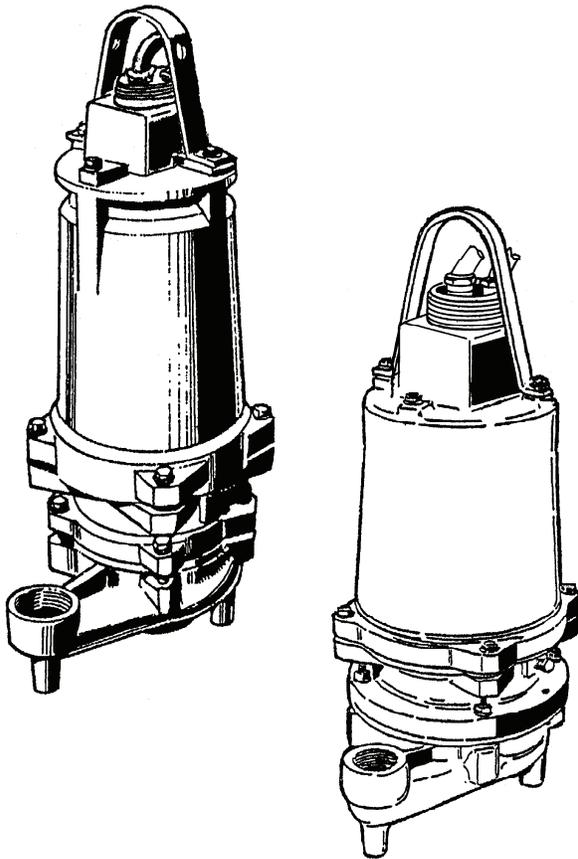


BARNES[®]

INSTALLATION MANUAL Submersible Grinder Pump

For Class I, Group D, Division 1



**Series: XSGV
2, 3, 5, 7.5HP, 60Hz,
3450RPM**



Underwriters Laboratories Inc.[®]
File No. E73842



Canadian Standards Association
File No. 160440

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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Form No. 082188-Rev. V

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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.

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.

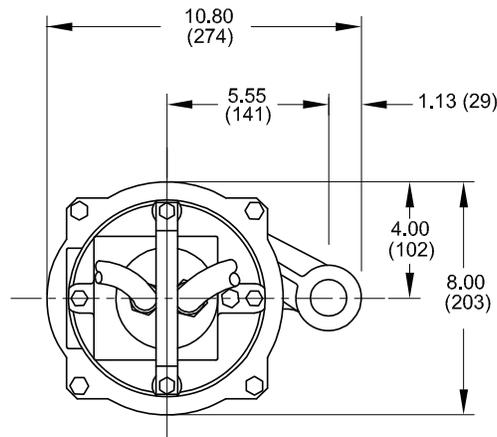
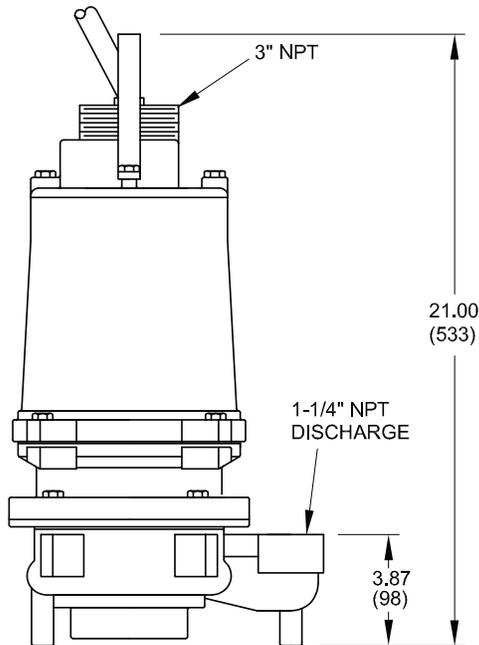


IMPORTANT! - Crane Pumps & Systems, Inc. is not responsible for losses, injury, or death resulting from a failure to observe these safety precautions, misuse or abuse of pumps or equipment.

SECTION A-1 - PUMP SPECIFICATIONS: XSGV 2 HP

DISCHARGE 1 1/4" NPT, Vertical
LIQUID TEMP 104°F (40°C) Continuous
VOLUTE Cast Iron ASTM A-48, Class 30
MOTOR HOUSING Cast Iron ASTM A-48, Class 30
SEAL PLATE Cast Iron ASTM A-48, Class 30
IMPELLER: Design 10 Vane, Vortex, With Pump Out Vanes On Back Side. Dynamically Balanced, ISO G6.3.
Material 85-5-5-5 Bronze
SHREDDING RING Hardened 440C Stainless Steel Rockwell@ C-55.
CUTTER Hardened 440C Stainless Steel, Rockwell@ C-55.
SHAFT 416 Stainless Steel
SQUARE RINGS Buna-N
HARDWARE 300 Series Stainless Steel
PAINT Air Dry Enamel.
SEAL: *Design* Tandem Mechanical, Oil Filled Reservoir.
Material Rotating Faces - Carbon
 Stationary Faces - Ceramic
 Elastomer - Buna-N
 Hardware - 300 Series Stainless
CORD ENTRY 30 ft. (9.1m) Std. Cord. Epoxy Sealed Housing with Secondary Pressure Grommet for Sealing and Strain Relief

UPPER BEARING:
Design Single Row, Ball, Oil Lubricated
Load Radial
LOWER BEARING:
Design Single Row, Oil Lubrication
Load Radial & Thrust
MOTOR: *Design* NEMA L-Single Phase, NEMA B-Three Phase Torque Curve. Oil-Filled, Squirrel Cage Induction
Insulation Class B.
SINGLE PHASE Capacitor Start/Capacitor Run. Requires overload protection to be included in control panel. Requires Barnes® Starter or Control Panel which Includes Capacitors, or Capacitor pack.
THREE PHASE Dual Voltage 230/460; Requires Overload Protection to be Included in control panel.
MOISTURE SENSORS Normally Open (N/O), Requires relay in control panel
TEMP SENSORS Normally Closed (N/C), Requires relay in control panel
OPTIONAL EQUIPMENT. Seal Material, Impeller Trims, Cord Length



inches
(mm)

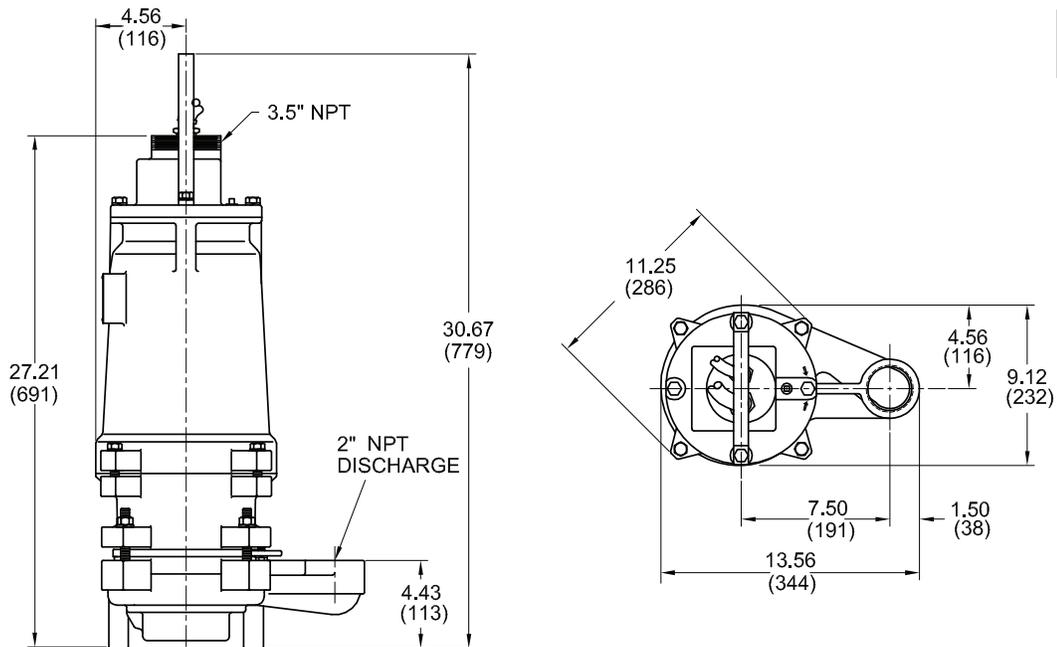
IMPORTANT !

- 1.) MOISTURE AND TEMPERATURE SENSORS MUST BE CONNECTED TO VALIDATE THE UL LISTING.
- 2.) A **NON-SPARKING** BREAK AWAY FITTING MUST BE USED TO VALIDATE THE UL LISTING.
- 3.) A SPECIAL MOISTURE SENSOR RELAY IS REQUIRED IN THE CONTROL PANEL FOR PROPER OPERATION OF THE MOISTURE SENSORS. CONTACT BARNES PUMPS FOR INFORMATION CONCERNING MOISTURE SENSING RELAYS FOR CUSTOMER SUPPLIED CONTROL PANELS.
- 4.) THESE PUMPS ARE UL LISTED FOR PUMPING WATER AND WASTEWATER. **DO NOT USE TO PUMP FLAMMABLE LIQUIDS.**
- 5.) 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.

