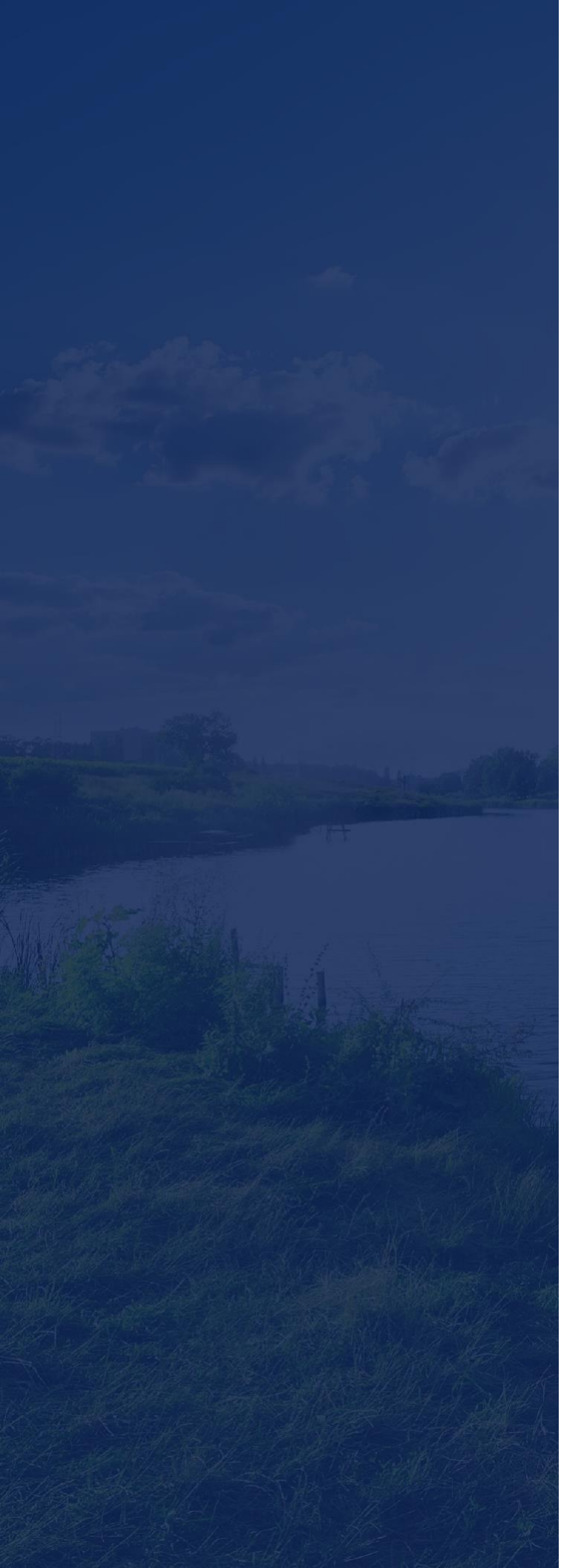


TANKS & ECOLOGICAL SYSTEMS
CANWEST
SINCE 1992
TOTALLY SAFE WATER

MOVING BED BIO REACTOR (MBBR) SYSTEM WASTEWATER TREATMENT PLANT

OPERATION & MAINTENANCE MANUAL

DESIGN BUILD PROJECTS

CONTENTS

A WORD ABOUT YOUR CWT-MBBR AEROBIC WASTEWATER TREATMENT SYSTEM

HOW IT WORKS

The Canwest Tanks Moving Bed Bio-Reactor (CWT-MBBR), Wastewater Treatment System that you have purchased produces high quality water suitable for various disposal methods. It is used to enhance your on-site wastewater disposal system. With a minimum amount of maintenance, you can directly contribute to a cleaner, safer environment.

All wastewater treatment systems of this type work by using aerobic bacteria that occurs naturally. By pumping air into the system, the bacteria grow on the surface of the media and thrive in much larger amounts than would occur naturally. The overpopulation of bacteria speeds up the process of breaking down domestic wastewater, making it safe for release into the environment.

The result of this process is a clear, odorless discharge, which meets or exceeds effluent quality standards.

PROCESS DESCRIPTION

Wastewater enters a pretreatment/settling tank like conventional septic tanks. In this tank, debris and settleable solids settle to the bottom, and start to break down the organic portion of the wastewater anaerobically.

The effluent enters the CWT-MBBR Wastewater Treatment System from the primary tank where it is exposed to an oxygen rich environment. In this oxygen rich environment, a colony of bacteria, called the biomass, develops and is capable of digesting (breaking down) biodegradable waste into carbon dioxide sludge and water. This is a continuous process if the biomass is supplied with incoming wastewater and oxygen. The CWT-MBBR is a specially designed containment device that houses a moving bed media specifically designed to treat organic wastewater. An external air compressor is connected to the tanks to provide the necessary air to the system. There are no moving mechanical parts or filters in the CWT-MBBR. In this system, conditions are favorable only to attached growth bacteria.

This means that the most common disadvantages of other types of systems are eliminated. No rising sludge, floating sludge or washouts can occur.

In addition to treating for BOD reduction, our system also provides for a significant benefit in nitrification and denitrification. Wastewater nitrification of the ammonia and denitrification of nitrates occur within the bacteria masses. A 50%+ removal rate of total nitrogen is common without any type of recirculation or cycling of the blower.

The result of this process is a clear, odorless discharge, which meets or exceeds all effluent quality

standards.

SPECIFICATIONS FOR CWT MOVING BED BIO REACTOR

GENERAL SPECIFICATIONS

The advanced wastewater treatment system described by these specifications is a Canwest Tanks & Ecological System Ltd. CWT-MBBR Wastewater Treatment System

Model CWT-MBBR Various Sizes

This device consists of a Media Container, Moving Bed Media, Air Diffusion System, having specially designed discharge outlet, blower assembly, and control/alarm panel.

Operating Conditions

The MBBR units have a wide design flow range with our NSF system ranging from 500 to 1500 gallons per day average daily flow (ADF) of domestic raw sewage waste with BOD5 not exceeding 300 mg/l. Our large bullets can treat up to 22.7 meters cubed per day or just under 6,000 USG per day with a wide range of BOD5 loading rates.

Construction

CONSTRUCTION OPTIONS

FIBERGLASS

The tanks shall be constructed of ¼ inch minimum thickness fiberglass. The tank shall be molded of fiberglass reinforced polyester resin manufactured by the lay-up and spray technique to assure that the interior has a smooth resin rich finish.

CONCRETE

The tanks shall be constructed of CONCRETE. The top, bottom, and outer walls of all concrete tanks shall be 3" thick plus or minus l/4" and constructed of concrete with a minimum compressive strength of 3000 psi. The top, bottom and side walls shall also be reinforced uniformly and completely with 10-gauge steel wire on 6" centers both ways fiber mesh reinforcement at a minimum of 1.2 pounds per yard Harbor light or equal.

POLYETHYLENE TANKS

The tanks shall be constructed from HDLPE. The thickness of the tank wall will be 1/4"or more.

PRIMARY TANK/ TRASH TANK / SETTLING TANK

A primary tank shall be provided as shown on the plans to receive the incoming flow. The pretreatment tank shall provide 24-hour hydraulic detention at the ADF rate. The primary tank shall be designed to collect large incoming solids. This shall be accomplished by extending the inlet pipe downward below the trash floatable zone and above the settling zone. The discharge pipe shall also be extended downward to draw pretreated sewage from the median zone, keeping both floatable and settle-able solids out of the reactor tank.

REACTOR TANK

The reactor tank shall be sized to hold MBBR media and provide enough time for aeration treatment.

CLARIFIER

The clarifier is designed to remove settling and non-settleable solids. Our clarifiers include both settled sludge removal as well as a skimmer for floating material removal. This helps meet or exceed total suspended solids removal efficiency. Our skimmer utilizes an air lift system that can most often share the air provided by the blower to the reactors.

SLUDGE REMOVAL

Our aerobic treatment systems convert dissolved organic matter (BOD) into CO2, heat and biomass. The biomass accumulation will depend on the characteristics of the BOD but will vary between 40 to 60% of the BOD reduced. Operators should regularly monitor the sludge bed height to determine the pump out frequency. The sludge accumulated in our clarifiers will be recycled back to the trash tank as return activated sludge (RAS). While the floating sludge in our clarifiers are removed by the skimmers, the bottom accumulated sludge will be removed by the submersible pump. The frequency of operation will need to be set accordingly based on accumulation.

AIR DELIVERY SYSTEM

Air delivery system shall be constructed of schedule 40 PVC pipe. Airports shall be designed for non-clogging and shall be maintenance free.

Aeration Blower: Provide one aeration blower system with sufficient capacity to furnish the treatment unit air requirements.

DISINFECTION (OPTIONAL)

A disinfection system using Ultraviolet light shall be included in the treatment system to achieve disinfection of the final effluent. The Ultraviolet Light, which have been NSF tested, are manufactured for, and installed by Canwest Tanks & Ecological Systems Ltd.

ELECTRICAL CONTROLS

An electrical control panel shall be furnished with each compressor and pumps if required.

Included in the panel shall be a pressure switch alarm system that will sound an alarm upon loss of air supply as well as high water. System shall be ANSI/NSF International certified utilizing.

UL rated components in an indoor/outdoor NEMA 3R painted steel enclosure.

PIPING

All necessary piping and valves inside the plant shall be PVC. At the exterior wall of the plant, as shown on the plans, properly sized inlet and outlet connections will be included. The manufacturer shall not be responsible for piping or valves outside the plant. The contractor or owner shall be responsible for necessary piping and valves between all systems.

WORKMANSHIP AND EXPERIENCE

All workmanship and materials shall be of the highest quality. The waste treatment plant shall be the product of an experienced manufacturer actively engaged in manufacturing and research and development of sewage treatment systems. NSF International test documents shall be available upon request of the designers.

OWNER CARE AND OPERATION INSTRUCTIONS

CWT-MBBR Moving Bed Bio Reactor Wastewater Treatment System has been designed and built to provide long term, reliable and efficient service.

Once the unit has been installed, (see Installation on page 9 the unit will operate continuously within the operating ranges.

Please reference the system's Data plate that is located on the tank, air pump and the alarm panel in the event that a problem arises, or service is required.

The following should be accomplished as checks for system failure:

Daily - Observe the warning device, which comes on when the power to the air pump has been interrupted or when the air supply system has malfunctioned or when there is a high-water level in the treatment plant. If the alarm is activated check for a blown fuse or thrown circuit breaker. Check the air pump to be sure it is operating. Once accustomed to the soft humming sound of a properly operating unit, any unusual noise is an indication of malfunction. If an unusual noise is detected or total failure is observed, call your local Maintenance Provider for service.

Weekly - Check the treatment plant for offensive odor. If such a condition should develop, call an authorized Dealer / Maintenance Provider.

Every 3 Months

- **The air filter on the air pump should be cleaned.** Rinse with warm water if necessary. (See Instructions) on page 9. Do not use oil or other solvents.

Every 6 Months

- Inspect and make any necessary adjustments to mechanical and electrical components. - Inspect effluent quality's color, turbidity, and check for any odor.
- Take a sample from the reactor tank to check the sludge level described in the "Solids Removal" section on page 6.
- **The homeowner must be notified in writing if any improper operation is observed and cannot be corrected at the time of service.**

ITEMS NOT PERMITTED IN SYSTEM

Note: - To keep maintenance to a minimum and ensure high effluent quality the following items should not be permitted to enter the system

Strong disinfectants or bleachers, other than small amounts normally utilized in day-to-day cleaning and laundry (be conservative). Laundry detergents recommended for use are low phosphates and biodegradable.

- Discharge from water softener. Any type of oils, greases, or other chemical wastes. Disposable baby diapers and wipes.
- Sanitary napkins, condoms or other similar items. Hair, bandages, rags or string. • Latex, plastic or metallic objects.
- Coffee grounds or cigarette butts. Mud or sticks.
- Paper towels, napkins or Kleenex Tidy Bowl type products. Beer waste or any other rich liquids.
- Garbage disposal should be used sparingly, not as a method of disposing of all solid food waste. To ensure good plant operation, waste should be disposed of in the garbage container.

The CWT - MBBR Moving Bed Bio Reactor Wastewater Treatment System is designed to handle domestic wastewater and nothing else should go into it.

OPERATION

1. The proper operation of this, as with other home-based sewage systems, depends on proper organic loading and on the life of the microorganisms inside the system.
   CWT cannot be responsible for the on-site operation of a system, other than the mechanical and structural workings of the plant itself.
   We likewise cannot control the amount of harsh chemicals or other harmful substances that may be discharged into the system by the occupants of a household, we can only provide a comprehensive owner's manual that outlines substances that should be kept out of the system.

2. Hydraulic overloading (flows more than design flow) may cause the sewage treatment system not to perform to the fullest capabilities.

3. Ants have been known to be destructive to the air pump. Regular care should be taken to prevent infestation of ants near the system. Damage or destruction by ants is not covered under the manufacturer's warranty.

4. Your State or Local Health Department may require other pieces of equipment to function separately or in conjunction with equipment manufactured by CWT-MBBR Moving Bed Bio Reactor Wastewater Treatment Systems. CWT-MBBR is not responsible for the mechanical or electrical safety of equipment it does not manufacture or supply with its CWT-MBBR Wastewater Treatment System. Care should be used in evaluating the electrical or mechanical safety of equipment manufactured by others. This may include but not be limited to electrical control panels or air pumps. If electrical service has not been installed for checking air distribution system during installation, and if an extension cord is used to test the air pump, **never** leave the extension cord plugged in. Remove it after testing is completed.
   All electrical work performed by the installer or others must be in accordance with the National Electrical Code and all Provincial & Municipal regulations.

SOLIDS REMOVAL

Determination of the need for solids removal can be done through a simple test. A one-quart sample should be pulled from the reactor tank and can be done so through the opening on the top. Allow the sample to settle in a clear one-quart jar for 30 minutes. If the solids content exceeds 25 percent of the total volume after settling the treatment unit should be pumped out. Call your local authorized sewage disposal service to have the tank contents pumped out and disposed of properly.

For our large bullet type systems, we recommend using a sludge judge to determine the sludge bed height.

Our bullet systems contain a clarifier that has both a skimmer and a pump for the return activated sludge (RAS). Excess sludge is returned back to the trash tank. Because of that, only the trash tank needs to be pumped.

The method of pumping out our NSF systems should be as follows:

- Remove all the solids from the Clarifier and primary trash tank.
- Never pump the MBBR Media from the Reactor
- The air pump should be in the off position.
- Remove sludge from the bottom of the tank.
- Leave some sewage from the middle of the Primary tank to make the new process start immediately.

After the pump-out process is complete, fill the tank with fresh water to normal operating level. This is extremely important in areas where high water tables are a concern, as this will prevent the tanks from floating up due to high buoyancy.

Refer to the Installation Instructions on page 9 to get the treatment plant back into operation.

Should any indication of improper operation be observed at any point in time, contact your local distributor.

PLEASE NOTE:

THE COST ASSOCIATED WITH PUMPING

THE TREATMENT SYSTEM IS NOT COVERED UNDER WARRANTY.

IT IS PART OF NORMAL MAINTENANCE AND OPERATIONS.

SEASONAL USE GUIDELINES

CWT-MBBR MOVING BED BIO REACTOR WASTEWATER TREATMENT SYSTEM

These guidelines are for conditions as outlined below and apply for systems that are not in use for periods of time indicated. Site conditions not covered by the following must be forwarded to CWT for recommended guidelines to meet the particular site conditions.

1. System not in use for less than one month.
   Electrical power is left on and there are no frost conditions.
   - Leave the air pump on and system running.

2. System not in use for more than one month.

Electrical power is turned off and there are not frost conditions.

- Remove all materials and liquid from tank.
- Refill with clean water.
- Turn off the air pump.

SAMPLE REQUIREMENTS

The CWT-MBBR Moving Bed Wastewater Treatment System properly operated and maintained should provide the following effluent quality as per NSF Report:

Biological Oxygen Demand 5-day average (BOD5) of less than 10 mg/1 (or ppm); Suspended Solids (SS of less than 10 mg/1 (or ppm), as per NSF results pH of 6.0 to 9.0.

Dissolved oxygen 1.5 to 3.0 mg/1 (or ppm).

TAKING EFFLUENT SAMPLES

Samples must be taken in the effluent discharge line or an effluent pump chamber or after the disinfection device. We recommend allowing the effluent to flow through the discharge pipe for a minimum of two minutes before taking the sample. This will allow any solids to be flushed out that might have accumulated in the discharge pipe.

SAMPLING SHOULD BE TAKEN BY A LOCAL CERTIFIED TESTING LABORATORY OR BY FOLLOWING THEIR PROCEDURES. THE FOLLOWING RECOMMENDED GUIDELINES MAY BE USED IF LOCAL PROCEDURES ARE NOT AVAILABLE.

1. **Biochemical Oxygen Demand (BOD)**
   Samples for BOD analysis may degrade significantly during storage between collection and analysis, resulting in low BOD values. Minimize reduction of BOD by analyzing the sample promptly or by cooling it to near freezing temperature during storage. However, even at low temperatures, keep the holding time to a minimum.

   Grab Samples:
   If analysis is begun within two hours of collection, cooling is unnecessary.

   If analysis is not started within two hours of sample collection, keep sample at or below 4 C from the time of collection. Begin analysis within six hours of collection; when this is not possible because the sampling site is distant from the laboratory, store at or below 4 C and report length and temperature of storage to the Lab. In no case, start analysis more than 24 hours after grab sample collection. When samples are to be used for regulatory purposes, make every effort to deliver samples for analysis within six hours of collection.

2. **TOTAL SUSPENDED SOLIDS (TSS)**
   Use resistant-glass or plastic bottles, provided that the material in suspension does not adhere to container walls. Begin analysis as soon as possible, because of the impracticality of preserving the sample. Refrigerate sample at 4 C to minimize microbiological decomposition of solids.

3. **AMMONIA NITROGEN**
   Most reliable results are obtained on fresh samples. Destroy residual chlorine immediately after sample collection to prevent its reaction with ammonia. If prompt analysis is impossible, preserve samples with 0.8-ml concentration H2SO4 /L samples and store at 4 C. The pH of the acid-preserved samples should be between 1.5 and 2. Some wastewater may require more concentration H2SO4 to achieve this PH. If acid preservation is used, neutralize samples with NaOH or KOH immediately before making the determination.

INSTALLATION INSTRUCTIONS

ONLY FOR USE BY CERTIFIED, LICENSED INSTALLERS

1. Prepare an excavation, having a diameter approximately one foot larger than the tank and a depth that will allow approximately three inches of the inspection port to extend above normal ground level. Backfill with a six-inch layer of Pea gravel if otherwise unable to provide a smooth, level, compact base.

2. Utilizing lifting lugs provided, place the plant in the excavation so that the inlet and outlet line up with the sewer piping. The inlet line should slope down toward the plant and the outlet line should slope down away from the plant. The plant should be level.

3. Position inlet and outlet lines and make connections as necessary, depending upon the construction materials. The inlet line should be inserted and glued into the inlet elbow and the discharge line should be inserted and glued into the outlet coupling. Note: Fill the tank with water until water flows from the discharge before backfilling. Backfill around plant, up to the bottom of the discharge connections.

4. Do not install the air pump(s) in a low-lying area where water may accumulate. The air pump should be installed near the control panel and within one hundred feet of the tank. Air pumps can be installed outdoors or in a clean, well-ventilated area, such as a mechanical room, garage, etc. **If the linear air pump is to be installed in an additional enclosure, the enclosure must be approved by CWT in writing.**

5. Mount the control panel in an area such that the alarm can be heard and be readily observed. All electrical work shall be done according to local code requirements.

6. The control panel is rated for indoor and outdoor use and contains a fuse or circuit breaker for the air

pump. An electrical malfunction in the air pump or wiring to the air pump will cause the fuse to blow or circuit breaker to trip. The control panel also contains a pressure switch and visual and audible alarm. Loss of air pressure caused by the air pump system malfunction will cause the alarm to sound to illuminate.

7. Connect the pressure air tubing to the 1/8" barb-fitting in the air piping system.

8. Install 3/4" schedule 40-PVC piping between air pump and treatment unit. A minimum of 12 inches ground cover is recommended.

9. Turn the power on to control panel. Air pump should start.

10. Check air piping joints for leakage using a soapy water solution. Repair if necessary and then carefully backfill airline and inlet and discharge piping and cover plant to grade level.

11. Re-check the water level in the tank.

12. Plant is ready to receive incoming sewage. No special start-up procedures are required. The process is naturally occurring and does not require any special additives.

13. Test alarm circuit by momentarily squeezing air tubing and allowing air pressure to decrease. This should take a few minutes. Alarm should occur. Release air tubing and alarm should stop.

14. Close cover to control panel, and lock if necessary.

15. **WARNING: CONTROL PANEL CONTAINS HIGH VOLTAGE AND MUST ONLY BE INSTALLED AND SERVICED BY QUALIFIED PERSONNEL.**

TROUBLE SHOOTING GUIDE

AIR SUPPLY MALFUNCTION

1. Check to be sure that the air system is working properly. This will be evident in the reactor as the liquid will be forcefully agitated. A septic (rotten egg) odor could mean that the system is not getting enough air. If the air system is not working, partially working, or working very little (slight bubbles), check the following:

    a. Check to be sure the air pump is working.
        - Check timer if one is used.
        - Bypass timer temporarily connect directly to source.
        - Check the electrical source.
        - If the electrical source is okay, check the service guide on pump unit for troubleshooting

information.

- Wash air filter on pump.
- Consult manufacturer for servicing information.

b. Check for broken or cracked air lines both outside and inside the tank.

c. Ants will destroy an air pump. Check to see if there is an ant nest around the air pump.

d. Air pumps should be protected from rising water.

e. Always check to see if inlet and outlet lines are correctly installed.

DESIGN OVERLOAD

1. The system could be hydraulically overloaded (there is too much water going through the system for the size of the system).

2. The system could be biologically overloaded (there is too much waste for the size of the system).

IMPROPER INSTALLATION OR SETTLING

1. Manufacturers installation procedures are Important, read and follow them very carefully.

2. Where settling is common, approximately 2 inches of sand should be placed and tamped in the bottom of the hole.

3. Proper installation is the first step in preventing call backs for service problems.

NO HARSH CHEMICALS SHOULD BE PUT INTO THE SYSTEM

1. Water in the reactor tank should be relatively clear in both the reactor and Clarifier. Blue or gray/blue water indicates heavy use of detergents or other chemicals.

2. Water in the Clarifier zone should be clear. Water is discharged into the discharge tee at a minimum of 6-8 inches below water surface. You MAY not be able to see clear water by looking into the Clarifier as scum will form on top of liquid. Samples must be taken at the Pump Chamber.

3. Oils Fats and grease should be kept to a minimum. Grease tends to form in white balls.

TROUBLESHOOTING ELECTRICAL SYSTEM

1. Air pump does not run:
   a. Check main service for power.
   b. Check and/or replace breaker with same rating as is in control panel.

2. Alarm does not occur when air pump is off:
   a. Malfunctioning pressure-switch – replace.
   b. Malfunctioning light or buzzer – replace.

3. Alarm occurs continuously even when air pump is running:
   a. Air-leak in main air system or air tubing to pressure switch – repair leak or replace air line.
   b. Oversensitive Pressure Switch, adjust sensitivity.
   c. Malfunctioning pressure switch - replace.

Note: All replacement parts are available from your local dealer

CAUTION: Electrical shock or hazard may occur if the unit is not serviced properly. The manufacturer recommends that a licensed electrician be called when electrical problems occur.

COMPONENT REPLACEMENT PROCEDURE

1. Air Pump – Follow same procedure as outlined in the “Installation Instructions”.

2. Pressure Switch – Turn all power off to control panel. Remove screws securing pressure switch as well as connectors and tubing. Reverse procedure to install new pressure switch.

3. Buzzer – Turn all power off to control panel. Remove screw attaching buzzer to back plate as well as connectors. Reverse procedure to install new buzzer.

4. Lamp-holder – Turn all power off to control panel. Remove lock nut securing lamp-holder to door as well as connectors. Remove lamp-holder. Install new lamp-holder with gaskets furnished. Continue with reverse procedure.

5. Lamp – Turn all power off to control panel. Remove red lamp cover from front of control panel. Remove and replace lamp which is a push in type. Replace lamp cover and cover gasket.

6. Buzzer Switch – Turn all power off to control panel. Remove rubber boot on switch. Remove hex nut from switch on panel front as well as connectors on switch. Reverse procedure to install new switch.

GENERAL COMMENTS

1. Only factory approved equipment can be used for replacement on individual treatment systems.

2. If the decision is made to pump out a system, be sure to contact a licensed waste hauler.

4. If a chronic problem develops and all items listed have been checked, consult with the manufacturer.

5. Taking pictures of systems when troubleshooting will help document activity in the field.

6. Keep good records.

MATERIALS OF CONSTRUCTION

A. Reactor Tank Fiberglass
   Cover Fiberglass
   Media Container Polyethylene

B. Reactor Tank Concrete
   Cover Concrete
   Media Container Polyethylene

C. Reactor Tanks Polyethylene
   Cover Polyethylene
   Media Container Polyethylene

These are standard production units. Other configurations are available upon request.

ELECTRICAL REQUIREMENTS

Model	Air blower	Measured OperatingWatts	Electrical Requirements
CWT-MBBR500	FujiMac 100 - or - ET 100A	105 watts	115 volt - single phase
CWT-MBBR 600	FujiMac 100 - or - ET 100A	105Watts	115 volt - single phase
CWT-MBBR 800	FujiMac 100 - or - ET 100A	105 Watts	115 volt - single phase
CWT-MBBR 1000	FujiMac 200 - or - ET 200A	195 Watts	115 volt - single phase
CWT-MBBR 1500	FujiMac 300 - or - ET 300A	275 Watts	115 volt - single phase

APPENDIX A
LIMITED WARRANTY

Canwest Tanks & Ecological Systems Ltd.

LIMITED WARRANTY

Canwest Tanks & Ecological Systems Ltd. ("Canwest") provides a limited warranty on the parts in each treatment device for a two (2) year period. All warranty issues shall be resolved through and by Canwest, whose decisions will be final and binding.

Subject to the terms and conditions of this limited warranty, Canwest warrants that the parts included in each treatment device will be free from defects in material and workmanship for a two (2) year period from the earlier of either the date of installation treating household wastewater OR thirty (30) days after purchase from Canwest or a Canwest authorized dealer.

To the extent permitted by law, there are no implied warranties, including, without limitation, any warranty of fitness for any particular purpose, that a device or its parts will be durable for any period of time, or that a device or its parts are of merchantable quality. In jurisdictions that do not allow limitations on implied warranties, or on how long an implied warranty lasts, the above limitation may not apply to you if Canwest sold the device that you purchased in such a jurisdiction.

Canwest's sole obligation under this warranty is as follows: Canwest shall fulfill this warranty by, in Canwest's sole discretion, repairing or exchanging any component part, F.O.B. Canwest's factory that in Canwest's judgment shows evidence of defects, provided said component part has been paid for and is returned through an authorized dealer, transportation prepaid. The claim under this limited warranty must clearly specify the nature of the defect. The claim must be accompanied by proof of purchase and be received by Canwest within the two (2) year period stated above.

The limited warranty does not cover treatment processes/devices/parts that: (a) have been flooded by external means, (b) have been disassembled, altered, modified or repaired by unauthorized persons, (c) were improperly installed, (d) have been subjected to external damage, (e) have been damaged by any cause including due to altered or improper wiring or overload protection, (f) have damage caused by accident, fire, misuse, neglect, unusual physical or electrical stress, improper or lack of maintenance or use outside of Canwest's published guidelines (whether published before or after your purchase of the device), (g) have serial numbers or date tags that have been removed or altered, (h) have any parts that were not supplied or manufactured by Canwest, (i) are limited life components or parts that have been subject to normal wear and tear, such as seals, gaskets and coatings (unless they are found by Canwest to have been non-functional or broken upon purchase).

This limited warranty applies only to the treatment process/device and does not include any of the house wiring, plumbing, drainage, or disposal system. Canwest is not responsible for any delay or damages caused by defective devices, parts, components or material, or for loss incurred because of interruption of service, or for any other special or consequential damage or expenses arising from the manufacture, sale, or use of a process/device.

Canwest reserves the right to revise, change or modify the construction and design of the treatment process/device for household wastewater or any component part or parts thereof without incurring any obligation to make such changes or modifications in previously sold equipment.

Canwest also reserves the right, in making replacements of component parts under this warranty, to furnish a component part which, in its judgment, is equivalent to the part being replaced.

The maximum liability of Canwest under this limited warranty is expressly limited to the lesser of the price you have paid for the device/process or the cost of repair or replacement of the parts/components that are found by Canwest to be defective. Under no circumstances will Canwest be responsible to you for any other direct or consequential damages caused by the device or process or the failure of the device or process to perform, including but not limited to lost profits, lost income, labor charges, delays in production, and/or idle production, which damages are caused by a defect in material and/or workmanship in its parts. This limitation of liability applies whether damages are sought, or a claim made under this limited warranty or as a tort claim (including negligence and strict product liability), a contract claim, or any other claim. This limitation of liability cannot be waived or amended by any person and is effective even if you have advised Canwest or an authorized representative of Canwest of the possibility of such damage. Some jurisdictions do not allow the exclusion of limitation of incidental or consequential damages, so this limitation or exclusion may not apply to you if Canwest sold the device that you purchased in such a jurisdiction.

The warranty is expressly in lieu of any other express or implied warranty, excluding any warranty of merchantability or fitness and of any other obligation on the part of Canwest. This warranty gives you specific legal rights, and you may also have other rights which may vary between the Canadian Provinces or legal jurisdictions as well as from state to state in the USA.

(2023)

APPENDIX B

PUMPS, BLOWERS, PANELS MANUALS

AIR BLOWER SPECIFICATION FUJIMAC

BLUE DIAMOND ENVIRO® ET SERIES

ENVIRO® ETA SERIES

RAIN BIRD

EZ SERIES

IFN SERIES

FUJIMAC

FPZ

ASHLAND

C-LEVEL

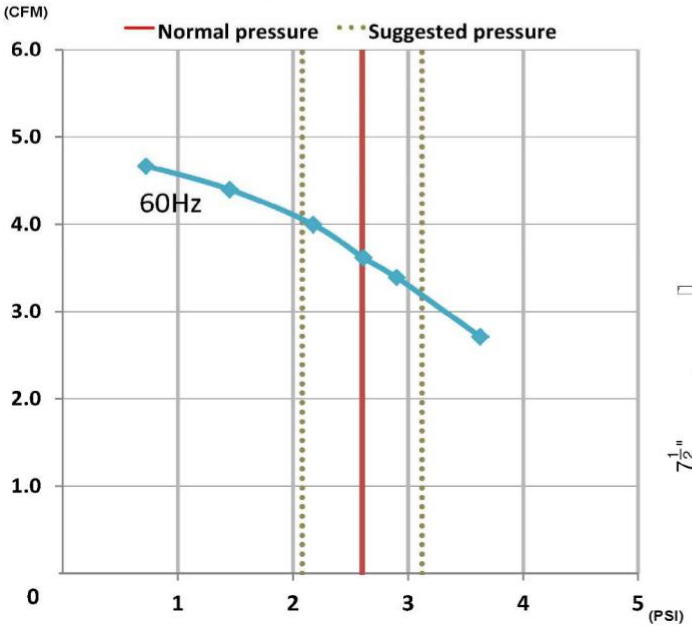
IFS SERIES

AIR BLOWER SPECIFICATION FUJIMAC

FujiMAC 100R II

Specifications

Model	MAC100RII
Rate Voltage	120V
Air Flow	3.5CFM
Pressure	2.6PSI
Outlet Pipe	13mm(external dia. 18mm)
Weight	5.0kg
Power Consumption	74w
Noise Level	40db



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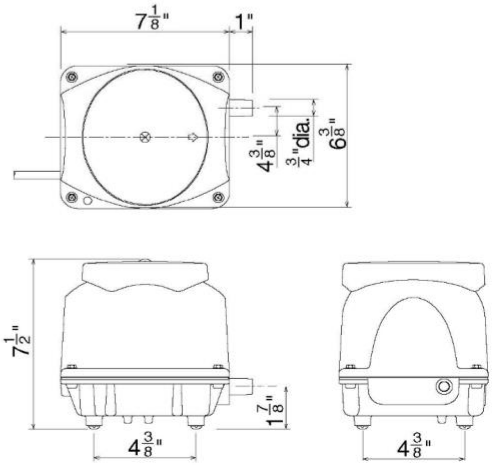
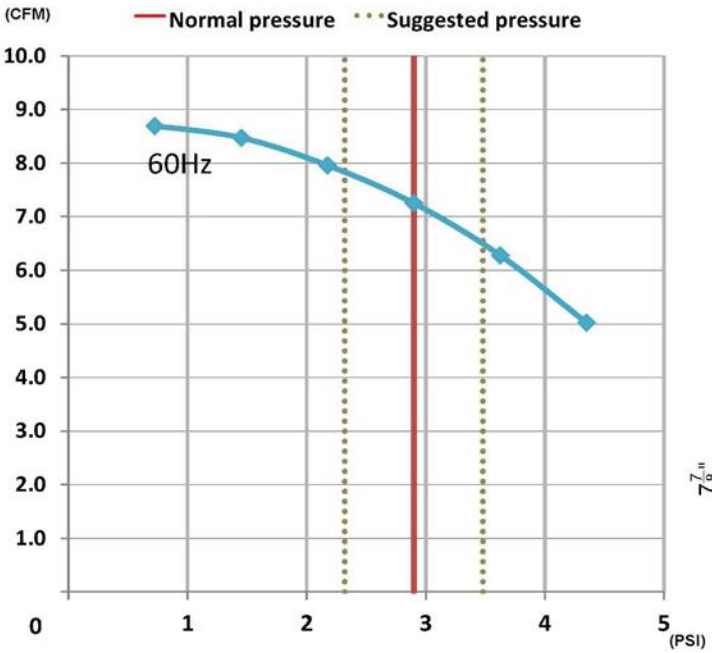


FujiMAC 200R II

Specifications

Model	MAC200RII
Rate Voltage	120V
Air Flow	7.1CFM
Pressure	2.9PSI
Outlet Pipe	20mm(external dia. 26mm)
Weight	9.0kg
Power Consumption	155w
Noise Level	43db



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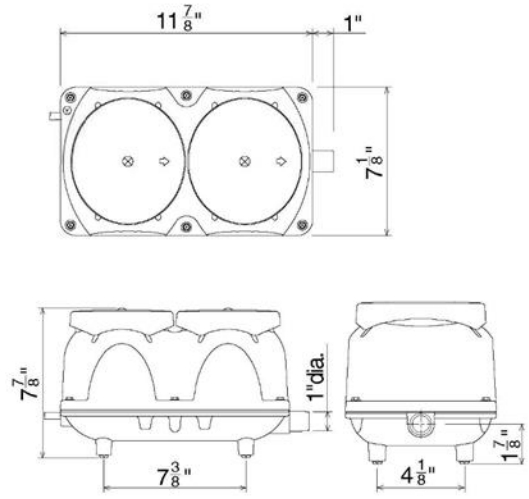
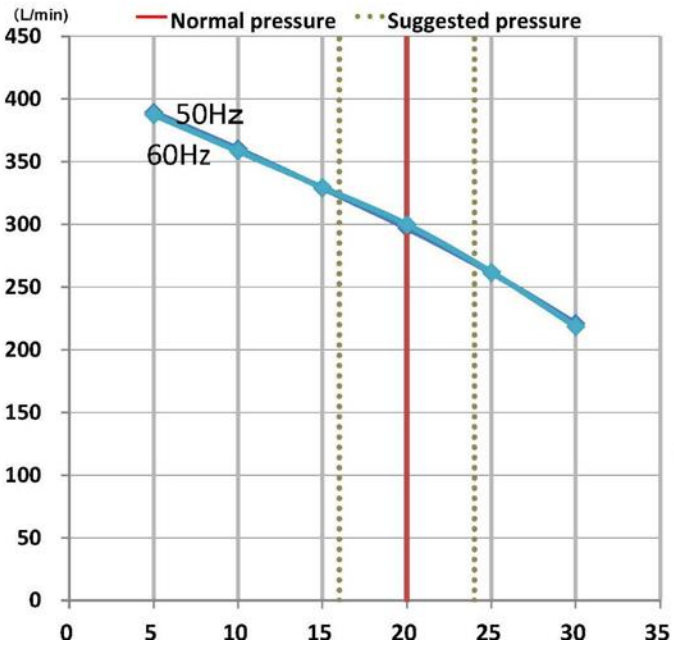


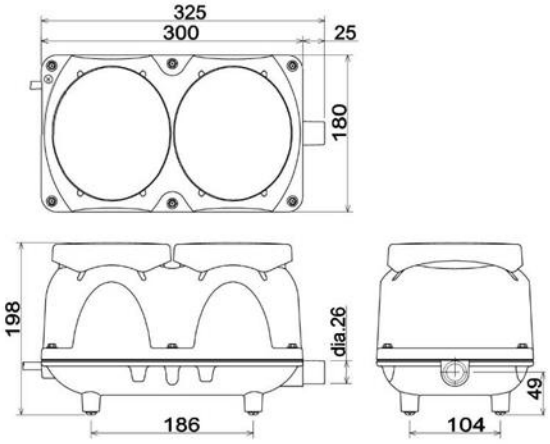
FujiMAC 300R II

Specifications

Model	MAC300RII
Rate Voltage	230V-240V
Air Flow	300L/min
Pressure	20kPa
Outlet Pipe	20mm(external dia. 26mm)
Weight	9.0kg
Power Consumption	250w
Noise Level	50db



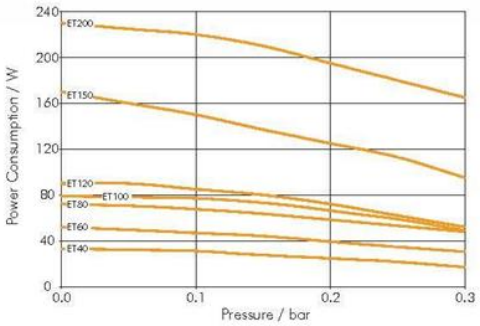
Dimensions



BLUE DIAMOND ENVIRO® ET SERIES

Air

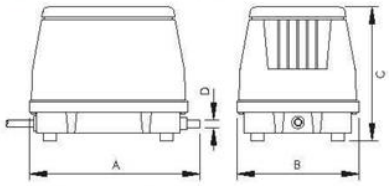
envir-o® ET series



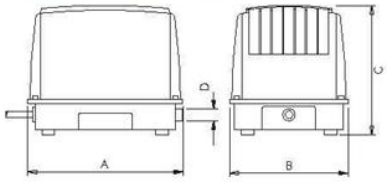
Model no.	Performance	Power consumption (w)	Noise level (db)
	Flow (cfm/min) @ Pressure (bar)		
ET40	1.41 @ 0.15	30	40
ET60	2.12 @ 0.15	55	40
ET80	2.83 @ 0.10	85	40
ET100	3.53 @ 0.10	105	45
ET120	4.24 @ 0.10	125	45
ET150	5.30 @ 0.15	130	45
ET200	7.06 @ 0.15	195	45

Dimensions

ET30, ET40, ET150 & ET200



ET60, ET80, ET100 & ET120



Model no.	Weight kg	Dimensions mm (inches)			
		A	B	C	D
ET40	4.3	220 (8.66)	155 (6.10)	190 (7.48)	14 (0.55)
ET60	6.0	203 (7.99)	165 (6.49)	153 (6.02)	18 (0.70)
ET80	7.0	210 (8.26)	185 (7.28)	171 (6.73)	18 (0.70)
ET100	8.5	238 (9.37)	196 (7.71)	177 (6.96)	18 (0.70)
ET120	9.5	265 (10.43)	215 (8.36)	198 (7.79)	18 (0.70)
ET150	9.0	256 (10.07)	200 (7.87)	222 (8.74)	18 (0.70)
ET200	9.0	256 (10.07)	200 (7.87)	222 (8.74)	18 (0.70)

Connections

ET40 - Plain, horizontal, connection 14.0mm (0.55") OD also supplied with screw in barbed connector 10.0mm (0.39") OD

ET60, ET80, ET100, ET120 - Plain, horizontal, connection 18.0mm (0.71") OD also supplied with screw in barbed connector 12.0mm (0.47") OD

ET150, ET200 - Plain, horizontal, connection 18.0mm OD

Other models in the envir-o® range

Accessories

Elbow connector (included)

Large brass barbed connector 18.0mm and 20.0mm (optional)

Please note - it is important that you ensure the motor specification stated and the range of materials offered in the pump are compatible with the performance, environmental limitations and chemical resistance requirements of the application.

For further information or details of our extensive range of pumps, contact our technical sales office who will be pleased to help you select the most suitable pump for your application.

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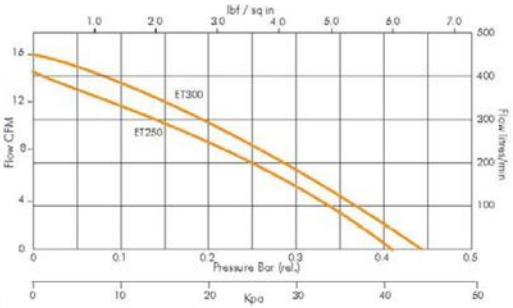
Air

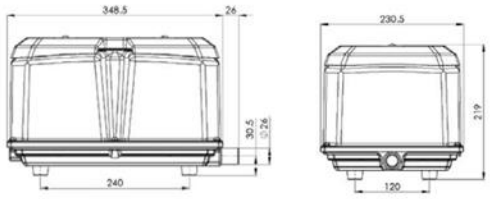
envir-o® ET double series

Using the same technology as the envir-o® ET series but with two pump blocks for high flow.

Model no.	Performance	Power consumption (w)	Noise level (db)
	Flow (cfm/min) @ Pressure (bar)		
ET250	8.80 @ 0.20	221	40
ET300	10.60 @ 0.20	275	40



Model no.	Weight kg	Dimensions mm (inches)			
		A	B	C	D
ET250	17.5	348.5 (13.72)	230.5 (9.07)	219 (8.62)	17.5 (1.02)
ET300	18.0	348.5 (13.72)	230.5 (9.07)	219 (8.62)	17.5 (1.02)

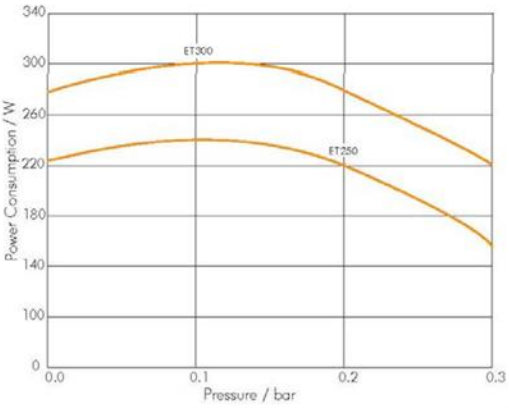


Connections

ET250, ET300 - Outlet connector 26mm (1"), also supplied with a straight rubber connector which can be used to increase pipe size to 29mm (1") ID

Accessories

Elbow connector (included)



2 year warranty

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CHARLES AUSTEN
PUMPS LTD

CE Registered

enviro® ETA SERIES PRO

- 30 to 500 litres per minute
- Robust and compact construction - weatherproof
- Green drive technology - energy efficient motors low power consumption
- Ideal for large grow systems and koi ponds
- Supplied with a brass fitting and L shaped elbow

2 YEAR WARRANTY

UL CERTIFIED

MODEL	FLOW @ PRESSURE	CONNECTOR	POWER	DIMENSIONS
ET 30	30 l/min @ 0.12 bar	14mm	25W	208 x 150 x 178mm
ET 40	40 l/min @ 0.12 bar	14mm	30W	218 x 156 x 182mm
ET 60	60 l/min @ 0.12 bar	18mm	55W	203 x 165 x 153mm
ET 80	80 l/min @ 0.10 bar	18mm	85W	210 x 185 x 171mm
ET 100	100 l/min @ 0.10 bar	18mm	105W	238 x 196 x 177mm
ET 120	120 l/min @ 0.20 bar	18mm	125W	265 x 215 x 198mm
ET 150	150 l/min @ 0.20 bar	18mm	130W	256 x 200 x 222mm
ET 200	200 l/min @ 0.20 bar	18mm	195W	256 x 200 x 222mm
ET 250	250 l/min @ 0.20 bar	26mm	220W	349 x 231 x 219mm
ET 300	300 l/min @ 0.20 bar	26mm	275W	349 x 231 x 219mm
ET 400	400 l/min @ 0.20 bar	26mm	220W	349 x 231 x 219mm
ET 500	500 l/min @ 0.20 bar	26mm	275W	349 x 231 x 219mm

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CHARLES AUSTEN PUMPS LTD

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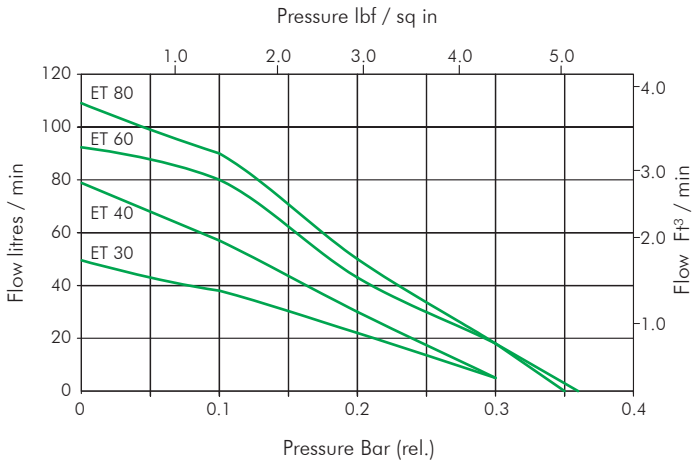
SERVICE KITS:			
MODEL	**DIAPHRAGM**	**FILTER**	**OTHER**
ET 30 - 120	2	1	1 Magnet
ET 150 - 200	2	1	8 Valves
ET 250 - 300	4	1	16 Valves
ET 400 - 500	4	1	16 Valves

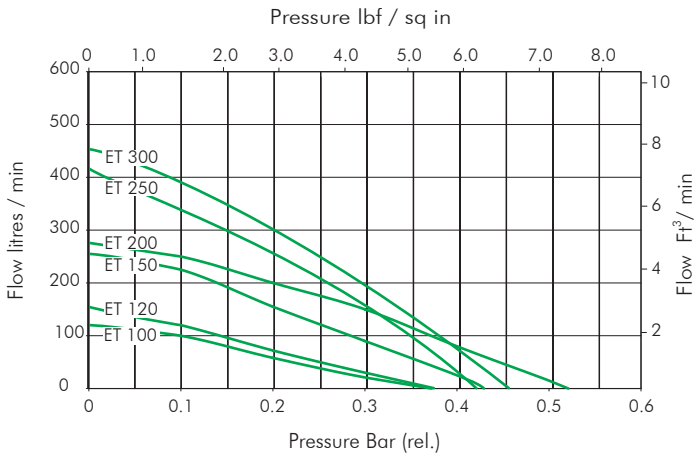
IDEAL FOR

HYDROPONICS

AQUATICS

At Charles Austen we recommend enviro® pumps are serviced every 18 months, service kits for each pump can be purchased from us. Sign up to our service reminder and we'll remind you when it is due!





CONNECTIONS

ET40A, ET60A, ET80A, ET100A & ET120A - Plain, horizontal, connection 18.0mm OD also supplied with screw barbed connector 12.0mm OD

ET150A, ET200A, ET250A, ET300A - Plain, horizontal, connection 18.0mm OD

ACCESSORIES

Elbow connector (included)

Large brass barbed connector 18.0mm and 20.0mm (optional)

Please note - it is important that you ensure the motor specification stated and the range of materials offered in the pump are compatible with the performance, environmental limiations and chemical resistance requirements of the application. For further information or details of our extensive range of pumps, contact our technical sales office who will be pleased to help you select the most suitable pump for your application.

