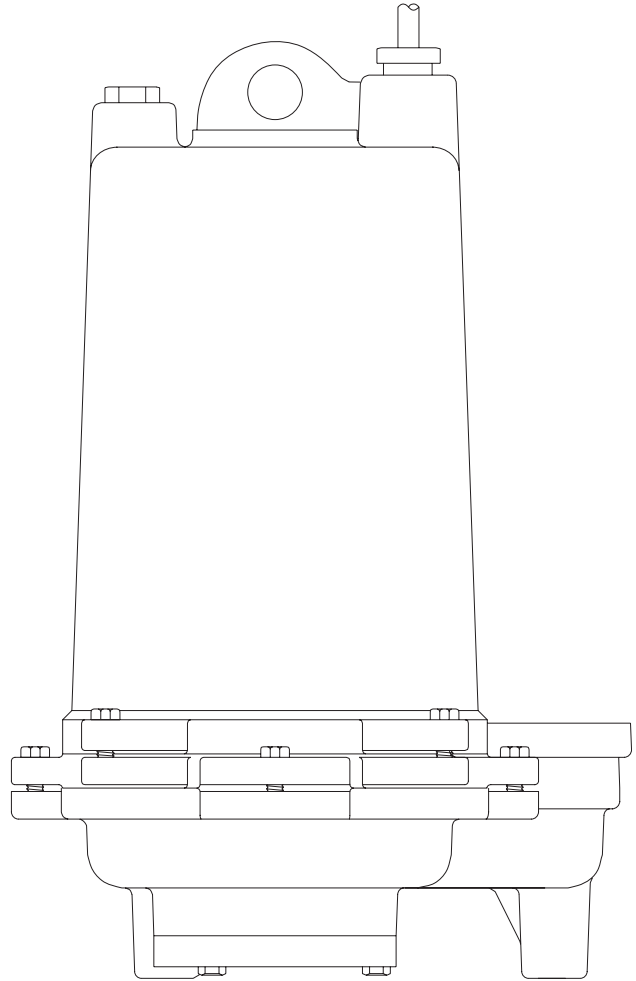




## DELTA ENVIRONMENTAL<sup>®</sup>



# MODEL D1C20-21 2 HP CENTRIFUGAL GRINDER PUMP

## SAFETY INSTRUCTIONS, INSTALLATION AND SERVICE MANUAL

**For residential and pressure sewer applications.  
For use with product built with AO Smith<sup>®</sup> motor.**

NOTE! To the installer: Please make sure you provide this manual to the owner of the equipment or to the responsible party who maintains the system.

**▲ CAUTION: READ THESE SAFETY WARNINGS FIRST BEFORE INSTALLING, SERVICING, OR OPERATING ANY PUMP.**

## SAFETY WARNINGS

### BEFORE INSTALLATION:

This manual contains important information for the safe use of this product. Read this manual completely and follow the instructions carefully. Reasonable care and safe methods relating to the installation and operation of this product should be practiced. Check local codes and requirements before installation.

**▲ DANGER: RISK OF ELECTRICAL SHOCK OR ELECTROCUTION. MAY RESULT IN SERIOUS INJURY OR DEATH OR FIRE HAZARD. INSTALLER MUST DISCONNECT ALL ELECTRICAL SOURCES PRIOR TO INSTALLATION, HANDLING OR SERVICING. ONLY QUALIFIED PERSONNEL MAY INSTALL THIS SYSTEM. NFPA 70/NATIONAL ELECTRIC CODE (NEC) OR LOCAL CODES MUST BE FOLLOWED. SYSTEM MUST BE PROPERLY GROUNDED ACCORDING TO NEC. DO NOT LIFT PUMP BY POWER CORD.**

**▲ DANGER: BIOHAZARD RISK. ONCE WASTEWATER SOURCE HAS BEEN CONNECTED TO SYSTEM, BIOHAZARD RISK EXISTS. INSTALLER(S) AND/OR SERVICE PERSONNEL MUST USE PROPER PERSONAL PROTECTIVE EQUIPMENT AND FOLLOW HANDLING PROCEDURES PER OSHA 29 CFR 1910.1030 WHEN HANDLING EQUIPMENT AFTER WASTEWATER SOURCE HAS BEEN CONNECTED TO SYSTEM.**