SECTION A-2 - PUMP SPECIFICATIONS: XSGV 3, 5 & 7.5HP

DISCHARGE 2" NPT, Vertical
LIQUID TEMP 104°F (40°C) Continuous
VOLUTE Cast Iron ASTM A-48, Class 30
MOTOR HOUSING Cast Iron ASTM A-48, Class 30
SEAL PLATE Cast Iron ASTM A-48, Class 30
IMPELLER: Design 12 Vane, Vortex, With Pump Out Vanes On Back Side. Dynamically Balanced, ISO G6.3.
Material Cast Iron
SHREDDING RING Hardened 440C Stainless Steel Rockwell® C-55.
CUTTER Hardened 440C Stainless Steel, Rockwell® C-55.
SHAFT 416 Stainless Steel
SQUARE RINGS Buna-N
HARDWARE 300 Series Stainless Steel
PAINT Air Dry Enamel.
SEAL: *Design* Tandem Mechanical, Oil Filled Reservoir.
Material Rotating Faces - Carbon
 Stationary Faces - Ceramic
 Elastomer - Buna-N
 Hardware - 300 Series Stainless
CORD ENTRY 30 ft. (9.1m) Std. Cord. Epoxy Sealed Housing with Secondary Pressure Grommet for Sealing and Strain Relief

UPPER BEARING:
Design Single Row, Ball, Oil Lubricated
Load Radial
LOWER BEARING:
Design Single Row, Oil Lubrication
Load Radial & Thrust
MOTOR: *Design* NEMA L-Single Phase, NEMA B-Three Phase Torque Curve. Oil-Filled, Squirrel Cage Induction
Insulation Class F.
SINGLE PHASE Capacitor Start/Capacitor Run. Requires overload protection to be included in control panel. Requires Barnes® Starter or Control Panel which Includes Capacitors, or Capacitor pack.
THREE PHASE Dual Voltage 230/460; Requires Overload Protection to be Included in control panel.
MOISTURE SENSORS Normally Open (N/O), Requires relay in control panel
TEMP SENSORS Normally Closed (N/C), Requires relay in control panel
OPTIONAL EQUIPMENT. Seal Material, Impeller Trims, Cord Length



inches
 (mm)

IMPORTANT !

- 1.) MOISTURE AND TEMPERATURE SENSORS MUST BE CONNECTED TO VALIDATE THE UL LISTING.
- 2.) A **NON-SPARKING** BREAK AWAY FITTING MUST BE USED TO VALIDATE THE UL LISTING.
- 3.) A SPECIAL MOISTURE SENSOR RELAY IS REQUIRED IN THE CONTROL PANEL FOR PROPER OPERATION OF THE MOISTURE SENSORS. CONTACT BARNES PUMPS FOR INFORMATION CONCERNING MOISTURE SENSING RELAYS FOR CUSTOMER SUPPLIED CONTROL PANELS.
- 4.) THESE PUMPS ARE UL LISTED FOR PUMPING WATER AND WASTEWATER. **DO NOT USE TO PUMP FLAMMABLE LIQUIDS.**
- 5.) 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.

SECTION B: GENERAL INFORMATION

B-1) To the Purchaser:

Congratulations! You are the owner of one of the finest pumps on the market today. CP&S pumps are products engineered and manufactured of high quality components. Over one hundred years of pump building experience along with a continuing quality assurance program combine to produce a pump which will stand up to the toughest applications. This manual will provide helpful information concerning installation, maintenance, and proper service guidelines.

B-2) Receiving:

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. If the manual is removed from the packaging, do not lose or misplace.

B-3) Storage:

Short Term- CP&S Pumps are manufactured for efficient performance following short inoperative periods in storage. 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 unit 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. (4.4 - 49°C). 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.

B-4) 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 Crane Pumps & Systems Canada, in Brampton, Ontario, (905) 457-6223.

SECTION C: INSTALLATION

C-1) Location:

These self-contained pumping units are Underwriters Laboratory Listed for Class I, Group D, Division 1 Locations and are recommended for use in a sump, lift station or basin. This pump is designed to pump sewage, effluent, wastewater or other nonexplosive or noncorrosive liquids not above 104°F (40°C).

Never install the pump in a trench, ditch or hole with a dirt bottom; the pump will sink into the dirt and the suction will become plugged. **DO NOT operate pump when it is setting on the bottom of the wet well. A clearance of 3 inches between bottom of pump and bottom of wet well must be maintained to insure proper operation of pump. Otherwise pump warranty is null and void.**

C-1.1) Submergence:

The pump should always be operated in the submerged condition and the sump liquid level should never be less than 10" above the pump bottom (see Fig. 1).

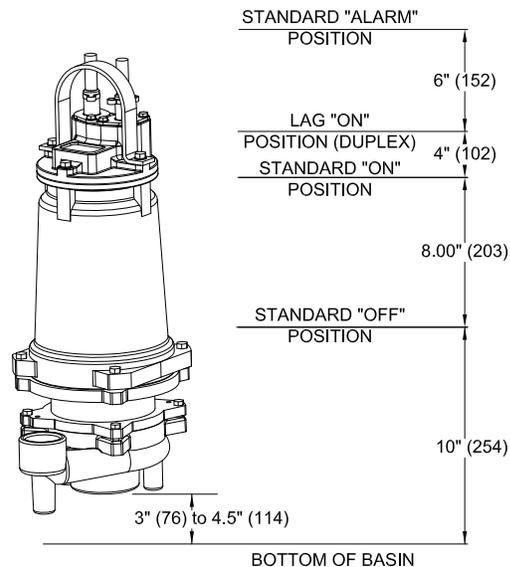


FIGURE 1

C-2) Discharge:

Discharge piping should be as short as possible. Both a check valve and a shut-off valve are recommended 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.

Barnes supplies a Non-Sparking Stainless Rail Package and stainless rail for concrete wet wells, designed to allow the pump to be installed or removed without requiring personnel to enter the wet well.

Non-Sparking Stainless Rail Package (Not Shown)

The non-sparking package system comes complete and ready to place into the ground as outlined in the project specifications. The movable portion of the Break Away Fitting (BAF), check valve, piping and guide bracket comes assembled on the pump along with the lifting rope. Insert pump bracket and movable portion of BAF into the guide channel and lower pump into basin (**DO NOT DROP**). Now connect power and control cables to the junction box or control panel depending on system design.

The type of basin system will determine the exact installation procedure. If a rigid conduit is used to install the pump it must meet Class I, Division 1 requirements of the National Electrical Code or the Canadian Electrical Code. Conduit must be stainless steel or coated metal, resistant to sewage water.

C-3) Liquid Level Controls: Intrinsically safe



WARNING! - Level control floats used within the hazardous location, must be in an intrinsically safe control circuit suitable for use in CLASS I, GROUP D, HAZARDOUS LOCATIONS.

The level controls are to be supported by a mounting bracket that is attached to the sump wall, cover or rail bracket. Cord grips are used to hold the cords in place on the mounting bracket. The control level can be changed by loosening the grip and adjusting the cord length as per the plans and specifications. Be certain that the level controls cannot hang up or foul in it's swing.

A Warrick intrinsically safe control relay, Series 27, is an acceptable panel mounted relay, providing the relay is properly installed and maintained.

The primary (A.C. supply line) circuit is not intrinsically safe, therefore the relay must be located in a "SAFE" location. The secondary circuit is intrinsically safe, however any splice must be made in a "SAFE" location and any control cord that is cut or damaged must be replaced immediately.

C-3.1) Level Control Float System:

It is recommended to use a two float, on and off, level control system. An additional float, incorporated with an alternator switching system will be required for a duplex system. A high level alarm may be required to alert maintenance personnel. A low level cut off may be required to provide system shutdown if the main level control system malfunctions. The off or low level float should be positioned so that the liquid level never drops below the minimum submergence level (see Fig. 1).

C-4) Electrical Connections:



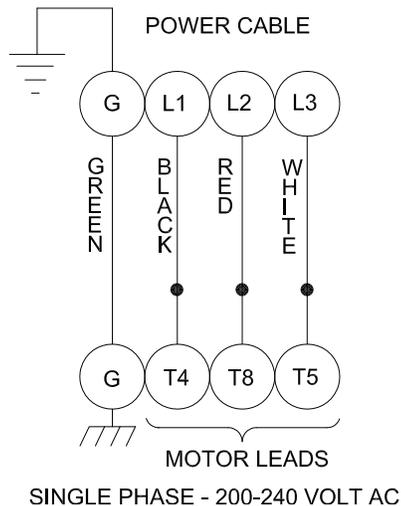
WARNING! - All model pumps and control panels must be properly grounded per the national electric code or the canadian electric code and state, province and local codes. Improper grounding voids warranty.

All electrical controls and motor starting equipment must be installed outside the hazardous area unless approved explosion proof controls are used.

C-4.1) Power/Control Cord:

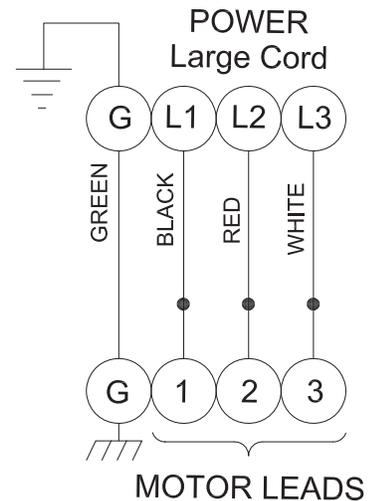
The cord assembly mounted to the pump must not be modified in any way except for shortening to a specific application. Any splice between the pump and the control panel must be made in accordance with the electric code and all applicable state, province and local electric codes. It is recommended that a junction box with sealed fittings, if used, be mounted outside the sump or be of at least Nema 7 (EEMAC-7) explosion proof construction if located within the wet well. A U.L. listed sealed fitting **MUST** be used in conduit leaving the hazardous location. **Do not use the power or control cords to lift pump.**

NOTE: The white wire is **NOT** a neutral or ground lead, but a power carrying conductor.