RAIN BIRD®

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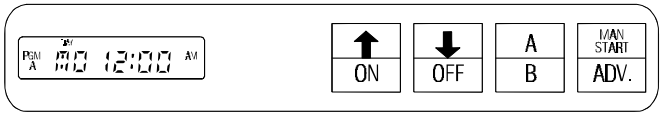
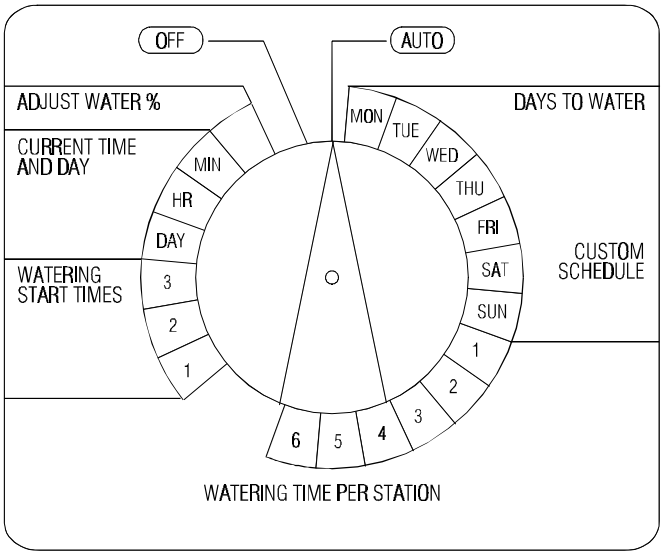




Installation, Programming, & Operation

ESP-4
ESP-6
ESP-8

INTRODUCTION

Congratulations on purchasing a Rain Bird ESP solid state controller. This manual describes how to install, operate, and maintain your controller. Please read these instructions carefully. For your convenience, we have included a Quick Reference Guide below, so you can quickly find instructions for common tasks.

Quick Reference Guide

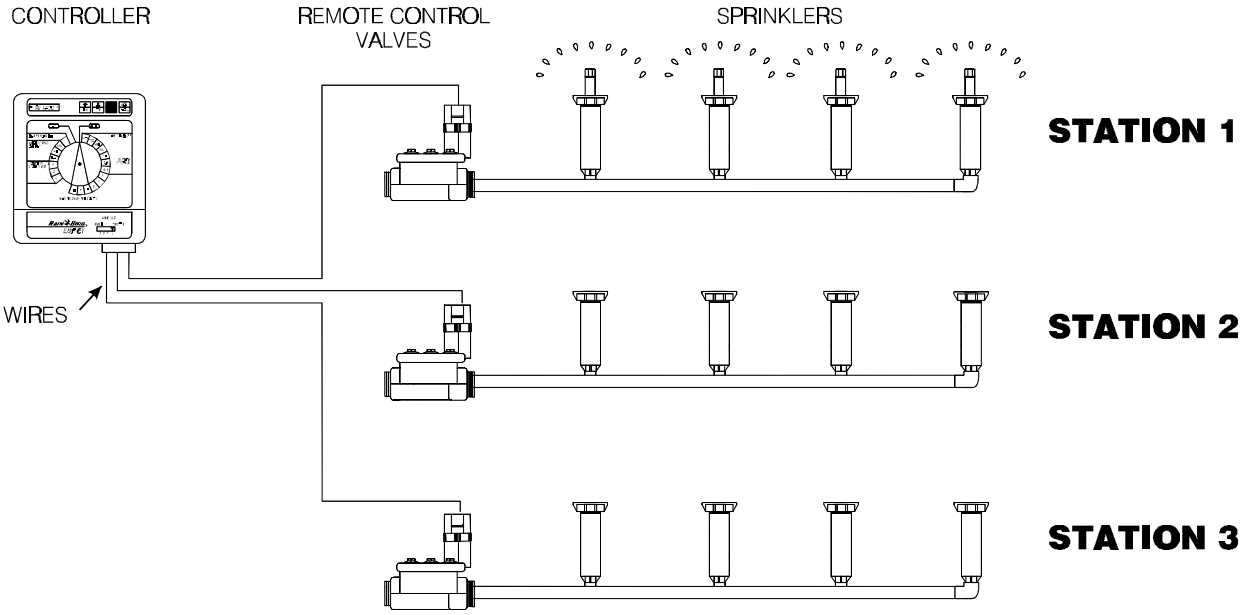
If you want to:

Controller Stations

The controller has several *stations* as shown in the illustration below. Each station is connected to a remote control sprinkler valve. The valve opens when it receives a signal from the controller, and the sprinklers connected to the valve turn on. When these sprinklers have run for their allotted time, the controller shuts off the valve and opens the next valve in sequence.

For example, the illustration shows that station 1 is currently watering. When station 1 is finished, the controller will shut it off and start station 2. In the same way, station 3 will begin watering when station 2 is finished.

Sample Station Layout



Controls and Switches

The illustration shows the programming controls on the face of the ESP. These controls include:

❶ *LCD Display* — during normal operation, displays the time of day; during programming, shows the results of your commands; during watering, shows the station that is running and the minutes remaining in its run time.

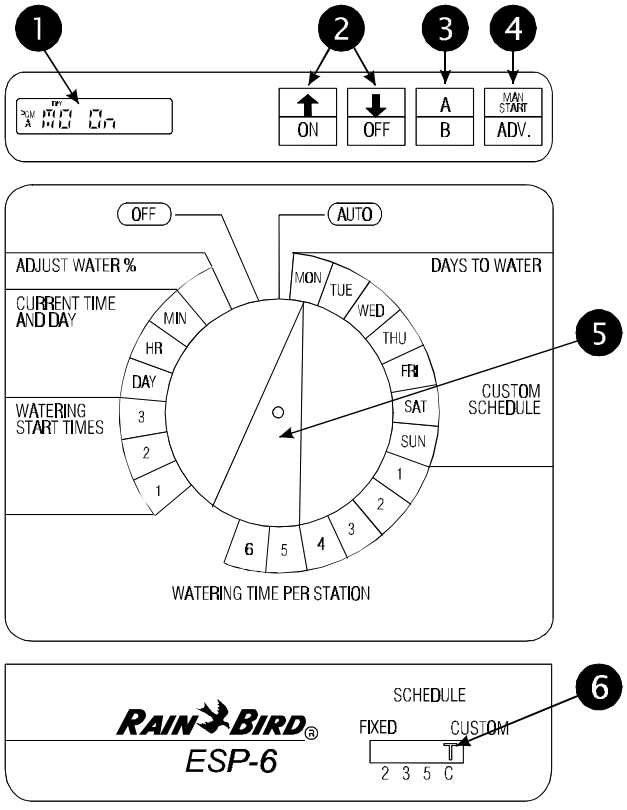
❷ *Arrow ON-OFF Buttons* — used to set times and days, and to make program changes.

❸ *A / B Program Button* — used to select watering program A or B. (On some ESP models, this button is labeled *PGM*.)

❹ *Manual Start / Advance Button* — used to start the irrigation program manually or to manually advance watering from one station to the next.

❺ *Programming Dial* — used to turn controller off and on, and for programming.

❻ *Schedule Slide Switch* — used to select one of the fixed-interval watering schedules or a custom watering schedule.



PROGRAMMING THE CONTROLLER

Your ESP controller is an electronic clock that controls when your sprinkler system turns on, and how long the sprinklers run.

Programming is the process of telling the controller exactly when and how long you want to water. The controller opens and closes the remote control valves according to the program you set.

Each program contains:

- *Watering days* — the specific days of the week on which watering takes place (for example, Monday, Wednesday, Friday), or the watering interval (for example, every third day).
- *Start time* — the time of day that the program begins; this is the time that the first station in the program begins watering; all other stations then follow in sequence.
- *Run time* — the number of minutes that each station runs.

Programming Checklist

To program the ESP- controller for the first time, we recommend that you complete the following steps in order:

Fill Out Program Schedule Sheet

Before you begin programming, fill out the ESP Controller Program Sheet and attach it to the label on the inside of the controller door. A sample Program Sheet is shown in this illustration.

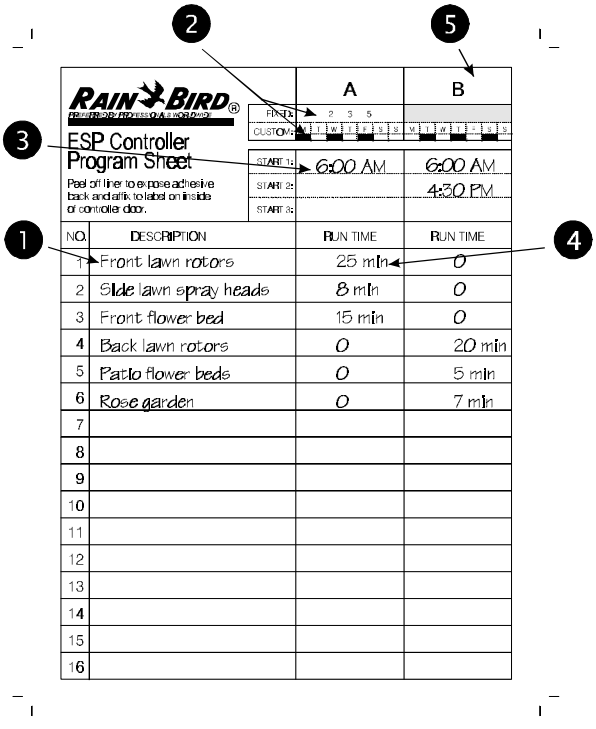
❶ Enter a brief description of each station on the controller.

❷ In the Program A column, mark the watering schedule. Either circle one of the fixed intervals, or fill in the watering days in the “Custom” row.

❸ Enter the starting time(s) for Program A. You may have up to three separate start times for each program.

❹ Enter the run time for each station assigned to Program A. Enter “0” for stations that are not used in Program A.

❺ Repeat steps 2 - 4 for Program B. If you are using a fixed schedule, Program B will have the same watering days as Program A.



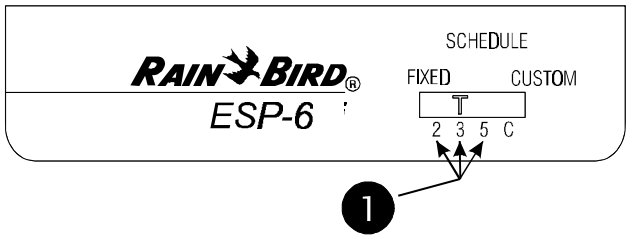
Select Watering Schedule

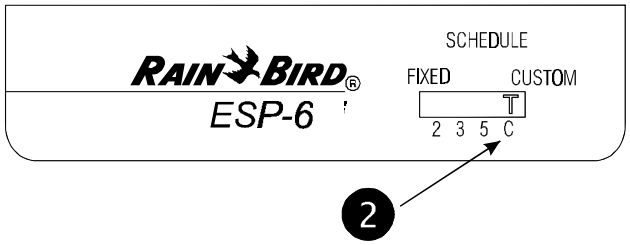
The ESP has two types of watering schedules, either fixed or custom. The fixed schedule sets watering to occur every second, third, or fifth day. The custom schedule lets you select specific days of the week on which watering is to occur.

The type of schedule you select applies to both programs, A and B. For example, you cannot set Program A to a fixed schedule and Program B to a custom schedule.

❶ To use a fixed schedule, move the Schedule Slide Switch to one of the FIXED positions:
2 = every other day
3 = every third day
5 = every fifth day

❷ To use the custom schedule, move the Schedule Slide Switch to the “C” position.





Set Current Time

❶ Turn the dial to “HR.”

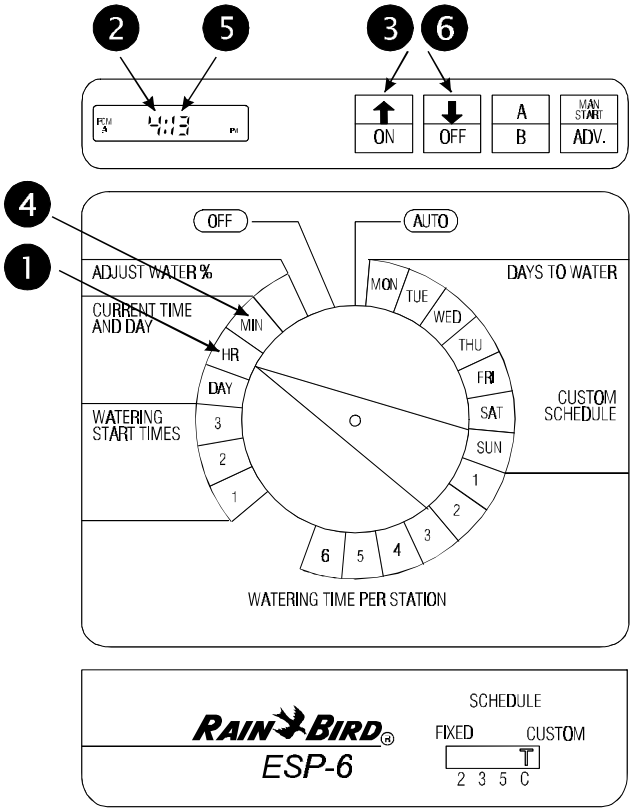
❷ The display shows the hour that is currently set, either AM or PM.

❸ Press ⇧ or ⇩ to set the current hour.

❹ Turn the dial to “MIN.”

❺ The display shows the minute currently set.

❻ Press ⇧ or ⇩ to set the current minute.



Set Current Day

Setting the current day varies somewhat depending on whether you are using a custom schedule or a fixed schedule.

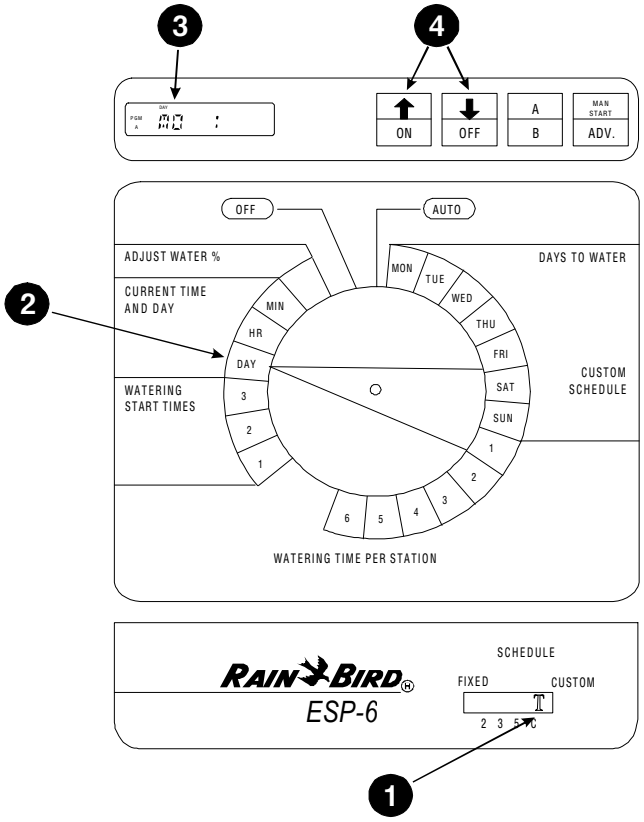
Custom Schedule

❶ Make sure the Schedule Slide switch is set to “C.”

❷ Turn the dial to “DAY.”

❸ The display shows the day of the week that is currently set (for example, “MO” for Monday).

❹ Press ⇧ or ⇩ to change the display to the current day of the week.



Fixed Schedule

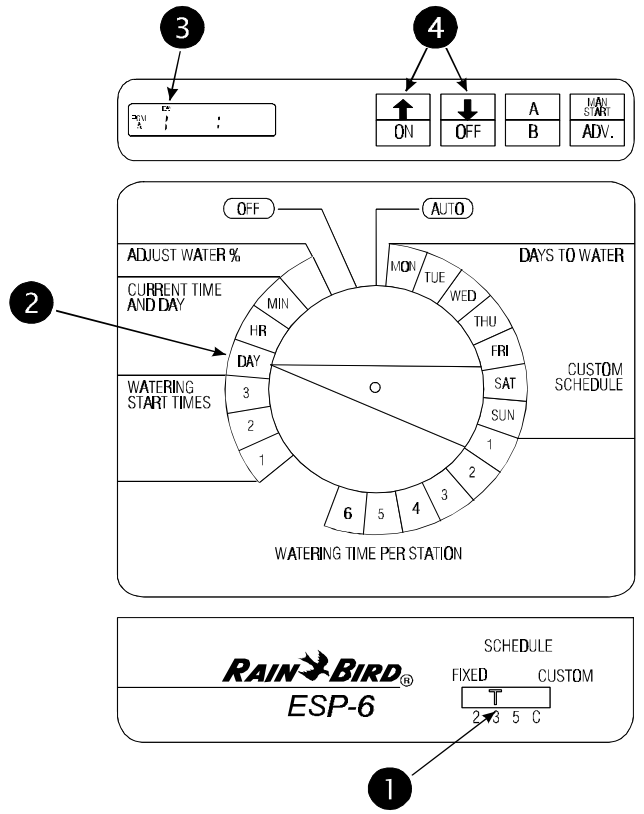
❶ Make sure the Schedule Slide switch is set to a fixed-
day schedule: 2, 3, or 5.

❷ Turn the dial to “DAY.”

❸ The display shows “1” for the first day of the watering cycle. Day 1 is always the watering day.

❹ Press ⇧ or ⇩ to change the current day from 1. If you want tomorrow to be the watering day, change the current day to the last day in your fixed schedule.

For example, if you’re using a two-day schedule and you want to start watering tomorrow, set the current day to “2.” If you’re using a three-day schedule and you want to start tomorrow, set the current day to “3.”



Select Program

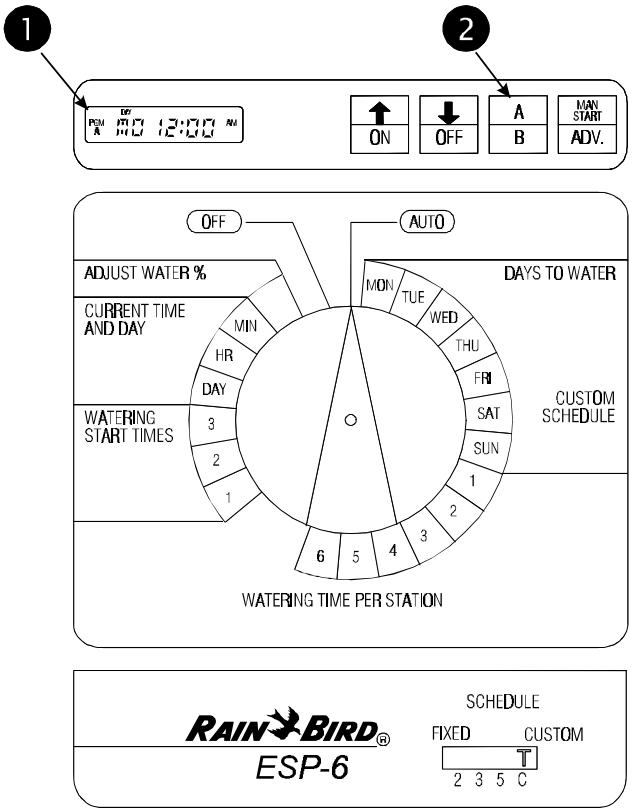
The ESP controller has two programs, A and B. Each program operates independently.
If you are using the custom watering schedule, each program can have different watering days. For example, Program A might run on Monday, Wednesday, and Friday; Program B on Tuesday, Thursday, and Saturday.

If you are using a fixed watering schedule, both programs will have the same "ON" days. For example, if you are using the three-day fixed schedule, Program A and Program B will both run every third day.

You can assign any station to Program A, Program B, or both.

❶ The program that is currently selected appears in the far left corner of the display. The display will show either "PGM A" or "PGM B."

❷ To select the program, press the A / B (or PGM) button until the program you want appears in the display. Pressing the A / B button switches back and forth between the two programs.



Set Station Watering Days

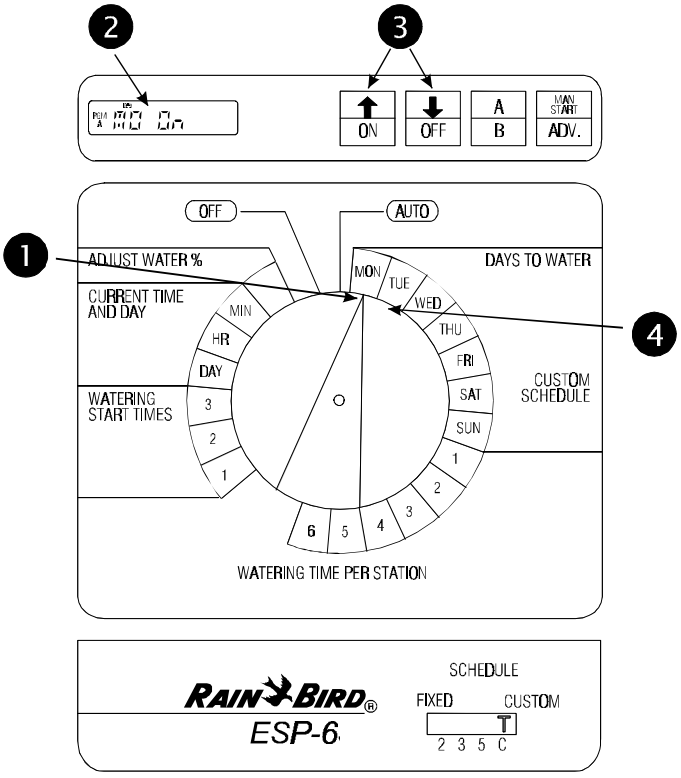
NOTE: *You must set station watering days* ***only*** *if you are using the CUSTOM Schedule. If you are using one of the FIXED schedules, skip to the steps in* ***Set Station Run Times***

❶ Turn the dial to "MON."

❷ The display shows the day of the week (for example, "MO" for Monday) and either "ON" or "OFF." ON means the selected day is a watering day. OFF means watering doesn't take place on the selected day.

❸ Press the ON or OFF button to set the selected day of the week on or off.

❹ Turn the dial to the next day of the week. Repeat steps 2 and 3 until you have set each day of the week either on or off.



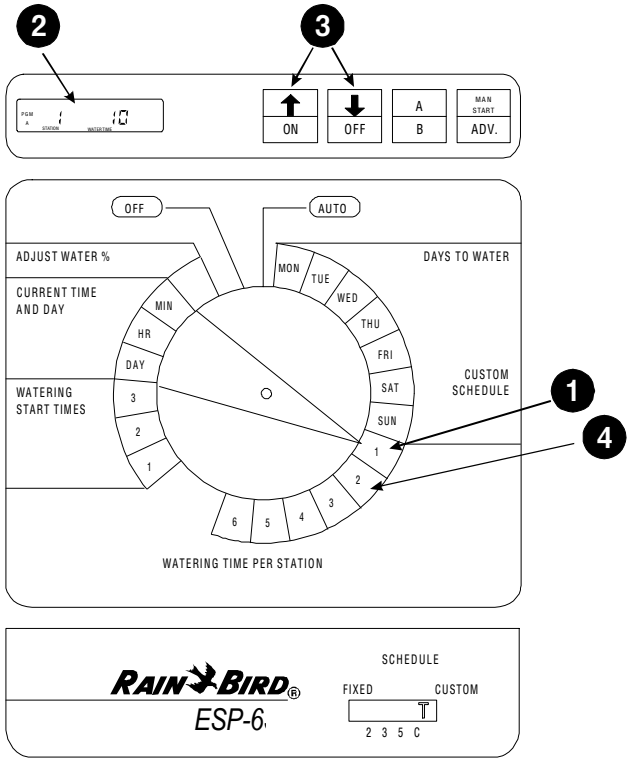
Set Station Run Times

❶ Turn the dial to Station 1.

❷ The display shows the selected station and its run time. If you are programming the controller for the first time, or after a long power outage, the built-in run time of 10 minutes will appear.

❸ Press ⇧ or ⇩ to change the display to the run time you want (up to 99 minutes). Set any unused stations to 0 minutes.

❹ Turn the dial to the next station in sequence. Repeat steps 2 through 4 until you have set the run time for each station.



Set Watering Start Times

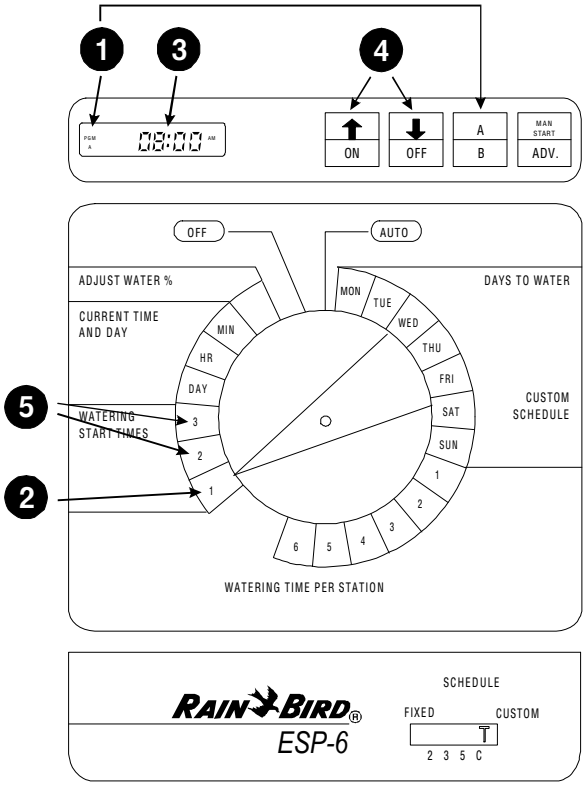
Each program on the ESP can have up to three watering start times, which tell the controller when to begin the watering program. The start time applies to all watering days for that program.

If you want to water more than once a day, you can set the second and third watering start times. For example, if you are growing new lawn seed, you might want to water several times a day. To do so, you could set a program to run at 6:00 A.M., 11:00 A.M., and 4:00 P.M.

❶ Make sure the program you want appears in the display. Either “PGM A” or “PGM B” will appear. To switch to the other program, press the A / B (or PGM) button.

❷ Turn the dial to 1 in the “Watering Start Times” section.

❸ The display shows the start time currently set for this program.



Set Watering Start Times (Continued)

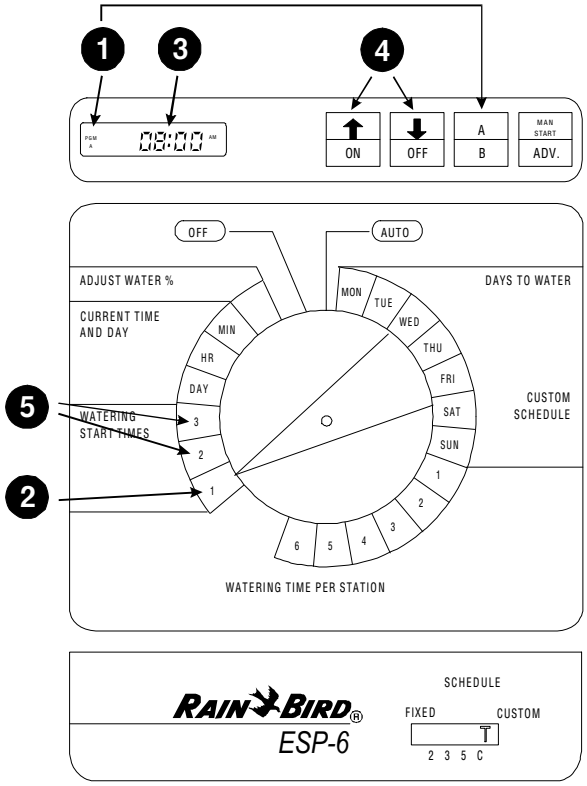
❹ Press ⇧ or ⇩ to change the start time. The time setting moves forward or backward in 15 - minute increments.

To eliminate a start time, press ⇧ or ⇩ until the blank setting between 11:45 PM and 12:15 AM appears.

❺ If you want to set additional start times for this program, move the dial to 2 or 3 in the "Watering Start Times" section. Then repeat steps 3 and 4.

If you are following the programming checklist on page 6, you have now completed all programming steps for Program A. At this point, you may:

- Enter Program B by following the steps that begin on page 3, or
- Set the controller to automatic operation, as described on page 8.



OPERATING THE CONTROLLER

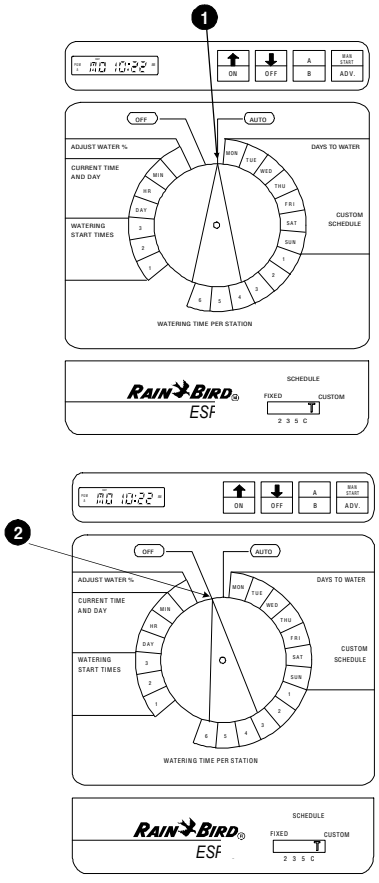
Turn Controller On and Off

❶ To set the controller to automatic operation, turn the dial to AUTO. The display will show the current day and time until the next scheduled automatic start. When a program is running, the display will show the station currently turned on and the minutes remaining on its run time. When the entire program is complete, the display will change back to the current day and time.

If you forget to turn the dial to AUTO, the controller will eventually set itself to automatic operation. The only setting that prevents automatic operation is OFF (see step 2).

❷ To turn the controller off and prevent all watering, set the dial to OFF. The display will show the current day and time. In addition, the right-hand minute digit will blink to show that the controller has been turned off.

The OFF setting can be used during rainy weather, seasonal shutdown, or system maintenance.



Adjust Water Budget Percent

The Water Budget feature on the ESP lets you increase or decrease the run times of all stations by a selected percentage. You may adjust the run times as low as 10 percent and as high as 200 percent. Adjustments must be made in increments of 10 percentage points.

The percentages are calculated on the normal programmed run times for each station. For example, if a station is programmed to run for 10 minutes, and you set the water budget percent to 80%, the station will run for 8 minutes (80% of 10 minutes). If you set the water budget to 120%, that same station will run for 12 minutes (120% of 10 minutes).

The water budget feature can be useful for cutting back watering during cool winter months, or for increasing watering during periods of unusual heat. Keep in mind that the percentage you set applies to **all** stations on **both** programs.

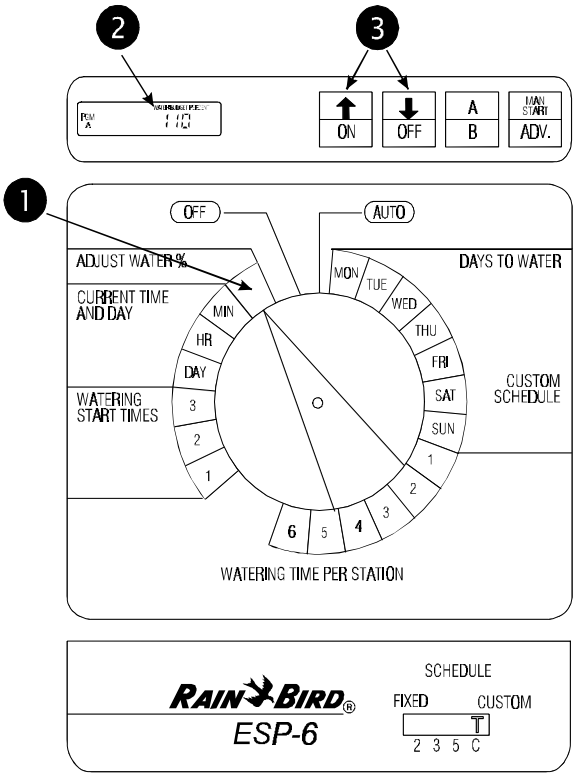
❶ Turn the dial to ADJUST WATER %.

❷ The display shows the current water budget setting (between 10% and 200%). A setting of 100% means that all stations will run according to their normal programmed run times.

❸ Press ⇧ or ⇩ to increase or decrease the percentage in 10-point increments.

When water budgeting is set above or below 100 percent, the words *WATER BUDGET PERCENT* will appear in the top of the display.

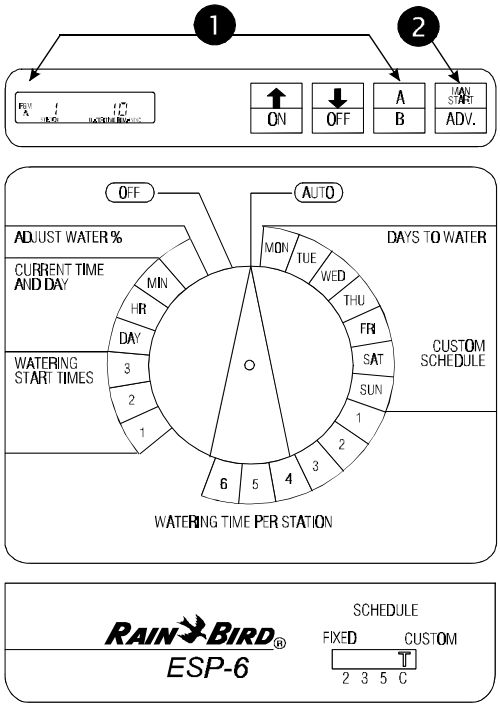
To turn off water budgeting, repeat steps 1 to 3, and set the percentage to 100%.



Use Manual Start / Advance

❶ Select the program you want to start. Press the A / B (or PGM) button to switch back and forth between the two programs.

❷ Press the MAN START / ADV. button to begin the program with the first assigned station. To advance through the stations in the program, press MAN START / ADV. repeatedly until the station you want is displayed.



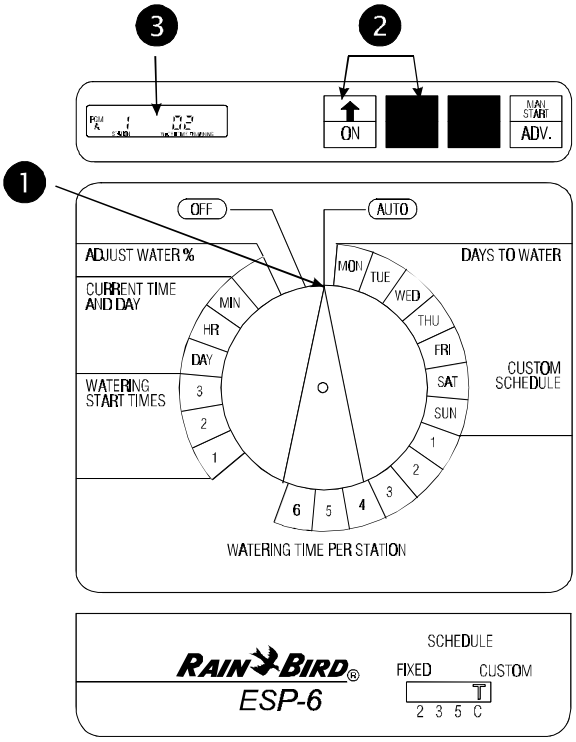
Run Test Program

The ESP controller has a built-in test program that will run each station in sequence for two minutes. You can use this program to check out the operation of all the sprinklers in the system.

❶ Turn the dial to AUTO.

❷ Press both arrow buttons at the same time and hold them down.

❸ The display shows the first station number and two minutes of watering time remaining. The controller will run each station for two minutes and then return to AUTO mode to await the next scheduled start time. Any station that has been set to a 0 run time will be skipped during the test program.



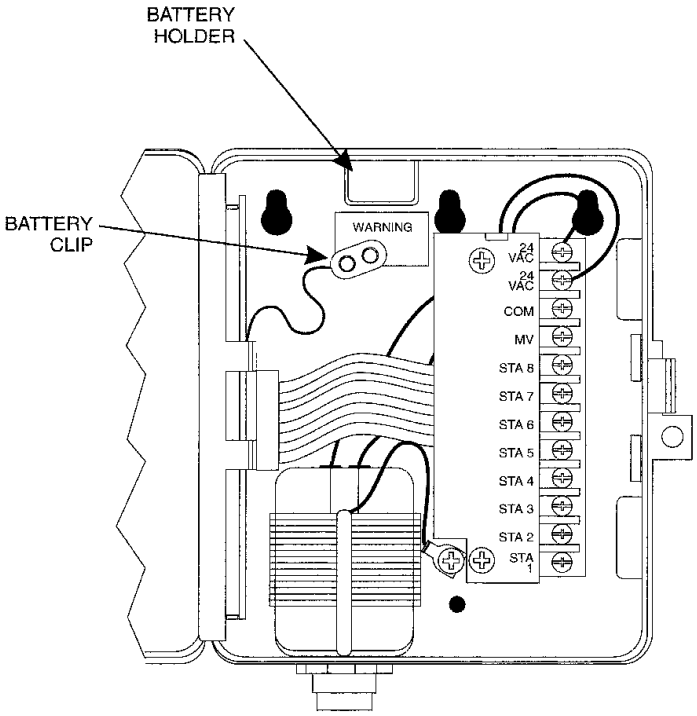
REPLACING THE BATTERY

The ESP controller features a rechargeable battery backup, which will preserve the controller's program in the event of a power failure. A fully charged battery will maintain the controller's program and keep current time for up to three days. However, the battery cannot operate the system. To replace the battery:

❶ Open the controller door and swing the face panel out on its hinges from right to left.

❷ Remove the old battery from the battery holder and disconnect it from the battery clip. Connect a new 9-Volt rechargeable, NiCad battery to the battery clip. Then insert the battery into the battery holder.

CAUTION: *DO NOT use 9-Volt alkaline batteries. They may burst or leak when subjected to the continuous charging circuit of the ESP. Use NiCad batteries only.*



INSTALLING THE CONTROLLER

Select Location

The plastic, weatherproof cabinet of the ESP controller is suitable for mounting outdoors or indoors. For best results, mount the controller at eye level in a sheltered location.

Allow approximately 7 1/2" of clearance to the left side of the controller so the controller door can swing fully open. In addition, mount the controller so that 117-Volt AC power is readily accessible.

The ESP controller has three "keyhole" slots on the back of the cabinet. Use these slots to mount the controller to a flat wall or vertical stud. Always use lower mounting hold "D" to secure the bottom of the controller.

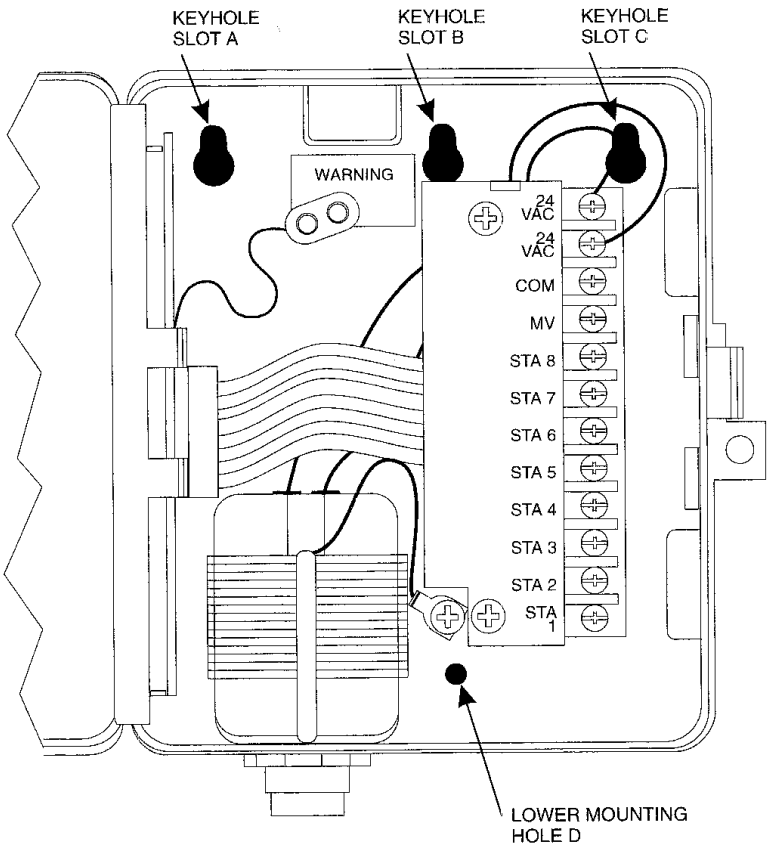
Mount Controller

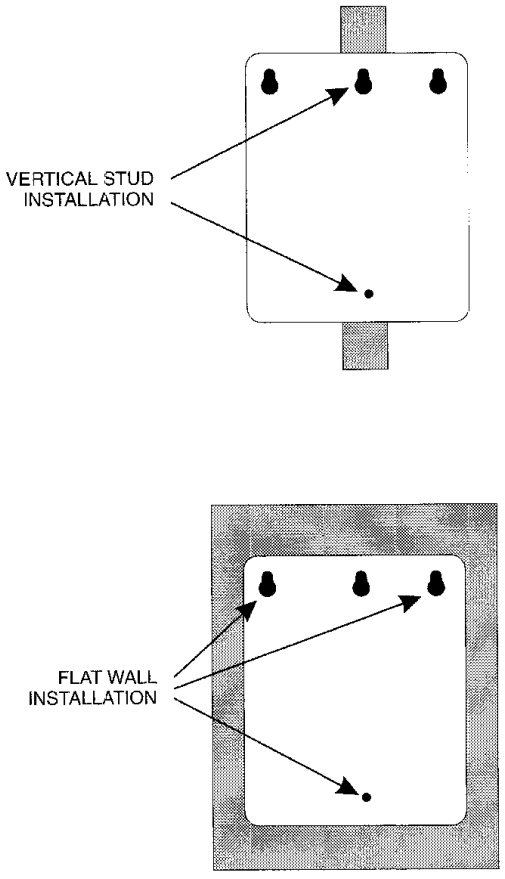
❶ Open the controller door and swing the face panel out on its hinges from right to left.

❷ Place the open controller on the mounting surface and mark through the *upper* slots of the keyholes. (Use keyholes A and C for wall mounting. Use keyhole B for mounting on a stud.) Then mark the location of hole D.

❸ Remove the cabinet. Drive appropriate fasteners into the wall or stud at the upper keyhole marks (A, B, C). Leave slightly more than 1/4" between the head of the fastener and the wall surface. Do **not** drive a fastener into location D at this time.

❹ Hang the controller on the upper keyhole slots. Make sure the shafts of the fasteners are in the upper, narrow portion of the slots. Then drive a fastener through lower mounting hole D. The controller should now be secure.





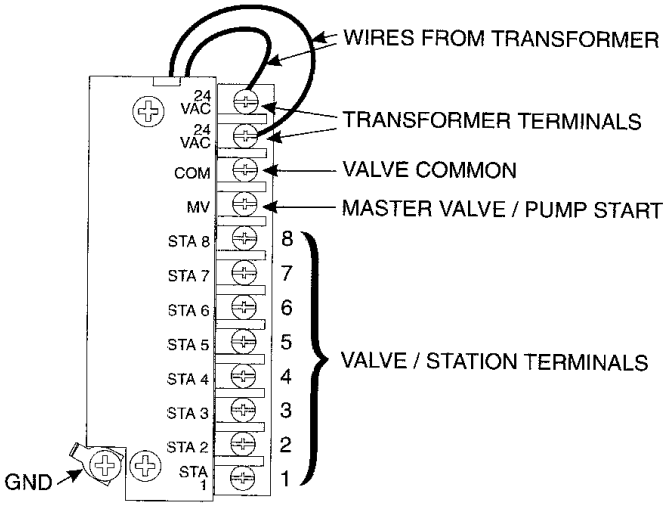
Connect Field Wiring

The ESP's terminal strip, shown in this illustration, provides fast screw connections for field wires.

❶ Wires connected to the terminal strip should be stripped to expose 1/2" of conductor at the end.

❷ To connect field wires, loosen the screw terminal. Insert the stripped wire around the base of the screw. Then tighten the screw terminal to grip the wire.

❸ Tug gently on each wire to make sure it's securely connected.



Station Valve Wiring

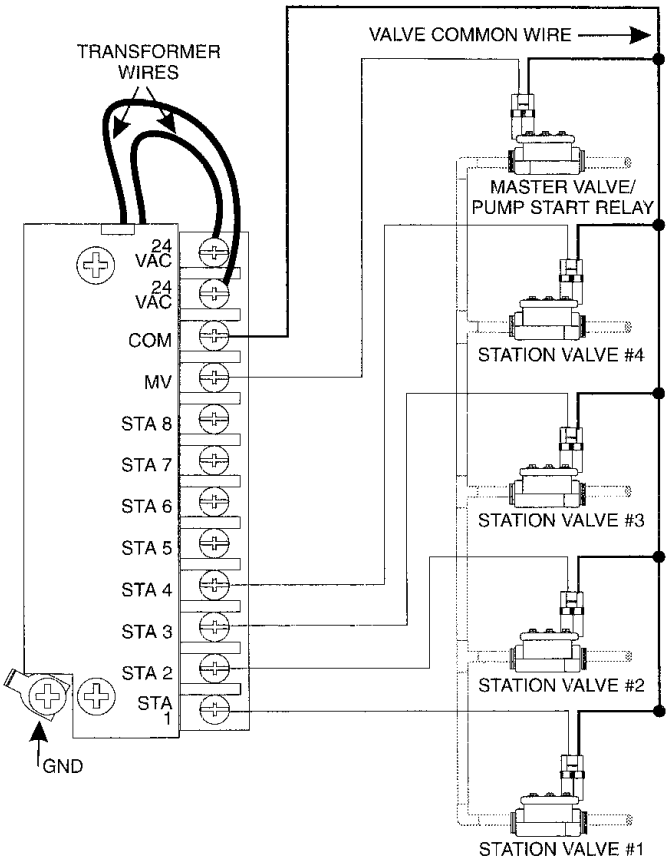
Connect each valve by its own separate power wire to one of the numbered terminals on the ESP terminal strip, as shown in the illustration.

Connect a common wire to one of the leads on each valve. Connect the other end of the common wire to the COM terminal on the ESP terminal strip. Wire used to connect the valves must be code-approved for underground installation. Bring all wires up through the right-hand hole in the bottom of the cabinet.

Master Valve / Pump Start Relay Wiring

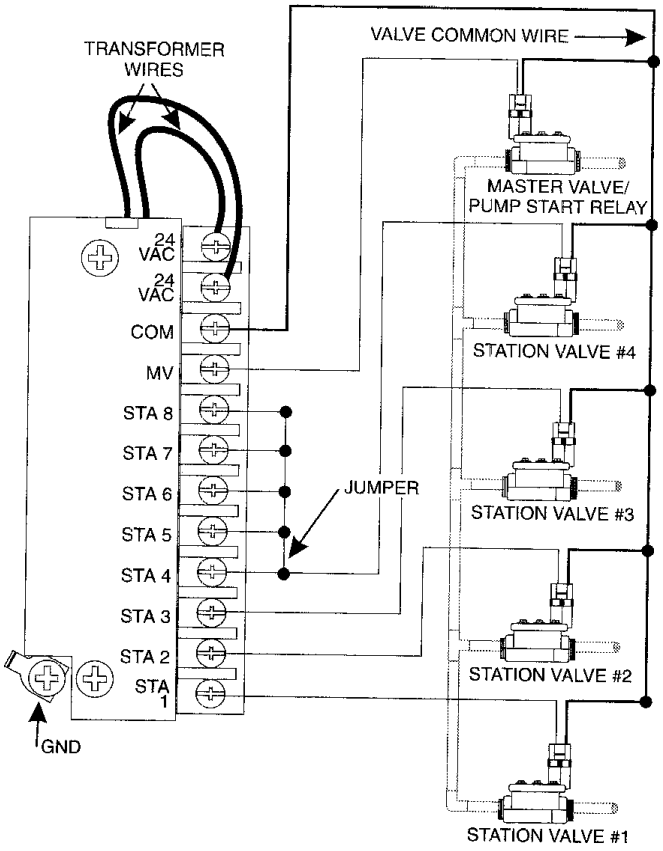
NOTE: Complete this section only if your system requires a master valve (an automatic valve installed on the mainline pipe upstream from the station valves) or a 24-Volt pump start relay.

Connect the master valve / pump start relay wiring to the MV terminal and COM terminal as shown in the illustration.



Jumper Settings for Unused Stations

CAUTION: To prevent **pump** damage when using a pump start relay, use a jumper to connect unused stations to a station that is being used. If program information is lost during a prolonged power outage, the ESP will automatically run a "default" program when power is restored. This program runs all stations for 10 minutes. If unused stations are not jumpered, the pump will operate with no flow (dead-head) during this 10-minute period. Dead-heading may cause the pump to overheat or burn out.



