

RAZOR

BY BARNES®

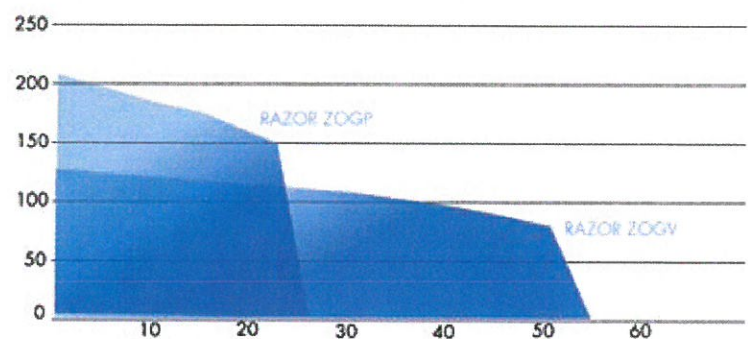
CUTTING EDGE DESIGN FOR A NEW-AGE WASTESTREAM

RAZOR Grinder pumps are the ideal 2 HP pump for light commercial and residential solids handling applications, thoughtfully designed with innovative axial cutting technology to efficiently reduce solids like flushable wipes, diapers, and other non-biodegradable items commonly found in the modern waste stream.



- **Patented Axial Cutter:** Provides Superior Non-Clogging versus Radial designs
- **Light Weight:** Designed for ease of installation and service
- **Dual Voltage Motor:** Optimal cutting torque performance in low voltage situations 208-230V
- **Retrofit:** Configurations available to retrofit into existing Barnes applications and competitor's grinder installs
- **Online Configurator:** Highly customizable solutions
- **Float and Pressure Switch protection**
- **Convenient Maintenance:** Utilize single tool for service and maintenance
- **Non-Overloading:** Built to handle varying flows without wear when pump runs with no load
- **Designed for Pressure Sewer:** Unlike non-clog pumps with large discharge sizes, Razor 1.25" discharge is suitable for pre-configured packaged systems and turn key solutions
- **Serviceability:** Plug-n-Play cord provides easy service without requiring removal of epoxy in conduit

RAZOR PERFORMANCE RANGE ZOGP - ZOGV



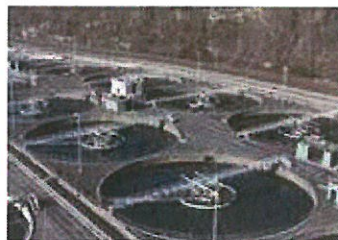
- 1 Plug-n-play cord simplifies service
- 2 Oil-Filled Motor for optimal motor cooling and maximum bearing life
- 3 Stainless steel hardware provides resistance against corrosion to extend pump life
- 4 Simplified hardware requires only one standard tool for service
- 5 Axial Cutter design greatly reduces clogging issues due to troublesome objects
- 6 Available in multiple discharge configurations for simple installation and replacement
- 7 Heavy duty, oil-lubricated bearings extend pump life
- 8 Smooth oversized lifting bail and light weight allows for easy installation by hand or hoist
- 9 Two stage impeller design ideal for pressure sewer applications



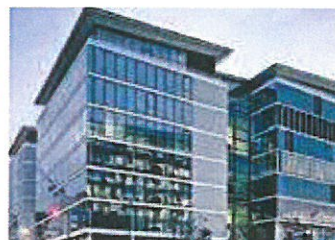
APPLICATIONS



PRESSURE SEWER



MUNICIPAL



COMMERCIAL



LIGHT INDUSTRIAL

ZOGV – 2 HP

Recessed Vortex

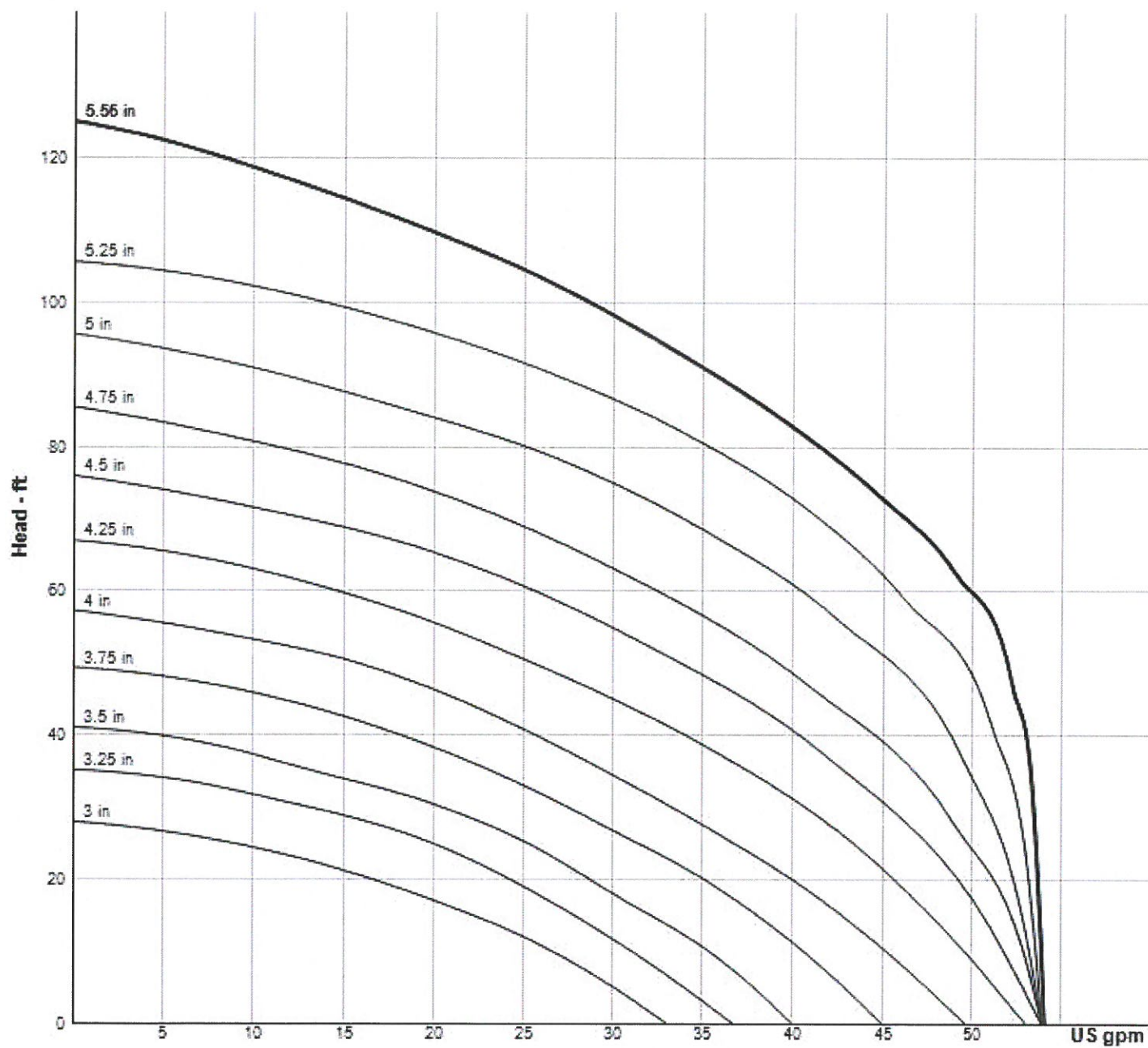


Specifications

IMPELLER:	Design: 12 Vane vortex, with pump out vanes on back side. Dynamically balanced, ISO G6.3.
	Material: Cast iron
SEAL:	Design: Single Mechanical
	Material:
	<ul style="list-style-type: none"> • Rotating Faces: Silicon-carbide • Stationary Faces: Silicon carbide • Elastomer: Buna-N • Hardware: 300 Series stainless steel
CORD ENTRY:	30 ft. (9.1 m) Std. Cord. Custom molded quick connect, for sealing and strain relief
CORD:	.CSA/UL Approved 12/3 Type SOW
DISCHARGE:	1-1/4" NPT, Vertical, Bolt-on Flange
LIQUID TEMPERATURE:	104°F (40°C) Continuous
VOLUTE:	Cast iron ASTM A-48, class 30
MOTOR HOUSING:	Cast iron ASTM A-48, class 30
SEAL PLATE:	Cast Iron ASTM A-48, Class 30
CUTTER PLATE:	Hardened 440C stainless steel Rockwell® C-55
CUTTER:	Hardened 440C stainless steel, Rockwell® C-55
SHAFT:	416 Stainless steel
O-RINGS:	Buna-N
HARDWARE:	300 Series stainless steel
PAINT:	Powder coat
UPPER BEARING:	Design: Single row, ball
	Lubrication: Oil
	Load: Radial
LOWER BEARING:	Design: Single row, ball
	Lubrication: Oil
	Load: Radial & thrust
MOTOR:	Design: NEMA L-single phase torque curve. oil-filled, squirrel cage induction
	Insulation: Class F

SINGLE PHASE: Capacitor start/capacitor run

Curve



Model Information

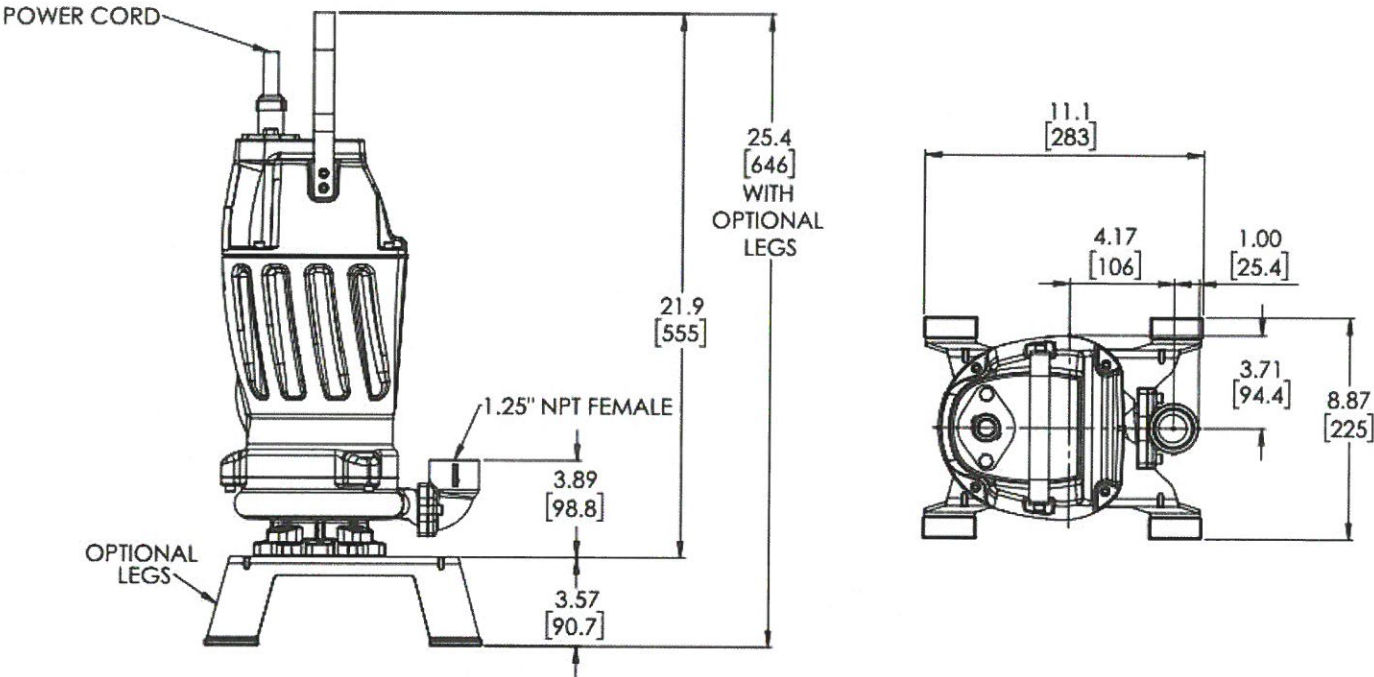
MODEL NUMBER	ZOGV2072L
PART NUMBER	145351
HP	2
VOLTAGE	208-240
PHASE/HZ	1/60
RPM (NOMINAL)	3450
NEMA START CODE	H
FULL LOAD AMPS	17.5-15.0
LOCKED ROTOR AMPS	53.8
CORD SIZE	12/3
CORD TYPE	SOW
CORD O.D. ± 0.02 -0.5IN (MM)	15.5



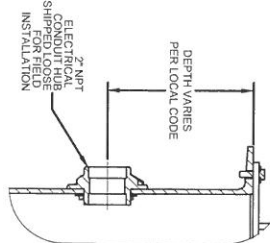
IMPORTANT

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

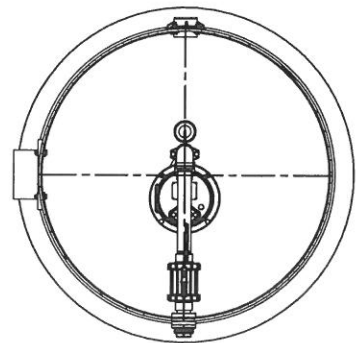
Drawing



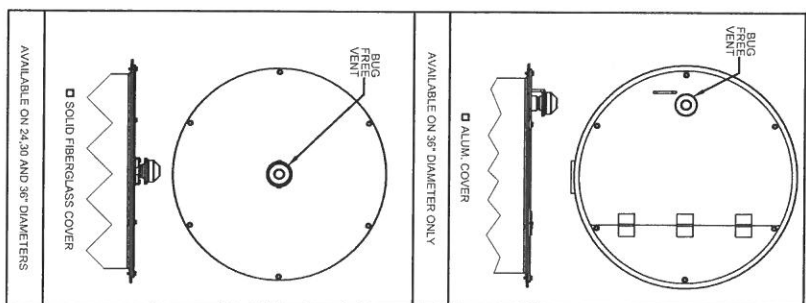
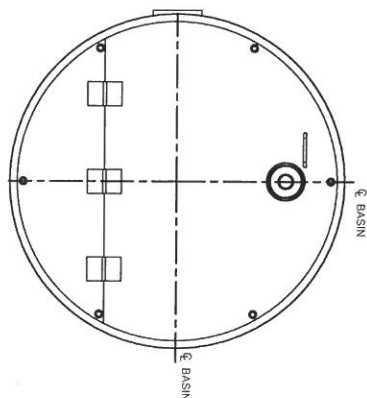
All dimensions are in inches (mm)



DETAIL A
SCALE 1 : 4



SECTION B-B

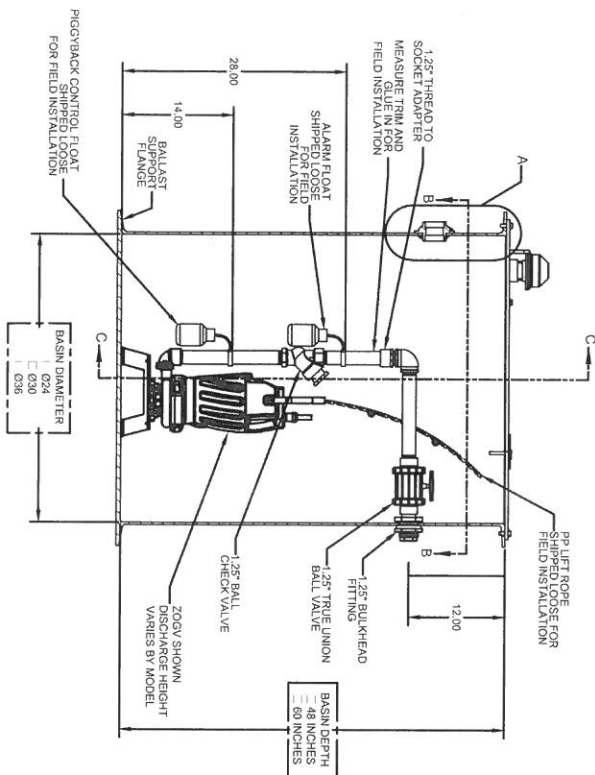


AVAILABLE ON 24.30 AND 36" DIAMETERS

□ SOLID FIBERGLASS COVER

□ ALUM. COVER

AVAILABLE ON 36" DIAMETER ONLY



SECTION C-C

- NOTES
1. DIMENSIONS TO BE 1/4" UNLESS OTHERWISE SPECIFIED.
 2. CONSULT FACTORY FOR OTHER DEPTHS.
 3. LEVEL CONTROL SWITCHES BE INSTALLED OUT OF THE ELECTRICAL CONDUIT & FITTINGS TO BE INSTALLED ACCORDING TO STATE AND LOCAL CODES.
 - 4.

