine and therefore serious injury to operators.

- **In case of noise and/or abnormal vibration indicating the possibility of seizing of the impeller, move away and turn the unit off immediately!**

Variations in normal working conditions (increases in power absorption, abnormal noise, vibration, excessive overheating of the service fluid) are indications of a unit malfunction.
Also, compare the measured values with those given in the "SPECIFICATIONS.

B) With the unit stopped and cooled, periodically carry out the following checks:

- Dust: check and remove deposits from the external surfaces of the unit.
- Suction filter (if fitted): every 10-15 days, check and clean or replace the filter cartridge. The dirty cartridge will create strong suction resistance and consequently a higher pressure differential, power absorption and operating temperature.

Danger due to high temperatures!

To limit the formation of surface layers of dust that can affect the natural heat exchange between the unit and the environment, ensure regular cleaning and removal with suitable equipment.
The suction and/or delivery pipes must not be dirty or clogged! Wear suitable PPE.

14.2 PERIODICAL MAINTENANCE AND TROUBLESHOOTING

Refer to the following section, "OPERATION PROBLEMS", to identify possible critical situations and types of failures.

- In case of periodical maintenance for cleaning and replacement of some components, as well as in case of failure, it is necessary to disconnect and remove the machine from the system.

Danger due to electricity.

Before carrying out any operation, make sure the machine is NOT powered.

Risk of injury due to shearing, crushing, entanglement.

During work on the unit there are risks of injury due to shearing, crushing or entanglement!
Therefore it must be carried out by qualified personnel who handle and install the machine, taking the necessary safety measures and following the instructions given in this manual.

Danger due to residual negative pressure or overpressure.

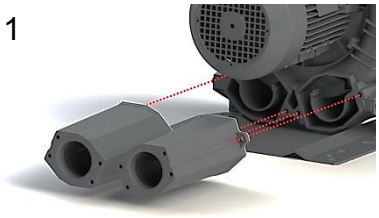
For residual overpressure: possible release of process fluids with risk of injury to the skin and eyes;
For negative pressure: possible drawing in of hair and clothing.
Disassemble the machine only after closing and draining the system connected to it.

14.3 REPLACING THE SOUND ABSORBING MATERIAL

When replacing the sound absorbing material in the silencers, proceed as follows:

- Undo the screws (1)
- Disconnect the silencer housings (1)
- Remove the sound absorbing material from the silencer housings (2)
- Recover the support mesh (2)
- Replace the sound absorbing material and assemble by proceeding in reverse order.

1



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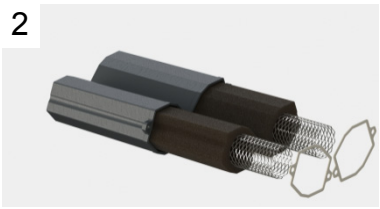
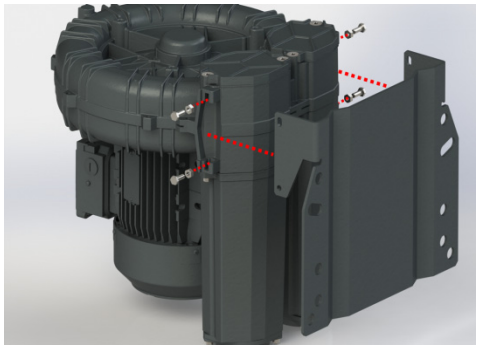


14.4 INTERNAL CLEANING

To clean the inside, proceed as follows:

- Place the unit upright, resting the fan cover on a flat and stable surface (1)
- Undo the screws (1)
- Remove the foot (1)
- Undo the cover screws (2)
- Remove the cover (3)
- Undo the screw and remove the washer (4)
- Remove the bearing and bearing cover (5)
- Remove the impeller (6)
- Clean and assemble by proceeding in reverse order
- Seal with System RS01 Arexons or Loctite 5970

1



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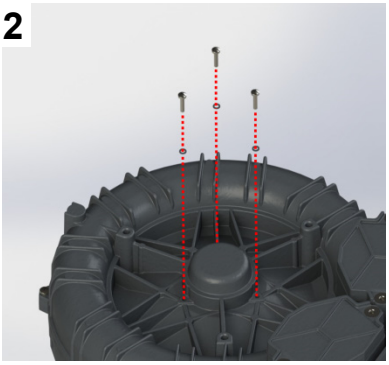

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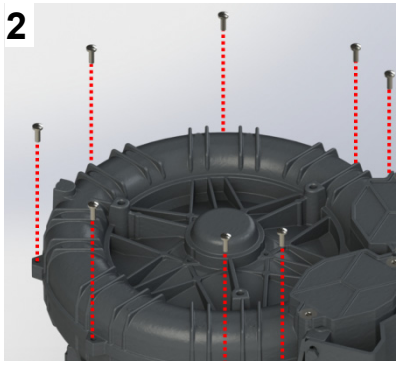

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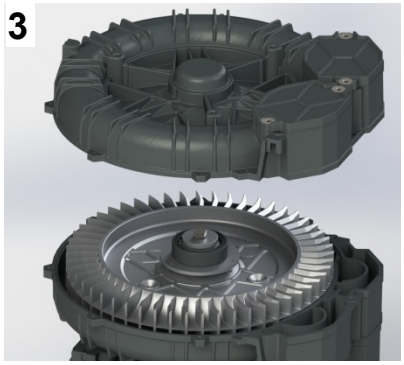

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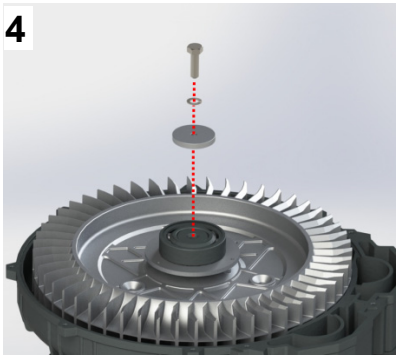

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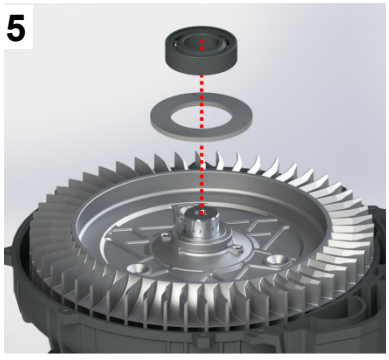

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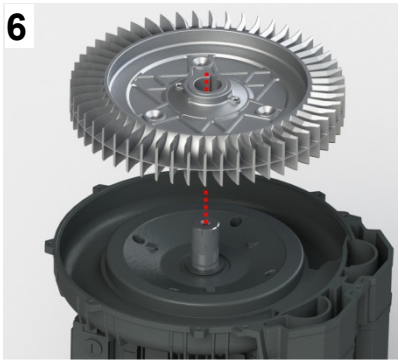

14.5 LIFE OF BEARINGS

- In normal operating conditions (values given in the SPECIFICATIONS) the machine's bearings must be replaced by FPZ personnel after 20000 hours or 3 years, whichever comes first.

ATTENTION	The unit's bearings must only be replaced: if all the instructions, parts list, and the section/exploded view of the respective unit are available.

14.6 OPERATION PROBLEMS

Problem	Seriousness[6]	Cause	Cure
The unit does not start	F	Incorrect electrical wiring.	Have the electrical connection checked by the Technician, referring to the diagram in the terminal box.
	F	Unsuitable supply voltage.	Make sure the supply voltage, measured at the motor terminals, matches the rated voltage +/-10%.
	G	The impeller is stuck.	Have the unit repaired by FPZ After-Sales Service.
Insufficient or no air flow	G	The suction filter is clogged.	Have the cartridge cleaned or replaced by the Technician.
	G	Wrong frequency (for inverter powered units).	Correct the frequency.
	G	Profile of impeller blades modified (due to deposits on the profile).	Have the impeller checked by FPZ After-Sales Service
Insufficient or no differential pressure	F	Wrong rotation direction.	Have the rotation direction reversed by the Technician, switching around the two power supply wires.
	G	Leak in the system	Find the leak and seal it.
Current absorption higher than the permissible value	F	Incorrect electrical wiring.	Have the electrical connection checked by the Technician, referring to the diagram in the terminal box.
	F	Supply voltage drop.	Have the supply voltage at the terminals restored within the permissible values by the Technician.
	G	The suction filter is clogged.	Have the cartridge cleaned or replaced by the Technician.
	G	The unit has accumulated deposits inside.	Have the unit cleaned inside by FPZ After-Sales Service.
	G	The unit is operating at a pressure and/or vacuum higher than the permissible value.	Operate on the system and/or control valve to decrease the pressure differentials.
High delivery air temperature	G	The unit is operating at a pressure/vacuum higher than the permissible value.	Operate on the system and/or control valve to decrease the pressure differentials.
	G	The suction filter is clogged.	Have the cartridge cleaned or replaced by the Technician.
	G	The unit has accumulated deposits inside.	Have the unit cleaned inside by FPZ After-Sales Service.
	G	Suction and/or delivery pipes obstructed.	Have the obstructions removed by the Technician.
	G	Intake air temperature above 40°C (+104°F).	Use heat exchangers to reduce the intake air temperature.
Abnormal noise	F	The sound absorbing material is damaged.	Have the sound absorbing material replaced by the Technician.
	G	The impeller rubs against the casing: - The unit is operating at a pressure/vacuum higher than the permissible value.	Operate on the system to decrease the pressure differentials.
	G	- Reduction of assembly play due to internal deposits (dust, dirt on pipes, process residues, etc.).	Have the unit cleaned inside by FPZ After-Sales Service.
	G	Worn bearing.	Have the bearing replaced by FPZ After-Sales Service.
	F	Unit installation position unsuitable.	Have the units installed on structures that cannot transmit or amplify the noise (tanks, metal plates, etc.) by the Technician.
Abnormal vibration	G	The impeller is damaged.	Have the impeller replaced by FPZ After-Sales Service.
	G	The impeller has accumulated deposits.	Have the unit cleaned inside by FPZ After-Sales Service.
	G	Unit fixed without vibration dampers.	Have the unit secured with vibration dampers by the Technician.
	F	Rigid connection to the system	Have flexible sleeves installed between the unit and the pipes by the Technician.
	G	Faulty bearing on blower side or motor side.	Have the bearing replaced by FPZ After-Sales Service.
Leaks	G	Faulty gaskets on the silencer.	Have the gaskets checked and, if necessary, replaced by FPZ After-Sales Service.
	G	Faulty gaskets on the cover.	Have the gaskets checked and, if necessary, replaced by FPZ After-Sales Service.

[6] Divided as follows: F for functional fault and G for serious fault

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REGENERATIVE BLOWERS - **PRESSURE**

SCL K03 / K04 / K05 / K06

MS SERIES - MOR RANGE

TECHNICAL CHARACTERISTICS

- Aluminium alloy construction
- Smooth operation
- High efficiency impeller
- Maintenance free
- Mountable in any position
- Recognized TEFC - **cURus** motor

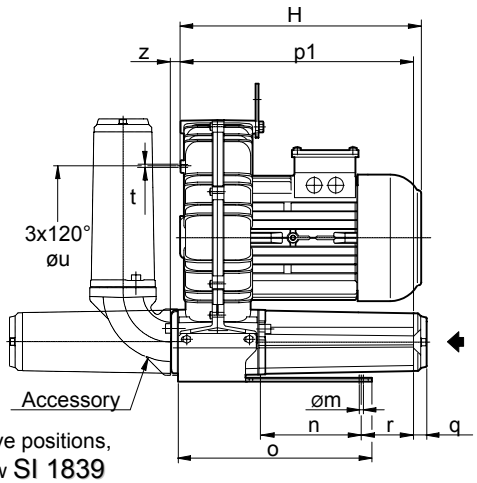
OPTIONS

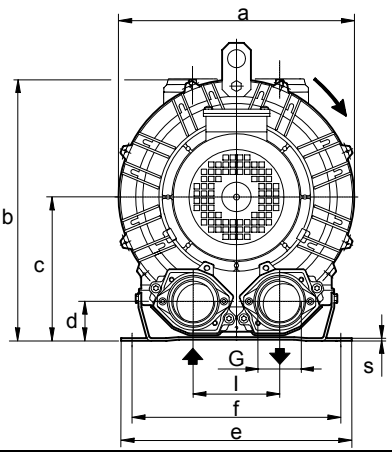
- Special voltages (IEC 38)
- Surface treatments

ACCESSORIES

- Inlet and/or inline filters
- Additional inlet/outlet silencers
- Safety valves
- Flow converting device
- Optional connectors

Dimensions in inches.
Dimension for reference only.





Possible alternative positions, please refer to drw SI 1839

Model	a	b	c	d	e	f	G	l	m	n	o	p1	q	r	s	t	u	z
K03-MS	**9.49**	**10.55**	**5.79**	**1.69**	**9.06**	**8.07**	**1"1/4 NPT**	**3.39**	**0.39**	**3.27**	**5.59**	**8.07**	**0.71**	**2.95**	**0.16**	**M6**	**5.51**	**0.47**
K04-MS	**11.22**	**12.40**	**6.77**	**1.93**	**10.04**	**8.86**	**1"1/2 NPT**	**4.02**	**0.47**	**3.74**	**6.73**	**8.74**	**0.71**	**2.76**	**0.16**	**M6**	**6.89**	**0.71**
K05-MS	**12.87**	**14.37**	**7.87**	**2.13**	**12.60**	**10.24**	**2" NPT**	**4.72**	**0.59**	**4.53**	**10.43**	**12.60**	**0.71**	**3.86**	**0.16**	**M8**	**7.87**	**0.75**
K06-MS	**14.80**	**15.47**	**8.07**	**2.13**	**12.80**	**11.42**	**2" NPT**	**4.92**	**0.59**	**5.51**	**10.71**	**13.15**	**0.71**	**3.35**	**0.16**	**M8**	**9.45**	**0.75**

Model	Maximum flow Scfm		Installed power Hp		Maximum differential pressure △p (In WG)		Noise level Lp dB (A) (1)		Overall dimensions H	Weight
	60 Hz 3500 rpm	*50 Hz 2900 rpm*	60 Hz 3500 rpm	*50 Hz 2900 rpm*	60 Hz 3500 rpm	*50 Hz 2900 rpm*	60 Hz 3500 rpm	*50 Hz 2900 rpm*	Inches	Lbs
K03-MS	**52**	***43***	**3/4**	***3/4***	**64**	***60***	**62.0**	***60.0***	**10.43**	**24.30**
			1	***1***	**95**	***77***	**62.3**	***60.3***	**11.97**	**26.50**
K04-MS	**98**	***81***	**1 ½**	***1 ½***	**58**	***80***	**64.8**	***62.8***	**11.65**	**36.40**
			2	***2***	**85**	***100***	**65.0**	***63.0***	**13.78**	**43.00**
			3	**-**	**120**	**-**	**65.2**	**-**	**13.78**	**49.60**
K05-MS	**156**	***129***	**2**	***2***	**52**	***70***	**70.5**	***68.5***	**13.20**	**51.80**
			3	***3***	**90**	***110***	**70.8**	***68.8***	**13.20**	**58.40**
			4	***4***	**128**	***120***	**71.1**	***69.1***	**14.40**	**67.20**
K06-MS	**216**	***179***	**3**	***3***	**50**	***65***	**73.0**	***71.0***	**13.54**	**68.70**
			4	***4***	**75**	***95***	**73.3**	***71.3***	**14.17**	**71.65**
			5 ½	***5 ½***	**110**	***140***	**73.6**	***71.6***	**14.17**	**77.60**
			6 1/5 (2)	**-**	**132**	**-**	**73.9**	**-**	**14.45**	**77.60**

(1) Noise measured at 1 m distance with inlet and outlet ports piped, in accordance to ISO 3744.
(2) No cURus motor

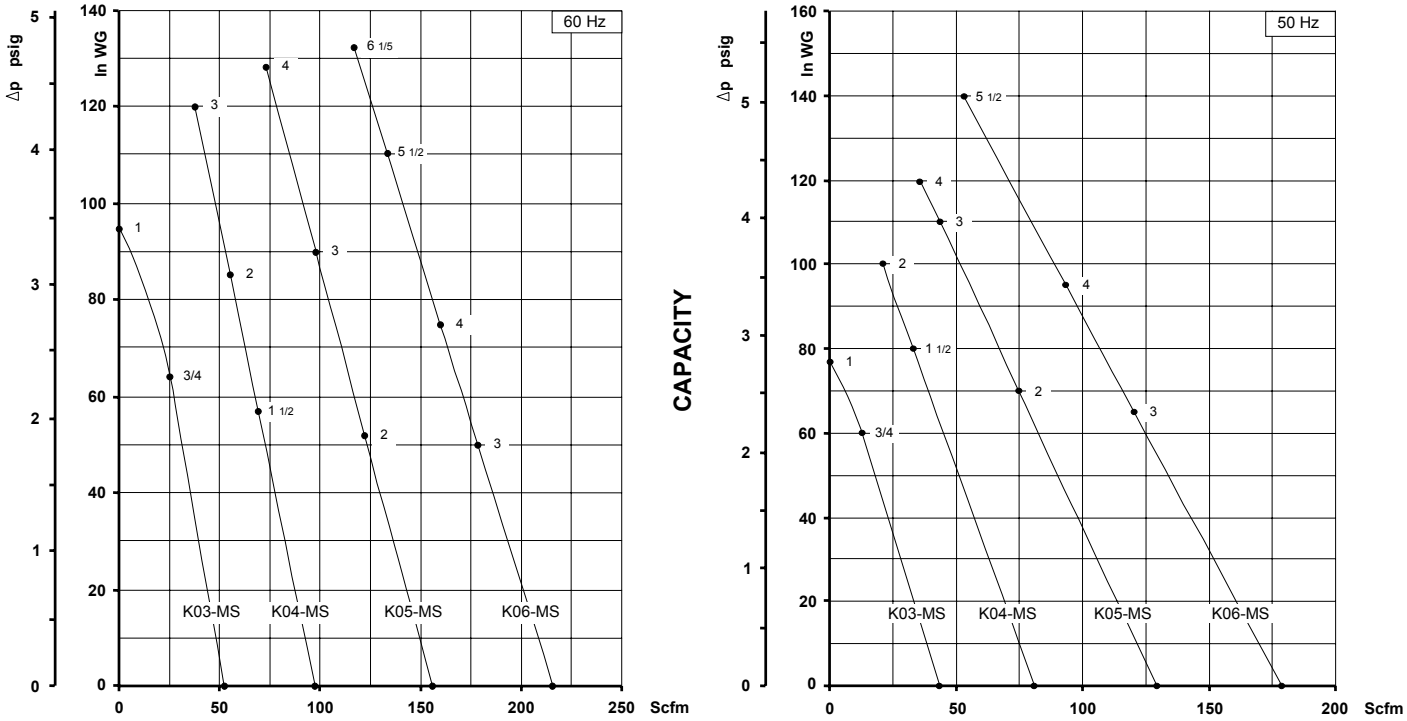
- For proper use, the blower should be equipped with inlet filter and safety valve; other accessories available on request.
- Ambient temperature from +5° to +104°F.
- Specifications subject to change without notice.

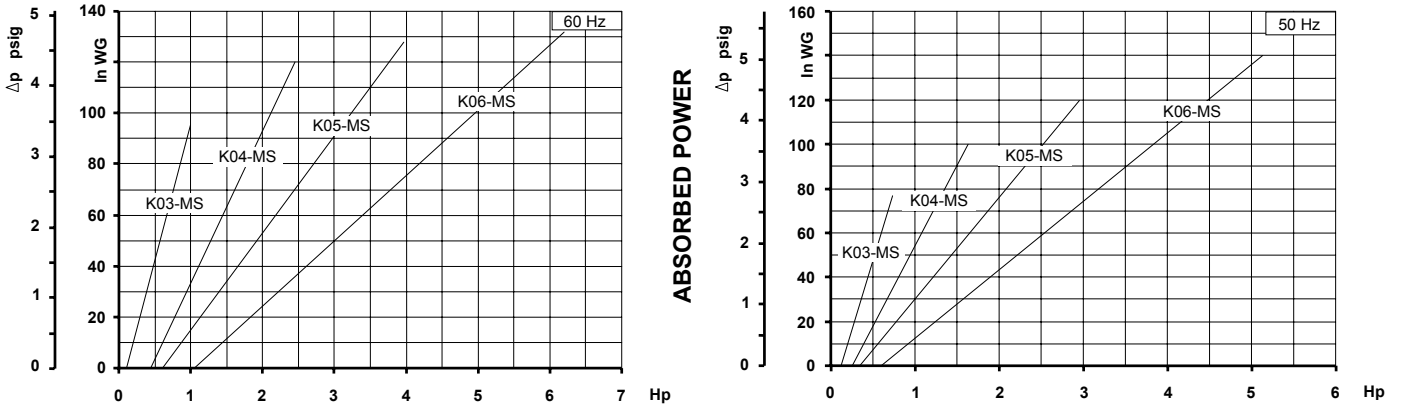
REGENERATIVE BLOWERS - **PRESSURE**

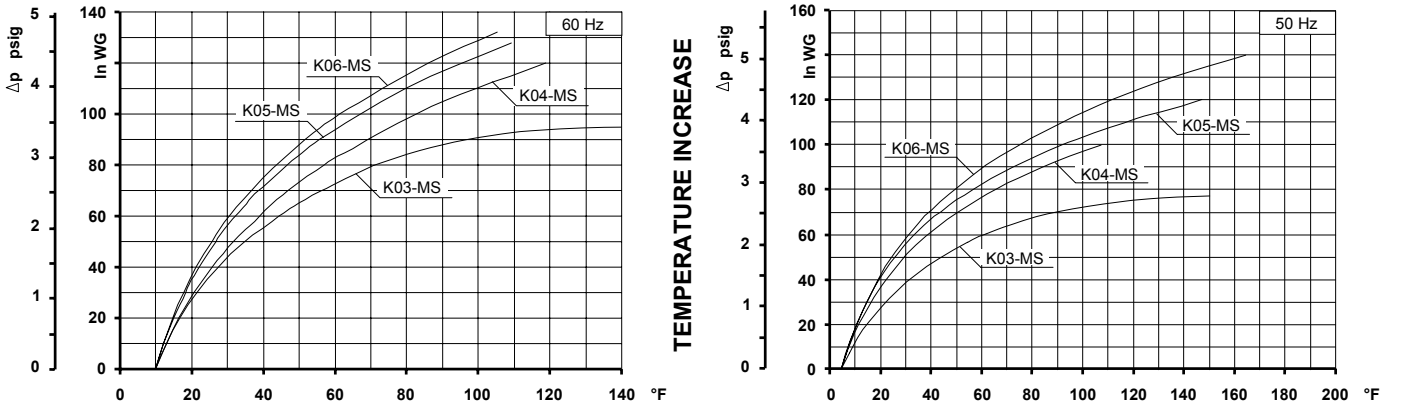
SCL K03 / K04 / K05 / K06

MS SERIES - MOR RANGE

SN 1874-8 2/2







Curves refer to air at 68°F temperature and 29.92 In Hg atmospheric pressure (abs) measured at inlet port.
Values for flow, power consumption and temperature rise: +/-10% tolerance.
Data subject to change without notice.

FPZ, Inc
150 N. Progress Drive
Saukville, WI, 53080 - **U.S.A.**
Tel. (262) 268-0180
Fax (262) 268-0415
E-mail usa@fpz.com

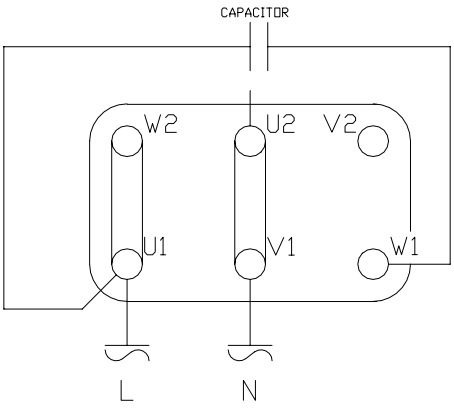
SINGLE PHASE DUAL VOLTAGE

GENERAL SPECIFICATIONS:

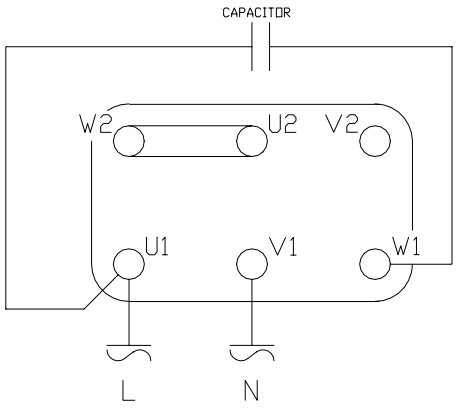
1-	***Type:***	**Single phase AC MOTOR - IEC 60034**
2-	***Marks:***	**cURus, CE**
3-	***Poles:***	**2**
4-	***Frequency:***	**60 Hz**
5-	***Insulation Class:***	**F**
6-	***Enclosure:***	**TEFC**
7-	***Protection:***	**IP 55**
8-	***Thermal Protector:***	**KLIXON 140 °C**
9-	***Service Factor:***	**1.15**
10-	***Max. Ambient:***	**40°C**
11-	***Duty:***	**Cont.**
12-	***Construction:***	**Aluminium frame**

POWER	VOLTAGE	SPEED	FLA	STARTING CURRENT	POWER FACTOR	CAPACITOR
Hp	V	min $^{-1}$	A	A	cos φ	µF
1/3	115-208/230	3330	3.5 / 1.7	12.3 / 6.0	0.97	16.0 - 400 V
1/2	115-208/230	3360	4.8 / 2.6	16.8 / 9.1	0.96	16.0 - 400 V
3/4	115-208/230	3450	9.8 / 4.9	46.1/ 23.0	0.95	20.0 - 400 V
1	115-208/230	3450	13,0 / 6,5	49.4 / 24.7	0.66	31.5 - 400 V
1 ½	115-208/230	3330	13.6 / 7.3	54.4 / 29.2	0.97	50.0 - 400 V
2	115-208/230	3440	24.0 / 12.0	79.2 / 39.6	0.90	70.0 - 400 V
3	115-208/230	3425	31.5 / 16.0	154.4 / 78.4	0.85	60.0 - 400 V

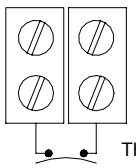
LOW VOLTAGE 115 V - 60 Hz



HIGH VOLTAGE 208-230 V - 60 Hz



THERMAL PROTECTION NORMALLY CLOSED



Specifications subject to change without notice. Alternate motor suppliers may be used.

Notice to installing contractor: Instructions must remain with installation.

Your Peace of Mind is Our Top Priority®

FM2676
0117
Supersedes
0816

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

Register your Zoeller Pump Company Product on our website: http://reg.zoellerpumps.com/

ZOELLER®
PUMP COMPANY
Zoeller Family of Water Solutions™

MAIL TO: *P.O. BOX 16347 • Louisville, KY 40256-0347*
SHIP TO: *3649 Cane Run Road • Louisville, KY 40211-1961*
(502) 778-2731 • 1 (800) 928-PUMP • FAX (502) 774-3624

visit our web site: www.zoeller.com

INSTALLATION INSTRUCTIONS
RECOMMENDED MODELS

DATE INSTALLED:
MODEL NUMBER:

EFFLUENT*/SUMP/DEWATERING	SEWAGE
49 / 53 / 57 Series, 98 Series	264 Series
137 Series, 151 / 152 / 153 Series	266 / 267 Series

NOTICE: VENT HOLE FOR CHECK VALVE SEE #3 IN CAUTION SECTION BELOW AND #4 ON PAGE 3

P/N 151797

* Effluent systems should specify that pumps should not handle solids exceeding 3/4" (19.1 mm) in order to prevent large solids from entering leeching fields, mound systems, etc. (Model 49 Series has 3/8" [9.5 mm] solids capability. 50, 90, and 151 Series have ½" [12.7 mm], 130 Series has 5/8" [15.9 mm], 152 and 153 models have 3/4" [19.1 mm].) Where code permits, sewage pumps can be used for effluent systems. Nonautomatic pumps with external-level controls are recommended for septic tank effluent applications.