**▲ DANGER: RISK OF ASPHYXIATION. INSTALLER(S) AND/OR SERVICE PERSONNEL MUST USE PROPER PERSONAL PROTECTIVE EQUIPMENT AND FOLLOW OSHA 29 CFR 1910.146 OR OSHA 29 CFR 1926. PUMP MAY BE INSTALLED IN A LOCATION CLASSIFIED BY AS A CONFINED SPACE.**

**▲ DANGER: RISK OF FIRE OR EXPLOSION. DO NOT SMOKE OR USE OPEN FLAMES IN OR AROUND THIS SYSTEM. THIS SYSTEM IS NOT INTENDED FOR USE IN HAZARDOUS LOCATIONS PER NFPA 70 NATIONAL ELECTRIC CODE. DO NOT PUMP FLAMMABLE LIQUIDS. CONSULT FACTORY FOR OPTIONAL EQUIPMENT RATED FOR HAZARDOUS LOCATION USE.**

**▲ DANGER: CUTTING RISK. RISK OF SERIOUS CUTTING OR AMPUTATION EXISTS. DISCONNECT ALL POWER SOURCES PRIOR TO SERVICING PUMP OR GRINDING MECHANISM. PUMP MAY START WITHOUT WARNING. GRINDING MECHANISM IS EXTREMELY SHARP. USE CAUTION WHEN HANDLING GRINDER MECHANISM.**

**▲ DO NOT MODIFY THE CORD AND PLUG. WHEN USING THE CORD AND PLUG, PLUG INTO A GROUNDED OUTLET ONLY. WHEN WIRING TO A SYSTEM CONTROL, CONNECT THE PUMP GROUND LEAD TO THE SYSTEM GROUND.**

**▲ DO NOT RUN THE PUMP DRY. DRY RUNNING CAN OVERHEAT THE PUMP (CAUSING BURNS TO ANYONE HANDLING IT) AND WILL VOID THE WARRANTY.**

**▲ THE PUMP NORMALLY RUNS HOT. TO AVOID BURNS, ALLOW IT TO COOL FOR 30 MINUTES AFTER SHUTDOWN BEFORE HANDLING IT.**

**▲ SUBMERSIBLE GRINDER 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. THIS SPECIALIZED PUMP IS DESIGNED TO INCORPORATE A GRINDING MECHANISM TO REMOVE WASTEWATER PARTICULATE AND PUMP THE RESULTING SLURRY FROM A RESIDENTIAL STRUCTURE TO A COLLECTION SYSTEM.**

### CALIFORNIA PROPOSITION 65 WARNING:

**▲ WARNING** This product and related accessories contain chemicals known to the State of California to cause cancer, birth defects or other reproductive harm.

**DO NOT THROW AWAY OR LOSE THIS MANUAL.** Keep it in a safe place so that you may refer to it often for the continued safe operation of the product.

## INSTRUCTIONS

These instructions cover only the grinder pump unit. Separate instructions for the basin system are included with the basin. Pump is not to be disassembled except at a certified service station or at the factory. **WARRANTY IS VOID IF PUMP IS TAKEN APART FOR ANY REASON EXCEPT TO REPLACE GRINDER IMPELLER, VOLUTE CASE/GRINDING RING.**

## INSPECTING PUMP

Before making any piping or electrical connections, check the pump for shipping damage or cracks. Using a flat screwdriver placed in the slot on the shaft end, turn shaft and impellers to be sure they are free. **DO NOT TURN IMPELLER WITH FINGERS AS EDGES ARE SHARP.**

**▲ CAUTION! NEVER WORK ON THE UNIT WITHOUT DISCONNECTING THE ELECTRICAL POWER CORD.**



## POWER SUPPLY

The D1C20-21 Series grinder pump should be connected only to a 230 volt, single phase, 60 Hz power source. The pump will draw approximately 9.1 amperes at minimum flow and 15.0 full load amperes. Locked rotor current is 37.3 amperes. The pump must be connected to a grounded power socket. **DO NOT** cut off the ground pin from the power cord plug.