Connect Transformer

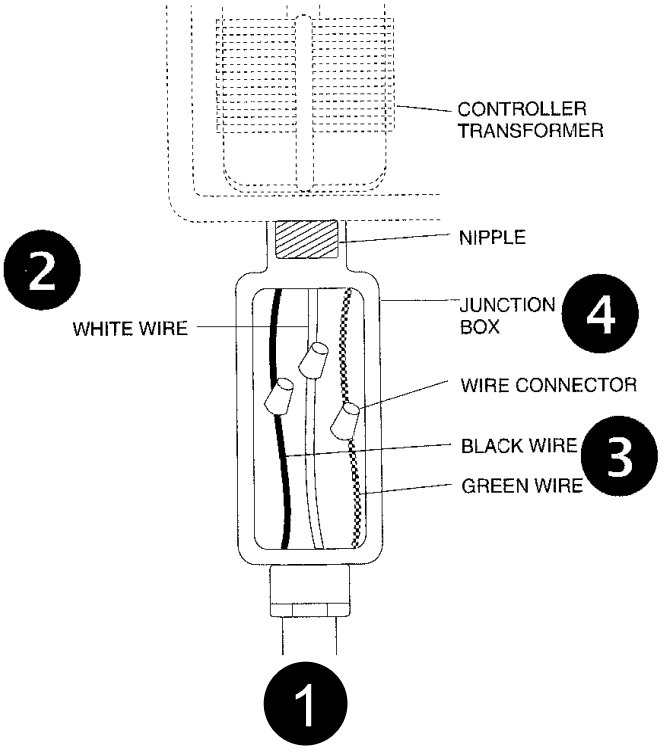
The ESP controller has a nipple-mounted transformer that provides a 1/2" nipple below the cabinet. Use this nipple to connect the ESP to an electrical function box or other code-approved enclosure for wire connections.

❶ Make sure the 117-Volt AC power is off.

❷ Connect the white wire from the controller nipple to the white wire coming out of the electrical conduit from the power source. Make sure all connections are made with code-approved insulated connectors.

❸ In the same way, make the black-to-black and green-to-green wire connections.

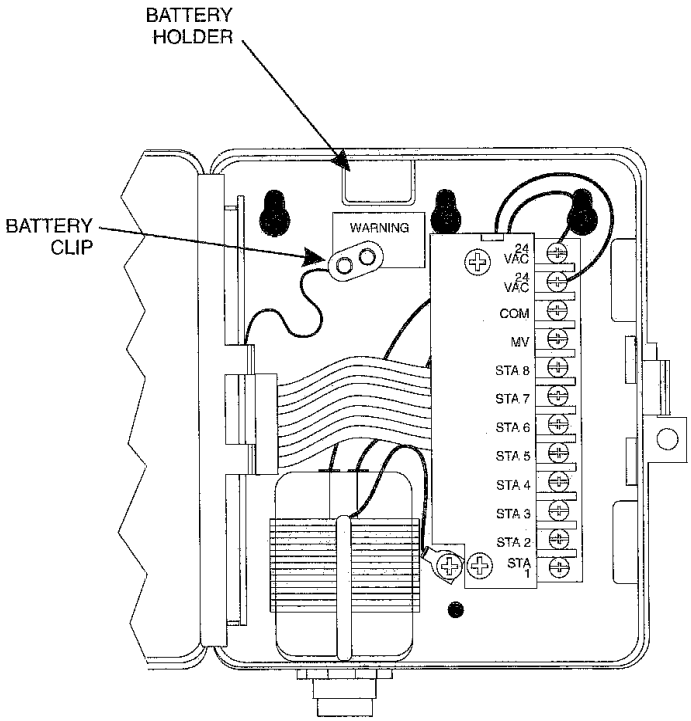
❹ Close up the weatherproof junction box after all connections are complete.



Install Battery

Connect a rechargeable 9-Volt NiCad battery to the battery clip and insert the battery into the battery holder. See page 10 for complete instructions.

CAUTION: DO NOT use alkaline batteries in the ESP.



TROUBLESHOOTING

SYMPTOM	CAUSE	CORRECTION
Display shows "PR OFF "	**1.** Fuse has blown	Replace the fuse with one of the same amperage rating. Use the MAN START / ADV button to run a watering program Press MAN START / ADV to cycle through each station; if the fuse blows again on a particular station, that station's solenoid or field wires may have a short circuit that needs repair.
	2. Power is off to the controller	Determine why power to the controller has been interrupted, and re-establish power.
Display is blank	**3.** If the controller is still receiving power, an electrical surge exceeding the controller's built-in surge protection may have damaged the controller's microprocessor.	Shut off power to the controller, open the lower face panel, and disconnect the battery. Let the controller "rest" for about 5 minutes. Reinstall the battery and turn power back on. If numbers and letters return to the display, the power surge did not do permanent damage: reprogram the controller. If the display remains blank, the ESP may be permanently damaged. Call 1-800-RAIN-BIRD for a service referral.
	4. Power is off to the ESP and the backup battery has run down.	Re-establish power to the controller, and then reprogram it. The recharging circuit will charge the battery in about 12 to 14 hours.
Display shows numbers and letters, but Is not moving or advancing	Same as Cause *#3*	See correction for Cause *#3*

This controller generates radio frequency energy and may cause interference to radio and television reception. It has been type tested and found to comply with the limits for a Class B computing device in accordance with the specifications in Subpart J of Part 15 of FCC Rules, which are designed to provide reasonable protection against such interference in a residential installation. However, there is no guarantee that interference will not occur in a particular installation.

If this equipment does cause interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

1. Reorient the receiving antenna.
2. Move the controller away from the receiver.
3. Plug the controller into a different outlet so that the controller and receiver are on different branch circuits.

If necessary, the user should consult the dealer or experienced radio / television technician for additional suggestions. The user may find the following booklet prepared by the Federal Communications Commission helpful:

"How to Identify and Resolve Radio-TV Interference Problems."

This booklet is available from the U.S. Government Printing Office, Washington, D.C. 20402, Stock No. 004-000-00345-4.

RAIN BIRD

PREFERRED BY PROFESSIONALS WORLDWIDE

Rain Bird Sales, Inc.
Customer Support Center
6640 S. Bonney Ave.
Tucson, AZ 85706
1-800-RAIN BIRD
(520) 434-6289 FAX

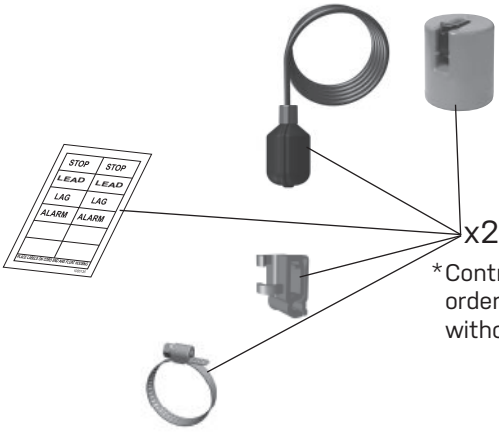
SJE RHOMBUS™ EZ Series®

Single Phase Simplex/Duplex

Installation Instructions and Operation Manual

c UL us LISTED

Parts included



⚠ WARNING!

ELECTRICAL SHOCK HAZARD
Disconnect all power sources before servicing. Failure to do so could result in serious injury or death.

This control panel must be installed and serviced by a licensed electrician in accordance with the National Electric Code NFPA-70, state and local electrical codes. UL Type 4X enclosures are for indoor or outdoor use.

Warranty void if panel is modified.

For information regarding operation, available options, or servicing questions, please call an SJE RHOMBUS customer service technician:

1-800-Rhombus (1-800-746-6287)
Monday-Friday, 7:00 AM to 6:00 PM Central Time

SJE RHOMBUS offers a five-year limited warranty.
For complete terms and conditions, please visit www.sjerhombus.com.

Products returned must be cleaned, sanitized, or decontaminated as necessary prior to shipment to ensure that employees will not be exposed to health hazards in handling said material. All applicable laws and regulations shall apply.

Manufactured by: SJE RHOMBUS
22650 County Highway 6
Detroit Lakes, MN 56501 USA

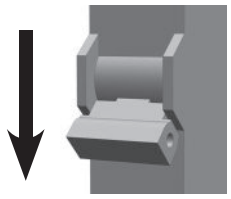
Toll free: 1-888-DIAL SJE (1-888-342-5753)
Phone: 218-847-1317

Email: customer.service@sjeinc.com
Website: www.sjerhombus.com
Fax: 218-847-4617

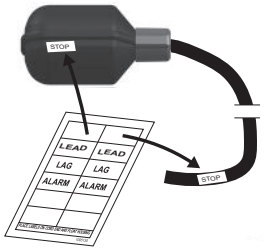
Installing the Float Switches

The EZ Series® Single Phase control panel operates with two, three, or four float switches.

1 **⚠ WARNING!**
Ensure all power is turned OFF before installing floats in tank. Failure to do so could result in serious or fatal shock.

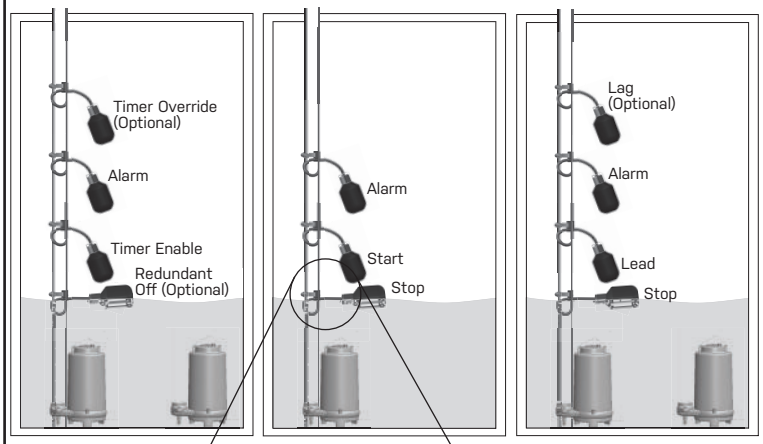


2 Label each float and cord end with the provided pairs of stickers.

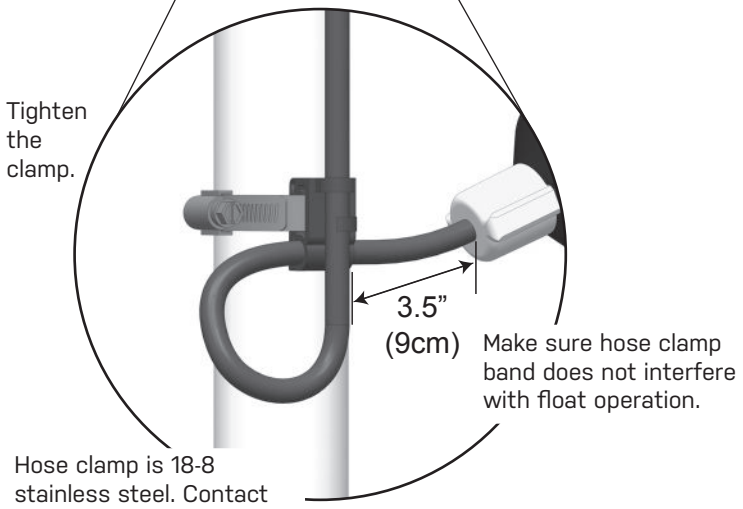


3 **⚠ CAUTION!**
If the floats are not properly mounted and connected in the correct order, the pumps will not function properly.

Floats require free range of motion.



Simplex Timed Dose | Simplex Demand | Duplex Demand



Mounting the Control Panel

Mount control panel with mounting devices furnished.

NOTE
If the distance to the control panel exceeds the length of the float switch cords or the pump power cord, splicing in a liquid-tight junction box will be required. For outdoor or wet installation, we recommend an SJE RHOMBUS, UL Type 4X junction box.

Wiring the control panel

1 Determine conduit entrance locations on control panel as shown. Check local codes and schematic on the inside cover of the panel for the number of power circuits required.

⚠ CAUTION!
Be sure the pump power voltage and phase are the same as the pump motor being installed.

Use of separate pump and control/alarm power sources is recommended.

2 Connect the following wires to the proper terminal positions:
- incoming power for each pump circuit
- incoming power for control/alarm circuit
- pump 1
- pump 2 (Duplex)
- float switches

⚠ CAUTION!
You must use conduit sealant to prevent moisture or gases from entering the panel.

Type 4X conduit must be used to maintain a Type 4X rating of the control panel.

3 Verify correct operation of control panel after installation is complete.

Operations

The EZ Series® (EZS) control panel uses float switches to continuously monitor and control the liquid level in the tank.

Hand Operation - Press and hold the "Push to Run" switch if stop float is OPEN. If stop float is CLOSED, press "Push to Run" switch and the pump will run until stop float opens.

Off Operation - Turn control/alarm breaker off to be in Off operation.

Auto Operation - In timed dose mode (simplex models only) the timer controls pump ON and OFF time as long as the timer enable float is raised. In demand dose mode, the stop and start floats control the pump.

Green Control and Alarm Power Indicators - Illuminate when control power and alarm power is present. Alarm light will flash if alarm power is lost.

Controller

Viewing Panel Settings:

Press menu/enter button to view:

- Float Status or Float Error
- Elapsed Time Meter
- Cycle Count
- Pump 2 Elapsed Time Count (Duplex)
- Pump 2 Cycle Count (Duplex)
- High Level & Power Fail Alarm Counts
- Float Error Count
- Auxiliary Alarm Input Counts (OPTIONAL)
- Lag Float Count (Duplex)

Timed Dose Mode only:

- Timer Override Count
- ON Time
- Off Time
- Remaining ON/OFF Times

Programming Panel Settings:

Press set/change button for 3 seconds to enter program mode.

Simplex:

The display will show ON time in mm:ss.

Press set/change button to set the pump ON time. Use menu/enter button to select digit desired to change. Use set/change button to change ON time.

Press menu/enter button. The display will show OFF time in hh:mm.

Press set/change button to set the pump OFF time. Use menu/enter button to select digit desired to change. Use set/change button to change OFF time.

Note: Setting the OFF times to 00:00 turns off timed dose mode and timed dose menu items. The panel will operate in demand mode.

Duplex:

The display will show Set Alternation, then either Alternate, 1-2 or 2-1.

Press set/change button to set the desired pump sequence.

Press menu/enter button to display number of floats.

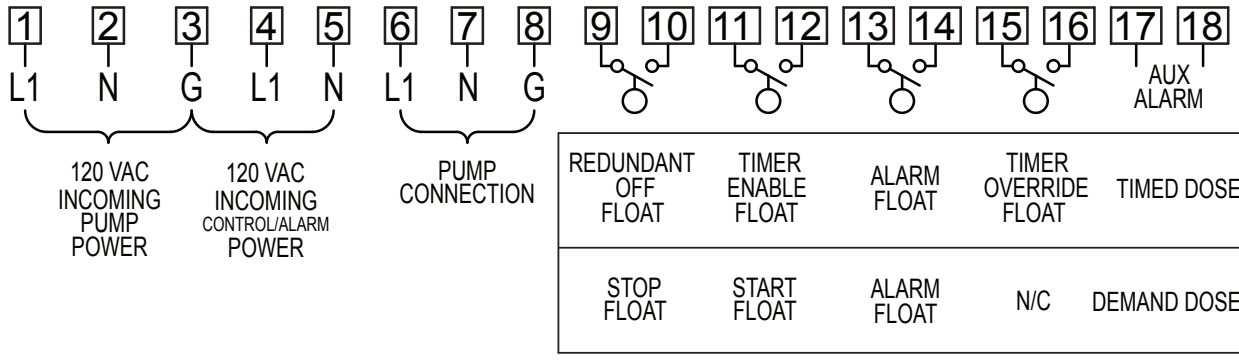
Press set/change button to choose 3 Floats or 4 floats.

Press menu/enter button.

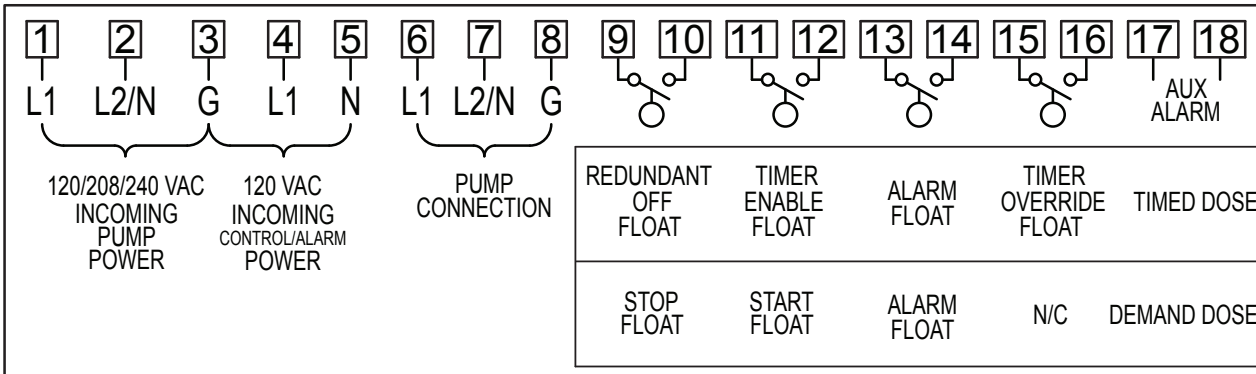
Press set/change button for 3 seconds to return to the view menu.

Standard EZ Wiring

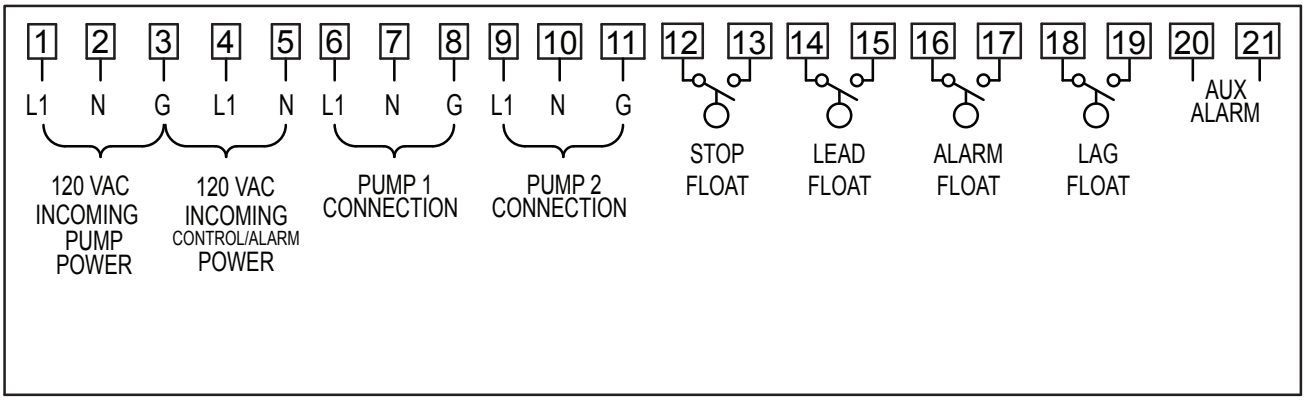
Simplex 120 VAC - Models EZS11W914* / EZ21W914* shown below:



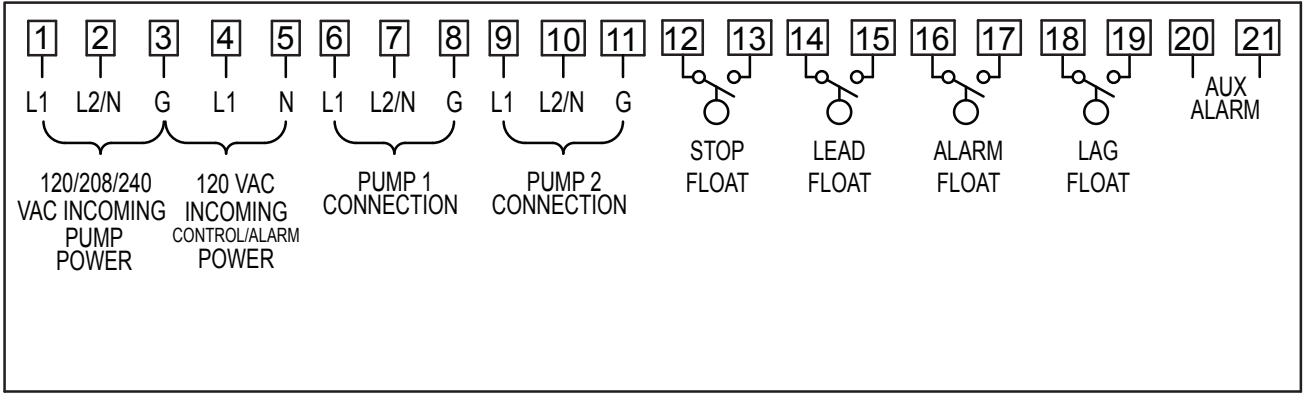
Simplex 120/208/240 VAC - Models EZS11W914* / EZS21W114* shown below:



Duplex 120 VAC - Model EZS41W914* shown below:



Duplex 120/208/240 VAC - Model EZS41W114* shown below:



SJE RHOMBUS

Installer Friendly Series®

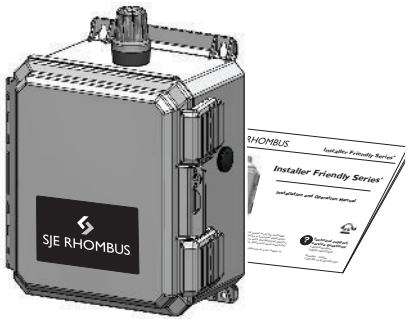
Installer Friendly Series®

Installation and Operation Manual

c UL us LISTED

Parts included

*Control panel may be ordered with or without C-Level™ Sensor/Floats.



C-Level™ Sensor Models

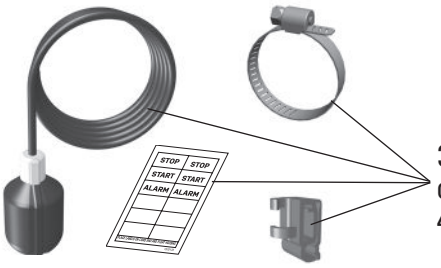
C-Level™ Sensor

Redundant Off Float

High Water Float

OR

Float Switch Models



WARNING!

ELECTRICAL SHOCK HAZARD
Disconnect all power sources before servicing. Failure to do so could result in serious injury or death.

This control panel must be installed and serviced by a licensed electrician in accordance with the National Electric Code NFPA-70, state and local electrical codes. UL Type 4X enclosures are for indoor or outdoor use.

Warranty void if panel is modified.

For information regarding operation, available options, or servicing questions, please call SJE Rhombus Technical Support.

SJE Rhombus offers a five-year limited warranty on the control panel and the C-Level™ sensor.
For complete terms and conditions, please visit **www.sjerhombus.com**.

Products returned must be cleaned, sanitized, or decontaminated as necessary prior to shipment to ensure that employees will not be exposed to health hazards in handling said material. All applicable laws and regulations shall apply.

Manufactured by:
SJE Rhombus
Detroit Lakes, MN, USA

Technical Support: +1 800-746-6287
techsupport@sjerhombus.com
www.sjerhombus.com
Technical Support Hours: Monday-Friday, 7 A.M. to 6 P.M. Central Time

Installing the C-Level™ Sensor & Float Switches

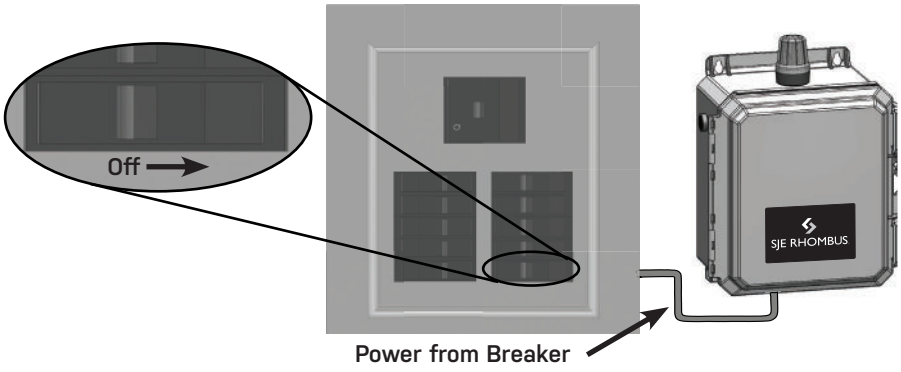
The IFS control panel operates with a C-Level™ sensor and 1 or 2 recommended float switches or with 3 to 4 float switches. For C-Level™ sensor operation, C-Level™ sensor operates the Pump Start, Stop and Alarm functions and the back-up float switches are for redundant off and high level alarm. For float switch operation, the float switches operate the Pump Start, Stop and Alarm functions.

⚠ WARNING!

Ensure all supply power to the control panel is turned OFF before installing or servicing the C-Level™ sensor, float switches or pumps in the tank. Failure to do so could result in serious or fatal shock.

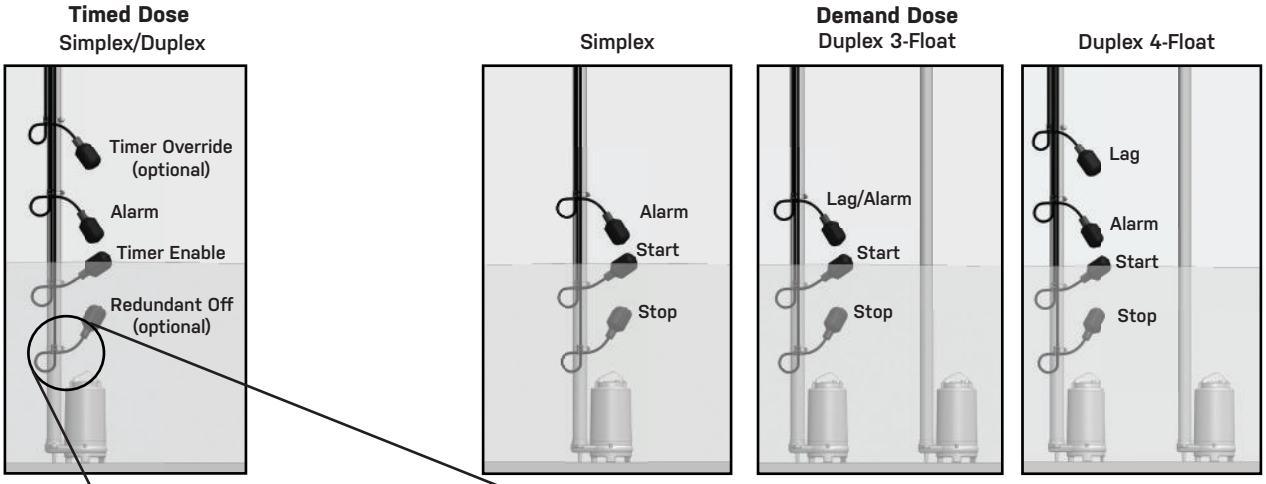
NOTE

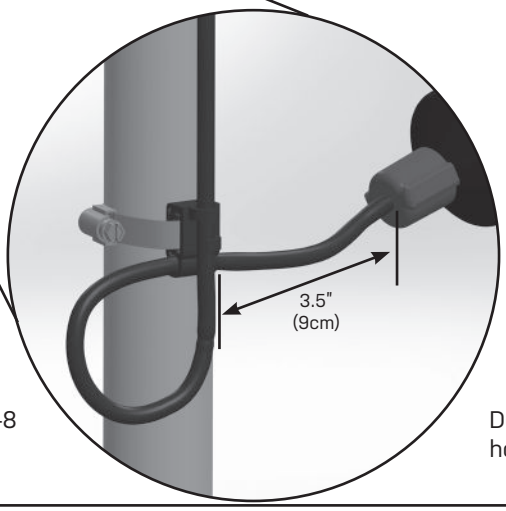
Do not splice the C-Level™ sensor cable.
Do not run C-Level™ sensor cable or float switch cables in the same conduit as the pump cables.



Mounting the Control Panel

Float Switch Installation





Tighten the clamp.

Hose clamp is 18-8 stainless steel.

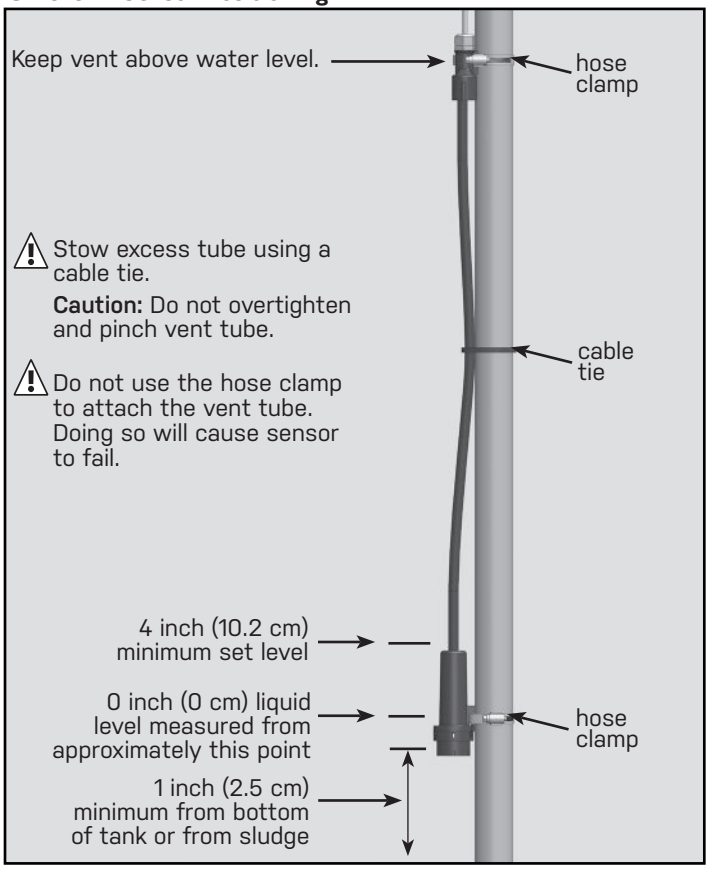
Make sure hose clamp band does not interfere with float operation.

Floats require free range of motion. They must not touch each other or any equipment in the pump chamber.

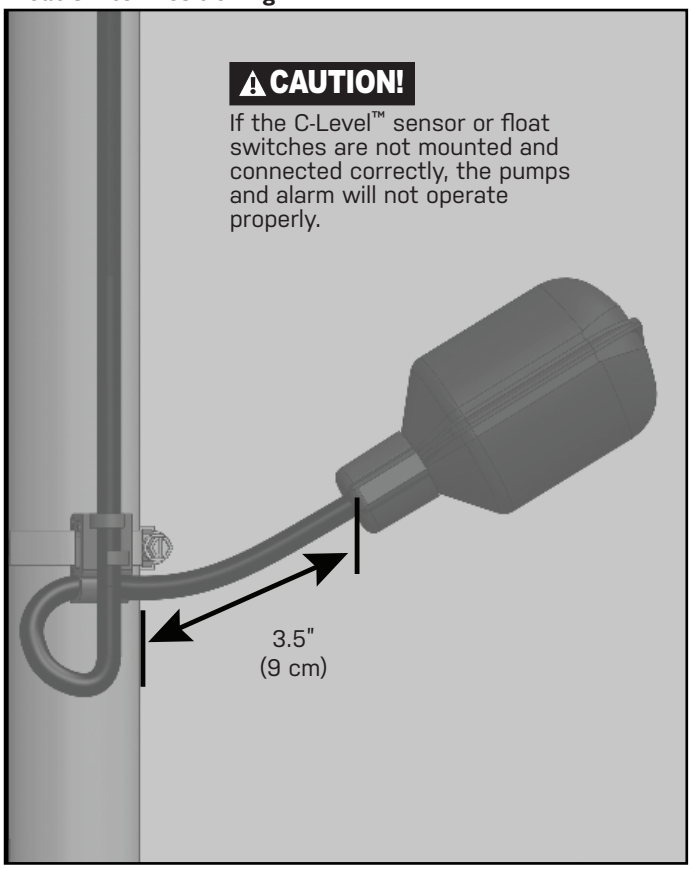
Do not install cord under hose clamp.

C-Level™ Sensor and Float Switch Installation

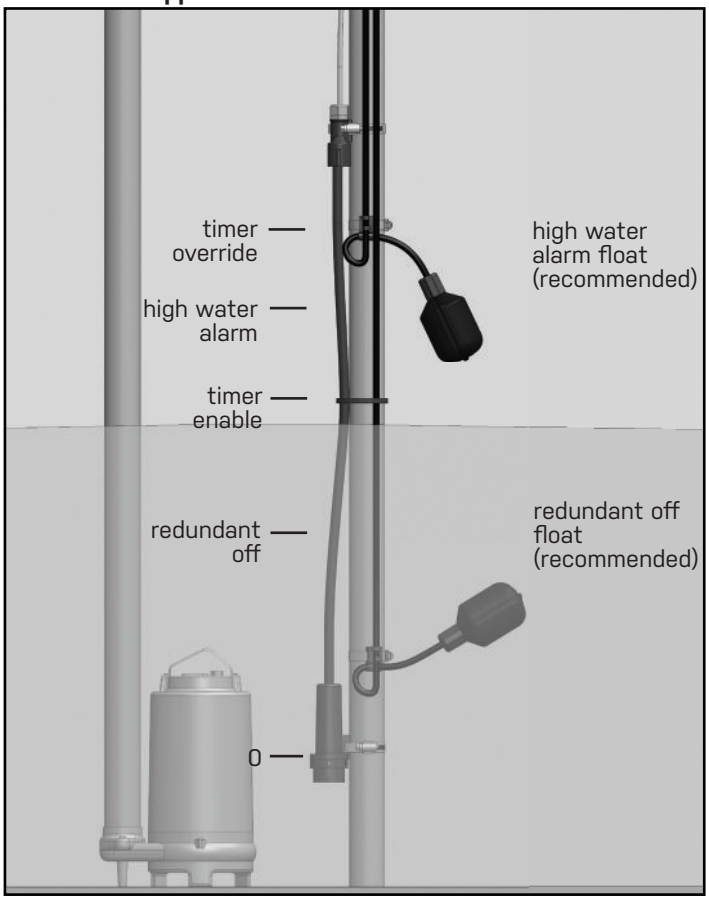
C-Level™ Sensor Positioning



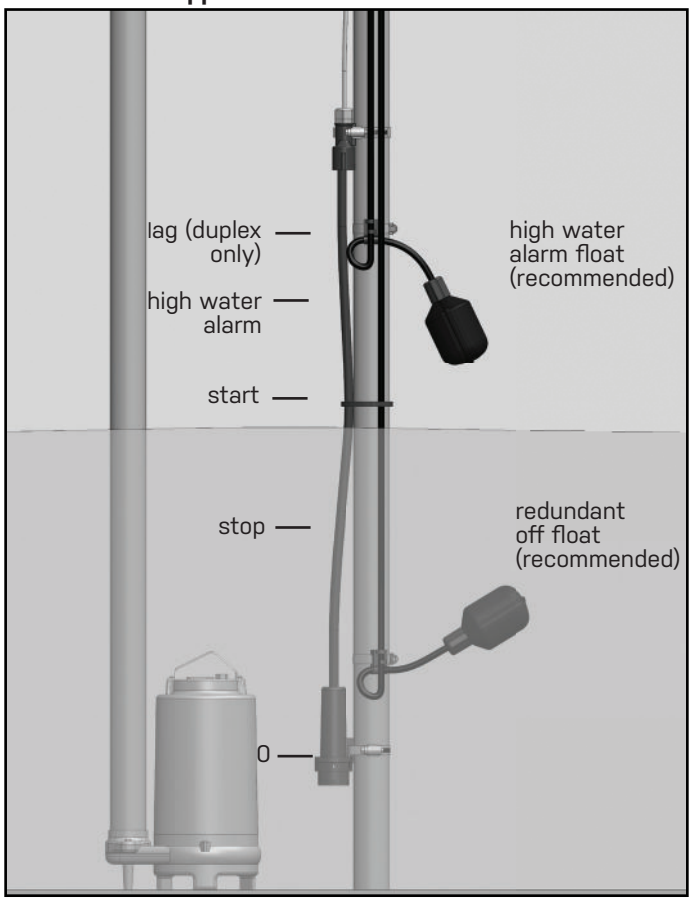
Float Switch Positioning



Timed Dose Application



Demand Dose Application



Wiring the Control Panel

1 Locate conduit entrance at the bottom of the enclosure as shown. Check local codes for the number of power circuits required. The schematic is located on the inside cover of the control panel.

⚠ CAUTION!

Be sure the incoming voltage is the same as the pump motor nameplate.

Providing separate pump and control/alarm power sources is recommended.

Type 4X conduit must be used to maintain a Type 4X rating of the control panel.

2 Connect the following wires to the proper terminals:

- incoming power for each pump circuit breaker
- incoming power for control/alarm
- pump 1
- pump 2 (duplex only)
- C-Level™ sensor
- float switches (recommended)

See schematic label on inside cover of the control panel for details.

3 Verify correct operation of control panel after installation is complete.

Setup and Operation

Rotate dial and press to select the corresponding pump's mode indicator or panel settings icon.

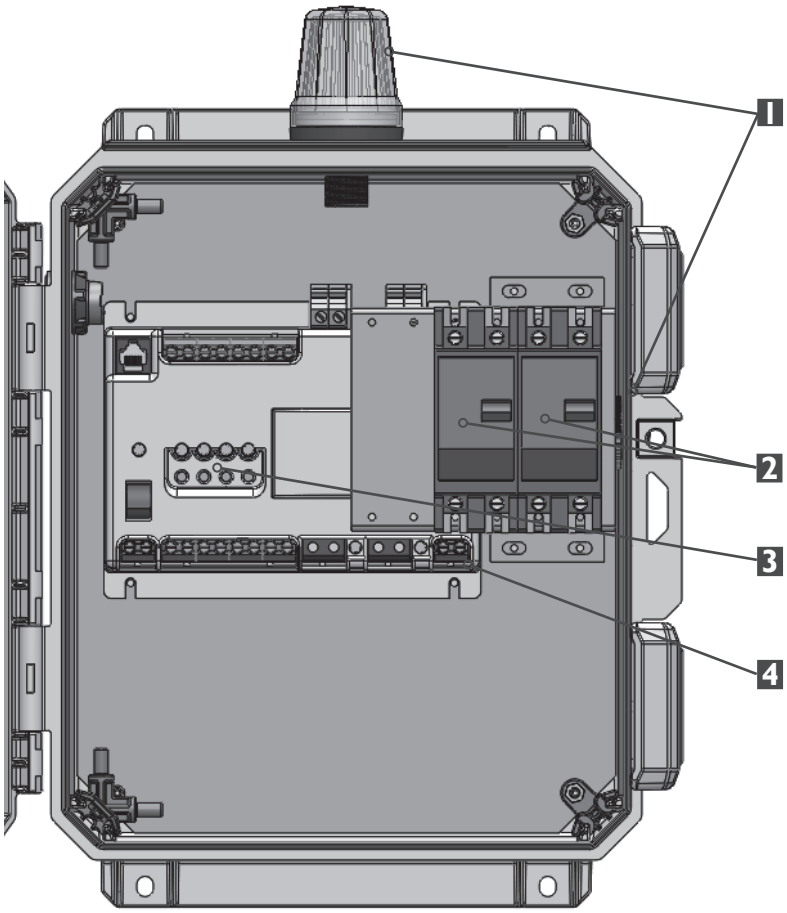
PUMP 1

PUMP 2 (duplex only)

HOA

SETTINGS

Counts and ETMs	- Displays pump run time and counts of pump run and alarms
Timer Settings	- Configures timers (Timed Dose mode only)
Level Settings	- Configures level setpoints
Alternation (duplex only)	- Configures alternation mode for duplex panels
Advanced	- Configure advanced functions and view troubleshooting tools



Duplex Model Shown

⚠ CAUTION! Seal the electrical conduit with an approved sealing compound to prevent moisture or gases from entering into the control panel.

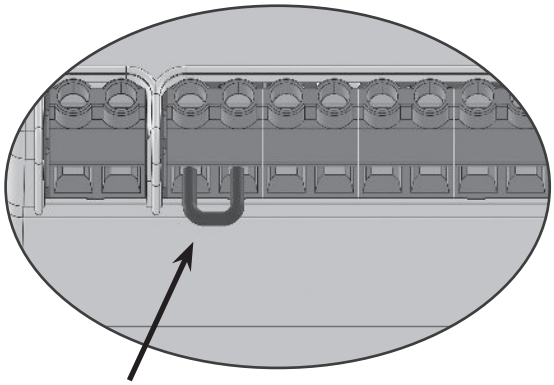
1 Alarm System (Indicator Light and Horn)
When an alarm condition occurs, the red light and horn will be activated.

If the TEST/SILENCE button is pressed and released, the horn will be silenced. When the alarm condition is cleared, the alarm system is reset.

2 Circuit Breakers
Each pump circuit has a thermal-magnetic circuit breaker that provides branch circuit protection and a means to disconnect the pump.

3 Float Test Switches
Push to simulate a float closure condition for each input.

4 Dry Auxiliary Contacts
Normally Open - Contacts are OPEN under normal conditions and CLOSED when alarm condition is present. CLOSED during power loss.
Automatically resets once alarm condition is cleared.
Aux contact rating: 120V, 5A



NOTE If redundant off float is not used, a jumper must be installed in its place.

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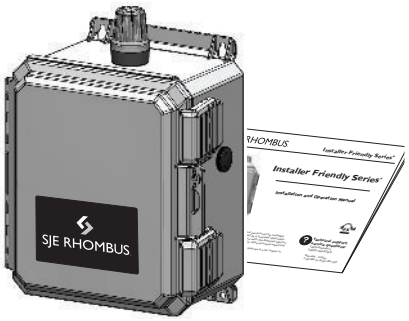
Installer Friendly Series®

Manual de instalación y operación

c UL us LISTED

Piezas incluidas

*Es posible solicitar el panel de control con o sin sensor C-Level™/flotadores.



Sensor C-Level™

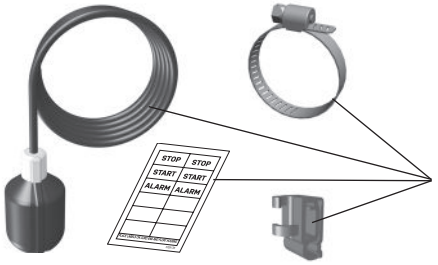
Modelos

Sensor C-Level™ | Flotador de apagado redundante | Flotador de nivel alto

O BIEN

Interruptor de flotador

Modelos



⚠ ADVERTENCIA

RIESGO DE CHOQUE ELÉCTRICO
Desconectar todas las fuentes de poder antes de efectuar mantenimiento o reparaciones. No obedecer estas indicaciones podría resultar en serias lesiones o mortales.

La instalación, el mantenimiento y la reparación de este panel de control deben ser efectuados por un electricista certificado conforme al Código Eléctrico Nacional de EE.UU. NFPA-70 y los códigos estatales y locales. Las cajas/gabinetes clasificación UL tipo 4X son para uso interior o exterior.

La garantía queda anulada si se modifica el panel.

Para información acerca del funcionamiento, las opciones disponibles o para preguntas acerca del mantenimiento, por favor comunicarse con Soporte técnico de SJE Rhombus.

SJE Rhombus ofrece una garantía limitada de cinco años para el panel de control y el sensor C-Level™. Para consultar los términos y condiciones, visite el portal **www.sjerhombus.com**.

Los productos devueltos deben estar limpios, desinfectados y descontaminados según sea necesario antes de enviarlos de modo que se garantice que los empleados no van a estar expuestos a riesgos de salud durante la manipulación de dicho material. Se aplicarán todas las leyes y normas vigentes.

Fabricado por:
SJE Rhombus
Detroit Lakes, MN, USA

Soporte técnico: +1 800-746-6287
techsupport@sjerhombus.com
www.sjerhombus.com
Soporte técnico, Horario: Lunes a viernes 7 A.M. a 6 P.M., hora del Centro

Instalación del sensor C-Level™ y los interruptores de flotador

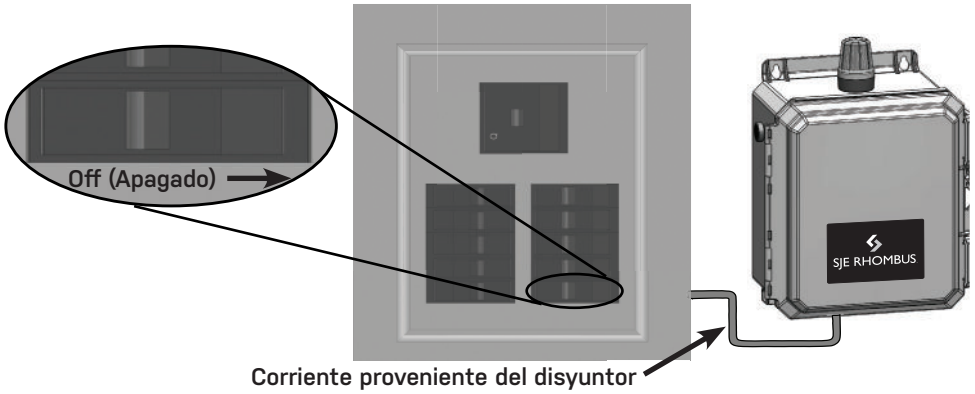
El panel de control IFS opera con un sensor C-Level™ y 1 o 2 interruptores de flotador recomendados o con 3 a 4 interruptores de flotador. En cuanto al funcionamiento del sensor C-Level™, dicho sensor C-Level™ opera las funciones de Arrancar, Detener y Alarma de la bomba y los interruptores de flotador de respaldo son para el flotador de apagado redundante y la alarma de nivel alto. En lo que se refiere al funcionamiento del interruptor de flotador, éste opera las funciones de Arrancar, Detener y Alarma de la bomba.

⚠ PRECAUCIÓN

Asegurarse de que toda la alimentación de entrada al panel de control esté APAGADA (OFF) antes de la instalación o el mantenimiento del sensor C-Level™, de los interruptores de flotador o de las bombas al interior del tanque. No obedecer estas indicaciones podría resultar en choque eléctrico serio o mortal.

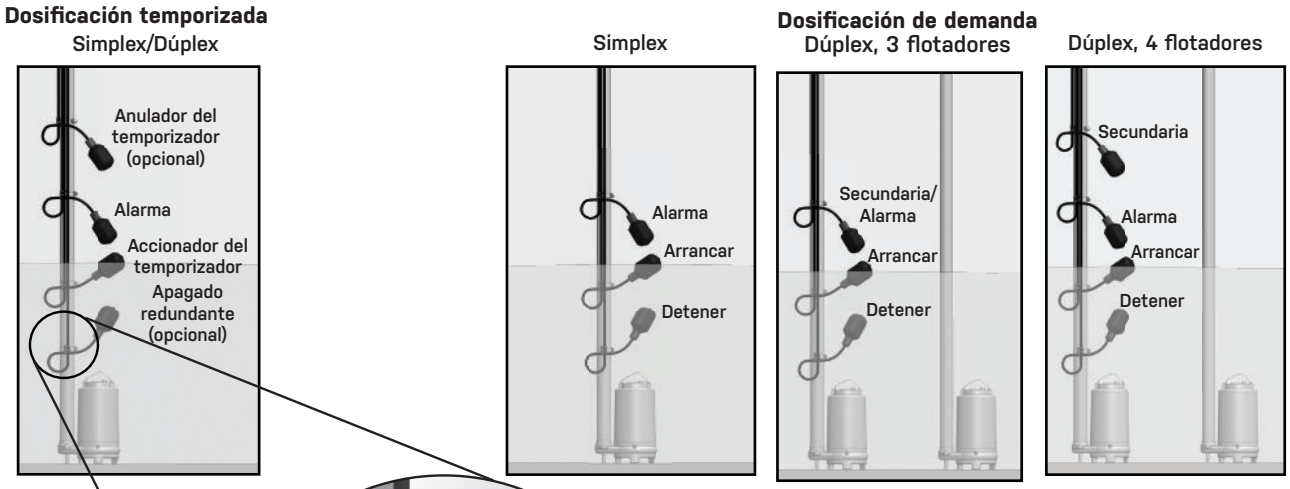
NOTA

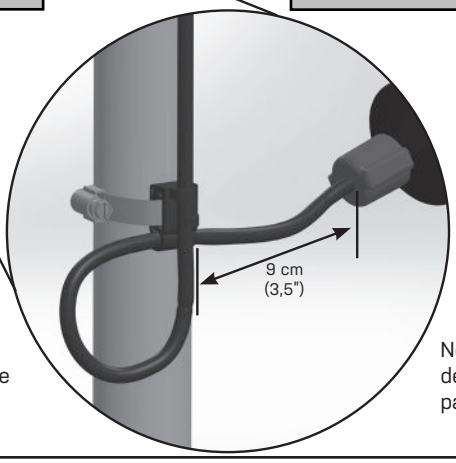
No empalmar el cable del sensor C-Level™.
No pasar el cable del sensor C-Level™ o los cables de los interruptores de flotador por el mismo conducto eléctrico de los cables de la bomba.



Montaje del panel de control

Instalación del interruptor de nivel





Apretar la abrazadera.

La abrazadera para manguera debe ser de acero inoxidable 18-8.