PREINSTALLATION CHECKLIST - ALL INSTALLATIONS

1. **Inspect your pump.** Occasionally, products are damaged during shipment. If the unit is damaged, contact your dealer before using. **DO NOT** remove the test plugs in the cover nor the motor housing.
2. **Carefully read the literature** provided to familiarize yourself with specific details regarding installation and use. These materials should be retained for future reference.

⚠ WARNING

SEE BELOW FOR LIST OF WARNINGS

1. Make certain that the receptacle is within the reach of the pump's power supply cord. DO NOT USE AN EXTENSION CORD. Extension cords that are too long or too light do not deliver sufficient voltage to the pump motor, and they could present a safety hazard if the insulation were to become damaged or the connection end were to fall into a wet or damp area.
2. **Make sure the pump electrical supply circuit is equipped with fuses or circuit breakers of proper capacity.** A separate branch circuit is recommended, sized according to the "National Electrical Code" for the current shown on the pump nameplate.
3. **Testing for ground.** As a safety measure, each electrical outlet should be checked for ground using an Underwriters Laboratory Listed circuit analyzer which will indicate if the power, neutral and ground wires are correctly connected to your outlet. If they are not, call a qualified, licensed electrician.
4. **For Added Safety.** Pumping and other equipment with a 3-prong grounded plug must be connected to a 3-prong grounded receptacle. For added safety the receptacle may be protected with a ground-fault circuit interrupter. When a pump needs to be connected in a watertight junction box, the plug can be removed and spliced to the supply cable with proper grounding. For added safety this circuit may be protected by a ground-fault circuit interrupter. The complete installation must comply with the National Electrical Code and all applicable local codes and ordinances.
5. **FOR YOUR PROTECTION, ALWAYS DISCONNECT PUMP FROM ITS POWER SOURCE BEFORE HANDLING**. Single phase pumps are supplied with a 3-prong grounded plug to help protect you against the possibility of electrical shock. **DO NOT, UNDER ANY CIRCUMSTANCES, REMOVE THE GROUND PIN.** The 3-prong plug **must** be inserted into a mating 3-prong grounded receptacle. **If** the installation does not have such a receptacle, it must be changed to the proper type, wired and grounded in accordance with the National Electrical Code and all applicable local codes and ordinances. Three phase pumps require motor starting devices with motor overload protection. See FM0486 for duplex installations.
6. The tank is to be vented in accordance with local plumbing code. Pumps **must** be installed in accordance with the National Electrical Code and all applicable local codes and ordinances. Pumps are not to be installed in locations classified as hazardous in accordance with National Electrical Code, ANSI/NFPA 70.
7. **Risk of electrical shock.** Do not remove power supply cord and strain relief or connect conduit directly to the pump.
8. Installation and servicing of electrical circuits and hardware should be performed by a qualified licensed electrician.
9. Pump installation and servicing should be performed by a qualified person.
10. Risk of electrical shock - These pumps have not been investigated for use in swimming pool and marine areas.
11. According to the state of California (Prop 65), this product contains chemicals known to the state of California to cause cancer and birth defects or other reproductive harm.

⚠ CAUTION

SEE BELOW FOR LIST OF CAUTIONS

1. Check to be sure your power source is capable of handling the voltage requirements of the motor, as indicated on the pump name plate.
2. The installation of automatic pumps with variable level float switches or nonautomatic pumps using auxiliary variable level float switches is the responsibility of the installing party and care should be taken that the tethered float switch will not hang up on the pump apparatus or pit peculiarities and is secured so that the pump will shut off. It is recommended to use rigid piping and fittings and the pit be 18" (46 cm) or larger in diameter.
3. **Information - vent hole purpose.** It is necessary that all submersible sump, effluent, and sewage pumps capable of handling various sizes of solid waste be of the bottom intake design to reduce clogging and seal failures. If a check valve is incorporated in the installation, a vent hole (approx. 3/16" [5 mm]) must be drilled in the discharge pipe below the check valve and pit cover to purge the unit of trapped air. Trapped air is caused by agitation and/or a dry basin. Vent hole should be checked periodically for clogging. The 53 / 57, and 98 Series pumps have a vent located in the pump housing opposite the float, adjacent to a housing lug, but an additional vent hole is recommended. The vent hole on a High Head application may cause too much turbulence. You may not want to drill one. If you choose not to drill a vent hole, be sure the pump case and impeller is covered with liquid before connecting the pipe to the check valve and no inlet carries air to the pump intake. NOTE: THE HOLE MUST ALSO BE BELOW THE BASIN COVER AND CLEANED PERIODICALLY. Water stream will be visible from this hole during pump run periods.
4. Pump should be checked frequently for debris and/or buildup which may interfere with the float "on" or "off" position. Repair and service should be performed by Zoeller Pump Company Authorized Service and Warranty Center.
5. Dewatering and effluent sump pumps are not designed for use in pits handling raw sewage.
6. Maximum operating temperature for standard model pumps must not exceed 130°F (54°C).
7. Pump models 266, 267, and 137 must be operated in an upright position. Do not attempt to start pump when tilted or laying on its side.
8. Do not operate a pump in an application where the Total Dynamic Head is less than the minimum Total Dynamic Head listed on the Pump Performance Curves.

NOTE: Pumps with the "UL" mark and pumps with the "US" mark are tested to UL Standard UL778. CSA Certified pumps are certified to CSA Standard C22.2 No. 108.

REFER TO WARRANTY ON PAGE 2.

Limited Warranty

Manufacturer warrants, to the purchaser and subsequent owner during the warranty period, every new product to be free from defects in material and workmanship under normal use and service, when properly used and maintained, for a period of three years from the date of purchase. Proof of purchase is required.Parts that fail within the warranty period, that inspections determine to be defective in material or workmanship, will be repaired, replaced or remanufactured at Manufacturer's option, provided however, that by so doing we will not be obligated to replace an entire assembly, the entire mechanism or the complete unit. No allowance will be made for shipping charges, damages, labor or other charges that may occur due to product failure, repair or replacement.

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

Contact Manufacturer at, 3649 Cane Run Road, Louisville, Kentucky 40211, Attention: Customer Service Department to obtain any needed repair or replacement of part(s) or additional information pertaining to our warranty.

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

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

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

In those instances where damages are incurred as a result of an alleged pump failure, the Homeowner must retain possession of the pump for investigation purposes.

EASY DO'S & DON'T'S FOR INSTALLING A SUMP PUMP

1. **DO** read thoroughly all installation material provided with the pump.
2. **DO** inspect pump for any visible damage caused by shipping. Contact dealer if pump appears to be damaged.
3. **DO** clean all debris from the sump. Be sure that the pump will have a hard, flat surface beneath it. **DO NOT** install on sand, gravel or dirt.
4. **DO** be sure that the sump is large enough to allow proper clearance for the level control switch(es) to operate properly.
5. **DO Always Disconnect Pump From Power Source Before Handling**.
   DO always connect to a separately protected and properly grounded circuit.
   DO NOT ever cut, splice, or damage power cord (Only splice in a watertight junction box).
   DO NOT carry or lift pump by its power cord.
   DO NOT use an extension cord with a sump pump.
6. **DO** install a check valve and a union in the discharge line.
   DO NOT use a discharge pipe smaller than the pump discharge.
7. **DO NOT** use a sump pump as a trench or excavation pump, or for pumping sewage, gasoline, or other hazardous liquids.
8. **DO** test pump immediately after installation to be sure that the system is working properly.
9. **DO** cover sump with an adequate sump cover.
10. **DO** review all applicable local and national codes and verify that the installation conforms to each of them.
11. **DO** consult manufacturer for clarifications or questions.
12. **DO** consider a two pump system with an alarm where an installation may become overloaded or primary pump failure would result in property damages.
13. **DO** consider a D.C. Backup System where a sump or dewatering pump is necessary for the prevention of property damages from flooding due to A.C. power disruptions, mechanical or electrical problems or system overloading.
14. **DO** inspect and test system for proper operations at least every three months.

SERVICE CHECKLIST

⚠ WARNING **ELECTRICAL PRECAUTIONS-** Before servicing a pump, always shut off the main power breaker and then unplug the pump - making sure you are wearing insulated protective sole shoes and not standing in water. Under flooded conditions, contact your local electric company or a qualified licensed electrician for disconnecting electrical service prior to pump removal.

⚠ WARNING Submersible pumps contain oils which becomes pressurized and hot under operating conditions. **Allow 2-1/2 hours after disconnecting before attempting service.**

CONDITION	COMMON CAUSES
A. Pump will not start or run.	Check fuse, low voltage, overload open, open or incorrect wiring, open switch, impeller or seal bound mechanically, defective capacitor or relay when used, motor or wiring shorted. Float assembly held down. Switch defective, damaged, or out of adjustment.
B. Motor overheats and trips overload or blows fuse.	Incorrect voltage, negative head (discharge open lower than normal) impeller or seal bound mechanically, defective capacitor or relay, motor shorted.
C. Pump starts and stops too often.	Float tight on rod, check valve stuck or none installed in long distance line, overload open, level switch(s) defective, sump pit too small.
D. Pump will not shut off.	Debris under float assembly, float or float rod bound by pit sides or other, switch defective, damaged or out of adjustment.
E. Pump operates but delivers little or no water.	Check strainer housing, discharge pipe, or if check valve is used vent hole must be clear. Discharge head exceeds pump capacity. Low or incorrect voltage. Incorrect motor rotation. Capacitor defective. Incoming water containing air or causing air to enter pumping chamber.
F. Drop in head and/or capacity after a period of use.	Increased pipe friction, clogged line or check valve. Abrasive material and adverse chemicals could possibly deteriorate impeller and pump housing. Check line. Remove base and inspect.

If the above checklist does not uncover the problem, consult the factory. Do not attempt to service or otherwise disassemble pump. Service must be performed by Zoeller Authorized Service and Warranty Centers. Go to www.zoellerpumps.com/servicestations to find the Authorized Service Center in your area.

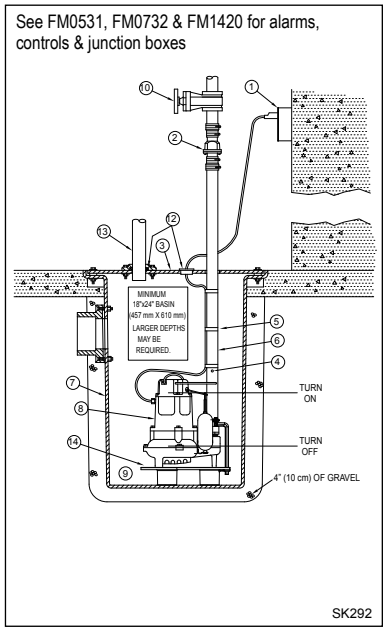
RECOMMENDED INSTALLATION FOR ALL APPLICATIONS

(1) Electrical wiring and protection must be in accordance with National Electrical Code and any other applicable state and local electrical requirements.
(2) Install proper Zoeller unicheck (combination union and check valve), preferably just above the basin to allow easy removal of the pump for cleaning or repair. On sewage, effluent or dewatering, if high head or below cover installation is required use 30-0164 on 1-1/2" pipe, 30-0152 on 2" pipe and 30-0160 on 3" pipe. See (4) below.
(3) All installations require a basin cover to prevent debris from falling into the basin and to prevent accidental injury.
(4) When a Unicheck is installed, drill a $^{3}/_{16}$" (5 mm) dia. hole in the discharge pipe even with the top of the pump. ***NOTE: THE HOLE MUST ALSO BE BELOW THE BASIN COVER AND CLEANED PERIODICALLY.*** (High Head unit see #3 under "Caution" on front page). Water stream will be visible from this hole during pump run periods.
(5) Securely tape or clamp power cord to discharge pipe, clear of the float mechanism(s).
(6) Use full-size discharge pipe.
(7) Basin must be in accordance with applicable codes and specifications.
(8) Pump must be level and float mechanism(s) clear of sides of basin before starting pump.
(9) Basin must be clean and free of debris after installation.
(10) Gate Valve or Ball Valve to be supplied by installer and installed according to any and all codes.
(11) Locate float switches as shown in sketches. The best place for the "off" point is above the motor housing and positioned 180° from the inlet. Never put "off" point below discharge on pump (Sewage & Effluent only). ***NOTE: FOR AUTOMATIC PUMPS, USE DEWATERING INSTALLATION SKETCH.***
(12) Gas tight seals required to contain gases and odors.
(13) Vent gases and odors to the atmosphere through vent pipe (Sewage & Dewatering only).
(14) Install Zoeller Pump Stand (10-2421) under pump to provide a settling basin. (Effluent & Dewatering only.)

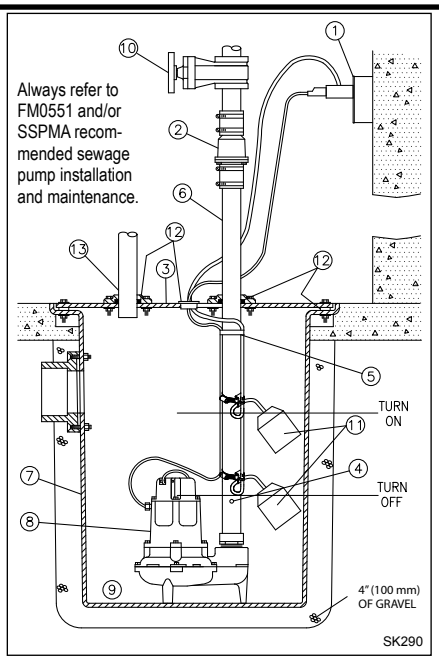
For Effluent Only:

(15) Wire pump to power through a Zoeller watertight junction box or watertight splice. ***NOTE: Watertight enclosure is a must in damp areas. See No. 8 on front page of FM0732.***
(16) Refer to SSPMA Effluent Sizing Manual for determining "on" - "off" switches.
(17) Septic tank risers must be used for easy pump and filter access.

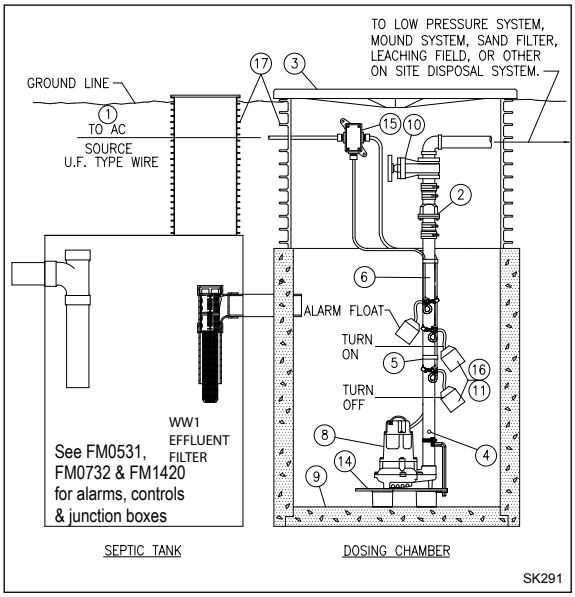
NOTE: *Double seal pumps offer extra protection from damage caused by seal failure.*



TYPICAL DEWATERING INSTALLATION



TYPICAL SEWAGE INSTALLATION



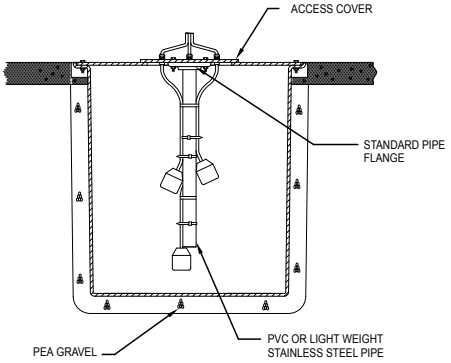
TYPICAL EFFLUENT INSTALLATION

All installations must comply with all applicable electrical and plumbing codes, including, but not limited to, National Electrical Code, local, regional, and/or state plumbing codes, etc. Not intended for use in hazardous locations.

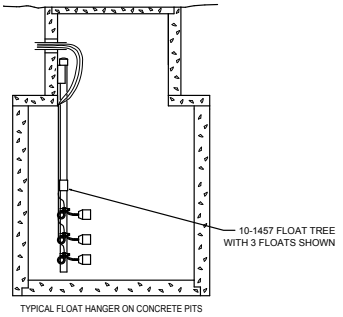
SUGGESTED METHODS OF FLOAT INSTALLATION

On some installations it may be desirable to install an independent hanger for the level control switches to avoid possible hang ups on the pumps, piping, valves, etc. Float hangers are available from Zoeller Company on Catalog Sheet FM0526 or can be fabricated from standard pipe and fittings.

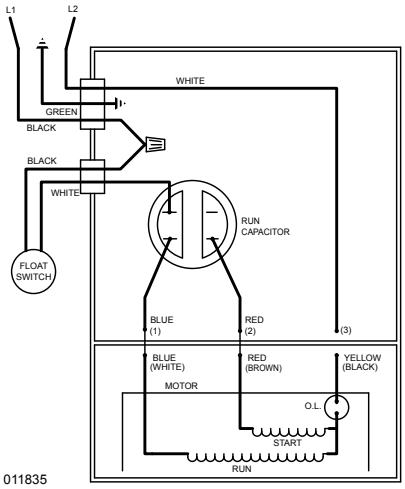
TYPICAL FLOAT HANGER ON STEEL COVER PITS



TYPICAL FLOAT HANGER ON CONCRETE PITS OR SEPTIC TANK RISERS



WD & WH MODEL INSTALLATION



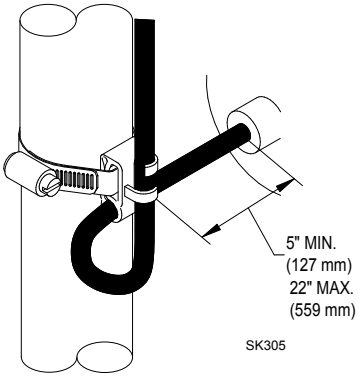
WIRING DIAGRAM FOR MODELS
WD - 230V, 1 Ph, 60 Hz.
WH - 200/208V, 1 Ph, 60 Hz.

Determining Pumping Range in Inches (1 inch - 2.5 cm)

Tether Length	5 min.	10	15	20	22 max.
Pumping Range	9	13.5	18	22	24

Use only as a guide. Due to weight of cable, pumping range above horizontal is not equal to pumping range below horizontal. Ranges are based on testing in nonturbulent conditions. Range may vary due to water temperature and cord shape. As tether length increases, so does the variance of the pumping range.

Models WD & WH are fully automatic. A float switch is included and factory wired in the pump circuit to provide automatic operation once the float switch is secured properly to the outlet pipe. Use the diagram above to secure the float switch properly and obtain the proper tether to customize the on-off cycle to each application.



20 AMP SWITCH (WD & WH MODELS)

Note: Failure to keep within proper tether limits may prevent reliable switch operation.

Note: Cable must be mounted in horizontal position.

SINGLE PHASE WIRING INSTRUCTIONS

⚠ WARNING **FOR YOUR PROTECTION, ALWAYS DISCONNECT PUMP FROM ITS POWER SOURCE BEFORE HANDLING**. Single phase pumps are supplied with a 3-prong grounded plug to help protect you against the possibility of electrical shock. **DO NOT UNDER ANY CIRCUMSTANCES REMOVE THE GROUND PIN.** The 3-prong plug **must** be inserted into a mating 3-prong grounded receptacle. **If** the installation does not have such a receptacle, it must be changed to the proper type, wired and grounded in accordance with the National Electrical Code and all applicable local codes and ordinances.

⚠ WARNING **Risk of electrical shock.** Do not remove power supply cord and strain relief or connect conduit directly to the pump.

⚠ WARNING Installation and checking of electrical circuits and hardware should be performed by a qualified licensed electrician.

⚠ WARNING Units supplied without a plug (single and three phase) and single phase nonautomatic units with a 20 amp plug must have a motor control and liquid level control provided at time of installation. The control device should have suitable voltage, ampere, frequency, grounding and horsepower rating for the pump to which it is connected.

THREE PHASE WIRING INSTRUCTIONS

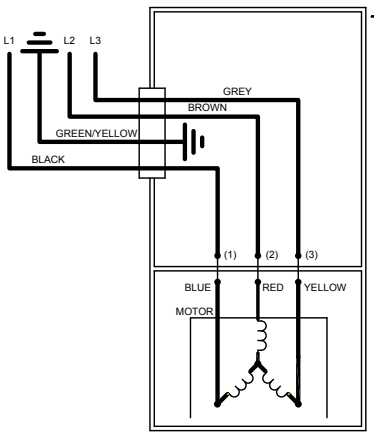
⚠ WARNING **FOR YOUR PROTECTION, ALWAYS DISCONNECT PUMP FROM ITS POWER SOURCE BEFORE HANDLING**.

To automatically operate a nonautomatic three phase pump, a control panel is required. Follow the instructions provided with the panel to wire the system. For automatic three phase pumps see automatic 3 phase wiring diagram located to the far right.

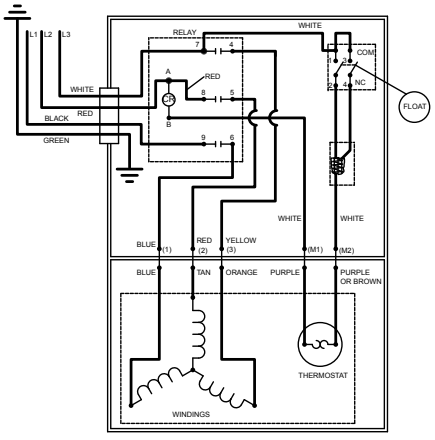
Before installing a pump, check the pump rotation to ensure that wiring has been connected properly to power source, and that the green lead of power cord (See wiring diagram), is connected to a valid ground. Momentarily energize the pump, observing the directions of kick back due to starting torque. Rotation is correct if kick back is in the opposite direction of rotation arrow on the pump casing. If rotation is not correct, switching of any two power leads other than ground, should provide the proper rotation.

All three phase pumps require motor starting devices with motor overload protection. See FM0486 for duplex installations. Pumps **must** be installed in accordance with the National Electrical Code and all applicable local codes and ordinances. Pumps are not to be installed in locations classified as hazardous in accordance with National Electrical Code, ANSI/NFPA 70.

NONAUTOMATIC 3 PHASE



AUTOMATIC 3 PHASE



IMPORTANT NOTICE: Some insurance policies, both commercial and residential, extend coverage for damages incurred by product failure. You will need to have possession of the product to support your claim in most cases. Zoeller Pump Co. will exchange the unit or refund the original purchase price once the claim is settled with the insurer in the case where you need to retain possession of the product to support a damage claim you submit to your insurance company.

These are the original installation instructions.

Aviso al contratista instalador: Las instrucciones deberán permanecer con la instalación.
Su tranquilidad es nuestra mayor prioridad™

FM2676S

La información presentada adentro refleja condiciones al tiempo de publicación. Consultar la fábrica sobre discrepancias o contradicciones.

Registre en línea su producto de Zoeller Pump Company: http://reg.zoellerpumps.com/

ZOELLER®
PUMP COMPANY
Zoeller Family of Water Solutions™

DIRECCIÓN POSTAL: *P.O. BOX 16347 • Louisville, KY 40256-0347 EEUU*
DIRECCIÓN PARA ENVÍOS: *3649 Cane Run Road • Louisville, KY 40211-1961 EEUU*
TEL: *+1 (502) 778-2731 •* ***FAX:*** *+1 (502) 774-3624*

visite a nuestro sitio web:
www.zoeller.com

INSTRUCCIONES DE INSTALACIÓN
MODELOS RECOMENDADOS

FECHA DE INSTALACIÓN:
NÚMERO DE MODELO:

EFLUENTES*/SUMIDERO/ACHIQUE	AGUAS NEGRAS
Series 49 / 53 / 57, Series 98	Series 264
Series 137, Series 151 / 152 / 153	Series 266 / 267

AVISO: AGUJERO DE VENTILACIÓN PARA LA VÁLVULA DE RETENCIÓN, VEA EL NRO. 3 EN LA SECCIÓN DE PRECAUCIONES A CONTINUACIÓN Y EL NRO. 4 EN LA PÁGINA 7.

* Los sistemas de efluentes deben especificar que las bombas no deben manipular sólidos superiores a 19.1 mm (3/4 pulg.) con el fin de evitar que entren partículas sólidas grandes en los campos de drenaje, sistemas de montículo, etc. (El modelo serie 49 tiene una capacidad para sólidos de 9.5 mm ([3/8 pulg.]) Los modelos serie 50, 90 y 151 tienen una capacidad para sólidos de 12.7 mm [½ pulg.], el serie 130 de 15.9 mm [5/8 pulg.], los modelos 152 y 153 de 19.1 mm [3/4 pulg.]). Cuando lo permita el código, se pueden utilizar bombas de aguas negras para sistemas de efluentes. Se recomiendan bombas no automáticas con controles a nivel externo para aplicaciones de efluentes de fosas sépticas.

LISTA DE VERIFICACIÓN DE PRE-INSTALACIÓN - TODAS LAS INSTALACIONES

1. Inspeccione su bomba. Ocasionalmente, los productos se dañan durante el envío. Si la unidad está dañada, comuníquese con su vendedor antes de usarla. NO quite los tapones de prueba de la cubierta ni del cárter del motor.

2. Lea cuidadosamente toda la literatura provista para familiarizarse con los detalles específicos relacionados con la instalación y uso. Estos materiales deberán guardarse para referencia futura.

⚠ AVERTISSEMENT
VER ABAJO LA LISTA DE ADVERTENCIAS

1. Asegúrese de que el tomacorriente esté al alcance del cable de alimentación eléctrica de la bomba. NO USE UN CABLE DE EXTENSIÓN. Los cables de extensión que son demasiado largos o livianos no suministran voltaje suficiente al motor de la bomba, presentan un peligro a la seguridad si el aislante se daña o el extremo de conexión cae dentro de un área mojado.
2. **Asegúrese de que el circuito de alimentación eléctrica de la bomba esté equipado con fusibles o interruptores de circuito de capacidad adecuada.** Se recomienda un circuito auxiliar, del tamaño de acuerdo al "Código Eléctrico Nacional" para la corriente que se muestra en la etiqueta de nombre de la bomba.
3. **Prueba de puesta a tierra.** Como medida de seguridad, cada tomacorriente debe verificarse para puesta a tierra usando un analizador de circuitos aprobado por el Underwriters Laboratory, el cual indicará si los alambres de energía, neutrales y de puesta a tierra están conectados correctamente a su tomacorriente. Si no lo están, llame a un técnico electricista calificado.
4. **Para mayor seguridad.** El equipo de bombeo y otro equipo eléctrico con enchufes de 3 patillas deben conectarse a un tomacorriente para 3 patillas con puesta a tierra. Para mayor seguridad, el tomacorriente puede estar protegido con un interruptor de circuito de falla a tierra. Cuando una bomba necesita ser conectada a una caja de conexión hermética, el enchufe puede ser retirado y empalmado al cable de alimentación eléctrica propiamente conectado a tierra. Para mayor seguridad, este circuito puede ser protegido mediante un interruptor de circuito de falla a tierra. La instalación completa deberá cumplir con el Código Eléctrico Nacional y todas las ordenanzas y códigos locales aplicables.
5. **PARA SU PROTECCIÓN, SIEMPRE DESCONECTE LA BOMBA DE LA FUENTE DE ALIMENTACIÓN ELÉCTRICA ANTES DE MANIPULARLA.** Las bombas monofásicas se suministran con enchufes de 3 patillas con puesta a tierra para ayudar a protegerle contra la posibilidad de choque eléctrico. **NO RETIRE BAJO NINGUNA CIRCUNSTANCIA LA CLAVIJA DE PUESTA A TIERRA.** Los enchufes de 3 patillas se **deben** introducir en un tomacorriente para 3 patillas apropiado. **Si** la instalación no posee un tomacorriente de este tipo, se debe cambiar por uno apropiado, cableado y con puesta a tierra de acuerdo al Código Eléctrico Nacional y a todas las ordenanzas y códigos locales aplicables. Las bombas trifásicas requieren dispositivos de arranque del motor con protección contra sobrecarga. Vea FM0486 para instalaciones duplex.
6. El tanque se debe ventilar conforme a los códigos de plomería locales. Las bombas se **deben** instalar conforme al Código Eléctrico Nacional y a todos los códigos y ordenanzas locales que correspondan. Las bombas no se deben instalar en sitios peligrosos conforme a la clasificación del Código Eléctrico Nacional, ANSI/NFPA 70.
7. **Riesgo de choque eléctrico.** No quite el cable de alimentación eléctrica ni el dispositivo de alivio de tensión y no conecte un conductor directamente a la bomba.
8. La instalación y verificación de los circuitos eléctricos y del equipo deberán llevarse a cabo por un técnico electricista calificado.
9. La instalación y verificación de la bomba deberá llevarse a cabo por una persona calificada.
10. **Riesgo de choque eléctrico.** No se ha investigado el uso de estas bombas en áreas marinas y en piscinas.
11. Este producto contiene sustancias químicas que de acuerdo al estado de California pueden causar cáncer y defectos congénitos u otros daños a la salud reproductiva.