SINGLE PHASE 200/230 VOLT AC

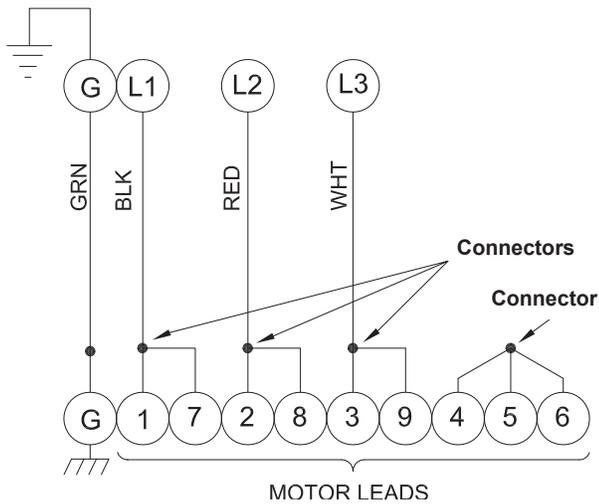
Power Cable	Motor Lead Number
Green (Ground)	Green
White	5 (Common)
Black	4 (Run)
Red	8 (Start)



THREE PHASE 200 & 575 VOLT AC

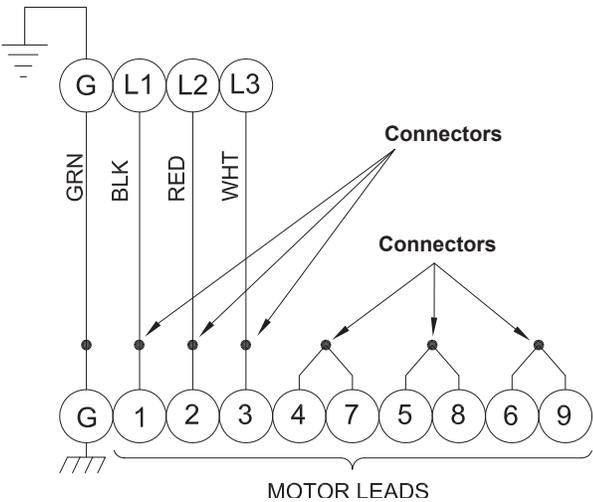
Power Cable	Motor Lead Number
Green (Ground)	Green
White	3
Black	1
Red	2

FIGURE 2



THREE PHASE, 230 VOLT AC

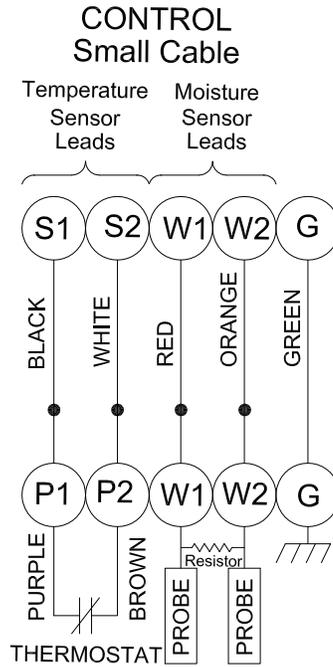
Power Cable	Motor Lead Number
Green (Ground)	Green
White	3 & 9
Red	2 & 8
Black	1 & 7
	4, 5 & 6 Together



THREE PHASE, 460 VOLT AC

Power Cable	Motor Lead Number
Green (Ground)	Green
White	3
Red	2
Black	1
	4 & 7 Together
	5 & 8 Together
	6 & 9 Together

FIGURE 2



CONTROL CABLE CONNECTION

Color	Lead Number
Black	P1 - In series with starter coil.
White	P2 - In series with starter coil.
Red	W1 - Moisture detection control.
Orange	W2 - Moisture detection control.
Green	Ground

C-4.2) Wire Size:

If additional cable is required consult a qualified electrician for proper wire size. See table on page 21 for further electrical information.

WARRANTY NOTE:

Both The Temperature Sensor And Moisture Detection System Must Be Connected To The Motor Circuitry Such That The Motor Will Be De-energized If Excessive Motor Temperatures Are Reached And/or If Water Is Detected In The Oil And/or Motor Chamber. Failure To Have The Above Mentioned Systems Installed And Operative, Nullifies Warranty.

C-4.3) Overload Protection:

The normally closed (N/C) thermal sensor is embedded in the motor windings and will detect excessive heat in the event an overload condition occurs which will then trip and stop the pump. The thermal sensor leads marked **P1** and **P2** **MUST** be connected in series with the stop button of the pilot circuit of the magnetic motor controller located in the control panel so that the thermostat will open the circuit before dangerous temperatures are reached.

TYPICAL THERMAL PROTECTION WIRING DIAGRAM

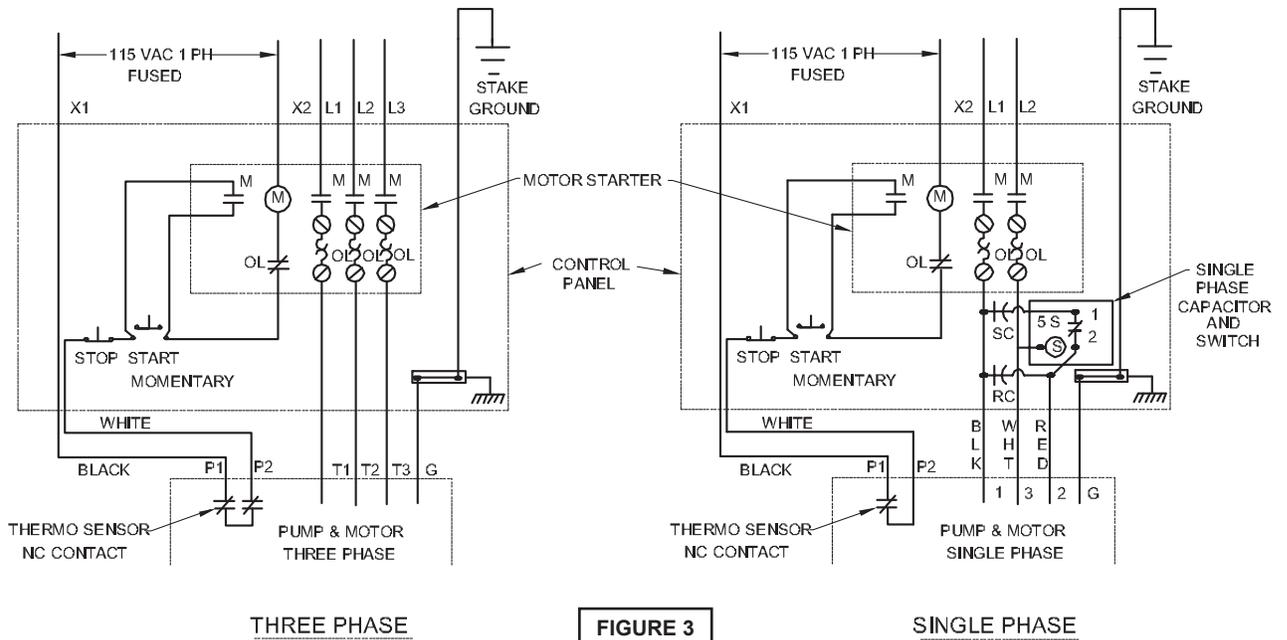


FIGURE 3

A manual momentary start switch is required to prevent the automatic restarting of the motor when the thermostat resets. For a typical wiring diagram, refer to Fig. 3. In the event of an overload, the source of this condition should be determined and rectified before the pump is put back into normal operation.

DO NOT LET THE PUMP CYCLE OR RUN IF AN OVERLOAD CONDITION OCCURS !

If current through the temperature sensor exceeds the values listed, an intermediate control circuit relay must be used to reduce the current or the sensor will not work properly.

TYPICAL WIRING DIAGRAM FOR MOISTURE SENSOR RELAY

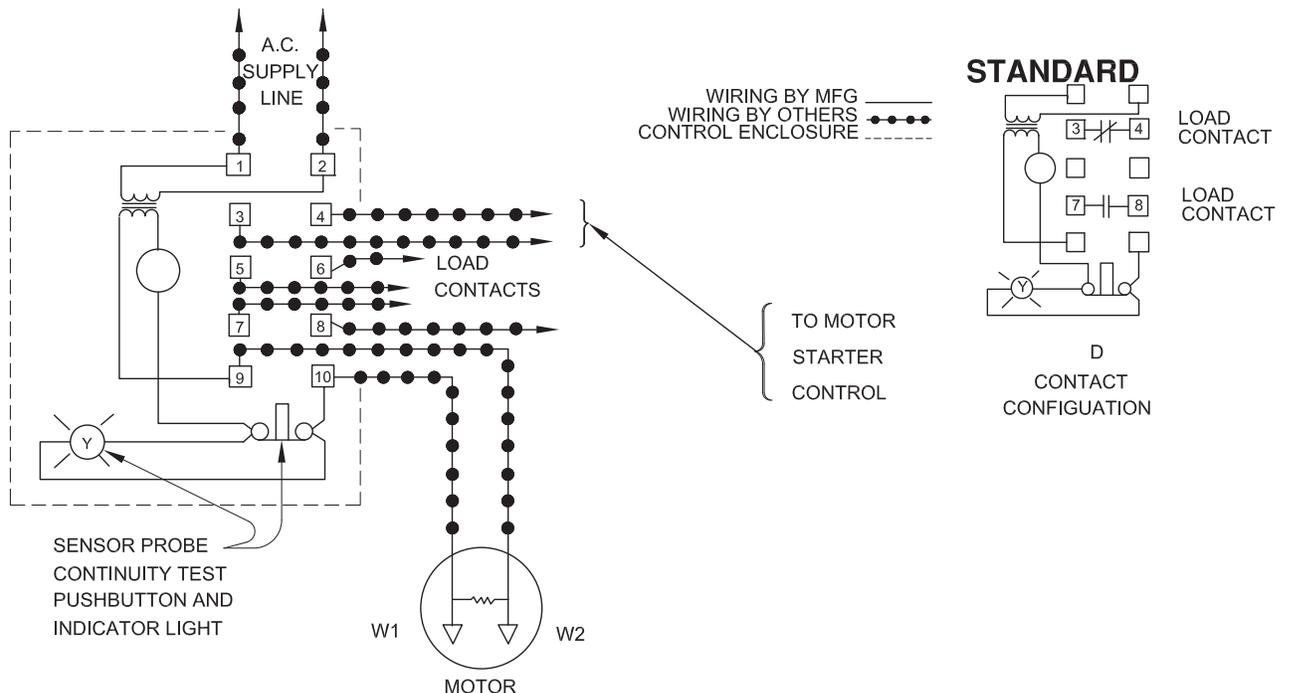


FIGURE 4

TEMPERATURE SENSOR ELECTRICAL RATINGS		
Volts	Continuous Amperes	Inrush Amperes
110-120	3.00	30.0
220-240	1.50	15.0
440-480	0.75	7.5

C-4.4) Moisture Sensors:

A normally open (N/O) detector is installed in the pump seal chamber, which will detect any moisture present, and a continuity test resistor built into the motor. The test resistor is rated 1 watt at 330K ohms. The moisture sensors **MUST** be connected to moisture detector control, which includes a continuity test circuit, see Fig. 4 for typical wiring diagram. The normally closed (N/C) contact of the moisture detector **MUST** be connected in series with the stop button of the pilot circuit of the magnetic motor controller. A Warrick moisture detection control, Type 2800 is an acceptable control if properly installed and maintained. Wiring must be provided from the moisture detector sensor probe leads of the motor designated W1 and W2 to terminals 9 and 10 of the 2800-XXX control. Terminal pair 1-2 must be continuously energized from an A-C supply line of electrical characteristics shown on the data table.