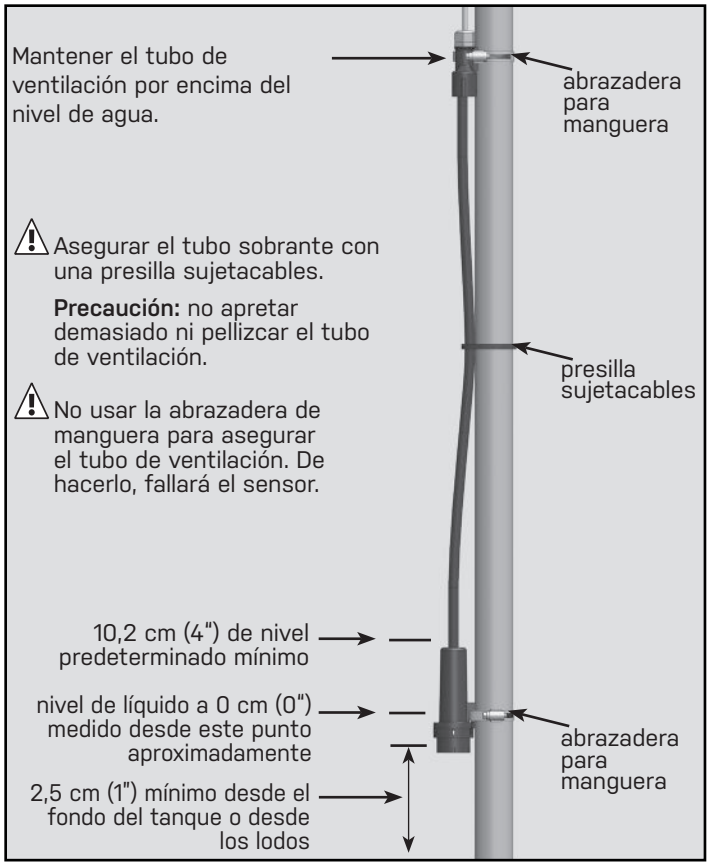
La banda de la abrazadera para manguera no debe interferir con la operación del flotador.

Los flotadores deben tener libre movimiento. No pueden tocarse entre sí ni tocar los equipos en la cámara de la bomba.

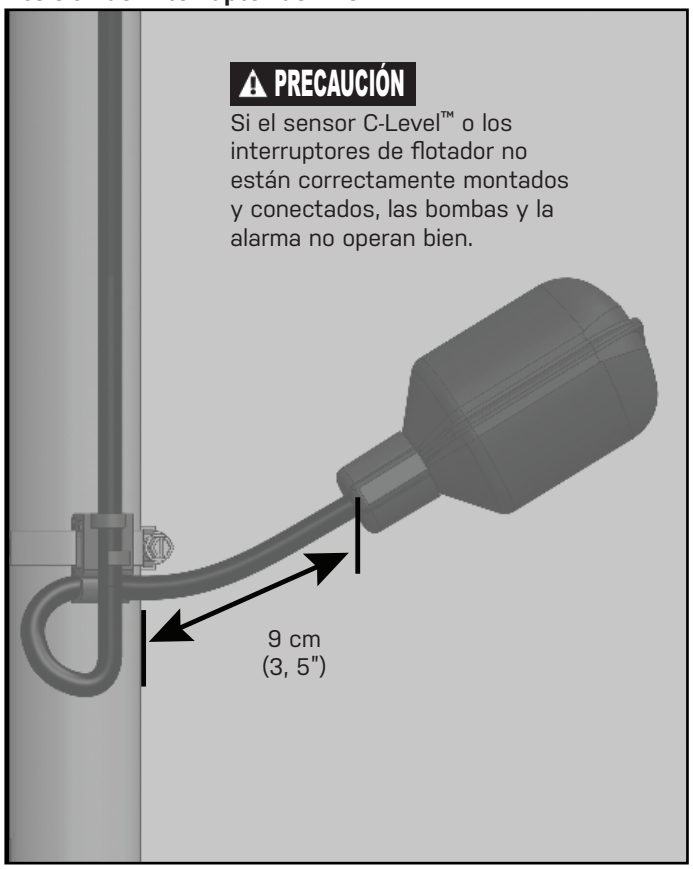
No instalar el cable por debajo de la abrazadera para manguera.

Instalación del sensor C-Level™ y del interruptor de flotador

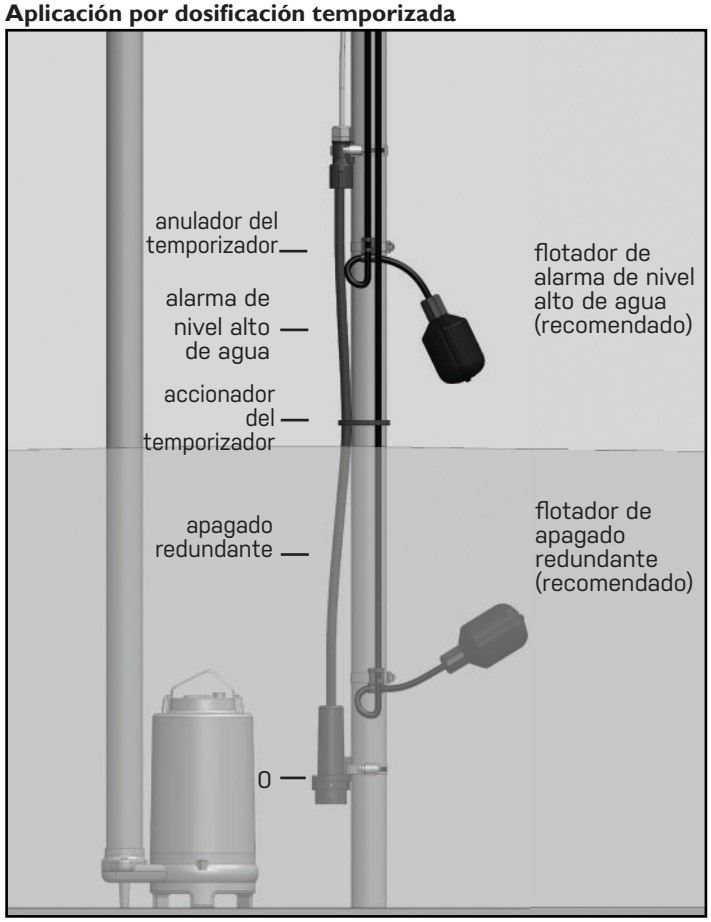
Posición del sensor C-Level™



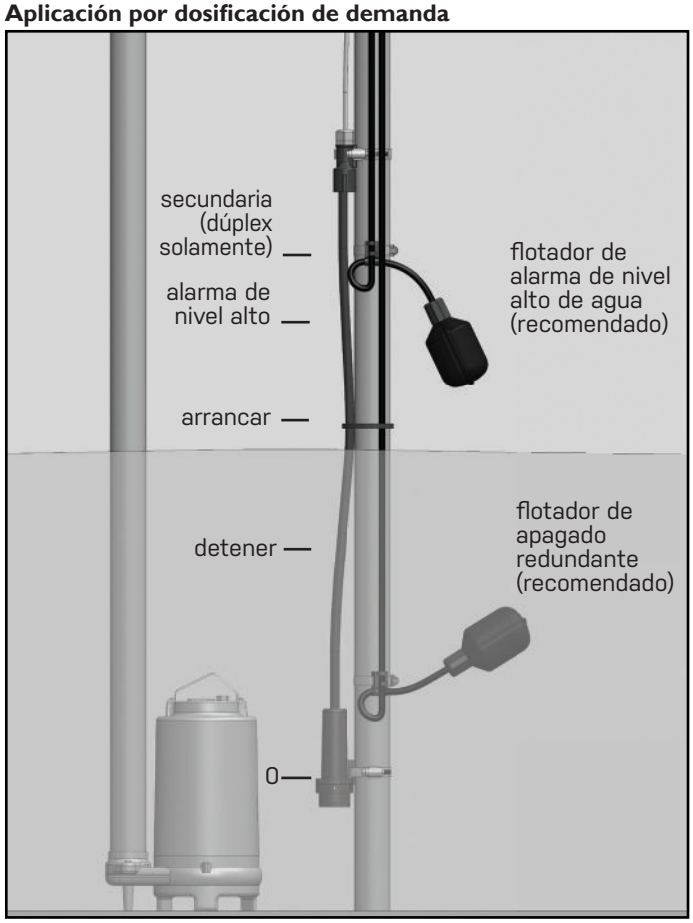
Posición del interruptor de nivel



Aplicación por dosificación temporizada



Aplicación por dosificación de demanda



Cableado del panel de control

1 Localizar la entrada del conducto en la parte inferior de la caja tal como se ilustra. Consultar los códigos locales para saber el número de circuitos de corriente necesarios. El diagrama eléctrico está situado en la cubierta interior del panel de control.

⚠ PRECAUCIÓN

Asegurarse de que la tensión sea igual a la indicada en la placa del motor.

Se recomienda proporcionar fuentes de alimentación separadas para la bomba y el control/la alarma.

Es necesario utilizar un conducto tipo 4X para mantener la clasificación tipo 4X del panel de control.

2 Conectar los siguientes cables en las terminales correspondientes:

- entrada de alimentación de cada disyuntor para bombas
- entrada de alimentación para el control/la alarma
- bomba 1
- bomba 2 (dúplex exclusivamente)
- sensor C-Level™
- interruptores de flotador (recomendados)

Ver los detalles en la etiqueta respectiva en el diagrama eléctrico localizado en la cubierta interior del panel de control.

3 Una vez finalizada la instalación, verificar la operación correcta del panel de control.

Configuración y operación

Girar el dial y pulsar para seleccionar el indicador de modo de la bomba correspondiente o el icono de configuración del panel.

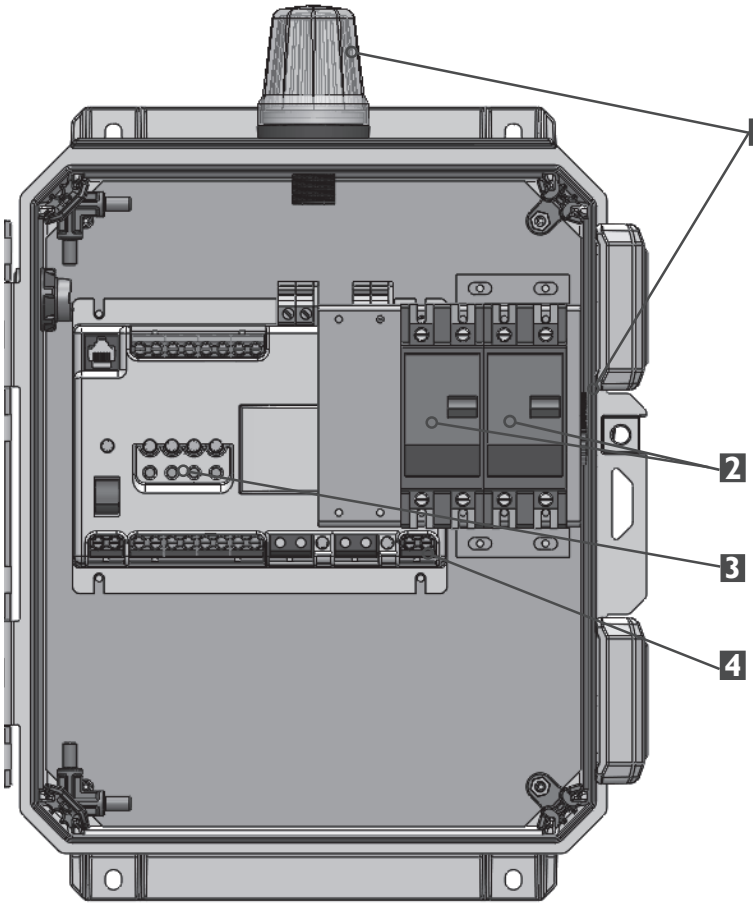
BOMBA 1

BOMBA 2 (dúplex exclusivamente)

HOA

CONFIGURACIÓN

Conteos y ETM	- Despliega el tiempo transcurrido de funcionamiento de la bomba y los conteos de ciclos y alarmas de la bomba
Configuración del temporizador	- Configura los temporizadores (exclusivamente en modo de dosificación temporizada)
Configuración del nivel	- Configura los puntos de activación del nivel de líquido
Alternación (dúplex exclusivamente)	- Configura el modo de alternación para paneles dúplex
Avanzado	- Configura las funciones avanzadas y visualiza las herramientas de localización de problemas



Se ilustra el modelo dúplex

⚠ PRECAUCIÓN Sellar los conductos eléctricos con un sellador autorizado y así evitar la entrada al panel de gases o humedad.

1 Sistema de alarma (luz indicadora y bocina)
Cuando se presenta una condición de alarma, se activan la luz roja y la bocina o alarma sonora.

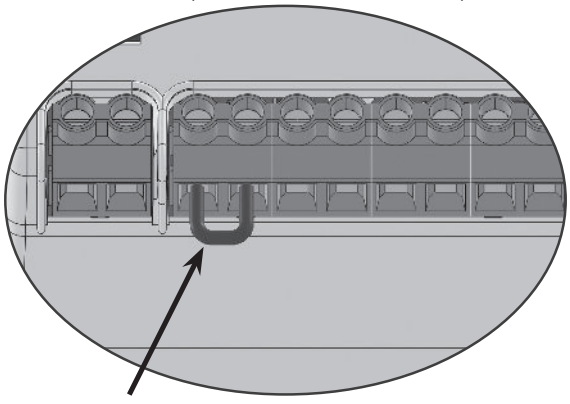
Al pulsar y soltar el botón de prueba/silencio (Test/Silence), queda silenciada la alarma sonora o bocina. Una vez despejada la condición de alarma, se restablece el sistema de alarma.

2 Disyuntores
Cada circuito de la bomba tiene un disyuntor termomagnético que protege el circuito ramificado y permite desconectar la bomba.

3 Interruptores de prueba del flotador
Pulsar para simular la condición de cierre de un flotador para cada entrada.

4 Contactos auxiliares secos
Normalmente abiertos - Se ABREN los contactos bajo condiciones normales y se CIERRAN cuando hay una condición de alarma. CERRADOS durante una pérdida de corriente. Se restablecen automáticamente una vez se haya despejado la condición de alarma.

Contactos auxiliares, valores nominales: 120V, 5A



NOTA Si no se utiliza el flotador redundante de apagado, en su lugar debe instalarse un puente.

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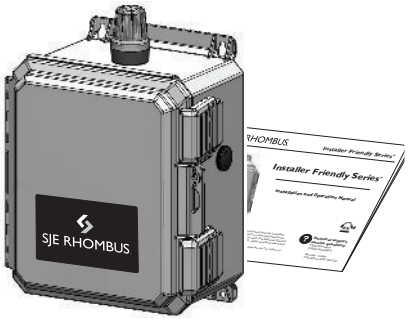
Installer Friendly Series®

Manuels d'installation et de fonctionnement

c UL us LISTED

PIÈCES - Inclus

*Le panneau de contrôle peut être commandé avec ou sans capteur C-Level™/flotteurs.

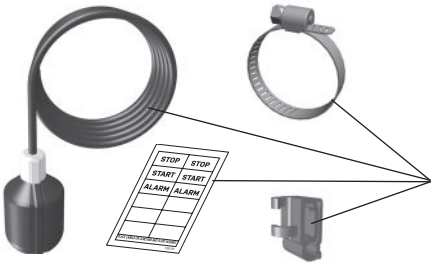


Capteur C-Level™ | Flotteur redondant d'arrêt | Flotteur de haut niveau d'eau

Modèles avec capteur C-Level™

OU

Modèles avec flotteurs



⚠ AVERTISSEMENT!

DANGER DE CHOC ÉLECTRIQUE
Débranchez toutes les sources d'alimentation avant d'effectuer un entretien sinon, il y a un risque de blessure grave ou mortelle.

Ce panneau de contrôle doit être installé et entretenu par un électricien certifié conformément au National Electric Code NFPA-70 et aux codes électriques provinciaux et locaux. Les boitiers de Type UL 4X sont conçues pour un usage intérieur ou extérieur.

La garantie sera annulée en cas de modification du panneau de contrôle.

Pour plus de détails sur le fonctionnement, les options disponibles, ou pour des questions sur l'entretien, veuillez appeler le support technique de SJE Rhombus.

SJE Rhombus offre une garantie limitée de cinq ans sur le panneau de contrôle et du capteur C-Level™. Pour en savoir plus au sujet des termes et conditions, veuillez visiter **www.sjerhombus.com**.

Les produits retournés doivent être nettoyés, désinfectés ou décontaminés le cas échéant avant l'expédition pour éviter d'exposer les employés à des risques sanitaires lors de la manipulation dudit matériau. Toutes les lois et réglementations en vigueur sont applicables.

Fabriqué par :
SJE Rhombus
Detroit Lakes, MN É.-U.

Support technique : (+1) 800 746 -6287
techsupport@sjerhombus.com
www.sjerhombus.com
Support technique: Heures du lundi au vendredi, de 7 h à 18 h Heure du Centre

Installation du capteur C-Level™ et des interrupteurs à flotteur

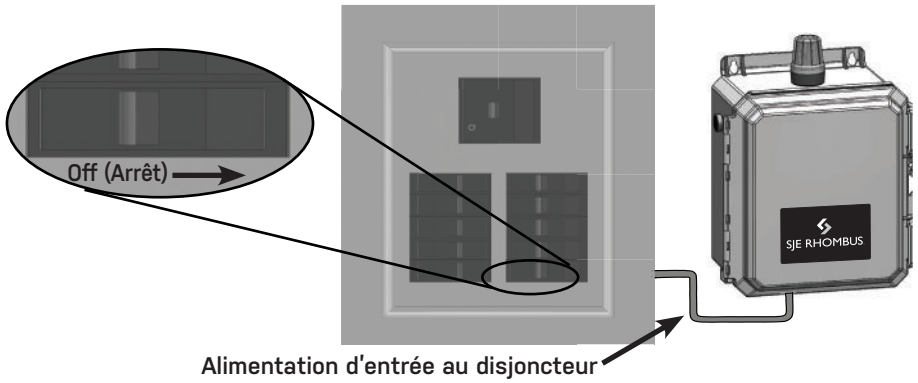
Le panneau de contrôle IFS fonctionne avec un capteur C-Level™ et 1 ou 2 interrupteurs à flotteur recommandé ou avec 3 à 4 interrupteurs à flotteur. Pour le fonctionnement du capteur C-Level™, le capteur C-Level™ est conçu pour activer les fonctions de démarrage, d'arrêt et d'alarme de la pompe et les interrupteurs à flotteur de secours sont destinés aux redondant d'arrêt et l'alarme de haut niveau. Pour le fonctionnement de l'interrupteur à flotteur, les interrupteurs à flotteur commandent les fonctions de démarrage, d'arrêt et d'alarme de la pompe.

⚠ ATTENTION

Débranchez toutes les sources d'alimentation du panneau de contrôle avant d'installer ou d'entretenir le capteur C-Level™, les interrupteurs à flotteur ou les pompes dans le réservoir. Le cas échéant, cela pourrait entrainer un risque de choc électrique grave ou mortel.

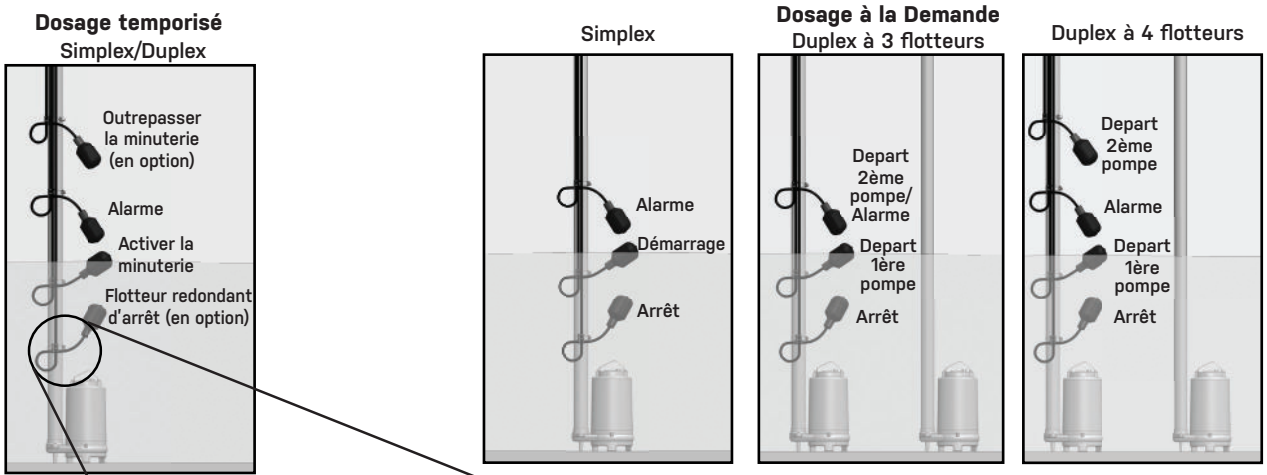
NOTE

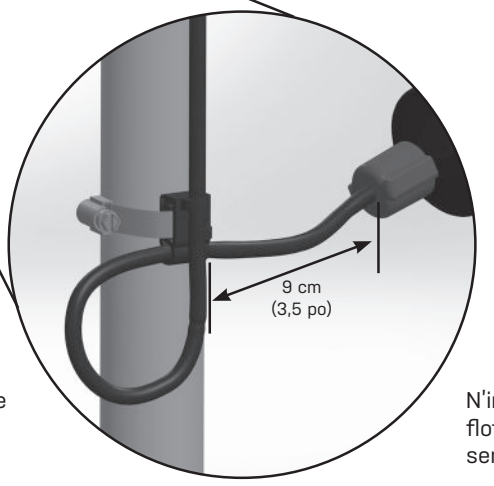
Ne pas épisser le câble du capteur C-Level™. Ne pas acheminer le câble du capteur C-Level™ ou les câbles de les interrupteurs à flotteur dans le même conduit que les câbles de la pompe.



Fixer le panneau de contrôle au mur

Installation de l'interrupteur à flotteur





Serrez le collier de serrage.

Le collier de serrage est fait en acier inoxydable 18-8.

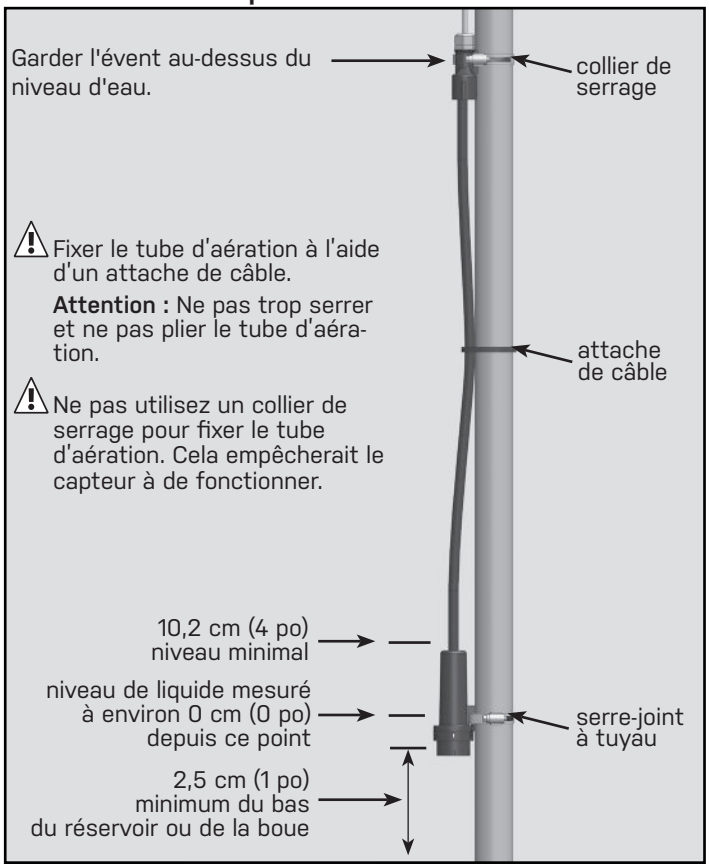
Assurez-vous qu'aucune partie du collier de serrage n'interfère pas avec le fonctionnement du flotteur.

Les flotteurs doivent bouger librement. Ils ne doivent pas se toucher entre eux ni avec les équipements qui se trouve dans le bassin de la pompe.

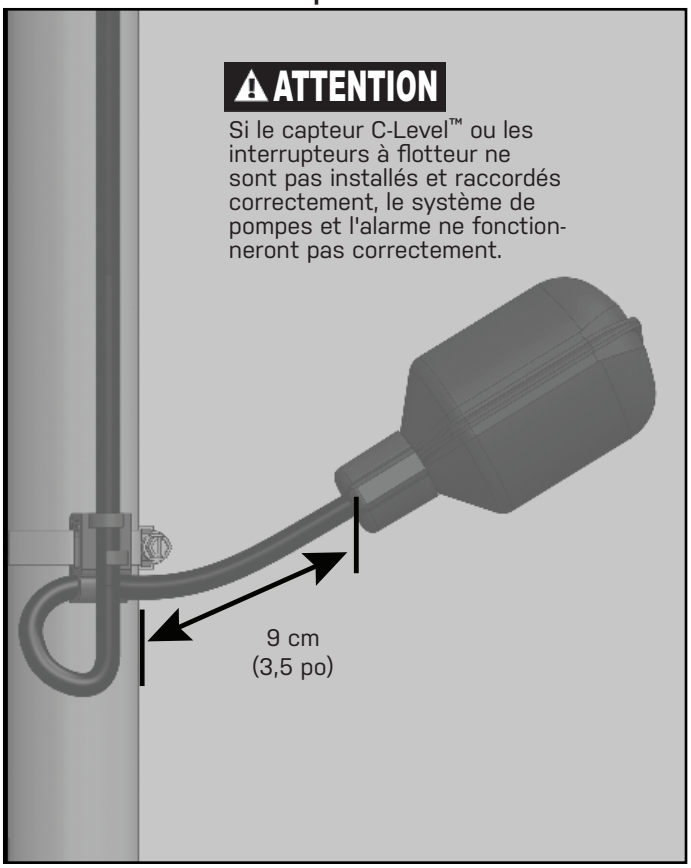
N'installez pas le cable du flotteur sous le collier de serrage.

Instructions d'installation du capteur C-Level™ et de l'interrupteur à flotteur

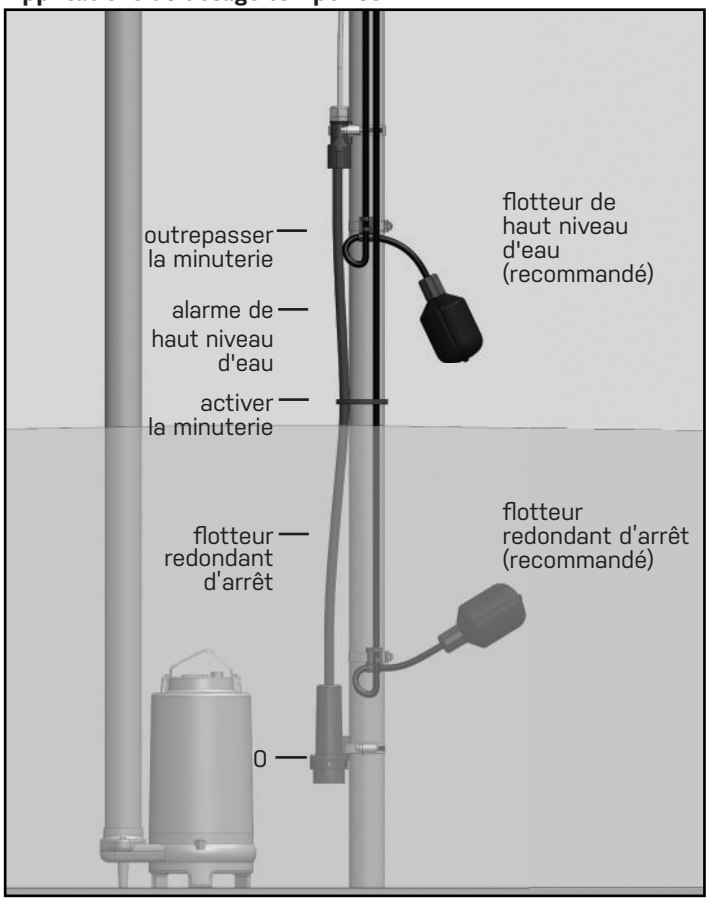
Positionnement du capteur C-Level™



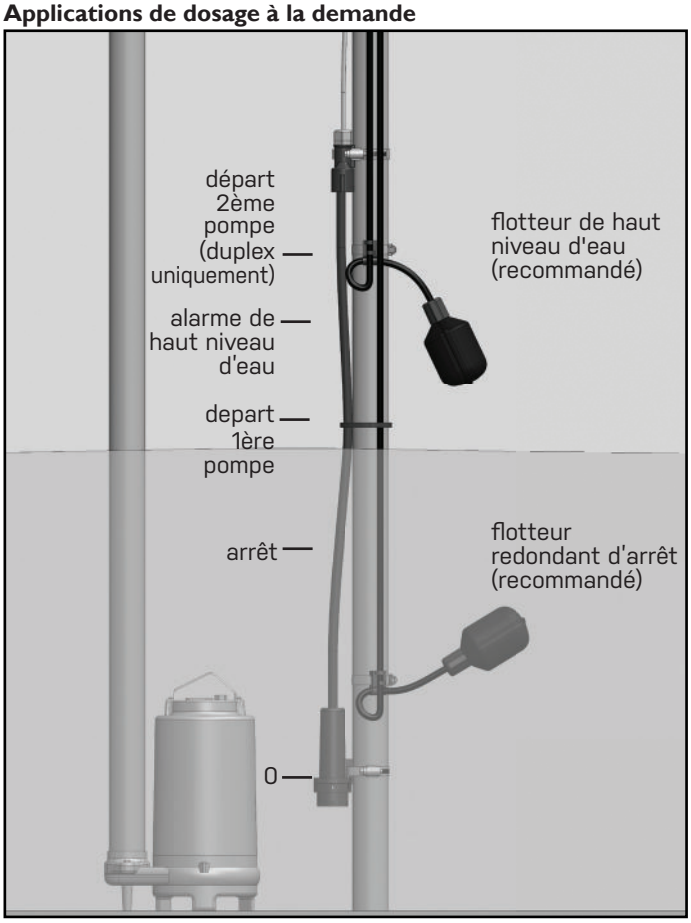
Positionnement de l'interrupteur à flotteur



Applications de dosage temporisé



Applications de dosage à la demande



Raccordement du panneau de contrôle

1 Localisez l'entrée des conduits au bas du boitier comme illustré. Examinez les codes locaux pour vérifier le nombre de circuits d'alimentation requis. Le diagramme est situé à l'intérieur du couvercle du panneau de contrôle.

⚠ ATTENTION

Assurez-vous que la tension d'alimentation est identique à celle indiquée sur la plaque d'identification du moteur de pompe. Fournir des sources d'alimentation distinctes pour la pompe et le contrôle/alarme est recommandé.

Des conduits de type 4X doivent être utilisés afin de conserver la classification de type 4X du panneau de contrôle.

2 Branchez les câbles suivants aux bornes appropriées :

- alimentation d'entrée pour chaque disjoncteur de pompe
- alimentation d'entrée pour la commande/alarme
- pompe 1
- pompe 2 (panneaux duplex uniquement)
- capteur C-Level™
- interrupteurs à flotteur (recommandé)

Voir l'étiquetage du diagramme à l'intérieur du couvercle du panneau de contrôle pour plus de détails.

3 Vérifiez que le panneau de contrôle fonctionne correctement après l'installation.

Configuration et fonctionnement

Tournez le bouton rotatif et appuyez pour sélectionner l'indicateur de mode de la pompe ou l'icône des paramètres du panneau de commande correspondant.

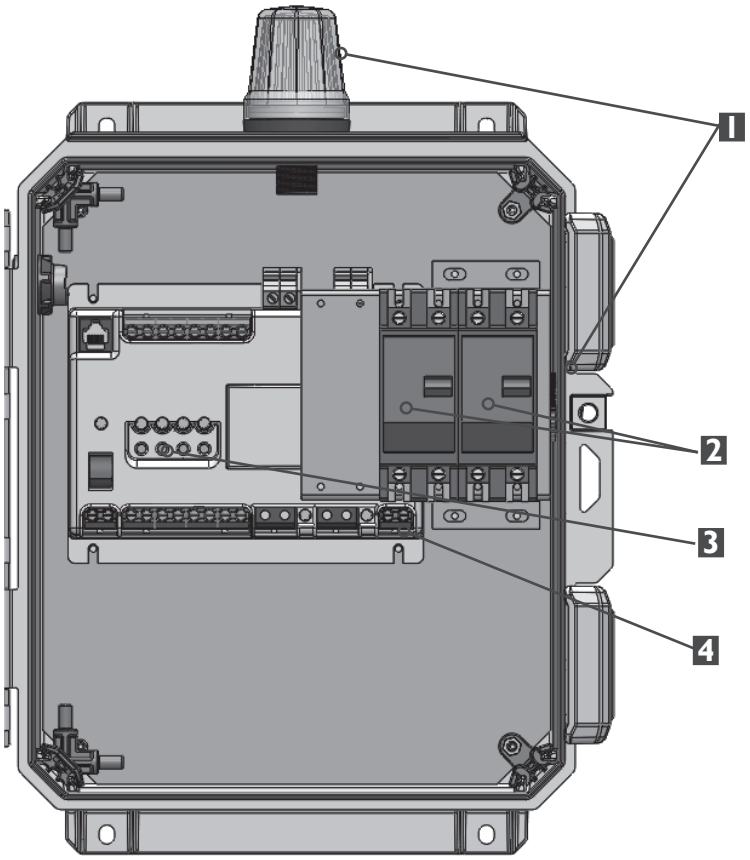
PUMP 1

PUMP 2 (panneaux duplex uniquement)

HOA

SETTINGS

Counts and ETMs	- Affiche le temps de fonctionnement de la pompe et compte les cycles et alarmes de la pompe
Timer Settings	- Configure les minuteries (mode dose programmée uniquement)
Level Settings	- Configure les points de consigne de niveau
Alternation (duplex only)	- Configure le mode d'alternance pour les panneaux duplex
Advanced	- Configure les fonctions avancées et afficher les outils de dépannage



Modèle duplex illustré

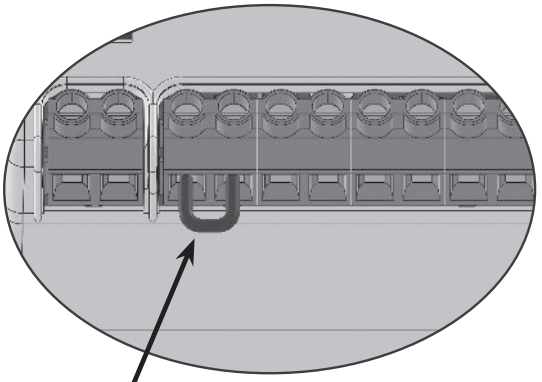
1 Système d'alarme (sonnerie et témoin)
Lorsqu'une alarme est déclenchée, le témoin rouge s'allume et la sonnerie retentit.

Si vous appuyez/relâchez le commutateur TEST/SILENCE (ESSAI/SILENCE), sonnerie s'arrêtera. Lorsque l'alarme est n'est plus présente, le système d'alarme est réinitialisé.

2 Disjoncteurs
Chaque circuit de pompe possède un disjoncteur thermo-magnétique qui assure une protection du circuit et un moyen d'isoler la pompe.

3 Boutons d'essai du flotteur
Appuyer pour simuler une condition de fermeture du circuit pour chaque flotteur.

4 Contacts auxiliaires secs
Normalement ouverts - Les contacts sont OUVERTS si les conditions sont normales et FERMÉS si une alarme est activée. FERMÉS pendant une coupure de courant. Se réinitialisent automatiquement dès que l'alarme est corrigée. Capacités des contacts aux. : 120 V, 5 A



⚠ ATTENTION Sceller le conduit électrique avec un produit d'étanchéité approuvé pour empêcher l'humidité ou les gaz de s'infiltrer dans le panneau de contrôle.

NOTE Si le flotteur redondant d'arrêt n'est pas utilisé, un fil de liaison doit être installé à sa place.

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FujiMAC Air Pump Online Manual

Thank you for purchasing the FujiMAC Air Pump.
Be sure to read through this manual before proceeding with operation.

FujiMAC
http://www.fujimacjapan.com/

Contents

■ Before Use

- Check for any problems on the outside of this product.
- Check that all the accessories are included.
  Accessories: Rubber hose, hose band, manual
- Please keep this manual for future reference.
- Read through this manual and ensure you understand how to use and care for this product before proceeding with operation.
- The contents of this section are vital to ensuring safety. Please pay special attention to the following signs.

⚠ DANGER

Indicates an extremely hazardous situation that could result in death or serious injury if not avoided.

⚠ WARNING

Indicates a potentially hazardous situation that could result in death or serious injury if not avoided.

⚠ CAUTION

Indicates a potentially hazardous situation that could result in minor or moderate injury and/or property damage if not avoided.

■ Safety Precautions

⚠ WARNING

- When this appliance is used by children from 8 years old and older and persons with reduced physical, sensory, or mental capabilities or lack of experience and knowledge, they must first be made to understand the hazards involved by being given supervision and instruction concerning safe use of the appliance by a person responsible for their safety.
- Supervise children to ensure that they do not play with the appliance.
- Close supervision is necessary when this appliance is used near children.
- If the power cord is damaged and needs replacement, it must be sent to the manufacturer or a service agent to avoid a hazardous situation. Alternatively, it must be replaced by a similarly qualified person.
- Unplug or switch off the appliance before carrying out maintenance.
- This product is an air pump designed to transmit air under water. Do not use this product for any use other than the intended use.
- Do not place flammable materials and/or gas near this appliance. Doing so may result in electric shock or fire.
- If an extended power cord is needed, a suitably sized extension cord should be used. Using a cord that is too small may cause it to overheat. Be sure to choose a suitable extension cord so that it will not be tripped over or pulled.

⚠ WARNING — Preventing electrical shock

- Do not try to open or repair this product yourself. Only the retailer from which the purchase was made and trained personnel can provide overhaul and repair services as needed.
- Do not touch the plug with wet hands.
- Do not open the product's cover with the power plug inserted into an outlet.
- Use this product at a higher position than the water level in order to prevent water backflow.
- Do not immerse this product in the water. If the air pump falls in the water, do not reach for it. Unplug this product immediately.
- Carefully check this product before use. Do not plug in the air pump if there is water on any parts not intended to be wet.
- Do not operate this product if it has a damaged cord or plug or if it is malfunctioning or has been dropped or damaged.
- If the plug does not fit fully into the outlet, try switching the orientation of the plug. The plug may not fit into the outlet because the pins of the plug may have different polarities. If the plug still does not fit, contact a qualified electrician. Do not use an extension cord unless the plug can be fully inserted.

⚠ CAUTION

- This product will become hot during operation. The bottom of this product will become especially hot during operation, so do not touch it directly with bare hands. Doing so may cause burns and other injuries.
- Do not throw water on this product. Doing so may cause damage to this product or electrical shock.
- Do not lift this product by the filter cover or power cord. Doing so may cause damage to this product and/or injury.

■ Installation Manual

- Install this product in a well-ventilated place away from direct sunlight, preferably under a cover.
- Install the air pump in a place that provides easy access for inspection and maintenance.
- Place this product level on a stable surface.
- Connect this product and the pipe by a rubber tube and tighten by a pinchcock.
- Ensure the voltage shown on the label correlates with the mains supply voltage.

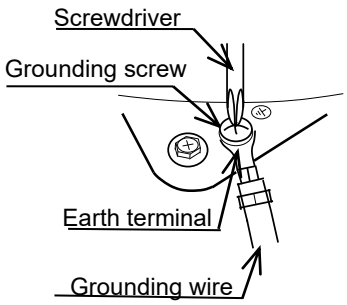
⚠ WARNING

- All electrical work must be performed by a licensed electrician.
- Do not place any object on the power cord. Doing so may cause electric shock and/or fire.

⚠ CAUTION

- The diaphragms and valve will be damaged by chlorine gas and other fumes. Any hole or gap (i.e., conduit or air pipe) where chlorine gas could pass through to this product must be sealed completely with silicon sealant or other suitable material. (Diaphragm and valve damage is not covered by the warranty.)
- To prevent this product from falling into the water tank, do not install this product directly above the water tank.
- Make sure this product is used in a dry, moisture and dust-free place protected from rain, splashing water, flooding, and snow accumulation.
- Do not install this product under a kitchen fan or where air that includes oil can be taken into this product.
- Avoid installing this product in a bedroom or other places where noises may be a nuisance.
- Install this product above the water level so that water does not flow back by siphoning.
- Ensure that water cannot reach the socket. (Refer to Example of Suggested Installation.)
- This product must be connected to a grounded, metallic, permanent wiring system or an equipment-grounding terminal or lead on the product.
- Be sure to conduct grounding construction work. (Applicable only for 2-pin plugs.)

Grounding instruction (For 2-pin plugs)



Grounding must be done to avoid the risk of electric shock.

1. Use a grounding wire with a thickness of AWG16 or more.
2. Remove the grounding screw from this product's cover.
3. Connect the grounding wire to this product's cover using the grounding screw and a screwdriver.
4. Make sure the grounding screw is securely tightened and does not move.
5. The grounding wire must be connected to a grounding rod by a qualified electrician.
   *Do not connect it to anything flammable such as a gas pipe.

⚠ WARNING

- **Improper grounding may cause electric shock and/or fire**.

Grounding instruction (For North America)

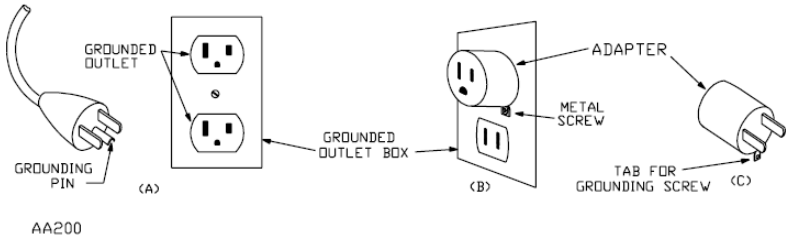
This product must be grounded. In the event of an electrical short circuit, grounding reduces the risk of electric shock by providing an escape wire for the electric current. This product is equipped with a cord having a grounding wire with an appropriate grounding plug. The plug must be plugged into an outlet that is properly installed and grounded in accordance with all local codes and ordinances.

⚠WARNING – Improper installation of the grounding plug is able to result in a risk of electric shock. When repair or replacement of the cord or plug is required, do not connect the grounding wire to either flat blade terminal. The wire with insulation having an outer surface that is green with or without yellow stripes is the grounding wire.
Substitution of the signal word "DANGER" for "WARNING" is not prohibited when the risk associated with the product is such that a situation exists which if not avoided will result in death or serious injury.

Check with a qualified electrician or serviceman when the grounding instructions are not completely understood, or when in doubt as to whether the product is properly grounded. Do not modify the plug provided; if it does not fit the outlet, have the proper outlet installed by a qualified electrician.

This product is for use on a nominal 120-V circuit, and has a grounding plug similar to the plug illustrated in sketch A in Figure 1. A temporary adapter similar to the adapter illustrated in sketches B and C may be used to connect this plug to a 2-pole receptacle as shown in sketch B when a properly grounded outlet is not available. The temporary adapter shall be used only until a properly grounded outlet (sketch A) is installed by a qualified electrician. The green colored rigid ear, lug, or similar part extending from the adapter must be connected to a permanent ground such as a properly grounded outlet box cover. Whenever the adapter is used, it must be held in place by a metal screw.

Figure 1
Grounding Method



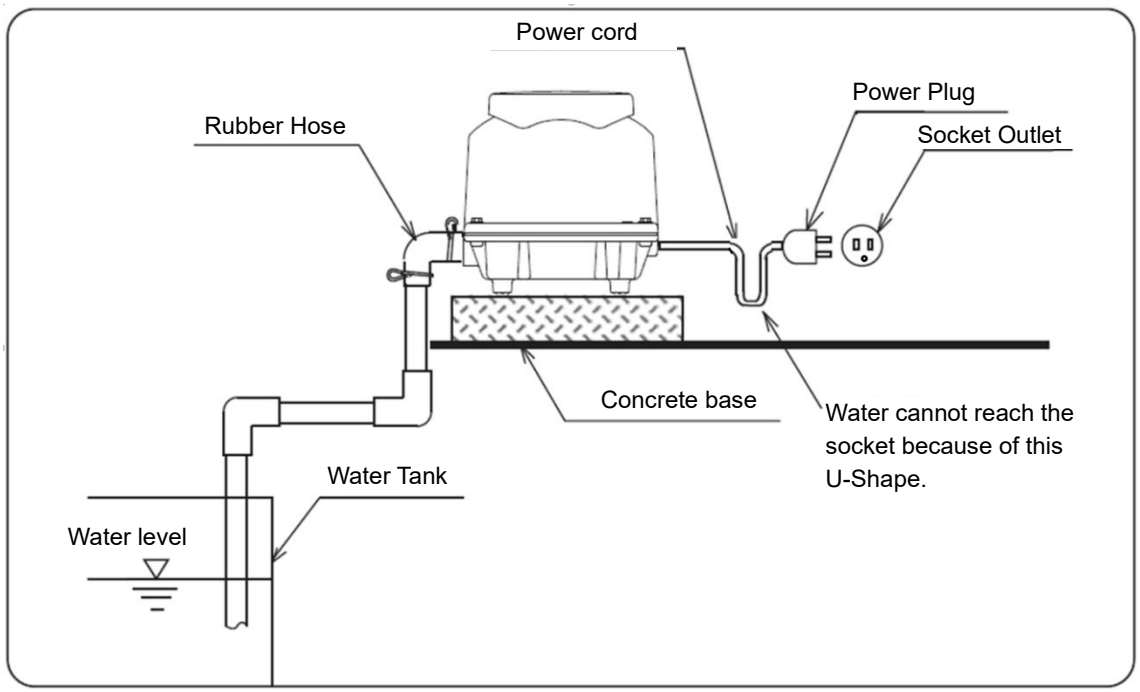
Extension Cords (For North America)

Use only a 3-wire extension cord that has a 3-blade grounding plug, and a 3-slot receptacle that accepts the plug on the product. Make sure your extension cord is not damaged. When using an extension cord, be sure to use one heavy enough to carry the current your product draws. For lengths less than 50ft, 18AWG extension cords shall be used. An undersized cord results in a drop in line voltage and loss of power and overheating. (NOTE: Table 1 shows the correct size to use depending on cord length and nameplate ampere rating. When in doubt, use the next heavier gauge. The smaller the gauge number, the heavier the cord.)

Table 1
Minimum Gauge for Extension Cord

Cord length(ft)	25	50	100	150	200	250	300	400	500
AWG	18	18	16	14	12	12	10	10	8

Example of Suggested Installation



■ Test Operation

- The water tank (i.e., the purification tank) that is connected to this product must be filled with water up to the prescribed level for the tank before inserting this product's plug into an outlet and starting operation.
- Ensure there is proper aeration after turning on the air pump.
- Ensure that this product is making no abnormal noises or vibrations.

⚠ CAUTION

- The recommended working pressure for this product is ±20% of the normal pressure specified on this product's name plate. Check the actual working pressure (back pressure) between this product and the water tank connected to this product. This pressure being outside the recommended range may shorten the service life of the product, so adjust the pressure by changing, for example, the piping.
- The air flow volume will vary depending on the actual voltage. For example, a rated voltage (230-240V) product can be used at 220V, but the air volume will be smaller than when operated at the rated voltage (230–240 V). The air volume will change depending on the back pressure as well.

■ Inspection and Maintenance as Required

⚠ CAUTION

- Before starting work, disconnect the power plug from the outlet. Do not disconnect the plug by pulling on the cord. Doing so may cause damage to the cord.

⚠ WARNING

- This product becomes hot during operation. The bottom of this product becomes especially hot. Do not touch it directly. After disconnecting the power cord plug, check that this product has cooled before opening the cover. Failing to do so may cause burns and other injuries.

(1) Air Filter

⚠ CAUTION

- Inspect and clean every 3 or 4 months and replace every year.
- To optimize the lifespan of the air filter when used in areas where dust accumulation may be high, frequent maintenance is required. If the air filter gets too dirty, replacement will be necessary. Failing to do so may cause overheating, reduced air volume, and short-term damage to the diaphragm.
- When the filter cover is fixed in place with screws, the recommended tightening torque for theses screws is 1.4 Nm (1 ft-lb). Note that excessive tightening may cause damage to the screws. If there are no screws, ensure that the filter cover is oriented correctly, and then push down on it to firmly fit it in place.

(2) Diaphragm/Valve

⚠ CAUTION

- Replace the diaphragm/valve every year. Be sure to replace the diaphragm/valve before it becomes damaged.
- If the diaphragm/valve becomes damaged, the auto-stop function will engage (excluding MAC40RII). Do not leave this product in this stopped state, quickly replace the damaged part. Failing to do so may decrease the performance of the purification tank and cause foul odors. The diaphragm and compression chamber assembly are consumable parts and are not covered by the warranty. If necessary, purchase a new part from a retailer.