⚠ PRECAUCIÓN
VER ABAJO LA LISTA DE PRECAUCIONES

1. Asegúrese de que la fuente de energía eléctrica sea capaz de manejar los requisitos de voltaje del motor, según se indica en la etiqueta de nombre de la bomba.
2. La instalación de bombas automáticas con interruptores de flotador de nivel variable o las bombas no automáticas que usan interruptores de flotador de nivel variable auxiliares es responsabilidad del instalador y deberá verificarse que el interruptor de flotador atado no se enganchará en el aparato de la bomba ni en las peculiaridades del foso y que está fijado de manera que permita la parada de la bomba. Se recomienda usar tubería y empalmes rígidos y que el foso tenga 45 cm (18 pulg.) o más de diámetro.
3. **Información - Objetivo del agujero de ventilación.** Es necesario que todas las bombas sumer-gibles de sumidero, efluentes y de aguas cloacales capaces de manejar residuos sólidos de varios tamaños tengan la entrada en la parte inferior para reducir el atascamiento y las fallas del sello. Si se incorpora a la instalación una válvula de retención, deberá perforarse un agujero de ventilación [de aprox. 5 mm (3/16 pulg.)] en la tubería de descarga debajo de la válvula de retención y de la tapa del foso a fin de purgar la unidad del aire atrapado. La causa de aire atrapado puede ser agitación y/o un estanque seco. Deberá revisarse periódicamente el agujero de ventilación para verificar que no esté atascado. Las bombas de las series 53, 57 ó 98 poseen una ventilación ubicada en la caja de la bomba del lado opuesto al flotador, junto a una aleta de la caja. Sin embargo, se recomienda un agujero de ventilación adicional. Un agujero de ventilación en una aplicación de carga elevada podría causar demasiada turbulencia. Es posible que usted prefiera no perforar uno. Si decide no perforar un agujero de ventilación, asegúrese de que la caja de la bomba y el impulsor estén cubiertos de líquido antes de conectar la tubería a la válvula de retención y que no haya ningún tipo de entrada de aire en la vía de entrada de la bomba. NOTA: EL AGUJERO TAMBIÉN DEBERÁ ESTAR POR DEBAJO DE LA TAPA DEL SUMIDERO Y SE DEBERÁ LIMPIARLO PERIÓDICAMENTE. Se verá un chorro de agua saliendo del agujero durante los períodos de bombeo.
4. Se debe revisar la bomba frecuentemente para asegurarse de que no hay escombros y/o acumulación que pueda interferir con la posición "on" (encendido) o "off" (apagado) del flotador. La reparación y servicio deberá hacerse solamente por personal de una Estación de servicio autorizada por Zoeller Pump Company.
5. Las bombas de achique y de efluentes no se diseñan para uso en fosos con aguas negras crudas.
6. La temperatura de funcionamiento máxima para bombas de modelo estándar no debe superar 54 °C (130 °F).
7. Las bombas modelos 266, 267, y 137 se deben operar en posición vertical. No intente encender la bomba cuando esté inclinada o apoyada sobre uno de sus lados.
8. No opere la bomba en una aplicación donde la carga dinámica total sea menor que la carga dinámica total mínima que se indica en la Curva de rendimiento de la bomba.

AVISO: Las bombas con la marca "UL" y "US" han sido probadas de acuerdo al estándar UL778. Las bombas "aprobadas por CSA" están certificadas de acuerdo al estándar CSA C22.2 No. 108.

REFIÉRASE A LA GARANTÍA EN LA PÁGINA 6.

GARANTÍA LIMITADA

El Fabricante garantiza, al comprador y el propietario subsiguiente durante el período de garantía, que cada producto nuevo está libre de defectos en materiales y mano de obra bajo condiciones de uso y servicio normales, cuando se usa y mantiene correctamente, durante un período de tres años a partir de la fecha de compra. Se requiere evidencia de compra. Las partes que fallen durante el período de garantía, un año a partir de la fecha de compra por parte del usuario final, lo que ocurra primero, cuyas inspecciones determinen que presentan defectos en materiales o mano de obra, serán reparadas, reemplazadas o remanufacturadas a opción del Fabricante, con la condición sin embargo de que por hacerlo no estemos en la obligación de reemplazar un ensamblaje completo, el mecanismo entero o la unidad completa. No se dará concesión alguna por costos de envío, daños, mano de obra u otros cargos que pudieran surgir por falla, reparación o reemplazo del producto.

Esta garantía no aplica a y no se ofrecerá garantía alguna por ningún material o producto que haya sido desarmado sin aprobación previa del Fabricante, o que haya sido sometido a uso indebido, aplicación indebida, negligencia, alteración, accidente o acto fortuito; que no haya sido instalado, usado o mantenido según las instrucciones de instalación del Fabricante; que haya sido expuesto a sustancias foráneas que incluyen pero no se limitan a lo siguiente: arena, grava, cemento, lodo, alquitrán, hidrocarburos, derivados de hidrocarburos (aceite, gasolina, solventes, etc.), u otras sustancias abrasivas o corrosivas, toallas para lavar o productos sanitarios femeninos, etc. en todas las aplicaciones de bombeo. La garantía presentada en el párrafo anterior deja sin efecto cualquier otra garantía expresa o implícita; y no autorizamos a ningún representante u otra persona para que asuma por nosotros ninguna otra responsabilidad con respecto a nuestros productos.

Comuníquese con el Fabricante en 3649 Cane Run Road, Louisville, KY 40211 EE.UU., Attention: Customer Service Department, para obtener cualquier reparación necesaria o reemplazo de partes o información adicional sobre nuestra garantía.

EL FABRICANTE EXPRESAMENTE RECHAZA RESPONSABILIDAD POR DAÑOS ESPECIALES, EMERGENTES O INCIDENTALES O POR INCUMPLIMIENTO DE LA GARANTÍA EXPRESA O IMPLÍCITA; Y CUALQUIER GARANTÍA IMPLÍCITA DE IDONEIDAD PARA UN FIN PARTICULAR Y DE COMERCIALIZACIÓN SE LIMITARÁ A LA DURACIÓN DE LA GARANTÍA EXPRESA.

Algunos estados no permiten limitaciones en la duración de una garantía implícita, de forma que la limitación anterior podría no aplicar a usted. Algunos estados no permiten la exclusión o limitación de daños incidentales o emergentes, de forma que la limitación o exclusión anterior podría no aplicar a usted.

Esta garantía le otorga a usted derechos legales específicos y podría tener otros derechos que varían de un estado a otro.

En aquellas instancias en que haya daños causados por una presunta falla de la bomba, el propietario deberá conservar la bomba a fin de investigar dicha falla.

LO QUE DEBE Y NO DEBE HACER PARA INSTALAR UNA BOMBA DE SUMIDERO

1. **LEA** completamente todo el material sobre la instalación provisto con la bomba.
2. **INSPECCIONE** la bomba para ver si hay cualquier daño visible causado durante el envío. Comuníquese con el vendedor si la bomba está dañada.
3. **RETIRE** todos los escombros del sumidero. Asegúrese de que la bomba se apoyará sobre una superficie dura, plana y estable. **NO LA INSTALE** sobre arena, grava o tierra.
4. **ASEGÚRESE** de que el sumidero sea suficientemente grande para permitir el funcionamiento correcto de los interruptores de control de nivel.
5. **SIEMPRE desconecte la bomba de la fuente de alimentación eléctrica antes de manipularla.**
   SIEMPRE conecte la bomba a un circuito protegido separadamente y con puesta a tierra adecuado.
   JAMÁS corte, empalme o dañe el cable de alimentación eléctrica. (Empalme únicamente cuando hay una caja de conexión hermética.)
   JAMÁS transporte o levante la bomba por su cable de alimentación eléctrica.
   JAMÁS use un cable de extensión con una bomba de sumidero.
6. **INSTALE** una válvula de retención y una unión en la tubería de descarga.
   JAMÁS use una tubería de descarga de menor tamaño que la descarga de la bomba.
7. **JAMÁS** use una bomba de sumidero como una bomba excavadora o para zanjas, ni para bombear aguas cloacales, gasolina u otros líquidos peligrosos.
8. **PRUEBE** la bomba inmediatamente después de su instalación para asegurarse de que el sistema funciona correctamente.
9. **CUBRA** el foso con una tapa adecuada para sumidero.
10. **EXAMINE** todos los códigos nacionales y locales aplicables y verifique que la instalación esté de acuerdo a cada uno de ellos.
11. **CONSULTE** con el fabricante si necesita aclaraciones o tiene preguntas.
12. **CONSIDERE** un sistema de dos bombas con alarma en donde la instalación puede sobrecargarse o la falla de una bomba primaria causaría daños a la propiedad.
13. **CONSIDERE** un sistema de apoyo de CD en donde una bomba de achique o sumidero es necesaria para prevenir daños a la propiedad debido a inundación causada por interrupciones en el suministro de energía eléctrica, problemas mecánicos o eléctricos, o sobrecarga del sistema.
14. **INSPECCIONE** y pruebe el funcionamiento del sistema por lo menos cada 3 meses.

LISTA DE VERIFICACIÓN DE SERVICIO

⚠ ADVERTENCIA **PRECAUCIONES ELÉCTRICAS -** Antes de proporcionar algún servicio a la bomba, desactive siempre el interruptor principal de suministro de energía eléctrica y desenchufe la bomba. Asegúrese de usar zapatos protectores con suelas aislantes y de no estar parado en el agua. Bajo condiciones de inundación, llame a su compañía eléctrica local o a un técnico electricista calificado para desconectar el servicio eléctrico antes de quitar la bomba.

⚠ ADVERTENCIA Las bombas sumergibles contienen aceites que se presurizan y calientan bajo condiciones operativas.
Deje que pasen 2-1/2 horas después de apagarla antes de proceder con el servicio.

CONDICIÓN		CAUSAS COMUNES
A.	**La bomba no arranca o no funciona.**	Verifique el fusible, voltaje bajo, protección contra sobrecarga abierta, cableado abierto o incorrecto, interruptor abierto, impulsor o sello trabado mecánicamente, capacitor o relé defectuoso, motor o cableado eléctrico en corto circuito. Conjunto del flotador enganchado. Interruptor defectuoso, dañado o fuera de punto.
B.	**El motor se sobrecalienta y activa la protección contra sobrecarga o desconecta el fusible.**	Voltaje incorrecto, carga negativa (descarga abierta menos de lo normal), impulsor o sello trabado mecánicamente, capacitor o relé defectuoso, motor en corto circuito.
C.	**La bomba se encienda y se apaga muy a menudo.**	El flotador está apretado en la varilla, la válvula de retención está atascada o no hay una instalada en una línea de larga distancia, protección contra sobrecarga abierta, interruptores defectuosos, foso del sumidero demasiado pequeño.
D.	**La bomba no se apaga.**	Hay escombros debajo del conjunto del flotador, el flotador o la varilla del flotador están trabados por los lados del foso u otros, interruptor defectuoso, dañado o fuera de punto.
E.	**La bomba funciona pero sin o con poca agua.**	Verifique la caja del filtro y la tubería de descarga, o si se usa una válvula de retención, el agujero de ventilación debe estar abierto. La carga de descarga excede la capacidad de la bomba. Voltaje bajo o incorrecto. Rotación incorrecta del motor. Capacitor defectuoso. El agua de entrada contiene aire o hace que el aire entre en la bomba.
F.	**Caída en la carga y/o capacidad después de un período de uso.**	Aumento de fricción en la tubería, línea o válvula de retención atascada. Material abrasivo o productos químicos adversos podrían haber deteriorado el impulsor o el cárter de la bomba. Revise la línea. Quite la base e inspeccione.

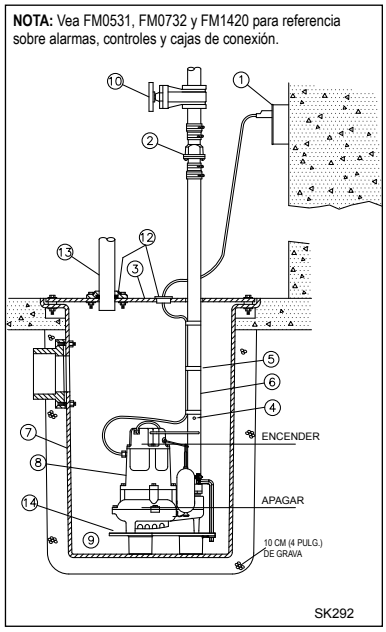
Si la lista de verificación arriba mencionada no revela el problema, consulte con la fábrica. No intente proporcionar algún servicio o desarmar la bomba. Las Estaciones de servicio autorizadas por Zoeller deberán proporcionar dicho servicio.
Visite el sitio www.zoellerpumps.com/servicestations para encontrar la estación de servicio autorizada para su zona.

INSTALACIÓN RECOMENDADA PARA TODAS LAS APLICACIONES

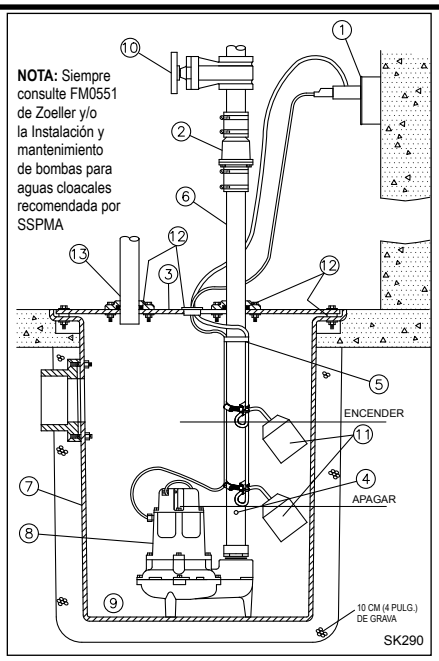
1. El cableado y la protección eléctrica deben estar de acuerdo con el Código Eléctrico Nacional y todos los otros requisitos eléctricos locales y estatales aplicables.
2. Instale el "Unicheck" (combinación de unión y válvula de retención) apropiado de Zoeller, luego arriba del estanque para que se pueda quitar fácilmente la bomba para su limpieza o reparación. Si los sistemas para aguas cloacales, efluentes o achique requieren instalación de carga elevada o por debajo de la tapa, use 30-0164 en tubería de 38 mm (1-1/2 pulg.), 30-0152 en tubería de 51 mm (2 pulg.) y 30-0160 en tubería de 76 mm (3 pulg.). Vea el número 4 más abajo.
3. Todas las instalaciones requieren una tapa para prevenir que escombros caigan dentro del estanque y prevenir lesiones accidentales.
4. Cuando instale un "Unicheck", perfore un agujero de 5 mm (3/16 pulg.) de diámetro en la tubería de descarga al mismo nivel de la parte superior de la bomba. **NOTA:** EL AGUJERO TAMBIÉN DEBERÁ ESTAR POR DEBAJO DE LA TAPA DEL ESTANQUE Y SE DEBE LIMPIARLO PERIÓDICAMENTE. (Para unidades de carga elevada, ver el número 3 de la lista de "Precauciones" en la página 1.) Se verá un chorro de agua saliendo del agujero durante los períodos de bombeo.
5. Fije firmemente el cable de alimentación eléctrica al tubo de descarga con cinta o abrazadera.
6. Use tubería de descarga de tamaño completo.
7. El estanque debe estar de acuerdo con los códigos y las especificaciones aplicables.
8. La bomba debe estar nivelada y el mecanismo del flotador libre de los lados del estanque antes de encender la bomba.
9. El estanque debe estar limpio y libre de escombros después de la instalación.
10. El instalador deberá suministrar una válvula de paso directo o una válvula de bola y instalarla de acuerdo con cualesquiera y todos los códigos.
11. La ubicación de los interruptores de flotador es como se muestra en el esquema a la izquierda. El punto "off" (apagado) debe estar por encima del cárter del motor y a 180° de la entrada. **NOTA:** PARA BOMBAS AUTOMATICAS, UTILICE EL ESQUEMA PARA LA INSTALACION PARA ACHIQUE MÁS ABAJO.
12. Los sellos herméticos contra gases son necesarios en todas las instalaciones de aguas cloacales a fin de contener los gases y olores.
13. Ventile los gases y olores a la atmósfera a través del tubo de ventilación. (sólo para cloaca y achique).
14. Instale el soporte para bomba Zoeller (Modelo 10-2421) debajo de la bomba para proporcionar un sumidero de decantación (sólo para efluente y achique).

Para efluente solamente:

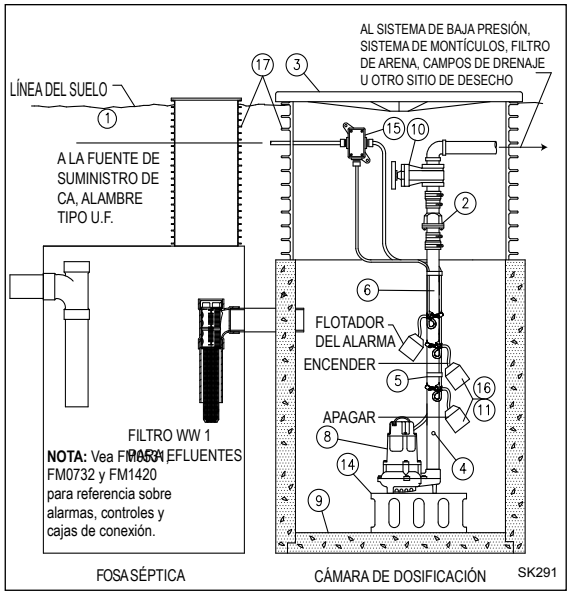
15. La conexión del cableado de la bomba a la fuente de alimentación eléctrica debe hacerse a través de una caja de conexión hermética Zoeller o un empalme hermético. **NOTA:** La caja hermética es obligatoria en áreas húmedas. Vea FM0732. Vea el número 8 en la página 1.
16. Consulte el Manual sobre tamaños de efluentes del SSPMA para determinar la posición de los interruptores "on-off" (encendido-apagado).
17. Se debe usar tubos verticales en el tanque séptico para tener fácil acceso a la bomba y al filtro.
    NOTA: Las bombas de sello doble ofrecen protección adicional contra los daños causados por falla del sello.



INSTALACIÓN TÍPICA PARA ACHIQUE



INSTALACIÓN TÍPICA PARA AGUAS NEGRAS



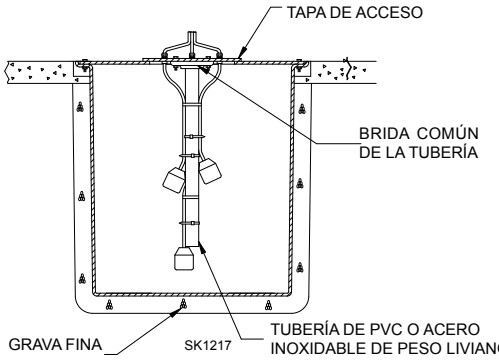
INSTALACIÓN TÍPICA PARA EFLUENTES

Todas las instalaciones deben cumplir con todos los códigos eléctricos y de instalación sanitaria aplicables, incluyendo, pero sin limitarse al Código Eléctrico Nacional, los códigos locales, regionales y/o los códigos estatales de instalación sanitaria, etc. No se debe usar las instalaciones en lugares peligrosos.

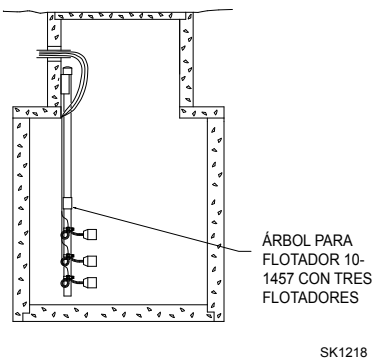
MÉTODOS SUGERIDOS PARA LA INSTALACIÓN DEL FLOTADOR

En algunas instalaciones es deseable instalar un soporte colgante independiente para los interruptores de control de nivel para evitar posibles enganches en las bombas, tubería, válvulas, etc. Los soportes colgantes del flotador se pueden comprar de Zoeller Company según la Hoja de catálogo FM0526, o fabricarse de tubería y empalmes comunes.

SOPORTE COLGANTE PARA FLOTADOR TÍPICO EN FOSOS CON TAPA DE ACERO



SOPORTE COLGANTE PARA FLOTADOR TÍPICO EN FOSOS DE CONCRETO O TUBOS VERTICALES PARA TANQUES SÉPTICOS



INSTRUCCIONES PARA LA INSTALACIÓN DE LOS MODELOS WD Y WH

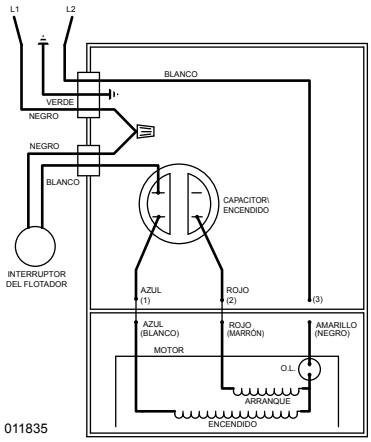


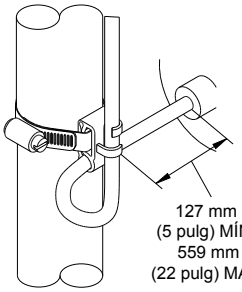
DIAGRAMA DE CABLEADO PARA LOS MODELOS:
WD-230V, 1 FASE, 60 CICLOS
WH-200/208V, 1 FASE, 60 CICLOS

Determinación del rango de bombeo en pulgadas
(1 pulg. = 2,5 cm)

Longitud de la atadura	5	10	15	20	22
	mín.				máx.
Rango de bombeo	9	13.5	18	22	24

Usar solamente como guía. Debido al peso del cable, el rango de bombeo sobre la horizontal no es igual al rango de bombeo debajo de la horizontal. Los rangos se basan en pruebas en condiciones no turbulentas. El rango puede variar debido a la temperatura del agua y a la forma del cable. A medida que aumenta la longitud de la atadura, también aumenta la variación en el rango de bombeo.

Los modelos WD y WH son completamente automáticos. Se incluye un interruptor de flotador con cableado de fábrica en el circuito de la bomba para proveer una operación automática una vez que el interruptor de flotador se haya atado correctamente a la tubería de salida. Use el diagrama de arriba para asegurar correctamente el interruptor de flotador y obtener la atadura apropiada para adecuar el ciclo de encendido-apagado a cada aplicación.



INTERRUPTOR DE 20 AMPERIOS
(MODELOS WD Y WH)

Nota: No tener en cuenta los límites adecuados de la atadura podría alterar el funcionamiento seguro del interruptor.
Nota: El cable debe ser instalado en posición horizontal.

INSTRUCCIONES PARA EL CABLEADO MONOFÁSICO

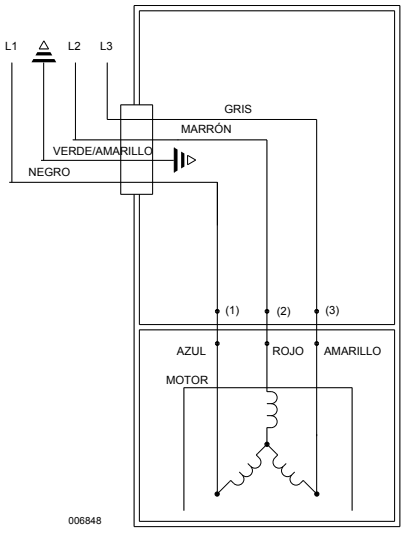
ADVERTENCIA **PARA SU PROTECCIÓN, SIEMPRE DESCONECTE LA BOMBA DE LA FUENTE DE ALIMENTACIÓN ELÉCTRICA ANTES DE MANIPULARLA.** Las bombas monofásicas se suministran con enchufes de 3 patillas con puesta a tierra para ayudar a protegerle contra la posibilidad de choque eléctrico. **NO RETIRE BAJO NINGUNA CIRCUNSTANCIA LA CLAVIJA DE PUESTA A TIERRA.** Los enchufes de 3 patillas **se deben** introducir en un tomacorriente para 3 patillas apropiado. Si la instalación no posee un tomacorriente de este tipo, se debe cambiar por uno apropiado, cableado y con puesta a tierra de acuerdo al Código Eléctrico Nacional y a todas las ordenanzas y códigos locales aplicables.

ADVERTENCIA **"Riesgo de choque eléctrico".** No quite el cable de alimentación eléctrica ni el dispositivo de alivio de tensión y no conecte un conductor directamente a la bomba.

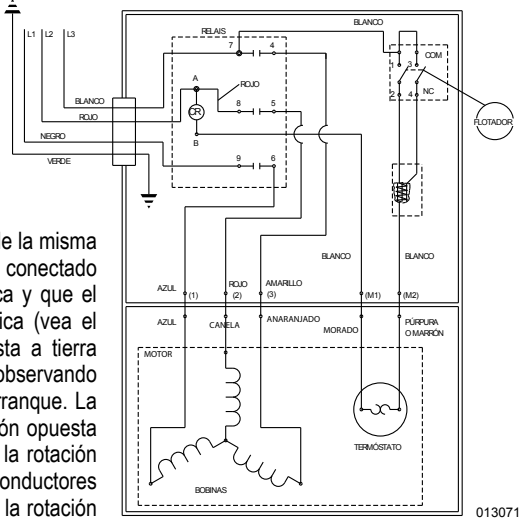
ADVERTENCIA La instalación y verificación de los circuitos eléctricos y del equipo deberán llevarse a cabo por un técnico electricista calificado.

ADVERTENCIA A las unidades que se suministran sin enchufe (monofásico y trifásico) y a las unidades monofásicas no automáticas que poseen un enchufe de 20 amperios se les debe conectar un control de motor y un control de nivel de líquidos durante la instalación. Los niveles de voltaje, amperaje, frecuencia, puesta a tierra y potencia del dispositivo de control deben ser apropiados para la bomba a la cual se conecta.

INSTRUCCIONES PARA EL CABLEADO TRIFÁSICO



Las bombas trifásicas no son automáticas. Para operarlas automáticamente se requiere un panel de control. Siga las instrucciones provistas con el panel para completar el cableado del sistema. Para bombas trifásicas automáticas, ver el diagrama de cableado para bombas trifásicas automáticas a la derecha.



Antes de instalar una bomba, verifique la rotación de la misma para asegurarse de que los cables se hayan conectado correctamente a la fuente de alimentación eléctrica y que el conductor verde del cable de alimentación eléctrica (vea el diagrama de cableado) está conectado con puesta a tierra adecuada. Active momentáneamente la bomba, observando la dirección del retroceso debido a la torsión de arranque. La rotación es correcta si el retroceso está en dirección opuesta a la flecha de rotación en la caja de la bomba. Si la rotación no es correcta, cambiar dos de cualquiera de los conductores eléctricos, excepto el con puesta a tierra, proveerá la rotación apropiada.