In the event of a moisture detect, the pump should be pulled and the source of the failure located and repaired.

IF A MOISTURE DETECT HAS OCCURRED SCHEDULE MAINTENANCE AS SOON AS POSSIBLE!

C-4.5) Control Panel and Electrical System:

The control panel and the electrical system **MUST** be properly designed and wired to include at least, but not limited to the following;

- a. Proper grounding per NEC.
- b. A temperature sensing circuit (see Fig. 3)
- c. A moisture detection circuit with continuity test circuit (see Fig. 4)
- d. An intrinsically safe level control system.
- e. A main power manual disconnect and lock out.
- f. A motor starter and overload system.
- g. Single phase only, requires a capacitor power pack (see Fig. 3).

Control panels for single phase pumps **MUST** be purchased from the factory and it is advisable that all three phase control panels are also purchased from the factory.

SECTION: D START-UP OPERATION

D-1) Check Voltage and Phase:

Before operating pump, compare the voltage and phase information stamped on the pump's identification plate to the available power.

D-2) Check Pump Rotation:

Before putting pump into service for the first time, the motor rotation must be checked. Improper motor rotation can result in poor pump performance and can damage the motor and/or pump. To check the rotation, suspend the pump freely, momentarily apply power and observe the "kickback". "Kickback" should always be in a counter-clockwise direction as viewed from the top of the pump motor housing.

D-2.1) Incorrect Rotation for Three-Phase Pumps:

In the event that the rotation is incorrect for a three-phase installation, interchange any two power cable leads at the control box. **DO NOT** change leads in the cable housing in the motor. Recheck the "kickback" rotation again by momentarily applying power.

D-2.2) Incorrect Rotation for Single-Phase Pumps:

In the unlikely event that the rotation is incorrect for a single phase pump, contact a Barnes Service Center.

D-2.3) Test Procedure For Moisture Sensor Control:

With a Warrick moisture detection control, type 2800, a normally closed push button and neon indicating lamp is provided as a means of checking the moisture sensing components. When the push button is depressed, the indicating lamp will be illuminated to indicate (A) power is supplied to the control, (B) the control is operative, and (C) wiring to the moisture sensing probes in the motor is intact. This procedure should be performed periodically to confirm integrity of the circuit.

D-2.4) Operation Precautions:

1. Do not operate the pump in the "hand" control position and leave the pump unattended.
2. Minimize the amount of cooking grease entering the system
3. Do not leave pump cover off the basin cover, except while servicing, to prevent entrance of foreign materials such as rocks, metal, soil, animals or humans.
4. Prevent large articles of clothing, large amounts of chemicals, other materials or substances such as are uncommon of domestic sewage from entering the system.
5. During power black-outs, discontinue water consumption at the home(s) to prevent sewage from backing up into the house.
6. Prevent infiltration or direct flow of rain or run-off water into the pump basin to minimize pump cycling, This will prevent overloading the treatment facility, and will facilitate swift transportation of sewage.
7. Always keep the shut-off valve completely open when system is in operation, (unless advised otherwise by the proper authorities).
8. Keep the control box locked or confined to prevent unauthorized access to it.
9. If the pump is idle for long periods of time, it is advisable to start the pump occasionally by adding water to the basin.

10. Before removing the pump from the basin, be sure to close the shut-off valve. (This prevents backflow from the pressure sewer.)
11. Make sure level controls are provided at time of installation.
12. Recommended starts per hour, 6 to 8, no more than 10.

D-3) Start-Up Report:

Included at the end of this manual are two start-up report sheets, these sheets are to be completed as applicable. Return one copy to Barnes and store the second in the control panel or with the pump manual if no control panel is used. It is important to record this data at initial start-up since it will be useful to refer to should servicing the pump be required in the future.

D-3.1) Identification Plate:

Record the numbers from the pump's identification plate on both START-UP REPORTS provided at the end of the manual for future reference.

D-3.2) Insulation Test:

Before the pump is put into service, an insulation (megger) test should be performed on the motor. The resistance values (ohms) as well as the voltage (volts) and current (amps) should be recorded on the start-up report.

D-3.3) Pump-Down Test:

After the pump has been properly wired and lowered into the basin, sump or lift station, it is advisable to check the system by filling with liquid and allowing the pump to operate through it's pumping cycle. The time needed to empty the system, or pump-down time along with the volume of water, should be recorded on the start-up report.

SECTION E: PREVENTATIVE MAINTENANCE

As the motor and seal chambers are oil filled, no lubrication or other maintenance is required, and generally Barnes pumps will give very reliable service and can be expected to operate for years on normal sewage pumping without failing. However as with any mechanical piece of equipment a preventive maintenance program is recommended and suggested to include the following checks:

- 1) Test moisture detector control "Test Switch" for continuity of circuit. - Water in the seal chamber will energize a seal leak warning light at the control panel. This is a warning light only and does not stop the motor. It indicates the seal has leaked and must be repaired. This should be done as soon as possible to prevent further damage. See section D-2.3.
- 2) Inspect impeller and body for excessive build-up or clogging and repair as required per section F-3.
- 3) Check motor for ground leakage and proper amp draw. See section D-3.2.
- 4) Inspect outer seal for wear or leakage and repair as required per section F-4.

SECTION F: SERVICE AND REPAIR

NOTE: All item numbers in () refer to Figures 8 & 9 for 2HP and 10 & 11 for 3, 5 & 7.5HP Pumps.



WARNING! - *Electrical power to the pump motors must be disconnected and locked out to prevent any dangerous electrical hazards or personnel danger before any service work is done to the pump.*



CAUTION! - *operating pump builds up heat and pressure; allow time for pump to cool to room temperature before handling or servicing.*

F-1) Motor & Shaft Seal Service



WARNING! - *Motor & upper shaft seal repair: Motor and upper shaft seal must only be serviced at the BARNES factory. Any unauthorized field repair voids warranty.*

The XSGV Submersible Pump motor is designed to meet the requirements for Underwriters Laboratory Class I, Group D service and must only be serviced as described above.

F-2) Conduit Box and Cable Assembly:



WARNING ! - *The conduit box and cable assembly should not be field serviced. If a problem develops in the power or control cord the complete pump should be removed and serviced only by authorized personnel as described above.*

F-3) Impeller, Cutters and Volute Service:

F-3.1) Disassembly and Inspection:

To obtain access to the impeller (13) or shredding ring (9), first remove screw (6) and washer (7). Then holding the motor shaft stationary with a screwdriver, tap the radial cutter (8) loose in the counter-clockwise direction and remove, (Heat may be needed to break the screw (6) loose.)

Next remove nuts (3) and washers (4) from stud (2) and pull the body (1) and square ring (5) from the rest of the pump. Remove shims (12) from shaft, then impeller (13) can be removed by turning it counter-clockwise while holding stationary the motor shaft with a screwdriver.

NOTE: With the impeller (13) removed, the seal spring is relaxed and some oil may seep from the seal cavity. **DO NOT** store this pump without the impeller (13) in place to hold the seal shut.

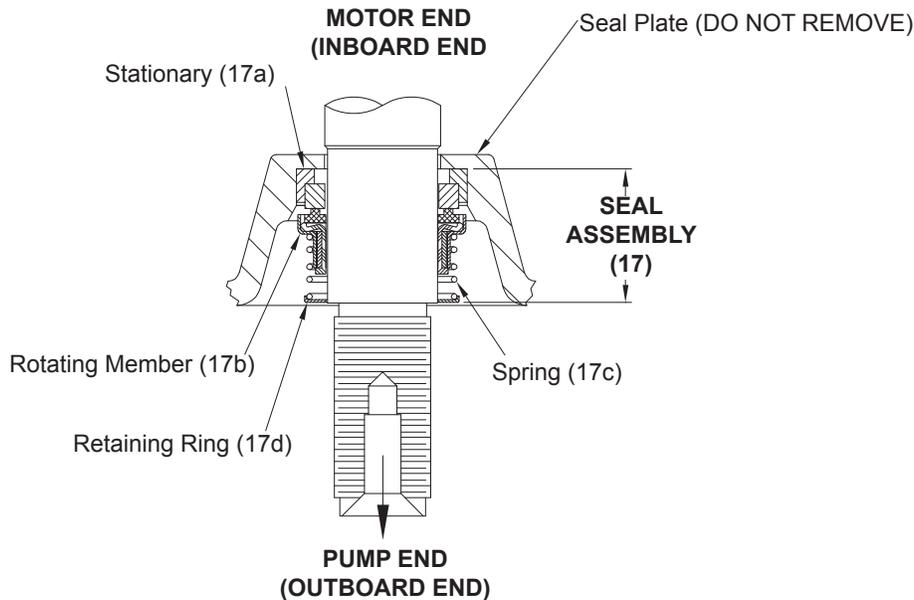


FIGURE 5

To remove or reverse the shredding ring (9) first remove the three flat head allen screws (10) and lift the throat (11) out of the body (1). The shredding ring (13) is press fitted in the body (1) and must be removed with an arbor press.