## POWER CORD

A 20 foot power cord is attached to the grinder pump via two insulated quick-disconnect terminals. To replace a cord the oil must be drained and the motor housing removed, follow instructions under "To Replace Capacitors Only" section for detailed instructions.

To install new cord, reconnect terminals (black to black, white to white), and attach grounding ring terminal to motor endplate. Guide terminals back through hole in motor housing. Once terminals have passed through the hole, retighten the cord nut into housing. Tighten nut firmly but do not overtighten.

The power cord should be replaced if it has been damaged in any way or the cord jacket has become brittle with age.

## MOTOR TYPE

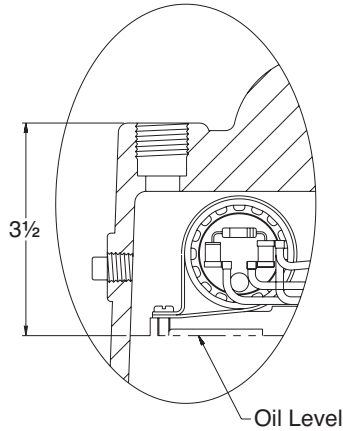
The D1C20-21 Series grinder pump contains a 3/4 frame, 2 HP, single phase, 60 Hz, 3450 RPM, capacitor start - capacitor run motor with Class F insulation and built-in on-winding overload protection. Motor has upper and lower ball bearings and is oil-cooled and lubricated. Resistance at motor leads is 9.7 ohms.

**▲ CAUTION! THE D1C20-21 SERIES GRINDER PUMP SHOULD NEVER BE WORKED ON WITHOUT FIRST DISCONNECTING THE POWER CORD.**

## OIL TYPE

The motor housing contains dielectric transformer oil to provide good heat transfer and lubrication of ball bearings; no other lubrication is required. Oil level may be checked by removing the nut (item 15C) and washers from the top of the motor housing. The oil should be filled to the bottom of the end shield (see figure 1). **Do not overfill with oil.** Only dielectric transformer oil obtained from an authorized service center should be used.

FIGURE 1



## PUMP SWITCH INSTALLATION INSTRUCTIONS

**NOTE:** In accordance to third party approval, pump must be submerged a minimum of 8-1/2" from bottom of the legs on volute case during operation.

### MOUNTING THE SWITCH

1. Determine pumping range for installation (see Figures A and B). Do not tether less than 3-1/2" (9 cm) from pipe.
2. Tighten strap around discharge pipe keeping switch cable between strap and pipe to prevent slippage (see Figure C).
3. Space small ties at least 1" (2.5 cm) apart (see Figure C). To readjust ties, press small tie tabs down.
4. To lock releasable tab, run remaining strap between tab and head. Tuck strap back through head (see Figure C).

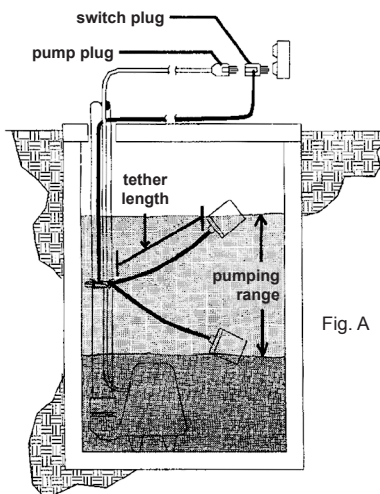


Fig. A

## PIGGYBACK PLUG INSTALL

- ⚠ Electrical outlet must not be located in pump chamber.
  - ⚠ Electrical outlet voltage, piggyback plug voltage, and pump voltage must match.
1. Follow steps 1 through 4 of "Mounting the Switch."
  2. Insert switch's piggyback plug into outlet.
  3. Plug pump into piggyback plug (see Figure A).
  4. Check installation. Allow system to cycle to ensure proper operation.

### Determining Pumping Range In Inches (1 inch = 2.5 cm)

tether length	3.561014182224
pumping range	7101622283336

Use only as a guide. Pumping ranges are based on testing in nonturbulent conditions. Range may vary due to water temperature and cord shape. Note: As the tether length increases, so does the variance of the pumping range.