Todas las bombas trifásicas requieren dispositivos de arranque del motor con protección contra sobrecarga. Vea FM0514 para instalaciones simplex o FM0486 para instalaciones duplex. Las bombas **se deben** instalar de acuerdo al Código Eléctrico Nacional y a todas las ordenanzas y códigos locales aplicables. Las bombas no se deben instalar en sitios clasificados como peligrosos según el Código Eléctrico Nacional ANSI/NFPA 70.

ADVERTENCIA **PARA SU PROTECCIÓN, SIEMPRE DESCONECTE LA BOMBA DE LA FUENTE DE ALIMENTACIÓN ELÉCTRICA ANTES DE MANIPULARLA.**

AVISO IMPORTANTE: Ciertas pólizas de seguro, tanto comerciales como residenciales, extienden la cobertura a los daños causados por la falla del producto. En la mayoría de los casos, usted deberá conservar el producto para respaldar su reclamo. Zoeller Pump Co. reemplazará la unidad o reembolsará el precio de compra original una vez que la compañía de seguros liquide el reclamo, en el caso de que usted necesite conservar el producto para respaldar un reclamo por daños que le haya presentado a su compañía de seguros.

Esta es una traducción de las instrucciones de instalación originales.

Avis à l'installateur - Les instructions doivent rester avec l'installation.

Votre tranquillité d'esprit est notre priorité absolue™

FM2676F

Les renseignements présentés dans ce document représentent les conditions au moment de la publication. Consulter l'usine en cas de désaccord et de manque de cohérence.

Enregistrez votre produit Zoeller Pump Company en ligne: http://reg.zoellerpumps.com/

ZOELLER®

PUMP COMPANY

Zoeller Family of Water Solutions™

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ADRESSE PHYSIQUE : *3649 Cane Run Road • Louisville, KY 40211-1961 USA*
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Visitez notre site internet : www.zoeller.com

INSTRUCTIONS D'INSTALLATION
MODÈLES RECOMMANDÉS

DATE D'INSTALLATION :
NUMÉRO DE MODÈLE :

EFFLUENTS* / PUISARD / ASSÈCHEMENT	ÉGOUT
Séries 49 / 53 / 57, Séries 98	Séries 264
Séries 137, Séries 151 / 152 / 153	Séries 266 / 267

AVIS : TROU D'ÉVENT POUR LE CLAPET DE SÉCURITÉ VOIR N° 3 CI-DESSOUS ET N° 4 PAGE 11.

***** Les systèmes d'effluent doivent préciser que les pompes ne doivent pas traiter des solides dépassant 19,1 mm (3/4 po) afin d'éviter que des solides volumineux n'entrent dans les champs d'épuration, les champs d'épuration en monticule, etc. (Capacité pour les solides de 9,5 mm [3/8 po] pour le modèle 49. Les séries 50, 90 et 151 ont une capacité de 12,7 mm [½ po], la série 130 de 15,9 mm [5/8 po] et les modèles 152 et 153 de 19,1 mm [3/4 po].) Là où la législation le permet, les pompes à eaux usées peuvent remplacer les systèmes à effluent. Il est conseillé d'utiliser des pompes non automatiques possédant des contrôles de niveau externe pour les applications d'effluents de fosse septique.

LISTE DE VÉRIFICATIONS AVANT L'INSTALLATION - TOUTES LES INSTALLATIONS

1. **Inspecter la pompe.** De temps en temps, la pompe est endommagée en cours d'expédition. Si la pompe est endommagée, contacter le distributeur avant de l'utiliser. **NE PAS** enlever les bouchons test du couvercle ni du compartiment moteur.
2. **Il faut lire attentivement tous les documents** fournis pour se familiariser avec les détails spécifiques de l'installation et de l'utilisation. Il faut conserver ces documents pour pouvoir les consulter ultérieurement.

⚠ AVERTISSEMENT — **VOIR PLUS BAS POUR LA LISTE DES AVERTISSEMENTS**

⚠ MISE EN GARDE — **VOIR PLUS BAS POUR LA LISTE DES MISES EN GARDE**

1. Il faut vérifier que la prise est à portée du cordon d'alimentation de la pompe. **NE PAS UTILISER DE RALLONGE.** Les rallonges trop longues ou de trop faible capacité ne fournissent pas la tension nécessaire au moteur de la pompe, elles peuvent être dangereuses si l'isolant est endommagé ou si l'extrémité avec le branchement tombe dans un endroit humide ou mouillé.
2. **Vérifier que le circuit d'alimentation de la pompe est équipé de fusibles ou de disjoncteurs de capacité appropriée.** Il est recommandé d'installer un circuit indépendant de capacité suffisante, conforme aux codes électriques nationaux pour la capacité indiquée sur la plaque d'identification de la pompe.
3. **Vérification de la mise à la terre.** Pour des raisons de sécurité, il faut vérifier la terre de chaque prise électrique en utilisant un analyseur de circuit sur la liste d'Underwriters Laboratory qui indique si les fils de phase, de neutre et de terre de la prise sont branchés correctement. S'ils ne sont pas branchés correctement, appeler un électricien agréé qualifié.
4. **Pour des raisons de sécurité**, les pompes et autre équipement équipés d'un fil à trois broches, avec mise à la terre, doivent être branchés sur une prise à trois broches. Pour des raisons de sécurité, la prise doit être protégée par un disjoncteur différentiel. Quand la pompe est branchée dans un boîtier de branchement étanche, il est possible d'enlever la fiche et de faire le branchement directement sur l'alimentation avec mise à la terre appropriée. Pour des raisons de sécurité, ce circuit peut être protégé par un disjoncteur différentiel. L'installation doit être conforme au code national d'électricité et tous les règlements locaux.
5. **POUR DES RAISONS DE SÉCURITÉ, IL FAUT TOUJOURS DÉBRANCHER L'ALIMENTATION DE LA POMPE AVANT DE LA MANIPULER.** Les pompes monophasées sont équipées d'un cordon avec fiche à trois broches de mise à terre pour protéger contre les électrocutions. **IL NE FAUT JAMAIS ENLEVER LA BROCHE DE MISE À TERRE. Il faut** brancher la fiche à trois broches dans une prise à trois broches de mise à terre. **Si** le circuit n'est pas équipé d'une telle prise, il faut en installer une en respectant le code national d'électricité et toute la législation et réglementation locales en vigueur. Les pompes triphasées doivent être équipées d'un dispositif de mise en marche avec protection thermique du moteur. Consulter la norme FM0486 pour les installations duplex.
6. La ventilation du réservoir doit être conforme au code de plomberie local. Les pompes **doivent** être installées conformément au code national d'électricité et à toute la législation et réglementation locales en vigueur. Les pompes ne doivent pas être installées dans des endroits classifiés à risque, conformément à la norme ANSI/NFPA 70 du Code national américain de l'électricité.
7. **Risque d'électrocution.** Ne pas enlever le cordon d'alimentation ni le distributeur de tension mécanique, ni brancher le conduit directement à la pompe.
8. L'installation et la vérification de l'équipement électrique doivent être faites par un électricien qualifié.
9. L'installation et la vérification de la pompe doivent être faites par une personne qualifiée.
10. **Risque d'électrocution.** L'usage de ce type de pompe dans une piscine de natation et des zones marines n'a pas été étudié.
11. Ce produit contient des produits chimiques dont l'état de la Californie a déterminer comme étant la cause de cancer et de déficiences à la naissance ou autres dommages reproductifs.

1. Vérifier que le circuit d'alimentation a une capacité suffisante pour alimenter le moteur, comme indiqué sur la pompe ou sur la plaque d'identification de l'appareil.
2. L'installateur est responsable de l'installation des pompes automatiques avec des interrupteurs à niveau variable ou des pompes non-automatiques utilisant des interrupteurs auxiliaires à niveau variable et il doit s'assurer que l'interrupteur à flotteur est installé fermement pour qu'il n'accroche pas à la pompe ni au puits pour permettre l'arrêt de la pompe. Il est recommandé d'utiliser du tuyau et des raccords rigides et le puits doit avoir un diamètre supérieur à 45 cm (18").
3. **Renseignements sur le trou d'évent.** Il est nécessaire que la pompe submersible, les pompes à effluents et d'égout capables de passer des solides de différentes tailles aient leur alimentation à la base pour réduire le colmatage et la défaillance des joints. Si l'installation comprend un clapet de sécurité, il faut percer un trou d'évent d'environ 5 mm (3/16") dans le tuyau de refoulement au-dessous du clapet de sécurité et le couvercle pour purger l'air de l'appareil. L'air emprisonné est causé par l'agitation et / ou un puits sec. Il faut vérifier périodiquement que le trou d'évent n'est pas colmaté. Les carters de pompe de la série 53 / 57 et 98 sont équipés d'un trou d'évent à l'opposé du flotteur, près du goujon du carter, du goujon du carter, mais un trou d'évent est recommandé. Le trou d'évent de l'application à une hauteur de refoulement dynamique élevée peut causer une turbulence trop élevée. Il peut être désirable de ne pas le percer. S'il est décidé de ne pas percer de trou d'évent, il faut s'assurer que le carter et le rotor de la pompe sont couverts de liquide avant de brancher le tuyau sur le clapet anti-retour et qu'aucune conduite d'aspiration n'amène de l'air à l'admission de la pompe. REMARQUE - LE TROU DOIT AUSSI ÊTRE AU-DESSOUS DU COUVERCLE DU PUITS ET IL FAUT LE NETTOYER RÉGULIÈREMENT. Un jet d'eau sera visible de cette orifice durant les périodes de fonctionnement de la pompe.
4. Il faut vérifier fréquemment qu'il n'y a pas de débris ni d'accumulation pouvant interférer avec le déplacement du flotteur de marche / arrêt. Les réparations ne doivent être faites que par un centre de réparation agréé par Zoeller Pump Company.
5. Les pompes d'assèchement mécanique et d'effluents sont conçues pour pompage d'eau usée non traitée dans un puits.
6. La température de fonctionnement maximale d'une pompe standard ne peut pas être plus de 54°C (130°F).
7. Il faut utiliser les pompes modèles 266, 267, et 137 en position verticale. Il ne faut pas essayer de mettre la pompe en marche quand elle est inclinée ou couchée sur le côté.
8. Il ne faut pas faire fonctionner la pompe dans une application où la hauteur de refoulement dynamique est inférieure à la hauteur de refoulement dynamique minimale donnée dans les courbes de refoulement et de capacité.

REMARQUE - Les pompes avec annotations "UL" et "US" sont vérifiées d'après la norme UL778. Les pompes certifiées CSA sont vérifiées d'après la norme C22.2 no 108.

SE RÉFÉRER À LA GARANTIE EN PAGE 10.

GARANTIE LIMITÉE

Le fabricant garantit à l'acheteur et au propriétaire ultérieur pendant la période de garantie, tout produit neuf contre tout vice de matériel et de main-d'œuvre, en utilisation normale et quand utilisé et entretenu correctement, pendant une période de 3 ans de la date de achat. Preuve d'achat est requis. Les pièces devenant défectueuses pendant la période de garantie, et que des inspections prouvent contenir des vices de fabrication ou de main-d'œuvre, seront réparées, remplacées ou rénovées au choix du Fabricant, à condition qu'en faisant cela nous ne soyons pas obligés de remplacer l'ensemble, le mécanisme complet ou l'appareil complet. Aucune provision n'est faite pour les frais d'expédition, les dégâts, la main-d'œuvre ni d'autres frais causés par la défaillance, la réparation ou le remplacement du produit.

Cette garantie ne s'applique pas et ne couvre aucun matériel ou produit qui a été démonté sans l'autorisation préalable du Fabricant, soumis à un usage abusif, des applications incorrectes, de la négligence, des modifications, des accidents ou un cas de force majeure ; qui n'a pas été installé, utilisé ou entretenu selon les instructions d'installation du Fabricant; qui a été exposé, y compris, mais non de façon limitative, à du sable, des gravillons, du ciment, de la boue, du goudron, des hydrocarbures ou des dérivés d'hydrocarbures (huile, essence, solvants, etc.) ou à d'autres produits abrasifs ou corrosifs, serviettes ou produits d'hygiène féminine etc., dans toutes les applications de pompage. La garantie mentionnée ci-dessus remplace toutes les autres garanties expresses ou implicites et nous n'autorisons aucun représentant ou autre personne à accepter la responsabilité en notre nom pour nos produits.
Prendre contact avec le Fabricant, 3649 Cane Run Road, Louisville, KY 40211, à l'attention du Service à la Clientèle, pour obtenir des réparations, des pièces de remplacement ou des renseignements supplémentaires concernant la garantie.

LE FABRICANT REFUSE EXPRESSÉMENT TOUTE RESPONSABILITÉ POUR LES DÉGÂTS SPÉCIAUX, INDIRECTS OU SECONDAIRES OU POUR LES RUPTURES DE GARANTIE EXPRESSES OU IMPLICITES; ET TOUTE GARANTIE IMPLICITE D'APPLICABILITÉ À UNE UTILISATION SPÉCIFIQUE OU DE COMMERCIALITÉ EST LIMITÉE À LA DURÉE DE LA GARANTIE EXPRESSE.

Certaines provinces ne permettent pas les limitations de la durée de la garantie implicite et il est possible que cette limitation ne s'applique pas. Certaines provinces ne permettent pas l'exclusion ou la limitation des dégâts secondaires ou indirects, et il est possible que cette limitation ou exclusion ne s'applique pas.

Cette garantie vous donne des droits spécifiques reconnus par la loi et vous pouvez également avoir d'autres droits qui varient d'une province à l'autre.

Lorsque des dégâts sont causés par une défaillance présumée de la pompe, le propriétaire doit garder la pompe en sa possession en vue d'enquête.

CONSEILS POUR L'INSTALLATION D'UNE POMPE DE PUISARD

1. **IL FAUT** lire toutes les instructions d'installation fournies avec la pompe.
2. **IL FAUT** vérifier que les appareils n'ont pas été endommagés en cours d'expédition. Contacter le distributeur si la pompe a été endommagée.
3. **IL FAUT** nettoyer tous les débris dans le puisard. Vérifier qu'il y a une surface dure et plate à l'emplacement désiré pour la pompe. **NE PAS** installer la pompe sur du sable, du gravier ou de la terre.
4. **IL FAUT** vérifier que le puisard est assez large pour avoir de l'espace suffisant pour le bon fonctionnement des interrupteurs de commande de niveau.
5. **IL FAUT toujours débrancher l'alimentation de la pompe avant de la manipuler.**
   IL FAUT toujours brancher la pompe sur un circuit séparé mis à la terre.
   IL NE FAUT JAMAIS couper, faire une épissure ou endommager un cordon d'alimentation. (Pour faire une raccordement, il faut utiliser un boîtier de raccordement étanche.
   IL NE FAUT PAS utiliser le cordon d'alimentation pour transporter ou soulever la pompe.
   IL NE FAUT PAS utiliser de rallonge pour une pompe de puisard.
6. **IL FAUT** installer un clapet de sécurité et un raccord sur la conduite de refoulement. **IL NE FAUT PAS** utiliser une conduite de refoulement de diamètre inférieur à celui du refoulement de la pompe.
7. **IL NE FAUT PAS** utiliser une pompe de puisard comme pompe de tranchée ou d'excavation, ou pour pomper des égouts, de l'essence ou tout autre liquide dangereux.
8. **IL FAUT** essayer la pompe immédiatement après l'installation pour être certain que le système fonctionne correctement.
9. **IL FAUT** recouvrir la pompe de puisard d'un couvercle de puisard approprié.
10. **IL FAUT** étudier tous les codes locaux et nationaux applicables et vérifier que l'installation est conforme.
11. **IL FAUT** consulter le fabricant pour obtenir des clarifications ou des réponses aux questions.
12. **IL FAUT** considérer un système à deux pompes avec une alarme quand l'installation peut être surchargée ou si une défaillance de la pompe primaire causait des dégâts importants.
13. **IL FAUT** considérer un système de secours en courant alternatif quand une pompe de puisard ou d'séchage mécanique est nécessaire pour éviter des dégâts matériels en cas d'inondation à la suite d'une panne d'alimentation secteur, de problème mécanique ou électrique ou de surcharge du système.
14. **IL FAUT** inspecter le système et vérifier son fonctionnement au moins tous les trois mois.

LISTE DE VÉRIFICATIONS POUR L'ENTRETIEN

⚠ AVERTISSEMENT **PRÉCAUTIONS AVEC LE SYSTÈME ÉLECTRIQUE** – Avant de réparer la pompe, il faut toujours ouvrir le circuit et débrancher la pompe, en prenant soin de porter des chaussures à semelle isolante et de ne pas se tenir dans l'eau. En cas d'inondation, contacter la compagnie d'électricité ou un électricien agréé pour couper l'alimentation avant de déposer la pompe.

⚠ AVERTISSEMENT Les pompes submersibles contiennent de l'huile qui peut être sous pression ou devenir chaude en cours de fonctionnement. **Attendre 2 heures et demi après l'avoir débranchée avant de travailler sur la pompe.**

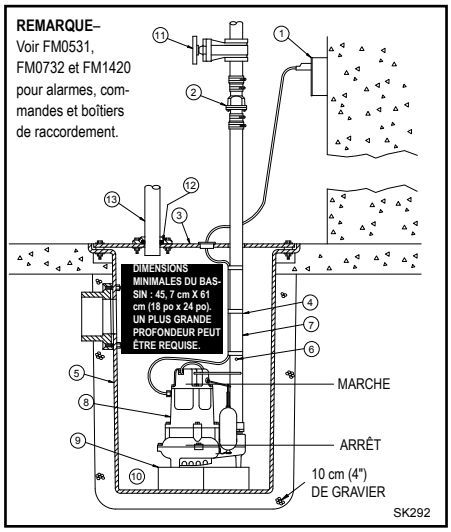
CONDITION	CAUSES FRÉQUENTES
A. La pompe ne démarre pas ou ne fonctionne pas.	Vérifier que le fusible est en bon état, que la tension est normale, que le circuit n'est pas surchargé et que le câblage est correct, que l'interrupteur n'est pas ouvert, que le rotor ou le joint n'est pas bloqué, que le condensateur ou le relais n'est pas défectueux, si installé, qu'il n'y a pas de court-circuit dans le moteur ou le bobinage. Flotteur bloqué en position basse. Interrupteur défectueux, endommagé ou mal réglé.
B. Le moteur surchauffe et déclenche le disjoncteur ou la sécurité thermique.	Mauvaise tension, hauteur de refoulement négative (refoulement ouvert au-dessous de la normale), blocage mécanique du rotor ou du joint, moteur court-circuité.
C. La pompe se met en marche et s'arrête trop fréquemment.	Flotteur grippé sur la tige, clapet de sécurité coincé ou pas de clapet installé sur une conduite longue, clapet de sécurité ouvert, interrupteurs de niveau défectueux, puits trop petit.
D. La pompe ne s'arrête pas.	Débris sous le flotteur, flotteur ou tige du flotteur coincé contre la paroi du puits, interrupteur défectueux, endommagé ou mal réglé.
E. La pompe fonctionne mais son débit est faible ou non existant.	Vérifier le carter de crépine, le tuyau de refoulement ou, si un clapet de sécurité est installé, le trou d'évent. La hauteur de refoulement est supérieure à la capacité de la pompe. Mauvaise tension. Mauvaise direction de rotation de la pompe. Condensateur défectueux. L'eau d'alimentation contient de l'air ou provoque l'entrée d'air dans la chambre de la pompe.
F. Baisse de capacité ou de hauteur de refoulement après une période d'utilisation.	Augmentation de la friction dans le tuyau de refoulement, tuyau ou clapet de sécurité colmaté. Des produits abrasifs ou des produits chimiques peuvent détériorer le rotor et le carter de pompe. Inspecter la conduite. Déposer la base et inspecter.

Si les vérifications ci-dessus ne résolvent le problème, consulter l'usine. Ne pas essayer de réparer ou de démonter la pompe. Toutes les réparations doivent être faites par un centre de réparation agréé par Zoeller. Visitez le site Web www.zoellerpumps.com/servicestations pour trouver le centre de service agréé le plus proche.

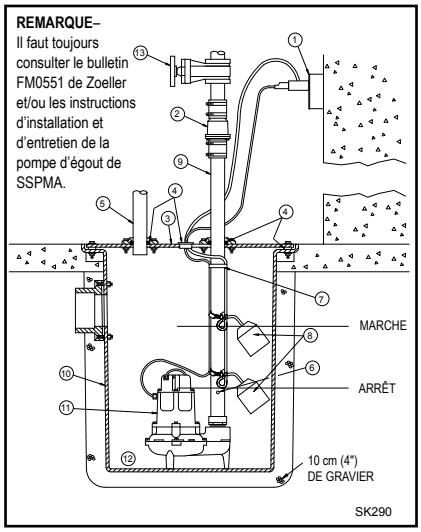
INSTALLATION RECOMMANDÉE POUR TOUTES APPLICATIONS

(1) Les circuits et les protections électriques doivent être conformes aux normes des codes électriques nationaux, provinciaux et locaux.
(2) Installer un Unicheck (raccord / clapet de sécurité combiné) de Zoeller approprié, de préférence juste au-dessus du puits pour permettre la dépose de la pompe pour le nettoyage ou les réparations. Pour les égouts, les effluents ou les eaux d'assèchement mécanique, utiliser le modèle 30-0164 avec des tuyaux de 1-1/2" (38 mm), modèle 30-0152 avec des tuyaux de 2" (51 mm) et le modèle 30-0160 avec des tuyaux de 3" (76 mm) s'il faut une grande hauteur de refoulement ou en cas d'installation sous un couvercle. Voir (4) ci-dessous.
(3) Tous les puits doivent avoir un couvercle pour empêcher les débris d'y tomber et éviter les chutes accidentelles.
(4) Quand un Unicheck est installé, percer un trou de 5 mm (3/16") dans le tuyau de refoulement, de niveau avec le dessus de la pompe. Les pompes de la série 50 et 90 ont un trou d'évent intégré. **REMARQUE** – LE TROU DOIT AUSSI ÊTRE AU-DESSOUS DU COUVERCLE DU PUITS ET IL FAUT LE NETTOYER RÉGULIÈREMENT (pompes à hauteur de refoulement élevée, voir n° 3 de la première page « MISE EN GARDE »). Un jet d'eau sera visible de cette orifice durant les périodes de fonctionnement de la pompe.
(5) Attacher fermement le cordon d'alimentation électrique sur le tuyau de refoulement en utilisant du chatterton ou des colliers.
(6) Utiliser un tuyau de refoulement de pleines dimensions.
(7) Le puits doit être conforme à tous les règlements applicables.
(8) Avant la mise en service, la pompe doit être de niveau et le mécanisme du flotteur ne doit pas toucher les bords du puits.
(9) Après l'installation, le puits doit être propre et ne doit pas contenir de débris.
(10) L'installateur doit fournir la vanne d'arrêt et l'installer en respectant tous les codes.
(11) Identifier les interrupteurs à flotteur indiqués dans les illustrations. Le point d'arrêt doit être au-dessus du carter du moteur et à 180° de l'admission. Le point d'arrêt ne se doit trouver jamais au-dessous du refoulement de la pompe (uniquement pour les systèmes d'eaux usées et d'effluent). **REMARQUE - pour les pompes automatiques, utiliser le schéma d'installation pour l'assèchement ci-dessous.**
(12) Pour éviter la propagation des gaz et des odeurs, toutes les installations doivent avoir des joints étanches.
(13) Les gaz et les odeurs sont évacués à l'atmosphère au moyen d'un tuyau d'évent. (uniquement pour les systèmes d'eaux usées et d'assèchement).
(14) Installer la base de pompe Zoeller (modèle 10-2421) sous la pompe pour former un bassin de décantation (uniquement pour les systèmes d'effluent et d'assèchement).
Uniquement pour les systèmes d'effluent :
(15) Brancher l'alimentation de la pompe par l'intermédiaire d'un boîtier étanche Zoeller ou d'une épissure étanche. ***REMARQUE – Le boîtier étanche est une nécessité absolue dans un milieu humide. Voir le n° 8 à la première page de FM0732.***
(16) Consulter le manuel de dimensions pour les égouts de SSPMA afin de déterminer le modèle d'interrupteur de marche / arrêt à utiliser.
(17) Un accès à la fosse septique doit être prévu pour l'entretien du filtre et de la pompe.

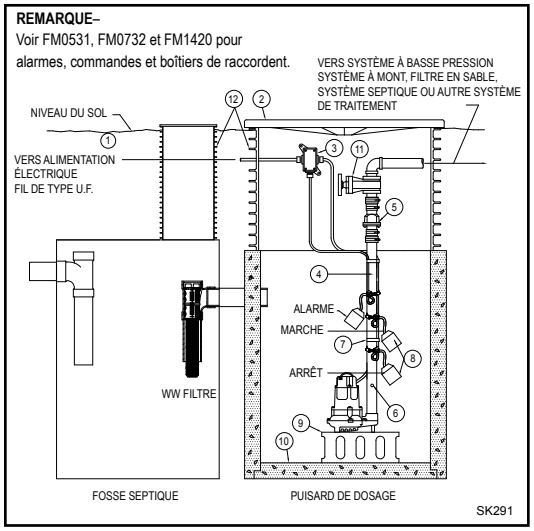
REMARQUE *– Les pompes à joint double offrent une protection supplémentaire contre les dommages causés par la défaillance du joint.*



INSTALLATION TYPIQUE POUR L'ASSÈCHEMENT MÉCANIQUE



INSTALLATION TYPIQUE POUR ÉGOUT

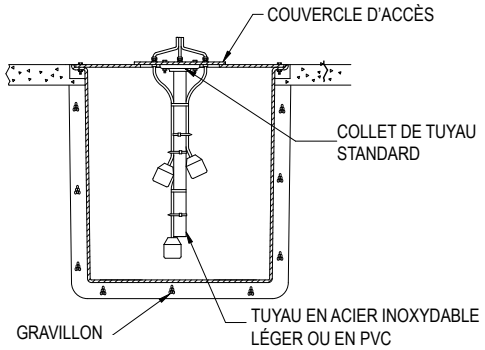


INSTALLATION TYPIQUE POUR LES EFFLUENTS

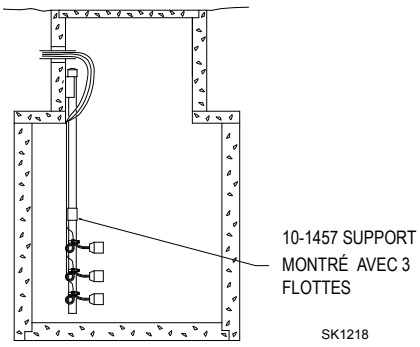
Toutes les installations doivent être conformes aux codes électriques et de plomberie applicables, y compris, mais pas limité aux codes électriques nationaux, locaux, régionaux et aux codes de plomberie provinciaux. Pas conçu pour utilisation dans les endroits dangereux.

MÉTHODES SUGGÉRÉES POUR L'INSTALLATION DU FLOTTEUR

Pour certaines installations, il peut être nécessaire d'installer un support indépendant pour les interrupteurs de commande de niveau pour éviter des accrochages possibles sur la pompe, la tuyauterie, les vannes, etc. Il est possible de fabriquer les supports de flotteur en utilisant des tuyaux et des raccords standard pour faciliter la dépose en cas de réparation. Les supports de flottes sont disponible chez Zoeller tel que décrit au feuillet FM0526 ou peuvent être fabriqué avec de la tuyauterie et des raccords standard.