After a number of years of service or whenever the shredding ring (13) cutting edges dull, the part can be pressed out of the body (1) and reversed to utilize the opposite cutting edges and replaced in the body (1). To maintain efficient grinder pump operation, care should be taken to keep both the radial cutter (8) and shredding ring (13) cutting edges sharp. Neither part can be sharpened to renew the cutting ability. The radial cutter (8) must be replaced and the shredding ring either reversed or replaced.

F-3.2) Reassembly:

To replace impeller (13) on shaft, turn clockwise while holding shaft stationary with a screwdriver. Then replace shims (12) on motor shaft. Important that the same quantity be replaced as removed.

Next install shredding ring (9) by pressing into body (1) with the use of an arbor press. Then insert throat (11) into body (1) with three flat head allen screws (10). Apply a thin coat of petroleum jelly to the square ring (5) and place on body (1). Place motor assembly on body (1), being careful not to damage square ring (5). Place washers (4) and nuts (3) on studs (2) and tighten.

Screw radial cutter (8) on shaft clockwise. Hold motor shaft stationary with screwdriver and tighten. Then replace washer (7) and screw (6). Radial cutter (8) to be flush with shredding ring (9) on suction side to within $\pm .020$.

F-4) OUTER SHAFT SEAL SERVICE:



CAUTION! - Handle seal parts with extreme care. DO NOT scratch or mar lapped surfaces.

F-4.1) Disassembly and Inspection:

Outer Seal - To expose outer shaft seal (17) for examination disassemble volute, cutter and impeller as outlined in paragraph F-3.1. Set pump so that the shaft is in the upright position, this will keep the oil from draining out while servicing the outer shaft seal. To inspect seal further, remove retaining ring (17d), spring (17c) and rotating member (17b) from shaft (see Fig. 5). Examine all seal parts and especially contact faces. Inspect seal for signs of wear such as uneven wear pattern on stationary members, chips and scratches on either seal face. **DO NOT** interchange seal components, replace the entire shaft seal (17). If replacing seal, remove stationary (17a) by prying out with flat screw driver.

F-4.2) Reassembly:

Outer Seal - Clean and oil seal cavities in seal plate (**DO NOT remove seal plate**). Lightly oil (**DO NOT use grease**) outer surface of stationary member (17a). Press stationary member (17a) firmly into seal plate, using a seal pusher (see parts list- seal tool kit). Nothing but the seal pusher is to come in contact with seal face (see Fig. 6).

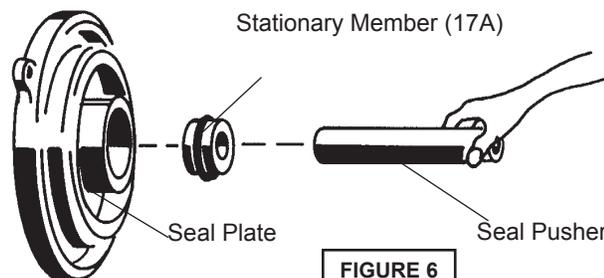


FIGURE 6



IMPORTANT ! - DO NOT hammer on the seal pusher- it will damage the seal face.

Make sure the stationary member is in straight. Slide a bullet (see parts list-seal tool kit) over motor shaft. Lightly oil (**DO NOT use grease**) shaft, bullet and inner surface of bellows on rotating member (17b) see Fig. 7. With lapped surface of rotating member (17b) facing inward toward stationary member (17a), slide rotating member (17b) over bullet and onto shaft, using seal pusher, until lapped faces of (17a) and (17b) are together (see Fig. 7).

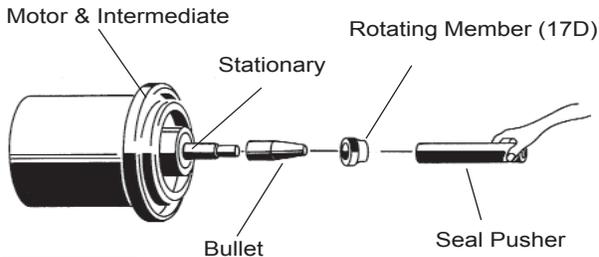


FIGURE 7



IMPORTANT ! - It is extremely important to keep seal faces clean during assembly. Dirt particles lodged between these faces will cause the seal to leak.

Place spring (17c) over shaft and in place on rotating member (17b), making sure it is seated on retainer and not cocked or resting on bellows tail. Slide retaining ring (17d) over shaft and let rest on spring (17c). Assemble impeller, cutter and volute as outlined in paragraph F-3.2.

SECTION: G REPLACEMENT PARTS

G-1 ORDERING REPLACEMENT PARTS:

When ordering replacement parts, ALWAYS furnish the following information:

1. Pump serial number and date code. (Paragraph G-4)
2. Pump model number. (Paragraph G-3)
3. Pump part number. (Paragraph G-2)
4. Part description.
5. Item part number.
6. Quantity required.
7. Shipping instructions.
8. Billing Instructions.

CRANE PUMPS & SYSTEMS 105500	HP.	Volts	Code	Ph.	Hz.
	RPM	FLA	Model No.	2	
	Part No.	3		Serial No.	1
	Impeller Dia.	Max. Liq. Temp. °C	Ins. Class		

WARNING TO REDUCE RISK OF ELECTRICAL SHOCK DISCONNECT THE PUMP FROM THE POWER SOURCE BEFORE HANDLING OR SERVICING. SEE INSTRUCTION MANUAL FOR PROPER INSTALLATION. SEE WARNING PLATE FOR ADDITIONAL CAUTIONS.

G-2 PART NUMBER:

The part number consists of a six (6) digit number, which appears in the catalog. A one or two letter suffix may follow this number to designate the design configuration. This number is used for ordering and obtaining information.

G-3 MODEL NUMBER:

This designation consists of numbers and letters which represent the discharge size, series, horsepower, motor phase and voltage, speed and pump design. This number is used for ordering and obtaining information.

G-4 SERIAL NUMBER:

The serial number block will consist of a six digit number, which is specific to each pump and may be preceded by a alpha character, which indicates the plant location. This number will also be suffixed with a four digit number, which indicates the date the unit was built (Date Code).

EXAMPLE: A012345 0490.

Reference the six digit portion (Serial Number) of this number when referring to the product.

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"> 1. Poor electrical connection, blown fuse, tripped breaker or other interruption of power, improper power supply. 2. Motor or switch inoperative (to isolate cause, go to manual operation of pump). <ol style="list-style-type: none"> 2a. Float movement restricted. 2b. Switch will not activate pump or is defective. 3. Insufficient liquid level. 	<ol style="list-style-type: none"> 1. 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.
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"> 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). 3. Make sure liquid level is at least equal to suggested turn-on point.
Pump hums but does not run	<ol style="list-style-type: none"> 1. Incorrect voltage 8. Cutter jammed or loose on shaft, worn or damaged, inlet plugged. 	<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.
Pump delivers insufficient capacity	<ol style="list-style-type: none"> 1. 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. 	<ol style="list-style-type: none"> 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.
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. 	<ol style="list-style-type: none"> 10. Remove & examine for damage. Replace pump stator if required. 11. Repair fixtures as required to eliminate leakage.
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"> 1. 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. 	<ol style="list-style-type: none"> 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 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. 	