Fig. B

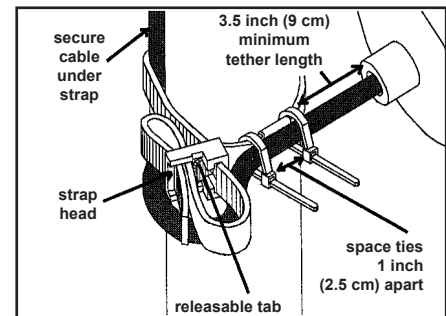
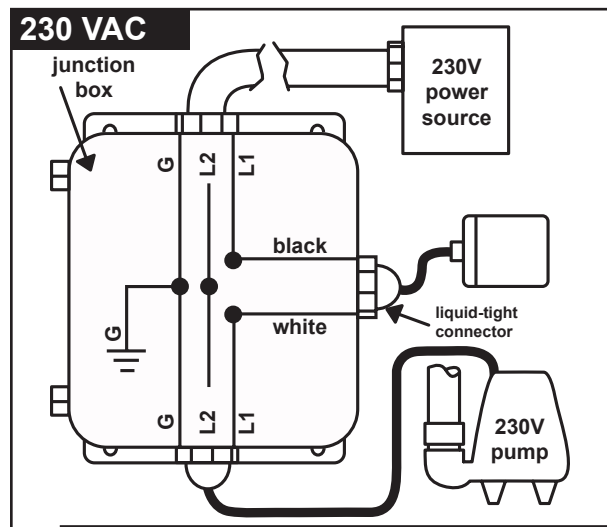


Fig. C

## DIRECT WIRE INSTALL

1. Follow steps 1 through 4 of "Mounting the Switch."
2. Wire switch as shown below.
3. Check installation. Allow system to cycle to ensure proper operation.



### ⚠ WARNING



In 230 VAC pump installations, one side of the line going to the pump is always **HOT**. This condition exists if the switch is on or off. Install double pole disconnect on all 230 VAC pump circuits.

## DISMANTLING PUMP FOR REPLACEMENT PARTS

Before dismantling pump for replacement parts, clean pump thoroughly. Knock off all scale and deposits. Use sandblast if possible. Submerge complete unit in bleach solution for one hour before taking apart.

## REPLACING GRINDER IMPELLER AND GRINDER SHREDDING RING

This is the only disassembly operation allowed in the field. All other repairs must be done at the factory or at an authorized service station.

### STANDARD TOOLS REQUIRED:

1. Allen head socket set.
2. Standard socket wrench set.
3. Set of open end wrenches.
4. Plastic hammer.
5. Vise grip pliers.
6. Large screwdriver with heavy handle.
7. Three-cornered file

**IMPORTANT: PUMP SHOULD BE THOROUGHLY CLEANED OF TRASH AND DEPOSITS BEFORE STARTING DISASSEMBLY OPERATIONS.**

**▲ CAUTION! DISCONNECT ALL POWER AND CONTROL WIRES TO MOTOR AT CONTROL PANEL BEFORE STARTING DISASSEMBLY OPERATIONS. NEVER RELY ON OPENING CIRCUIT BREAKER ONLY.**



## DISASSEMBLY OF SHREDDING RING AND GRINDER IMPELLER

1. Remove three screws from grinder ring flange. Grinder ring is pressed into flange for easy removal.
2. Using Allen head socket wrench, thread two screws into tapped back-off holes in flange. Evenly tighten screws to guide grinding ring out of pump volute case.
3. Hold grinder impeller by prying against impeller cutting bar and remove cap screw from end of shaft.
4. Use large screwdriver in slot in end of shaft and bump on cutter vane with plastic hammer. Bump in counterclockwise direction as thread is right-hand. It may take several bumps to loosen impeller. If impeller cannot be loosened it will be necessary to take unit to service station for service. **DO NOT CONTINUE TO POUND ON IMPELLER AS IMPELLER AND SHAFT MAY BE DAMAGED.**
5. If impeller comes off easily, clean up and replace if worn.
6. Be sure pump impeller has not loosened when grinder impeller is removed. This can be checked on reassembly of grinder impeller and shredding ring. Tips of impeller cutter vanes should extend about 1/8" below bottom of shredding ring. If distance is more, it means the pump impeller has loosened, and if it is less, it means the shredding ring is not properly seated.