SUPPORT TYPIQUE DE FLOTTEUR POUR COUVERCLE DE PUITS EN ACIER



SUPPORT DE FLOTTES TYPIQUE POUR PUISARD EN BÉTON OU POUR PUIT D' ACCÉS DE FOSSE SEPTIQUE

Installation des modèles WD et WH

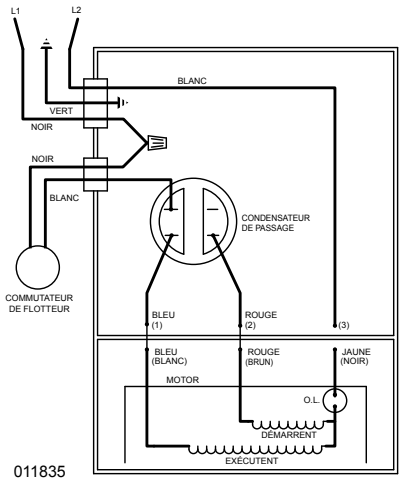
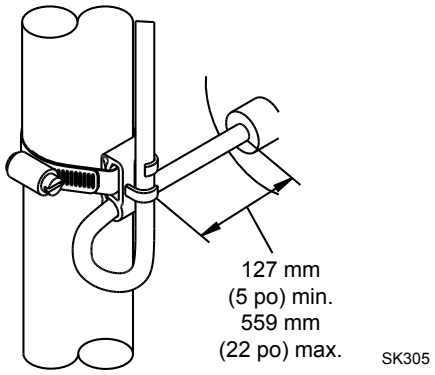


SCHÉMA ÉLECTRIQUE POUR LES MODÈLES
WD - 230 V, monophasé, 60 Hz
WH - 200/208, monophasé, 60 Hz

Définition de la plage de pompage en pouces (1 pouce = 2,5 cm)

Longueur du bras d'attache	5 min.	10	15	20	22 max.
Plage de pompage	9	13.5	18	22	24

Ce tableau ne doit être utilisé que comme guide. À cause du poids du câble, la plage de pompage au-dessus de l'horizontale n'est pas égale à la plage de pompage au-dessous de l'horizontale. Les plages sont basées sur des essais sans turbulence. La plage peut varier en fonction de la température de l'eau et de la forme du cordon. Plus le bras est long, plus les variations de plage de pompage sont importantes.



Interrupteur 20 amps (modèles WD et WH)

Les modèles WD et WH sont entièrement automatiques. Un interrupteur à flotteur est inclus et branché dans le circuit de la pompe pour permettre le fonctionnement automatique après avoir installé l'interrupteur à flotteur correctement sur le tuyau de refoulement. Il faut utiliser le schéma ci-dessus pour attacher correctement l'interrupteur à flotteur et obtenir un bras approprié pour modifier le cycle de marche-arrêt pour chaque application.

Remarque – L'interrupteur risque de mal fonctionner si le câble d'attache n'est pas maintenu dans les limites appropriées.

Remarque – Le câble doit être installé horizontalement.

Instructions de branchement monophasé

AVERTISSEMENT **POUR DES RAISONS DE SÉCURITÉ, IL FAUT TOUJOURS DÉBRANCHER L'ALIMENTATION ÉLECTRIQUE DE LA POMPE AVANT L'INTERVENTION.** Les pompes monophasées sont fournies avec une fiche à trois broches pour aider à protéger contre les risques d'électrocution. **IL NE FAUT JAMAIS ENLEVER LA BROCHE DE TERRE.** La fiche à trois broches **doit** être branchée dans une prise à trois alvéoles correspondantes. **Si** le circuit d'alimentation n'a pas une telle prise, il faut installer une prise du type approprié, branchée et mise à la terre selon le code national de l'électricité et tous les codes et règlements locaux appropriés.

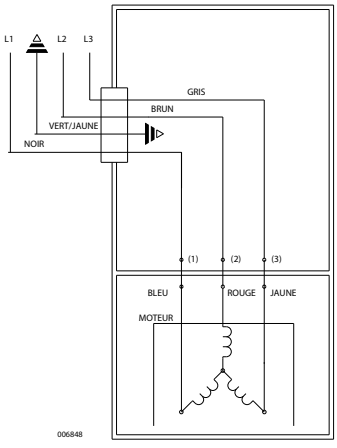
AVERTISSEMENT **« Risque d'électrocution ».** Il ne faut pas enlever le cordon d'alimentation et le serre-câble ni brancher directement la pompe.

AVERTISSEMENT L'installation et la vérification des circuits électriques et de la quincaillerie doivent être faites par un électricien qualifié.

AVERTISSEMENT Les unités non équipées d'une fiche (monophasée et triphasée) et les unités non automatiques monophasées à fiche de 20 ampères doivent être dotées d'une commande de moteur et d'un régulateur de niveau de liquide lors de l'installation. La tension, l'intensité, la fréquence, la mise à la terre et la puissance du dispositif de commande doivent s'accorder à la pompe sur lequel il est branché.

Instructions de branchement triphasé

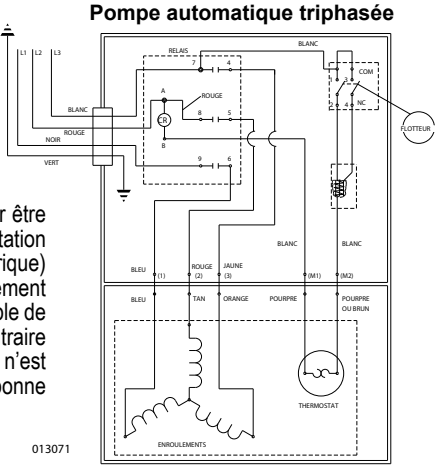
Pompe non-automatique triphasée



Les pompes triphasées ne sont pas automatiques. Pour qu'elles fonctionnent automatiquement, il faut installer un panneau de commande. Pour brancher le système, suivre les instructions fournies avec le panneau de commande. Pour trois phases automatique les pompes voient le diagramme de câblage automatique de 3 phases situé vers le droit.

Avant d'installer la pompe, vérifier la rotation de la pompe pour être certain que les fils ont été branchés correctement sur l'alimentation et que le fil vert du cordon d'alimentation (voir schéma électrique) est branché sur une bonne terre. Mettre la pompe momentanément sous tension et observer la direction du retour causé par le couple de démarrage. La rotation est correcte si le retour est en sense contraire à la flèche de rotation dans le carter de la pompe. Si la rotation n'est pas correcte, inverser deux des fils de phase pour obtenir la bonne direction de rotation.

Pompe automatique triphasée



Toutes les pompes triphasées doivent être équipées d'un dispositif de démarrage, avec dispositif de protection contre la surcharge. Voir FM0486 pour les installations duplex. La pompe **doit** être branchée conformément au code national de l'électricité et tous les codes et règlements locaux appropriés. Il ne faut pas installer les pompes dans un endroit classé dangereux conformément au code national de l'électricité, ANSI/NFPA 70.

AVERTISSEMENT **POUR DES RAISONS DE SÉCURITÉ, IL FAUT TOUJOURS DÉBRANCHER L'ALIMENTATION ÉLECTRIQUE DE LA POMPE AVANT L'INTERVENTION.**

REMARQUE IMPORTANTE. – Certaines polices d'assurance commerciales et résidentielles couvrent les dommages résultant d'une défaillance du produit. Dans la plupart des cas, vous devez être en possession du produit pour déposer une réclamation. Zoeller Pump Co. s'engage à remplacer l'appareil ou à rembourser le prix d'achat original après que l'assureur aura réglé la réclamation dans un cas où vous êtes tenu d'être en possession du produit pour documenter une réclamation soumise à votre assureur.

Il s'agit ici d'une traduction des instructions d'origine.

AMERICAN ONSITE CONTROLS

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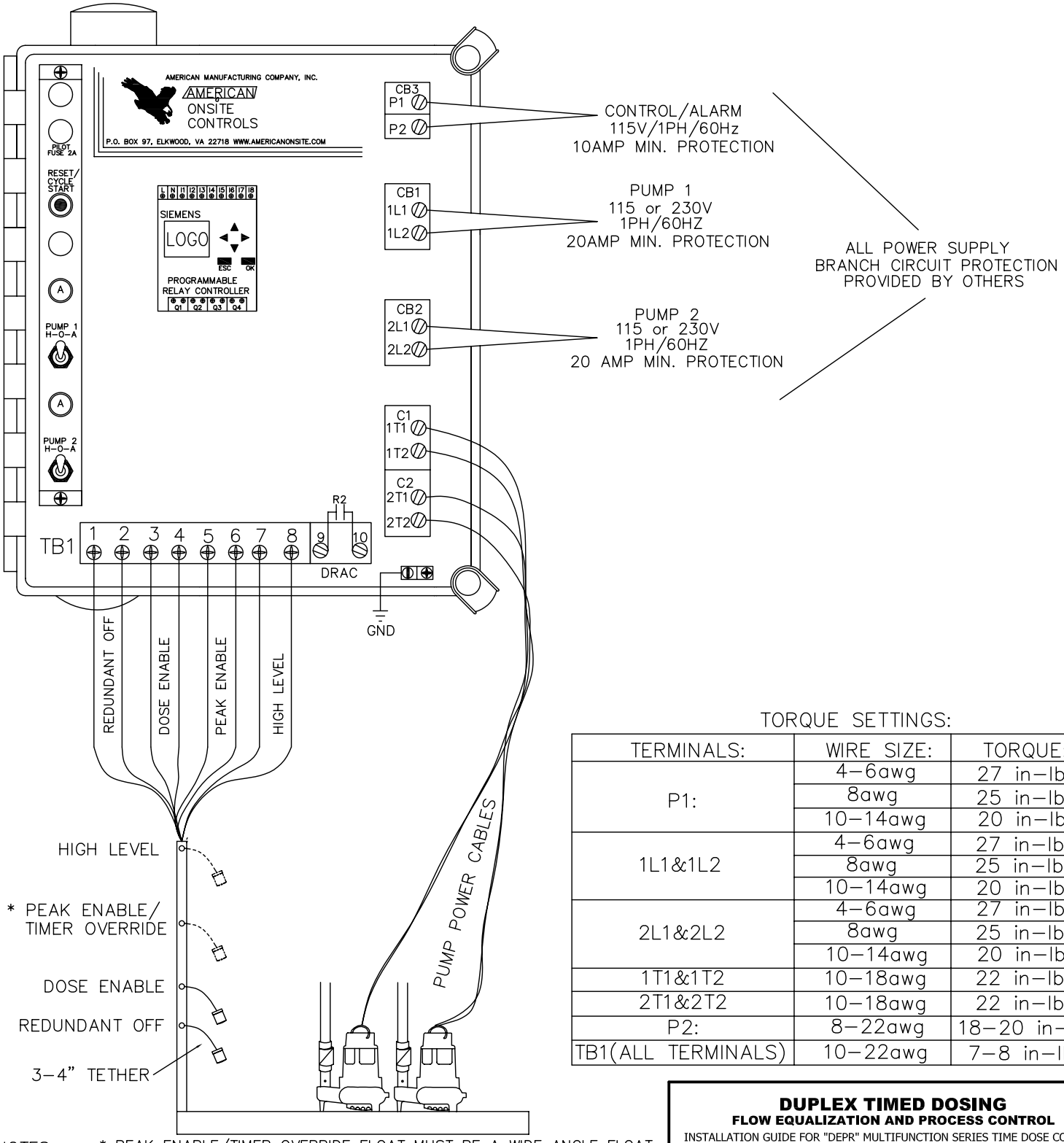
(800) 345-3132 www.americanonsite.com



TORQUE SETTINGS:

TERMINALS:	WIRE SIZE:	TORQUE:
P1:	4-6awg	27 in-lbs
	8awg	25 in-lbs
	10-14awg	20 in-lbs
1L1&1L2	4-6awg	27 in-lbs
	8awg	25 in-lbs
	10-14awg	20 in-lbs
2L1&2L2	4-6awg	27 in-lbs
	8awg	25 in-lbs
	10-14awg	20 in-lbs
1T1&1T2	10-18awg	22 in-lbs
2T1&2T2	10-18awg	22 in-lbs
P2:	8-22awg	18-20 in-lbs
TB1(ALL TERMINALS)	10-22awg	7-8 in-lbs

NOTES: * PEAK ENABLE/TIMER OVERRIDE FLOAT MUST BE A WIDE ANGLE FLOAT.

1. PLEASE REVIEW ALL PAGES AND INSERTS IN THIS MANUAL BEFORE ATTEMPTING TO INSTALL ANY CONTROL EQUIPMENT.
2. DASHED LINES REPRESENT OPTIONAL EQUIPMENT.
3. TIME DOSING IS CONTROLLED BY A SIEMENS LOGO! SEE ADDITIONAL MANUAL FOR PROGRAMMING INSTRUCTIONS.

c UL us

DUPLEX TIMED DOSING
FLOW EQUALIZATION AND PROCESS CONTROL
INSTALLATION GUIDE FOR "DEPR" MULTIFUNCTION SERIES TIME DOSE CONTROL
1 PHASE OPTIONS A,J,L,P (C) R

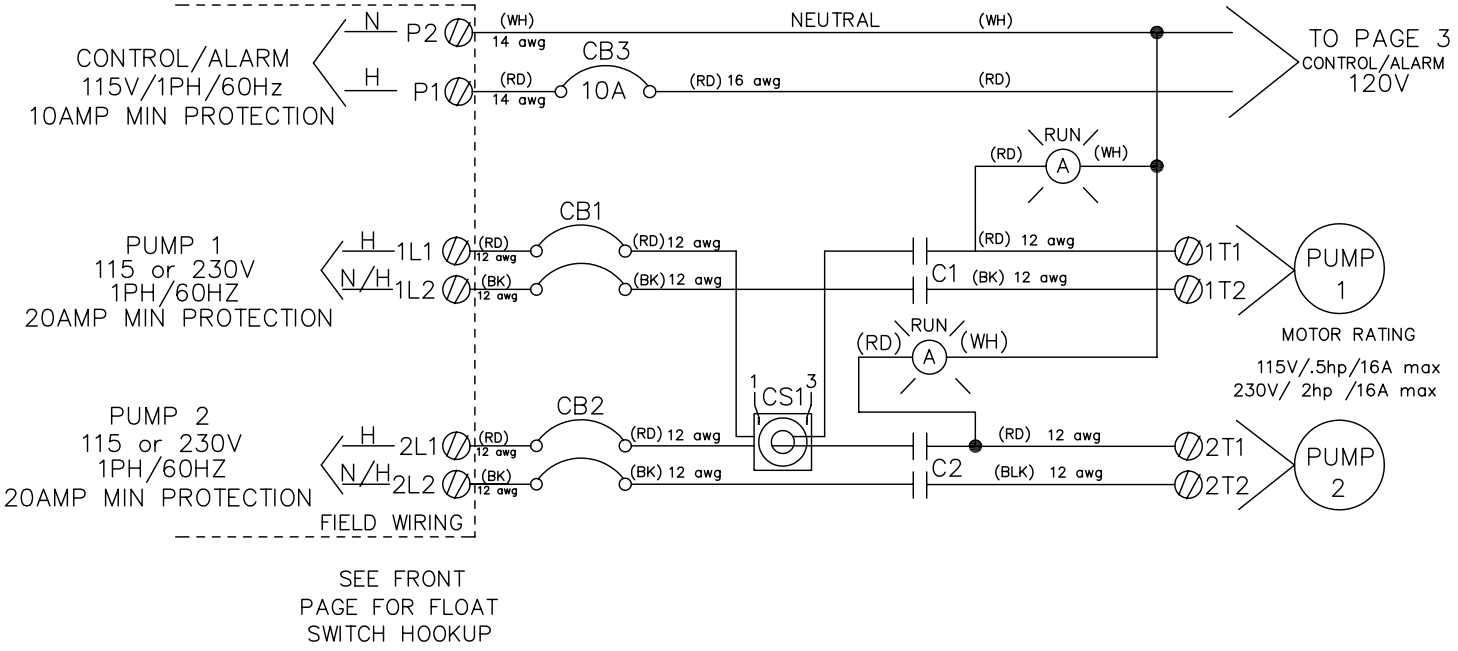
MODEL#: DEPRAB124-AJLP(C)R		
DWG#: E4666		REVISION D
DATE: 11/10/2008	DRAWN BY: KRF	APPROVED
FILE PATH: S:\DATA\CONTROLS\AUTOCAD200LT\EQUALIZE\E4666 New.dwg		PAGE 1

POWER SUPPLY INSTALLATION SCHEMATIC

NOTES:
ALL WIRES ARE 18 awg
UNLESS OTHERWISE NOTED.

ALL POWER SUPPLY
BRANCH CIRCUIT PROTECTION
MUST BE PROVIDED BY OTHERS

NOTE:
H= HOT LEG
N= NEUTRAL



SEE FRONT
PAGE FOR FLOAT
SWITCH HOOKUP

WIRE COLOR CODE

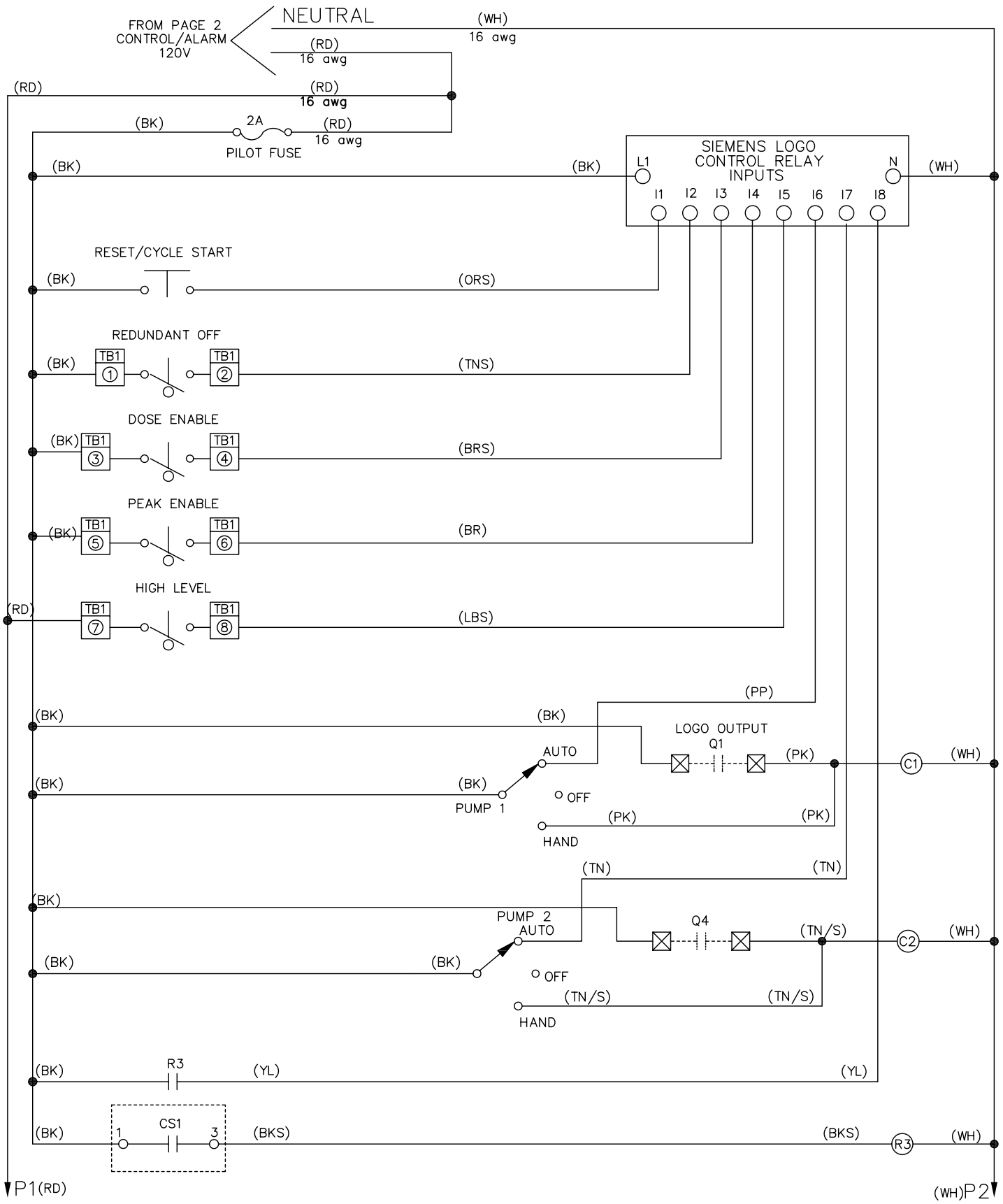
(BK)–BLACK	(GRS)–GREEN STRIPE	(GY)–GRAY	(TNS)–TAN STRIPE
(BKS)–BLACK STRIPE	(PK)–PINK	(GYS)–GRAY STRIPE	(WH)–WHITE
(BR)–BROWN	(PKS)–PINK STRIPE	(LB)–LIGHT BLUE	(WHS)–WHITE STRIPE
(BRS)–BROWN STRIPE	(PP)–PURPLE	(LBS)–LT BLUE STRIPE	(YL)–YELLOW
(DB)–DARK BLUE	(PPS)–PURPLE STRIPE	(OR)–ORANGE	(YLS)–YELLOW STRIPE
(DBS)–DRK BLUE STRIPE	(RD)–RED	(ORS)–ORANGE STRIPE	
(GR)–GREEN	(RDS)–RED STRIPE	(TN)–TAN	(**SEE NOTE 12.**)

POWER SUPPLY INSTALLATION NOTES:

1. DASHED LINES (– – –) REPRESENT TERMINALS, EQUIPMENT, AND/OR OPTIONS THAT MAY OR MAY NOT BE PRESENT IN EACH SYSTEM COVERED BY THIS MANUAL.
2. BRANCH CIRCUIT PROTECTION MUST BE PROVIDED BY OTHERS. CONSULT NEC AND/OR LOCAL CODES.
3. SINGLE (1) PHASE PUMP MOTORS MUST HAVE INTEGRAL THERMAL OVERLOAD PROTECTION.
4. TEMPERATURE RATING OF FIELD INSTALLED COPPER CONDUCTORS MUST BE AT LEAST 140°F (60°C).
5. FOR PUMPS THAT REQUIRE EXTERNAL CAPACITOR INSTALLATION KITS, SEE "K" PACK INSTALLATION INSERT PROVIDED.
6. PUMP SUPPLY MUST MATCH REQUIRED PUMP VOLTAGE. CONDUIT ENTRANCE MUST MATCH ENCLOSURE RATING.
7. PUMP AND PANEL VOLTAGE CODE MUST BE EQUIVALENT TO INCOMING PUMP AND CONTROL POWER SUPPLIES.
8. OVERLOAD/MOTOR PROTECTOR UNITS MAY REQUIRE ADJUSTMENT TO MATCH PUMP FULL LOAD AMPS (FLA).
9. SEPARATE OVERLOAD (O.L.) NOT REQUIRED WHEN MOTOR PROTECTORS (MP) ARE SUPPLIED.
10. THE MANUFACTURER RECOMMENDS THAT CONTROL/ALARM SUPPLY BE SEPARATE FROM THE PUMP SUPPLY.
11. UNITS WITH BREAKERS DO NOT REQUIRE SEPARATE PUMP SUPPLIES. A SINGLE SUPPLY MAY BE USED, BUT IT MUST BE SIZED TO HANDLE THE CURRENT REQUIREMENTS OF BOTH PUMPS.
12. THE WIRE CHART SHOULD BE USED IN CONJUCTION WITH PAGES 3 AND 4 FOR TROUBLESHOOTING PURPOSES ONLY.
13. REFER TO BACKPLATE LAYOUT ON PAGE 5 FOR THE REQUIRED TORQUE SETTINGS FOR EACH COMPONENT.

INSTALLATION SCHEMATIC

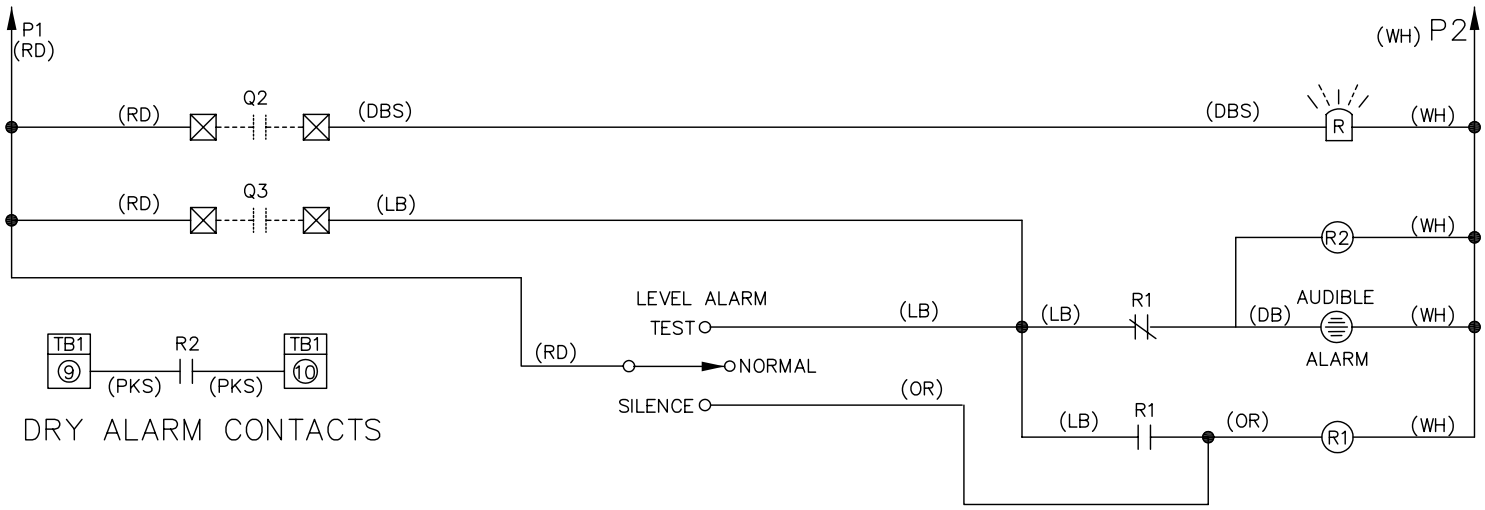
NOTES:
ALL WIRES ARE 18 awg
UNLESS OTHERWISE NOTED.



AMERICAN MANUFACTURING COMPANY INC. ELKWOOD, VIRGINIA 22718	MODEL#: DEPRAB124–AJLP(C)R	DATE: 11/10/08
	DWG#: E4666	PAGE 3

INSTALLATION SCHEMATIC

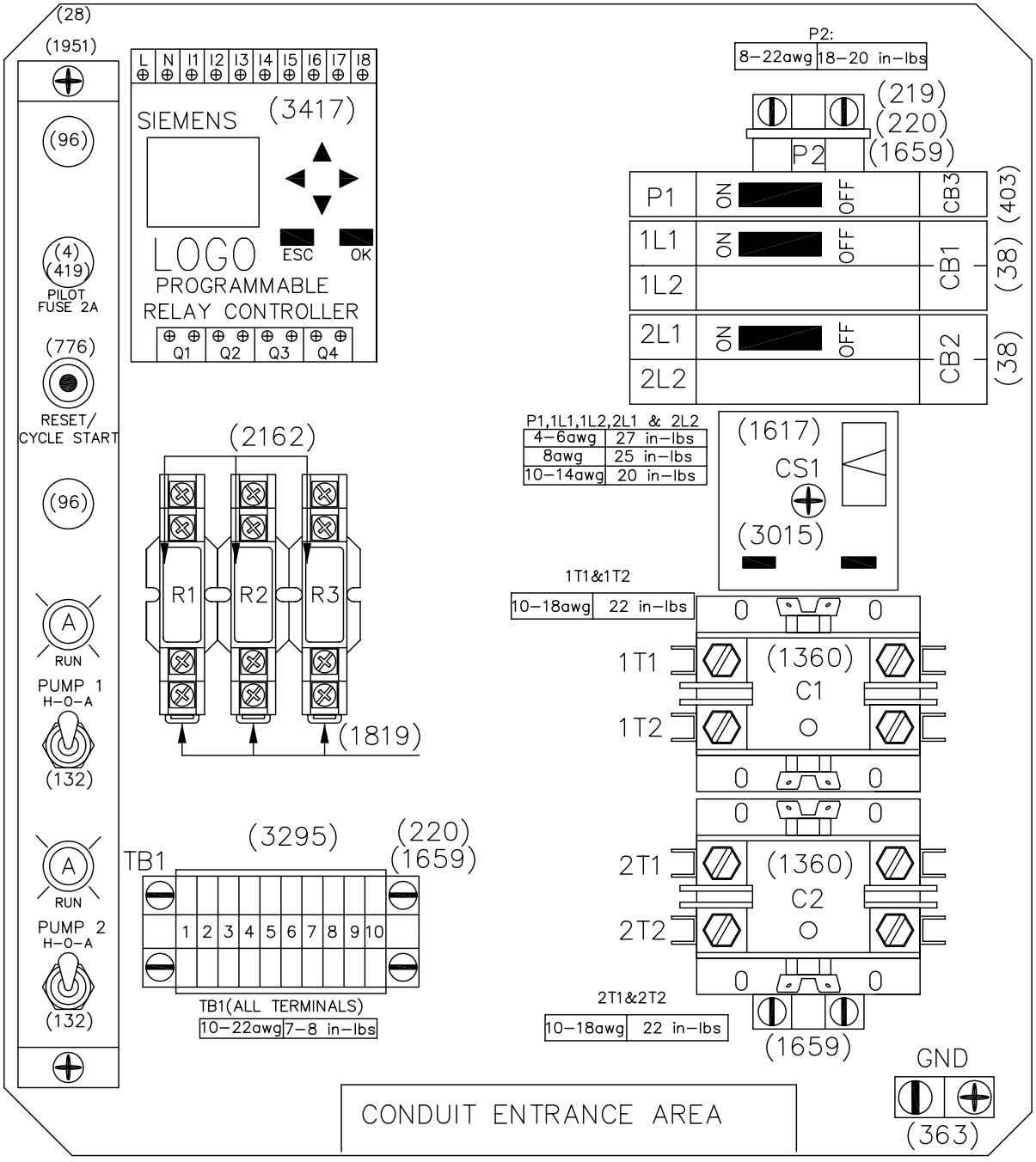
NOTES:
ALL WIRES ARE 18 awg
UNLESS OTHERWISE NOTED.



