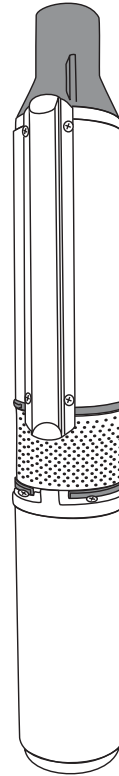


OWNERS GUIDE TO INSTALLATION AND OPERATION OF 1/2 - 5 HP, 5, 7, 10, 15, 19 & 27 GPM 4" SUBMERSIBLE PUMPS



IL0632

Questions, problems, missing parts? Before returning, call our customer service department at 1-800-742-5044, 7:30 a.m.-5:00 p.m., EST, Monday-Friday.

SAFETY INFORMATION

Please read and understand this entire manual before attempting to assemble, operate or install the product. If you have any questions regarding the product, please call customer service at 1-800-742-5044, 7:30 a.m.-5:00 p.m., EST, Monday-Friday.

- **NOTE:** Pumps with the "UL" Mark and pumps with the "US" mark are tested to UL Standard UL778. CSA certified pumps are certified to CSA Standard C22.2 No. 108. (CUS)

DANGER

Always disconnect power source before performing any work on or near the motor or its connected load. If the power disconnect is out of sight, lock it in the open position and tag to prevent unexpected application of power.

Do not handle a pump or pump motor with wet hands or when standing on a wet or damp surface or in water. Disconnect main power before handling unit for ANY REASON!

These pumps have not been investigated for use in swimming pool areas.

Can shock, burn or cause death. Ground pump before connecting to power supply.

The pump is intended for use in a well. Motor frame must be connected to power supply ground or fatal electrical shock may result.

NEVER leave fused disconnect switch or pressure control switch cover or covers open (either partially or completely) when not being worked on by a qualified electrician or repairman.

WARNING

Follow all local electrical and safety codes, as well as the National Electrical Code (NEC) and the Occupational Safety and Health Act (OSHA).

Do not use to pump flammable or explosive fluids such as gasoline, fuel oil, kerosene, etc. Do not use in flammable and/or explosive atmospheres.

This product contains chemicals known to the State of California to cause cancer and birth defects or other reproductive harm.

Install pressure relief valve in discharge pipe. Release all pressure on system before working on any component.

CAUTION

Wire motor for correct voltage. See Electrical section and motor nameplate.

The power supply for a submersible pump should be a separate circuit, independent of all other circuits. It must be equipped with a fuse box of ample capacity.

Ground motor and controls before connecting to power supply.

Shut off power source when voltage drops 10% below rated voltage of motor.

Follow wiring instructions in this manual when connecting to power lines.

For fire protection, power supply should be free of any building, preferably on a direct line from transformer. In event of fire, wires will not be destroyed and water supply not cut-off.

Protect power cable from nicks or cuts from sharp objects or scraping on well casing when lowering pump into well. Do not allow it to come into contact with oil, grease, hot surfaces or chemicals.

The motor voltage and phase indicated on the motor nameplate should be checked against the actual electrical supply. Check your power source. Check electrical supply for correct fusing, wire size, and adequate grounding and transformer size.

NOTE: Install all electrical equipment in protected area to provide adequate ventilation for pressure switch and controls to prevent moisture damage to components.

NOTE: Install pump, pressure tank, pitless adaptor or well seal in accordance with state and local plumbing codes.

Before beginning installation of product, make sure all parts are present. Compare parts with package contents drawing. If any part is missing or damaged, do not attempt to assemble the product. Contact customer service for replacement parts.

warranty. Larger wire sizes may always be used for better economy of operation. Be sure voltage at pressure switch or fuse is between the following limits:

- 115V Rated - Between 104 & 127 volts
- 230V Rated - Between 210 & 250 volts

SUBMERSIBLE PUMP CABLE AND POWER CABLE SELECTION

Check cable size against Submersible Wire Size Chart A. For 3-wire plus ground models, motor and control box voltage must match. Submersible power cable must be UL listed for submersible pump applications. For Canadian installations, type RWU, TWU, SGOW or SWOW power supply cable is recommended. Cable is selected for the maximum pump setting plus the offset distance to the service entrance.

The National Electric Code (NEC 250-43) requires a separate ground wire be run down the well to the submersible pump and connected to all exposed metal parts of the pump and motor. Refer to the most recent National Electric Code (NEC) Article 250 (grounding) for additional information.

NOTE: All wiring should be done by a qualified electrician.

IMPORTANT: Use of wire sizes smaller than those specified in the chart will cause low starting voltage, may cause early pump failure and will void the

WARNING: 3-WIRE SUBMERSIBLES ONLY: This submersible pump must be wired directly to a control box of the same horsepower and voltage rating in order to work properly. IT MUST BE USED WITH WITH A CONTROL BOX.

Wire Size Chart A

HP	Volt	Maximum Cable Length In Feet Using AWG Cable*		
		#14	#12	#10
1/2	110/115	100	160	250
1/2	230	400	650	1020
3/4	230	300	480	760
1	230	250	400	630
1-1/2	230	190	310	480
2	230	150	250	390
3	230	120	190	300

*NOTE: Wire length is the total distance from power source to pump depth.