If the pump impeller has loosened, remove grinder impeller and shredding ring as described above and remove bolts from volute case and remove case. Plastic hammer can be

used to bump on casing discharge to loosen. Place gasket in oil to prevent drying out. **DO NOT** loosen the pump impeller further -- it is the seat for the seal spring.

7. After case is removed, wrap emery paper around shaft and hold with vise grip pliers. Use cloth on impeller and screw up against shoulder. Now pump can be reassembled.
8. Clean all threads with wire brush and file; smooth any threads that may have been nicked.
9. Use Never-Seez® or other graphite compound on threads before replacing grinding impeller.
10. Be sure cap screw in bottom of shaft is tight. Hold impeller with a screwdriver between cutter bar and teeth of shredding ring while tightening cap screw.
11. Be sure impeller turns free by hand after reassembly. Some drag will occur due to the seal, but there should be no binding or tight spots when turning the grinder impeller.
12. If impeller rubs or drags on shredding ring, loosen bolts in shredding ring plate and tap with plastic hammer to loosen, retighten screws. Be sure to pull screw down evenly, applying pressure on all three screws. **DO NOT TIGHTEN ONE SCREW CLEAR DOWN BEFORE ADJUSTING OTHER SCREWS.**
13. **ALWAYS** use a rag on the impeller when turning to prevent cutting hands on the sharp corners of shredding ring.



## TO REPLACE CAPACITORS ONLY

**▲ CAUTION! DISCONNECT ALL POWER AND CONTROL WIRES TO MOTOR AT CONTROL PANEL BEFORE STARTING DISASSEMBLY OPERATIONS. DO NOT RELY ON OPENING CIRCUIT BREAKER ONLY.**

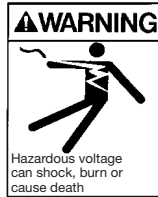
1. Remove oil fill plug near the top of motor housing and pour oil out.
2. Loosen the cord nut on power cord until cord is loose enough to push cord down into motor housing.
3. Remove four bolts from motor housing and bump housing with a plastic hammer to loosen. Lay pump on its side.
4. Remove the housing carefully to be sure that enough cord is pushed into the housing so as not to create tension on cord.
5. Slide motor housing up far enough to expose the capacitors and to be able to lay the housing down.
6. Disconnect wiring from capacitor and loosen capacitor clamp and slide capacitor out. Replace with new capacitor, tighten clamp and reconnect per wiring diagram given in this manual.
7. Check all wiring connectors to be sure they are secure.
8. Be sure tetriseal gasket is in place.
9. Slide motor housing back onto pump while pulling the cord out slowly. Assemble motor housing with four bolts.
10. Reassemble cord nut. Be sure washers are seated and cord is pulled up against the washers. Tighten nut securely.
11. Put pump upright and refill motor with Delta submersible pump oil. **DO NOT OVERFILL WITH OIL.** See figure 1 (page 2) for oil level. Reassemble washer, gasket, nut (item 15C) in motor housing. Retighten nut firmly, but do not overtighten.



- Be sure pump turns freely before connecting power. Turn pump on side and turn impeller, using screwdriver in slotted shaft. Plug pump into receptacle to test operation. Pump must run quiet and free of vibration.

## TO REPLACE MOTOR STATOR AND SHELL

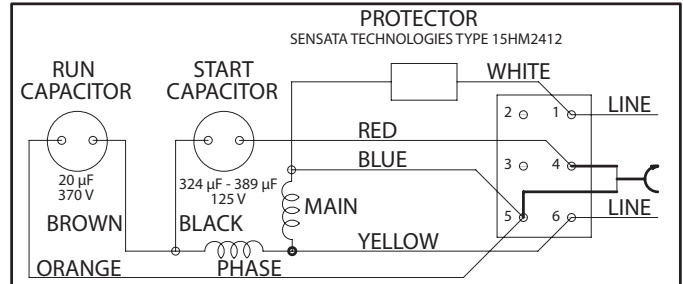
**▲ CAUTION! DISCONNECT ALL POWER AND CONTROL WIRES TO MOTOR AT CONTROL PANEL BEFORE STARTING DISASSEMBLY OPERATIONS. NEVER RELY ON OPENING CIRCUIT BREAKER ONLY.**



- Remove motor housing as described above.
- Disconnect all leads from power and ground wire and set pump upright.
- Loosen four long screws holding motor and remove slowly.
- Either remove previous capacitors and clamps from old motor and assemble onto new stator and shell or replace with new capacitors and assemble per wiring diagram.
- Position bearing spring washer on top of upper ball bearing.