DRY ALARM CONTACTS

PROGRAMMABLE RELAY			
INPUT		OUTPUT	
I1	– RESET/CYCLE START	Q1	– PUMP 1
I2	– REDUNDANT OFF		
I3	– DOSE ENABLE	Q2	– ALARM LIGHT
I4	– PEAK ENABLE		
I5	– HIGH LEVEL	Q3	– ALARM HORN
I6	– PUMP 1 AUTO		
I7	– PUMP 2 AUTO	Q4	– PUMP 2
I8	– PUMP FAIL		

BACKPLATE LAYOUT



BACKPLATE NOTES:

1. (xxxx) DENOTES ITEM NUMBER FOR ALL INSTALLED COMPONENTS.
2. INSTALLERS MUST FOLLOW TORQUE SPECIFICATION PROVIDED. TERMINALS ARE LISTED ALONG WITH ACCEPTABLE WIRE SIZES AND MINIMUM/MAXIMUM TORQUE SETTINGS.

SHORT CIRCUIT RATINGS:

PUMP 1 POWER CIRCUIT
5kA rms @ 230Vmax

PUMP 2 POWER CIRCUIT
5kA rms @ 230Vmax

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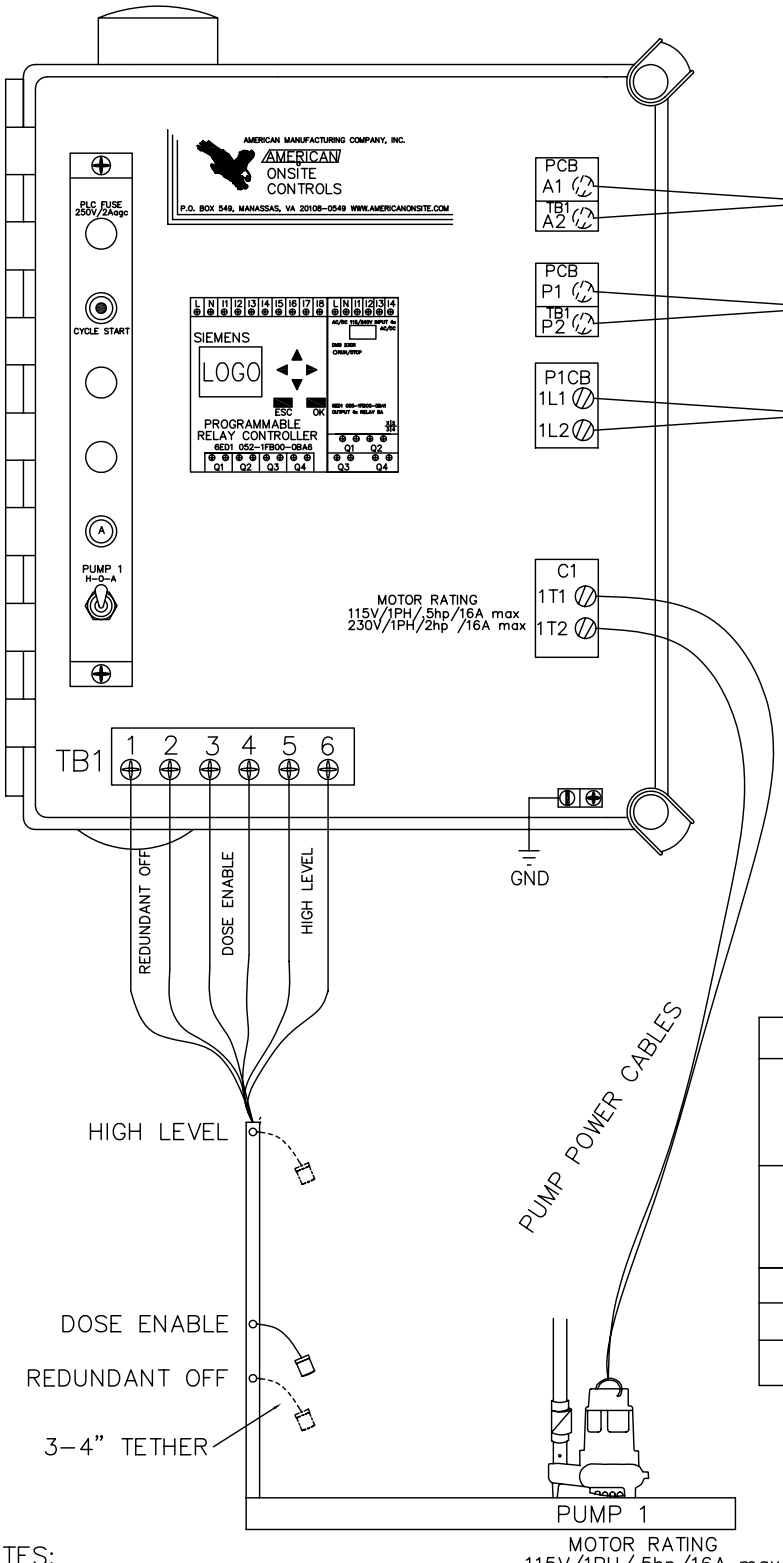
(800) 345-3132 www.americanonsite.com



BRANCH CIRCUIT PROTECTION
ALL POWER SUPPLY
PROVIDED BY OTHERS

ALARM SUPPLY
115V/1PH/60Hz
10AMP MIN. PROTECTION

CONTROLSUPPLY
115V/1PH/60Hz
10AMP MIN. PROTECTION
PUMP 1
115 or 230V
1PH/60HZ
20AMP MIN. PROTECTION

TORQUE SETTINGS:

TERMINALS:	WIRE SIZE:	TORQUE:
A1 & P1	4-6awg	27 in-lbs
	8awg	25 in-lbs
	10-14awg	20 in-lbs
1L1&1L2	4-6awg	27 in-lbs
	8awg	25 in-lbs
	10-14awg	20 in-lbs
1T1&1T2	10-18awg	22 in-lbs
A2 & P2	8-22awg	18-20 in-lbs
TB1 1-6	10-22awg	7-8 in-lbs

NOTES:

1. PLEASE REVIEW ALL PAGES AND INSERTS IN THIS MANUAL BEFORE ATTEMPTING TO INSTALL ANY CONTROL EQUIPMENT.
2. DASHED LINES MAY REPRESENT OPTIONAL EQUIPMENT.
3. TIME DOSING IS CONTROLLED BY A SIEMENS LOGO! SEE ADDITIONAL MANUAL FOR PROGRAMMING INSTRUCTIONS.

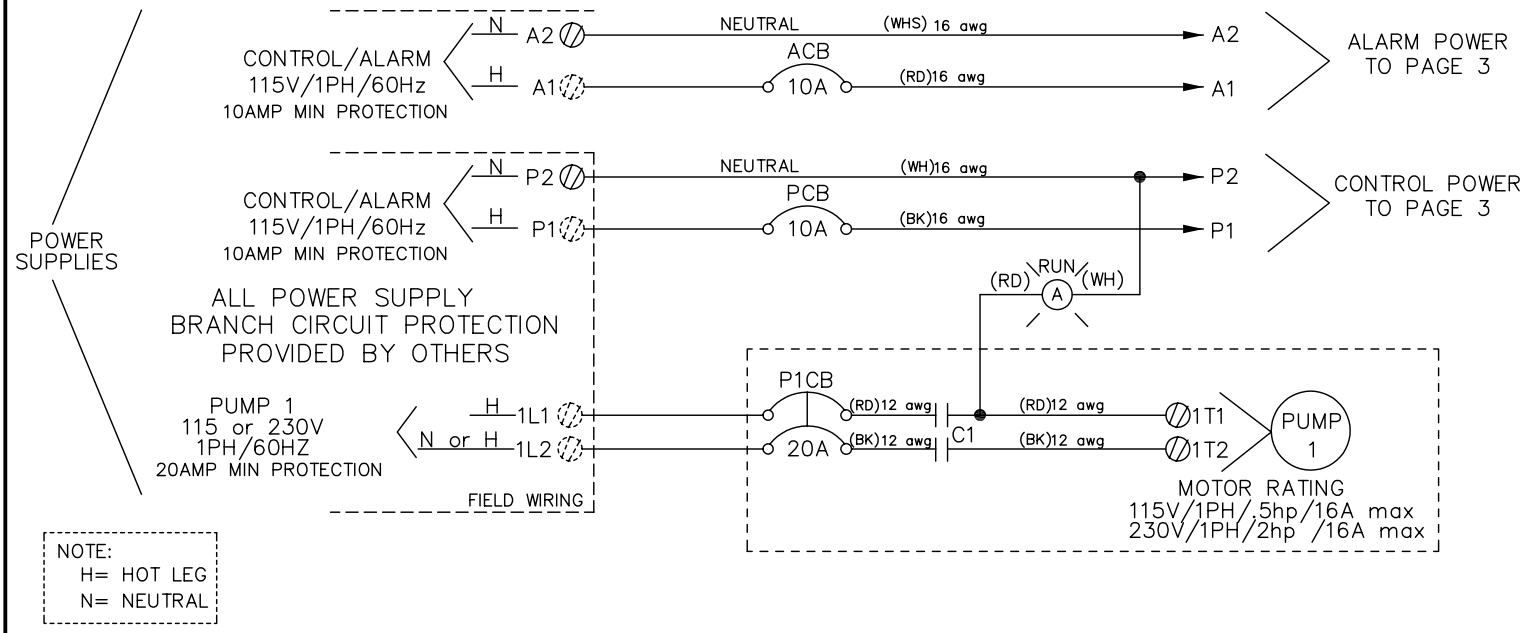
SIMPLEX TIMED DOSING
FLOW EQUALIZATION AND PROCESS CONTROL
INSTALLATION GUIDE FOR "SEPR" MULTIFUNCTION SERIES TIME DOSE CONTROL
NEMA 4X,1 PHASE, OPTIONS: A, J, L, R,X(26) PW

MODEL#: SEPRAB124-AJLRX(PW)		
DWG#: E4702		REVISION –
DATE: 02/20/09	DRAWN BY: SPC	APPROVED
FILE PATH: S:\DATA\CONTROLS\AUTOCAD200LT\EQUALIZE\E4702.dwg		PAGE 1

POWER SUPPLY INSTALLATION SCHEMATIC

FOR 1PH UNITS WITH ALARM

NOTES:
ALL WIRES ARE 18 awg
UNLESS OTHERWISE NOTED.



NOTE:
H= HOT LEG
N= NEUTRAL

WIRING SCHEMATIC

WIRE COLOR CODE	
(BK)–BLACK	(ORS)–ORANGE STRIPE
(BKS)–BLACK STRIPE	(PK)–PINK
(BR)–BROWN	(PKS)–PINK STRIPE
(BRS)–BROWN STRIPE	(PP)–PURPLE
(DB)–DARK BLUE	(PPS)–PURPLE STRIPE
(DBS)–DRK BLUE STRIPE	(RD)–RED
(GR)–GREEN	(RDS)–RED STRIPE
(GRS)–GREEN STRIPE	(TN)–TAN
(GY)–GRAY	(TNS)–TAN STRIPE
(GYS)–GRAY STRIPE	(WH)–WHITE
(LB)–LIGHT BLUE	(WHS)–WHITE STRIPE
(LBS)–LT BLUE STRIPE	(YL)–YELLOW
(OR)–ORANGE	(YLS)–YELLOW STRIPE

PROGRAMMABLE RELAY I/O

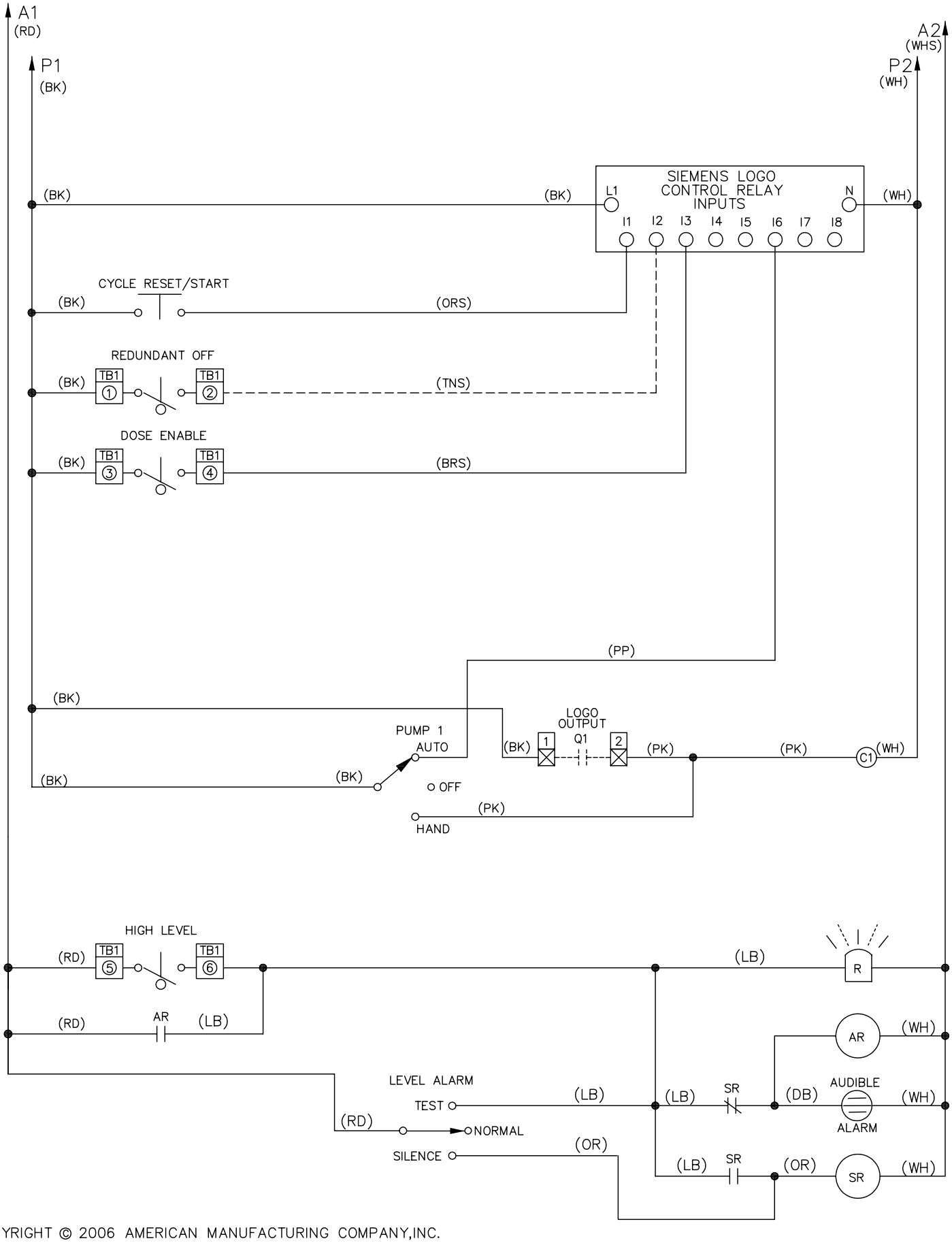
INPUT		OUTPUT	
I1	– CYCLE RESTART	Q1	– PUMP 1
I2	– REDUNDANT OFF	Q2	– NOT USED
I3	– DOSE ENABLE	Q3	– NOT USED
I4	– NOT USED	Q4	– NOT USED
I5	– NOT USED		
I6	– PUMP 1 AUTO		
I7	– NOT USED		
I8	– NOT USED		

POWER SUPPLY INSTALLATION NOTES:

1. DASHED LINES (– – –) REPRESENT TERMINALS, EQUIPMENT, AND/OR OPTIONS THAT MAY OR MAY NOT BE PRESENT IN EACH SYSTEM COVERED BY THIS MANUAL.
2. BRANCH CIRCUIT PROTECTION MUST BE PROVIDED BY OTHERS. CONSULT NEC AND/OR LOCAL CODES.
3. SINGLE (1) PHASE PUMP MOTORS MUST HAVE INTEGRAL THERMAL OVERLOAD PROTECTION.
4. TEMPERATURE RATING OF FIELD INSTALLED COPPER CONDUCTORS MUST BE AT LEAST 140°F (60°C).
5. FOR PUMPS THAT REQUIRE EXTERNAL CAPACITOR INSTALLATION KITS, SEE K" PACK INSTALLATION INSERT PROVIDED
6. PUMP SUPPLY MUST MATCH REQUIRED PUMP VOLTAGE. CONDUIT ENTRANCE MUST MATCH ENCLOSURE RATING
7. PUMP AND PANEL VOLTAGE CODE MUST BE EQUVALENT TO INCOMING PUMP AND CONTROL POWER SUPPLIES.
8. OVERLOAD/MOTOR PROTECTOR UNIT MAY REQUIRE ADJUSTMENT TO MATCH PUMP FULL LOAD AMPS (FLA)
9. SEPARATE OVERLOAD (O.L.) NOT REQUIRED WHEN MOTOR PROTECTORS (MP) ARE SUPPLIED.
10. THE MANUFACTURER RECOMMENDS THAT CONTROL/ALARM SUPPLY BE SEPARATE FROM THE PUMP SUPPLY.
11. REFER TO BACKPLATE LAYOUT ON PAGE 4 FOR THE REQUIRED TORQUE SETTINGS FOR EACH COMPONENT.

WIRING SCHEMATIC

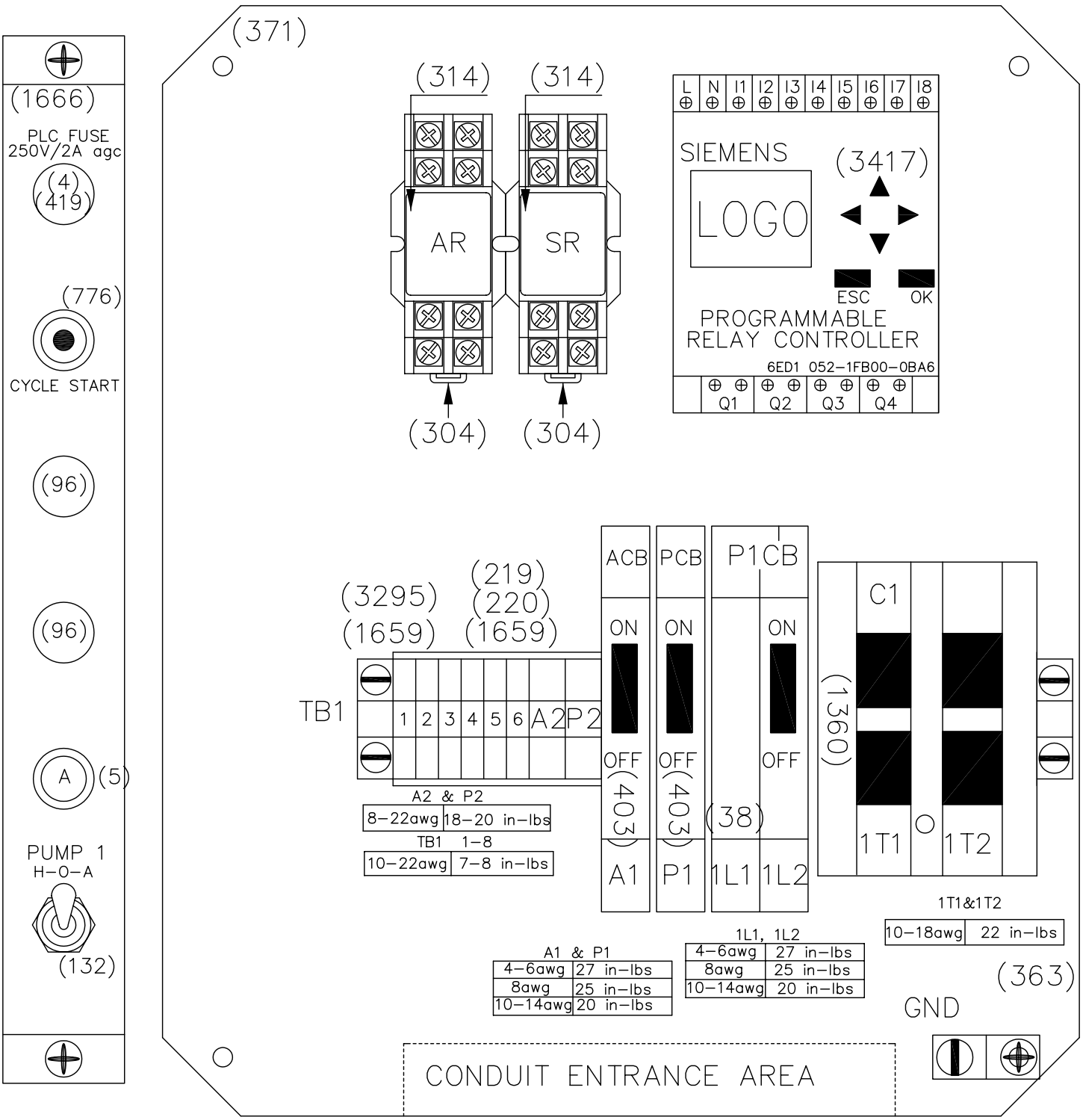
NOTES:
ALL WIRES ARE 18 awg
UNLESS OTHERWISE NOTED.



AMERICAN MANUFACTURING COMPANY INC. ELKWOOD, VIRGINIA 22718	MODEL: SEPRAB124–AJLRX(PW)	DATE: 02/20/09
	DWG# E4702	PAGE 3

BACKPLATE LAYOUT

(19) (266)
(148) (629)
(3592) (3560)



BACKPLATE NOTES:

1. (xxxx) DENOTES ITEM NUMBER FOR ALL INSTALLED COMPONENTS
2. INSTALLERS MUST FOLLOW TORQUE SPECIFICATION PROVIDED. TERMINALS ARE LISTED ALONG WITH ACCEPTABLE WIRE SIZES AND MINIMUM/MAXIMUMTORQUE SETTINGS.

SHORT CIRCUIT RATINGS:
PUMP 1 POWER CIRCUIT
5kA rms @ 230Vmax

SEPR/DEPR SYSTEM OPERATION

The system is designed to operate with up to 4 floats: a "REDUNDANT OFF", a "DOSE ENABLE", a "PEAK ENABLE" and a "HIGH LEVEL ALARM" for controlled monitoring and operation of 1 or 2 pumps. Water dispersion occurs via a timed dosing event into a designated drain field.

MANUAL OPERATION:

By placing the pump(s) "H-O-A" (Hand-Off-Auto) switch(s) in the "OFF" position, the control of the Microprocessor is disabled. Either or both pumps can be forced on by placing the desired pump "H-O-A" switch into the "HAND" position. The selected pump(s) will now run until the pump "H-O-A" switch(s) is placed back into the "OFF" position. ** To return to automated operation, place the pump(s) "H-O-A" switch(s) into the automated position.

Note: Manual operation is not recommended. If tank water levels are low, may cause damage to pumps and other equipment.

AUTOMATIC OPERATION:

By placing the pump(s) "H-O-A" switch(s) in the "AUTO" position, the system becomes fully automated and controlled by the SIEMENS LOGO! Microprocessor. It receives information from the floats and controls the pump(s) accordingly.

Note: In a Duplex system, the pumps will alternate between dosing events. This provides a redundancy in the event that one pump malfunctions, a backup is there to take over. This setup also lengthens the lifespan of the pumps because they are utilized half as often.

The first float (bottom) is the "REDUNDANT OFF" float. The purpose of the float is to cut power to the pump(s) to avoid damage due to low tank levels. When disabled (down position) a "disabled" timer initiates to keep track of the time the float is inactive. When the float is enabled (the up position), a "rest" timer initializes and begins to time out the initial rest period.

The "DOSE ENABLE" float (second from the bottom) is responsible for initiating a dose. Once the rest timer lapses, and the "DOSE" float is made, a discharge event occurs for a predetermined time limit. This will continue to happen until the float becomes disabled. If the "DOSE ENABLE" float drops down during a dosing cycle, the pump will remain on until the cycle is finished. It will not begin another timed dosing cycle until the "DISCHARGE ENABLE" float is again in the up position and the rest timer times out.

The "PEAK ENABLE" float is designed to manage critical water levels in the storage tank. When the water elevates this float, the timing cycle for the dosing events is overridden to allow for maximum water displacement on to the drain field by reducing the rest time between dosing events.

The "HIGH LEVEL ALARM" float is used to indicate critically high water levels in the storage tank. This float operates standard with an audible and visual alarm. To silence/eliminates the alarm, after the water level subsides, the Reset/Cycle Start button must be depressed. (Refer to alarms section)

The "RESET/CYCLE START" button will stop any current pump cycle if depressed and held for +1 seconds. To reinitiate pump cycles, depress and hold the button in again for (+-) 5 seconds, a dosing event will take place, and the elapsed rest time will be set to zero.

Note: The Pump(s) "H-O-A"(s) must be in the "AUTO" position and the dose enable float must be made for a Cycle Start event be made to occur.

SALCOR INC.

P. O. Box 1090, Fallbrook, CA 92088
Phone: 760-731-0745 Email: jscruver@aol.com Fax: 760-731-2405

SPECIFICATIONS FOR THE SALCOR MODEL 3G UV WASTEWATER DISINFECTION UNIT

1.0 DESCRIPTION

The Salcor 3G disinfection chamber couples directly to the aerobic plant discharge pipe and is permanently installed below grade. The design details of the Salcor 3G unit are shown in sections 2.0 and 4.0.

The ultraviolet light source for disinfection is mounted in a sub-assembly which can be inserted or removed through the top of the riser pipe for periodic servicing. The light source is mounted in the center of an anodized aluminum frame which divides the disinfection chamber in half. The frame seals against the inner surface of the disinfection chamber to prevent flow bypass.

When fully inserted, the disinfection sub-assembly is properly located by two pins mounted near the top of the disinfection chamber. The disinfection subassembly causes the wastewater entering one side of the unit to flow vertically downward, make a 180 degree turn, and then flow vertically upward and out the other side of the unit. This well-defined flow path is designed to give the fluid proper exposure time and no short circuiting.

The ultraviolet light source is surrounded by a clear fused quartz tube to control the lamp surface temperature. A clear Teflon™ film covers the quartz tube to minimize surface fouling. This design feature incorporates the beneficial attributes of both quartz and Teflon™.

When the disinfection chamber is filled with water, the ultraviolet light source can operate continuously, whether or not water is flowing. Continuous operation with a lamp surface temperature range of between 105 and 120 degrees Fahrenheit provides optimum ultraviolet light output and long lamp life.