(3) Pressure

⚠ **CAUTION**

- The recommended working pressure for this product is ±20% of the normal pressure, which is specified on this product's name plate. Do not perform operation with abnormally high or low pressure. Doing so may cause abnormal heat generation or early diaphragm damage.

(4) Power Plug

⚠ **WARNING**

- Check at least once a year whether any dirt or dust has built up on the power plug, and be sure to plug into the power point firmly. Dirt/dust accumulation and faulty connections may cause electric shock and/or a fire.

(5) Auto-Stop Function

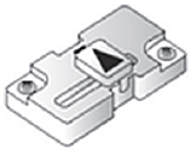
- Make sure to inspect the function every time the diaphragm/valve assembly is replaced. Remove the auto-stop piece and put in the plug to ensure the auto-stop function works properly. After checking, disconnect the plug from the power point and set the auto-stop piece in the right position. (See below.)

⚠ **WARNING**

- Be sure to turn off the power when replacing the diaphragm/valve assembly and/or handling the auto-stop piece. Failing to do so may cause an electric shock.

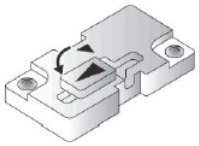
<How to remove the auto-stop piece>

1)



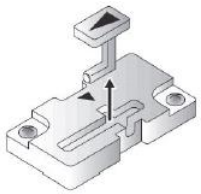
Normal position.

2)



Turn the auto-stop piece and align the ▲ symbol with the slit.

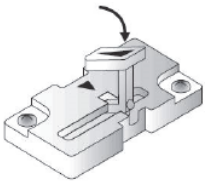
3)



Remove the auto-stop piece from the air pump auto-stop holder.

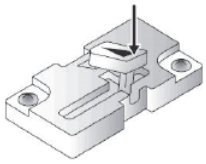
<How to set the auto-stop piece>

1)



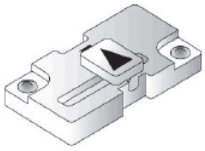
Align the ▲ symbol from the auto-stop piece toward the ▲ symbol on the auto-stop holder and slide the piece into the holder.

2)



Push it in until it clicks.

3)

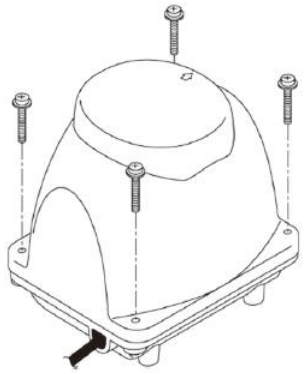


The auto-stop is now ready for use.

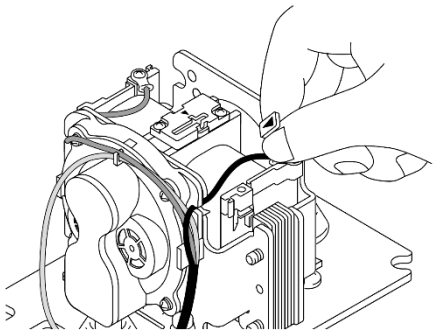
(6) Diaphragm Replacement Procedure

Cord wiring may differ from the illustration for some models.

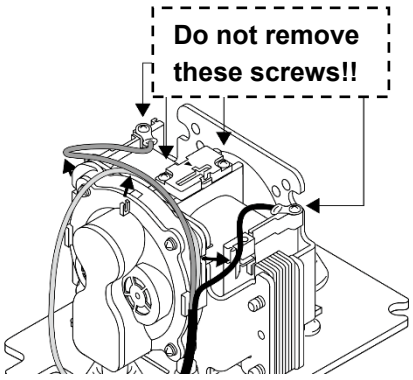
1. Replace the cover bolts using an 8 mm (5/16”) wrench.



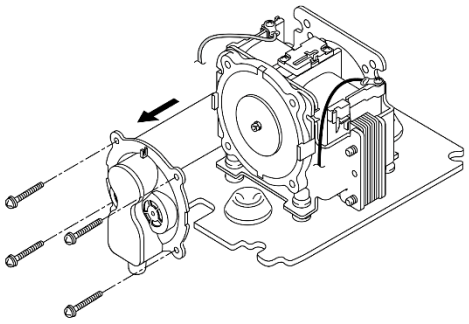
2. Remove the auto-stop piece as instructed under 5. Auto-Stop Function.



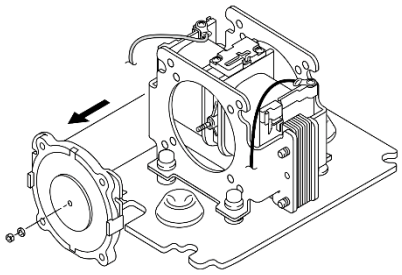
3. Remove the wires from the 3 hooks.
   NOTE: Do not remove the screws.



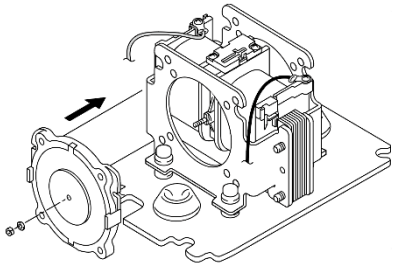
4. Remove the 4 screws from the casing using a Phillips screwdriver.



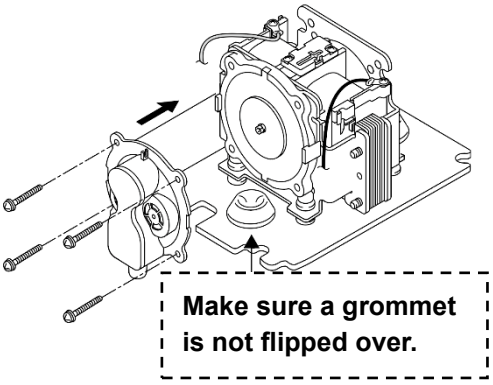
5. Remove the nut and take the diaphragm off the motor body.



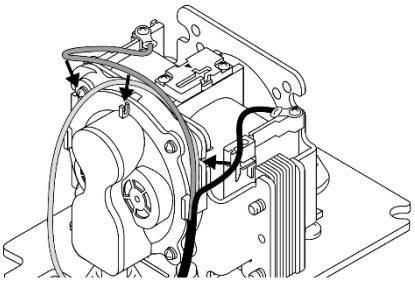
6. Install a new diaphragm using the new provided nut.
   *Tightening torque: Approx. 1 Nm (approx. 0.75 ft-lb)



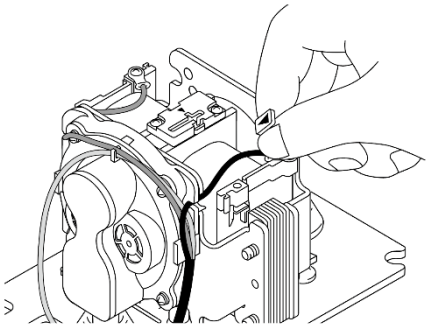
7. Insert the air outlet into the rubber grommet and reattach the casing assembly with the 4 screws.



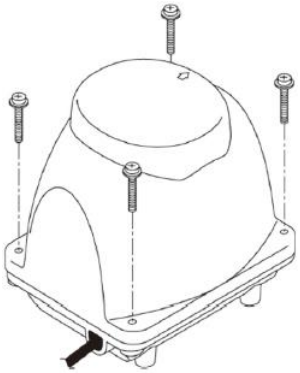
8. Replace the wires in the 3 hooks.



9. Install the auto-stop piece as instructed in the first steps.



10. Tighten the cover bolts using an 8 mm (5/16”) wrench.



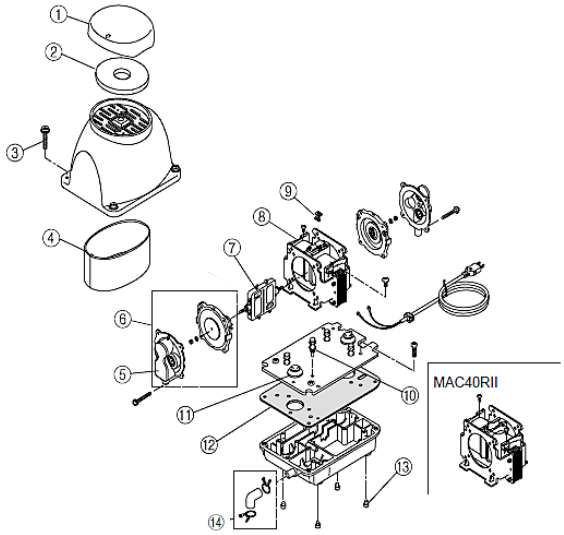
⚠ WARNING

Unplug the power cord and be sure to let the air pump cool down before opening the cover.

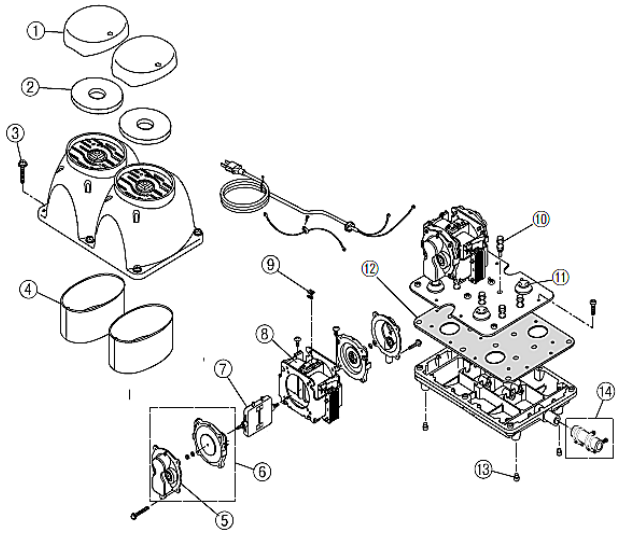
- Replace both sides of the diaphragm/casing assembly at the same time. If one diaphragm breaks, it generally indicates that the remaining diaphragm is weak and vulnerable to breaking in the near future.
- Replace the diaphragm assembly kit every year.
- Operate the blower to ensure operation is correct after replacing the diaphragms.
- Do not lubricate any internal parts of the air pump.

■ Exploded View and Parts List

<MAC40RII–120RII>



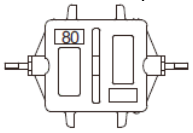
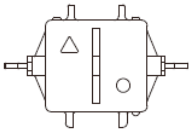
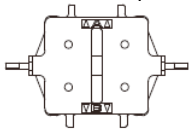
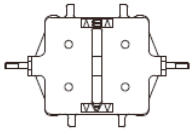
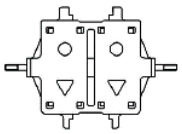
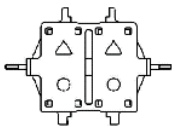
<MAC150RII–300RII>



	Part Number	Item Name	40RII	60RII(A)	80RII(A)	100RII(A)	120RII	150RII	200RII	250RII	300RII (50 Hz)	300RII (60 Hz)
1	H612	N6 Filter cover	○	—	—	—	—	—	—	—	—	—
	H613	N8 Filter cover	—	○	○	○	○	○	○	○	○	○
2	H507	N6 Air filter	○	—	—	—	—	—	—	—	—	—
	H508	N8 Air filter	—	○	○	○	○	○	○	○	○	○
6	H150K	N6 Diaphragm assembly (with N6 Compression chamber)*	○	—	—	—	—	—	—	—	—	—
	H154K	T10 Diaphragm assembly (with T10 Compression chamber)*	—	○	○	○	—	○	○	—	—	—
	H157K	T30 Diaphragm assembly (with T30 Compression chamber)*	—	—	—	—	○	—	—	○	○	○
9	H256K	N6 Auto-stop piece	—	○	○	○	—	○	○	—	—	—
	H257	T30 Auto-stop piece	—	—	—	—	○	—	—	○	○	○
10	H658	N6 Shock absorbing rubber (4 pcs.)	○	○	○	○	○	○	○	○	○	○
11	H821	N6 Rubber grommet	○	○	○	○	○	○	○	○	○	○
12	H639	R10 Tank gasket	○	○	○	○	○	—	—	—	—	—
	H638	N0 Tank gasket	—	—	—	—	—	○	○	○	○	○
13	H659	N6 Rubber foot (4 pcs.)	○	○	○	○	○	○	○	○	○	○
14	H812	A4 Exhaling rubber hose assembly	○	○	○	○	—	—	—	—	—	—
	H820	Exhaling rubber hose assembly (⌀13 straight)	—	—	○	○	—	—	—	—	—	—
	H827	T10 Different diameter hose assembly (for north America)	○	○	○	○	—	—	—	—	—	—
	H814	E2 Exhaling rubber hose assembly	—	—	—	—	○	○	○	○	○	○

NOTE: Order 2 sets of the same parts for 1 air pump (MAC150RII–300RII).

<Oscillator direction>

60RII(A), 80RII(A)	100RII(A)	150RII	200RII	250RII, 300RII (50 Hz)	120RII, 300RII (60 Hz)
Set “80” mark upward	Set “△” mark upward	Set “A” mark upward	Set “B” mark upward	Set "○" mark upward	Set “△” mark upward
					

■ Specifications

<AC 230–240V model>

		MAC 40RII	MAC 60RII	MAC 80RII	MAC 100RII	MAC 120RII	MAC 150RII	MAC 200RII	MAC 250RII	MAC 300RII (50 Hz)	MAC 300RII (60 Hz)
Air flow volume	L/min	40	60	80	100	120	150	200	250	300	300
Rated pressure	kPa	12	15	15	18	18	20	20	20	20	20
Electricity consumption (at rated pressure)	W	27/28	35/38	47/51	68/80	86/101	100/125	140/159	186/226	250	260
Electricity consumption (at open flow)	W	36	67	70	90	130	170	205	260	280	350
Rated voltage	V	230–240									
Frequency	Hz	50/60								50	60
Outlet pipe diameter	mm	18				26					
Weight	kg	5.0					9.0				
Plug type		SE / BF / A / O (GB) / O (AS)							SE / BF / A / O (GB)		
Power cord length	m	SE / BF / A / O (GB): 1.5, O (AS): 0.75					SE / BF / A: 1.5, O (GB): 2.0, O (AS): 0.75		SE / BF: 1.5, A / O (GB): 2.0		
Country of origin		Japan									

<AC120V model>

		MAC 40RII	MAC 60RII (60RIIA)	MAC 80RII (80RIIA)	MAC 100RII (100RIIA)	MAC 120RII	MAC 150RII	MAC 200RII
Air flow volume	CFM	1.4	2.1	2.8	3.5	4.2	5.3	7.1
	L/min	40	60	80	100	120	150	200
Rated pressure	PSI	1.7	2.2	2.2	2.6	2.6	2.9	2.9
	kPa	12	15	15	18	18	20	20
Electricity consumption (at rated pressure)	W	30	37	51	74	93	115	155
Rated voltage	V	AC 120						
Frequency	Hz	60						
Outlet pipe diameter	inch	0.71”				1.02”		
	mm	18				26		
Weight (With alarm unit)	lbs.	11					20	
			(12)					
	kg	5.0					9.0	
			(5.4)					
Plug type		A						
Power cord length	inch	74.02”						
	mm	1880						
Country of origin		Japan						

■ Operation of Alarm Air Pumps（MAC60RIIA、80RIIA、100RIIA for the U. S.）

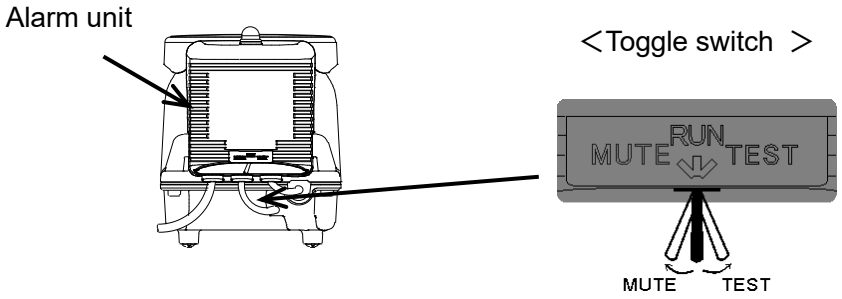
⚠ **WARNING**

- Maintenance of the alarm unit must be performed by a qualified service person.
- Do not disassemble the alarm unit. To prevent risk of electrical shock or alarm unit failure.
- Do not pull on the power cord when moving or carrying. Failure to take this precaution may result in malfunction or electric shock.
- If the alarm shell or lamp is cracked or damaged, immediately unplug it and contact a qualified service person.

⚠ **CAUTION**

- Never lift the pump by the alarm housing as this could result in electric shock or pump damage.

How to operate the alarm



RUN	Normal operating position, with treatment tank full to operating level and aeration functioning correctly.
MUTE	When the aeration system is not functioning correctly the alarm will sound. The MUTE setting will silence the alarm. (BE SURE TO RETURN SWITCH TO RUN AFTER REPAIR)
TEST	Check audible and visual alarm function by placing switch in test position.

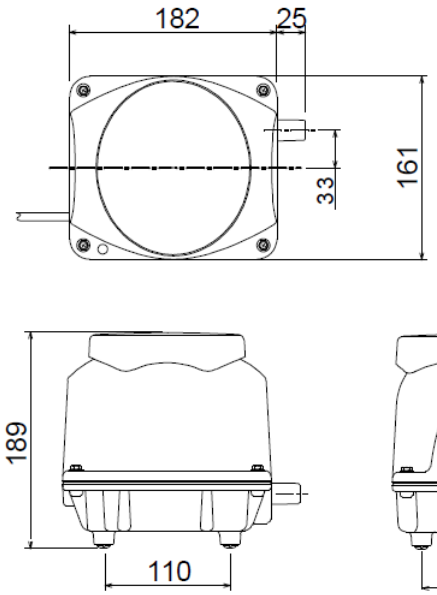
Specifications (Environment)

Temperature Range	-4 °F to 104 °F (-20 ℃ to 40 ℃)
Humidity	90% or less

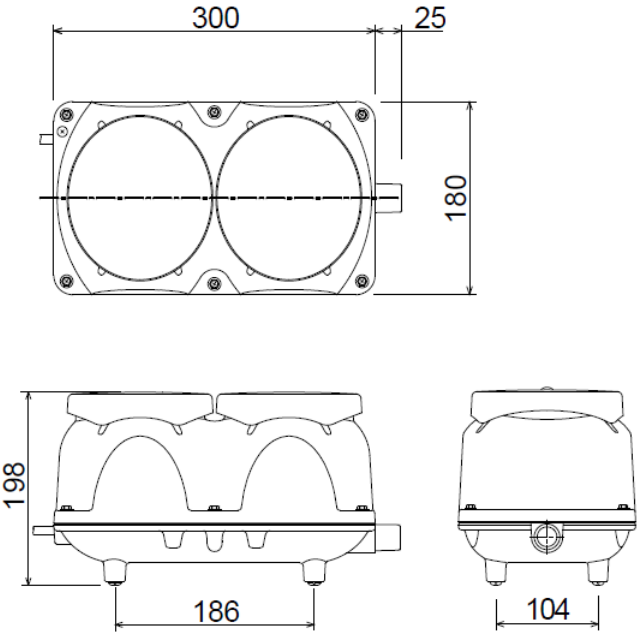
■ Overall View

Unit: mm

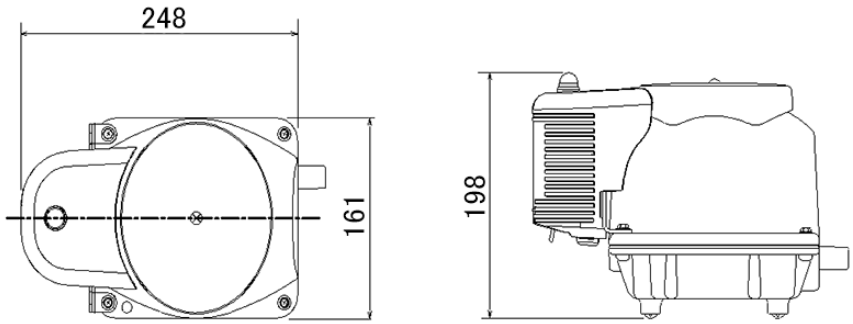
MAC40–120RII



MAC150–300RII



MAC60–100RIIA



■ Q&A

Q1. A newly purchased product does not operate. What are the possible causes?

A1. Check the following to identify the cause.

- Power is not supplied to the outlet.

  → Check whether power is supplied to the outlet. For example, connect another electrical device to the same outlet.

- The auto-stop has been triggered within the product or one of its parts is damaged.

  → The auto-stop may be triggered due to impact during transportation of the product. Open the cover and check whether the auto-stop is properly set, and check for any damaged parts.

Q2. The product stopped operating. What are the possible causes?

A2. Check the following to identify the cause.

- No power supply.

  → Check the outlet and plug. Insert the plug completely.

- The auto-stop has been triggered.

  → The diaphragm/valves are damaged. If damaged, please replace. If not damaged, other possible reasons include auto-stop problems such as poor installation and disconnection due to impact. Check that it has been installed securely.

- No electrical continuity.

  → A part may be disconnected. Perform a continuity check. If there are disconnected parts, request replacements or repairs from a maintenance company.

- The bimetal circuit breaker has been triggered.

  → If the main unit becomes too hot, the bimetal circuit breaker will be triggered, stopping operation of the product. The likely cause is clogging on the discharge or inlet side of the product. Check for closed valves; clogging of the diffuser tube, air filter, and inlet; and similar problems. Remove any clogs that you find.

Q3. The product is noisy. What are the possible causes?

A3. Check the following and take action accordingly.

- Rattling is occurring due to, for example, a pebble being caught between the product and the base.

  → Remove all foreign material and place the product so that it does not rattle.

- The screw of a part is loose.

  → Firmly tighten any loose screws.

- Sound is trapped within the installation environment and is resonating. (Refer to the following figure.)

  → Install the product in a different location.

- Sound travels through the pipes.

  → Attach a chamber.

[Examples of Installations That Are Prone to Noise]

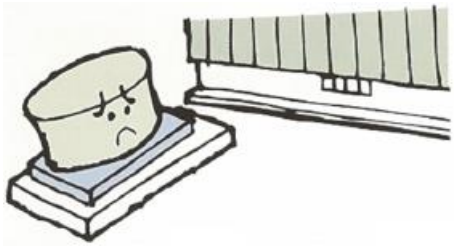
1. Installation in a narrow space between a building and a wall, a space surrounded on three sides, or a space with a ceiling.

The sound is louder on the open side.

2. Installation on a base that is in contact with the foundation of a building (berm).

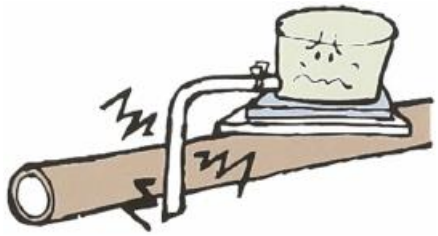
Vibration is more easily transmitted to the building.

3. The installation base is not level.



Vibration of the product increases.

4. Piping to the purification tank is in contact with the foundation of a building or another piping system.



Sound travels through the pipes to the building.

Q4. The diaphragm/valves broke in a short time. What are the possible causes?

A4. Check the following to identify the cause.

• Improper discharge pressure.

→ The discharge pressure cannot be too low or too high, as either can lead to the diaphragm being torn quickly. Remove the cause and adjust the discharge pressure to normal pressure ±20%.

	Too high			Too low	
Cause	Diffuser tube is clogged.	Valve is closed.	Piping is too long.	Piping has damaged/loose parts.	Blower failure.
Action	Cleaning/replacement	Valve adjustment	Use piping with a larger diameter.	Repair/correction	Repair

• The air filter or inlet is clogged.

→ Clogging in the filter prevents air flow, which leads to heat buildup in the solenoid. This heat can quickly damage the diaphragm. Clean or replace the filter.

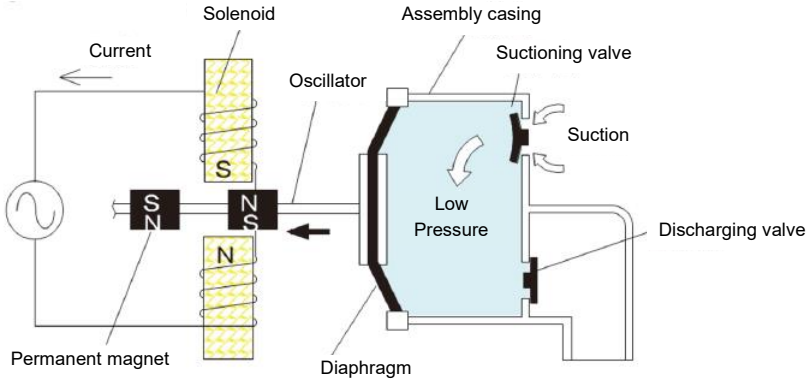
• The unit has suctioned up foreign material such as chlorine gas or oil.

→ Do not place the unit in a location where it can suction up oil or chlorine gas, or where it is exposed to direct sunlight with poor ventilation or to a lot of dust or particles, as this can quickly lead to tearing of the diaphragm. Move the unit to an appropriate location.

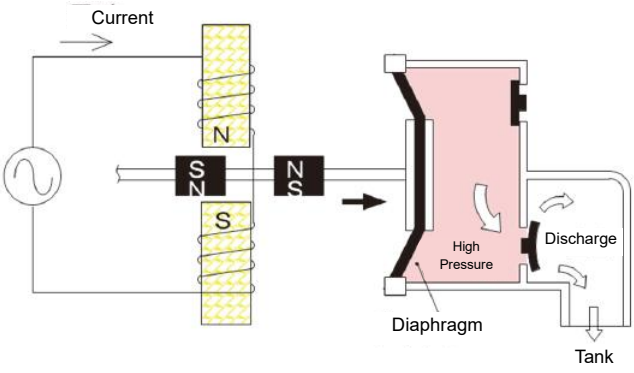
Q5. What is the working principle of this product?

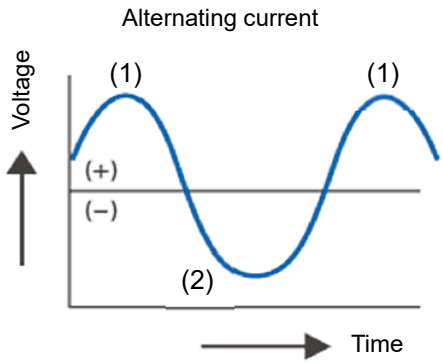
A5. The pump you purchased is a diaphragm pump. This pump works with an electromagnetic linear drive. The pump is driven by two opposing fixed electromagnets and an axially vibrating oscillator rod (equipped with permanent magnets). A diaphragm is attached to the oscillator rod on both sides, which together with the inlet and outlet valves produces the pumping function.

(1) Suctioning process



(2) Discharging process





■ Manufacturer's Warranty Information

Important

The original, dated invoice is required to activate your warranty. Please keep your purchase record in a safe place.

- Warranty claims must be submitted to the retailer from which the purchase was made. The manufacturer's warranty period is one (1) year from the date of purchase, although FujiMAC certified distributors may have extended warranty periods. Please contact with the retailer from which the purchase was made to inquire about your warranty.

(1) FujiMAC offers a full replacement warranty for pumps with a factory defect that causes the pump to malfunction or fail within the warranty period.

(2) Please note that the following criteria can be considered reasons to decline warranty replacement.

- Original dated purchase invoice not provided.
- Any failure caused by shipping damage.
- Any failure caused by not following the instructions in the owner's manual.
- Any modification to this product.
- Alteration of any product components with the exception of those required for routine maintenance.
- Any damage caused by direct impact to this product's case or internal components, or by any other rough treatment.
- Any failure or damage caused by natural disasters, flooding, or operation in wet locations, areas with heavy pollution, or with voltage spikes.
- Any failure or damage caused by rodents, ants, or other species.
- Damage caused by siphoning of water flowing from a tank or diffuser tube into this product.
- Failure or damage caused by use outside the rated voltage or frequency.
- Use of this product in such a manner that the operating pressure is greater than that recommended in the owner's manual. (I.e., too great a depth of water, restrictive or undersized piping, too great a distance from this product to the diffuser tube, an incorrect or restrictive diffuser tube, clogging.)

NOTE: This warranty covers preplacement of the pump only. Shipping and handling fees are to be paid for by the customer. FujiMAC is not responsible for any indirect damage or expense attributed to use of our product. Examples of indirect damage are not limited to but could include the following: odors; corrosive gas damage; malfunctions and flooding of facilities and/or equipment; disease; loss of living organisms such as fish, coral, and seaweed; and accumulation of any unwanted organisms.

FujiMAC

http://www.fujimacjapan.com/

FPZ MANUAL

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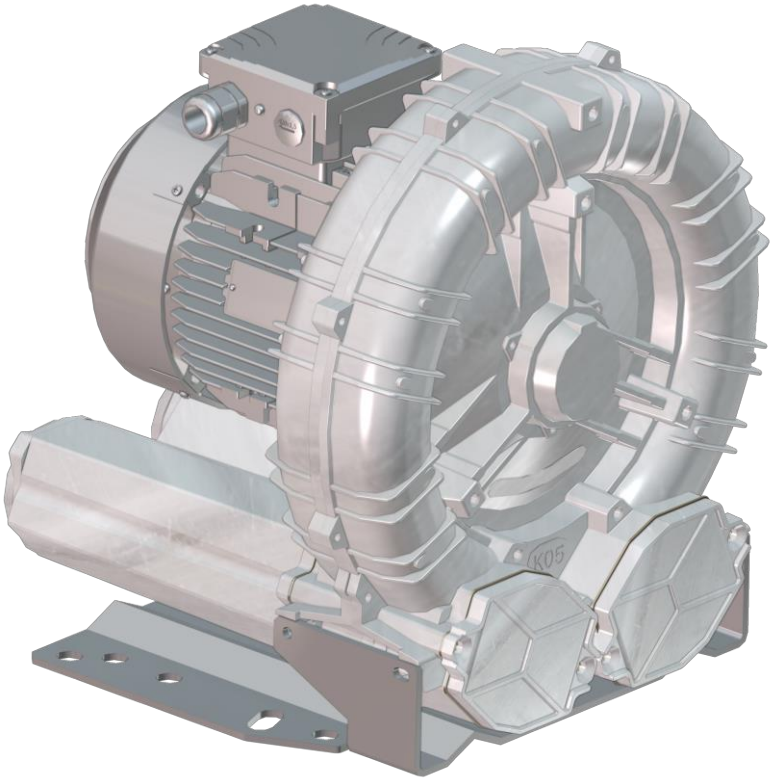
COMPRESSORI-ASPIRATORI A CANALE LATERALE **ISTRUZIONI** **I**
LATERAL CHANNEL BLOWERS-EXHAUSTERS **INSTRUCTIONS** **GB**

Leggere e seguire le istruzioni prima dell'uso e conservare il manuale come riferimento per il futuro. Il mancato rispetto di tutte le istruzioni del produttore, inclusa l'installazione impropria o l'uso improprio del prodotto, le alterazioni del prodotto e/o il mancato utilizzo del prodotto in conformità al presente manuale, possono causare danni, lesioni gravi o morte. **I**

WARNING

Read and follow all instructions before use and keep manual for future reference. Failure to comply with all manufacturer's instructions, including improper installation or use of the product, alterations to the product, and/or failure to use the product in accordance with this manual can result in property damage, serious injury or death. *GB*



Per ulteriori informazioni o assistenza all'installazione, prego contattare:
For further information or assistance with installation, please contact:

@ service@fpz.com +39 039 690981

COMPANY WITH QUALITY SYSTEM CERTIFIED BY DNV GL = ISO 9001 =

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1 GENERAL INFORMATION

Read the manual for safety information on correct installation, operation and maintenance.

1.1 PURPOSE OF MANUAL

- The purpose of the manual is to complete the information contained in the *operative instructions* (Figure 1*)* supplied with the blower in order to give "instructions for use" to the skilled operator to prevent and minimize risks during the interaction between man and machine.
- For safe installation, carefully read this manual before installing the product and follow all instructions exactly as shown.
- The information was prepared by the manufacturer in the original language (ITALIAN) considering the content communication effectiveness for the interested parties also depending on the operator's qualifications and perspicacity.
- Keep the *operative instructions* (Figure 1*)* for the entire service life of the unit in a known and easy to access place to make it always at hand for reference.
- Any observations made by recipients can be an important contribution to improve the after-sales services provided by the manufacturer.
- The information contained in this manual is intended for use by specialized operators whose definition is contained in the document MAN_PIC (Figure 2).
- For electric components and motors that may be installed to the blower, please refer to the manuals of their own manufacturers.

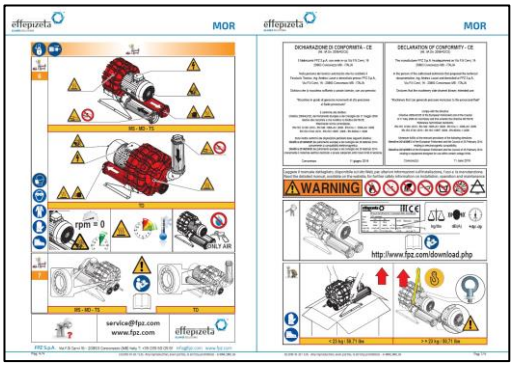


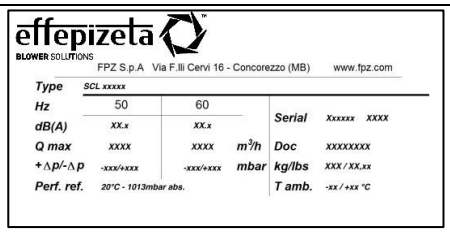
Figure 1 – *Operating Instruction*

Figure 2 - Document MAN_PIC

1.2 TECHNICAL DATA – NAMEPLATE

On the product nameplate are stated:

• Unit description
• Performance (Noise [dB], Flow [m^3/h] and Pressure [mbar]) at 50 Hz and 60 Hz frequency referring to 20°C and 1013 mbar abs.
• Serial number and year of manufacture
• Reference Doc. (*Operating Instruction)*
• Weight [kg/lbs]
• Reference temperature for the working blower (T. amb.)



It is strictly forbidden to remove or tamper with the product label.

1.3 TESTING, WARRANTY AND LIABILITY

Testing and inspection

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

Warranty

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

Liability

- See document MAN_PIC.

2 SAFETY RULES

2.1 IMPORTANT SAFETY INFORMATION

⚠WARNING	**The instructions listed below must be read carefully and become a fundamental part of daily procedures in the normal use and maintenance of all the equipment, in order to prevent any kind of personal or domestic animals (even serious) injury (or death) or damage to equipment.**

- Do not start the unit until its operation is clearly understood.
- All installation, commissioning and maintenance operations must be carried out by specialized operators only (see doc MAN_PIC).
- Keep the area around the unit constantly free of obstructions.
- Use appropriate PPE (Personal Protective Equipment) such as boots, gloves, goggles and work clothes.
- Pay attention to all danger and caution signs placed on the unit.
- Do not wear clothes, jewellery or accessories that can get caught in the cooling fan of the electric motor or that can be sucked into the blower.
- Do not modify the electrical connections on the unit.
- Observe all local, state and national electrical codes.
- Before starting the unit and/or with weekly frequency, the operator must check the efficiency of the devices that ensure the operation of the unit and any other unit defects. In case of any defects, immediately notify FPZ S.p.A.
- Devices that ensure the operation of the unit must never be removed or rendered useless.
- During maintenance or repair work, it may be necessary to exclude some mentioned devices from the service. This operation must be carried out by specialized operators only (see doc MAN_PIC).
- Always apply and enforce the safety rules; in case of any doubts, always consult this manual before acting.

⚠WARNING	**Non-compliant installation with the unit's intended use can cause personal (even serious) injury (or death) or damage to equipment.**

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 nameplate data.

2.2 PROHIBITIONS

⚠WARNING	**Failure to comply the following PROHIBITIONS can cause personal (even serious) injury (or death) or damage to equipment.**

- NEVER suck up and convey aggressive, corrosive, and/or harmful fluids.
- NEVER use the unit under conditions that differ from those indicated on the nameplate.
- NEVER use the unit without having installed a suction filter.
- NEVER operate with the suction and/or delivery openings closed.
- NEVER make conversions or changes to the unit, maintenance or repair work on one's own initiative or not envisaged in the manual. Maintenance work can be carried out only in compliance with what is described in this user manual, exclusively by specialized operators (see document MAN_PIC).
- NEVER use the unit in places where ATEX classification does not comply with Annex II of Directive 1999/92/EC.
- NEVER use the unit without having first installed and connected the sensors and/or regulators required to the plant and correctly installed and checked the seal system of the machine.
- NEVER use the unit with ambient temperatures below -15°C (+5°F) and above +40°C (+104°F).
- NEVER use the unit before ensuring correspondence between grid voltage and motor label voltage.

3 PROPER AND IMPROPER USE

3.1 OPERATING CONDITIONS

WARNING **Failure to observe the temperature, altitude, differential pressure and filtering modes for design and operation specifications there can be an impeller break which can cause personal (even serious) injury (or death) or damage to equipment .**

- The maximum permissible differential pressure indicated on the product nameplate must never be exceeded.
- It is important to install the unit at a maximum altitude of 1000 m (3300 ft.) above sea level, for higher altitudes contact FPZ.
- The unit is designed to operate at ambient temperature between -15°C (+5°F) and +40°C (+104°F).
- In case of suction in the environment or on the plant, protect the suction pipe using a suitable filter with a maximum degree of filtration of 25µm. Contact FPZ for filters with a different filtration degree. Check the compliance with the data of maximum pressure/vacuum listed on the nameplate. For ATEX blower we recommend an ATEX filter with a filtration degree of 20 µm / 25 µm.
- Installation, operation and maintenance of the blower must be carried out by specialized operators (see document MAN_PIC). Due to incorrect maintenance or an unauthorized modification, a non-compliant condition of use is determined, so the responsibility lies with the customer or end user.

NOTICE If installed outdoors, protect the unit against exposure to sunlight and to atmospheric agents.
If the flow rate has to be reduced, use a draw-off valve rather than throttling back the suction or delivery lines.

3.2 STANDARD SIDE CHANNEL BLOWER

FPZ side channel blowers / exhausters are designed to generate vacuum and overpressure for conveying non-explosive, non-flammable, non-dangerous gases and air in continuous use in a non-explosive environment. Side channel blowers are not designed to transport dusts of any grain size.

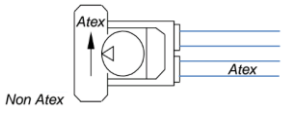
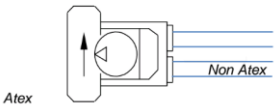
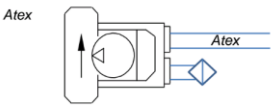
FPZ side channel blowers / exhausters are designed and built for use in industrial plants and are equipped with three-phase or single-phase asynchronous bipolar electric motors in compliance with IEC 60034-1.

3.3 ATEX BLOWERS (Category 3GD – Category 2G)

Atex blowers are designed and built in accordance with 2014/34/UE Directive and European standards EN 1127-1, EN 80079-36, EN 80079-37, EN 14986, considering the compatibility of unit components with treated fluids (contact FPZ for components compatibility details). Accessories and monitoring systems linked to the unit have to be compliant with 2014/34/UE Directive.
It is recommended that the connections and suction and delivery pipes are in metal or antistatic material.

Units are group II devices for use in environments classified as explosive for the presence of Gas (G) zone 1/2 and/or Dust (D) zone 22.

- For motors that may be installed to the blower refer to the Atex complementary instructions of the motor manufacturer.
- In case the blower is disposed vertically, thus standing on the cover, foreign objects shall be prevented from falling into the ventilation openings. If necessary the motor can be provided of a fan cover with protecting canopy.
- If not specifically indicated, the ATEX label refers to the equipment “indoor” and “outdoor” area.
- In the case of a double indication separated by the “/” symbol, the first number indicates the “indoor” category (internal surface of the blower), the second number the “outdoor” category (outside of the blower, including the electric motor).
- The blower protection mode is constructive (“EX **c**”).
- Electric motors have different protection modes depending on the category and the environment they are designed for.
- All “2G” e “3/2G” configurations have explosion-proof motors (EX d protection).
- Classification of work zones:

1	Use of blower for conveying flammable gas	**Equipment with internal potentially explosive atmospheres, intended for use in areas that are not classified**	
2	Use of blower for conveying non-hazardous fluids in ATEX classified environment	**Equipment with internal non-explosive atmospheres and intended for use in areas that are classified**	
3	Use of blower with suction of ambient air and operating in a classified zone	**Equipment with internal explosive atmospheres, interfaced with process atmospheres and intended for use in areas that are classified**	

3.4 IMPROPER USE AND ASSOCIATED RISKS

⚠WARNING	**Non-compliance with the unit's intended use or with prohibitions/obligations can cause personal (also serious) injury (or death) or equipment damage.**

- Listed below are some improper uses, identified through risk assessment and experiences. Improper uses are subdivided according to the conditions that they may generate.
- The list is a non-exhaustive and representative example of improper use and associated risks.

IMPROPER USE	POSSIBLE CONSEQUENCES	RISKS
IMPROPER USE LINKED TO NORMAL OPERATION		
Absence of cyclic monitoring and control.	Anomalous operation not detected / hidden.	Risk of damage to the unit, with possible injury (or death) for the operator if present nearby.
Different installation with respect to manufacturer's suggestion.	Yielding / break of fastening points.	Risk of damage to the unit, with possible injury (or death) for the operator if present nearby. The unit may fall or be subject to damage due to incorrect load at support.
Operation outside the performance indicated on the blower and electric nameplate.	Seizure of the impeller.	Risk of damage to the unit, with possible injury (or death) for the operator if present nearby. The unit may break.
Proceeding at all stages without consulting the *operating instructions* and this manual.	Using the unit for unforeseen purposes and without considering the associated risk factors.	Risk of damage to the unit, with possible injury (or death) for the operator if present nearby.
IMPROPER USE LINKED TO METHODS OF USE		
Use of a fluid different from that indicated / forbidden.	Incorrect workload.	Risk of damage to the unit, with possible injury (or death) for the operator if present nearby. The unit may break.
Physical load applied to the machine (no element excluded).	Breakage and/or presence of leakage of fluid collected.	Risk of damage to the unit, with possible injury (or death) for the operator if present nearby due to inhalation of harmful substances.
IMPROPER USE LINKED TO THE STOPPAGE OF A BLOWER		
Manipulation of the machine still rotating / moving.	Direct contact of the operator with moving parts and with the surface unit still hot.	Risk of possible injury for the operator such as burns and entanglement.
Disconnecting the unit from the electricity with the voltage inserted.	Direct contact of the operator with the live parts.	Risk of possible injuries for the operator through electrocution.
IMPROPER USE LINKED TO MAINTENANCE WORK		
Handling the machine differently from instructions for use.	Falling or sudden movement of the unit.	Risk of damage to the unit, with possible injury for the operator if present nearby.
Use of liquid during unit cleaning operations.	In case of stagnation, characteristics of the material may be compromised.	Risk of damage to the unit, with possible injury for the operator if present nearby.
Use of types of spare parts different to those supplied by FPZ.	Different performance from design (pressure, noise, vibration, sealing).	Risk of damage to the unit, with possible injury for the operator if present nearby.
BREAKDOWN AND EMERGENCY CONDITIONS		
Not stopping the machine when it is making an unusual noise.	Seizure of the impeller and overheating of the unit and of the electric motor.	Risk of damage for the unit, with possible injury (or death) for the operator if present nearby. The unit may break down.

4 STORAGE AND TRANSPORT

4.1 RECEIPT AND CHECK OF THE PACKAGE

- When receiving the unit, it is necessary to check that the packaging is intact and free from signs of damage due to transport or storage conditions.
- In the case of damage to the packaging, immediately inform the shipping agent and the manufacturer.

4.2 HANDLING AND TRANSPORT

Danger of crushing and / or impacting various parts of the body

During the transport and handling phases due to the sudden drop or displacement of the packaging, there may be a risk of crushing and / or impacting various parts of the body. During the activities around the unit, the operator may fall due to stumbling or slipping.
Use equipment compliant with the laws and follow the handling and manual handling procedures described in the operating manual, based on the weight indications on the packaging and in accordance with applicable regulations in the state in which this activity takes place. Use safety shoes during this phase.

4.3 STORAGE

- Store in a dry place, possibly keeping the machine in the packaging.
- Do not remove the protective covers of the openings.
- In the event of long-term storage, remove dust deposits on external surfaces and, before commissioning, check the unit's functional status with a start-up test.

5 INSTALLATION

5.1 INSTALLATION CONDITIONS

Commissioning and operation must only take place under the following installation conditions:

- The unit must be completely assembled and intact (not damaged or tampered).
- Silencers must be connected to the pipe system (see *operating instructions*); if silencers are not present, make sure that the connection is made by flexible sleeve.
- The machine must be securely fastened to the predetermined site and in the recommended modes (see *operating instructions*).
- The motor must be connected to a suitable control panel.
- Ensure the visibility of the unit installed from the position of the control elements.

Danger of ejection of objects

The entry of foreign bodies into the unit, even if very small, can cause personal serious injury (or death) and/or equipment damage with probable breakage of the impeller blades, including the danger of debris can be thrown out of the machine violently.
Remove the closure caps from the silencers and connect the pipes of the system, making sure to carry out the operation in a non-dusty area to prevent the entry of foreign bodies.

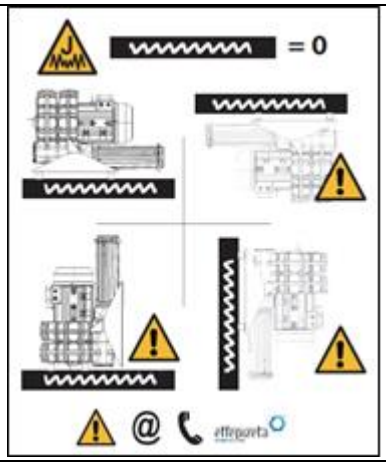
Danger of crushing and / or impacting various parts of the body

During the installation phase due to the sudden drop or displacement of the packaging, there may be a risk of crushing and / or impacting various parts of the body. During work around the unit, the operator may fall due to stumbling or slipping. Use the appropriate device (e.g. toe) to hook and lift the unit properly.

Danger of injury to upper limbs

The risk of injury to upper limbs may arise due to a combination of hazards during the mechanical assembly phase and the connection of the machine to the piping. Observe the operating manual to install the unit safely.

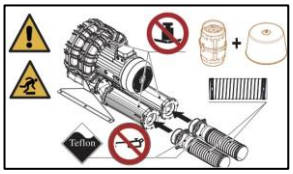
- The support surface of the unit must be flat, robust, stable and absolutely levelled.
- It is important that the unit is installed on supports that do not transmit vibration for example structures or antivibration

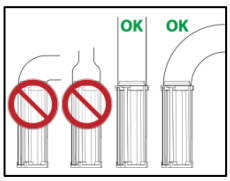


- Connect the pipes with flexible sleeves and avoid the unit bears pipes weight; except for the filter in the case of suction in the environment.

Size the pipes and choose accessories that minimize the load losses, therefore:

- do not fit pipes with diameters smaller than those of the machine's outlets and inlets;
- install multiple machines in parallel, sizing the manifold and main line proportionally;
- do not use angle-pipe, but bends with a large radius of curvature;
- do not install valves with passages smaller than the nominal value and check valves with a stopper pushed by a spring (the check valve with the lowest load loss is the type with a light disc);
- in the case of use for oxygenation, choose low-resistance diffusers (low load loss).



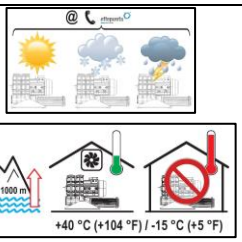


⚠WARNING	To avoid overloads caused by pressure variations, it's recommended that you install a relief valve on aspiration in the case of operation as suction, and on discharge in the case of operation as a compressor.

⚠WARNING	If you need to reduce the flow rate, use a branch valve instead of throttling the suction or discharge.

⚠WARNING	Protect the intake duct with a suitable filter with a filtration degree of 25 µm. Foreign bodies are: dust, sand, calcite, impurities in the pipes, cutting blades and shavings, drops and waste from welding, metal burrs, and residues of sealants produced during connection of pipes. Replace the filters regularly.

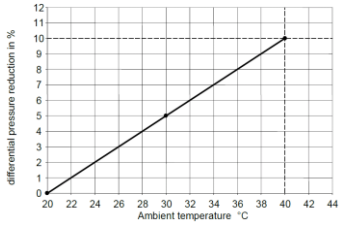
- When installing outdoors, protect the unit against direct exposure to the sun and atmospheric agents. For outdoor installations without the use of protections contact FPZ S.p.A..
- Ventilation of the motor must not be hampered by obstacles placed in the immediate vicinity. For this purpose, the electric motor air intake must remain free and a minimum distance between the electric motor fan cover and any other structure as defined by the manufacturer of electric motor.
- The unit must be installed at a maximum height of 1000 m a.s.l., for different conditions contact FPZ S.p.A..