- Position the “stator with shell” into place and line up screws with bosses and tighten the 4 long screws. Lay unit down in line with motor housing.
- Be sure pump turns freely with screwdriver in impeller end of shaft.
- Reconnect all terminals securely per wiring diagram.
- Be sure tetraseal gasket is in place.
- Reassemble motor housing and fill with oil as noted above in “Capacitor Replacement”.

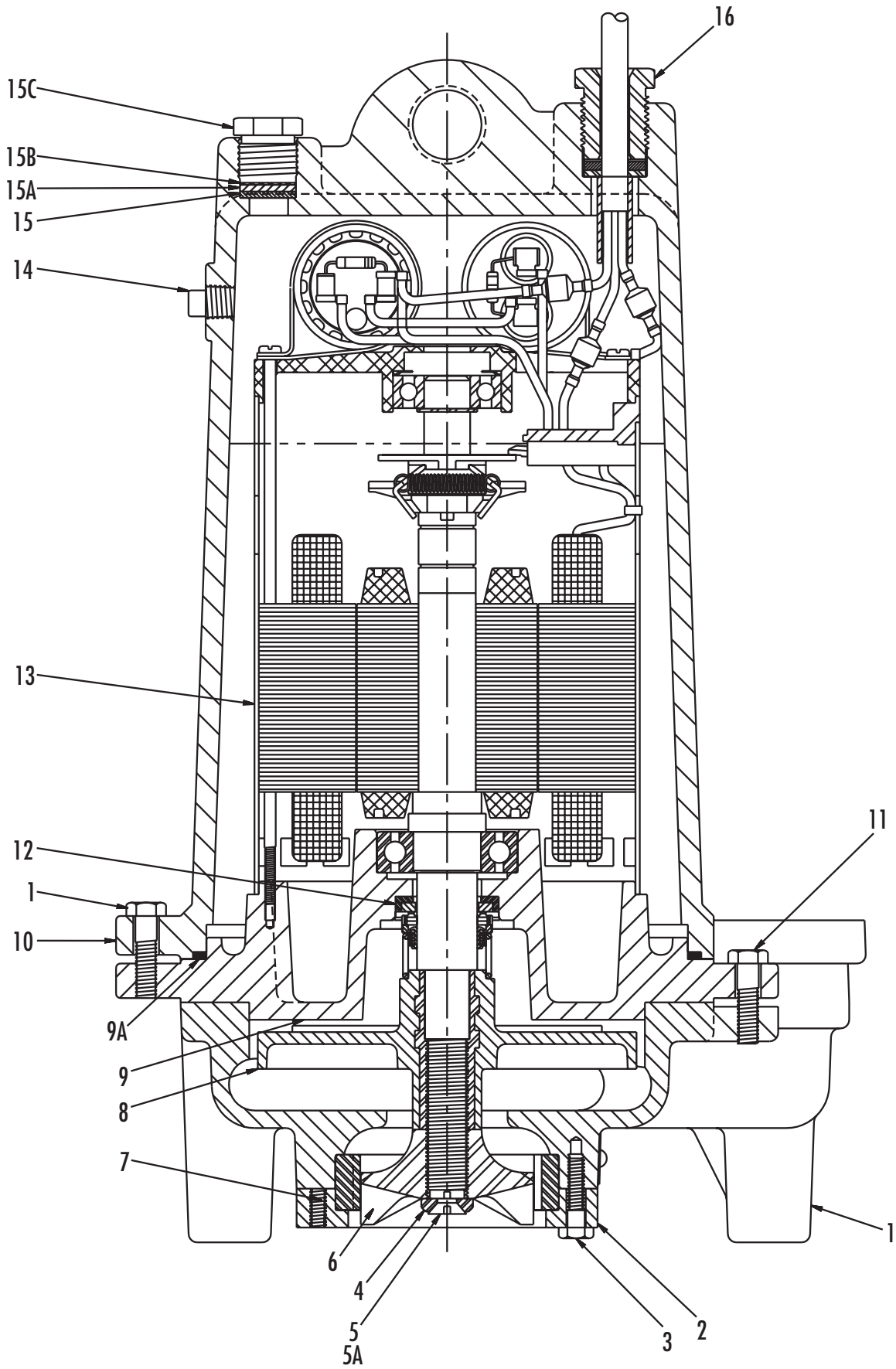
## WIRING DIAGRAM



## TROUBLESHOOTING

SYMPTOMS	SOLUTIONS
<p><b>Pump does not run or hum.</b> See A, B, C, D, E or F.</p> <p><b>Pump runs but does not deliver water.</b> See G, H, I, J, K or L.</p> <p><b>Pump runs and pumps out sump but does not stop.</b> See M.</p> <p><b>Pump runs but delivers only small amount of water.</b> See I, J, K, L or N.</p> <p><b>Fuse blows or circuit breaker trips when pump starts.</b> See K, L, N, O or P.</p> <p><b>Motor runs for short time then stops. Then after short period starts again. Indicates tripping overload caused by symptom shown.</b> See K, L, N or P.</p> <p>For any other symptoms call <b>Delta Service Dealer.</b></p>	<p>A. Line circuit breaker may be off; or fuse, if used, may be blown or loose.</p> <p>B. Water level in sump may be too low. Run in more water.</p> <p>C. Pump cord plug may not be making contact in receptacle.</p> <p>D. If pump is using the series cord plug, the two plugs may not be plugged tight together.