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SHEET 1 OF 1

TITLE

SIMPLEX, 24", 30" AND 36" DIA. BASIN
HARD PIPE - 1-1/4" DISCHARGE

CAGE NO

96046

DWG NO

CD137095-RAZOR

REV

A

CRANE

PUMPS & SYSTEMS

BURKS PUMPS - BARNES - SELLERS
PROSSERENPO - WEINMAN - DEMING

SECTION 43 26 13.XX
SUBMERSIBLE GRINDER PUMPS

PART 1 – GENERAL

1.01 SUMMARY

- A. This section addresses supervision, labor, materials and equipment in the work for furnishing and installing submersible grinder pumps
- B. General Contractor shall provide all labor, materials, tools, equipment, and incidentals as shown, specified, and required to furnish, install, adjust, and test submersible grinder pumps as shown on the Plans and as described in these Specifications.
- C. All submersible sewage pumps shall be provided by a single manufacturer.
- D. Pump manufacturer scope of supply:
 - 1. Submersible grinder pump motors
 - 2. Power cable
 - 3. Bearings
 - 4. Mechanical seals
 - 5. Volutes
 - 6. Impellers
 - 7. Pump shafts
 - 8. Axial cutter
 - 9. Cutter plate
 - 10. Other pump component parts
 - 11. Spare parts
 - 12. Extra materials as specified
 - 13. Technical services
 - 14. (Add or remove as needed)
- E. Contractor scope of supply: Provide materials, equipment, appurtenances, and services not supplied as part of the system, including but not limited to
 - 1. Unloading, storing, and protecting equipment at the site in accordance with supplier's recommendations (Add or remove as needed).
- F. Related requirements (Add or remove as needed):
 - 1. Special Provisions
 - a. (Add or remove as needed)
 - 1. (Add or remove as needed)
 - a. (Add or remove as needed)
 - 2. Materials and Equipment
 - 3. Starting of System
 - 4. Painting
 - 5. Sequence of Operation
 - 6. Electrical General Requirements

7. Basic Electrical Materials and Methods
8. Motor Control Panel

1.02 PRICE AND PAYMENT (USE AS NEEDED)

1.03 REFERENCES

- A. The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by basic designation only. The referenced publications shall be the current effective edition.
1. Hydraulic Institute Standards (HI)
 2. American Society for Testing Materials (ASTM)
 3. ASTM A48/A48M – 03 Standard Specification for Gray Iron Castings
 4. ASTM A470 Standard Specification for Vacuum-Treated Carbon and Alloy Steel Forgings for Turbine Rotors and Shafts
 5. American Iron and Steel Institute (AISI)
 6. Insulated Cable Engineers Association (ICEA)
 7. American Society of Mechanical Engineers (ASME)/American National Standards Institute (ANSI)
 8. B16.1 Gray Iron Pipe Flanges and Flanged Fittings
 9. National Electrical Manufacturers Association (NEMA)
 10. Institute of Electrical and Electronics Engineers (IEEE)
 11. National Electric Code (NEC)
 12. American Bearing Manufacturers Association (ABMA)
 13. American Society for Testing and Materials International (ASTM)

1.04 ALTERNATES - NOT USED

1.05 SUBMITTALS

- A. General: If requested the manufacturer will submit a minimum quantity of ____ sets of standard submittal data in accordance with Section ()
- B. Action submittals:
1. The manufacturer will supply the standard submittal, consisting of:
 - a. Pump Catalog Data, including a certified performance curve and pump dimensional drawing
 - b. Materials of construction list
 - c. Mounting Accessory details
 - d. Moveable fitting data
 - e. Typical installation drawing
 - f. Electrical schematics and diagrams, including control panel data and panel wiring schematic
 - g. Accessory data
 - h. Certified copies of test data from factory testing when specified, only after pumps have been ordered and manufactured.
- C. Informational submittals:
1. Descriptive information on material and equipment furnished

2. Anchorage requirements
 3. Installation instructions
 4. Manufacturer's certificate of acceptance of installation and testing
 5. List of manufacturer's recommended spare parts
 6. Installation & Operation Manual with parts list
 7. Warranty documents
 8. Name and address of factory authorized service facility
- D. Closeout submittals:
1. Comply with Section (), Operation and Maintenance Data.
 2. Project record documents: Record actual locations of pumps and appurtenances on the contract drawing, reflecting all post-bid changes.
 3. Section (), Operations and Maintenance Data: Submit maintenance instructions for equipment and accessories.

1.06 QUALITY ASSURANCE

- A. Warranty
1. The pumps shall come with a 3-year limited warranty, that begins at the date of shipment from the manufacturer's facility.
 2. A 5-year full coverage warranty is available as an option.
 - a. Include warranty coverage for/against (Insert text as needed)

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Comply with provisions of Section ()
1. List the special storage and handling requirements for the products specified, including location and environmental conditions to protect from damage.
 2. Store materials to permit easy access for inspection and identification. Keep all material off the ground, using pallets, platforms, or other supports. Protect steel members and packaged materials from corrosion and deterioration.
 3. All parts shall be properly protected so that no damage or deterioration will occur during a prolonged delay from the time of shipment until installation is completed and the unit and equipment are ready for operation.

PART 2 – PRODUCTS

2.01 MANUFACTURERS

- A. Manufacturer Qualifications
1. Pump(s) shall be manufactured by a company regularly engaged in the manufacture and assembly of similar units for a minimum of (5) years.
 2. The pumps shall be Barnes RAZOR submersible grinder pump model ZOGV_____.
 3. CONTRACTOR will provide OWNER with location and description of manufacturer's Service Centers and spare parts stock.
 4. Manufacturer shall be certified to ISO 9001 and shall provide a valid certificate upon request.

2.02 PRODUCT DETAILS

A. Service Conditions:

1. The pumps shall be submersible end suction centrifugal grinder type, installed in wet pit submersible installation. The pump will be suitable for submergence up to a depth of 66 ft.
 - a. The pumps shall be provided with a permanently installed "c"-channel guide rail system, with a sliding movable fitting that automatically connects to the discharge piping when lowered into place. The moveable fitting shall be equipped with a check valve, including integrated anti-siphon. (Add or remove as needed).
 - b. The pumps shall be installed on a pump support stand that is fabricated of 300 series stainless steel with rubberized pads on the feet, fixing the pump at the required distance to provide adequate suction clearance. The pumps shall be equipped with a 1.25-inch NPT or BSP discharge fitting which includes a check valve and integrated anti-siphon. (Add or remove as needed).
2. A centrifugal submersible grinder pump designed to reduce all material found in normal domestic and light industrial sewage, including plastics, rubber, sanitary napkins, and disposable diapers into a finely ground slurry. The resultant slurry is then pumped through small diameter piping into a gravity interceptor or treatment facility. The temperature limitation of the liquid being pumped is 104°F/40°C continuous, 160°F/40°C intermittent and the submersible motor shall be capable of running dry for extended periods.
3. Each pump will be capable of the following performance:

Primary Flow		US GPM
Primary Head		TDH - Feet
Minimum Hydraulic Efficiency		%
Secondary Flow		US GPM
Secondary Head		TDH - Feet
Tertiary Flow		US GPM
Tertiary Head at Shutoff		TDH - Feet
Discharge Size	1.25	In
Motor Speed	3450	RPM
Motor HP	2	HP
Frequency	60	Hz
Voltage and Phase	1 ph - 208-240	V and ph
Motor Service Factor	1.0	SF

2.03 PUMP AND MOTOR MATERIALS

A. Component Materials

Volute	ASTM A48 Class 30 Cast Iron
Impeller	ASTM A48 Class 30 Cast Iron
Axial Cutter	ASTM A276 440C Stainless Steel, Heat Treated to a minimum Rockwell C55
Cutter plate	ASTM A276 440C Stainless Steel, Heat Treated to a minimum Rockwell C55
Motor Housing	ASTM A48 Class 30 Cast Iron
Seal Plates	ASTM A48 Class 30 Cast Iron

External Hardware	300 Stainless Steel
Lifting Bail	304 Stainless Steel
Shaft	416 Stainless Steel
Mechanical Seal	Silicon carbide for the rotating face and silicon carbide for the stationary face
Coating	The pump (s) shall be powder coated with an epoxy primer and polyester top coat
Gaskets	Buna-N
O-Rings	Buna-N
Motor Rotor Bars	Die Cast Aluminum
Elastomeric plug holding plate	ASTM A48 Class 30 Cast Iron
Cable Entry Housing	ASTM A48 Class 30 Cast Iron
Nameplate	304 Stainless Steel

B. Pump Components

1. The pump end components including the volute and impeller will be ASTM A48 Class 30 Cast Iron. The volute shall be a single piece non-concentric design, with smooth passages. The Discharge connection shall be a standard 1.25-inch NPT in the vertical position using a threaded bolt on discharge flange. A movable fitting with C-Channel connection is also acceptable.
2. The pump impeller shall be of the recessed vortex design. Pumps with standard centrifugal semi-open impeller designs shall not be acceptable. The impeller shall be keyed to the shaft.
3. The impeller shall be capable of being trimmed to meet specific performance characteristics.
4. The grinder mechanism shall be specifically designed for use in a grinder pump. The mechanism shall consist of an axial cutter that is locked for rotation by a shaft key. The cutter is fixed axially by a socket head cap screw. The cutter plate is held in place by a press fit. The entire cutting mechanism shall be recessed, protecting the mechanism. All grinding mechanism components, including both the cutter plate and radial cutter shall be constructed of 440C stainless steel hardened to a minimum Rockwell C55 and shall be finish ground for a fine cutting edge. The grinder shall be placed immediately below the pumping elements and shall be direct-driven by a single, one-piece, stainless steel motor shaft. The grinding assembly shall operate without objectionable noise or vibration over the entire range of recommended operating pressures. The grinder shall be constructed so as to eliminate clogging and jamming under all normal operating conditions including starting. In order to demonstrate adequate flow velocity and grinding capability, the grinder pump shall be capable of passing a series of stringy type solids (diapers, rags, feminine products, etc.) through the pump without roping or winding the material in or immediately below the pump suction.
5. The pump and motor shaft will be a solid, continuous piece of 416 stainless steel. Shafts utilizing a coupling or other attachment method will not be acceptable. The shaft will have a maximum allowable deflection of 0.002 inches at the lower mechanical seal during operation.
6. The mechanical seals will be a single mechanical seal system. The materials of construction shall be silicon carbide for both the rotating face and for the stationary face,

lapped and polished to a tolerance of one light band, with 300 stainless steel hardware, with all elastomer parts of Buna-N.

7. Seals must operate in an oil filled chamber which shall provide superior heat transfer & seal cooling. Seal faces shall be lapped and polished to a tolerance of one light band. The seals must not require routine maintenance or adjustment but should be easily replaced. The seal shall be commercially available and not a pump manufacturer's proprietary design.
8. The common pump and motor shaft shall rotate on two bearings. These bearings shall be high quality and commercially available. The bearings shall operate in an oil bath environment for superior lubrication, cooling and life. Permanently lubricated bearings are not acceptable. The pump shall be a two-bearing design consisting of an upper ball bearing carrying the thrust loads, and lower ball bearing for the purpose of carrying the thrust loads and radial loads. Sleeve bearings will not be considered equal. The lower bearing shall be of the single row ball type, locked in position to accept radial and axial thrust loads and the upper bearing shall be of the single ball type for radial loads as needed to provide a minimum L10 Life of 50,000 hours at -50% to +50% of BEP.
9. Gaskets except for seal gland and bearing retainer shall be of the angular gland compression O-ring type eliminating critical slip fits and the possibility of damage during service associated with sliding O-ring sealing arrangements. Mating surfaces where watertight sealing is required shall be machined and fitted with O-rings.
10. The exterior of the pump liquid end shall be coated per Article 2.04 FINISHES below.
11. The pump shall be equipped with a stainless-steel nameplate, located in an easily accessible location. The following data will be included on the nameplate:
 1. Manufacturer's Name
 2. Pump Part Number, Model Number and Serial Number
 3. Motor Horsepower Rating
 4. Voltage, Phase, and Frequency
 5. Motor Speed
 6. Motor Full Load Amps
 7. Ambient Temperature Rating
 8. Code Letter
 9. Impeller Diameter
 10. Motor Insulation Class
12. Spare Parts
 1. One spare full diameter impeller for each pump model
 2. One spare cutter assembly set
 3. One spare set of mechanical seals
 4. All gaskets
 5. All o-rings
 6. Spare set of starting components (for 1 ph only)

C. Motor Components

1. The major driver components will be ASTM A48 Class 30 Cast Iron. The motor shaft shall be of 416 stainless steel.
2. The motor shall be a squirrel cage induction type and shall be dielectric oil filled for optimal thermal management and maximum bearing life. The pump shall be capable of operating in a totally, partially, or non-submerged condition for extended periods of time without damage due to heat being generated. Oil used must be able to be disposed of

as nonhazardous waste. Air-filled motors with grease lubricated bearings shall not be acceptable. The motor shall be NEMA Type B. The stator windings shall be insulated with moisture resistant and spike resistant Class F varnish and magnet wire insulation, rated for 155°C (311°F). The motor shall be ____ volts, ____ Hz, 1 phase, and shall have a voltage tolerance of +/- 10% from nominal voltage. The motor shall be designed to run continuously in a 40° (104°F) ambient environment.