2HP - XSGV SERIES

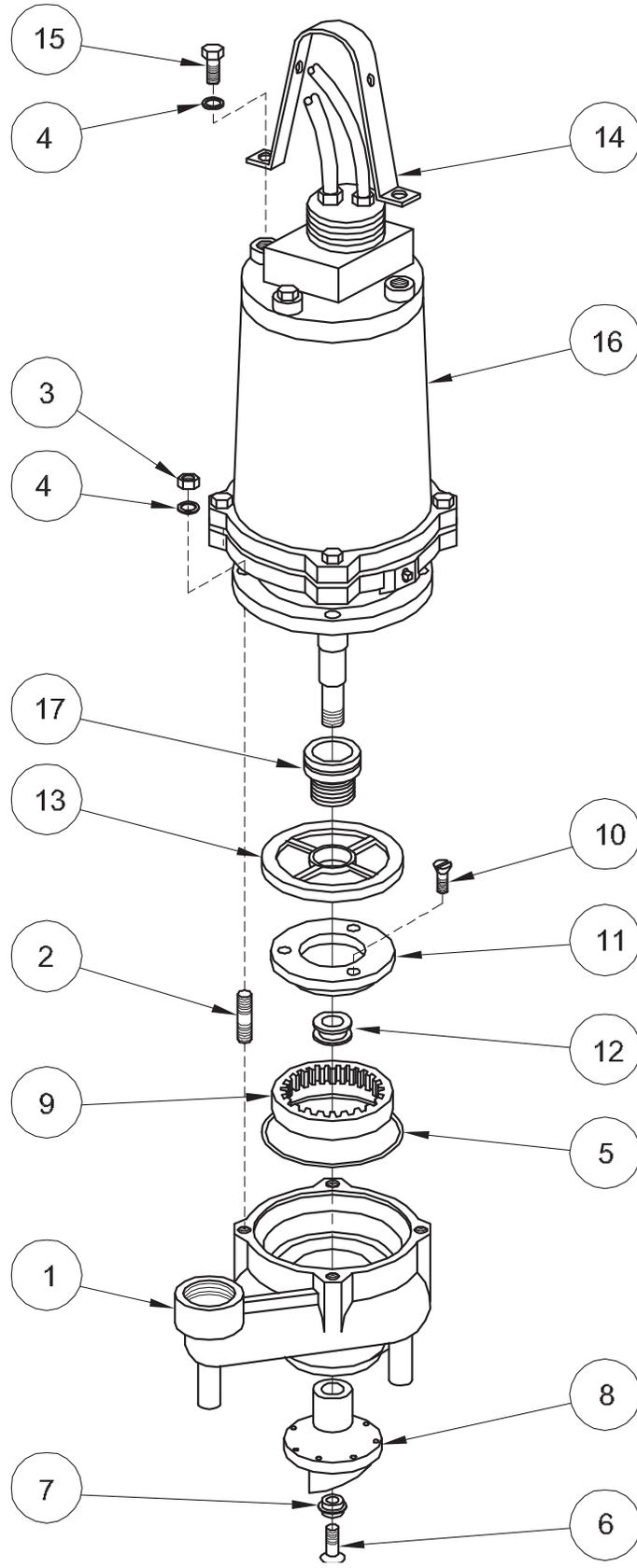


FIGURE 9

2HP - XSGV SERIES

PARTS KITS

Cutter Kit P/N-085226 (+) 3, 4, 6, 7, 8, 9, 10, 12

Tools: Seal Pusher..... P/N- TL-21360

Bullet..... P/N- TL-21375

PARTS LIST - Standard

ITEM	QTY	PART NO.	DESCRIPTION
1	1	067561	Volute (Standard)
		102795	(OPTIONAL) Moveable Fitting
2	4	018925	Stud 5/16-18 x 2.25 lg Stainless
3	4	15-19-1	+ Hex Nut 5/16-18 Stainless
4	4	026322	+ Lockwasher 5/16 Stainless
5	1	067564	Square Ring
6	1	070704	+ Flat Hd. Cap Screw 1/4-20 x .75 lg Stainless
7	1	067556	+ Washer Stainless
8	1	082088	+ Radial Cutter
9	1	082085	+ Shredding Ring
10	3	067569	+ Flat Hd. Cap Screw #10-24 x 3/4 lg Stainless
11	1	067554	Throat
12	2	016079	+ Shim (as required) .010"
13	1	067552	Impeller, Bronze 5.62" Dia., (STD)
		067552TD	5.00" Dia.
		067552TE	4.88" Dia.
		067552TF	4.75" Dia.
		067552TG	4.62" Dia.
		067552TH	4.50" Dia.
		067552TJ	4.38" Dia.
		067552TK	4.25" Dia.
		067552TL	4.12" Dia.
		067552TM	4.00" Dia.
		067552TN	3.88" Dia.
		067552TP	3.75" Dia.
		067552TR	3.62" Dia.
		067552TS	3.50" Dia.
14	1	082134	Lifting Handle
15	2	1-130-1	Hex Hd. Cap Screw 5/16-18 x 1.50 lg Stainless
16	1	-----	Motor Assy--(Includes: Motor, 30 ft. Cable, C/C/B Inner & Outer Seals)
		128617	2HP, 230V, 1PH--XSGV2022L
		128618	2HP, 200V, 3PH--XSGV2062L
		128619	2HP, 230V, 3PH--XSGV2032L
		128620	2HP, 460V, 3PH--XSGV2042L
		128621	2HP, 575V, 3PH--XSGV2052L
17	1	067562	Outer Shaft Seal (Standard) Carbon/Ceramic/Buna-N
		067562SB	Tungsten/Tungsten/Buna-N
		067562SD	Silicon/Silicon/Buna-N
		067562SF	Carbon/Ceramic/Viton®
		067562SH	Tungsten/Tungsten/Viton®
		067562SK	Silicon/Silicon/Viton®