</p> <p>E. Float may be stuck. Be sure float operates freely in basin. Check tether length of switch per instructions.</p> <p>F. If all symptoms check OK, motor winding may be open; take to service center for check.</p> <p>G. Check valve may be installed backward. Arrow on valve points in direction of flow.</p> <p>H. Discharge shut-off valve, if used, may be closed.</p> <p>I. Pump may be air locked. Start and stop several times by plugging and unplugging cord. Check vent hole on pump case for plugging.</p> <p>J. Pump head may be too high. Pump cannot deliver water over 100 ft. vertical. Horizontal distance does not affect pumping, except loss due to friction.</p> <p>K. Inlet holes in pump base may be clogged. Remove pump and clean out openings.</p> <p>L. Impeller or volute openings may be plugged or partially plugged. Remove pump and clean per maintenance instructions. Check tether length of switch per instructions.</p> <p>M. Float is stuck in up position. Be sure float operates freely in basin.</p> <p>N. Pump impeller may be partially clogged causing motor to run slow, resulting in motor overload.</p> <p>O. Fuse size or circuit breaker is too small. Must be 20 amps.</p> <p>P. Defective motor stator. Return to Delta service center.</p>

TYPICAL SECTION DRAWING FOR D1C-20-21



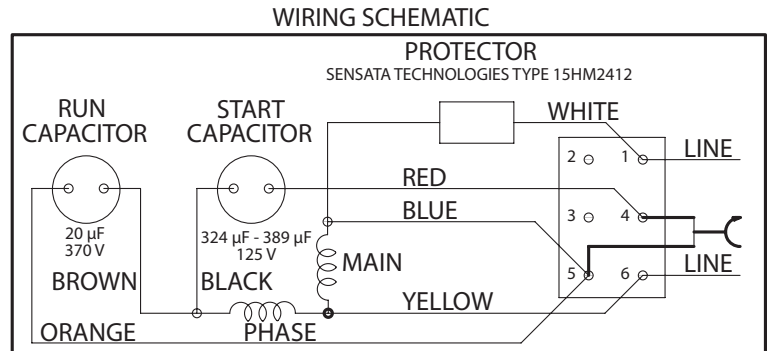
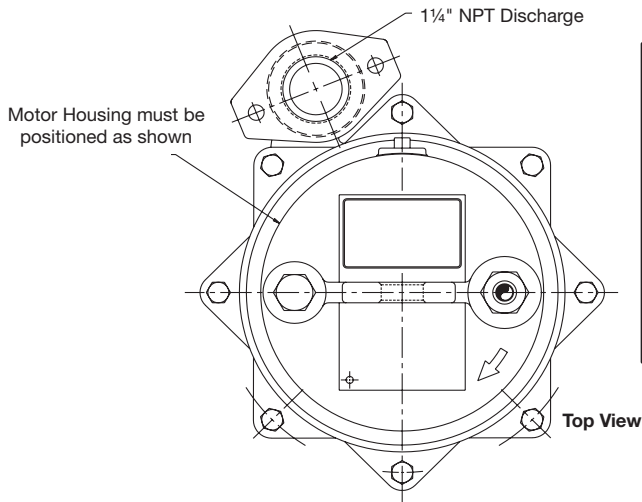