3. Single Phase motors shall be of the capacitor start capacitor run design. The start and run capacitors shall be integral to the pump. The capacitors shall be located above the motor, outside the oil filled chamber. A removable motor cap shall allow access to service the capacitors without draining oil from the motor housing.
4. The stator shall be press fit into the motor housing, for mechanical stability and optimal heat transfer. The use of bolts or pins to secure the stator into the housing will not be acceptable.
5. The motor shall have a minimum 1.0 service factor. The motor shall be designed for usage in submersible applications only. The motor horsepower shall be non-overloading of the nameplate rating throughout the entire pump performance curve. The motor shall meet the performance requirements of a NEMA L speed torque curve.
6. The rotor bars shall be die cast aluminum.
7. The motor will be capable of operating continuously at a maximum submergence depth of 66 ft (20m).
8. The motor will be capable of 11.5 starts per hour with a minimum rest time of 77 seconds between starts without overheating.
9. Motor shall be CSA Listed to the CSA harmonized standard.

D. Sensors

1. Motors shall have built-in thermal overload protection. An automatically resetting, heat sensing thermal device that interrupts current flow if excessive temperature and/or current is detected shall provide protection against excessive temperature.

E. Power Cord

1. The pumps shall be equipped with ____ ft. of type SOW power cord. The power cord and motor shall be connected via quick disconnect pin terminals located within the motor housing. Pin receptacles shall be crimped and molded to the power cord in a PVC plug. The plug shall be secured with a stainless steel compression plate to prevent water from entering the motor housing and to provide strain relief at the point of cord entry. A polybutylene terephthalate terminal block with brass pin inserts shall connect the power cord leads with motor leads. The ground pin shall be longer than the other pins such that the ground connection is the first connection made and the last connection broken when the plug is inserted and removed, respectively. A Buna-N O-ring shall provide isolation sealing between terminal block and the motor housing. The cord assembly shall be guaranteed by the manufacturer to meet UL approval for submersion.
2. The pumps shall be capable of being easily removed and replaced without the removal of the pump power cord from the electrical conduit.

2.04 FINISHES

- A. The pump (s) shall be powder coated with an epoxy primer and polyester top coat.

2.05 ACCESSORIES

(Add or remove as required)

- A. The pump shall be supplied with a Break Away Fitting assembly (BAF), which will allow the pump to be installed and operate continuously in a vertical submerged condition. The stationary portion of the BAF shall be installed in the wet pit, thus removing the need for personnel to enter the wet well. The stationary portion of the BAF shall consist of a cast iron base elbow, guide rails, an upper guide bracket, and an optional intermediate guide bracket. The intermediate guide bracket is only required for depths of 13 ft (4m) or more. The cast iron base elbow shall be bolted to the wet well floor. The movable portion of the BAF shall consist of a cast iron slide, which bolts to the pump discharge flange. On all models, this slide guides the pump up and down the guide rails, and includes a gasket, which ensures a complete seal. The two guide rails must be provided by others, and should be schedule 40 metallic pipe in a non-corrosive material, such as stainless steel. These guide rails shall be attached to the base elbow at one end, and the upper guide bracket at the other. The upper guide bracket shall be attached to the underside of the wet well cover. The bracket shall have elastomer plugs, which reduce noise and rail vibration. The guide rails serve only to guide the pump, and do not carry the weight of the pump. Designs that do not use a movable gasket, use guide chain, or use a single guide rail shall not be accepted.
- B. The pump shall be supplied with a "C" channel rail assembly to facilitate removal of the pump(s) from ground level. The "c"-channel guide rail assembly is made of 300 series stainless steel. The guide rail mounts to the upper and lower horizontal brackets attached to the basin wall. The unit also rests on the basin floor. The stainless steel guide rail supports the pump the required distance from the basin floor. Guide brackets are attached to the pump from positioning of the unit on the guide rail during installation and removal. The stationary fitting of the hydraulically sealed discharge is powder coated machined cast iron. The stationary fitting has a fiber reinforced neoprene diaphragm clamped between the stainless steel rail and the stationary pressure vessel. The moveable fitting is held against the stationary fitting by the construction of the stainless steel rail, aligning the moveable fitting to the flexible diaphragm for proper sealing of the two surfaces.
- C. The pumps shall be installed on a pump support stand that is fabricated of 300 series stainless steel with rubberized pads on the feet, fixing the pump at the required distance to provide adequate suction clearance. The pumps shall be equipped with a 1.25-inch NPT or BSP discharge fitting which includes a check valve and integrated anti-siphon.

PART 3 – EXECUTION

3.01 EXAMINATION (USE AS NEEDED)

3.02 PREPARATION (USE AS NEEDED)

3.03 INSTALLATION

- A. Install in accordance with manufacturer's printed instructions (and state/municipal, and other governing standards).
 - 1. The pump shall be capable of operating continuously in a vertical submerged condition.

2. Contractor shall complete all piping and supports, make all electrical power and control connections, and install all safety devices and instrumentation prior to equipment start-up.
3. All anchor bolts, nuts, washers, and sleeves shall be Type 316 stainless steel furnished by the contractor and shall be of ample size and strength for the purpose intended.
4. See also 2.05 ACCESSORIES above.

3.04 QUALITY CONTROL

- A. General: Comply with requirements of Section ()
- B. Factory Tests:
 1. The pump manufacturer shall perform a pump performance test to verify hydraulic performance as standard. The pump shall be completely submerged and run to determine that the unit meets three pre-determined hydraulic performance points.
 2. If certified testing is required, the manufacturer shall offer to perform tests in accordance with Grades B, E, or U of Hydraulic Institute standards 11.6 and 14.6.
 3. A check of the motor voltage and frequency shall be made as shown on the name plate.
 4. A motor and cable insulation test for moisture content or insulation defects, in accordance with CSA criteria.
 5. Each motor shall be dielectric tested to verify the motor insulation integrity.
 6. Contact the manufacturer for tests not listed here.
- C. Manufacturer's Representative
 1. Provide manufacturer's representative in accordance with Section (). The representative shall inspect the equipment, carry out the equipment start-up procedures, and provide training to the operators in how to effectively operate and maintain the equipment. The manufacturer's representative may be an employee of the manufacturer's distributor.
 2. Prior to Operational Testing, the CONTRACTOR shall have the manufacturer's representative perform the following:
 - a. Megger test the stator and power cables.
 - b. Check proper rotation.
 - c. Check power supply voltage.
 - d. Measure motor operating load and no-load current.
 - e. Check level control operation and sequence.
 3. During Final Acceptance Testing, the manufacturer's service representative shall review recommended operation and maintenance procedures with the OWNER'S personnel.
 4. The manufacturer's representative shall be present for a period of not less than one (1) day to complete the following:
 - a. Inspect completed installation
 - b. Observe equipment testing
 - c. Observe equipment start-up
 - d. Instruct operational personnel on equipment operation and maintenance.
- D. Field Tests:
 1. After installation, the pumping system shall be field tested using potable water for a minimum of 30 minutes and check for correct direction of rotation in the presence of the manufacturer's representative and the Engineer. The CONTRACTOR shall be

responsible for providing water and for conveying the water to the site and providing required meter and back-flow prevention check valve assembly. Each pump shall be cycled through the sequence of operation "pump on" as the level rises in the wet well and then "pump off" during draw down. Once each pump has been tested separately, the pumps will be operated in parallel.

2. Each pump shall operate over its intended operating range without undue noise, vibration, or cavitation. The CONTRACTOR shall monitor and record vibration at three symmetrically located points on each pump at maximum and minimum speed and supply data to the OWNER.

E. Inspections

1. Upon completion of the installation and on-site testing, and before acceptance by the OWNER, the Pump Manufacturer or the authorized Pump Manufacturer's Representative shall submit a written statement that the pump installation has been inspected and is completed in accordance with the manufacturer's recommendations.

3.05 ADJUSTING

- A. Adjust parts for smooth, uniform operation.

3.06 CLEANING

- A. Clean as recommended by manufacturer. Do not use materials or methods which may damage finish (surface) or surrounding construction.

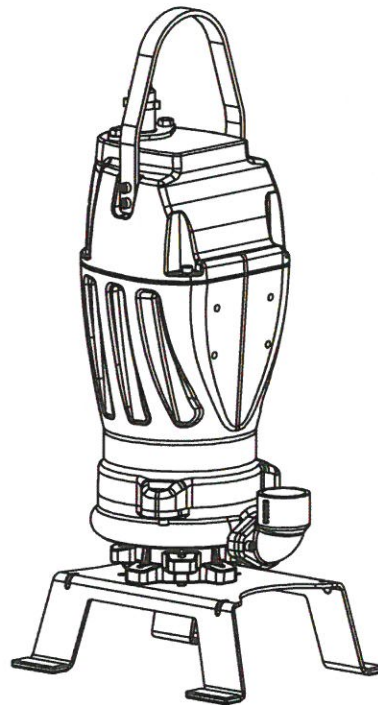
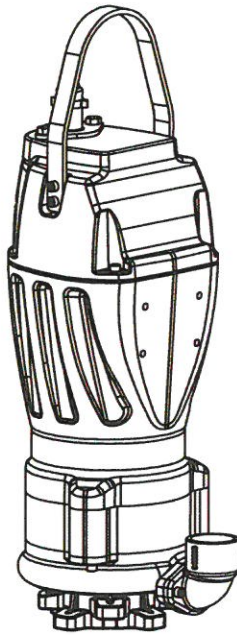
END OF SECTION

BARNES®

INSTALLATION MANUAL Submersible Single-Stage Grinder Pump

RAZOR
BY BARNES®

**Series:
ZSGV, ZOGV**



This product may be covered by one or more of the following patents and other patent(s) pending: Patent Pending

IMPORTANT!

*Read all instructions in this manual before operating pump.
As a result of Crane Pumps & Systems, Inc., constant product improvement program,
product changes may occur. As such Crane Pumps & Systems reserves the right to
change product without prior written notification.*

CRANE

A Crane Co. Company

PUMPS & SYSTEMS

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Fax: (905) 457-2650



Form No. 145448-Rev. H

SAFETY FIRST!

Please Read This Before Installing Or Operating Pump. This information is provided for **SAFETY and to PREVENT EQUIPMENT PROBLEMS**. To help recognize this information, observe the following symbols:



IMPORTANT! Warns about hazards that can result in personal injury or indicates factors concerned with assembly, installation, operation, or maintenance which could result in damage to the machine or equipment if ignored.

CAUTION ! Warns about hazards that can or will cause minor personal injury or property damage if ignored. Used with symbols below.

WARNING ! Warns about hazards that can or will cause serious personal injury, death, or major property damage if ignored. Used with symbols below.



Hazardous fluids can cause fire or explosions, burns or death could result.



Extremely hot - Severe burns can occur on contact.



Biohazard can cause serious personal injury.



Hazardous fluids can cause Hazardous pressure, eruptions or explosions could cause personal injury or property damage.



Rotating machinery Amputation or severe laceration can result.



Hazardous voltage can shock, burn or cause death.

Only qualified personnel should install, operate and repair pump. Any wiring of pumps should be performed by a qualified electrician.



WARNING ! - To reduce risk of electrical shock, pumps and control panels must be properly grounded in accordance with the National Electric Code (NEC) or the Canadian Electrical Code (CEC) and all applicable state, province, local codes and ordinances.

Prior to energizing the pump, a verification of the pump ground circuit should be made between the pump case and panel ground.

WARNING! - To reduce risk of electrical shock, always disconnect the pump from the power source before handling or servicing. Lock out power and tag.

Prevent large articles of clothing, large amounts of chemicals, other materials or substances such as are uncommon in domestic sewage from entering the system.

During power black-outs, minimize water consumption at the home(s) to prevent sewage from backing up into the house.

Always keep the shut-off valve completely open when system is in operation (unless advised otherwise by the proper authorities). Before removing the pump from the basin, be sure to close the shut-off valve. (This prevents backflow from the pressure sewer.)

Keep the control panel locked or confined to prevent unauthorized access to it.

If the pump is idle for long periods of time, it is advisable to start the pump occasionally by adding water to the basin.



CAUTION! Pumps build up heat and pressure during operation-allow time for pumps to cool before handling or servicing.



WARNING! - **DO NOT** pump hazardous materials (flammable, caustic, etc.) unless the pump is specifically designed and designated to handle them.

Do not block or restrict discharge hose, as discharge hose may whip under pressure.



WARNING! - **DO NOT** wear loose clothing that may become entangled in the impeller or other moving parts.



WARNING! - Keep clear of suction and discharge openings. **DO NOT** insert fingers in pump with power connected.

Make sure lifting handles are securely fastened each time before lifting. Do not operate pump without safety devices in place. Always replace safety devices that have been removed during service or repair.

Do not exceed manufacturers recommendation for maximum performance, as this could cause the motor to overheat.

Secure the pump in its operating position so it can not tip over, fall or slide.

Cable should be protected at all times to avoid punctures, cut, bruises and abrasions - inspect frequently.



Never handle connected power cords with wet hands.



To reduce risk of electrical shock, all wiring and junction connections should be made per the NEC or CEC and applicable state or province and local codes. Requirements may vary depending on usage and location.



Submersible Pumps are not approved for use in swimming pools, recreational water installations, decorative fountains or any installation where human contact with the pumped fluid is common.

Do not remove cord and strain relief. Do not connect conduit to pump.



Products Returned Must Be Cleaned, Sanitized, Or Decontaminated As Necessary Prior To Shipment, To Insure That Employees Will Not Be Exposed To Health Hazards In Handling Said Material. All Applicable Laws And Regulations Shall Apply.



Bronze/brass and bronze/brass fitted pumps may contain lead levels higher than considered safe for potable water systems. Lead is known to cause cancer and birth defects or other reproductive harm. Various government agencies have determined that leaded copper alloys should not be used in potable water applications. For non-leaded copper alloy materials of construction, please contact factory.



IMPORTANT! - Crane Pumps & Systems, Inc. is not responsible for losses, injury, or death resulting from a failure to observe these safety precautions, misuse or abuse of pumps or equipment.

Other brand and product names are trademarks or registered trademarks of their respective holders.

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4/07

USER GUIDE

USER GUIDE

Congratulations on your purchase of a Barnes Razor grinder pump system. With proper care and by following a few simple guidelines your grinder pump will give you many years of dependable service.

Use and Care

The Razor grinder pump station is designed to handle routine, domestic sewage. Solid waste materials should be thrown in the trash. While your station is capable of accepting and pumping a wide range of materials, regulatory agencies advise that the following items should not be introduced into any sewer either directly or through a kitchen waste disposal:

- Glass
- Metal
- Diapers
- Socks, rags or cloth
- Plastic objects (e.g., toys, utensils, etc.)
- Sanitary napkins or tampons

In addition you must **NEVER** introduce into any sewer:

- Explosives
- Flammable Material
- Lubricating Oil and/or Grease
- Strong Chemicals
- Gasoline

General Information

Your home wastewater disposal service is part of a low pressure sewer system. The key element in this system is the Barnes Razor grinder pump station. The basin collects all wastewater from the house. The solids in the sewage are then ground to a small size suitable for pumping in the slurry.