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 differential given in the Data Sheet by 5%;
- For ambient temperature +40°C (+104°F) **reduce** the maximum pressure differential given in the Data Sheet 10%.

The graph on the right has to be used to reduce the maximum pressure differential in case of ambient temperature between +21°C and +40°C (+70°F and +104°F)



- Check dimensions to allow adequate space for installing the unit with its accessories and ensure sufficient ventilation of the electric motor.

⚠WARNING	In the case of ATEX side channel blower intended for classified areas, the unit must be installed outdoors or in an air conditioned environment.

5.2 BLOWER WITHOUT ELECTRIC MOTOR (GOR – GVR EXECUTION)

NOTICE

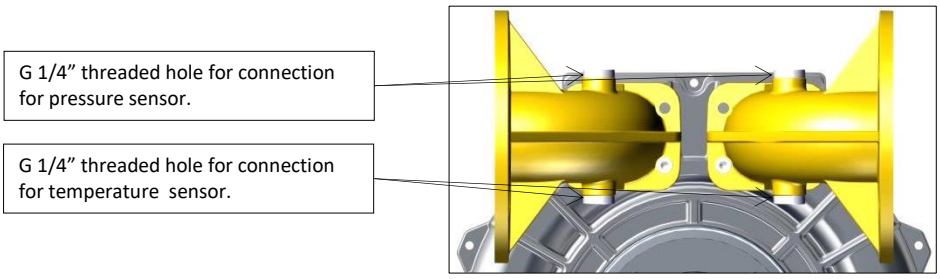
Units supplied without an electric motor, GOR execution (with horizontal coupling) or GVR (with vertical coupling) are considered as partly completed machinery, so the designer has to check the compatibility of the electric motor chosen with the data in the data sheets downloadable from the website.
During installation and maintenance, to install or dismantle the elastomeric coupling; it is recommended not to use a hammer, but pushers or extractors, to fit or remove the coupling flanges from the shaft. . Percussion can damage the slope of the bearings by reducing their durability. Coupling requires axial and angular alignment accuracy. Also refer to the coupling instruction manual.

5.3 ATEX 2G BLOWER (EXCLUDED TMD VERSION)

The blower is arranged for the installation of measurement/control systems in order to prevent machine faults that can produce potential sources of triggering:

- pressure sensor
- temperature sensor.

Danger of explosion. The unit is designed to convey flammable gas and is sealed. Do not start the machine before connecting and activating the unit and surveillance system



Pressure sensor

ALWAYS use a pressure sensor

Given the likelihood of an explosive atmosphere, the use of pressure measuring instruments is compulsory in order to check that the difference between the delivery and suction pressures respects the levels given in the "specifications" and on the machine's rating plate.

NOTICE

The use of an alarm and stop device (non-automatic reset) that automatically shuts off the power to the machine is advisable.

Temperature sensor

A possible temperature sensor is deemed functional for the customer's measurement needs, but can in any way replace the pressure sensor for monitoring any dangerous machine conditions.

WARNING

All the sensors must be protected against possible impacts, damage and atmospheric agents.

5.4 GOR TMD ATEX 2G BLOWER

The blower is designed for the installation of control systems which must be set up by the installer for the purpose of monitoring machine breakdowns which could produce possible sources of combustion:

- vibration sensor;
- pressure switch / vacuum switch;
- thermostat.

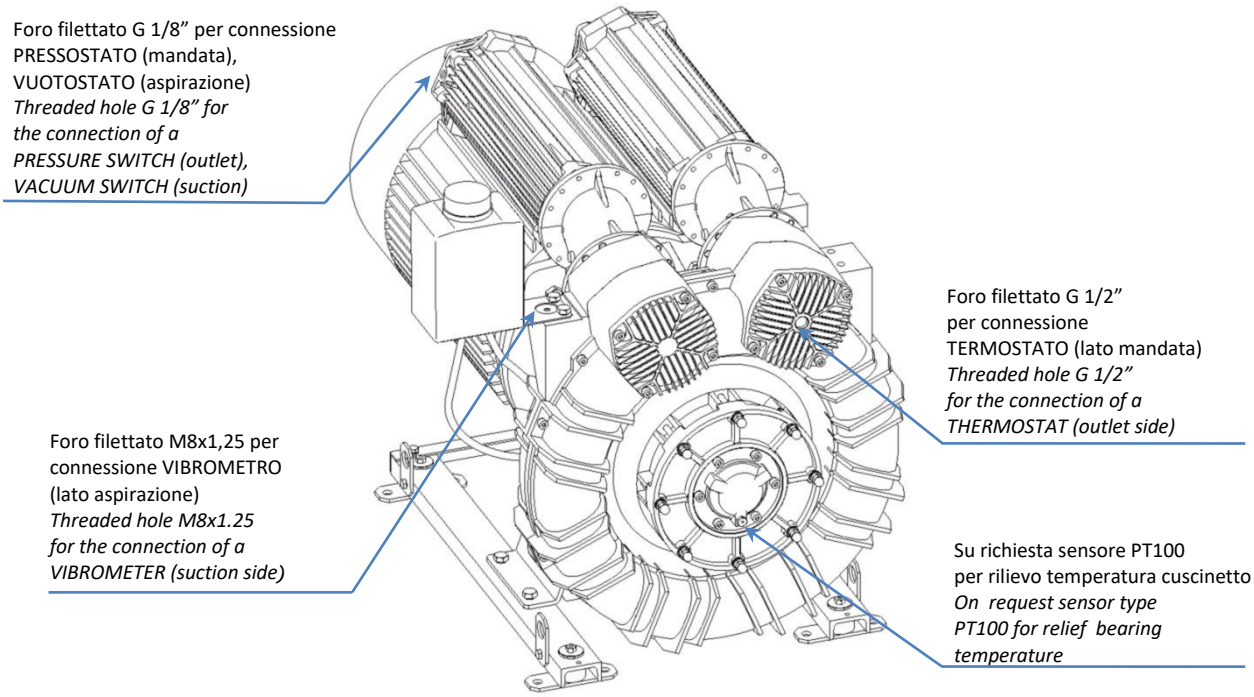
The mechanical seal installed also requires the following operations:

- refilling of the oil tray, as indicated below;
- connection of the oil level sensor.

If necessary, in order to avoid overloads caused by pressure variations, provide a vent device in conformity with EN 1127-1 branching off from the suction pipe, in the case of operation as a suction pump, and on the delivery pipe, in the case of operation as a compressor.

5.4.1 INSTALLATION OF SENSOR GOR TMD ATEX 2G BLOWERS

Install the machine on the plant. Fit the sensors (suitable for the purpose and especially for the Atex environment in question) in their places and connect them to the control system as specified in the instructions provided with the sensors and as required in the plant diagram:



- Vibration sensor

The signal from the sensor must monitor the vibrations of the machine constantly. This signal must be connected to an alarm and block device with manual reset, which automatically interrupts the power supply to the compressor/suction pump at the moment the level of the vibration signal exceeds the predetermined limits.

Effective vibration velocity value [mm/s]	***Class I*** (≤ 15kW)
a<**2.2**	***A***

Effective vibration velocity value [mm/s]	***Class II*** (> 15kW)
a<**3.5**	***A***

- Pressure switch and vacuum switch

The pressure or vacuum switch installed must be calibrated to the maximum pressure or vacuum level specified on the plate of the machine or in accordance with the operating limits of the plant.
The signal must be connected to an alarm and block device, with manual reset, that automatically interrupts the power supply to the machine.

- Thermostat

The thermostat must be set to come on at a temperature not exceeding 125°C to interrupt the power supply to the machine automatically.
The signal must be connected to an alarm and block device, with manual reset, that automatically interrupts the power supply to the machine.

⚠WARNING | **All sensors installed must be protected against impact, damage and weathering**. FPZ can supply a protective casing, on request and after receiving the dimensions of the sensors installed.

5.4.2 CONNECTION OF THE MECHANICAL SEAL FOR GOR TMD ATEX 2G BLOWER

	**Danger of slipping**

Oil spills can make the floor slippery. Clean the floor with absorbent and /or degreasing products.

	**Danger of electrostatic charges**

Do not clean or rub the oil reservoir with dry clothes.

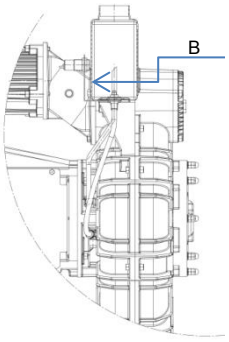
- Refilling the cooling oil tray

Refill the cooling circuit of the mechanical seal. For good circulation of the cooling liquid, it is important not to have air bubbles inside the circuit. To achieve this, refill by pouring the liquid into the vessel repeatedly in small amounts without exceeding level (B) of the return line. Top up completely only when the level at the return line has covered the bottom of the vessel.

The cooling liquid must be kept at least 10 mm above the level of the return line (B); top up as necessary.

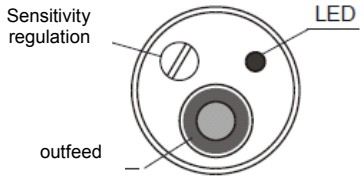
Recommended cooling liquid:	SAE 10W-40 oil Or SAE 5W-40 oil
First filling quantity:	Approx. 1,5 kg

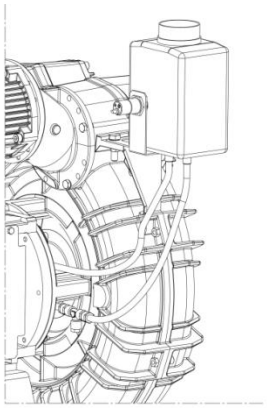
A small leak of fluxing liquid is normal, especially when the seals are settling down.



- Connection of the cooling oil level sensor

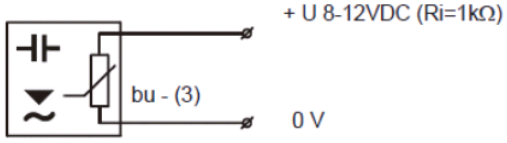
The capacitive oil level sensor consists of a stainless steel cylindrical body and is suitable for use in explosion risk zones. It is fitted with a potentiometer to regulate sensitivity and a LED display on the back end, which is normally on.





This sensor must be connected to an alarm and block system with manual reset which automatically interrupts the power supply to the machine. Connect the sensor to the control system following the specific instructions enclosed with this manual.

CPS-24Xi □-R□



Note: the connection cable must not be cut or tampered with.

5.5 ELECTRIC MOTOR

WARNING	**Comply with safety measures and instructions indicated in the instruction manual for the electric motor.**

Before starting working on the unit or system, the following precautions must be taken:

- make sure that the unit is NOT connected to electrical power mains;
- take precautions to prevent electricity from being reconnected;
- open the terminal box only after making sure that there is absolutely no live current.

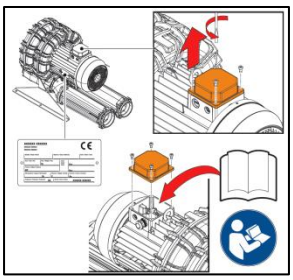
	Danger due to electricity

- If connecting operations are carried out without removing the voltage from the electrical system or without setting up a system to avoid reinsertion, direct contact between the operator and the live parts can occur. This can also cause personal serious injury (or death).
- Work on electrical equipment (installation and maintenance) has to be done only by specialized operators (see document MAN_PIC), wearing PPE.
- In the event of contact with a defective unit there is a risk of electrocution. Always have seals and electrics checked regularly by a specialized operator (see document MAN_PIC).
  - The terminal box must not contain foreign bodies, impurities or humidity. Close the terminal box with the cover, and seal the cable gland openings to prevent dust, water and humidity from getting inside.

NOTICE	In the case of several motor starts during an hour, there is a limitation of 6 start-ups per hour, evenly distributed; failure to respect this can severely damage the unit.

5.5.1 ELECTRIC CONNECTION

Incorrect motor connection may seriously damage the unit.



- Check that the details on the data plate are compatible with the line voltage and frequency.
- Always connect the motor's earth cable to the relevant terminal marked with this symbol  before connecting to the mains supply and check the dispersion capacity. The earth cable can be recognized by its color (yellow/green).
- Connect the machine to the earth system too, using the specific hole (marked with the relative symbol) located on the base of the unit. Connection to the power grid must be carried out in compliance with what is shown in the diagram inside the terminal box.
- Use the cable gland openings to allow power supply cables to pass into the terminal box.
- Proceed to tighten the power supply cables, taking the section of the electrical cables into account each time.
- The terminal boards for the electrical connections must be tightened properly to avoid high contact resistances and resulting overheating.
- Check that the insulation gaps between the various conductors are kept in the air and between surfaces, as indicated in the standards.
- All the screws used to close the terminal board must be tightened properly. Damaged screws must be replaced immediately, using screws of the same or better quality.

The connection must guarantee:

- long-lasting safety;
- that no wire ends are sticking out;
- protection with a (thermal or amperometric) trip switch is essential for dealing with risks of overloading, a loss of one phase in the mains supply, excessive voltage fluctuations, or the rotor getting stuck;
- that the motor trip switch has been set to a value that does not exceed the maximum current level shown on the nameplate. Warning: the trip switch does not always protect the blower in case the maximum pressure differential is exceeded. Verify the maximum pressure or vacuum as per chapter 6.2.
- motors may be equipped with thermal protectors PTO or PTC. To avoid that the motor is damaged by temperature rise over the admissible limit: PTO or PTC have to be connected to a suitable cut off device that opens the line that feed the motor itself.
- if the application requires protection against accidental start-up, this must be carried out on the electrical control circuit of the motor.

5.5.2 ELECTRIC MOTOR POWERED BY FREQUENCY CONVERTER

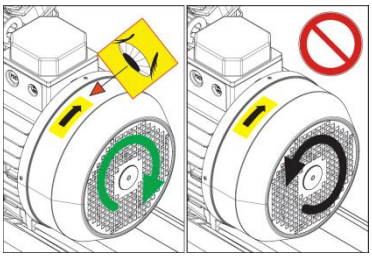
The unit's nominal pressure or vacuum characteristics for service at mains frequency cannot be maintained if the unit is powered via a frequency converter. Contact FPZ S.p.A. for information about the performance of a unit powered by a frequency converter. Download from the website www.fpz.com the "RPM Table" of your blower and do not exceed the maximum pressure differentials shown for every rotation speed.

When power is supplied with a frequency converter, the installer is responsible for:

- respecting the laws;
- checking with FPZ assistance if the motor can be powered by a frequency converter, if it doesn't appear on data sheet;
- checking and making any measures necessary to comply with the immunity and emission limits set by the standards;
- checking the suitability of the plant and the frequency converter for operation with standard motors (class F), or the need to use specific motors for these types of operation.

5.5.3 ROTATION DIRECTION

The machines must be used respecting 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 inside the terminal box and to this section.

6 START UP AND NORMAL OPERATION

6.1 PRELIMINARY CHECKS

WARNING! 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, to avoid compromising the heat dissipation during the unit work;
- 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 ports closed;
- make sure the ambient and conveyed gas suction temperatures come within the levels: -15°C (+5 °F)÷ +40°C (+104 °F);
- check the operation of any flow control/limiting devices (not supplied).

6.2 OPERATION

- If the side channel blower is put into operation without being fixed to a surface, a sudden displacement of the starting torque on ignition of the electric motor may occur.
- The information on the product nameplate must always be considered when commissioning and operating.

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.
- Respect the maximum pressure differential stated in the blower's nameplate.
  To evaluate the pressure differential Δp across the blower take into account:
  - For compression operating: add up to the outlet pressure the inlet vacuum if applied.
  - For vacuum operation: add up to the inlet vacuum the outlet pressure if applied.
- 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 nameplate value. An amperage below nameplate does not always guarantee that the blower is not exceeding the maximum permitted pressure differential.

⚠WARNING	**Non-compliance with the unit's use or with prohibitions/obligations can cause personal (also serious) injury (or death) or equipment damage**

	Danger of burns

Danger of burns caused by contact with hot surfaces of the unit, which at start-up and operation may reach high surface temperatures, as specified on the product nameplate.
Apply adequate PPE against the risk of burns.

Danger of suction

Danger of injury due to depression, which can cause a sudden suction of objects, hair and clothes.
Start the machine only if it is properly connected to the system.

Danger of vibration

Regularly check that the unit is firmly fixed to the support frame.
Excessive vibration of the unit can cause serious damage to the machine, such as the seizure of the impeller.

Danger due to noise

Some machines can produce loud noise, even over 80 dB (A).
Reference levels are shown on the table of characteristic data that does not consider environmental reverb.
Warning to be taken:
Measure the acoustic pressure of the machine in the installation environment.
In the case of levels above the threshold defined by local standards:

- report the noise hazard
- prepare the use of PPE
- isolate the environment

Danger of ejection of objects

- Danger due to exceeding performance levels that may cause seizure of the impeller.
  Check that operating conditions are in accordance with values declared on the nameplate.
  Avoid operating with the inlet and/or outlet ports closed even temporarily.
  Install a limit valve or equivalent circuit that can avoid excessive vacuum and / or overpressure and allow the compliance with levels shown on the product plate
- Danger of injury due to objects and fluids aspirated and thrown at high speed (injury to the skin or eyes).
  Only start the unit (first start) if it is properly connected and check it accurately.
  In the case of unusual noise from the impeller, switch off the unit immediately and check it accurately.

Danger of injury to upper limbs

During the start-up (first start) phase due to a combination of hazards, the risk of injury to upper limbs may arise.

Danger of sudden leakage and/or aspiration of fluids (even harmful ones)

They could cause damage to the respiratory system due to the leakage of gas while the unit is in use and/or the slowing down of connection to the gas flow circuit.

Danger due to a limited view of the place in which the unit is installed.

Make sure you always have the unit installed in your sight while carrying out any activities close to it.

6.3 STOPPING

- The unit must be stopped by switching off the power supply to the motor.
- On shutdown, make sure to operate the unit with open outlet (suction / delivery) for about 20 minutes. This operation allows the removal of any condensation inside.

7 MAINTENANCE

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

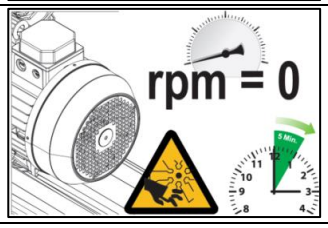
- periodical checks;
- periodical maintenance.

7.1 MAINTENANCE AND FAILURE CONDITIONS

WARNING **Before starting any maintenance, either periodical or due to malfunction, take the following safety measures in order to prevent personal (also serious) injury (or death) or equipment damage:**

- unplug the unit from the power supply by unplugging the main switch;
- apply a sign to the system and to the control unit **"DANGER! Maintenance work in progress";**
- cool the unit for at least 15 minutes;

- wait until the unit has completely stopped, checking through the motor fan that the impeller is not rotating;



- make sure that there is no depression or overpressure in the unit through a pressure gauge and make sure that no fluid can escape from the unit (through its stopping) and / or the system (through its insulation).

Danger due to electricity

- If connecting operations are carried out without removing the voltage from the electrical system or without setting up a system to avoid reinsertion, a direct contact of the operator with live parts can occur. This can also cause personal serious injury (or death).
- Work on electrical equipment (installation and maintenance) must be done only by specialized operators (see document MAN_PIC), wearing PPE.
- In the event of contact with a defective unit there is a risk of electrocution.

Danger of moving parts

High risk of cuts caused by rotating impellers. By removing the manifolds or blind flanges, it is possible to access the rotating impeller through the openings of the body and the cover of the side channel blower.
Never put your hands or objects through the openings.

Danger of burns

Danger of burns caused by contact with hot surfaces of the unit, which at startup and in operation may reach high surface temperatures, as specified on the product nameplate.
Apply adequate PPE against the risk of burns.

Danger of injury to upper limbs

During the maintenance phase due to use of improper tools, lack of PPE, bad illumination of the workplace or unauthorized start-up, the operator fails to perform the required procedures, the machine can be put into unmanaged operation, and the risk of injury to upper limbs may arise.

Danger due to noise

Some machines can produce loud noise, even over 80 dB (A) therefore the operator may be subject to acoustic pressure which may cause buzzing in the headset and reduced attention.

WARNING **Danger of sudden spillage of gas (also harmful) suction**

Respiratory damage could occur due to gas leakage during operation and / or loosening of the connections to the gas flow circuits.

7.2 PERIODICAL CHECKS

In order to avoid any defects that may directly or indirectly cause damage, it is important that the unit is inspected by specialized operators (see document MAN_PIC).

A) When the unit is running, routinely carry out the following checks:

- delivery temperature;
- operating pressure and/or vacuum;
- electric motor current absorption;
- vibrations;
- state of the filter and related load loss.

⚠WARNING	**Danger of seizure of the impeller due to excess vibration. Vibrations above the threshold (see table below) are considered NOT eligible and can cause damage to the machine and consequently personal injury even serious (or death) and / or damage to things.** **In the event of unusual noise and / or vibration over parameters, that may indicate the possibility the impeller is seizing up, turn off the unit immediately.**

Class I (Blower with electric motor of power ≤15kW)	Class II (Blower with electric motor of power >15kW)
a > 2,2	a > 3,5
a = effective vibration speed level [mm/s]	

Changes to normal working conditions (power ups, abnormal noise, vibrations, excessive overheating of the service fluid) are indications that the units is not working properly.

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 creates strong suction resistance and consequently a higher pressure differential, power absorption and operating temperature;
- for unit supplied with elastic joint, check the condition of the elastic joint as indicated in its operating manual;
- condensation discharge (if present): every 8-10 days, turn the yellow valve counterclockwise 90° to allow draining of the condensation that has built up inside the blower;
- check for oil leaks (TMD version) near the joint; if leaks are found, maintenance work must be scheduled to replace the seals.

7.3 ROUTINE MAINTENANCE REPAIR OF BREAKDOWNS

See the following chapter “TROUBLESHOOTING” for identifying possible critical situations and types of breakdowns.
Always disconnect the unit and remove it from the plant to do routine maintenance, cleaning and replacing components and in the event of a breakdown.

⚠WARNING	**Danger due to residual overpressure or drop in pressure:**

- with residual overpressure, process fluids can leak, with the risk of injury to the skin and eyes;
- with a drop in pressure there is the risk that hair and clothes can be trapped;
- disconnect the unit only after closing and bleeding the system connected to it.

7.4 LIFESPAN OF BEARINGS

Under normal operating conditions, the bearings of the unit must be replaced by a specialized operator (see document MAN_PIC), after a time fixed by the manufacturer (see details in the table below).

NOT ATEX BLOWERS

Every model, except the models at the following line	25000 hours or 3 years
e07 / e08 / e09 / e10 / e11 MS – TS – TD	40000 hours or 5 years

SOFFIANTI ATEX

Every Atex model	18000 hours or 3 years

NOTICE Replace the bearings of the unit only if you have all the instructions, the parts list and the section/explosion of the unit

7.5 DISMANTLING AND DEMOLITION

Danger of crushing and / or impacting various parts of the body

During the dismantling and demolition phases due to the sudden drop or displacement of the packaging, there may be a risk of crushing and / or impacting various parts of the body. During work around the unit, the operator may fall due to stumbling or slipping.

8 RESIDUAL RISKS

During the design of the machines or system on which the blower will be installed, the following residual risks should be considered.

Danger during the transport phase

Danger of crushing or slipping during the unit transport steps. The *operating instructions* (attached to the unit) and this manual describe how to carry out safe transport operations according to tested procedures.

Danger during the installation phase

Danger of crushing or slipping during the installation phases of the unit. The *operating instructions* (attached to the unit) and this manual describes how to carry out safe installation operations and according to tested procedures.

Danger during the start-up and operating phase

Danger of electrocution, burns, noise, unauthorized start-up of the unit, and ejection of objects or fluids during the start-up and operation phases of the unit. The *operating instructions* (attached to the unit) and this manual describe how to perform the operations mentioned safely and according to tested procedures.

Danger during maintenance and dismantling phases

Danger of electrocution, burns, noise, unauthorized start-up of the unit, and ejection of objects or fluids during the maintenance and dismantling phases of the unit. The *operating instructions* (attached to the unit) and this manual describe how to perform the operations mentioned safely and according to tested procedures.

9 TROUBLESHOOTING

Problem	Serious case	Cause	Solution	Precaution
The unit does not start	F	Electrical wiring incorrect	The electrical connection has to be checked by a technician referring to the wiring diagram contained in the terminal board box	Turn off the power to the electrical system or set up a system that avoids reinsertion
	F	Power supply voltage unsuitable	Check that the power supply voltage, measured at the motor terminals, is within +/- 10% of the rated voltage	Use PPE against the electrical hazards
	G	The impeller is stuck	Call FPZ assistance to repair the unit	
No or insufficient air flow	G	The suction filter is clogged	A specialized operator (see MAN_PIC) has to clean or replace the cartridge	Avoid entering foreign bodies into the unit
	G	Wrong frequency (for units powered through an inverter)	Correct the frequency	Check the rating plate
	G	Profile of the impeller blades modified (due to deposits on the profile)	Call FPZ assistance personnel to check the impeller	
No or insufficient pressure differential	F	Incorrect direction of rotation	The direction of rotation has to be inverted by a specialized operator (see MAN_PIC) switching two of the electrical power supply wires.	Turn off the power to the electrical system or set up a system that avoids reinsertion
	G	Leaks in the plant	Locate the leak and seal	Use proper sealants
Current absorption exceeding the admissible level	F	Electrical wiring incorrect	The electrical connection has to be checked by a technician referring to the wiring diagram contained in the terminal board box	Take off the power to the electrical system or set up a system that avoids reinsertion
	F	Drop in mains supply voltage	The power supply voltage has to be restored by a specialized operator (see MAN_PIC) at the terminals and at the established values.	
	G	The suction filter is clogged	The cartridge has to be cleaned or replaced by a specialized operator (see MAN_PIC)	Avoid entering foreign bodies into the unit.
	G	The unit has accumulated deposits inside	Call FPZ assistance personnel to clean the inside of the unit	Avoid entering foreign bodies into the unit.
	G	The unit is operating at a pressure and/or vacuum that exceeds the admissible level	Adjust the system and/or the regulating valve to lower pressure differentials.	Use appropriate PPE to operate near the unit
High delivery air temperature	G	The suction filter is clogged	Adjust the system and/or the regulating valve to lower pressure differentials.	Use appropriate PPE (surge protectors, gloves) to operate near the unit
	G	The suction filter is clogged	The cartridge has to be cleaned or replaced by a specialized operator (see MAN_PIC)	Avoid entering foreign bodies into the unit.
	G	The unit has accumulated deposits inside	The unit has to be cleaned inside by a specialized operator (see MAN_PIC).	Avoid entering foreign bodies into the unit.
	G	Suction and/or delivery piping obstructed.	Obstructions have to be removed by a specialized operator (see MAN_PIC).	Avoid entering foreign bodies into the unit.
	G	Suction air temperature exceeds 40°C (+104°F)	Use heat exchangers to reduce the suction air temperature	
Abnormal noise	F	The soundproofing material is damaged	Soundproofing cloth has to be replaced by a technician.	Avoid entering foreign bodies into the unit.
	G	The impeller scrapes against the casing. - The unit is operating at a pressure and/or vacuum that exceeds the admissible level	Reduce the pressure differentials in the plant	Use appropriate PPE (surge protectors, gloves) to operate near the unit
	G	- Reduction of assembly tolerances due to internal deposits (dust, impurities in the pipes, process residues, etc.)	The unit has to be cleaned inside by a specialized operator (see MAN_PIC).	Avoid entering foreign bodies into the unit.
	G	Worn bearing	Bearings have to be replaced by a specialized operator (see MAN_PIC).	
	F	Unit's installation position unsuitable	The unit has to be installed by a technician on structures that cannot transmit or amplify noise (tanks, steel plating, etc.)	Use proper anti-vibration and move the units according to local regulations

Abnormal vibrations	G	The impeller is damaged	The impeller has to be replaced by a specialized operator (see MAN_PIC).	
	G	The impeller has accumulated deposits	The unit has to be cleaned inside by a specialized operator (see MAN_PIC).	Avoid entering foreign bodies into the unit
	G	Unit anchored without anti-vibration insulators	The unit has to be anchored with anti-vibration insulators by specialized operator (see MAN_PIC).	Use proper anti-vibration and move the units according to local regulations
	F	Rigid connection to the plant	Flexible hoses between the unit and the piping have to be fitted by a specialized operator (see MAN_PIC).	Carry out the activity only if the unit is disconnected to the power supply.
	G	Bearing on the blower or motor side defective	Bearings have to be replaced by a specialized operator (see MAN_PIC).	

Leaks	G	Defective silencer gaskets	Gaskets have to be checked by a specialized operator (see MAN_PIC), and if necessary have to be replaced.	Avoid entering foreign bodies into the unit.
	G	Defective casing gaskets	Gaskets have to be cleaned by a specialized operator (see MAN_PIC), and if necessary have to be replaced.	Avoid entering foreign bodies into the unit.

Seriousness: F for functional fault and G for serious fault.

10 REFERENCES

Documents quoted:

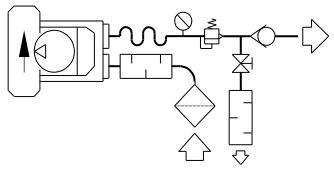
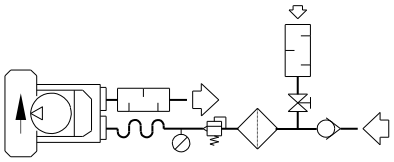
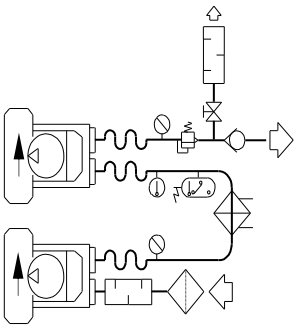
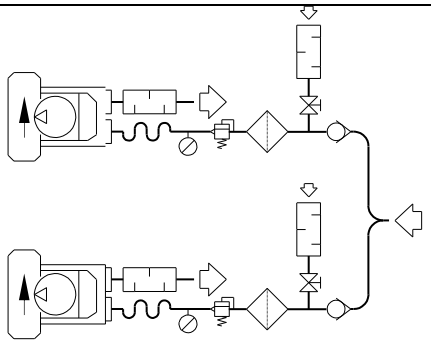
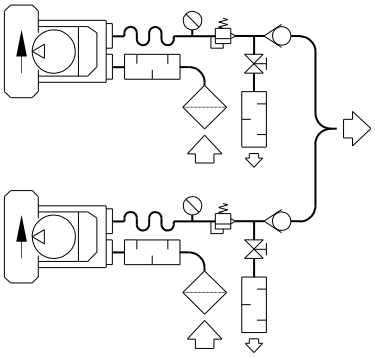
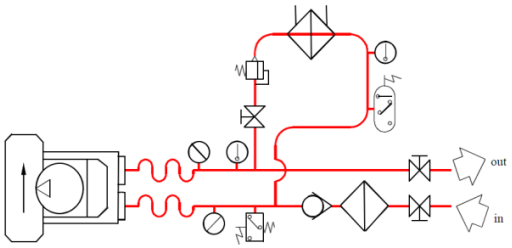
- Operating Instruction: supplied with the blower
- MAN_PIC: document with pictogram definitions
- Instruction manual of elastic joint
- Instruction manual of electric motor

Norme e direttive:

- Machinery directive 2006/42/EC
- Atex directive 2014/34/EU (Applies to Atex blowers only)
- EN ISO 12100: 2010
- EN 349:1993+A1: 2008
- EN 614-1: 2006+A1: 2009
- EN ISO 3746: 2010
- EN ISO 13857: 2008
- EN 60204-1: 2006
- EN 1127-1: 2011 (Applies to Atex blowers only)
- EN ISO 80079-36: 2016 (Applies to Atex blowers only)
- EN ISO 80079-37: 2016 (Applies to Atex blowers only)
- EN 14986: 2017 (Applies to Atex blowers only)

11 INSTALLATION DIAGRAMS

SCHEMI DI INSALLAZIONE I
INSTALLATION DIAGRAM GB

COMPRESSORE PRESSURE SERVICE	ASPIRATORE VACUUM SERVICE
	
COMPRESSORE IN SERIE SERIAL PRESSURE SERVICE	ASPIRATORE IN PARALLELO PARALLEL VACUUM SERVICE
	
COMPRESSORE IN PARALLELO PARALLEL PRESSURE SERVICE	ATEX BLOWERS SCHEMA D'INSTALLAZIONE INSTALLATION DIAGRAM
	

LEGENDA, KEY – ACCESSORIES

Item Item		Denominazione Name	Item Item		Denominazione Name
1		Filtro - Filtro in linea Filter - Inline filter	7		Valvola di ritegno Check valve
(2)		Silenziatore Silencer	8		Valvola Valve
3		Manicotto flessibile Flexible sleeve	(9)		Scambiatore Cooler
4		Manometro – Vuotometro Pressure gauge - Vacuum gauge	(10)		Termometro Thermometer
5		Pressostato – Vuotostato Pressure switch – Vacuum switch	(11)		Termostato Thermostat
6		Valvola limitatrice Pressure relief valve	(x) (x)	SE NECESSARIO IF NECESSARY	

Ashland®

PUMP

Utility, Sump, Effluent, Sewage and Grinder Pumps for Residential and Onsite Applications

Ashland Pump

Ashland Pump is located in Ashland, Ohio and manufactures a complete line of pump products for the Residential Wholesale market. We are a family owned business with over 35 years of experience manufacturing pumps. Our commitment to you, our customer, is to offer a quality, dependable product with unmatched customer service. To support that, we stock thousands of pumps in our 130,000 sq. foot warehouse and know that having inventory on-hand for our customers is important. We are thoroughly committed to supporting the Professional marketplace with a full line of Sump, Sewage, Effluent and Grinder pumps for the Residential market.

Ashland Pump products are proudly sold through the Professional channel in the Plumbing Wholesale, On-Site Septic and Commercial markets. Our products feature only the highest quality components and time tested and professional approved materials.

- Heavy Duty Cast Iron
- Energy Efficient Motors
- Piggy-back SJ Rhombus Switches
- Professional-duty ball bearing design

We believe that in business, as in every other area of life, we will hold ourselves to be Honest, Professional and Dependable. This is true for our brand as well as the people that make up the company.

Outstanding Construction

HEAVY DUTY CAST IRON

Rugged design, great heat dissipation

OIL-FILLED CONTINUOUS DUTY MOTORS

Higher efficiency, lower amp draw, long life

DOUBLE BALL BEARING DESIGN

Double row, angular contact lower bearing, low maintenance, longer mean time between repairs, handles radial and thrust loading

APPLICATION SPECIFIC IMPELLERS

Thermoplastic, brass and cast iron variations, vortex impellers reduce pump clogging, two-vane enclosed impellers provide better efficiency while remaining clog free, replaceable wear rings to restore original performance

HONEST PROFESSIONAL DEPENDABLE

Utility and Sump Pumps

Effluent Pumps

Sewage Pumps

Grinder Pumps

UTILITY PUMPS

Model: UT57

Heavy Duty High Capacity Utility Pump

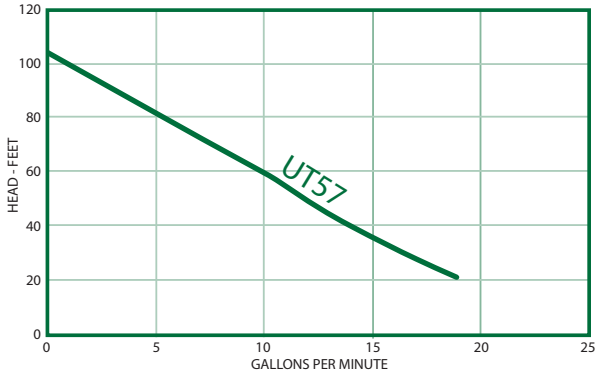
Features

- Designed For Large Water Transfer Jobs
- Heavy Duty Cast Iron
- Capable Of Boosting Household Water Pressure

Specifications

DISCHARGE SIZE	3/4" NPT
MOTOR HOUSING	Cast Iron
IMPELLER	Thermoplastic
SEAL TYPE	Mechanical
MOTOR TYPE	Brush Type
HP	1/2
VOLTAGE	115
FULL LOAD AMPS	8.0

Performance Curve



Models: UT56 and UT80

Submersible Utility Pumps

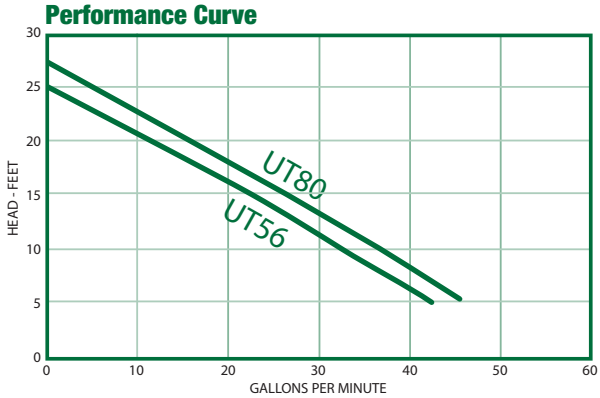
Features

- Designed To Pump 1/8" Solids
- Continuous Duty Psc Motor
- Ideal For Pool Covers, Irrigation And Flooded Areas

Specifications

DISCHARGE SIZE	1-1/4" NPT
MOTOR HOUSING	Thermoplastic
IMPELLER	Thermoplastic
SEAL TYPE	Standard
MOTOR TYPE	PSC
HP	1/3 (UT56) and 1/2 (UT80)
VOLTAGE	115
FULL LOAD AMPS	3.3 for both

Performance Curve



Model: AC15

Condensate Pump

Features

- Designed For Removal Of Condensate From Furnaces, Air Conditioners,Dehumidifiers And Other Types Of Equipment.
- Safety Switch To Automatically Shut Down Equipment In Case Of Power Failure.
- High Impact Thermoplastic Tank.
- Wall Mounts And Removable Built-In Check Valve Included.
- Three Intake Holes.
- 3/8" Outlet.

Specifications

DISCHARGE SIZE	3/8"
MOTOR HOUSING	Thermoplastic
IMPELLER	Thermoplastic
HP	1/12
VOLTAGE	115
FULL LOAD AMPS	1.5
CAPACITY	100 GPH @ 0 Head
MAXIMUM HEAD	18'

SUMP PUMPS

Models: PED33 and PED50

Pedestal Sump Pumps

Models

- PED33 and PED50 - Thermoplastic
- PED33CI and PED50CI - Cast Iron
- PED33B and PED50B - Brass

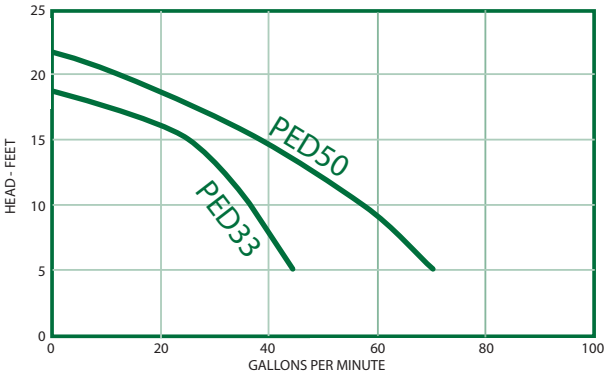
Features

- Column Style Sump Pump
- Available In Thermoplastic, Cast Iron And Bronze
- Non-Clogging Vortex Impeller

Specifications

DISCHARGE SIZE	1-1/2" NPT, 1-1/4" NPT (PEDB)
MOTOR HOUSING	Steel
IMPELLER	Thermoplastic, SS (PEDCI) Bronze (PEDB)
SEAL TYPE	Lip
MOTOR TYPE	PSC
HP	1/3 (PED33) and 1/2 (PED50)
VOLTAGE	115
FULL LOAD AMPS	4.0 (PED33), 5.2 (PED50)

Performance Curve



Model: APBS

Battery Backup System

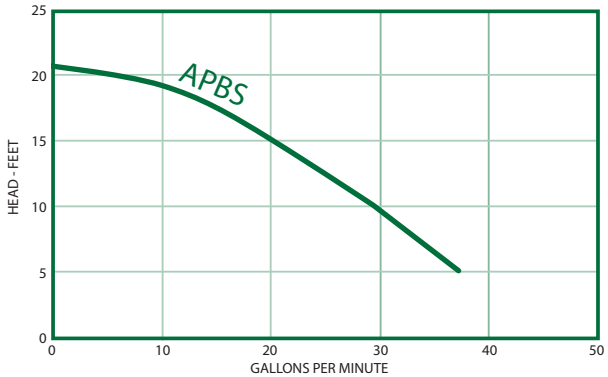
Features

- Automatically Functions During Power Outages
- Audible And Visual Alarms
- High Capacity 12V DC Pump
- Fully Recharge Depleted Battery In 24-48 Hours

Specifications

DISCHARGE SIZE	1-1/4" NPT
MOTOR HOUSING	Thermoplastic
IMPELLER	Thermoplastic
SEAL TYPE	Lip
MOTOR TYPE	DC
HP	DC12V
VOLTS @ 60Hz	DC12V
AMPS	16

Performance Curve

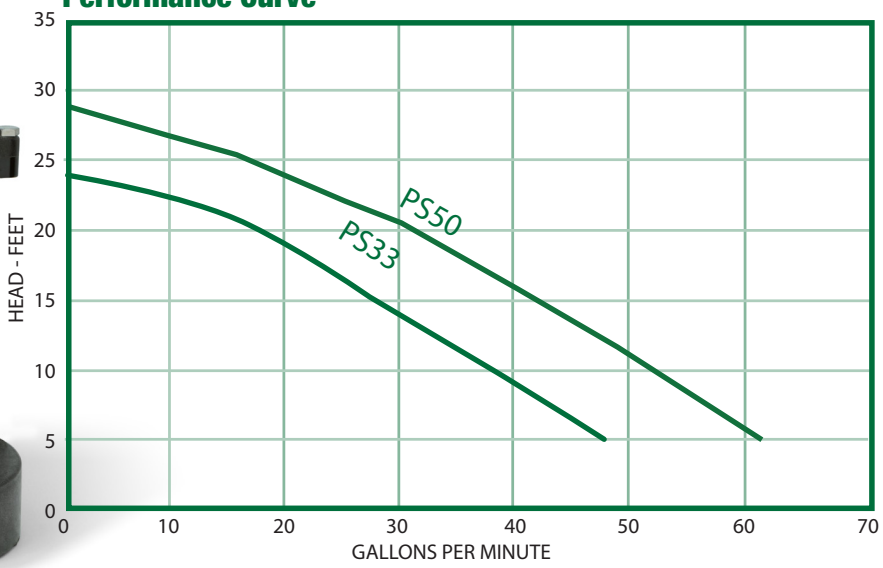


SUMP PUMPS

Models: PS33 and PS50

Submersible Sump Pumps

Performance Curve



Features

- Corrosion Resistant
- Anodized Aluminium Construction
- Continuous Duty, Low Amp Drawing PSC Motor
- Available In Mutiple Switch Configurations
- Vortex Thermoplastic Impeller
- 1-1/2" NPT Discharge

Specifications

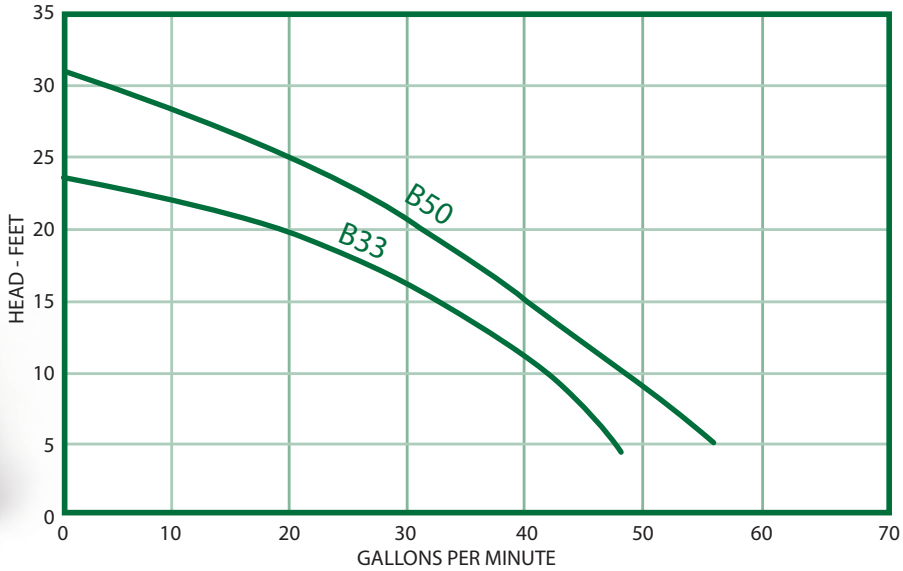
Model	HP	Hz	Volts/Ph	RPM	Full Load Amps	Cord Type
PS33M1-10	1/3	60	115	3450	5.3	SJTW 18/3C
PS33W1-10	1/3	60	115	3450	5.3	SJTW 18/3C
PS33V1-10	1/3	60	115	3450	5.3	SJTW 18/3C
PS50M1-10	1/2	60	115	3450	7.0	SJTW 18/3C
PS50W1-10	1/2	60	115	3450	7.0	SJTW 18/3C
PS50V1-10	1/2	60	115	3450	7.0	SJTW 18/3C

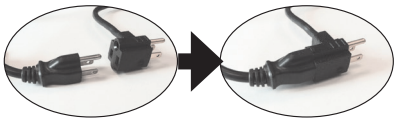
SUMP PUMPS

Models: B33 and B50

Cast Iron Sump Pumps

Performance Curve





PiggybackSwitchPlug

Features

- Heavy Duty Cast Iron Construction
- Strong PSC Continuous Duty Rated Motor
- Recessed Vortex Impeller To Reduce Clogging
- Piggyback Plug Standard
- 1-1/2” Discharge

Specifications

Model	HP	Hz	Volts/Ph	RPM	Full Load Amps	Cord Type
B33M1-10	1/3	60	115	3450	5.0	SJTW 18/3C
B33W1-10	1/3	60	115	3450	5.0	SJTW 18/3C
B33V1-10	1/3	60	115	3450	5.0	SJTW 18/3C
B50M1-10	1/2	60	115	3450	7.0	SJTW 18/3C
B50W1-10	1/2	60	115	3450	7.0	SJTW 18/3C
B50V1-10	1/2	60	115	3450	7.0	SJTW 18/3C
B33M1-10LK	1/3	60	115	3450	5.0	SJTW 18/3C
B33W1-10LK	1/3	60	115	3450	5.0	SJTW 18/3C
B33V1-10LK	1/3	60	115	3450	5.0	SJTW 18/3C
B50M1-10LK	1/2	60	115	3450	7.0	SJTW 18/3C
B50W1-10LK	1/2	60	115	3450	7.0	SJTW 18/3C
B50V1-10LK	1/2	60	115	3450	7.0	SJTW 18/3C

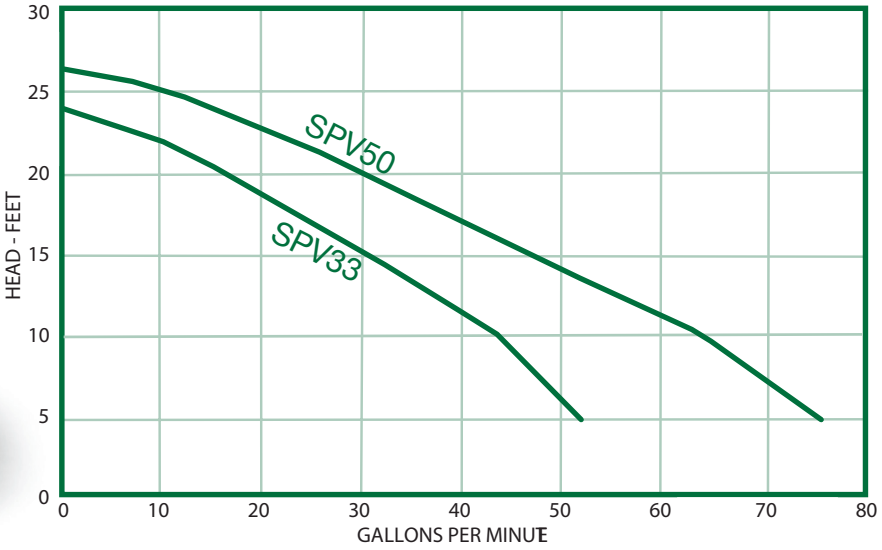
Optional plastic legs “LK”
P/N: 091BLEGX

SUMP PUMPS

Model SPV33 and SPV50

Cast Iron Sump Pumps

Performance Curve



Features

- PSC Continuous Duty Rated Motor
- Upper And Lower Ball Bearing Design For Longer Life And Smoother Operation
- Rugged Cast Iron Construction
- Vortex Thermoplastic Impeller (SPV33)
- Vortex Cast Iron Impeller (SPV50)
- 1-1/2” Discharge