## PARTS LIST FOR D1C-20-21

Ref No.	Description	Part Number
1	Case, Volute	26433D002
2	Flange, w/Shredding Ring	21584B000
3	Screw, Cap 1/4" x 1" Long, SST (3 req'd)	19099A012
4	Retainer, Impeller, SST	21583B000
5	Screw, Flat Head, 1/4" x 3/4" Long	07597A018
5A	Sealant, Loctite® Grade 271	14550A001
6	Impeller, Grinding	21582B000
7	Screw, Set 1/4" x 3/8" Long (2 req'd)	05013A039
8	Impeller, Pump Plastic	26434C010
8	Impeller, Cast Iron (Optional)	26434C000
9	Plate, Seal/Bearing	26430D001
9A	Gasket, Tetraseal 7" x 6-3/4" x 1/8"	05014A181

Ref No.	Description	Part Number
10	Housing, Motor	25327D000
11	Screw, Cap, 5/16" x 1-1/4" Long (8 req'd)	19100A012
12	Seal, 7/8" Shaft	21576A010
13	Motor, 2 HP, 230V, 1 ph	27739D000
14	Plug, Pipe 1/4 NPT	05022A009
15	Washer, SST, 3/32" Thick	05030A235
15A	Gasket, Rubber	05014A193
15B	Washer, SST, 1/32" Thick	05030A234
15C	Nut, Solid	25341A002
16	Cord, Power	25338B001
23	Oil, Transformer	24709110000

## D1C-20-21 DIMENSIONAL DRAWINGS



# STANDARD LIMITED WARRANTY

Delta Environmental warrants its products against defects in material and workmanship for a period of 24 months from the date of shipment from Delta Environmental or 27 months from the manufacturing date, whichever occurs first – provided that such products are used in compliance with the requirements of the Delta Environmental catalog and technical manuals for use in pumping raw sewage, municipal wastewater or similar, abrasive free non-corrosive liquids.

During the warranty period and subject to the conditions set forth, Delta Environmental, at its discretion, will repair or replace to the original user, the parts which prove defective in materials and workmanship. Delta Environmental reserves the right to change or improve its products or any portions thereof without being obligated to provide such a change or improvement for prior sold and/or shipped units.

Start-up reports and electrical schematics may be required to support warranty claims. Warranty is effective only if Delta Environmental authorized control panels are used. All seal fail and heat sensing devices must be hooked up, functional and monitored or this warranty will be void. Delta Environmental will only cover the lower seal and labor thereof for all dual seal pumps. Under no circumstance will Delta Environmental be responsible for the cost of field labor, travel expenses, rented equipment, removal/reinstallation costs or freight expenses to and from the factory or an authorized Delta Environmental service facility.

This limited warranty will not apply: (a) to defects or malfunctions resulting from failure to properly install, operate or maintain the unit in accordance with the printed instructions provided; (b) to failures resulting from abuse, accident or negligence; (c) to normal maintenance services and parts used in connection with such service; (d) to units which are not installed in accordance with applicable local codes, ordinances and good trade practices; (e) if the unit is moved from its original installation location; (f) if unit is used for purposes other than for what it is designed and manufactured; (g) to any unit which has been repaired or altered by anyone other than Delta Environmental or an authorized Delta Environmental service provider; (h) to any unit which has been repaired using non factory specified/OEM parts.

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