The grinder pump generates sufficient pressure to pump this slurry from your home to the wastewater plant.

Power Failure

Your grinder pump cannot dispose of wastewater or provide an alarm signal without electrical power. If electrical power service is interrupted, keep water usage to a minimum.

Warranty

Your grinder pump is furnished with a warranty against defects in material or workmanship. A properly completed

Start-Up/Warranty Registration form must be on file at the Barnes factory in order to activate your warranty. In addition your pump must be installed in accordance with the installation instructions.

If you have a claim under the provisions of the warranty, contact your local Barnes Distributor.

When contacting your representative for service, please include your station serial number, pump model number, and pump serial number.

For future reference, record the following information:

Station Serial No: _____

Pump Model No: _____

Pump Serial No: _____

Local Distributor: _____

Distributor Telephone: _____

PUMP SPECIFICATIONS:

DISCHARGE 1 1/4"
LIQUID TEMPERATURE 104°F (40°C) Continuous
MOTOR HOUSING Cast Iron ASTM A-48, Class 30
VOLUTE Cast Iron ASTM A-48, Class 30
SEAL PLATE Cast Iron ASTM A-48, Class 30
DOUBLE SEAL PLATE Cast Iron ASTM A-48, Class 30
IMPELLER
 Design 12 vane, Splitter-Type, vortex, with
 pump out vanes
 on back side. Dynamically balanced,
 ISO G6.3
 Material Cast Iron ASTM A-48, Class 30
CUTTER PLATE Hardened 440C Stainless Steel
 Rockwell® C-55
CUTTER Hardened 440C Stainless Steel
 Rockwell® C-55
SHAFT 416 Stainless Steel
O-RING Buna-N
HARDWARE 300 Series Stainless Steel
PAINT Powder Coat
SEAL *Design* Single or Double Mechanical,
 oil filled reservoir
 Material Rotating Faces - Silicon-Carbide
 Stationary Faces - Silicon-Carbide
 Elastomer - Buna-N
 Hardware - 300 series stainless steel
CORD ENTRY Custom Molded, Quick Connected
 for sealing and strain relief
CORD CSA/UL Approved 12/3 or 12/4
 Type SOW

SPEED 3450 RPM, 60Hz
 2875 RPM, 50Hz

UPPER BEARING:

Design Single Row, Ball
Lubrication Oil
Load Radial & Thrust

LOWER BEARING

Design Single Row, Ball
Lubrication Oil
Load Radial & Thrust

MOTOR

Design NEMA L, Oil Filled,
 Squirrel Cage Induction
Insulation Class F

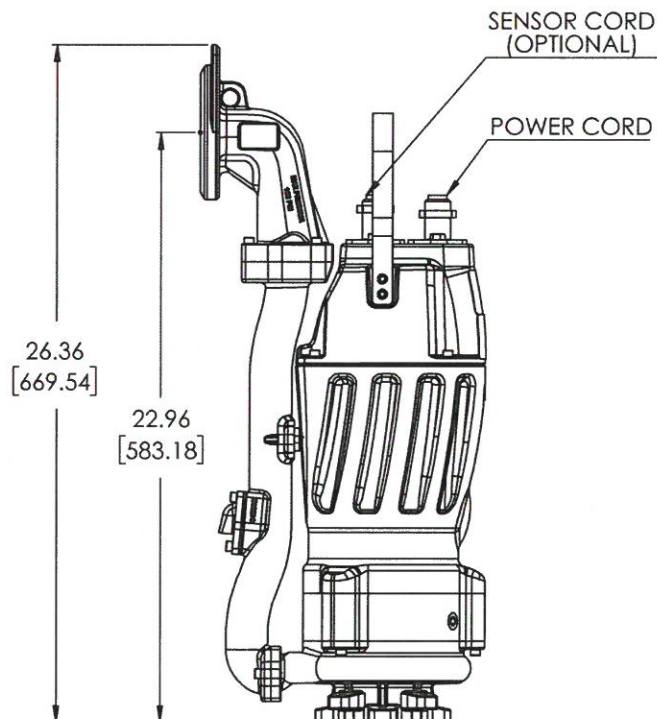
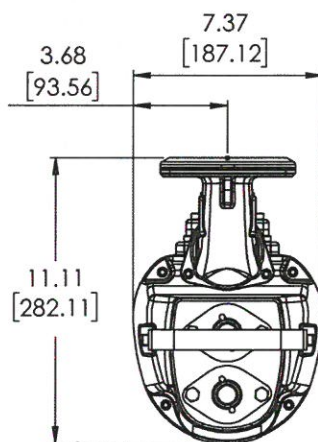
SINGLE PHASE Capacitor start/capacitor run

LEVEL CONTROLS: **SOLD SEPARATELY**, Model
 ESPS-150™, Environmentally
 sealed pressure switch with CPVC
 housing, HNBR diaphragm, Custom
 Molded Quick Connect for Sealing
 and Strain Relief

OPTIONAL EQUIPMENT Additional Cord, Automatic to Manual
 Adapter Plug Kit, BSP Check Valve
 Kit, C-Channel Rail Check Valve Kit,
 NPT Check Valve Kit, Base Kit

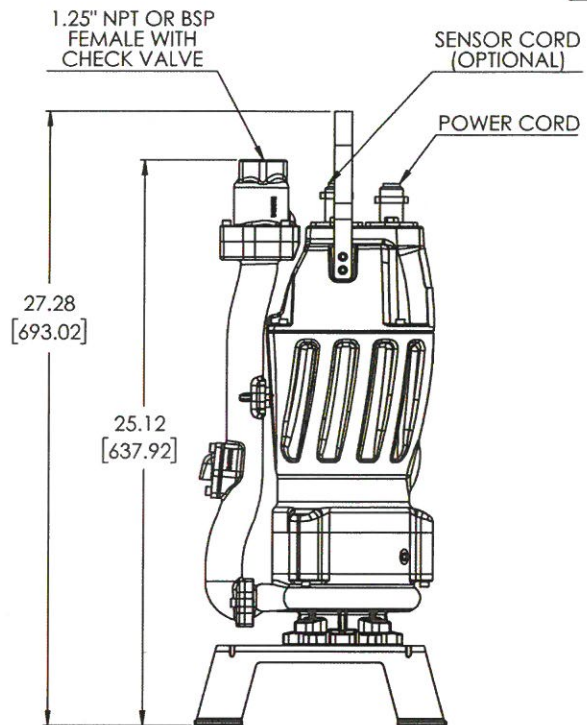
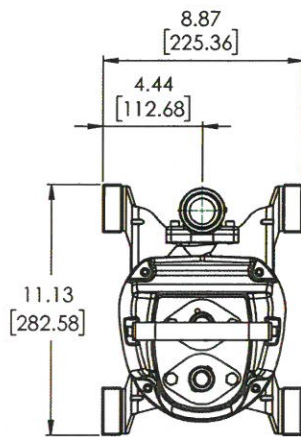
ZSGV_CC - For "C" Channel
Shown with optional C-Channel
Movable Fitting

inches
 (mm)



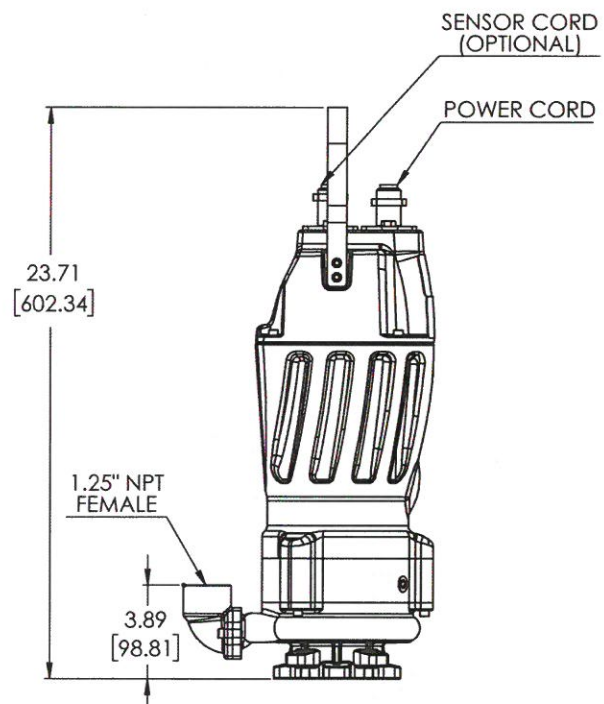
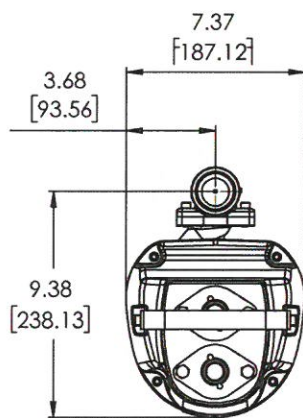
ZSGV20_CT - Threaded
Shown with optional NPT-BSP
Threaded Fitting

inches
(mm)



ZSGV20_L

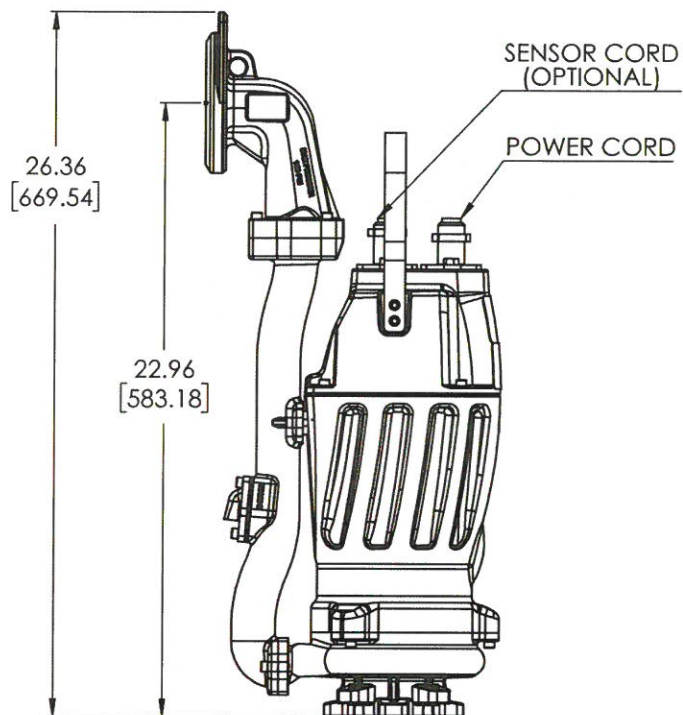
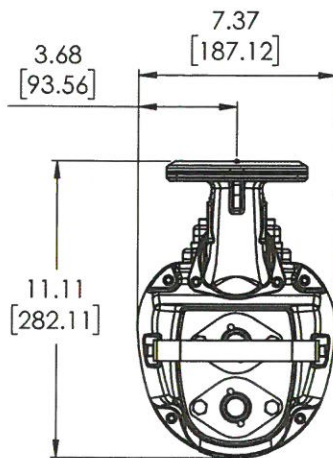
inches
(mm)



Shown without Discharge Valve - ESPS Level Control Sold Separately

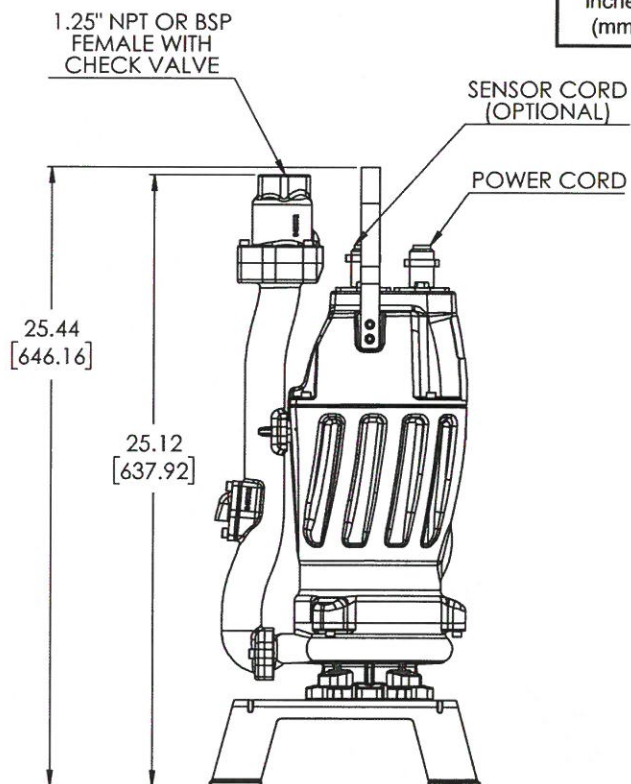
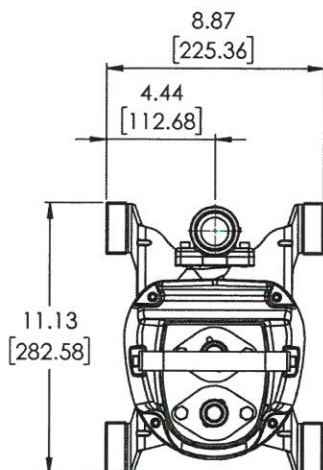
**ZOGV_CC - For "C" Channel
Shown with optional C-Channel
Movable Fitting**

inches
(mm)



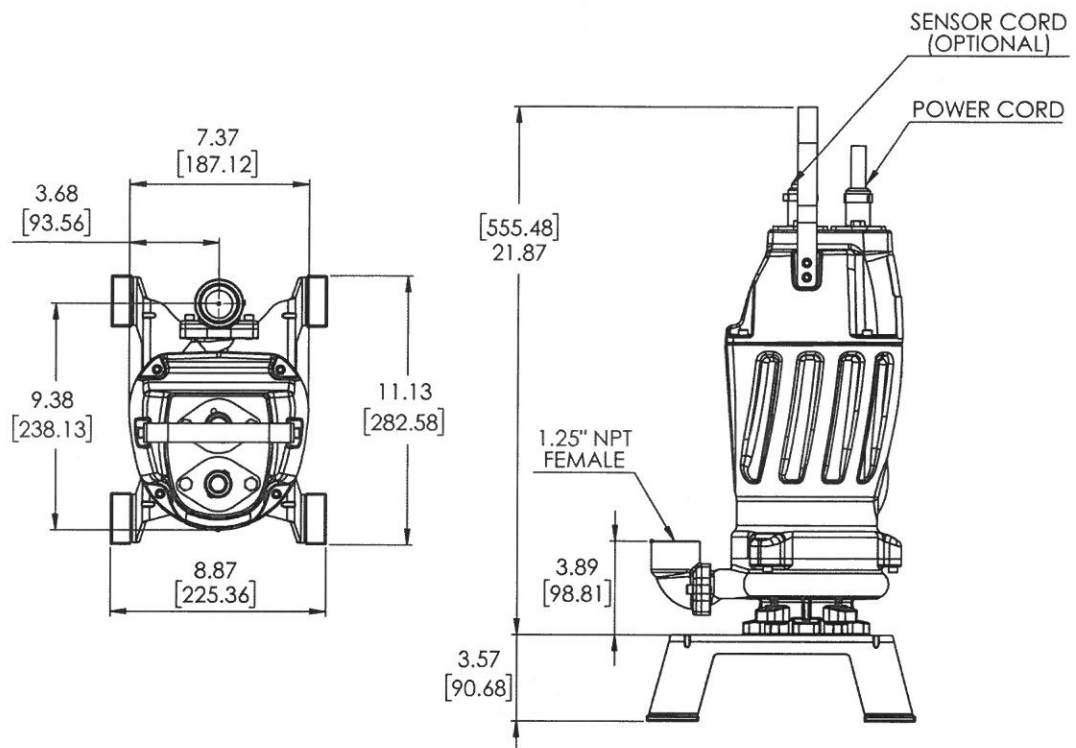
**ZOGV20_CT - Threaded
Shown with optional NPT-BSP
Threaded Fitting**

inches
(mm)