Specifications

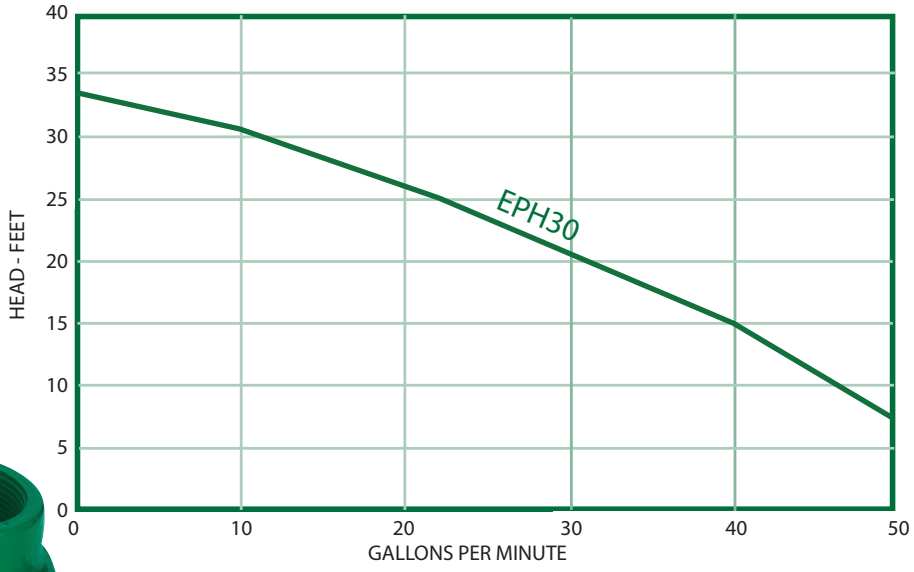
Model	HP	Hz	Volts/Ph	RPM	Full Load Amps	Cord Type
SPV33	1/3	60	115	1750	5.0	SJTW 18/3C
SPV50	1/2	60	115	1750	6.5	SJTW 18/3C

EFFLUENT PUMPS

Model: EPH30

High Head Cast Iron Effluent Pump

Performance Curve



Features

- Continuous duty rated PSC motor
- 3/4” solids handling
- All cast iron construction
- Recessed vortex cast iron impeller
- 1-1/2” NPT Discharge

Specifications

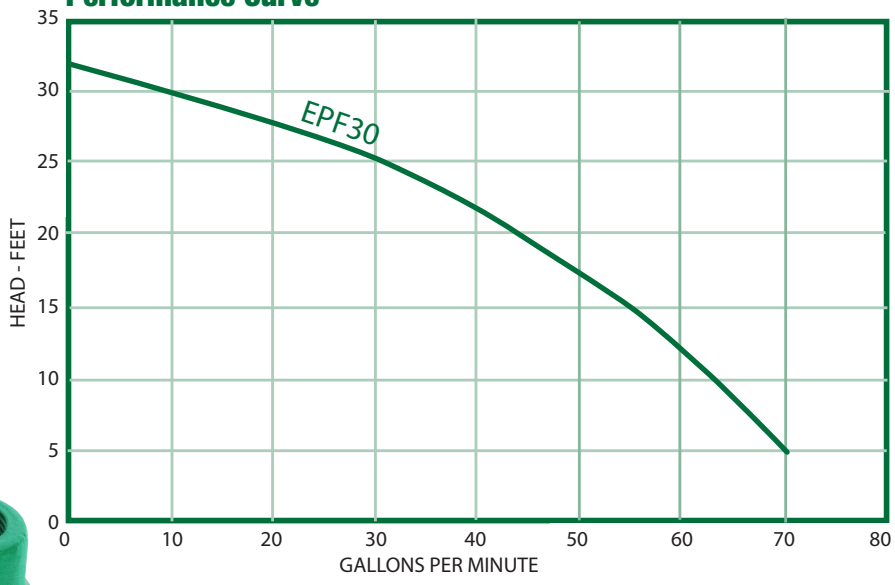
Model	HP	Hz	Volts/Ph	RPM	Full Load Amps	Cord Type
EPH30M1-20	3/10	60	115	3450	7.0	SJTW 18/3C
EPH30M2-20	3/10	60	230	3450	3.5	SJTW 18/3C
EPH30W1-20	3/10	60	115	3450	7.0	SJTW 18/3C
EPH30W2-20	3/10	60	230	3450	3.5	SJTW 18/3C

EFFLUENT PUMPS

Model EPF30

High Flow Cast Iron Effluent Pumps

Performance Curve



Features

- Heavy-duty cast iron construction
- 3/10 HP continuous duty rated PSC motor
- Recessed Cast iron vortex impeller
- 3/4” solids handling
- 2” NPT Discharge

Specifications

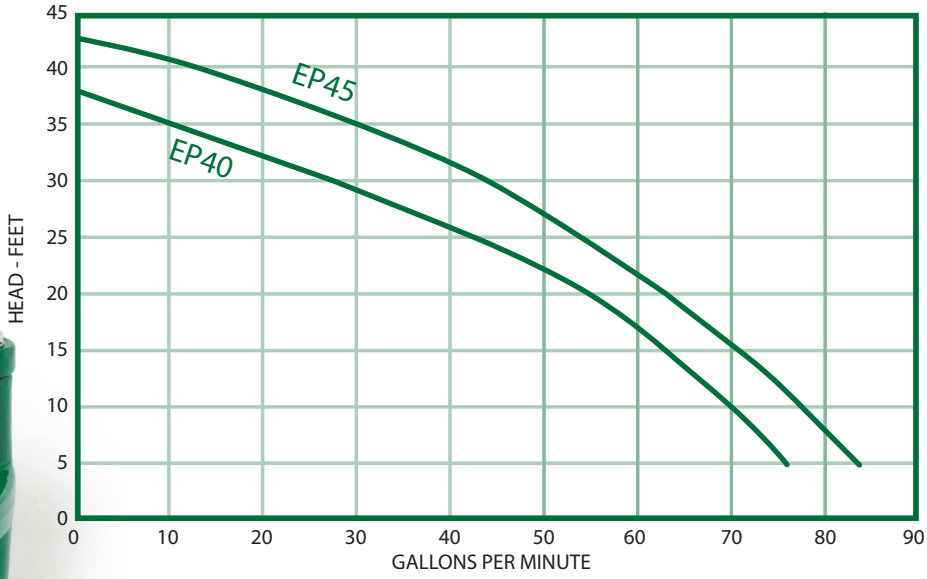
Model	HP	Hz	Volts/Ph	RPM	Full Load Amps	Nema Start Code	Cord Type	Cord Power Size	Cord O.D.
EPF30M1-20	3/10	60	115	3450	8.0	R	SJTW	16AWG/3C	.34
EPF30M2-20	3/10	60	230	3450	4.0	R	SJTW	16AWG/3C	.34
EPF30W1-20	3/10	60	115	3450	8.0	R	SJTW	16AWG/3C	.34
EPF30W2-20	3/10	60	230	3450	4.0	R	SJTW	16AWG/3C	.34

EFFLUENT PUMPS

Models: EP40 and EP45

Cast Iron Effluent Pumps

Performance Curve



Features

- Heavy-Duty Cast Iron Construction
- Continuous Duty Rated PSC Motor
- Upper And Lower Ball Bearing Design
- 3/4" Solids Handling
- Recessed Vortex Cast Iron Impeller
- 2" NPT Discharge

Specifications

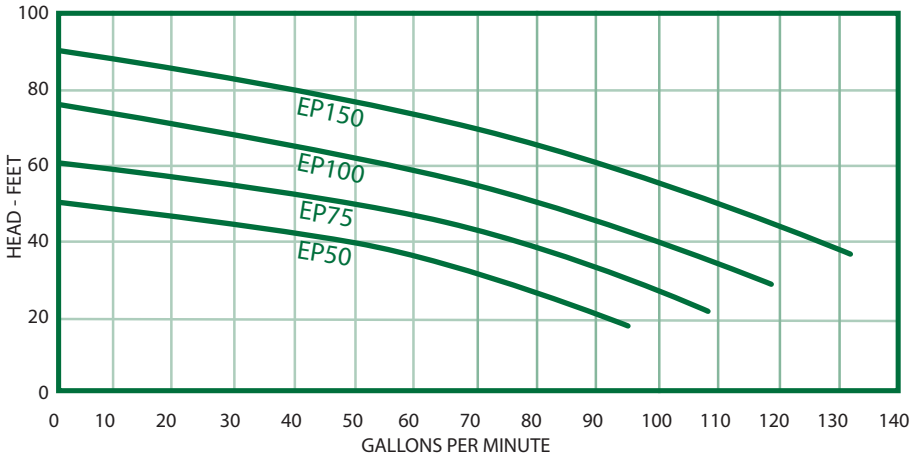
Model	HP	Hz	Volts/Ph	RPM	Full Load Amps	Nema Start Code	Cord Type	Cord Power Size	Cord O.D.
EP40M1-20	4/10	60	115	3450	9.0	P	SJTW	16AWG/3C	.34
EP40M2-20	4/10	60	230	3450	4.5	P	SJTW	16AWG/3C	.34
EP40W1-20	4/10	60	115	3450	9.0	P	SJTW	16AWG/3C	.34
EP40W2-20	4/10	60	230	3450	4.5	P	SJTW	16AWG/3C	.34
EP45M1-20	1/2	60	115	3450	11.0	P	SJTW	16AWG/3C	.34
EP45M2-20	1/2	60	230	3450	5.5	P	SJTW	16AWG/3C	.34
EP45W1-20	1/2	60	115	3450	11.0	P	SJTW	16AWG/3C	.34
EP45W2-20	1/2	60	230	3450	5.5	P	SJTW	16AWG/3C	.34

EFFLUENT PUMPS

Models: EP50, EP75, EP100 and EP150

Cast Iron Effluent Pumps

Performance Curve



Features

- Heavy-Duty Cast Iron Construction
- Oil-Filled Continuous Duty Rated PSC Motor
- Upper And Lower Ball Bearing Design
- Recessed Cast Iron Vortex Impeller
- 3/4" Solids Handling

Specifications

MODEL	HP	HZ	VOLTS/PH	RPM	FULL LOAD AMPS	NEMA START CODE	CORD TYPE	CORD SIZE	CORD O.D.	BREAKER SIZE	RUN CAPACITOR
EP50M1-20	1/2	60	115/1	3450	12.0	J	SOW	16AWG/3C	0.385-0.430	15A	370V 35MFD±5%
EP50W1-20	1/2	60	115/1	3450	12.0	J	SOW	16AWG/3C	0.385-0.430	15A	370V 35MFD±5%
EP50M2-20	1/2	60	230/1	3450	6.0	J	SOW	16AWG/3C	0.385-0.430	10A	370V 35MFD±5%
EP50W2-20	1/2	60	230/1	3450	6.0	J	SOW	16AWG/3C	0.385-0.430	10A	370V 35MFD±5%
EP50M3-20	1/2	60	230/3	3450	3.2	J	SOW	16AWG/4C	0.410-0.460	5A	N/A
EP50M4-20	1/2	60	460/3	3450	1.6	J	SOW	16AWG/4C	0.410-0.460	3A	N/A
EP50M5-20	1/2	60	208/1	3450	6.5	J	SOW	16AWG/3C	0.385-0.430	10A	450V 35MFD±5%
EP50M6-20	1/2	60	208/3	3450	3.5	J	SOW	16AWG/4C	0.410-0.460	5A	N/A
EP75M1-20	3/4	60	115/1	3450	13	H	SOW	16AWG/4C	0.410-0.460	10A	450V 35MFD±5%
EP75W1-20	3/4	60	115/1	3450	13	H	SOW	16AWG/4C	0.410-0.460	10A	450V 35MFD±5%
EP75M2-20	3/4	60	230/1	3450	6.5	H	SOW	16AWG/3C	0.385-0.430	10A	450V 35MFD±5%
EP75W2-20	3/4	60	230/1	3450	6.5	H	SOW	16AWG/3C	0.385-0.430	10A	450V 35MFD±5%
EP75M3-20	3/4	60	230/3	3450	4.7	H	SOW	16AWG/4C	0.410-0.460	5A	N/A
EP75M4-20	3/4	60	460/3	3450	2.3	H	SOW	16AWG/4C	0.410-0.460	3A	N/A
EP75M5-20	3/4	60	208/1	3450	8.2	H	SOW	16AWG/3C	0.385-0.430	10A	450V 35MFD±5%
EP75M6-20	3/4	60	208/3	3450	5.0	H	SOW	16AWG/4C	0.410-0.460	5A	N/A
EP100M2-20	1	60	230/1	3450	11.8	H	SOW	16AWG/3C	0.385-0.430	15A	450V 35MFD±5%
EP100W2-20	1	60	230/1	3450	11.8	H	SOW	16AWG/3C	0.385-0.430	15A	450V 35MFD±5%
EP100M3-20	1	60	230/3	3450	6.0	H	SOW	16AWG/4C	0.410-0.460	10A	N/A
EP100M4-20	1	60	460/3	3450	3.0	H	SOW	16AWG/4C	0.410-0.460	5A	N/A
EP100M5-20	1	60	208/1	3450	12.0	H	SOW	16AWG/3C	0.385-0.430	15A	450V 35MFD±5%
EP100M6-20	1	60	208/3	3450	6.2	H	SOW	16AWG/4C	0.410-0.460	10A	N/A
EP150M2-20	1-1/2	60	230/1	3450	15.0	G	SOW	14AWG/3C	0.520-0.575	20A	450V 35MFD±5%
EP150M3-20	1-1/2	60	230/3	3450	7.4	G	SOW	16AWG/4C	0.410-0.460	10A	N/A
EP150M4-20	1-1/2	60	460/3	3450	3.7	G	SOW	16AWG/4C	0.410-0.460	5A	N/A
EP150M5-20	1-1/2	60	208/1	3450	15.2	G	SOW	14AWG/3C	0.520-0.575	20A	450V 35MFD±5%
EP150M6-20	1-1/2	60	208/3	3450	7.8	G	SOW	16AWG/4C	0.410-0.460	10A	N/A

EFFLUENT PUMPS

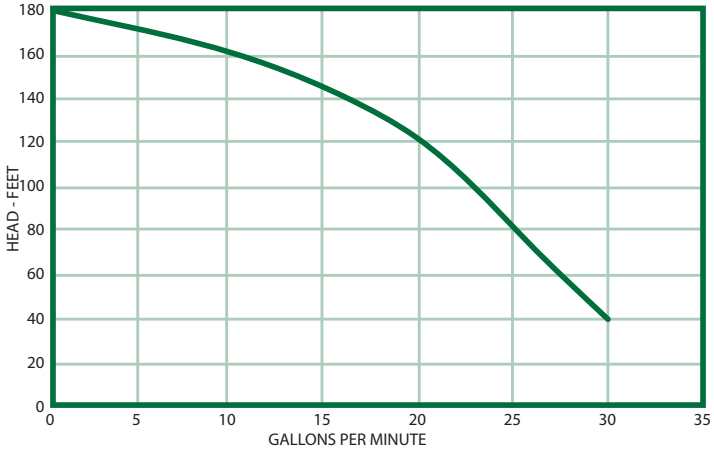
Models: EPMS5-20-10

High Head Effluent Pump

Applications

- Filtered effluent for residential
- Commercial and agricultural use

Performance Curve



Features

- 1-1/4” FNPT discharge connection
- Includes built-in check valve
- Provides smooth water passages for maximum efficiency
- Stainless steel pump shaft
- Precision molded impellers and diffusers
- Stainless steel splined shaft
- Kingsbury-type thrust bearing
- Pressure equalizing diaphragm
- NEMA mounting dimensions
- 16 AWG SOW Power Cord

EFFLUENT PUMPS

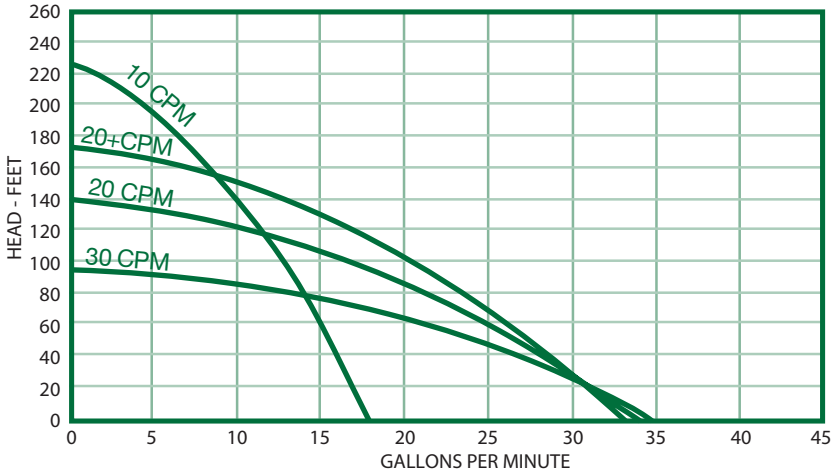
Models: CPM

Cistern Pumps

Applications

- Filtered effluent water pumping
- Gray water pumping
- Water feature/ Aeration applications
- Rain water basin applications

Performance Curve



Features

- Bottom Suction Design For Maximum Drawdown
- Able To Pass 1/8" Solids
- Available In 10, 20, And 30 GPM Flow Rates
- 1/2 HP, 115V And 230V Single Phase Motors
- Heavy Duty Discharge With Stainless Steel Internal Threads
- 300 Volt, 10' SJOOW Jacketed Lead
- High Shut-Off Pressure
- Quiet Operation
- Standard Removable Base For Stable Mounting

Specifications

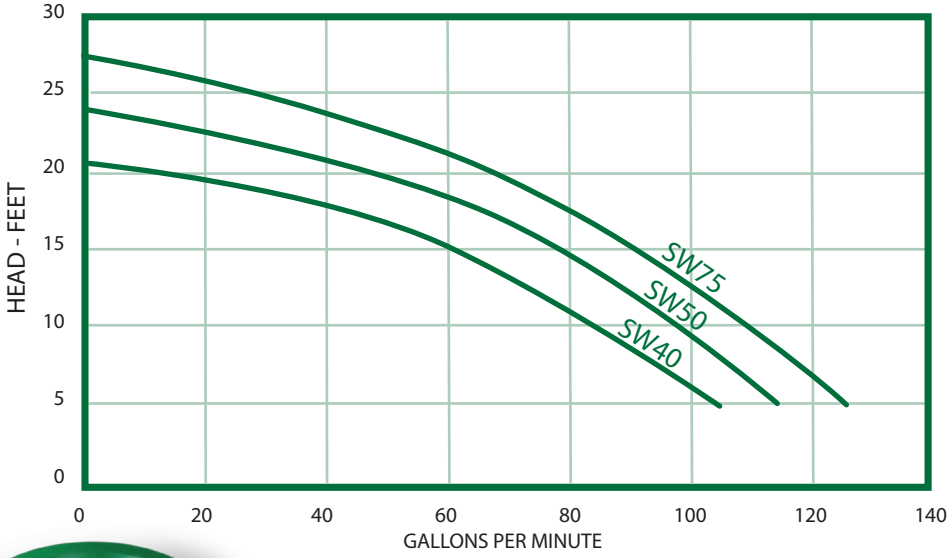
Model/Order No.	GPM	HP	Voltage/Ph.	FLA	Stage Count	Length (in.)	Shipping Wt. (lbs.)
10CPM115	10	1/2	115/1	6	7	26	17
10CPM230	10		230/1	10	7	26	17
20CPM115	20		115/1	10	5	25	16
20CPM230	20		230/1	10	5	25	16
20+CPM115	20+		115/1	10	6	26	17
20+CPM230	20+		230/1	6	6	26	17
30CPM115	30		115/1	10	4	25	16
30CPM230	30		230/1	6	4	25	16

SEWAGE PUMPS

Models: SW40/50/75

Cast Iron Sewage Pumps

Performance Curve



3" NPT Adapter

Features

- 2" NPT Discharge
- Cast Iron Vortex Impeller
- Cast Iron Motor Housing
- Single Mechanical Carbon Ceramic Seal
- 20' Piggyback Cord Length
- Handles 2" Solids

Specifications

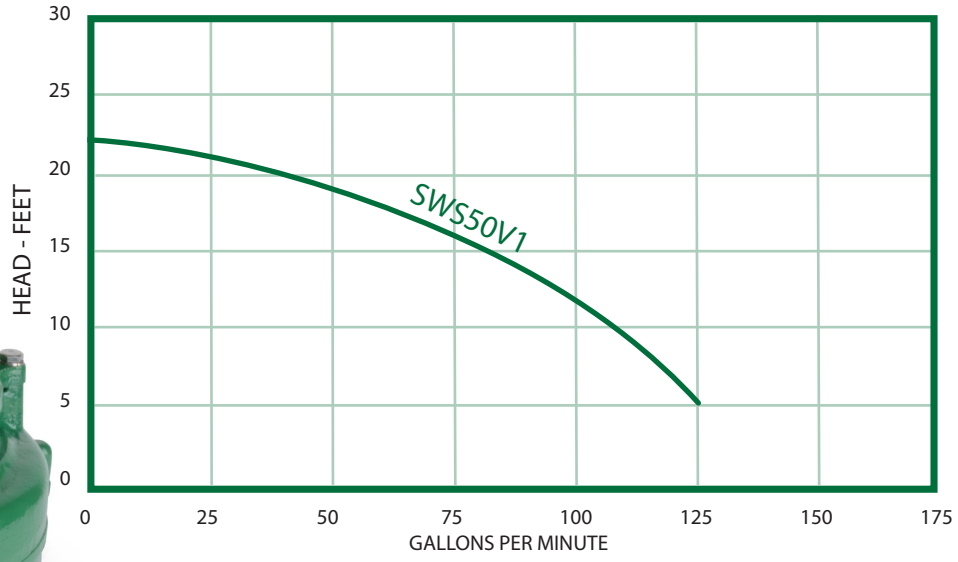
Model	HP	Volt	Ph	Nema Start Code	Full Load Amps	Cord Size	Cord Type	Cord O.D. Inches (mm)
SW40M1-20	4/10	115	1	R	9.0	16AWG/3C	SJTOW	.325-.360
SW40M2-20	4/10	230	1	R	4.5	16AWG/3C	SJTOW	.325-.360
SW50M1-20	1/2	115	1	P	9.5	16AWG/3C	SJTOW	.325-.360
SW50M2-20	1/2	230	1	P	4.8	16AWG/3C	SJTOW	.325-.360
SW75M1-20	3/4	115	1	P	10.5	16AWG/3C	SJTOW	.325-.360
SW75M2-20	3/4	230	1	P	5.3	16AWG/3C	SJTOW	.325-.360
SW75M3-20	3/4	230	3	R	3.2	16AWG/4C	SJTOW	.350-.394
SW75M4-20	3/4	460	3	R	1.6	16AWG/4C	SJTOW	.350-.394
SW75M5-20	3/4	208	1	P	5.8	16AWG/3C	SJTOW	.325-.360
SW75M6-20	3/4	208	3	R	3.3	16AWG/4C	SJTOW	.350-.394

SEWAGE PUMPS

Model: SWS50V

Cast Iron Sewage Pumps

Performance Curve



Features

- 2” NPT Discharge
- Vortex - Thermoplastic Impeller
- Cast Iron Motor Housing and Volute
- Single Mechanical Carbon Ceramic Seal
- 10’ Power Cord
- Handles 2” Solids

Specifications

Model	HP	Volt	Ph	Nema Start Code	Full Load Amps	Cord Size	Cord Type	Cord O.D. Inches (mm)
SWS50V1-10	1/2	115	1	P	9.4	18AWG/3C	SJTW	.325-.360
SWS50V2-10	1/2	230	1	P	4.7	18AWG/3C	SJTW	.325-.360

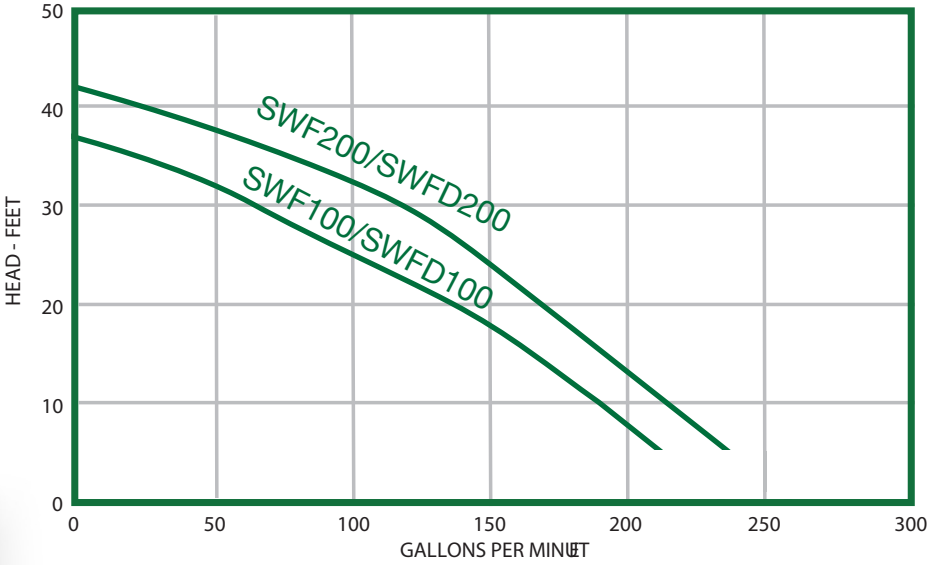
SEWAGE PUMPS

Models: SWF100, SWF200, SWFD100, and SWFD200

Cast Iron Sewage Pumps

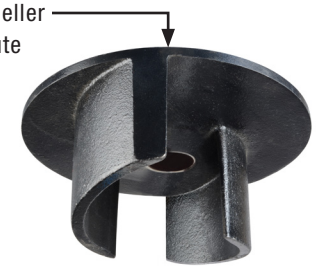
Dual Seal Pump

Performance Curve



Features

- 3” Flanged Discharge
- 2-Vane, Semi-open Cast Iron Impeller
- Cast Iron Motor Housing and Volute
- Mechanical Carbon Ceramic Seal
- 20’ Cord
- Handles 2” Solids



Specifications

Model	HP	Hz	Volts/Ph	RPM	Full Load Amps	Nema Start Code	Cord Type	Cord Power Size	Cord O.D.
SWF100M2-20/SWFD100M2-20	1	60	230/1	1750	10.8	P	SOW	14AWG/3C	.55
SWF100M3-20/SWFD100M3-20	1	60	230/3	1750	8.0	P	SOW	16AWG/4C	.45
SWF100M4-20/SWFD100M4-20	1	60	460/3	1750	4.0	P	SOW	16AWG/4C	.45
SWF100M5-20/SWFD100M5-20	1	60	208/1	1750	13.0	P	SOW	14AWG/4C	.55
SWF100M6-20/SWFD100M6-20	1	60	208/3	1750	8.5	P	SOW	16AWG/4C	.45
SWF200M2-20/SWFD200M2-20	2	60	230/1	1750	16.7	K	SOW	12AWG/3C	.62
SWF200M3-20/SWFD200M3-20	2	60	230/3	1750	11.0	L	SOW	14AWG/4C	.59
SWF200M4-20/SWFD200M4-20	2	60	460/3	1750	5.5	L	SOW	14AWG/4C	.59
SWF200M5-20/SWFD200M5-20	2	60	208/1	1750	21.0	K	SOW	12AWG/3C	.62
SWF200M6-20/SWFD200M6-20	2	60	208/3	1750	11.5	L	SOW	14AWG/4C	.59

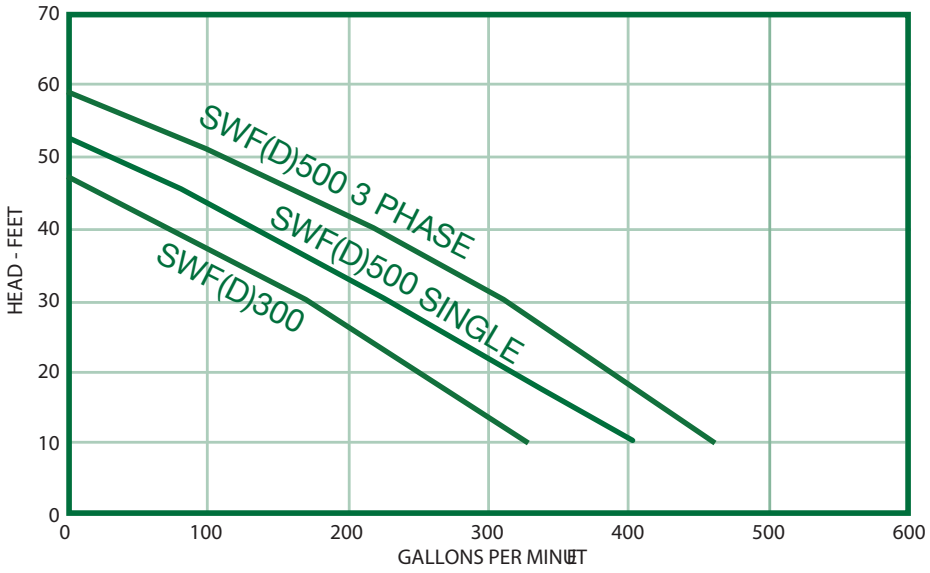
SEWAGE PUMPS

Models: SWF300, SWF500, SWFD300 and SWFD500

Cast Iron Sewage Pumps

Dual Seal Pump

Performance Curve



Features

- 3" NPT Discharge
- 2-Vane, Semi-open Cast Iron Impeller
- Cast Iron Motor Housing and Volute
- Mechanical Carbon Ceramic Seal
- 20' Cord
- SWF300 Handles 2-1/2" Solids
  SWF500 Handles 3" Solids

Specifications

Model	HP	Hz	Volts/Ph	RPM	Full Load Amps	Nema Start Code	Cord Type	Cord Power Size	Cord O.D.
SWF300M2-20/SWFD300M2-20	3	60	230/1	1750	28.0	D	SOW	8AWG/4C	1.0
SWF300M3-20/SWFD300M3-20	3	60	230/3	1750	20.0	D	SOW	12AWG/4C	.7
SWF300M4-20/SWFD300M4-20	3	60	460/3	1750	10.0	D	SOW	12AWG/4C	.7
SWF300M5-20/SWFD300M5-20	3	60	208/1	1750	33.5	D	SOW	8AWG/4C	1.0
SWF300M6-20/SWFD300M6-20	3	60	208/3	1750	18.0	D	SOW	12AWG/4C	.7
SWF500M2-20/SWFD500M2-20	5	60	230/1	1750	45.6	D	SOW	6AWG/4C	1.2
SWF500M3-20/SWFD500M3-20	5	60	230/3	1750	23.6	D	SOW	12AWG/4C	.7
SWF500M4-20/SWFD500M4-20	5	60	460/3	1750	11.8	D	SOW	12AWG/4C	.7
SWF500M5-20/SWFD500M5-20	5	60	208/1	1750	46.0	D	SOW	6AWG/4C	1.2
SWF500M6-20/SWFD500M6-20	5	60	208/3	1750	24.0	D	SOW	12AWG/4C	.7

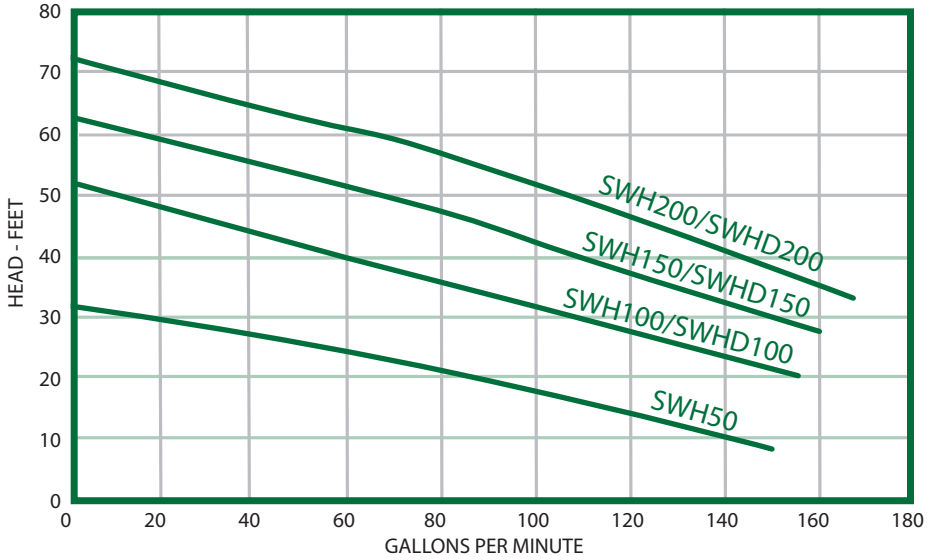
SEWAGE PUMPS

Models: SWH50, SWH100, SWH150, SWH200, SWHD100, SWHD150 & SWHD200

Cast Iron Sewage Pumps

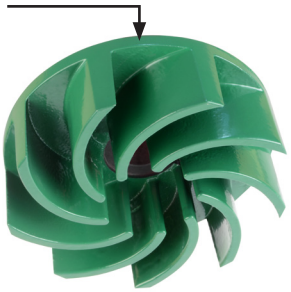
Dual Seal Pump

Performance Curve



Features

- 2" NPT Flanged Discharge, 3" NPT Optional
- 9-Vane, Vortex Cast Iron Impeller
- Cast Iron Motor Housing and Volute
- Mechanical Carbon Ceramic Seal
- 20' Cord
- Handles 2" Solids



Specifications

Model	HP	Hz	Volts/Ph	RPM	Full Load Amps	Cord Type	Cord Power Size	Cord O.D.
SWH50M1-20	1/2	60	115/1	3450	12.0	SOW	16AWG/3C	.430
SWH50M2-20	1/2	60	230/1	3450	6.0	SOW	16AWG/3C	.430
SWH50M3-20	1/2	60	230/3	3450	4.0	SOW	16AWG/4C	.460
SWH50M4-20	1/2	60	460/3	3450	2.0	SOW	16AWG/4C	.460
SWH50M5-20	1/2	60	208/1	3450	6.8	SOW	16AWG/3C	.430
SWH50M6-20	1/2	60	208/3	3450	4.2	SOW	16AWG/4C	.460
SWH100M2-20/SWHD100M2-20	1	60	230/1	3450	11	SOW	16AWG/3C	.430
SWH100M3-20/SWHD100M3-20	1	60	230/3	3450	6.6	SOW	16AWG/4C	.460
SWH100M4-20/SWHD100M4-20	1	60	460/3	3450	3.3	SOW	16AWG/4C	.460
SWH100M5-20/SWHD100M5-20	1	60	208/1	3450	12	SOW	16AWG/3C	.430
SWH100M6-20/SWHD100M6-20	1	60	208/3	3450	6.8	SOW	16AWG/4C	.460
SWH150M2-20/SWHD150M2-20	1-1/2	60	230/1	3450	13.8	SOW	14AWG/3C	.575
SWH150M3-20/SWHD150M3-20	1-1/2	60	230/3	3450	7.6	SOW	16AWG/4C	.460
SWH150M4-20/SWHD150M4-20	1-1/2	60	460/3	3450	3.8	SOW	16AWG/4C	.460
SWH150M5-20/SWHD150M5-20	1-1/2	60	208/1	3450	15	SOW	14AWG/3C	.575
SWH150M6-20/SWHD150M6-20	1-1/2	60	208/3	3450	7.8	SOW	16AWG/4C	.460
SWH200M2-20/SWHD200M2-20	2	60	230/1	3450	18	SOW	14AWG/3C	.575
SWH200M3-20/SWHD200M3-20	2	60	230/3	3450	9	SOW	16AWG/4C	.460
SWH200M4-20/SWHD200M4-20	2	60	460/3	3450	4.5	SOW	16AWG/4C	.460
SWH200M5-20/SWHD200M5-20	2	60	208/1	3450	20	SOW	12AWG/3C	.655
SWH200M6-20/SWHD200M6-20	2	60	208/3	3450	10.4	SOW	16AWG/4C	.460

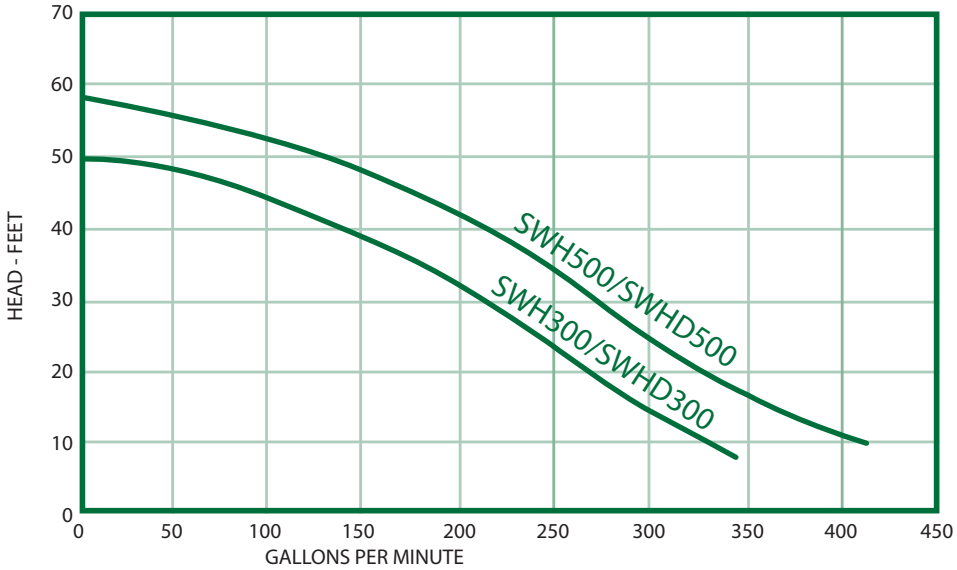
SEWAGE PUMPS

Models: SWH300, SWH500, SWHD300 and SWHD500

Cast Iron Sewage Pumps

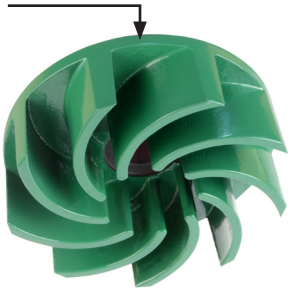
Dual Seal Pump

Performance Curve



Features

- 3” NPT
- 9-Vane, Vortex Cast Iron Impeller
- Cast Iron Motor Housing and Volute
- Mechanical Carbon Ceramic Seal
- 20’ Cord
- SWH300 Handles 2-1/2” Solids
  SWH500 Handles 3” Solids



Specifications

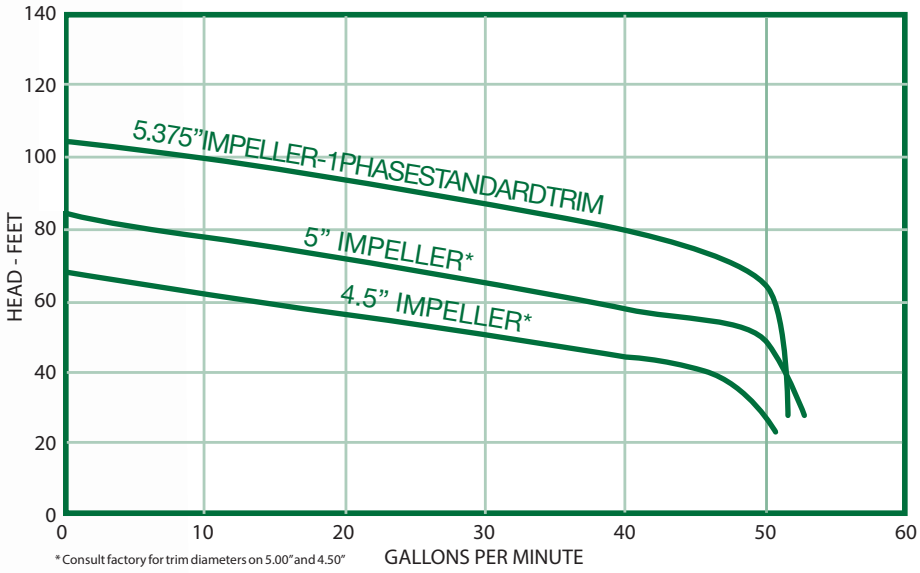
Model	HP	Hz	Volts/Ph	RPM	Full Load Amps	Nema Start Code	Cord Type	Cord Power Size	Cord O.D.
SWH300M2-20/SWHD300M2-20	3	60	230/1	1750	28.0	D	SOW	8AWG/4C	1.0
SWH300M3-20/SWHD300M3-20	3	60	230/3	1750	16.0	D	SOW	12AWG/4C	.7
SWH300M4-20/SWHD300M4-20	3	60	460/3	1750	8.0	D	SOW	12AWG/4C	.7
SWH300M5-20/SWHD300M5-20	3	60	208/1	1750	33.5	D	SOW	8AWG/4C	1.0
SWH300M6-20/SWHD300M6-20	3	60	208/3	1750	18.0	D	SOW	12AWG/4C	.7
SWH500M2-20/SWHD500M2-20	5	60	230/1	1750	40.0	D	SOW	6AWG/4C	1.2
SWH500M3-20/SWHD500M3-20	5	60	230/3	1750	23.6	D	SOW	12AWG/4C	.7
SWH500M4-20/SWHD500M4-20	5	60	460/3	1750	11.8	D	SOW	12AWG/4C	.7
SWH500M5-20/SWHD500M5-20	5	60	208/1	1750	46.0	D	SOW	6AWG/4C	1.2
SWH500M6-20/SWHD500M6-20	5	60	208/3	1750	24.0	D	SOW	12AWG/4C	.7

GRINDER PUMP

Model: AGPR

Cast Iron Single Seal Grinder Pump

Performance Curve



*Consult factory for trim diameters on 5.00" and 4.50"

Features

- 1-1/4" NPT + Flanged Horizontal with Vertical Adapter
- 10-Vane, Open Vortex Noryl™ Impeller
- Cast Iron Motor Housing and Volute
- Mechanical Carbon Ceramic Seal
- 20' Cord Standard, 35' Cord Optional
- Handles Domestic Wastewater with Fibrous Solids

Hybrid Cutters
440 SST, Hardened
PATENTED
(U.S. Patented No.
10,316,846)

Leg Kit Included

Optional:

- Manual with 20' & 35' Cord Lengths
- 3' Integral switch
- 20' & 35' Piggyback

Specifications

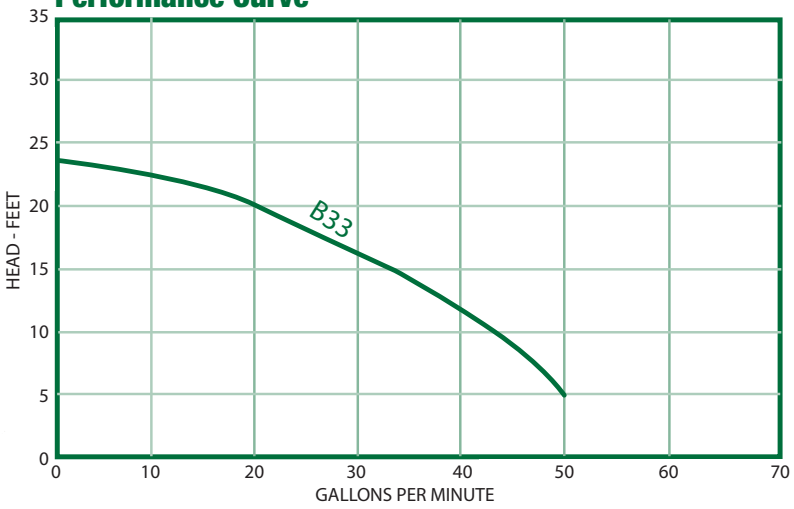
MODEL	HP	HZ	VOLTS/PH	RPM	FULL LOAD AMPS	NEMA START CODE	CORD TYPE	CORD SIZE	CORD OD	SOLID STATE RELAY	START CAPACITOR	RUN CAPACITOR	SWITCH TYPE
AGPR200M2-20	2	60	230/1	3450	15	G	SJTOW	14 AWG/3C	.36-.37	SAMUSCO ECS225P	MARS 11068	MARS 12248	N/A
AGPR200M2-35	2	60	230/1	3450	15	G	SJTOW	14 AWG/3C	.36-.37	SAMUSCO ECS225P	MARS 11068	MARS 12248	N/A
AGPR200W2-20	2	60	230/1	3450	15	G	SJTOW	14 AWG/3C	.36-.37	SAMUSCO ECS225P	MARS 11068	MARS 12248	INTEGRAL
AGPR200W2-35	2	60	230/1	3450	15	G	SJTOW	14 AWG/3C	.36-.37	SAMUSCO ECS225P	MARS 11068	MARS 12248	INTEGRAL
AGPR200WP2-20	2	60	230/1	3450	15	G	SJTOW	14 AWG/3C	.36-.37	SAMUSCO ECS225P	MARS 11068	MARS 12248	PIGGY-BACK
AGPR200WP2-35	2	60	230/1	3450	15	G	SJTOW	14 AWG/3C	.36-.37	SAMUSCO ECS225P	MARS 11068	MARS 12248	PIGGY-BACK

PREPLUMBED LAUNDRY PACKAGE SYSTEM

Model: B33VSTPKG

Laundry Basin and Sump Pump

Performance Curve



Features

- Package Includes: B-Series 1/3 HP Pump, Sump Basin, Pre-plumbed with check valve
- 15” X 15” (6 Gallon) Structured Foam, Pre-plumbed Sump Basin
- For New Or Existing Installations
- Sump Pump Is Heavy Duty Cast Iron Construction
  - Strong PSC Continuous Duty Rated Motor
  - Recessed Vortex Thermoplastic Impeller To Reduce Clogging
  - Discharge Size 1-1/2” NPT
  - Single Mechanical Carbon Ceramic Seal
  - Piggyback Plug Standard

Specifications

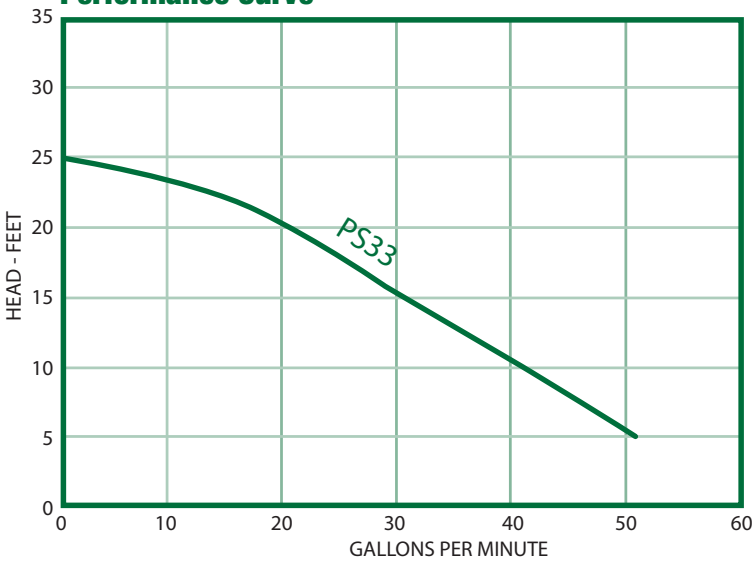
Model	HP	Hz	Volts/Ph	RPM	Full Load Amps	Cord Type
B33V1-10	1/3	60	115	3450	5.0	SJTW 18/3C

PREPLUMBED LAUNDRY PACKAGE SYSTEM

Model: PS33VSTPKG

Laundry Basin and Sump Pump

Performance Curve



Features

- Package Includes: PS-Series 1/3 HP Pump, Sump Basin, Pre-plumbed with check valve
- 15” X 15” (6 Gallon) Structured Foam, Pre-plumbed Sump Basin
- For New Or Existing Installations
- Sump Pump Is Anodized Aluminum and Thermoplastic Construction
  - Strong PSC Continuous Duty Rated Motor
  - Vortex Thermoplastic Impeller To Reduce Clogging
  - Discharge Size 1-1/2” NPT

Specifications

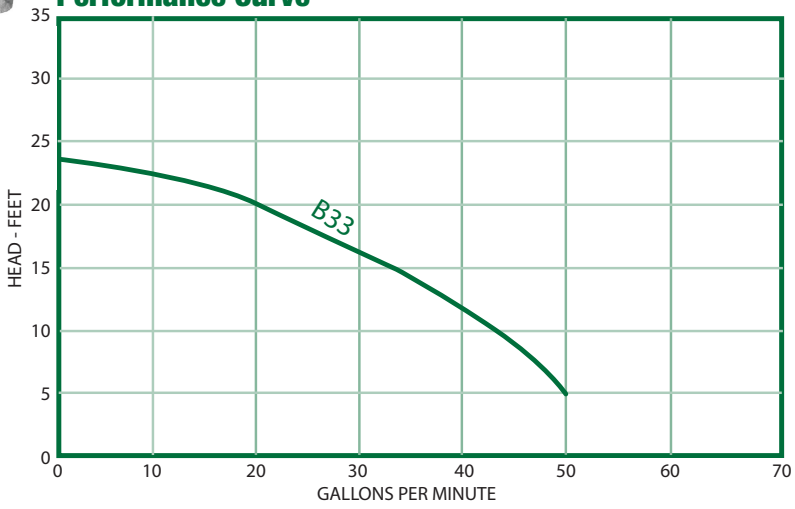
Model	HP	Hz	Volts/Ph	RPM	Full Load Amps	Cord Type
PS33V1-10	1/3	60	115	3450	5.3	SJTW 18/3C