The Salcor Model 3G unit may be installed in a pump tank, or it may be installed in the ground. In a direct ground installation, access to the unit should be through an irrigation or valve box so that the electrical subassembly junction box is shielded from direct sunlight.

Properly installed, the Model 3G unit is rated NEMA 6P, and is capable of operating during short term submergence.

The Salcor Model 3G unit is now both UL and cUL certified (US and Canada) under standard 979. As of this date, the Salcor Model 3G unit is the only UV wastewater disinfection unit that is UL and cUL listed.

The electrical subassembly is mounted in a junction box located on top of the 4-inch riser pipe. The box contains fuses, alarm circuitry, UV lamp ballast, power cable connections, voltage surge protection, and electronic noise filters.

The Salcor Model 3G alarm relay circuit triggers an external alarm to warn the user when the UV lamp is not operating properly.

Electronic components in the circuit sense changes in the UV lamp operationwhich correlate with the germicidal ultraviolet output. *The normally energized relay has contacts that allow actuation of an external alarm indicating low UV output or a lamp outage.*

The alarm relay circuit has been designed to be compatible with a wide variety of alarm systems used on upstream aerobic treatment plants. The relay contacts are rated for alarm power sources that operate at up to 250 Volts AC or DC, and up to 12 Amps.

When the UV lamp is producing ultraviolet germicidal light at a safe level, a green LED indicator light, located on the top of the electrical junction box, glows indicating proper UV lamp operation. The light stops glowing when the light output from the UV lamp falls below a safe level or is not operating.

The Salcor Model 3G UV Disinfection Unit and the UV lamp have a 2 year limited warranty.

2.0 DESIGN PARAMETERS

2.1 Flow Rate. Maximum flow at 3 gpm (4320 gpd) for waste water effluents for suspended solids less than 30 mg/liter and BODs less than 30 mg/liter.

Maximum flow rate of 6 gpm (8640 gpd) for waste water effluents of

suspended solids less than 10 mg/liter and BODs less than 10 mg/liter.
2.2 Fecal coliform reduction at lamp end-of –life (2 years) greater than 99.9 percent.
2.3 Inlet and outlet pipe is 4 inch schedule 40 ABS.
2.4 Pressure drop is less than 0.5 inches of water at maximum flow rate.
2.5 Power use is 30 Watts.
2.6 Energy use is 0.72 kW-hr/day, assuming continuous operation.
2.7 UV lamp is low pressure mercury, 90 percent of output at 253.7 nanometers. Minimum arc length is 30 inches, and the UV intensity is greater than 190 microwatts/cm^2 at one meter. The lamp life is greater than two years.
2.8 UV dose is greater than 55 mj/cm (55,000 microwatt-seconds/cm^2).
2.9 UV Lamp Ballast. Ninety Percent efficient, high frequency (50 kilohertz) with thermal link protection. Input Voltage, 120 VAC, 50 or 60 Hz.
Input current, up to 0.5 amps.

3.0 THIRD PARTY TESTING

3.1 University of Rhode Island. George Loomis 1999 - 2005

- FAST Unit effluent
- Annual Service
- Lamp replacement every two years
- Geometric mean fecal coliform count 9.4/100 ml

3.2 Washington State Testing

- Advanced Treatment Unit & UV
- NSF Standard 40 & WA State Fecal Coliform Reduction Protocol
- Duration 26 weeks
- Seventeen tests have been completed.
- 3G UV Effluent Fecal Coliform ranged from 2 – 35 per 100 ml (Geometric Mean)
- Demonstrates that the 3 G UV unit operates reliably without maintenance over 6 months

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3.0 THIRD PARTY TESTING (CONTINUED)

3.3 Manufacturers Who Have Tested With the Salcor 3G Unit Using the Washington State Protocol

- Delta Whitewater, Ecopod.
- Orenco, AX 20N.
- Consolidated Treatment, Enviroguard .75.
- Consolidated Treatment, Multiflo.
- Consolidated Treatment, Nyadic.
- Delta Whitewater, DF 60.
- Bio Microbics, Microfast 0.5.
- Quanics, ATS-CSAT-8-AC-C500.
- Hoot Aerobics.
- Jet Inc.
- Enviro Flo.
- Bord na Mona.
- Norweco – Singulair.
- AK Industries, Hydro Action.
- Aero Tech.
- Clearstream.
- Aqua Klear**.**

4.0 MULTIPLE UNITS AND DRAWINGS

Salcor Model 3G units may be connected in series, parallel, or in a series-parallel array as shown in figures 6 through 10. Commercially available ABS drain pipe and fittings may be used to provide a larger flow capacity. Arrays of 3G UV units have been installed to disinfect flow rates of up to 100,000 gal. /day. This approach has saved up to 75 percent in capital cost over an open channel UV wastewater disinfection system, and has provided increased system reliability.

SALCOR INC.

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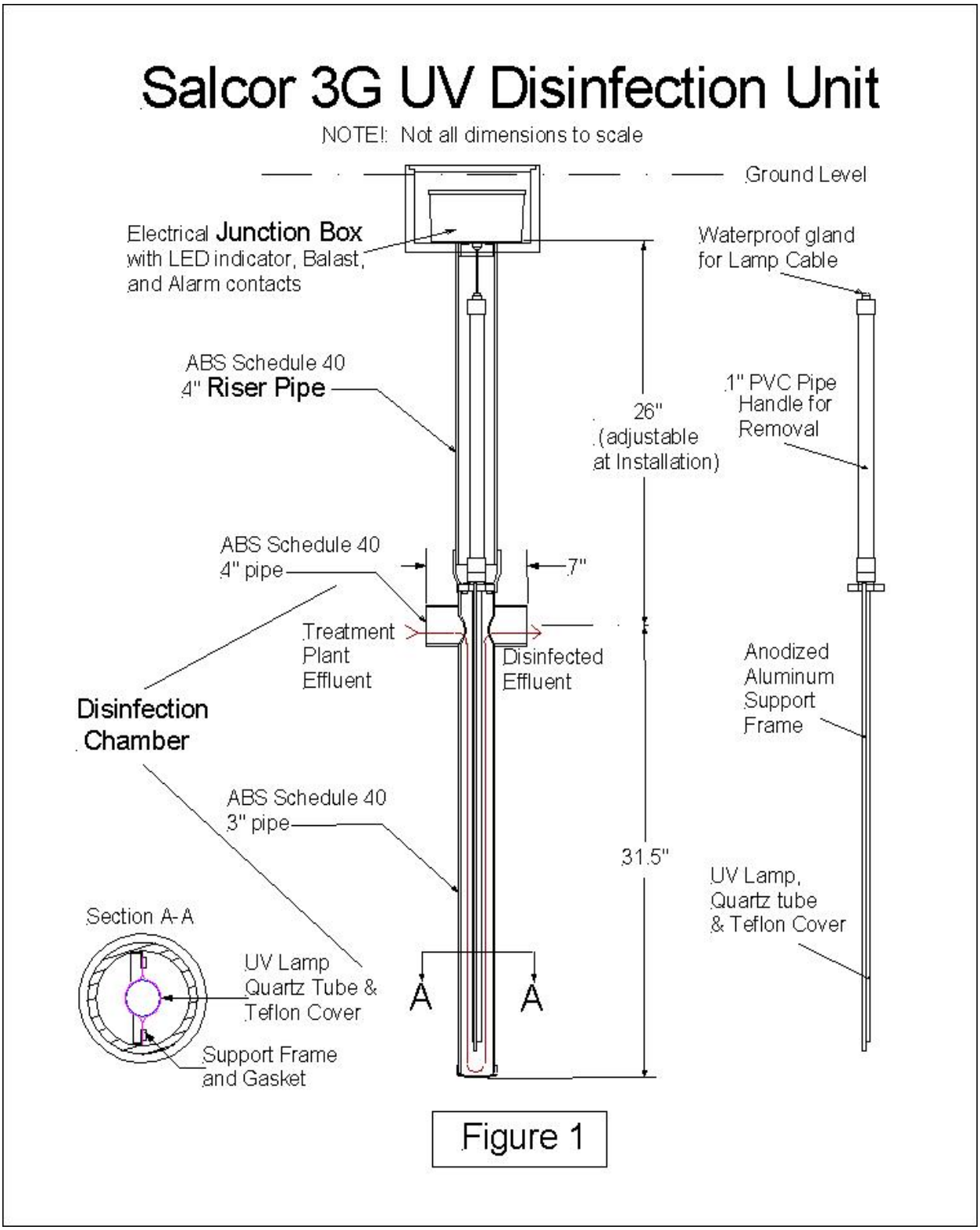


Figure 1

SALCOR UV DISINFECTION UNIT

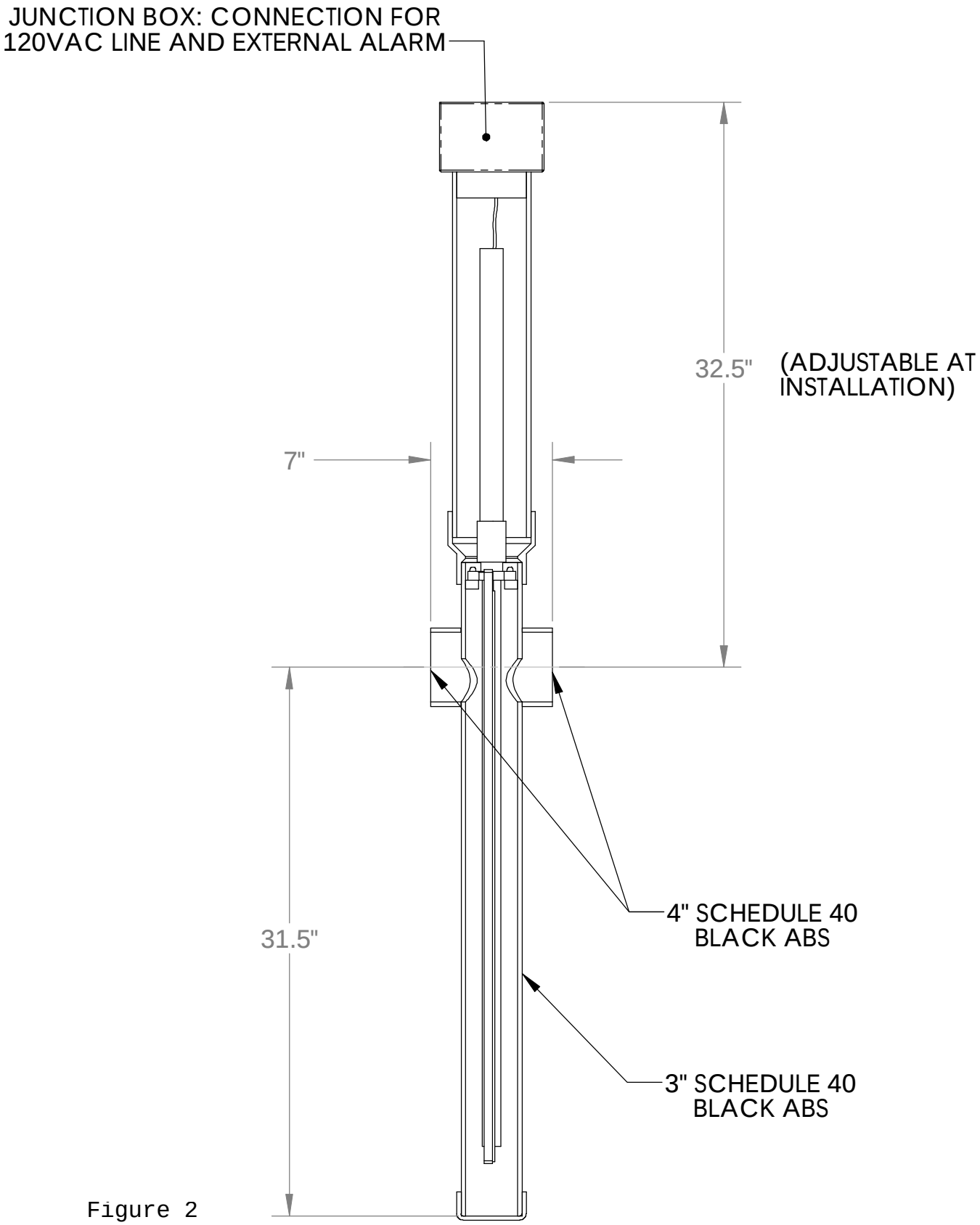


Figure 2

NOTE: NOT ALL DIMENSIONS TO SCALE

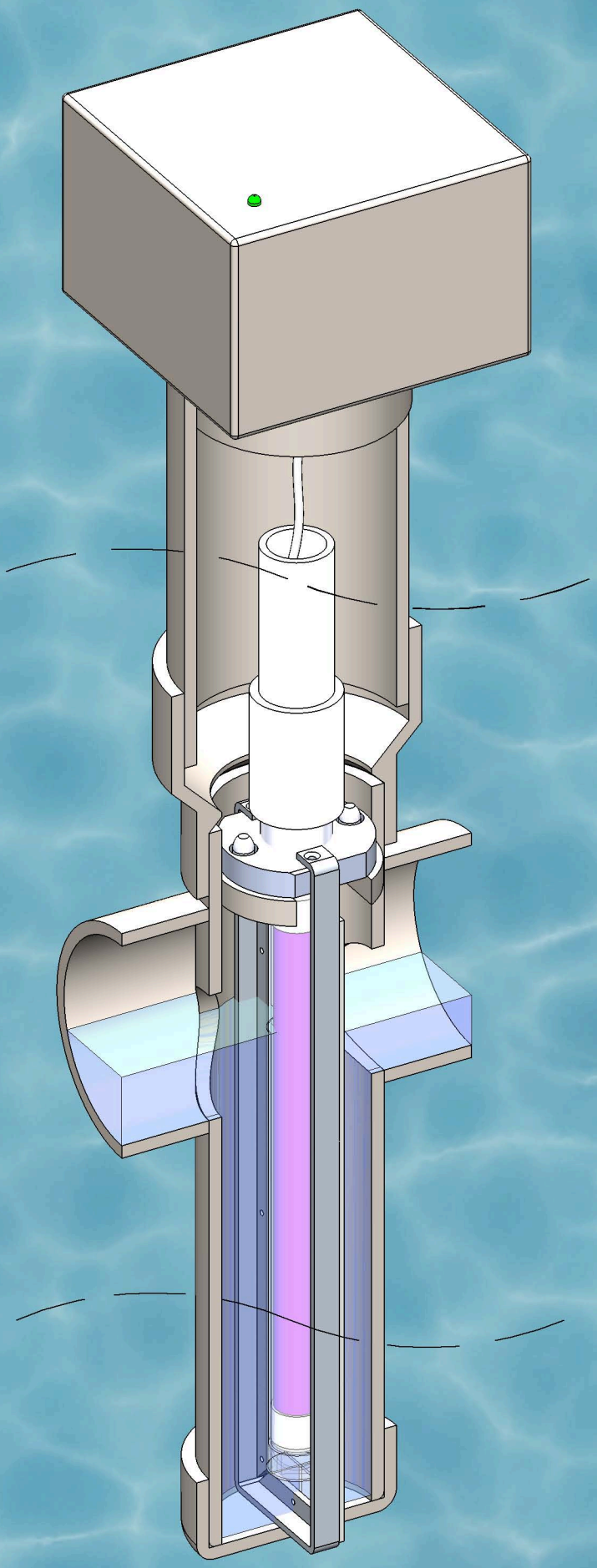


Figure 3

In Ground Installation

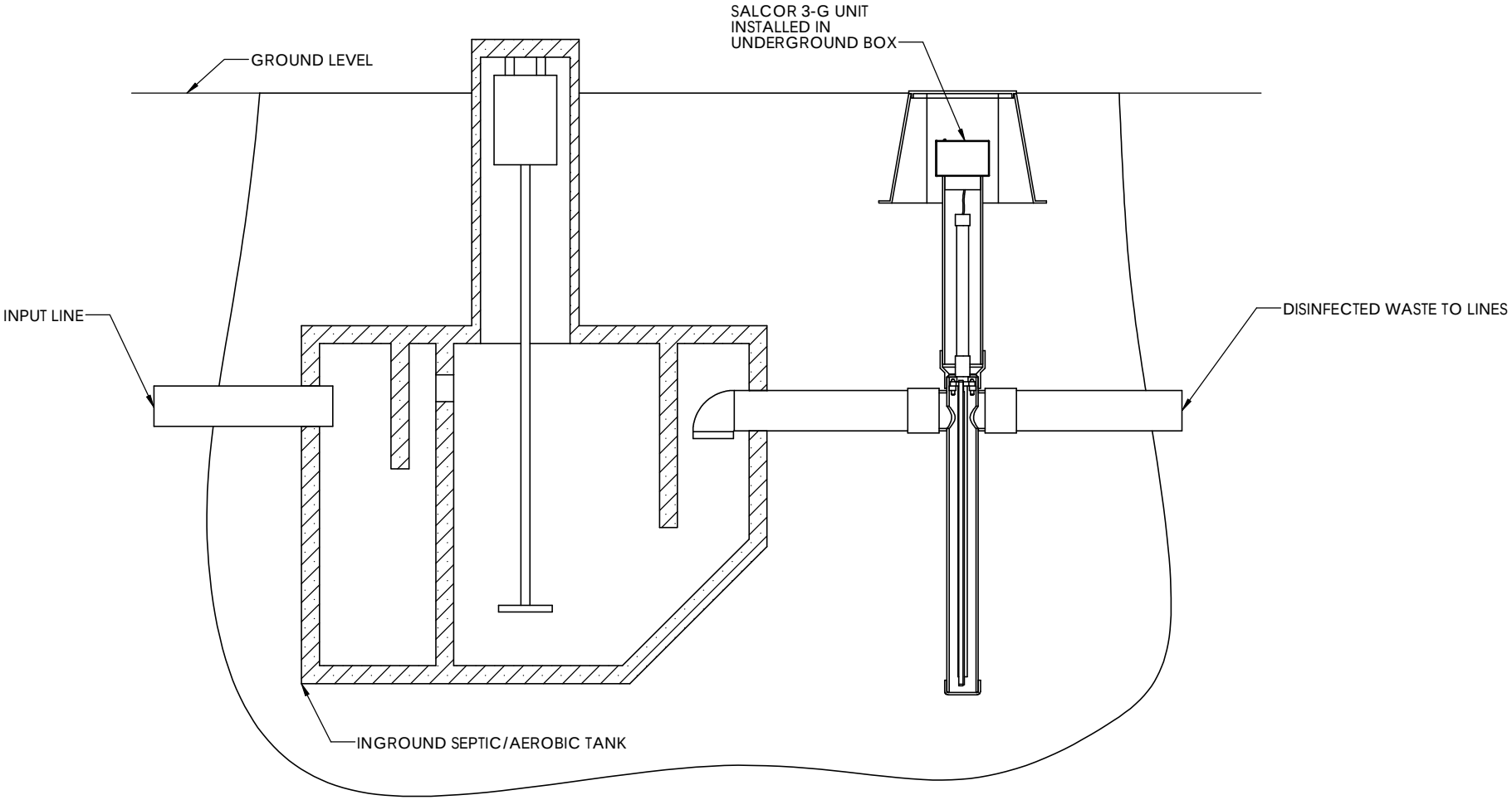


Figure 4

In Tank Installation

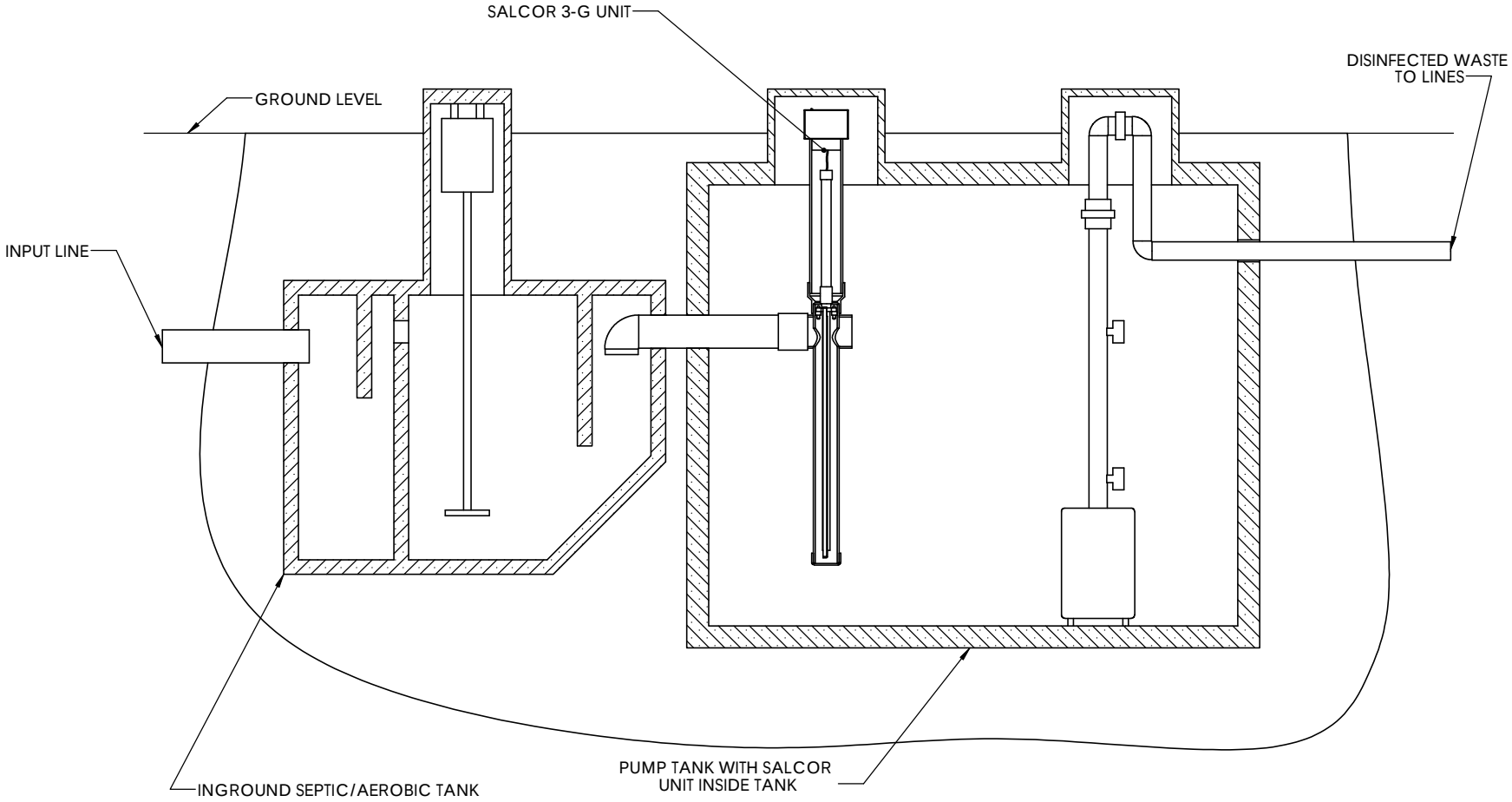
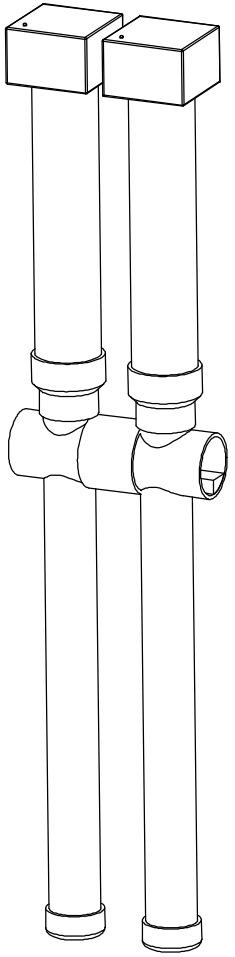


Figure 5

2 Units in Series



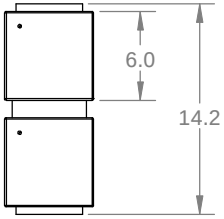
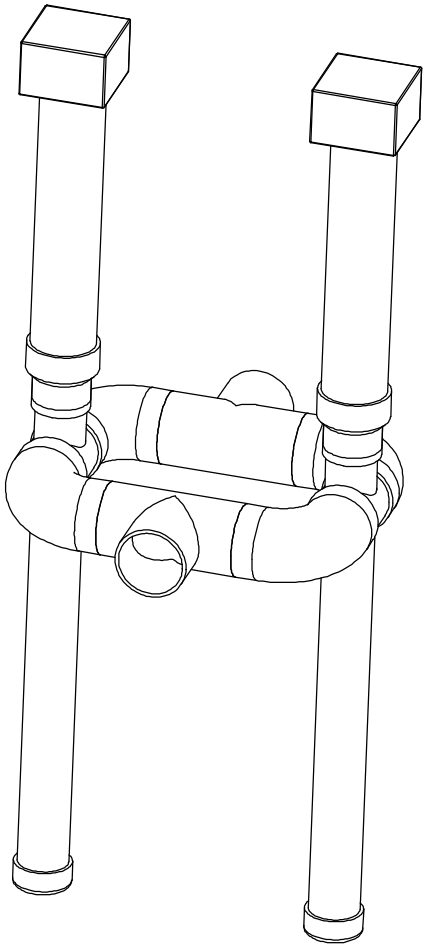


Figure 6

2 Units in Parallel



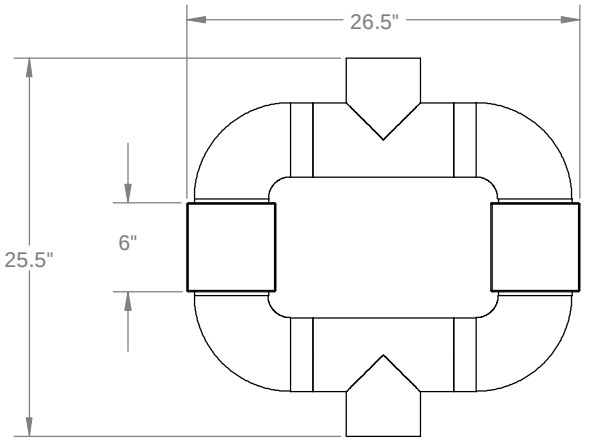
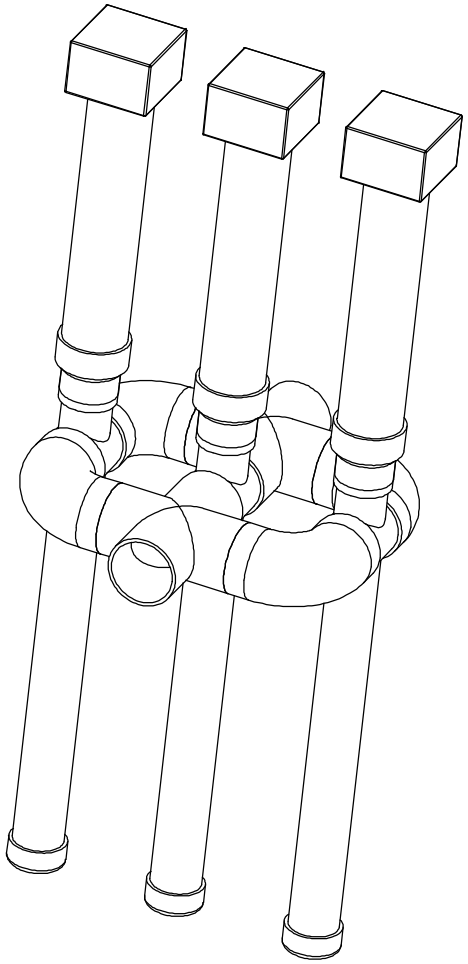