ZOGV20_L

inches
(mm)



MODEL NO	HP	VOLT	PH	NEMA START CODE	FULL LOAD AMPS	LOCKED ROTOR AMPS	CORD SIZE	CORD O.D. ± .02 (.5) in (mm)	WINDING RESISTANCE MAIN – START	RECOMMENDED BREAKER SIZE
ZSGV2072__ ZOGV2072__	2	208-240	1	H	17.5-15.0	53.8	"12/4 12/3"	.67 (17.0) .61 (15.5)	1.2--3.2	25 AMP
ZSGV2092__	2	208-240	3	J	8.5-8.2	43.9	12/4	.67 (17.0)	1.6	15 AMP
ZSGV2042__	2	480	3	J	4.6	22.0	12/4	.67 (17.0)	6.4	10 AMP
ZSGV2052__	2	600	3	J	3.6	14.5	12/4	.67 (17.0)	11.5	
ZSGV2022__	2	380	3	J	5.2	26.3	12/4	.67 (17.0)	10.2	10 AMP

Winding Resistance ± 5%, measured from terminal block.

Pump rated for operation at ± 10% voltage at motor.

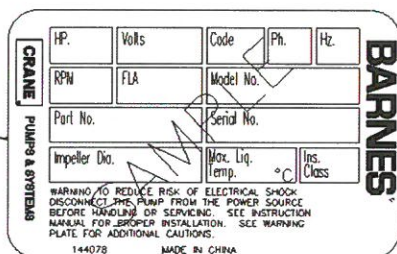
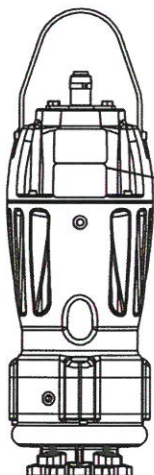
For 3 Phase Models: Temperature Sensor Cord is 14/3 SOW .55 (14mm) ± .02 (.51mm) OD

ZSGV2072L: Start Cap– 300V, 250MF Run Cap– 370V, 30MF

Switch– Samusco ECS 224L

Recommended Breaker Sizes

Pump Model	HP	Phase	Volts	Frequency	Breaker Size
ZSGV2072__ ZOGV2072__	2	1	208-240	60	25
ZSGV2042__	2	3	208-240	60	15
ZSGV2042__	2	3	480	60	10
ZSGV2022__	2	3	380	50	10



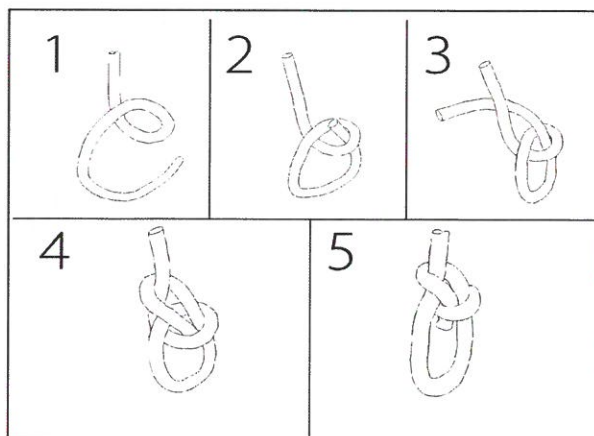
NAMEPLATE

The nameplate is located on the side of the pump. This contains the pumps part number, horsepower voltage, phase, and serial number, as well as other information. The start-up form located in the back of this manual contains a place to record this data. The information should be recorded now so the pump does not have to be pulled again later. The start-up form can be left in the control panel until station start-up is completed later.

Tie the bowline knot where shown per the directions provided (Steps 1 through 5).

On the CC series, tie one bowline knot on the moveable fitting and one bowline knot in the handle on the pump (See Fig 1).

On the CT (Not Shown) series tie bowline knot on the handle.



RECEIVING/UNPACKING:

Upon receiving the pump, it should be inspected for damage or shortages. If damage has occurred, file a claim immediately with the company that delivered the pump. Unpack pump and record pump serial and model number before installing. If the manual is removed from the packaging, do not lose or misplace.

STORAGE:

Short Term- For best results, pumps can be retained in storage, as factory assembled, in a dry atmosphere with constant temperatures for up to six (6) months.

Long Term- Any length of time exceeding six (6) months, but not more than twenty-four (24) months. The units should be stored in a temperature controlled area, a roofed over walled enclosure that provides protection from the elements (rain, snow, wind-blown dust, etc.), and whose temperature can be maintained between +40 deg. F and +120 deg. F. If extended high humidity is expected to be a problem, all exposed parts should be inspected before storage and all surfaces that have the paint scratched, damaged, or worn should be recoated with a air dry enamel paint. All surfaces should then be sprayed with a rust-inhibiting oil.

Pump should be stored in its original shipping container. On initial start up, rotate impeller by hand to assure seal and impeller rotate freely. If it is required that the pump be installed and tested before the long term storage begins, such installation will be allowed provided:

- 1.) The pump is not installed under water for more than one (1) month.
- 2.) Immediately upon satisfactory completion of the test, the pump is removed, thoroughly dried, repacked in the original shipping container, and placed in a temperature controlled storage area.
- 3.) Before placing pump into service, pump should be brought to operational temperature range. Excessive or direct heating or cooling should NOT be used.

OPERATION TEMPERATURE RANGE: +35°F (2°C) to 104°F (40°C).

SERVICE CENTERS:

For the location of the nearest Barnes Service Center, check your Barnes representative or Crane Pumps & Systems, Inc. Service Department in Piqua, Ohio, telephone (937) 778-8947 or in Brampton, Ontario, Canada (905) 457-6223.

INSTALLATION:

Location - The pump is designed to fit into your basin either by sliding down the rail assembly, or by being mounted on a pump base. **THIS PUMP MUST BE INSTALLED WITH A MINIMUM OF 3 INCHES AND A MAXIMUM OF 4.5 INCHES OF CLEARANCE UNDER THE PUMP FOR THE ENTRANCE OF SEWAGE SOLIDS.**

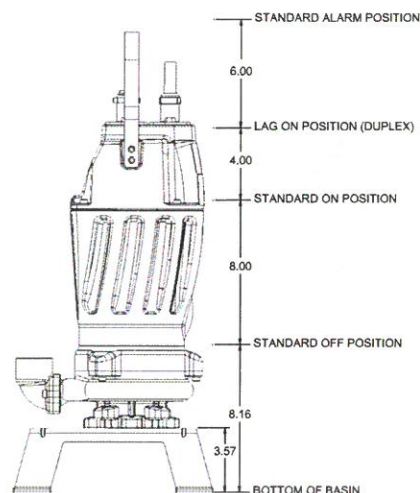


FIGURE 1 - Normal Operating Points

Discharge - Assemble discharge piping or hose assembly (whichever is required by your application), to the pump. Discharge piping should be as short as possible. Both a check valve and a shut-off valve are required for each pump being used. The check valve is used to prevent backflow into the sump. Excessive backflow can cause flooding and/or damage to the pump. The shut-off valve is used to stop system flow during pump or check valve servicing. An anti-siphon valve is also required.

Package Systems- Refer to manual supplied with basin package system.

ELECTRICAL CONNECTIONS:

Pump Cables - The cord assembly mounted to the pump must **NOT** be modified in any way except for shortening to a specific application. Any splice between the pump and the control panel must be made in accordance with the National Electric Code or the Canadian Electric Code and all applicable state, province and local electric codes. It is recommended that a junction box, be mounted outside the sump or be of at least Nema 4 (EEMAC-4) construction if located within the wet well. **DO NOT USE THE POWER OR CONTROL CABLES TO LIFT PUMP!**

Overload Protection - For single phase, the type of in-winding overload protector used is referred to as an inherent overheating protector and operates on the combined effect of temperature and current. This means that the overload protector will trip out and shut the pump off if the windings become too hot, or the load current becomes too high. It will then automatically reset and start the pump after the motor cools to a safe temperature. In the event of an overload, the source of this condition should be determined and rectified immediately. **DO NOT LET THE PUMP CYCLE OR RUN IF AN OVERLOAD CONDITION OCCURS !**

Wire Size - If additional cable is required consult a qualified electrician for proper wire size.

CABLE CONNECTIONS:

Power/Control Cable- Insert female end of cable plug into housing bore aligning alignment mark with hole in terminal block see Figures 4 & 5. Tighten bolts on compression flange until flush with motor housing.

Pump Power - Large Pin (furthest from discharge)
Level Control - Small Pin (closest from discharge)

Level control cord has molded fitting at both ends of the cord. Install one end to the Pump and the other end to the Level Control.

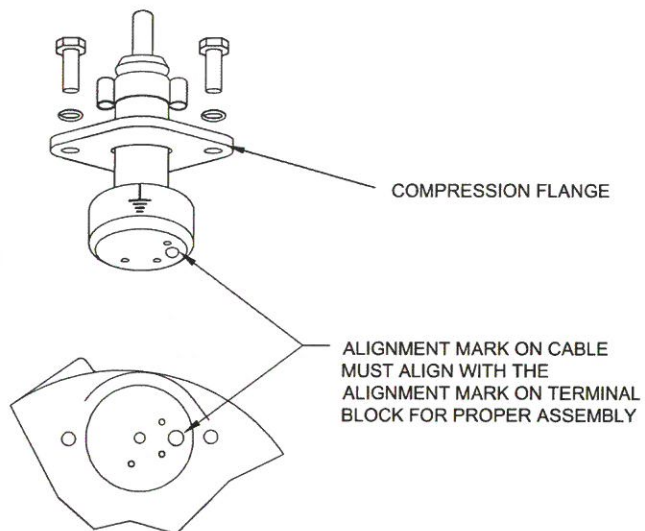
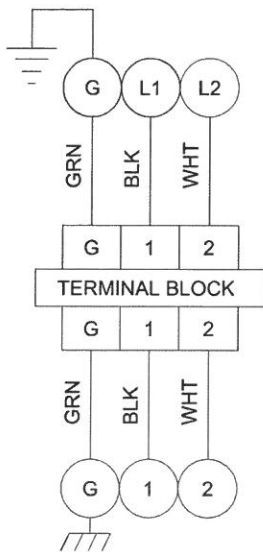


FIGURE 4

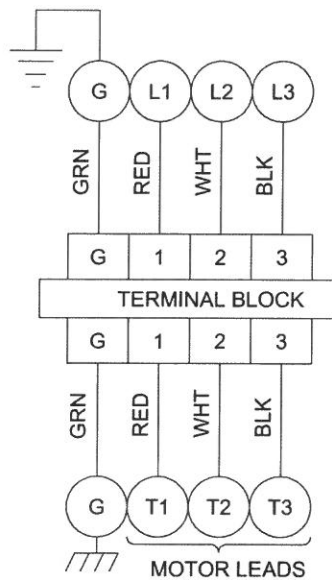
GROUND VERIFICATION:

Prior to energizing the pump, a verification of the pump ground circuit should be made between the pump case and panel ground using a continuity tester or ohm meter.



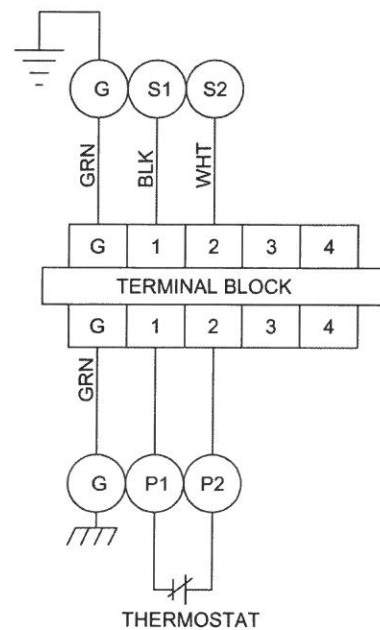
Single phase 240 Volt AC, 60Hz
"L" Series, 12/3 SOW

FIGURE 6



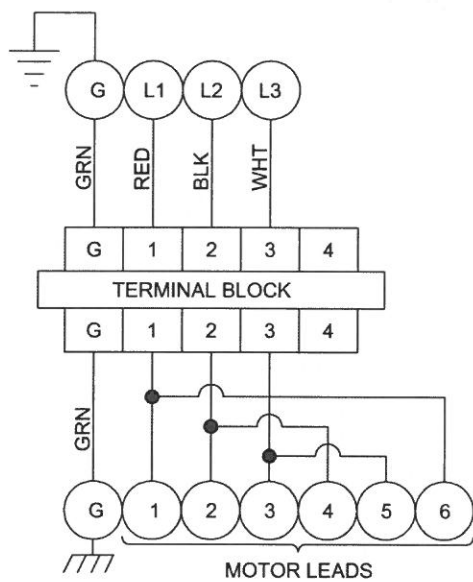
Single phase 240 Volt AC,
External Capacitor