PREPLUMBED SUMP PACKAGE SYSTEM

Model: B33VB1824

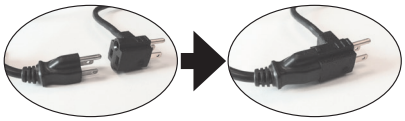
Sump Basin and Sump Pump

Performance Curve



Features

- Package Includes: B-Series 1/3 HP Pump, Sump Basin, Pre-plumbed with check valve
- 18" X 24" (22 Gallon) Structured Foam, Pre-plumbed Sump Basin
- For New Or Existing Installations
- Sump Pump Is Heavy Duty Cast Iron Construction
  - Strong PSC Continuous Duty Rated Motor
  - Recessed Vortex Thermoplastic Impeller To Reduce Clogging
  - Discharge Size 1-1/2" NPT
  - Single Mechanical Carbon Ceramic Seal
  - Piggyback Plug Standard



B33 Pump Specifications

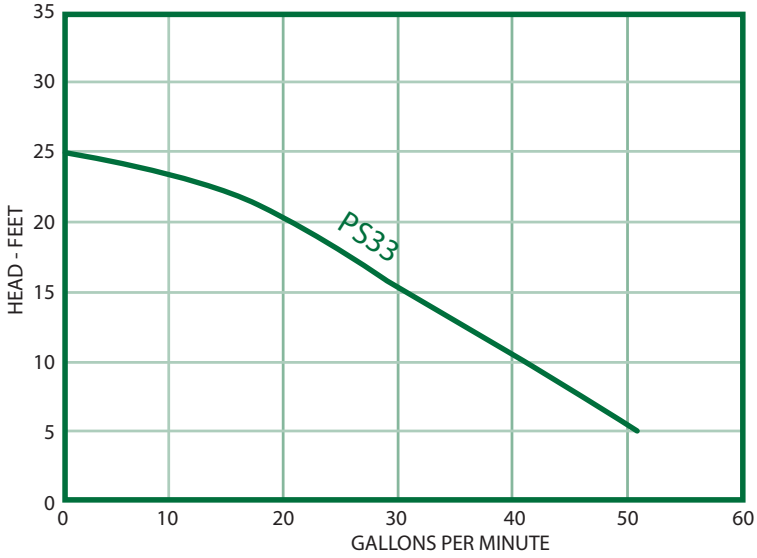
Model	HP	Hz	Volts/Ph	RPM	Full Load Amps	Cord Type
B33V1-10	1/3	60	115	3450	5.0	SJTW 18/3C

PREPLUMBED SUMP PACKAGE SYSTEM

Model: PS33VB1824

Sump Basin and Sump Pump

Performance Curve



Features

- Package Includes: PS-Series 1/3 HP Pump, Sump Basin, Pre-plumbed with check valve
- 18” X 24” (22 Gallon) Structured Foam, Pre-plumbed Sump Basin
- For New Or Existing Installations
- Sump Pump Is Anodized Aluminum and Thermoplastic Construction
  - Strong PSC Continuous Duty Rated Motor
  - Vortex Thermoplastic Impeller To Reduce Clogging
  - Discharge Size 1-1/2” NPT

PS33 Pump Specifications

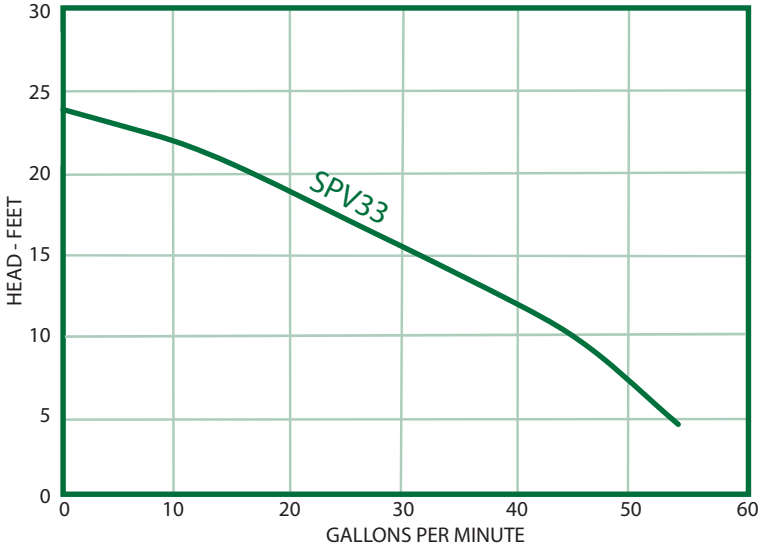
Model	HP	Hz	Volts/Ph	RPM	Full Load Amps	Cord Type
PS33V1-10	1/3	60	115	3450	5.3	SJTW 18/3C

PREPLUMBED SUMP PACKAGE SYSTEM

Model: SPV33B1824

Sump Basin and Sump Pump

Performance Curve



Features

- Package Includes: SPV-Series 1/3 HP Pump, Sump Basin, Pre-plumbed with check valve
- 18" X 24" (22 Gallon) Structured Foam, Pre-plumbed Sump Basin
- For New Or Existing Installations
- Sump Pump Is Heavy Duty Cast Iron Construction
  - Strong PSC Continuous Duty Rated Motor
  - Vortex Thermoplastic Impeller To Reduce Clogging
  - Discharge Size 1-1/2" NPT

SPV33 Pump Specifications

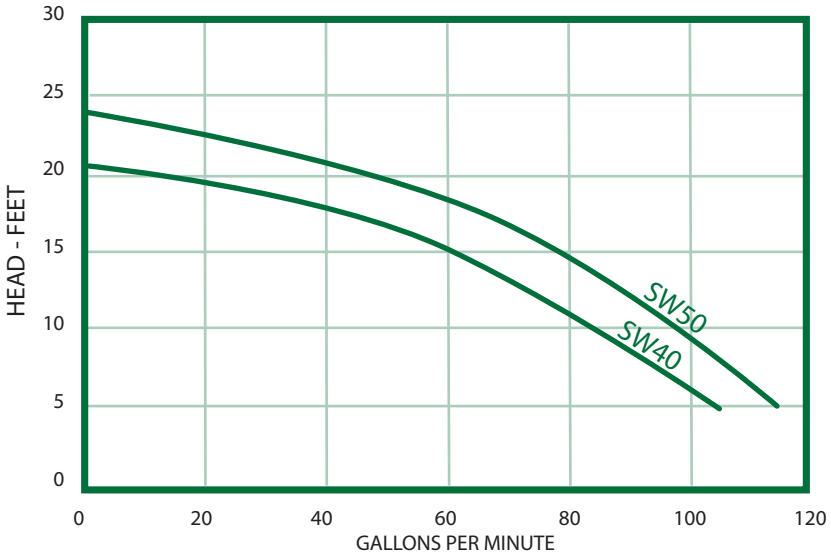
Model	HP	Hz	Volts/Ph	RPM	Full Load Amps	Cord Type
SPV33	1/3	60	115	1750	5.0	SJTW 18/3C

PREPLUMBED SEWAGE PACKAGE SYSTEM

Model: SW40WB1830/SW50WB1830

Sewage Basin and Sewage Pump

Performance Curve



Features

- Package Includes: SW-Series 4/10 or 1/2 HP Pump, Sewage Basin, Pre-plumbed with check valve
- 18" X 30" (30 Gallon) Structured Foam, Pre-plumbed Sewage Basin
- For New Or Existing Installations
- Sewage Pump Is Heavy Duty Cast Iron Construction
  - Strong PSC Continuous Duty Rated Motor
  - Vortex Cast Iron Impeller To Reduce Clogging
  - Discharge Size 2" NPT

Pump Specifications

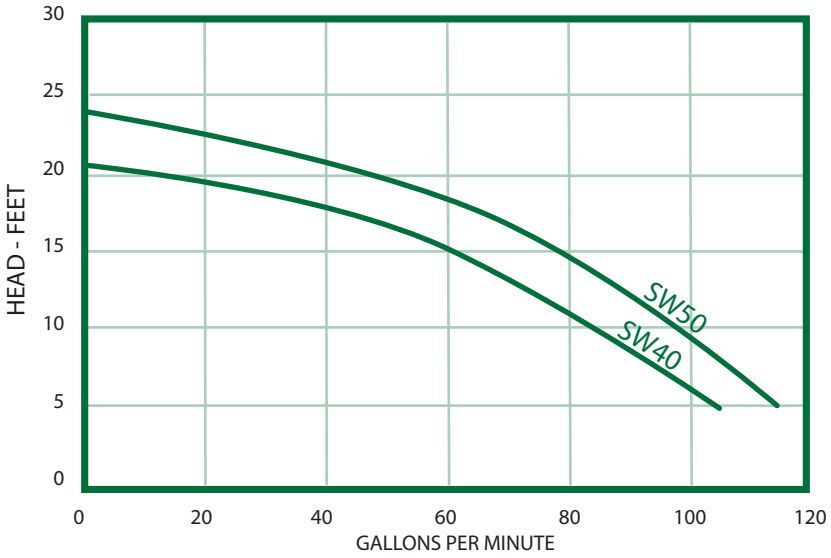
Model	HP	Volt	Ph	Nema Start Code	Full Load Amps	Cord Size	Cord Type	Cord O.D. Inches (mm)
SW40W1-20	4/10	115	1	R	9.0	16AWG/3C	SJTOW	.325-.360
SW50W1-20	1/2	115	1	P	9.5	16AWG/3C	SJTOW	.325-.360

PREPLUMBED SEWAGE PACKAGE SYSTEM

Model: SW40WB2424/SW50WB2424

Sewage Basin and Sewage Pump

Performance Curve



Features

- Package Includes: SW-Series 4/10 or 1/2 HP Pump, Sewage Basin, Pre-plumbed with check valve
- 24” X 24” (45 Gallon) Structured Foam, Pre-plumbed Sewage Basin
- For New Or Existing Installations
- Sewage Pump Is Heavy Duty Cast Iron Construction
  - Strong PSC Continuous Duty Rated Motor
  - Vortex Cast Iron Impeller To Reduce Clogging
  - Discharge Size 2” NPT

Pump Specifications

Model	HP	Volt	Ph	Nema Start Code	Full Load Amps	Cord Size	Cord Type	Cord O.D. Inches (mm)
SW40W1-20	4/10	115	1	R	9.0	16AWG/3C	SJTOW	.325-.360
SW50W1-20	1/2	115	1	P	9.5	16AWG/3C	SJTOW	.325-.360

ACCESSORIES

CHECK VALVES

EFUNCV150 (SUMP)

Inline sump pump check valve, 1-1/2”

CV200R (SEWAGE)

Sewage pump check valve, 2”

EFCVP200 (SEWAGE)

Sewage pump plastic check valve, 2”

FLOAT SWITCHES

060M3A002 (PIGGYBACK WIDE ANGLE)

ALARMS

10A500
(HIGH WATER ALARM)

1033578
115V OIL SPOTTER SYSTEM WITH TANK ALERT

1037723
230V OIL SPOTTER SYSTEM WITH TANK ALERT

HOSE KIT

HOSE150 (1-1/2”)

Sump pump basin hose, with 1-1/4” x 1-1/4” and 1-1/2” x 1-1/4” barbed adapters.
Plus hose clamp

MARS KITS

MARS KIT-167

SWF(D)300M2/5-35, SWH(D)300M2/5-35
SWF(D)500M2/5-35, SWH(D)500M2/5-35

ASHLAND PUMP WARRANTY

For a period of time no greater than three (3) years after the original purchase of the subject product, and subject to the conditions of this Limited Warranty, Ashland Pump will repair or replace for the original purchaser only, any portion of your new Ashland Pump product that proves to contain defective materials or defective workmanship, provided the product is properly installed, serviced and operated under normal conditions and according to the manufacturer's instructions. Ashland Pump disclaims all liability, including liability under this Limited Warranty, for improper installation, application or use of its products. Ashland Pump shall have and possess the sole discretion to determine whether to repair or replace defective equipment, parts or components with a new or remanufactured part. Any item to be replaced under this Warranty must be returned to Ashland Pump, or such other place as Ashland Pump may designate, freight prepaid. In the absence of suitable proof of purchase date, the effective date of this warranty will be based upon the date of manufacture as evidenced by the serial number of the product.

There is no other express or implied warranty covering your Ashland Pump product. Without limiting the foregoing, Ashland Pump specifically disclaims the implied warranties of merchantability and fitness for a particular purpose. No warranties or representations at any time made by any representative of Ashland Pump shall vary or expand the provisions of this written Limited Warranty. This Limited Warranty contains the purchaser's exclusive remedy for any alleged defect in the product.

To the greatest extent permissible by applicable law, Ashland Pump shall not be liable or responsible for consequential, incidental or special damages resulting from or related in any manner to any Ashland Pump product or parts. Personal injury and/or property damage may result from improper installation, application or use of your Ashland Pump product. Ashland Pump shall not be liable for any loss, damage, or expenses resulting from the installation or use of its products other than as expressly set forth in this Limited Warranty. Ashland Pump shall in no event be responsible or liable for the cost of field labor or other charges incurred by any purchaser or user in removing and/or reaffixing any Ashland Pump product, part or com- ponent or any temporary pumping or other equipment. 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.

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PUMP

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AP-0109/Ashland Pump Res Catalog rev 04/2023

C-LEVEL **Installer Friendly Series®**

SJE Rhombus® Type IFS w/C-Level™ Sensor

Installation Instructions and Operation/Troubleshooting Manual

WARNING!

ELECTRICAL SHOCK HAZARD
Disconnect all power sources before servicing. Failure to do so could result in serious injury or death.

This control panel must be installed and serviced by a licensed electrician in accordance with the National Electric Code NFPA-70, state and local electrical codes. All conduit running from the sump or tank to the control panel must be sealed with conduit sealant to prevent moisture or gases from entering the panel. **NEMA 4X enclosures are for indoor or outdoor use,** primarily to provide a degree of protection against corrosion, windblown dust and rain, splashing water and hose-directed water. **Cable connectors must be liquid-tight in NEMA 4X enclosures.**

The C-Level sensor is suitable for use in sewage applications. Do NOT use in potable water.

Installation

Installer Friendly Series® (IFS) control panels are designed to control pump(s). The controller records number of pump cycles, elapsed run time, alarm counts, and signal error counts.

Mounting the Control Panel

Note: The control panel should not be mounted in a location that may be subject to submersion.

1. Determine mounting location for panel. If distance exceeds the length of either the sensor or float cables or the pump power cables, splicing will be required. **Note:** Please refer to C-Level™ Sensor installation instructions for splicing instructions. Maximum total cable length is 300 feet. For outdoor or wet installation, we recommend the use of an SJE Rhombus® liquid-tight junction box with liquid-tight connectors to make required connections. **You must use conduit sealant to prevent moisture or gases from entering the panel.**

2. Mount control panel with mounting devices furnished.

3. Determine conduit entrance locations on control panel. Check local codes and schematic for the number of power circuits required. **(Sensor cable requires separate conduit from power and pump cables.)**

Note: Be sure the proper power supply voltage, amperage, and phase meet the requirements of the pump motor(s) being installed. If in doubt, see the pump identification plate for voltage/phase requirements.

4. Drill proper size holes for type of connectors being used.

Note: If using conduit, be sure that it is of adequate size to pull the pump cable(s) through.

5. Attach cable connectors and/or conduit connectors to control panel.

FOR INSTALLATION REQUIRING A SPLICE, FOLLOW STEPS 6-10; FOR INSTALLATION WITHOUT A SPLICE, GO TO STEP 11.

Warranty void if panel is modified.

Call factory with servicing questions:

1-800-RHOMBUS
(1-800-746-6287)

Manufactured by:

SJE RHOMBUS®

Technical Support: +1 800-746-6287
techsupport@sjerhombus.com
www.sjerhombus.com
Technical Support Hours:
Monday - Friday, 7 A.M. to 6 P.M. Central Time

PN 1036677E 07/23

6. Determine location for mounting junction box according to local code requirements. **Do not** mount the junction box inside the sump or basin.

7. Mount junction box to proper support.

8. Run conduit to junction box. Drill proper size holes for the type of conduit used.

9. Identify and label each wire before pulling through conduit into control panel and junction box. Make wire splice connections at junction box.

10. Firmly tighten all fittings on junction box.

11. If a junction box is not required, pull cables through conduit into control panel.

12. Connect pump wires per wiring diagram or schematic, and sensor or float wires to the proper terminals as shown on the schematic.

13. Connect pump, control, and alarm incoming power conductors to proper position on terminals. See schematic for terminal connections.

VERIFY CORRECT OPERATION OF CONTROL PANEL AFTER INSTALLATION IS COMPLETE.

Installation of C-Level Sensor and Floats

WARNING: Verify C-Level™ and IFS panel are matched with CL40 or CL100. Using wrong sensor with panel will cause settings to be incorrect.

CAUTION: If control switch cables are not wired and mounted in the correct order, the pump system will not function properly. Sensor and float cables need to run in separate conduit from pump and power lines.

Industry practices suggest that a secondary device, such as a float switch, be used for redundant activation of the high level alarm and pump shut off.

WARNING: Turn off all power before installing pump wires in pump chamber. Failure to do so could result in serious or fatal electrical shock.

NOTE: The C-Level™ sensor operates between 0 and 39.9 inches of water pressure for the CL40 or between 0 and 99.9 inches of water pressure for the CL100. The C-Level™ sensor reads 0 inches at the approximate point shown in **Figure 2**. As the liquid level rises, the IFS display shows depth of liquid from the zero point. The minimum set point for the stop (demand) or redundant off (timed dose) level is 4 inches (measured from 0) see **Figure 2**.

The maximum set point allowed is 39 inches (measured from 0) for the CL40 or 99 inches (measured from 0) for the CL100. Operating temperature range is 32ºF (0ºC) to 120ºF (50ºC).

1. Determine the nominal operating levels for the configuration, as illustrated in **Figure 3 or 4.**

2. Position C-Level sensor at appropriate location on pipe and secure sensor as shown in **Figure 2** using a hose clamp.

   WARNING: Do not support the C-Level sensor by the cable. Position the sensor in the tank so that nothing is pushing in the diaphragm.

3. Ensure the vent at the end of the cable is not plugged and in a water tight enclosure.

   WARNING: Do **NOT** kink or place vented cable under an extreme clamp. **Doing so will cause sensor to fail.**

4. If optional high water or redundant off floats are used, position and secure as shown in **Figures 1, 3 or 4**. Redundant off float should be located to activate at approximately the zero point for the C-Level per **Figure 3 or 4**.

   NOTE: SJE Rhombus® recommends using the optional high water alarm float for added protection against flooding.

5. Tighten all hose clamps using a screw driver. Over tightening may result in damage to the plastic parts.

   NOTE: All hose clamp components are made of 18-8 stainless steel material. See your SJE Rhombus® supplier for replacement parts.

6. Functionally test the system by filling the tank and witnessing proper operation.

Installation Instructions

Figure 1

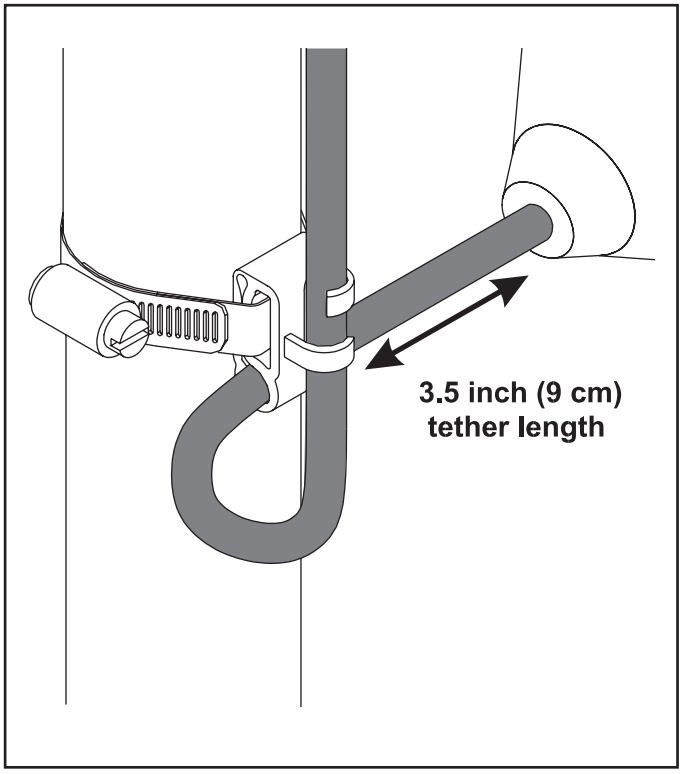


Figure 2

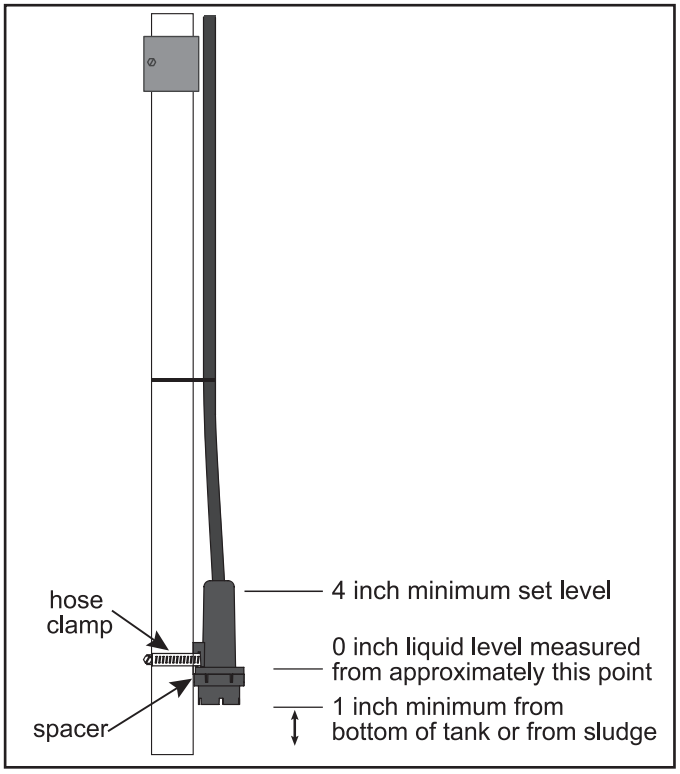


Figure 3 - Timed Dose

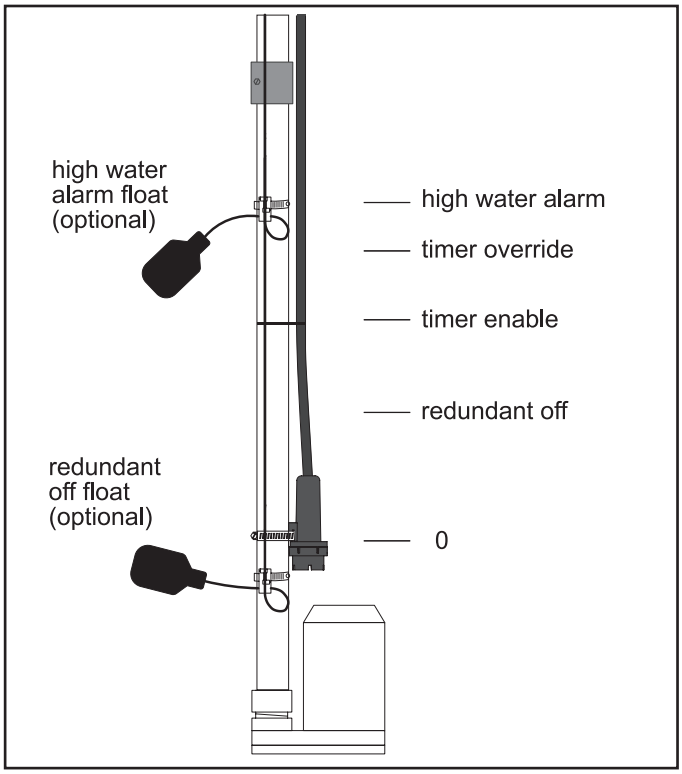
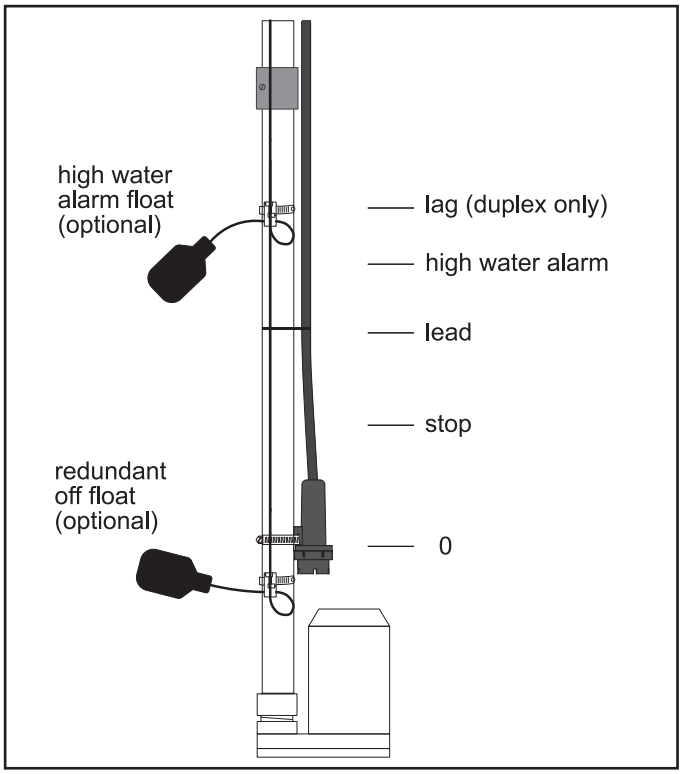


Figure 4 - Demand Dose



Operations

The Installer Friendly Series (IFS) control panel uses the C-Level sensor to continuously monitor and control the liquid level in the tank. An optional high water alarm float and redundant off float can be used to provide additional protection from high or low water conditions.

Hand Operation - The level must be above the stop/redundant off set point to put the panel in HAND operation. To override the stop/redundant off set point, press and hold the HAND button. The pump runs until the HAND button is released. The panel then returns to the AUTO mode. If the level is above the stop/redundant off set point and the panel is placed in the HAND mode, and left in HAND mode, the pump continues to run until the liquid level reaches the stop/redundant off set point. The panel then returns to the AUTO mode.

Off Operation - The panel is in the OFF mode.

Auto Operation - In time dose (t-dose) mode, when the panel is in the AUTO mode, the timer controls pump ON and OFF time as long as the redundant off and timer enable set points are activated. In demand (d-dose), the stop and lead set points control the pump.

Level Indicators - Illuminate if the corresponding set point is triggered.

Green Control and Alarm Power Indicators - (mounted on interior circuit board) Illuminates when control power and alarm power is present. If the control fuse needs replacing the panel sounds an alarm.

LED Display - Used to view and set panel settings and cycle count data. Will turn off after five minutes of non-use.

Viewing Panel Settings and Cycle Data

To view panel settings and cycle data press the **NEXT** button. Each time the **NEXT** button is pressed the display will advance to the next setting or cycle data. Information will be displayed in the following order:

in - Level of the liquid measured from the zero point on the sensor. This will be shown in inches or centimeters depending on the units selected.

t-dOSE or d-dOSE – Identifies if the panel is configured as a time dose or demand dose panel.

Et 1 – Elapsed time meter for pump 1 shown in hh:mm:ss.

CC 1 – Cycle count for pump 1.

AL 1Ctr – Cycle count for Duo Alarm 1 option for single phase models **OR**
Cycle count for Pump 1 Fail for three phase models and single phase models with overloads.

Et 2 – Elapsed time meter for pump 2 shown in hh:mm:ss (duplex only)

CC 2 – Cycle count for pump 2 (duplex only).

AL 2Ctr – Cycle count for Duo Alarm 2 option for single phase models **OR**
Cycle count for Pump 2 Fail for three phase models and single phase models with overloads.

AL-Ctr – Alarm counter which includes high water alarm, float error alarm, and Duo Alarm 1 and 2.

FE-Ct – Float error counter which counts how many times the water level drops below the bottom of the sensor and when the optional redundant off float opens.

tO-Ct – Timer override which counts how many times the liquid level has reached the timer override set point (time dose only).

On – On time currently set for the pump shown in hh:mm:ss (time dose only).

OFF – OFF time currently set for the pump shown in hh:mm:ss (time dose only).

t-OFF or t-On – Display counts down the OFF or On time remaining in the cycle (time dose only).

Operations

Programming Panel Settings

Entering the program mode:

Press and hold the **SET** button for 3 seconds until the "Prog" is displayed. The first parameter that can be set, along with its current value, will then flash on the display. You are now in the program mode.

Exiting the program mode:

At any point in the program mode push and hold the **SET** button for 3 seconds until run is displayed. The display will then return to its normal state.

To change and set a parameter:

NOTE: While setting parameters the following conditions must be met or the display will show (ERROR):

LAg	- level must be ***above*** **LEAd** for Demand Dose
LEAd	- level must be ***above*** **StOP** for Demand Dose
StOP	- level must be ***4 inches or higher*** for Demand Dose
tO	- level must be ***above*** **tEnbLE** for Time Dose
tEnbLE	- level must be ***above*** **rEdOFF** for Time Dose
rEdOFF	- level must be ***4 inches or higher*** for Time Dose.

1. When in the program mode push the NEXT button until the desired parameter is displayed.

2. Push the SET button and the current value of that parameter will be displayed with the first digit flashing.

3. Use the UP button to change the value of the flashing digit. When the desired value of the flashing digit is reached, push the NEXT button to advance to the next digit. Use the UP and NEXT buttons to set the total value of that parameter.

4. When done setting the parameter, push the set button and the parameter will flash along with its new value. If an (ERROR) message is received, check above conditions to ensure all are being met.

5. Push the NEXT button to advance to the next parameter and follow steps 2 – 4 to set the values.

Parameters that can be set:

The parameters that can be set when in the program mode are:

For Time Dose Panels:

On – On time for pump in hh:mm:ss
OFF – Off time for the pump in hh:mm:ss
ALtErn – Sets the alternation of the pumps. Settings are ALt, 2-1 and 1-2. (duplex panels only)
ALAr – High water alarm set point.
tO – Timer override set point
tEnbLE – Timer enable set point
rEdOFF – Redundant off set point.
UnitS – Units of measure can be set in inches (in) or centimeters (c).

For Demand Dose Panels:

ALtErn – Sets the alternation of the pumps. Settings are ALt, 2-1 and 1-2. (duplex panels only)
ALAr – High water alarm set point.
LAg – Lag pump start point. (duplex panels only)
LEAd – Lead pump start point.
StOP – Pump stop set point.
UnitS – Units of measure can be set in inches (in) or centimeters (c).

Operations

Selecting Time Dose or Demand Dose - Panels in the field

To set the panel to either Timed Dose or Demand Dose in the field:

1. Turn the control/alarm power off to the control panel.
2. Turn the pump power off to the control panel.
3. Place a small screwdriver or pen into the slot in the label on the inner door marked "DEMAND DOSE TIMED DOSE".
   - Move the dip switch (up) for demand dose
   - Move the dip switch (down) for Timed dose
4. Turn the control/alarm power on to the control panel. After the display goes blank press the "NEXT" switch.
   - The display will show d-dose for demand dose.
   - The display will show t-dose for timed dose.

   WARNING: Changing the dip switch positions will change the operation of the panel.
   WARNING: If changing to timed dose, be sure to set the off and on times.
5. Turn on the pump power after all the settings are changed.
6. **WARNING:** Check the panel for correct operation before leaving the site.

Troubleshooting

C-Level Sensor

1. Verify that the vented cable is not kinked or has any holes in it. If either condition exists, the pressure sensor may fail or give inaccurate level readings.

2. Tubing in vented cable is to be unobstructed and in a dry environment. Obstructing the vent will result in an error or inaccurate readings, as it is needed to compensate for barometric pressure changes.

3. The black diaphram is located on the end of the sensor body. The diaphragm must not be damaged or deformed. A damaged or deformed diaphragm will result in inaccurate level readings.

4. Verify the bottom of the C-Level Sensor is not resting on the bottom of the tank or on any other obstacle.

5. Verify that the electrical cable is not damaged or severed.

6. Verify that the shielding for cable is properly attached to ground.

7. If the panel includes the optional redundant off float, verify that the float is properly wired to the panel.

Fuse

To check the continuity of the fuse, pull the fuse out of the fuse holder. With the ohmmeter on the R X 1 scale, measure resistance. A reading of infinity (high resistance) indicates a blown fuse that must be replaced with a fuse of the same type, voltage, and amp rating.

Alarm Light

With power on, hold the test/normal/silence switch in the "test" position. The alarm light should turn on. If not, replace the light with that of the same type.

Alarm Horn

With power on, hold the test/normal/silence switch in the "test" position. The alarm horn should turn on. If not, replace the horn with that of the same type.

NOTES:

SJE Rhombus® Limited Warranty

SJE Rhombus offers a five-year limited warranty on the control panel
and a two-year limited warranty on the C-Level™ sensor.
For complete terms and conditions, please visit **www.sjerhombus.com**.

NOTICE!
Products returned must be cleaned, sanitized, or decontaminated as necessary prior to shipment to ensure that employees will not be exposed to health hazards in handling said material. All applicable laws and regulations shall apply.

NOTES:

SJE RHOMBUS®

Technical Support: +1 800-746-6287
techsupport@sjerhombus.com
www.sjerhombus.com
Technical Support Hours: Monday - Friday, 7 A.M. to 6 P.M. Central Time

IFS SERIES

Installer Friendly Series®

SJE Rhombus® Type IFS

Installation Instructions and Operation/Troubleshooting Manual

WARNING!

ELECTRICAL SHOCK HAZARD
Disconnect all power sources before servicing. Failure to do so could result in serious injury or death.

This control panel must be installed and serviced by a licensed electrician in accordance with the National Electric Code NFPA-70, state and local electrical codes.

All conduit running from the sump or tank to the control panel must be sealed with conduit sealant to prevent moisture or gases from entering the panel. **NEMA 4X enclosures are for indoor or outdoor use,** primarily to provide a degree of protection against corrosion, windblown dust and rain, splashing water and hose-directed water. **Cable connectors must be liquid-tight in NEMA 4X enclosures.**

Installation

This Installer Friendly Series® (IFS) control panel was designed to control pump(s). The controller records pump status, number of cycles, elapsed run time, current float status, and float error counts.

Mounting the Control Panel

Note: The control panel should not be mounted in a location that may be subject to submersion.

1. Determine mounting location for panel. If distance exceeds the length of either the float cables or the pump power cables, splicing will be required. For outdoor or wet installation, we recommend the use of an SJE Rhombus® liquid-tight junction box with liquid-tight connectors to make required connections. **You must use conduit sealant to prevent moisture or gases from entering the panel.**

2. Mount control panel with mounting devices furnished.

3. Determine conduit entrance locations on control panel. Check local codes and schematic for the number of power circuits required. **(Float cables require separate conduit from power and pump cables.)**

Note: Be sure the proper power supply voltage, amperage, and phase meet the requirements of the pump motor(s) being installed. If in doubt, see the pump identification plate for voltage/phase requirements.

4. Drill proper size holes for type of connectors being used.

Note: If using conduit, be sure that it is of adequate size to pull the pump cable(s) through.

5. Attach cable connectors and/or conduit connectors to control panel.

FOR INSTALLATION REQUIRING A SPLICE, FOLLOW STEPS 6-10; FOR INSTALLATION WITHOUT A SPLICE, GO TO STEP 11.

6. Determine location for mounting junction box according to local code requirements. **Do not** mount the junction box inside the sump or basin.

7. Mount junction box to proper support.

8. Run conduit to junction box. Drill proper size holes for the type of conduit used.

Warranty void if panel is modified.

Call factory with servicing questions:

1-800-RHOMBUS
(1-800-746-6287)

Manufactured by:

SJE RHOMBUS®

Technical support: +1-800-746-6287
techsupport@sjeinc.com
www.sjerhombus.com

PN 1022888E 06/19

Installation Instructions

9. Identify and label each wire before pulling through conduit into control panel and junction box. Make wire splice connections at junction box.

10. Firmly tighten all fittings on junction box.

11. If a junction box is not required, pull cables through conduit into control panel.

12. Connect pump wires per wiring diagram or schematic and float wires to the proper terminals as shown on the schematic.

13. Connect pump, control, and alarm incoming power conductors to proper position on terminals. See schematic for terminal connections.

VERIFY CORRECT OPERATION OF CONTROL PANEL AFTER INSTALLATION IS COMPLETE.

Installation of Floats

CAUTION: If control switch cables are not wired and mounted in the correct order, the pump system will not function properly. Control switches need to run in separate conduit from pump and power lines.

WARNING: Turn off all power before installing pump wires in pump chamber. Failure to do so could result in serious or fatal electrical shock.

1. Determine your normal operating level and desired float configuration, as illustrated in **Figures 2-5.**

2. Mount float switches at appropriate levels. Be sure that floats have free range of motion without touching each other or other equipment in the basin.

3. For mounting clamp installation: place the cord into the clamp as shown in **Figure 1**. Locate the clamp at the desired activation level and secure the clamp to the discharge pipe as shown in **Figure 1**.

NOTE: Do not install cord under hose clamp.

4. Tighten the hose clamp using a screwdriver. Over tightening may result in damage to the plastic clamp. Make sure the float cable is not allowed to touch the excess hose clamp band during operation.

NOTE: All hose clamp components are made of 18-8 stainless steel material. See your SJE Rhombus® supplier for replacements.

5. If using an optional redundant off float, mount slightly below the timer enable float.

6. The alarm float can be positioned anywhere that the alarm level is desired.

Figure 1

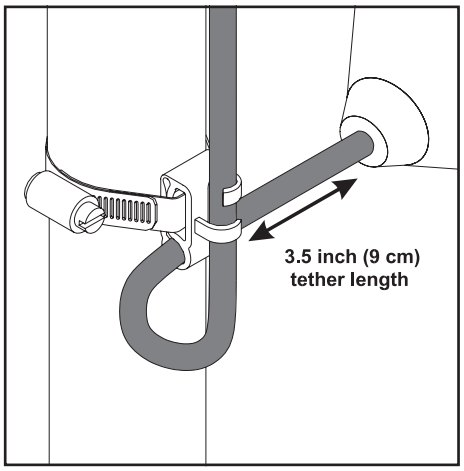


Figure 2
Simplex/Duplex Timed Dose

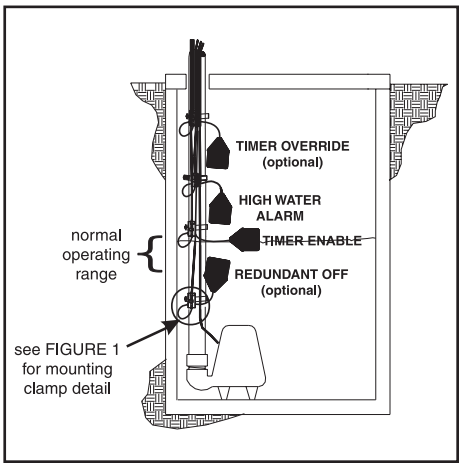


Figure 3
Simplex Demand

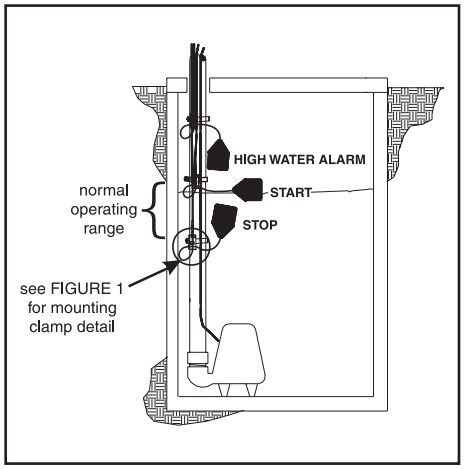


Figure 4
Duplex Demand 3 Float

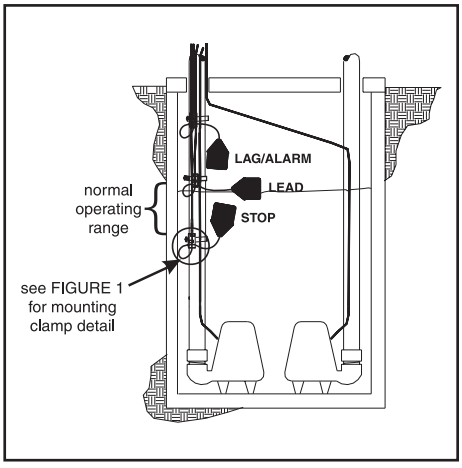
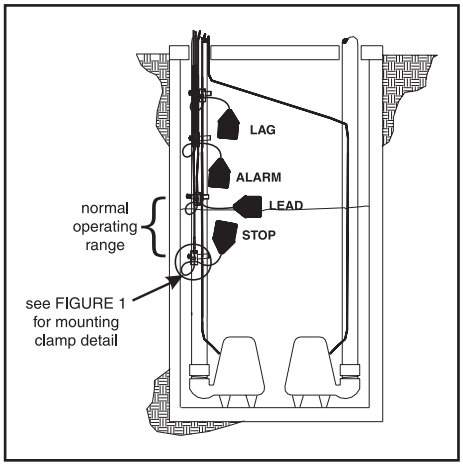


Figure 5
Duplex Demand 4 Float



Operations

The Installer Friendly Series® (IFS) control panel uses float switches to continuously monitor and control the liquid level in the tank.

Hand Operation - The stop/redundant off float must be raised to put panel in HAND operation. To override the stop/redundant off float, press and hold the HAND button. The pump runs until the HAND button is released. The panel then returns to the AUTO mode. If the stop/redundant off float is raised and the panel is placed in the HAND mode, and left in the HAND mode, the pump continues to run until the stop/redundant off float lowers. The panel then returns to the AUTO mode.

Off Operation - The panel is in the OFF mode.

Auto Operation - In time dose (t-dose) mode, when the panel is in the AUTO mode, the timer controls pump ON and OFF time as long as the low level float is raised. In demand (d-dose) mode, the stop and start floats control the pump.

Alarm Count - Shown on display as "AL-Ctr", counts the number of times the alarm is activated. Note: Alarm counter does not include testing operations in the total count. High alarm, floats out of sequence & auxiliary alarm add to count.

Green Control and Alarm Power Indicators - (mounted on interior circuit board) Illuminates when control power and alarm power is present. If the control fuse needs replacing, the panel sounds an alarm.

Display - Will turn off after one minute of non-use.

Float Indicators - Illuminates if the float is raised. If the float is out of sequence, the panel goes into alarm mode and display shows "FE" float error.

Timer Override Float - Overrides the OFF time and pump will run for full dose ON time. (timed dose only, optional)

Float Error Count - Shown on the display as "FE-Ct". Counts the number of times floats are out of sequence.

Timer Override Count - Shown on the display as "tO-Ct". Counts the number of times the timer override float is activated. (timed dose only)

Time left in "On" time cycle - Shown on the display as "t-On". Counts down the time left in the "On" cycle. (timed dose only)

Time left in "Off" time cycle - Shown on the display as "t-OFF". Counts down the time left in the "Off" cycle. (timed dose only)

Auxiliary alarm count- Shown on the display as "AL1Ctr" or "AL2Ctr".
Counts optional auxiliary alarm counts for single phase models. Counts Pump 1 and Pump 2 fail counts for three phase models and single phase models with overloads.

Viewing Panel Settings

With control power supplied to panel:

Press (NEXT) button. The display will show t-dOSE for timed dose applications, or d-dOSE for demand applications.

Press (NEXT) button. The display will show Et 1 count in hh:mm.

Press (NEXT) button. The display will show CC 1 count.

Press (NEXT) button. The display will show AL1Ctr count. Cycle count for Duo Alarm 1 option for single phase models. **OR** Cycle count for Pump 1 Fail for three phase models and single phase models with overloads.

Press (NEXT) button. The display will show Et 2 count (pump 2) in hh:mm. (duplex panels only)

Press (NEXT) button. The display will show CC 2 count. (pump 2) (duplex panels only)

Press (NEXT) button. The display will show AL2Ctr count. Cycle count for Duo Alarm 2 option for single phase models. **OR** Cycle count for Pump 2 Fail for three phase models and single phase models with overloads.

Press (NEXT) button. The display will show AL-Ctr alarm count.

Press (NEXT) button. The display will show FE-Ct float error count.

Press (NEXT) button. The display will show tO-Ct timer override count. (timed dose mode only)

Press (NEXT) button, The display will flash On , then the ON time in hh:mm:ss. (timed dose mode only)

Press (NEXT) button. The display will flash OFF, then the OFF time in hh:mm:ss. (timed dose mode only)

Press (NEXT) button. The display will flash either t-On or t-OFF , then the time left in the ON or OFF cycle. (timed dose mode only)

Program Timer On & Off Times

With control power supplied to panel:

Press and hold (SET) button for 3 seconds until Prog is displayed.

The display will flash On , then the time in hh:mm:ss.

Setting pump ON (follow Section A)

Section A

Press (SET) button to display time in hh:mm:ss.

Press (NEXT) button until desired digit flashes

Press (UP) button until desired time is achieved.

Repeat process pressing (NEXT) and (UP) buttons until desired time is reached.

Press (SET) button to save.

Operations

Setting pump OFF times

Press (NEXT) button. The display will flash OFF and show the OFF time in hh:mm:ss. **Repeat the instructions in Section A to set OFF times**.

Press and hold (SET) button for 3 seconds until [run] is displayed.

Timer programming is complete.

Program Pump Sequence

Program Pump sequence "Alt", "2-1" or "1-2" (duplex only)

With control power supplied to panel:

Press and hold (SET) button for 3 seconds until [Prog] is displayed.

Press (NEXT) button until [ALtErn] flashes with either [ALt], [2-1], or [1-2] flashing.

Press (SET) button to display [ALt], [2-1], [1-2].

Press (UP) button until desired sequence is achieved.

Press and hold (SET) button for 3 seconds until [run] is displayed.

Pump sequence programming is complete.

Selecting Time Dose or Demand Dose -Panels in the field

To set the panel to either Timed Dose or Demand Dose in the field:

1. Turn the control/alarm power off to the control panel.
2. Turn the pump power off to the control panel.
3. Place a small screwdriver or pen into the slot in the label on the inner door marked "DEMAND DOSE TIMED DOSE".
   - Move the dip switch (up) for demand dose
   - Move the dip switch (down) for Timed dose
4. Turn the control/alarm power on to the control panel. After the display goes blank press the "NEXT" switch.
   - The display will show d-dose for demand dose.
   - The display will show t-dose for timed dose.

   WARNING: Changing the dip switch positions will change the operation of the panel.

   WARNING: If changing to timed dose, be sure to set the off and on times.
5. Turn on the pump power after all the settings are changed.
6. **WARNING:** Check the panel for correct operation before leaving the site.

Troubleshooting

Float Controls

1. Check the floats during their entire range of operation. Clean, adjust, replace and repair damaged floats.

2. Measure the float resistance to determine if the float is operating properly.

To measure float resistance:

a. Isolate the float by disconnecting one or both of the float leads from the float terminals.

b. Place one ohmmeter lead on one of the float wires, and the other ohmmeter lead on the other float wire.

c. Set the ohmmeter dial to read ohms and place on the R X 1 scale. With the float in the "off" position, the scale should read infinity (high resistance), if not replace the float.

With the float in the "on" position, the scale should read close to zero, if not replace the float. **Readings may vary depending on the accuracy of the measuring device.**

Fuse

To check the continuity of the fuse, pull the fuse out of the fuse holder. With the ohmmeter on the R X 1 scale, measure resistance. A reading of infinity (high resistance) indicates a blown fuse that must be replaced with a fuse of the same type, voltage, and amp rating.

Alarm Light

With power on, hold the test/normal/silence switch in the "test" position. The alarm light should turn on. If not, replace the light with that of the same type.

Alarm Horn

With power on, hold the test/normal/silence switch in the "test" position. The alarm horn should turn on. If not, replace the horn with that of the same type.

SJE Rhombus® Five-Year Limited Warranty

For complete terms and conditions, please visit www.sjerhombus.com.

NOTICE!

Products returned must be cleaned, sanitized, or decontaminated as necessary prior to shipment to ensure that employees will not be exposed to health hazards in handling said material. All applicable laws and regulations shall apply.

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