3, 5, 7.5HP - XSGV SERIES

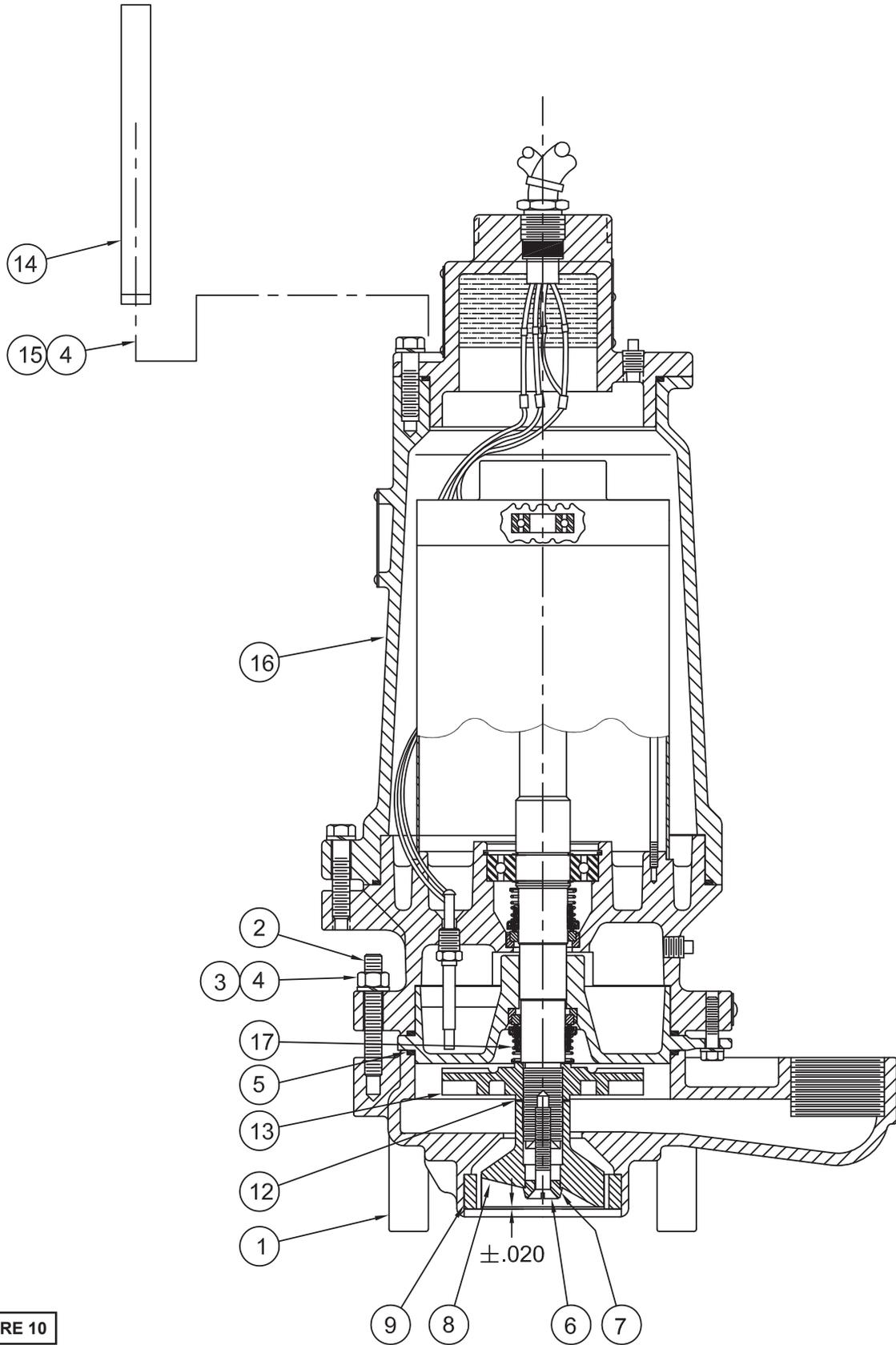


FIGURE 10

3, 5, 7.5HP - XSGV SERIES

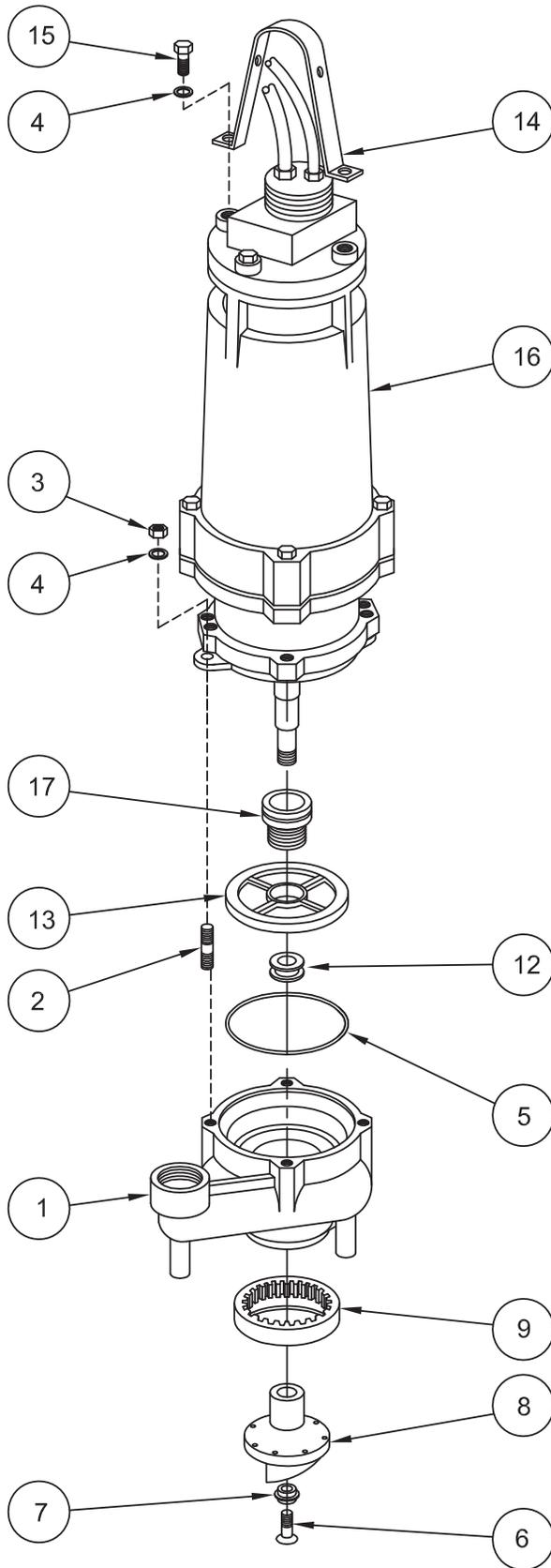


FIGURE 11

MODEL NO	HP	VOLT/PH	Hz	RPM (Nom)	NEMA START CODE	FULL LOAD AMPS	LOCKED ROTOR AMPS	CORD SIZE	CODE TYPE	CORD O.D. ± .02 (-.5) in (mm)	WINDING RESISTANCE MAIN-START	
											Emerson	G.E.
XSGV2022L	2	230/1	60	3450	H	15.0	53.8	12/4	SOW	0.67 (17)	1.44 -- 6.87	1.50 -- 7.60
XSGV2062L	2	200/3	60	3450	J	11.0	42.0	12/4	SOW	0.67 (17)	2.57	2.40
XSGV2032L	2	230/3	60	3450	J	9.0	36.0	12/4	SOW	0.67 (17)	3.09	3.13
XSGV2042L	2	460/3	60	3450	J	4.5	18.0	12/4	SOW	0.67 (17)	12.36	12.49
XSGV2052L	2	575/3	60	3450	J	3.2	14.4	12/4	SOW	0.67 (17)	16.10	----
XSGV3002L	3	200/1	60	3450	G	25.2	86.0	10/4	SOW	0.745 (19)	0.83 -- 3.31	----
XSGV3022L	3	230/1	60	3450	G	21.7	75.0	10/4	SOW	0.745 (19)	0.83 -- 3.31	----
XSGV3062L	3	200/3	60	3450	J	17.0	65.0	10/4	SOW	0.745 (19)	1.40	1.52
XSGV3032L	3	230/3	60	3450	K	14.5	62.0	10/4	SOW	0.745 (19)	1.95	1.85
XSGV3042L	3	460/3	60	3450	K	7.2	31.0	10/4	SOW	0.745 (19)	7.40	7.14
XSGV3052L	3	575/3	60	3450	J	5.6	22.6	10/4	SOW	0.745 (19)	11.60	----
XSGV5002L	5	200/1	60	3450	F	42.0	134.0	6/4	SOW	1.03 (26)	0.55 -- 3.85	0.38 -- 2.57
XSGV5022L	5	230/1	60	3450	H	39.0	136.0	8/4	SOW	0.93 (24)	0.70	0.79
XSGV5062L	5	200/3	60	3450	K	25.0	122.0	10/4	SOW	0.745 (19)	0.70	0.79
XSGV5032L	5	230/3	60	3450	L	21.9	120.0	10/4	SOW	0.745 (19)	0.84	1.00
XSGV5042L	5	460/3	60	3450	L	11.0	60.0	10/4	SOW	0.745 (19)	4.00	3.74
XSGV5052L	5	575/3	60	3450	L	8.8	46.0	10/4	SOW	0.745 (19)	5.12	----
XSGV7532L	7.5	230/3	60	3450	J	22.3	136.0	10/4	SOW	0.745 (19)	0.93	0.87
XSGV7542L	7.5	460/3	60	3450	J	11.2	68.0	10/4	SOW	0.745 (19)	3.72	3.28
XSGV7552L	7.5	575/3	60	3450	G	8.2	45.0	10/4	SOW	0.745 (19)	0.86	----

Winding Resistance ± 5%, measured from terminal block. Pump rated for operation at ± 10% voltage at motor.
Moisture and Temperature sensor cord for all models is 18/5 SOW, 0.47 ± .02 O.D.

Recommended Breaker & Heater Sizes

Model No.	HP	Ph	Volts	Breaker Size	Heater Size
XSGV2022L	2	1	230	30 AMP	K-57
XSGV2062L	2	3	200	20 AMP	K-53
XSGV2032L	2	3	230	20 AMP	K-50
XSGV2042L	2	3	460	15 AMP	K-33
XSGV2052L	2	3	575	15 AMP	---
XSGV3002L	3	1	200	60 AMP	K-64
XSGV3022L	3	1	230	50 AMP	K-63
XSGV3062L	3	3	200	30 AMP	K-56
XSGV3032L	3	3	230	30 AMP	K-54
XSGV3042L	3	3	460	15 AMP	K-41
XSGV3052L	3	3	575	15 AMP	----
XSGV5002L	5	1	200	100 AMP	K-73
XSGV5062L	5	3	200	50 AMP	K-63
XSGV5032L	5	3	230	40 AMP	K-62
XSGV5042L	5	3	460	20 AMP	K-50
XSGV5052L	5	3	575	20 AMP	----
XSGV7532L	7.5	3	230	50 AMP	K-67
XSGV7542L	7.5	3	460	30 AMP	K-54
XSGV7552L	7.5	3	575	30 AMP	----

NOTE: Factory recommended heater sizes may vary depending on pump station requirements.

SUSPENDED PUMP SYSTEMS

NOTE: This installation MUST meet Class I, Division 1 requirements of the National Electric Code.

Remove two capscrews (a) and lockwashers (b) and remove lifting handle (c) (See Figure 13). Replace lifting handle (c) with Suspended Bracket (61) on motor housing and insert two capscrews (a) and two lockwashers (b) and tighten.

Attach the pump cover to the top of the bracket. Then connect the discharge pipe (by others) to the pump. Mount the float switches to the discharge pipe and pull the pump cord sets and the float switch cords through the cord grips attached to the pump cover. The pump with cover can now be lowered into basin.

PARTS LIST

ITEM	QTY.	PART No.	DESCRIPTION
61	1	071753	Suspended Bracket Basin Depth 36"
		071754	Basin Depth 48"
		071755	Basin Depth 60"
		071756	Basin Depth 72"
		071757	Basin Depth 84"

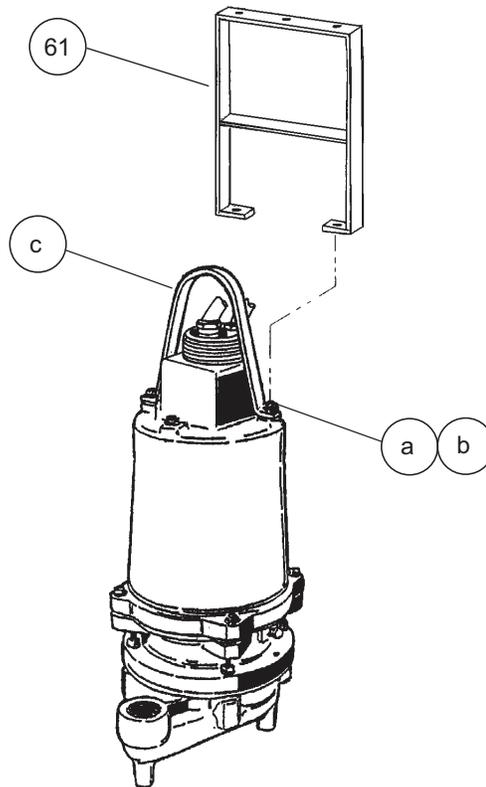


FIGURE 12

NON-SPARKING MOVABLE ASSEMBLY For "C" Channel Basin Package

PARTS LIST For 083526*, 2HP Explosion-Proof Grinder

ITEM	QTY.	PART No.	DESCRIPTION
50	1	075487	Lower Pump Bracket, Brass
51	1	075589	Pipe, Stainless 1.25 NPT x 14" Lg.
52	1	077881	Ball Check Valve, Cast Iron 1-1/4 NPT
53	2	075476	Close Nipple, Stainless 1.25 NPT
54	1	075481	Elbow, Stainless 1.25 NPT x 90°
55	1	075485	Moveable Fitting, Brass
56	1	074758	Upper Pump Bracket, Stainless
59	1	074759	U-Bolt and Nuts

* Pump NOT included under this part number. The Non-Sparking Moveable Assembly will be factory assembled to pump when a Basin Package system is ordered.

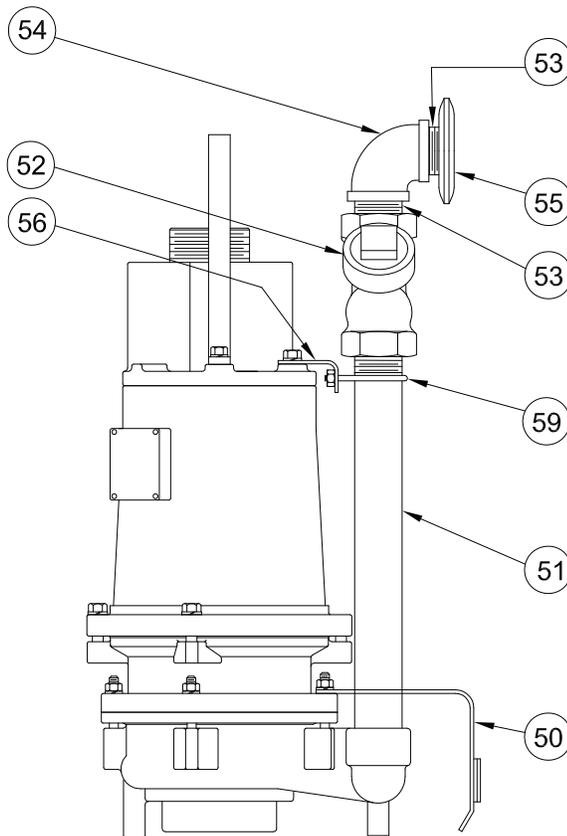


FIGURE 13

NON-SPARKING MOVABLE ASSEMBLY For "C" Channel Basin Package

PARTS LIST For 083527*, 3, 5, 7.5HP Explosion-Proof Grinder

ITEM	QTY.	PART No.	DESCRIPTION	
1	1	083528	Lower Pump Bracket, Brass	
2	1	078841	Upper Pump Bracket, Stainless	
3	2	075478	Close Nipple, Stainless	2 NPT
4	1	077882	Ball Check Valve, Cast Iron	2 NPT
5	1	075483	Elbow, Stainless	2 NPT x 90°
6	1	075486	Moveable Fitting, Brass	
7	1	076107	Pipe, Stainless	2 NPT x 6" Lg.
8	1	075276	U-Bolt and Nuts, Stainless	3/8-16 x 4.5" Lg.
9	A/R	----	Loctite, #PST567	
10	A/R	----	Loctite #242	
11	2	1-40-1	Hex Hd. Cap Screw, Stainless	3/8 -16 X 2" Lg.
12	2	15-23-1	Hex Nut, Stainless	3/8-16
13	4	082727	Flat Washer, Stainless	3/8
14	2	026210	Flange	
15	1	069140	Gasket	
16	1	083690	Pipe Nipple, Stainless	2 NPT x 3.5" Lg.