FIGURE 6a



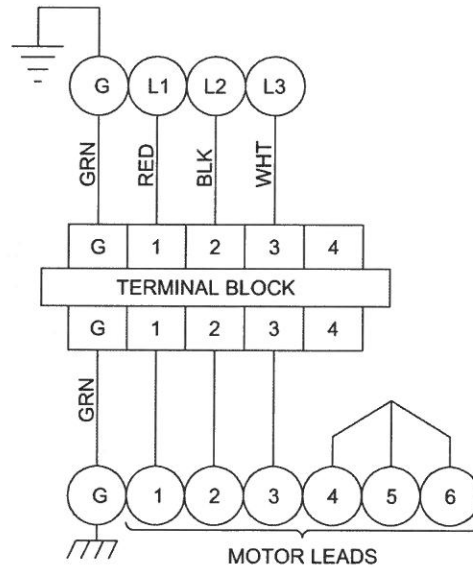
Temperature Sensors

FIGURE 6b



Three Phase, 200-240 Volt AC

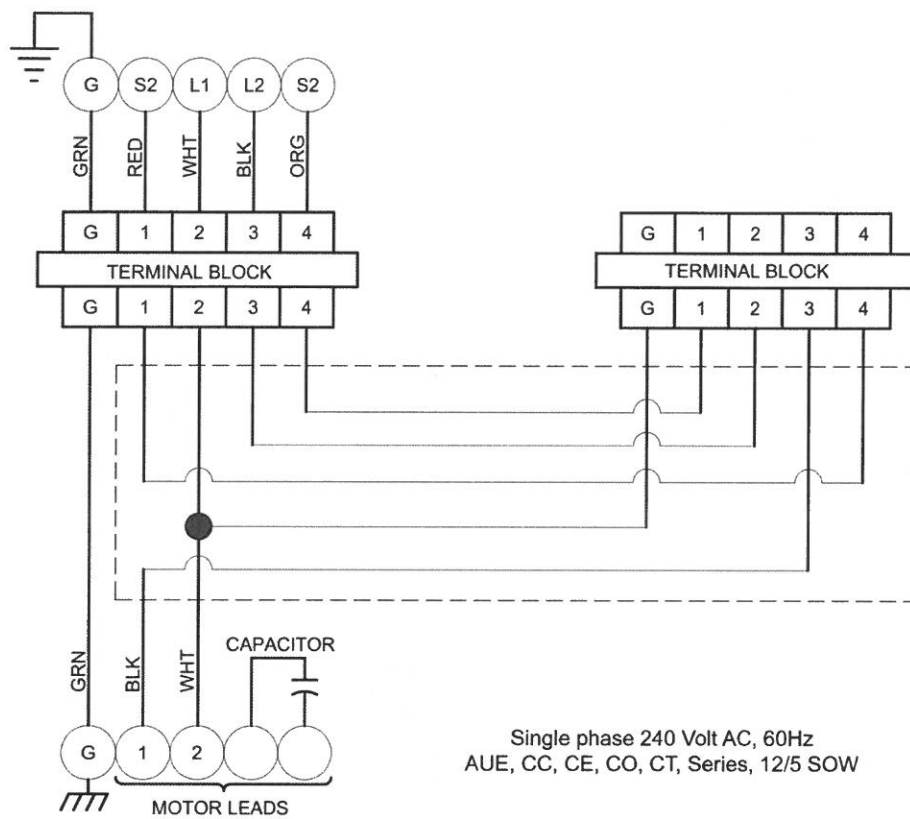
FIGURE 6c



Three Phase, 460 Volt AC

FIGURE 6d

Wiring Harness
Item 54 on Figure 8



Single phase 240 Volt AC, 60Hz
AUE, CC, CE, CO, CT, Series, 12/5 SOW

FIGURE 7

TROUBLE SHOOTING

CAUTION ! Always disconnect the pump from the electrical power source before handling.

If the system fails to operate properly, carefully read instructions and perform maintenance recommendations.

If operating problems persist, the following chart may be of assistance in identifying and correcting them:

MATCH "CAUSE" NUMBER WITH CORRELATING "CORRECTION" NUMBER.

NOTE: Not all problems and corrections will apply to each pump model.

PROBLEM	CAUSE	CORRECTION
Pump will not run	<ol style="list-style-type: none"> Poor electrical connection, blown fuse, tripped breaker or other interruption of power, improper power supply. Motor or switch inoperative (to isolate cause, go to manual operation of pump). 2a. Float movement restricted. 2b. Switch will not activate pump or is defective. 3a. Insufficient liquid level. 3b. Switch is unable to activate 	<ol style="list-style-type: none"> Check all electrical connections for security. Have electrician measure current in motor leads, if current is within $\pm 20\%$ of locked rotor Amps, impeller is probably locked. If current is 0, overload may be tripped. Remove power, allow pump to cool, then recheck current. 2a. Reposition pump or clean basin as required to provide adequate clearance for float. 2b. Disconnect level control. Set ohmmeter for a low range, such as 100 ohms full scale and connect to level control leads. Actuate level control manually and check to see that ohmmeter shows zero ohms for closed switch and full scale for open switch. (Float Switch). 3a. Make sure liquid level is at least equal to suggested turn-on point. 3b. Rotate ESPS level control in horizontal position.
Pump will not turn off	<ol style="list-style-type: none"> 2a. Float movement restricted. 2b. Switch will not activate pump or is defective. 4. Excessive inflow or pump not properly sized for application. 9. Pump may be airlocked. 14. H-O-A switch on panel is in "HAND" position 	<ol style="list-style-type: none"> 4. Recheck all sizing calculations to determine proper pump size. 5. Check discharge line for restrictions, including ice if line passes through or into cold areas. 6. Remove and examine check valve for proper installation and freedom of operation. 7. Open valve. 8. Check cutter for freedom of operation, security and condition. Clean cutter and inlet of any obstruction. 9. Loosen union slightly to allow trapped air to escape. Verify that turn-off level of switch is set so that the suction is always flooded. Clean vent hole. 10. Remove & examine for damage. Replace pump stator if required. 11. Repair fixtures as required to eliminate leakage. 12. Check pump temperature limits & fluid temperature. 13. Replace portion of discharge pipe with flexible connector. 14. Turn to automatic position. 15. Check for leaks around basin inlet and outlets.
Pump hums but does not run	<ol style="list-style-type: none"> Incorrect voltage 8. Cutter jammed or loose on shaft, worn or damaged, inlet plugged. 	
Pump delivers insufficient capacity	<ol style="list-style-type: none"> Incorrect voltage. 4. Excessive inflow or pump not properly sized for application. 5. Discharge restricted. 6. Check valve stuck closed or installed backwards. 7. Shut-off valve closed. 8. Cutter jammed or loose on shaft, worn or damaged, inlet plugged. 9. Pump may be airlocked. 10. Pump stator damaged/torn. 	
Pump cycles too frequently or runs periodically when fixtures are not in use	<ol style="list-style-type: none"> 6. Check valve stuck closed or installed backwards. 11. Fixtures are leaking. 15. Ground water entering basin. 	
Pump shuts off and turns on independent of switch, (trips thermal overload protector). CAUTION! Pump may start unexpectedly. Disconnect power supply.	<ol style="list-style-type: none"> Incorrect voltage. 4. Excessive inflow or pump not properly sized for application. 8. Cutter jammed, loose on shaft, worn or damaged, inlet plugged. 12. Excessive water temperature. 	
Pump operates noisily or vibrates excessively	<ol style="list-style-type: none"> 4. Operating at too high a pressure. 5. Discharge restricted. 8. Cutter broken. 13. Piping attachments to building structure too rigid or too loose. 	

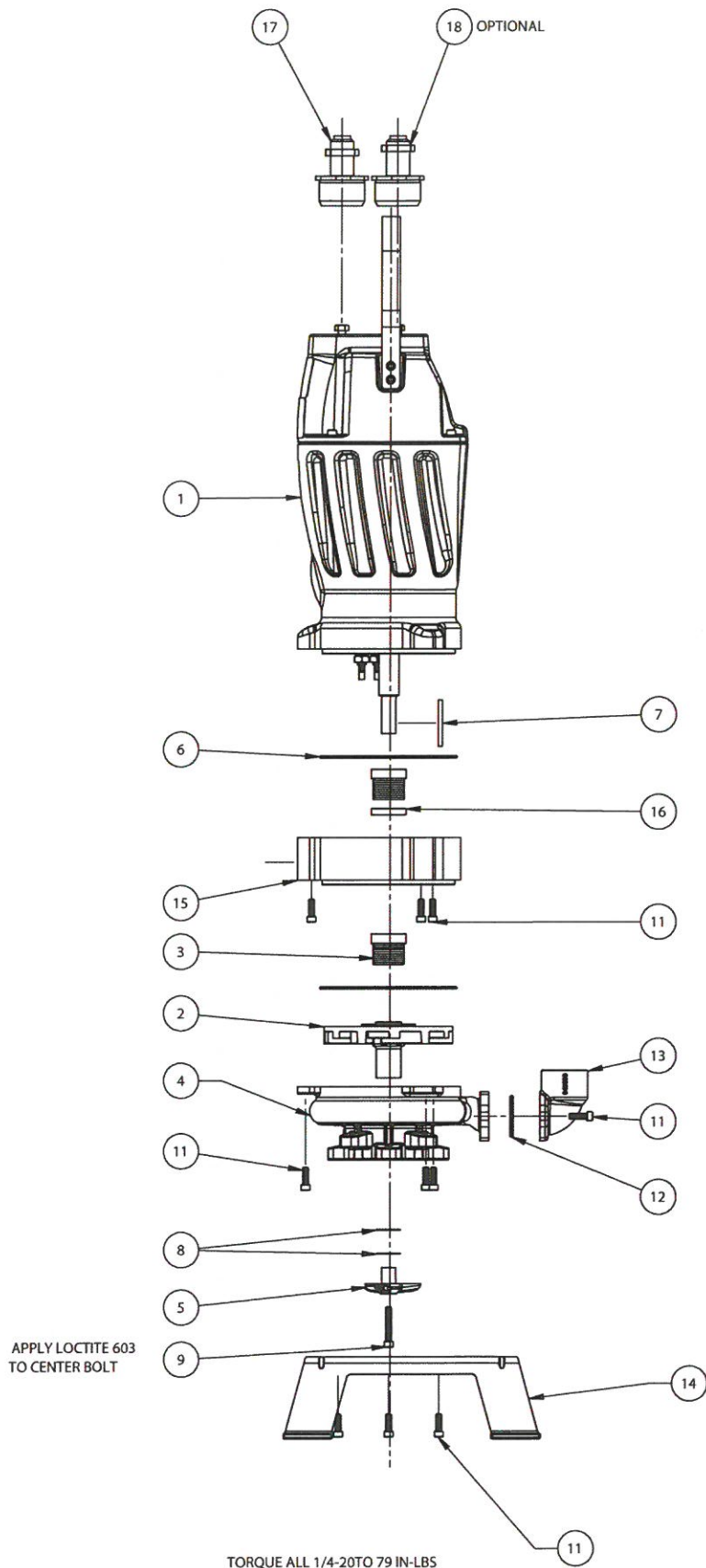


FIGURE 8

ZSGV PARTS LIST

ITEM	QTY	PART NO.	DESCRIPTION	MATERIAL
1	1	143448	ASSY, DRIVER, RAZOR (MANUAL) 2HP, 60HZ, 208-240V, 1PH	
		145241	ASSY, DRIVER, RAZOR, MS&TS (AUTO) 2HP, 60HZ, 208-240V, 1PH	
		145242	ASSY, DRIVER, RAZOR, MS&TS (AUTO) 2HP, 60HZ, 208-240V, 3PH	
		145243	ASSY, DRIVER, RAZOR, MS&TS (AUTO) 2HP, 60HZ, 460V, 3PH	
		145244	ASSY, DRIVER, RAZOR, MS&TS (AUTO) 2HP, 60HZ, 575V, 3PH	
		145247	ASSY, DRIVER, RAZOR, TS (AUTO) 2HP, 60HZ, 208-240V, 3PH	
		145248	ASSY, DRIVER, RAZOR, TS (AUTO) 2HP, 60HZ, 460V, 3PH	
		145249	ASSY, DRIVER, RAZOR, TS (AUTO) 2HP, 60HZ, 575V, 3PH	
2	1	141655BTA1	IMPELLER,VORTEX,OGV,SGV	CLASS 30 CI
3	2	111131SD	SEAL,MECH,.875",SC/SC/B	SC/SC/B
4	1	145611	ASSY,VOLUTE,SGV/OGV	
5	1	141653	CUTTER,NGG	440 SS
6	2	2-31003-162	O-RING,-162,BUNA,5.737ID	BUNA-N
7	1	141704	KEY,3/16SQ,2.00LG,18-8SS	18-8
8	A/R	143567-005 143567-010 143567-030 143567-060	SHIM,XXX,.69ID,1.03OD	316 SS
9	1	11-34-1	SCREW,SKHD,1/4-20,1.50"	300 SS
10	A/R	126638	LOCTITE #603 THREAD LOCK	
11	12	11/30/01	SCREW,SKHD,1/4-20,.75"	18-8 SS
12	1	2-31003-222	O-RING,-222,BUNA,1.484ID	BUNA-N
13	1	141650	ADAPTER,VERT,1.25NPT	CLASS 30 CI
14	1	145549	ASSY,BASE,SS,FEET	
15	1	141644	PLATE,SEAL,DOUBLE	Gray Cast Iron
16	1	142924	COLLAR,SHAFT,.875"	Plain Carbon Steel
17	1	SEE BOM	POWER CORD	
18	1	SEE BOM	SENSOR CORD (OPTIONAL)	
NOT SHOWN	1	139741	SWITCH,START,MOTOR	
NOT SHOWN	1	145401	CAP,RUN,370V,30MF	
NOT SHOWN	1	145400	CAP,START,300V,250MF	

Contact your local Distributor or the Factory for other cord lengths and other optional equipment.