Figure 7

3 Units in Parallel



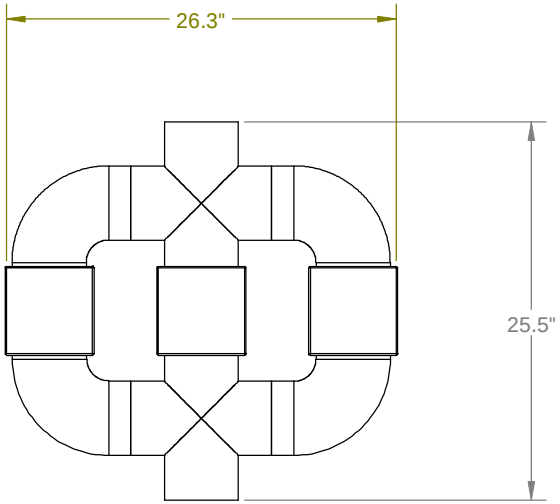
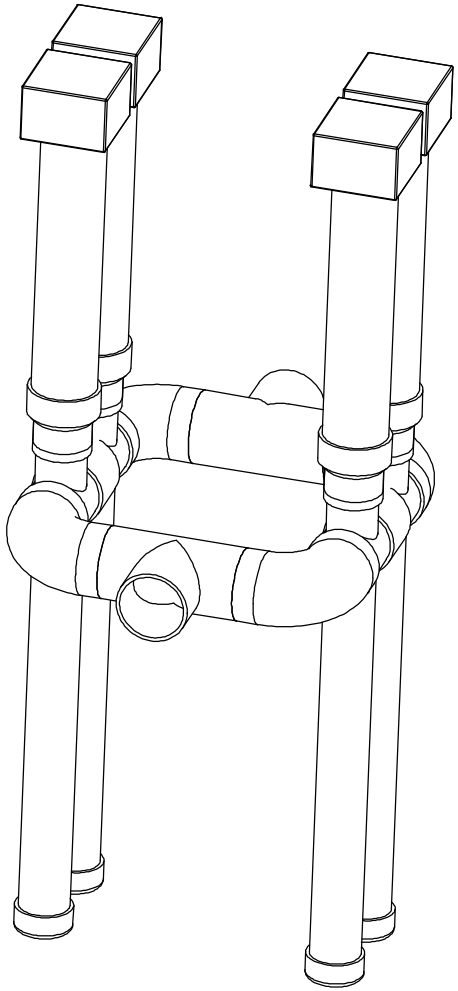


Figure 8

4 Units in Parallel & Series



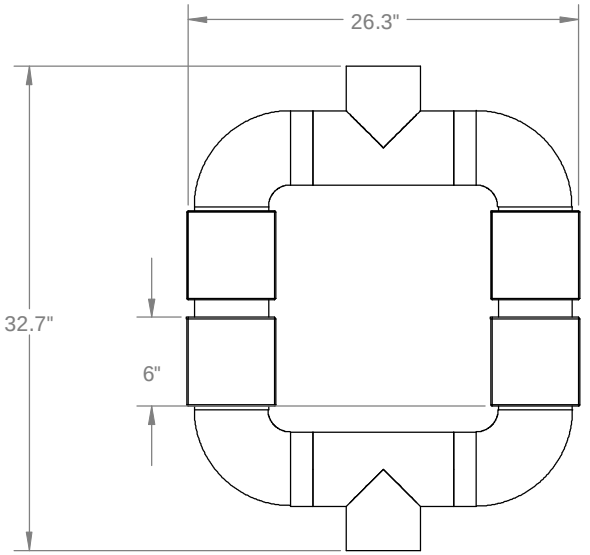
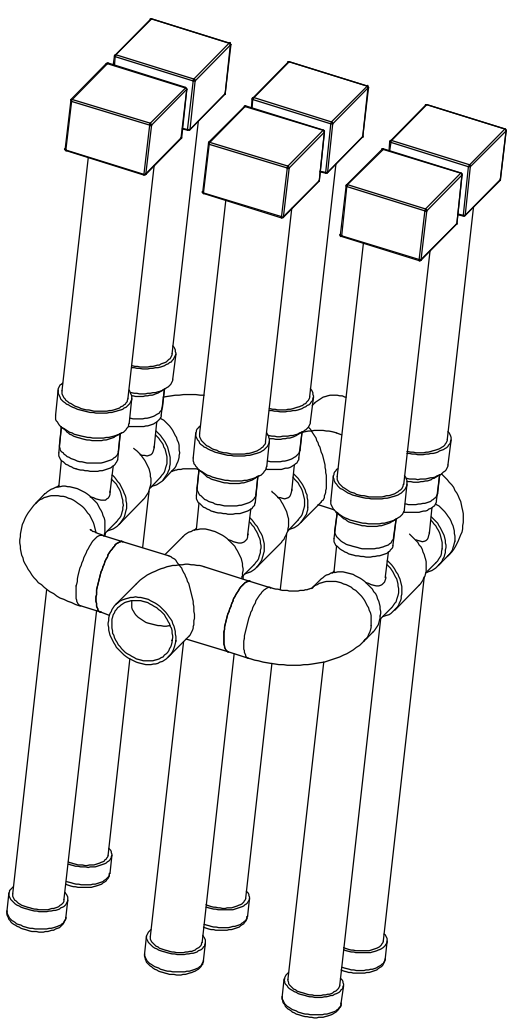


Figure 9

6 Units in Parallel & Series



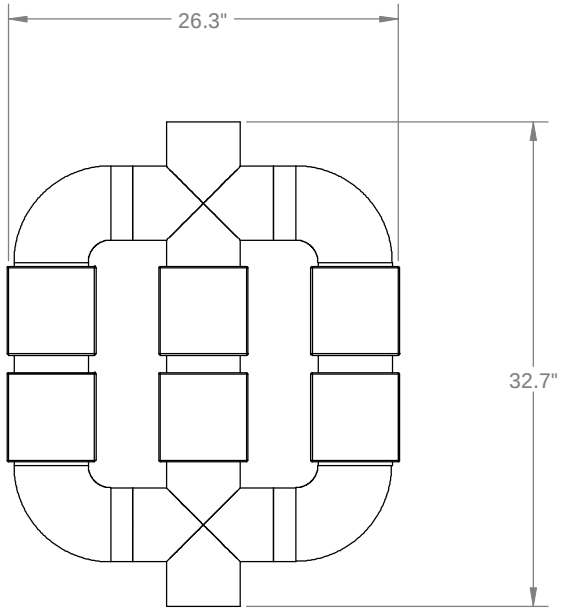
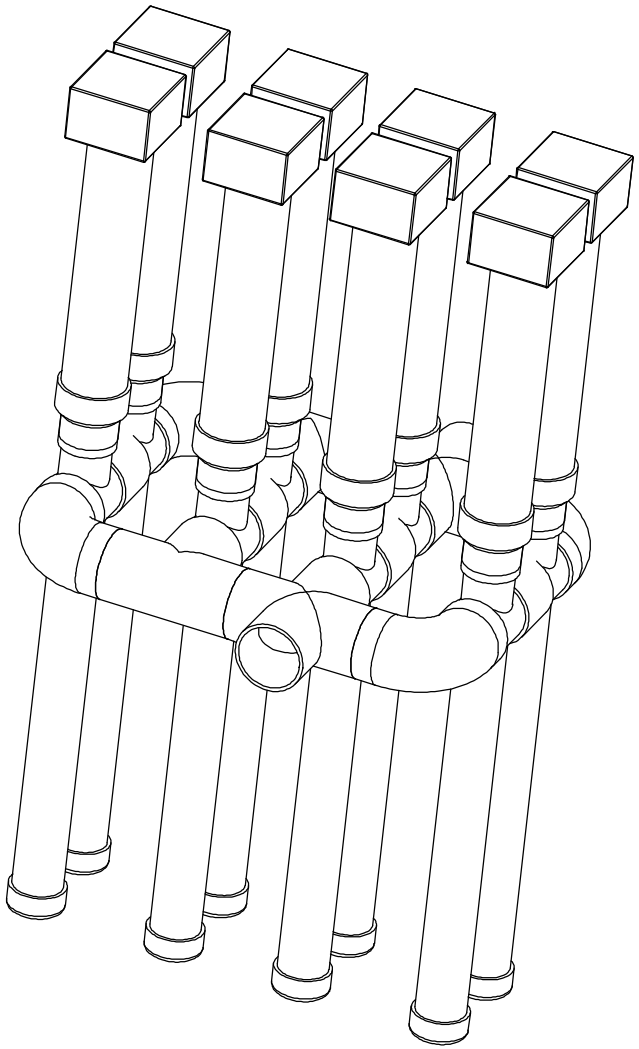


Figure 10

8 Units in Parallel & Series



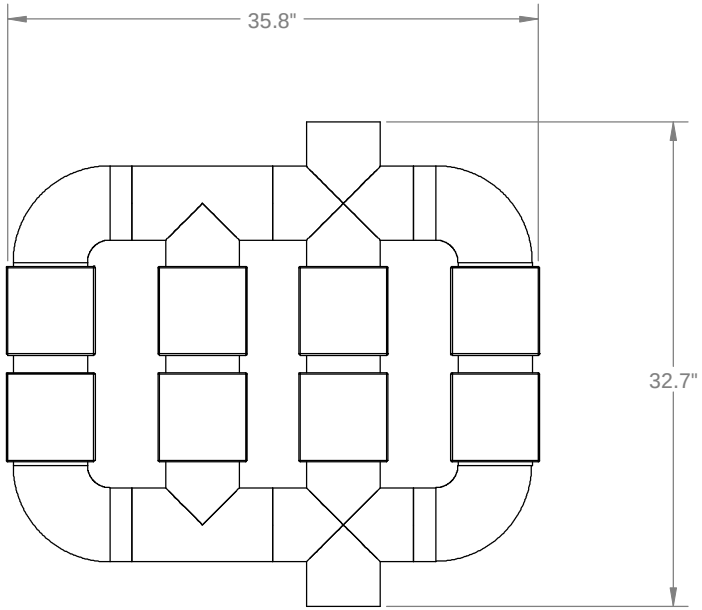


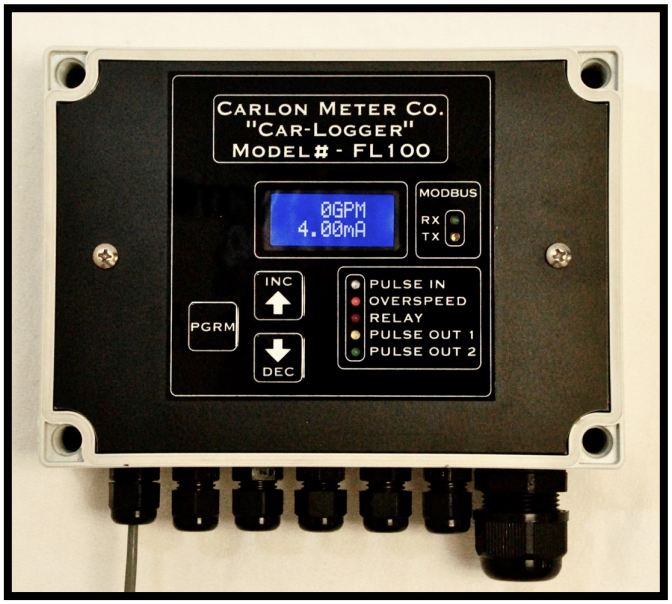
Figure 11

CARLON METER

LEADERS IN WATER MEASUREMENT AND CONTROL

INSTALLATION, PROGRAMMING, & OPERATING INSTRUCTIONS

CAR-LOGGER, #FL100 (B OR D)



1710 EATON DRIVE
GRAND HAVEN, MICHIGAN 49417
PHONE: 616-842-0420

WWW.CARLONMETER.COM

INSTALLATION, PROGRAMMING, AND OPERATING INSTRUCTIONS FOR MODELS #FL100 (B or D)

The versatile FL-100 CAR-LOGGER is designed to receive an input signal from a Carlon meter using an optical coupler located inside the meter register, providing "real time" flow signal information to the CAR-LOGGER. All models convert that signal into two visual display values: 1- the "real time" flow rate, 2- the "real time" total volume of water passing through the meter. CAR-LOGGER models FL100-B and FL100-D provide a 4 – 20 mA (milliamp) output current signal with values directly proportional to the flow rate, for data logging and dosing pump controller applications. Finally, CAR-LOGGER models provide two pulse output signals for inputs to programmable controllers and remote counters, if required for the application. Because the CAR-LOGGER has two pulse outputs, no splitter unit is required. (Optional MODBUS communication protocol information is included in this manual.)

The CAR-LOGGER has a non volatile memory – no battery is required. The programming menu is simple to use with a multiple choice approach. This product is designed to be used with Carlon's JSJ positive displacement meters, C series cold water turbine meters, and H series hot water turbine meters.

CAR-LOGGER INSTALLATION INSTRUCTIONS

1. DO NOT BRING POWER TO THE UNIT UNTIL IT IS MOUNTED AND WIRED TO THE WATER METER AND OUTPUT CONNECTIONS. Install the unit in the desired location, noting accessibility to power outlets. Mount and keep unit inside, free from dust, moisture, and extreme temperatures. To mount, remove the dust cover with thumb screws, and use the same holes as a template to drill holes and fasten to a wall or cabinet. All wiring to and from the CAR-LOGGER are to be done using the terminal strip inside the unit housing.

2. The optical input signal comes from the Carlon meter, which must be ordered with the CAR-LOGGER. The meter has been fitted with an optical coupler output. Connect the meter output wire to the CAR-LOGGER Optical Input for the type of meter being used to the terminal strip provided. See Terminal Strip Diagram for wiring location information.

3. All CAR-LOGGER models have the capability to send dry contact pulse output signals to other devices like remote counters and programmable controllers (proceed to step 4 if this type of output is not required). If these signals are necessary for the application, output locations on the terminal strip are provided. Use a two wire cable for each output. See Terminal Strip Diagram for wiring location information.

4. THE POWER SUPPLY (16.5 VAC) CAN NOW BE BROUGHT TO THE UNIT AND CONNECTED VIA THE TERMINAL STRIP. Plug the Carlon transformer into a wall outlet and run wire from the transformer to the CAR-LOGGER. *Only use the transformer supplied with the CAR-LOGGER*. Upon power-up, the display will show the flow rate of water through the meter, and the corresponding milliamp output level.

Caution should be taken not to run any power line in the same conduit with the input or output signals to and from the unit. That may cause electrical "noise" from the AC power line, which can cause significant electrical errors.

WIRING THE CAR-LOGGER TERMINAL STRIP

Remove the see-through cover.

Remove the two faceplate screws on the cover plate.

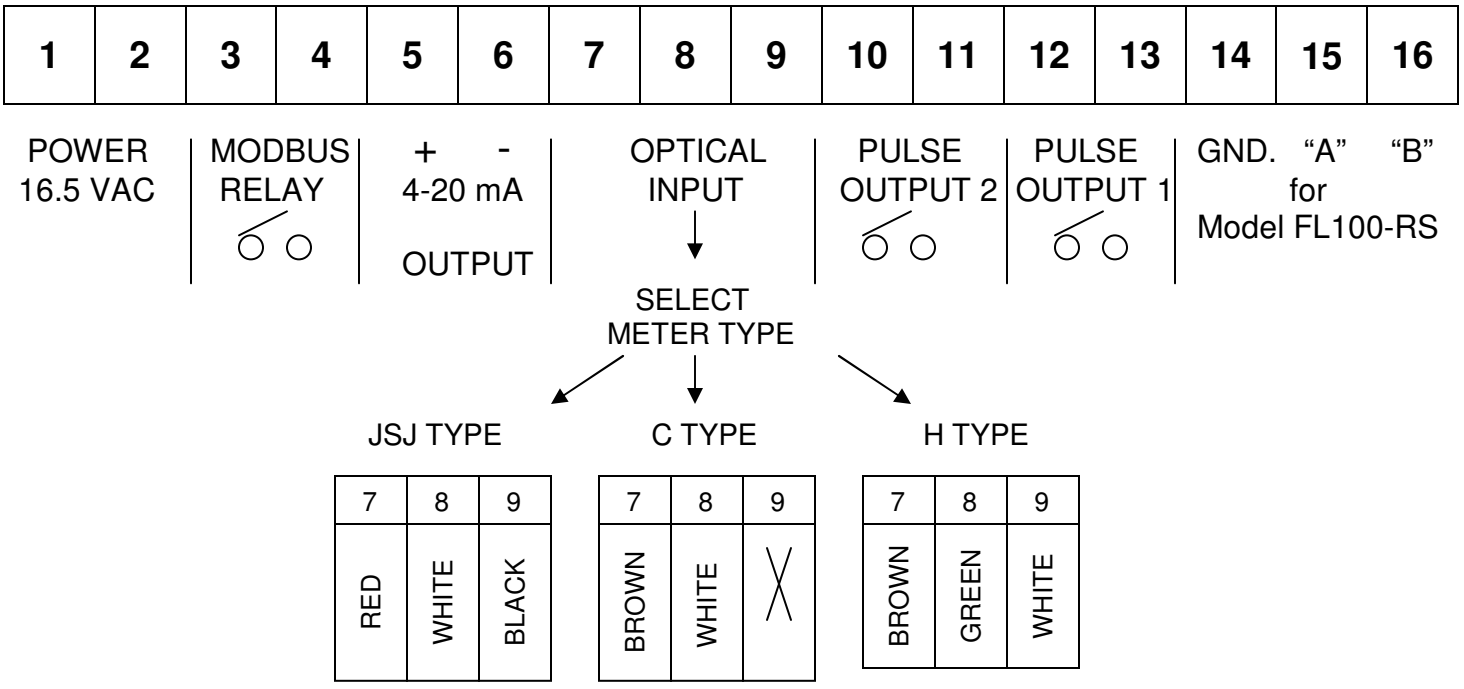
CAREFULLY pry up the plate at any corner, tilt it back, and locate the 5 PIN connector and flat plastic cable attached to the membrane switch pad.

Disconnect the connector from the circuit board pins and remove the face plate assembly to access the terminal strip for wiring purposes.

Be VERY CAREFUL handling this faceplate assembly.

Terminal strip diagram for electrical wiring locations.

Note: Models equipped with RS485 MODBUS Communication option must use # 14-16 terminals.



CHOICE OF NON ISOLATED OR ISOLATED POWERED OUTLET

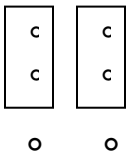
The CAR-LOGGER models can be configured in either of two ways:

Configuration 1 – ***Default configuration*** is a non-isolated, powered output (Car-Logger supplies the power to the loop)
BOTH JUMPERS must be in the "up position" on the circuit board - SEE DIAGRAM.

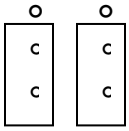
Configuration 2 - Isolated, loop powered output
(loop power is supplied by user)
BOTH JUMPERS must be in the "bottom position" pm the circuit board - SEE DIAGRAM.

CAUTION – jumpers must be in the same position BOTH up or BOTH down. Do NOT put jumpers in opposite positions or damage may occur to the circuit.

CONFIGURATION 1
UP



CONFIGURATION 2
DOWN



After wiring the terminal strip, reassemble the cable connector to the circuit board pins and reassemble the faceplate assembly in the CAR-LOGGER housing.

PROGRAMMING INSTRUCTIONS FOR ALL CAR-LOGGER MODELS

After all input, output, and power supply wiring connections have been made to the terminal strip, the unit is ready for programming. This is done by pressing the "PGRM" key momentarily, which offers choices on the display menu to choose from, using the "INC" or "DEC" keys to select the applicable item.

The display will show water flow rate on line one. Line two will show a corresponding milliamp number of the 4-20 mA output.

NOTE: After 15 seconds of user programming inactivity, the screen will return to displaying the "real time" flow rate and 4-20 mA analog corresponding value output. The one exception to this 15 second inactivity return to the flow rate value is the "adjust totalizer" display, which will remain on the screen until the user chooses to exit this specific display.

USE THE FOLLOWING STEPS TO SET UP THE CAR-LOGGER:

FIRST, using the PGRM, INC, & DEC keys, choose the Carlon meter type and size that is being used with the CAR-LOGGER. (Ex. JSJ-100)

SECOND, choose the units of flow and volume desired i.e. gallons, cubic feet, liters or cubic meters. (Normally, this is set to be the same as the register units chosen for the meter above.)

THIRD, adjust the totalizer water volume to zero or other starting number desired.

FOURTH, if the pulse output feature is needed, to activate a remote counter or programmable controller, choose pulse output 1 amount desired. This number is how often (in units of volume through the meter, like 10 gallons) the pulse output signal is sent to the device connected to this output line (such as a pump controller or remote counter).

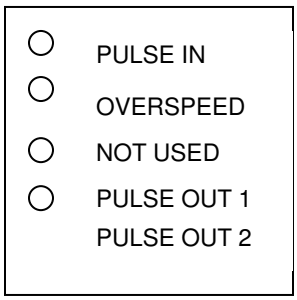
FIFTH, do the same for pulse output 2, if a second output signal is required.

SIXTH, decide if the CAR-LOGGER is to be password protected for security of programming and operation. The password can be alpha or numeric. Write the chosen password down and store in a separate location for future reference to re-access the unit.

SEVENTH, view manufacturing information on this specific CAR-LOGGER regarding date manufactured, serial number, etc.

EIGHTH, exit menu. Unit is now operational as programmed.

During operation, LED's will light showing incoming signals from the meter, excessive flow (overspeed) through the meter, and each time output pulse signals are being sent.



UNDERSTANDING THE 4-20 mA SIGNAL ON MODELS FL100-B & FL100-D

The milliamp display gives a numerical current reading which is proportional from zero flow to the maximum flow. The minimum value of the current range (4) is set to zero water flow through the meter, and the maximum number (20) is set for the maximum published flow rate of the meter. Exceeding this flow rate results in an "overspeed" led signal which will remain on as long as this condition exists.

The converter output providing the variable milliamp current output signal, located on the terminal strip, is to be connected to the instrument designated to receive the milliamp signal. See the terminal strip diagram for proper wiring locations.

Contact Carlon Meter directly for any assistance with this unit regarding installation, programming, or operation of the Carlon water meter and CAR-LOGGER unit.

Master Meter's Positive Displacement meter is nothing short of an engineering trifecta. Completely redesigned using Computational Fluid Dynamic (CFD) design science, our engineers crushed existing performance benchmarks largely left untouched by other manufacturers for more than a century.

Technical Specifications:

- **AWWA Standard** - Meets or exceeds all sections of Standard ANSI / AWWA C700, most recent revison for cold water displacement meters with AWWA bronze main cases.
- **NSF / ANSI Standard 61** - Optional Standard 61 certified no-lead main cases available.
- **Design/Operation** - Incoming water is continuously divided into crescent-shaped volumes by the action of the inlet ports, chamber interior and piston walls as controlled by the division plate and controller assembly. This hydraulic action causes the center of the oscillating piston measuring element to make continuous circular movements. A drive spindle formed integrally with the piston web moves the drive magnet. A magnetically-coupled follower magnet in the register assembly is directly connected to a gear system in the register that totalizes those movements into the desired billing units. The register assembly is removable under line pressure permitting seamless, simplified upgrades in AMR reading technology.

Features & Benefits:

- Oscillating piston technology delivers maximum flow with minimal pressure drop.
- Measuring chamber housing and piston measuring element built with advanced, non-hydrolyzing engineered polymer materials.
- **Establishes New Accuracy Benchmarks** - New meter accuracy after 4,000,000 USG.
- **Whisper-Quiet Measurement** — We shifted oscilating piston harmonics to outside the normal flow range.
- **Low Pressure Loss (VLPL) Desgin** — 7-19% improved drop in pressure vs. nearest competitors.
- 35 + Years Verified Sustained Accuracy (4,000,000 million USG) in independent tests on the 5/8" size meter by the Utah Water Research Laboratory.
- Improved capability to pass entrained solids.
- Twenty-year (5/15) accuracy warranty assures longer lasting revenue.

Technical Specs (Cont'd):

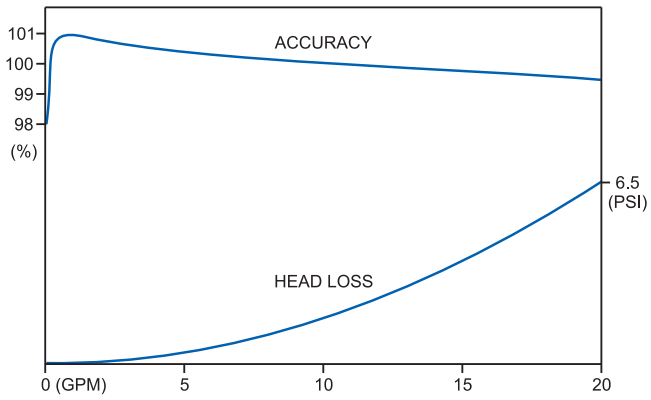
- **Main Case** - Choice of waterworks bronze case of 81% copper composition, or, 86% copper, no lead bronze. All main cases incorporate externally threaded ends to aid installation.
- **Register Sealing** - Direct read and DIALOG® registers are IP-68+ rated, permanently sealed with a scratch resistant glass lens, stainless steel base and wrap-around gasket to prevent intrusion of dirt or moisture. Available in USG, CF or M^3. Equipped with center mounted low flow leak indicator with high sensitivity resulting from direct one to one linkage to measuring element and large center sweep hand with one hundred (100) clearly marked gradations on the periphery of the dial face.

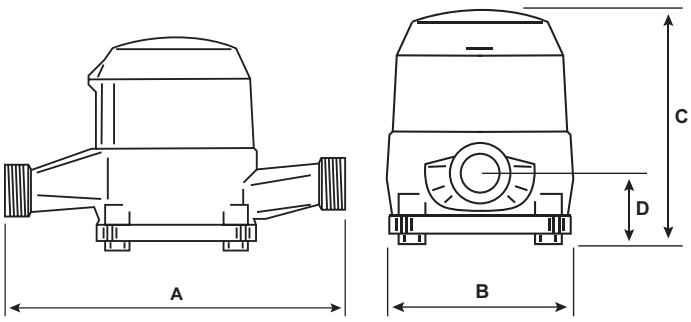
Strainer - A rigid, advanced polymer strainer is provided with more than 4 times the open area of the pipe. The unique strainer design smoothes the flow of water entering into the meter creating a flow profile that is gentle on the meter's internal components. Tough materials operating in a smooth, balanced environment enable the meters to perform more accurately over time

- **Magnetic Drive** - A reliable, direct magnetic drive provides linkage between measurement element and register. No intermediate gearing is required; no gearing is exposed to water.
- **Tamper Detection** - The Master Meter Positive Displacement design inhibits unauthorized register tampering and removal of the register. This design also provides a visual indication of tampering attempts.

METER OPERATING CHARACTERISTIC/DIMENSION	5/8" x 1/2"	5/8 x 3/4"	3/4" (.75")	3/4" (9")	1"
Flow Rating (gpm)	20	20	30	30	50
Continuous Flow (gpm)	10	10	15	15	25
Normal Flow Range (gpm)	1-20	1-20	2-30	2-30	3-50
Low Flow (gpm @ > 97%)	1/4	1/4	1/2	1/2	3/4
Extended Low Flow (gpm @ > 95%)	1/8	1/8	1/4	1/4	1/2
Maximum Working Pressure (psi)	150	150	150	150	150
Maximum Working Temperature (°F)	105	105	105	105	105
Specific Displacement (revs/gallon)	56.4/1	56.4/1	32/1	32/1	15.3/.96
Headloss at Maximum Flow Rate (psi)	6.5	6.5	8.4	8.4	7.9
Length (A below)	7.5"	7.5"	7.5"	9"	10.75"
Width (B below)	3-13/16"	3-13/16"	3.47"	3.47"	6-13/16"
Height, standard register with lid (C below)	5-3/8"	5-3/8"	5.07"	5.07"	5.75"
Height, bottom to center line (D below)	1-5/8"	1-5/8"	1.51"	1.51"	2 5/8"
Weight (lbs)	4.25	4.25	7.9	8.4	12.2
Packed To Carton	6	6	6	6	4
Carton Weight (lbs)	30	30	50	53	53.8

Accuracy and Head Loss Chart





APPENDIX D – EQUIPMENT MAINTENANCE RECORD

EQUIPMENT RECORD SHEET

Equipment Name:			Equipment Number:	
Equipment Manufacturer:				
Process Function:			Date of Purchase:	
Serial Number:				
Availability of Spare Parts:				
Date	Type of Service Performed	Performed by	Part of Preventive Maintenance	Comments

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