* Pump NOT included under this part number. The Non-Sparking Moveable Assembly will be factory assembled to pump when a Basin Package system is ordered.

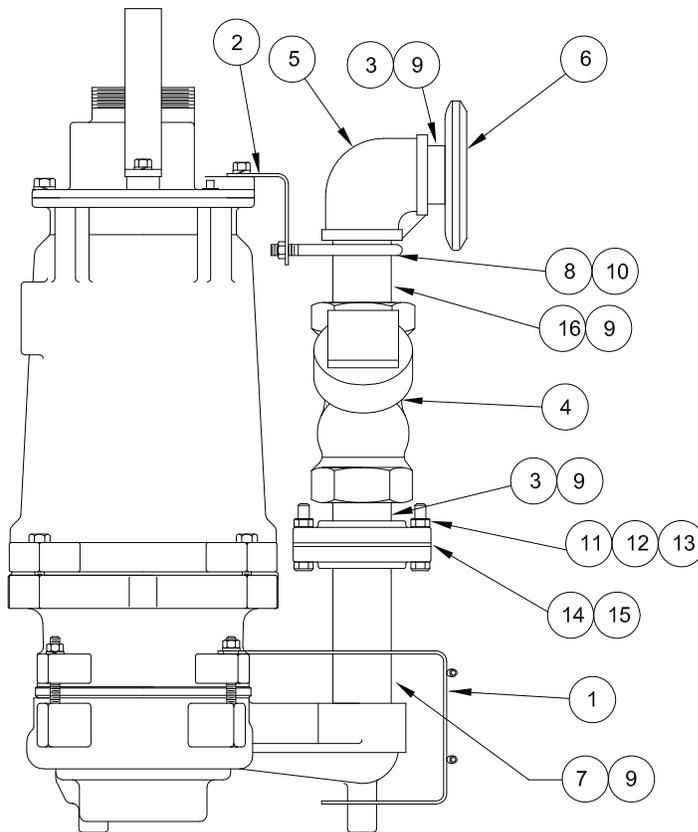


FIGURE 14

BARNES®



burks®

WEINMAN®

DEMING®

PROSSER®

Limited 24 Month Warranty

Crane Pumps & Systems warrants that products of our manufacture will be free of defects in material and workmanship under normal use and service for twenty-four (24) months after manufacture date, when installed and maintained in accordance with our instructions. This warranty gives you specific legal rights, and there may also be other rights which vary from state to state. In the event the product is covered by the Federal Consumer Product Warranties Law (1) the duration of any implied warranties associated with the product by virtue of said law is limited to the same duration as stated herein, (2) this warranty is a LIMITED WARRANTY, and (3) no claims of any nature whatsoever shall be made against us, until the ultimate consumer, his successor, or assigns, notifies us in writing of the defect, and delivers the product and/or defective part(s) freight prepaid to our factory or nearest authorized service station. Some states do not allow limitations on how long an implied warranty lasts, so the above limitation may not apply. **THE SOLE AND EXCLUSIVE REMEDY FOR BREACH OF ANY AND ALL WARRANTIES WITH RESPECT TO ANY PRODUCT SHALL BE TO REPLACE OR REPAIR AT OUR ELECTION, F.O.B. POINT OF MANUFACTURE OR AUTHORIZED REPAIR STATION, SUCH PRODUCTS AND/OR PARTS AS PROVEN DEFECTIVE. THERE SHALL BE NO FURTHER LIABILITY, WHETHER BASED ON WARRANTY, NEGLIGENCE OR OTHERWISE.** Unless expressly stated otherwise, guarantees in the nature of performance specifications furnished in addition to the foregoing material and workmanship warranties on a product manufactured by us, if any, are subject to laboratory tests corrected for field performance. Any additional guarantees, in the nature of performance specifications must be in writing and such writing must be signed by our authorized representative. Due to inaccuracies in field testing if a conflict arises between the results of field testing conducted by or for user, and laboratory tests corrected for field performance, the latter shall control. **RECOMMENDATIONS FOR SPECIAL APPLICATIONS OR THOSE RESULTING FROM SYSTEMS ANALYSES AND EVALUATIONS WE CONDUCT WILL BE BASED ON OUR BEST AVAILABLE EXPERIENCE AND PUBLISHED INDUSTRY INFORMATION. SUCH RECOMMENDATIONS DO NOT CONSTITUTE A WARRANTY OF SATISFACTORY PERFORMANCE AND NO SUCH WARRANTY IS GIVEN.**

This warranty shall not apply when damage is caused by (a) improper installation, (b) improper voltage (c) lightning (d) excessive sand or other abrasive material (e) scale or corrosion build-up due to excessive chemical content. Any modification of the original equipment will also void the warranty. We will not be responsible for loss, damage or labor cost due to interruption of service caused by defective parts. Neither will we accept charges incurred by others without our prior written approval.

This warranty is void if our inspection reveals the product was used in a manner inconsistent with normal industry practice and/or our specific recommendations. The purchaser is responsible for communication of all necessary information regarding the application and use of the product. **UNDER NO CIRCUMSTANCES WILL WE BE RESPONSIBLE FOR ANY OTHER DIRECT OR CONSEQUENTIAL DAMAGES, INCLUDING BUT NOT LIMITED TO TRAVEL EXPENSES, RENTED EQUIPMENT, OUTSIDE CONTRACTOR FEES, UNAUTHORIZED REPAIR SHOP EXPENSES, LOST PROFITS, LOST INCOME, LABOR CHARGES, DELAYS IN PRODUCTION, IDLE PRODUCTION, WHICH DAMAGES ARE CAUSED BY ANY DEFECTS IN MATERIAL AND/OR WORKMANSHIP AND/OR DAMAGE OR DELAYS IN SHIPMENT. THIS WARRANTY IS EXPRESSLY IN LIEU OF ANY OTHER EXPRESS OR IMPLIED WARRANTY, INCLUDING ANY WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE.**

No rights extended under this warranty shall be assigned to any other person, whether by operation of law or otherwise, without our prior written approval.

CRANE[®]

PUMPS & SYSTEMS

A Crane Co. Company

420 Third Street
Piqua, Ohio 45356
(937) 778-8947
Fax (937) 773-7157
www.cranepumps.com

83 West Drive
Brampton, Ont. Canada L6T 2J6
(905) 457-6223
Fax (905) 457-2650

**IMPORTANT!
WARRANTY REGISTRATION**

Your product is covered by the enclosed Warranty.
To complete the Warranty Registration Form go to:

<http://www.cranepumps.com/ProductRegistration/>

If you have a claim under the provision 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.**



START-UP REPORT

General Information

Pump Owner's Name: _____
Address: _____
Location of Installation: _____
Contact Person: _____ Phone: _____
Purchased From: _____

Nameplate Data

Pump Model #: _____ Serial #: _____
Part #: _____ Impeller Diameter: _____
Voltage: _____ Phase: _____ \emptyset Hertz: _____ Horsepower: _____
Full Load Amps: _____ Service Factor Amps: _____
Motor Manufacturer: _____

Controls

Control panel manufacturer: _____
Model/Part number: _____
Number of pumps operated by control panel: _____
Short circuit protection? YES___ NO___ Type: _____
Number and size of short circuit device(s): _____ Amp rating: _____
Overload Type: _____ Size: _____ Amp rating: _____
Do protection devices comply with pump and motor Amp rating? YES___ NO___
Are all electrical and panel entry connections tight? YES___ NO___
Is the interior of the panel dry? YES___ NO___
Liquid level Control Brand and Model: _____

Pre-Startup

All Pumps

Type of equipment: NEW___ REBUILT___ USED___
Condition of equipment at Start-Up: DRY___ WET___ MUDDY___
Was Equipment Stored? YES___ NO___ Length of Storage: _____
Liquid being pumped: _____ Liquid Temperature: _____
Supply Voltage/Phase/Frequency matches nameplate? YES___ NO___
Shaft turns freely? YES___ NO___
Direction of rotation verified for 3 \emptyset motors? YES___ NO___
Debris in piping or wet well? YES___ NO___
Debris removed in your presence? YES___ NO___
Pump case/wet well filled with liquid before startup? YES___ NO___
Is piping properly supported? YES___ NO___

Non-Submersible Pumps

Is base plate properly installed / grouted? YES___ NO___ N/A___
Coupling Alignment Verified per I&O Manual? YES___ NO___ N/A___
Grease Cup/Oil Reservoir Level checked? YES___ NO___ N/A___

Submersible Pumps

Resistance of cable and pump motor (measured at pump control):

Red-Black: _____ Ohms(Ω) Red-White: _____ Ohms(Ω) White-Black: _____ Ohms(Ω)

Resistance of Ground Circuit between Control Panel and outside of pump: _____ Ohms(Ω)

MEG Ohms check of insulation:

Red to Ground: _____ White to Ground: _____ Black to Ground: _____

Operational Checks

Is there noise or vibration present? YES___ NO___ Source of noise/vibration: _____

Does check valve operate properly? YES___ NO___ N/A___

Is system free of leaks? YES___ NO___ Leaks at: _____

Does system appear to operate at design flow rate? YES___ NO___

Nominal Voltage: _____ Phase: 1Ø 3Ø (select one)

Voltage Reading at panel connection, Pump OFF: L1, L2 _____ L2, L3 _____ L1, L3 _____

Voltage Reading at panel connection, Pump ON: L1, L2 _____ L2, L3 _____ L1, L3 _____

Amperage Draw, Pump ON: L1 _____ L2 _____ L3 _____

Submersible Pumps

Are BAF and guide rails level / plumb? YES___ NO___

Is pump seated on discharge properly? YES___ NO___

Are level controls installed away from turbulence? YES___ NO___

Is level control operating properly? YES___ NO___

Is pump fully submerged during operation? YES___ NO___

Follow up/Corrective Action Required

YES___ NO___

Additional Comments:

Startup performed by: _____ Date: _____

Present at Start-Up

() Engineer: _____ () Operator: _____

() Contactor: _____ () Other: _____

All parties should retain a copy of this report for future trouble shooting/reference



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