(*) Automatic - ESPS Level Control

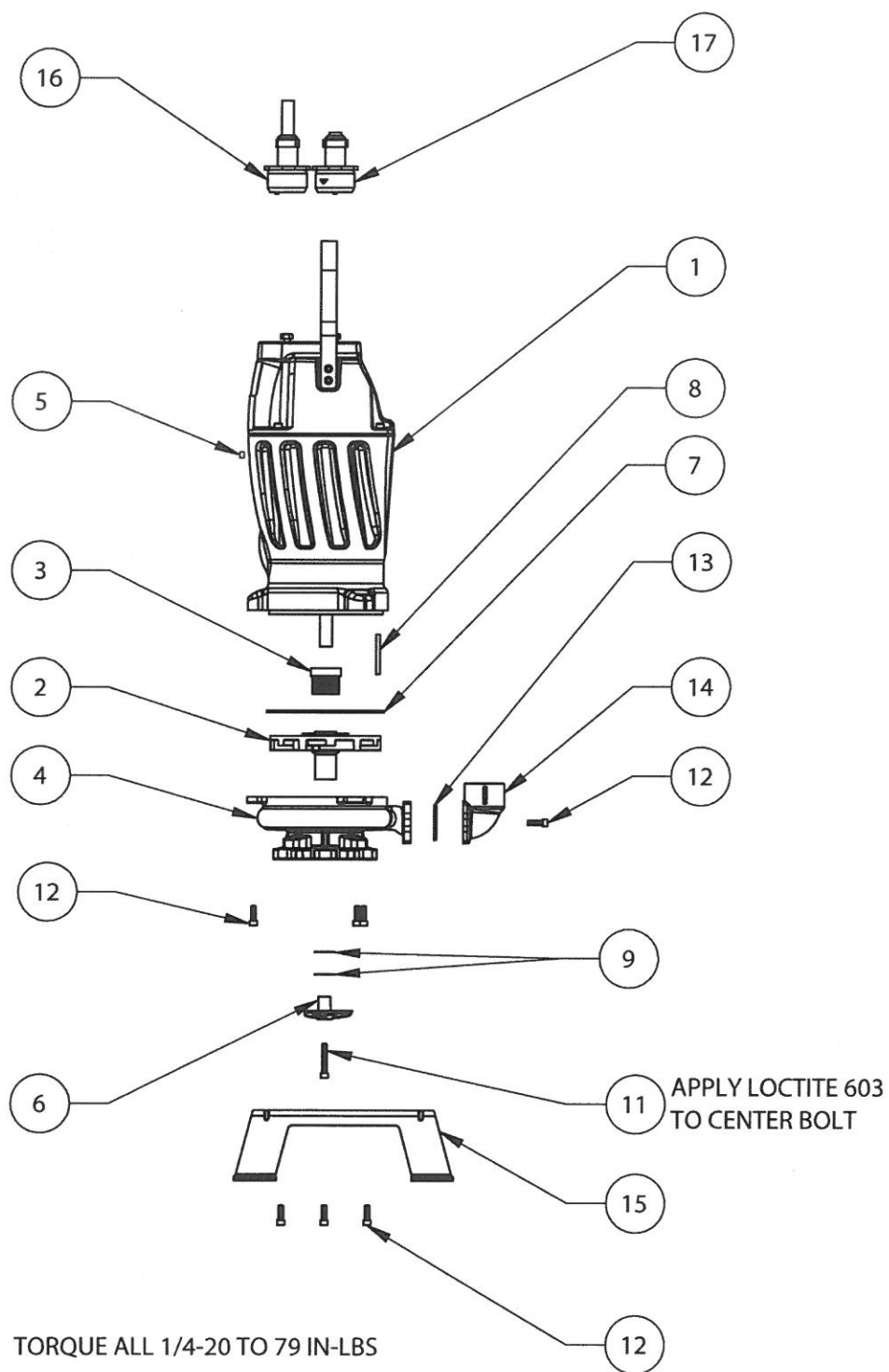


FIGURE 8

ZOGV PARTS LIST

ITEM	QTY	PART NO.	DESCRIPTION
1	1	143449	ASSY, DRIVER, RAZOR (AUTO) 2HP, 60 HZ, 208-240V, 1PH
		143453	ASSY, DRIVER, RAZOR (MANUAL) 2HP, 60 HZ, 208-240V, 1PH
2	1	141655BTA1	IMPELLER,VORTEX,OGV,SGV
3	1	111131SD	SEAL,MECH,.875",SC/SC/B
4	1	145611	ASSY,VOLUTE,SGV/OGV
5	1	014270-SS	PLUG,PIPE,.375-18NPT,C'SUNK
6	1	141653	CUTTER,NGG
7	1	2-31003-162	O-RING,-162,BUNA,5.737ID
8	1	141704	KEY,3/16SQ,2.00LG,18-8SS
9	A/R	"143567-005 143567-015 143567-030 143567-060"	Shims
10	A/R	126638	LOCTITE #603 THREAD LOCK
11	1	11-34-1	SCREW,SKHD,1/4-20,1.50"
12	9	36803	SCREW,SKHD,1/4-20,.75"
13	1	2-31003-222	O-RING,-222,BUNA,1.484ID
14	1	141650	ADAPTER,VERT,1.25NPT
15	1	145549	ASSY,BASE,SS,FEET
16	1	SEE BOM	POWER CORD...
17	1	SEE BOM	SENSOR CORD... (Optional)
NOT SHOWN	1	147000	CAP,START,300V, 150MF
NOT SHOWN	1	145401	CAP,RUN,370V, 30MF
NOT SHOWN	1	139741	SWITCH,START,MOTOR

Contact your local Distributor or the Factory for other cord lengths and other optional equipment.

(*) Automatic - ESPS Level Control

PARTS KITS

C-Channel Kit.....**P/N: 141707CA-KIT** Item #'s: 2, 3, 4, 5, 6, 7
C-Channel Kit SS.....**P/N: 141707CA-SS-KIT** Item #'s: 2, 3, 4, 5, 6, 7
NPT Check Valve Kit.....**P/N: 141707NA-KIT** Item #'s: 2, 3A, 4, 5, 6
BSP Check Valve Kit.....**P/N: 141707BA-KIT** Item #'s: 2, 3B, 4, 5, 6

ZSGV

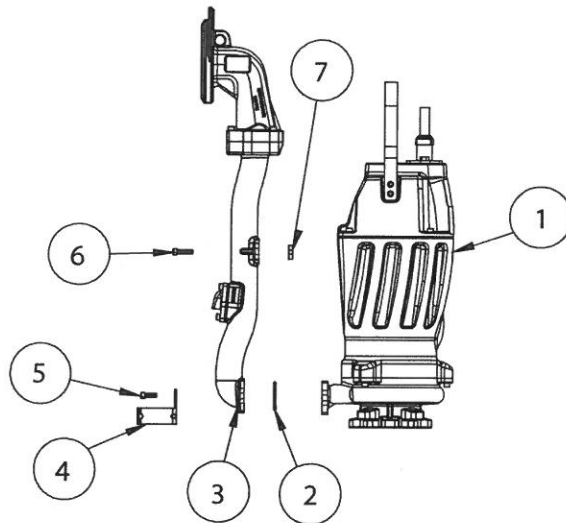
Seal Kit.....**P/N: 149189-KIT** Item #'s: 3, 6
Cutter Kit.....**P/N: 149190-KIT** Item #'s: 5, 8, 9
Start Component Kit.....**P/N: 149191-KIT** Item #'s: 19, 20, 21
Hydraulic Kit.....**P/N: 149192-KIT** Item #'s: 2, 4, 7, 9, 13
Driver Kits.....**Consult Engineering for Driver Assembly** Item #'s: 1

ZOGV

Seal Kit.....**P/N: 149185-KIT** Item #'s: 3, 7
Cutter Kit.....**P/N: 149186-KIT** Item #'s: 6, 9, 11
Start Component Kit.....**P/N: 149187-KIT** Item #'s: 18, 19, 20, O-Ring (Not Shown)
Hydraulic Kit.....**P/N: 149188-KIT** Item #'s: 2, 4, 8, 12, 14
Driver Kits.....**Consult Engineering for Driver Assembly** Item #'s: 1

C-Channel Discharge

ITEM	QTY	PART NO.	DESCRIPTION
1	1	See Page 13	ASSY,DRIVER,RAZOR
2	1	2-31003-222	O-RING,-222,BUNA,1.484ID
3	1	141707C	ASSY,DISCHARGE,C-CHANNEL
4	4	143993	BRACKET,DISCHARGE
5	1	11-30-1	SCREW,SKHD,1/4-20,.750, 18-8SS
6	1	11-32-1	SCREW,SKHD,1/4-20,.875", 18-8SS
7	1	143577	SPACER,DISCHARGE,BUNA



BSP/NPT Discharge

ITEM	QTY	PART NO.	DESCRIPTION
1	1	See Page 13	ASSY,DRIVER,RAZOR
2	1	2-31003-222	O-RING,-222,BUNA,1.484ID
3a	1	141707N	DISCHARGE,RAZOR,VLV,NPT
3b	1	141707B	DISCHARGE,RAZOR,VLV,BSP
4	2	11-30-1	SCREW,SKHD,1/4-20,.750 18-8SS
5	2	11-32-1	SCREW,SKHD,1/4-20,1.000" SS
6	1	143577	SPACER,DISCHARGE,BUNA

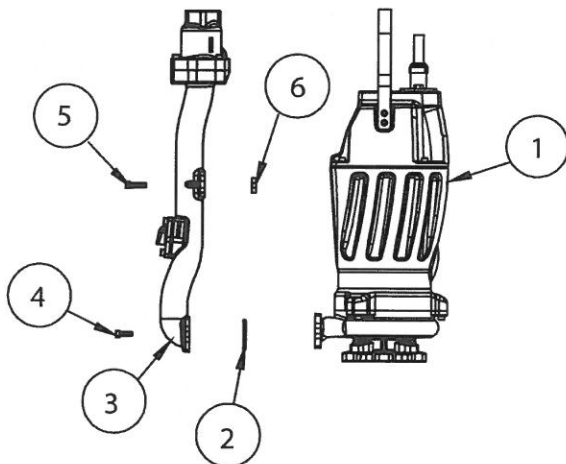
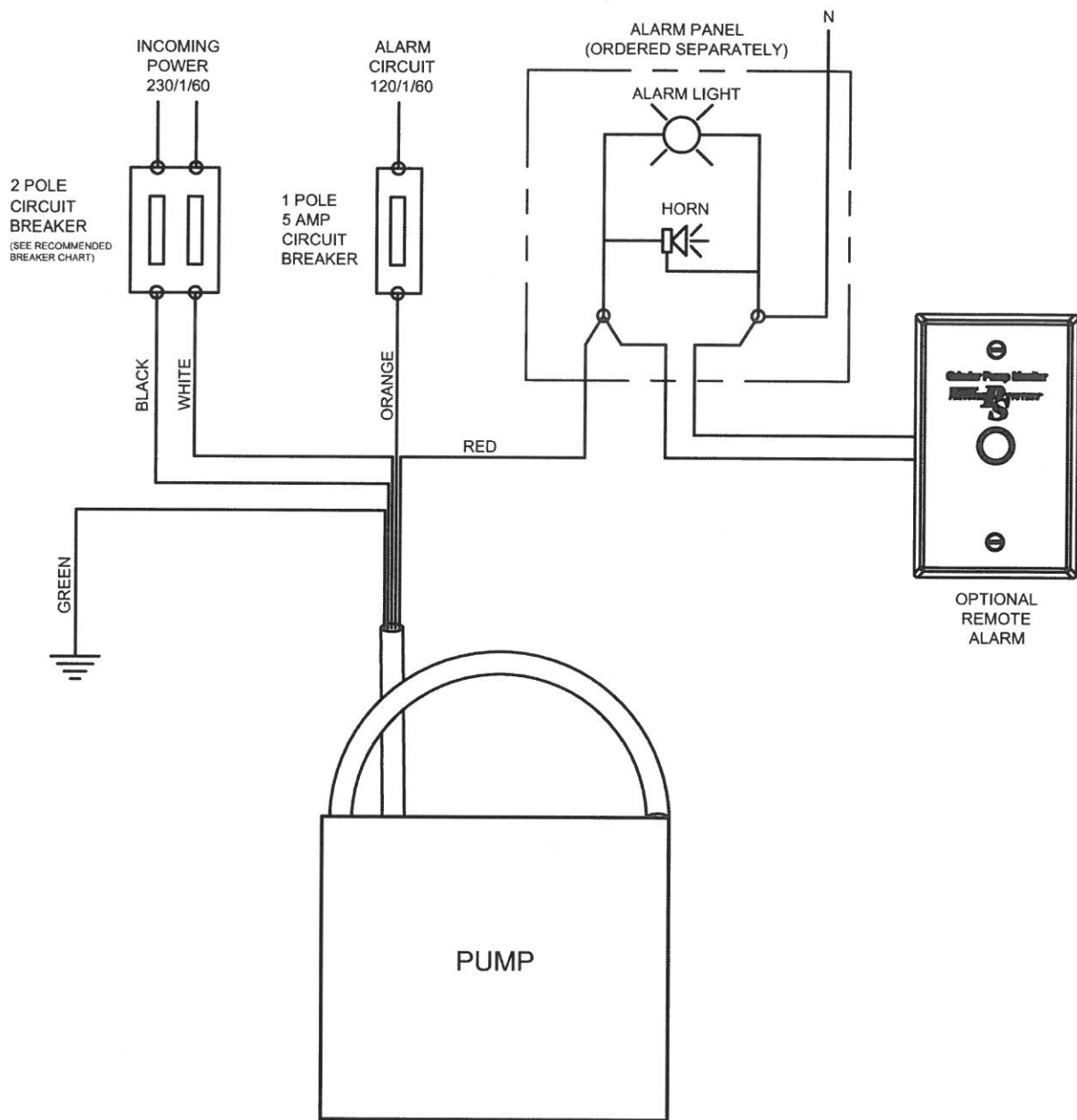


FIGURE 11

Typical Wiring Diagram (Generic)



IMPORTANT! WARRANTY REGISTRATION

Your product is covered by a warranty:

www.cranepumps.com/downloadables/CATALOGS_OIPMs/Warranty/36MonthWarranty.pdf

START UP GUIDE: <https://www.cranepumps.com/productregistration>

If you have a claim under the provisions of the warranty, contact your local
Crane Pumps & Systems, Inc. Distributor.

RETURNED GOODS

**RETURN OF MERCHANDISE REQUIRES A "RETURNED GOODS AUTHORIZATION".
CONTACT YOUR LOCAL CRANE PUMPS & SYSTEMS, INC. DISTRIBUTOR.**

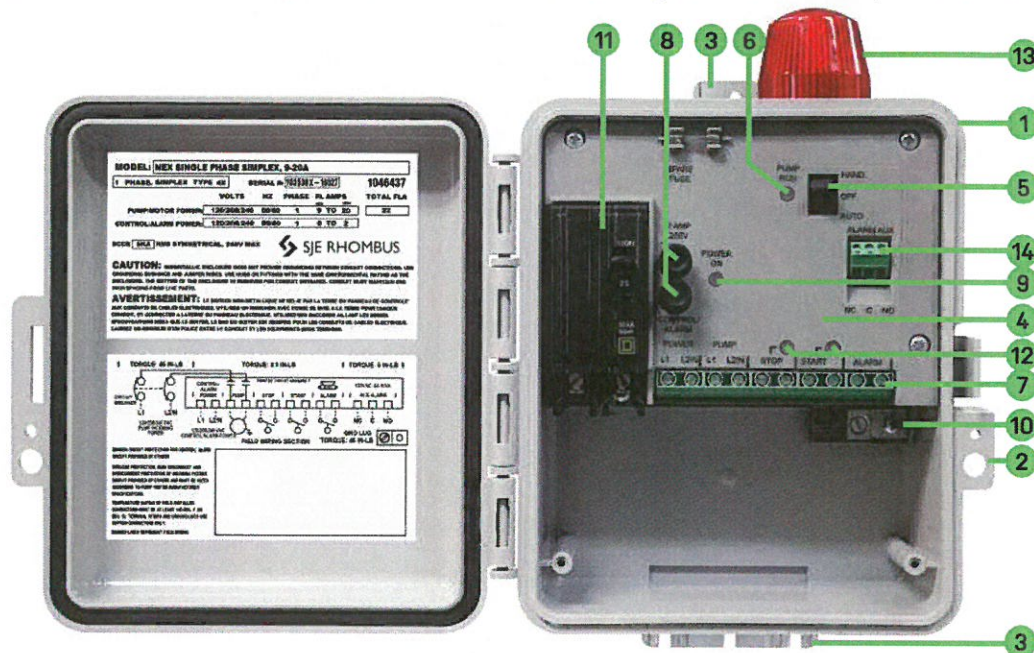


**Products Returned Must Be Cleaned, Sanitized,
Or Decontaminated As Necessary Prior To Shipment,
To Insure That Employees Will Not Be Exposed To Health
Hazards In Handling Said Material. All Applicable Laws
And Regulations Shall Apply.**

NEX SERIES® SINGLE PHASE SIMPLEX CONTROL PANEL

Single phase, simplex motor contactor control.

The NEX Series® control panel is designed to control one single phase pump in water and wastewater applications. Two control switches activate a power relay to turn the pump on and off. If an alarm condition occurs, an additional alarm switch activates the audible/visual alarm system. The compact design (20.32 x 15.24 x 10.16 cm) is ideal for residential applications. Universal pump voltage and control/alarm power allow the NEX Series® panel to handle three voltages (120/208/240V single phase). The innovative design of internal components and integral mounting tabs make



Standard Control Panels

PANEL COMPONENTS

1. Enclosure measures 20.32 X 15.24 X 10.16 cm (8 x 6 x 4 inches) NEMA 4X (ultraviolet stabilized thermoplastic) for indoor or outdoor use
2. Padlockable Latch
3. Integral Mounting Feet
4. Power Relay controls pump by switching electrical lines
5. HOA Switch for manual pump control
6. Green Pump Run Indicator Light
7. Field Wiring Terminal Block
8. Control/Alarm Fuses
9. Control/Alarm Power Indicator
10. Ground Lug
11. Circuit Breaker provides pump disconnect and branch circuit protection
12. Float Status Indicator Lights (Stop and Start Float Status)

STANDARD ALARM PACKAGE

13. Red Alarm Beacon provides 360° visual check of alarm condition
14. Auxiliary Alarm Contacts (Form C) are provided for signaling an external device
15. Alarm Horn provides audible warning of alarm condition, 85 to 90 decibel rating (not shown)
16. Exterior Alarm Test/Normal/Silence Switch allows horn and light to be tested and horn to be silenced in an alarm condition - alarm automatically resets once alarm condition has been cleared (not shown)



SJE RHOMBUS.

Phone: +1 218 847 1317
email: customer.service@sjeinc.com
www.sjerrhombus.com B.3

SEE BACK SIDE FOR COMPLETE LISTING OF AVAILABLE OPTIONS.

NEX SERIES® SINGLE PHASE SIMPLEX CONTROL PANEL

Single phase, simplex motor contactor control.

ORDERING INFORMATION

Part #	Description	Amps	Ship Weight
1046436	NEX Series® Single Phase Simplex, 120/208/240V, (3) 6 meter (20 ft) SJE SignalMaster® control float switches	0-12	4.08 kg
1046437	NEX Series® Single Phase Simplex, 120/208/240V, (3) 6 meter (20 ft) SJE SignalMaster® control float switches	9-20	4.08 kg
1047662	NEX Series® Single Phase Simplex, 120/208/240V, no float switches	0-12	2.27 kg
1047663	NEX Series® Single Phase Simplex, 120/208/240V, no float switches	9-20	2.27 kg

Part #	Description - With Optional Elapsed Time Meter	Amps	Ship Weight
1053452	NEX Series® Single Phase Simplex, 120/208/240 VAC, w/ ETM, (3) 20' SJE SignalMaster® Control Switches	0-12	4.08 kg
1053453	NEX Series® Single Phase Simplex, 120/208/240 VAC, w/ ETM, (3) 20' SJE SignalMaster® Control Switches	9-20	4.08 kg
1053454	NEX Series® Single Phase Simplex, 120/208/240 VAC, w/ ETM, no float switches	0-12	2.27 kg
1053455	NEX Series® Single Phase Simplex, 120/208/240 VAC, w/ ETM, no float switches	9-20	2.27 kg

SEE INTERNATIONAL PRICE BOOK FOR LIST PRICING.

SPECIFICATIONS

Voltage Supply:

Pump: 120/208/240V single phase, 50/60 Hz

Control/Alarm: 120/208/240V single phase, 50/60 Hz

Enclosure: 20.32 x 15.24 x 10.16 cm (8 x 6 x 4 inches), padlockable NEMA 4X
(ultraviolet stabilized thermoplastic with integral mounting feet for outdoor or indoor use)

Float Control Voltage: 12 VDC

Pump Amps: 0-12 amps; 9-20 amps

Auxiliary Alarm Contacts: Form C, 120V Max.



SJE RHOMBUS.

www.sjerhombus.com

customer.service@sjeinc.com

SJE SIGNALMASTER®/SJE SIGNALMASTER® SPDT CONTROL SWITCHES

Mechanically-Activated, Narrow-Angle Float Switches Designed to Activate Pump Control Panels and Alarms

These mechanically-activated, narrow-angle control switches are designed to accurately monitor liquid levels and activate pump control panels and alarms in:

- water applications
- sewage applications

The SJE SignalMaster® control switch is not sensitive to rotation.

Normally Open Model (high level) - Yellow Cap

The control switch turns on (closes) when the switch tips slightly above horizontal signaling a high level, and turns off (opens) when the switch drops slightly below horizontal.

Normally Closed Model (low level) - White Cap

The control switch turns on (closes) when the switch drops slightly below horizontal signaling a low level, and turns off (opens) when the switch tips slightly above horizontal.

SPDT (Single Pole Double Throw) - Green Cap

The control switch can be wired for either normally open or normally closed applications.

FEATURES

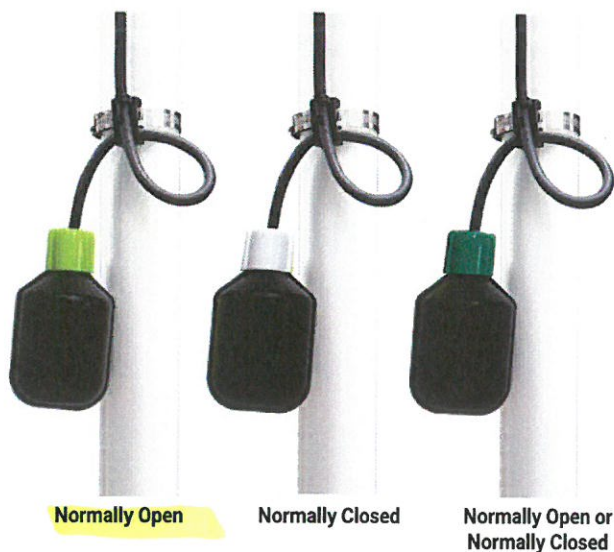
- Mechanically-activated, snap action contacts
- High impact, corrosion resistant, polypropylene float housing
- Not sensitive to rotation
- Control differential of 1.5 inches (4 cm) above or below horizontal
- Colored caps for easy identification: yellow = normally open; white = normally closed; green = SPDT (Single Pole, Double Throw) can be wired for either normally open or normally closed applications

OPTIONS

- In standard cable lengths of 10, 15, 20, or 30 feet and 3, 5, 6, or 10 meters (longer lengths available)
- with two mounting options that allow for flexibility in installation:

Mounting Clamp: for applications where the switch can be attached to a discharge pipe or similar mounting device

Externally Weighted: for applications where the switch can be suspended from above



UL Listed for Water & Sewage



SJE SIGNALMASTER®/SJE SIGNALMASTER® SPDT CONTROL SWITCHES - Mechanically-activated, narrow-angle float switches designed to activate pump control panels and alarms.

NORMALLY OPEN		NORMALLY CLOSED		Shipping Weight	List Price
Part #	Description	Part #	Description		
1006042	10SGMPCNO	1006046	10SGMPCNC	1.04 lbs.	\$54.06
1006050	10SGMWENO	1006054	10SGMWENC	2.13 lbs.	\$66.30
1006043	15SGMPCNO	1006047	15SGMPCNC	1.37 lbs.	\$59.16
1006051	15SGMWENO	1006055	15SGMWENC	2.45 lbs.	\$71.40
1006044	20SGMPCNO	1006048	20SGMPCNC	1.69 lbs.	\$64.26
1006052	20SGMWENO	1006056	20SGMWENC	2.70 lbs.	\$76.50
1006045	30SGMPCNO	1006049	30SGMPCNC	2.34 lbs.	\$75.48
1006053	30SGMWENO	1006057	30SGMWENC	3.43 lbs.	\$87.72

SPDT (NORMALLY OPEN OR NORMALLY CLOSED)				Shipping Weight	List Price
Part #	Description				
1006094	10SGMSPDTPC			1.20 lbs.	\$62.47
1006098	10SGMSPDTWE			2.29 lbs.	\$74.79
1006095	15SGMSPDTPC			1.61 lbs.	\$68.05
1006099	15SGMSPDTWE			2.69 lbs.	\$80.36
1006096	20SGMSPDTPC			2.01 lbs.	\$73.71
1006100	20SGMSPDTWE			3.10 lbs.	\$85.96
1006097	30SGMSPDTPC			2.82 lbs.	\$85.96
1006101	30SGMSPDTWE			3.91 lbs.	\$98.33

PC = Pipe Clamp **WE** = Weighted Externally **NO** = Normally Open **NC** = Normally Closed

SPDT: Can be wired to work in either pump down (normally open) or pump up (normally closed) applications (Single Pole, Double Throw).

NOTE: Descriptions are grouped by cable length measured in feet (10, 15, 20, 30).

PACKAGING: Bagged - Standard

ADDITIONAL CABLE: Longer cable lengths available.

SPECIFICATIONS

CABLE: SJE SignalMaster® - flexible 18 gauge, 2 conductor (UL) SJOW, water-resistant (CPE)

SJE SignalMaster® SPDT - flexible 18 gauge, 3 conductor (UL) SJOW, water-resistant (CPE)

FLOAT: 2.74 inch diameter x 4.83 inch long (7 x 12.3 cm), high impact, corrosion resistant polypropylene for use in sewage and water up to 140° F (60° C)

MAXIMUM WATER DEPTH: 30 feet (9 meters), 13 psi

ELECTRICAL: 5 amp, 125/250 VAC, 50/60 Hz

This switch is not recommended for controlling:

- electric loads less than 100 milliamps, 12 VAC
- non-arcing electric loads

OTHER INFORMATION

NORMALLY OPEN (HIGH LEVEL) OPERATION

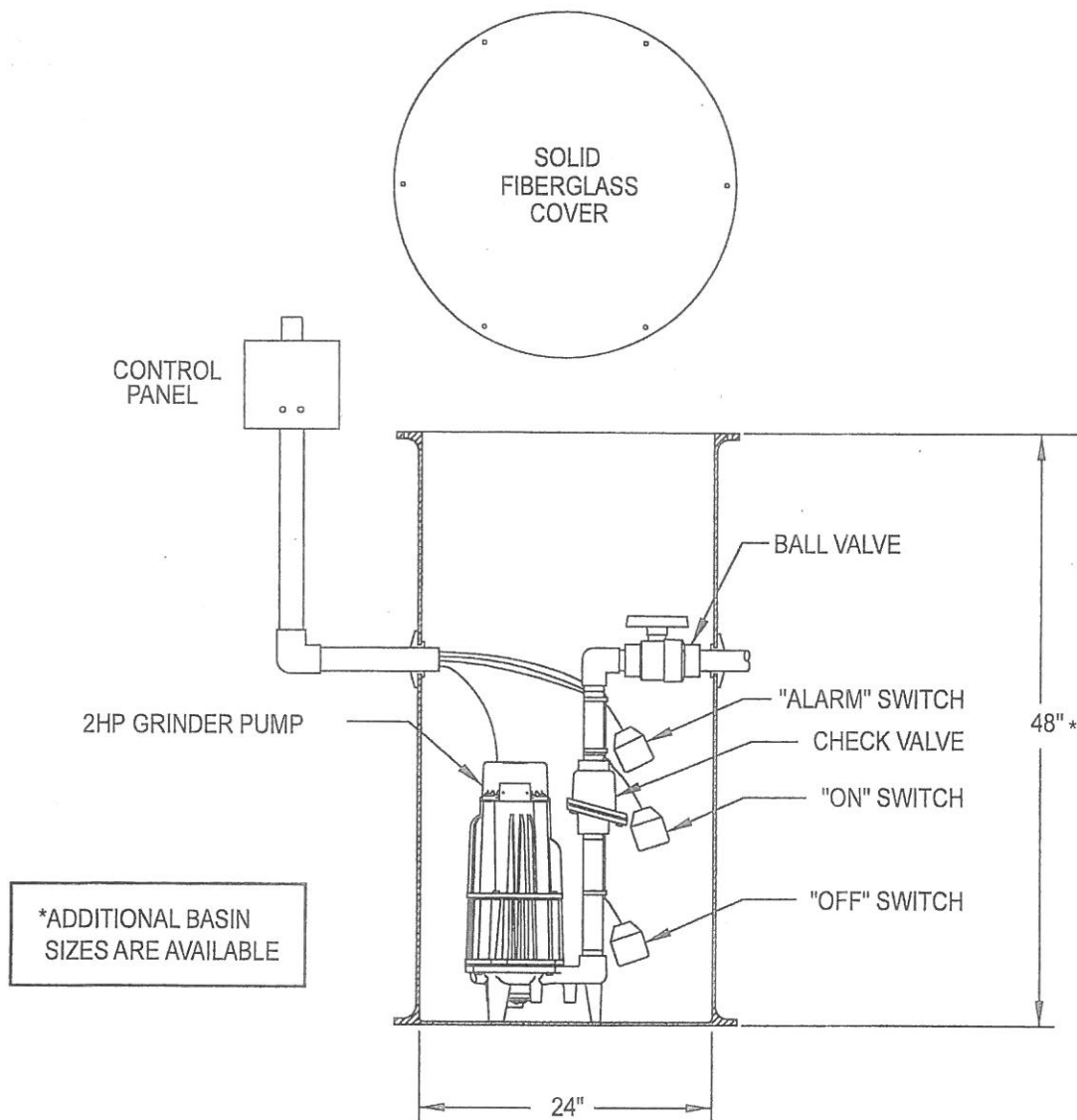
The control switch closes (turns on) when the float tips slightly **above** horizontal signaling a high level, and opens (turns off) when the float drops slightly **below** horizontal in water or sewage applications.

NORMALLY CLOSED (LOW LEVEL) OPERATION

The control switch closes (turns on) when the float drops slightly **below** horizontal signaling a low level, and opens (turns off) when the float tips slightly **above** horizontal in water or sewage applications.

SIMPLEX 840 GRINDER SYSTEM

OUTDOOR FIELD ASSEMBLED



Complete System As Shown Above (P/N 920-0006) Includes:

Qty.	Description
1	230 Volt, 1 Ph, 2 HP Grinder Pump
1	NEMA 4X Simplex Control Panel with Automatic Reversing
3	Float Switch
1	1.25" Cast Iron Check Valve
1	1.25" Ball Valve

Loose fittings provided are to be field installed.