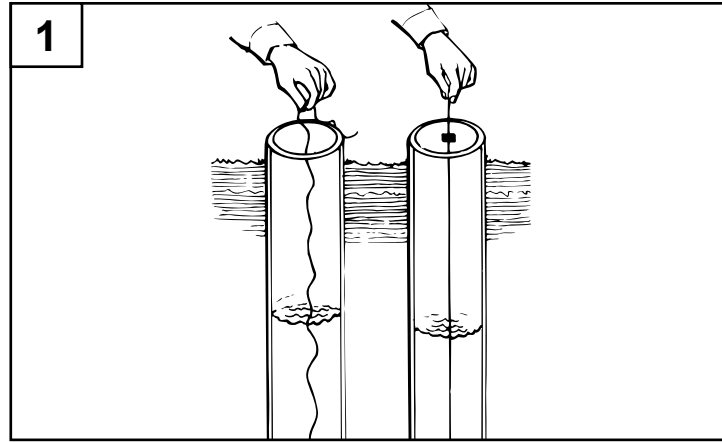
PREPARATION

SUBMERSIBLE CABLE AND GROUND WIRE SELECTION

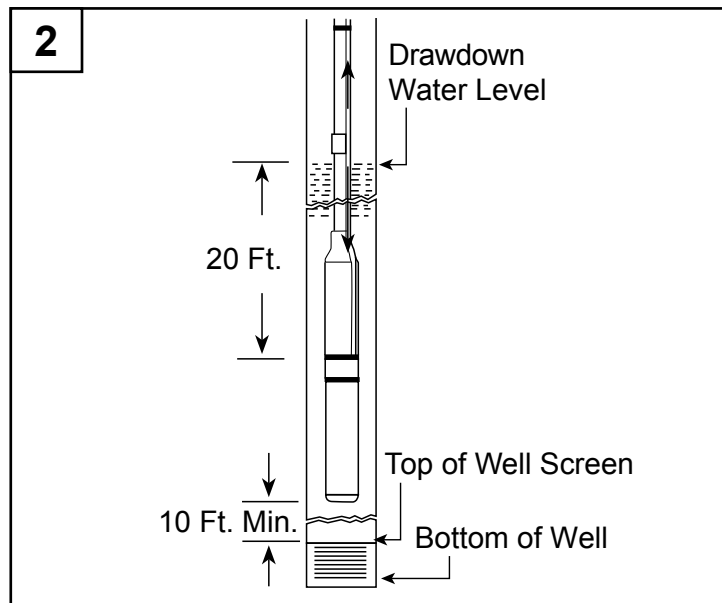
⚠ WARNING: Turn off power at the electrical service box before starting installation.

Finding the Depth of Your Well:

1. Tie a small, heavy weight to the end of a cord (make sure the cord is at least 350 ft. long). Lower this weight into the well until it reaches the bottom. Take up any slack and mark the string at ground level. Pull the string from the well and measure from the weight to your mark. This is the depth of your well. Subtract 10 ft. from your well depth. See catalog performance charts to be sure pump is rated for this depth. **(Fig. 1)**



2. Drawdown is the lowest water level in the well after the pump is turned on. If you know the drawdown, the pump can be set 20 feet below this level. However, the bottom of the motor should be at least ten feet from the top of the well screen. **(Fig. 2)**



ASSEMBLY

NOTE: Schedule 80 PVC pipe is recommended. If you use black poly pipe, the pipe must be rated for 160 PSI and be no longer than 200 ft.

NOTE: The pump must be assembled with piping on the ground before lowering into the well. Lay out all necessary materials near the well.

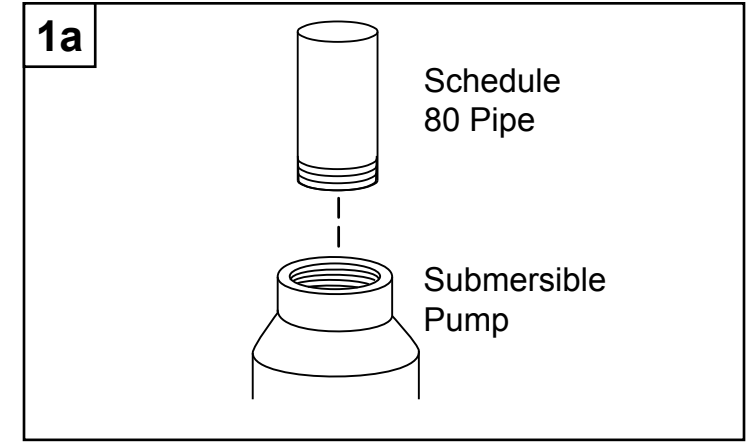
NOTE: All threaded joints and connections should have thread tape applied, tightened securely with a pipe wrench and then tightened an additional 1/4 turn.

ASSEMBLY INSTRUCTIONS

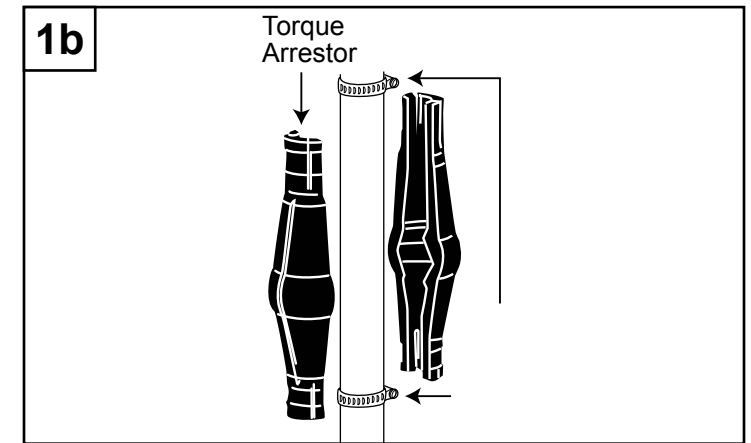
Follow step 1a and 1b below for Schedule 80 pipe or step 2a and 2b for black poly pipe.

Schedule 80 pipe (recommended)

1a. Apply thread tape and then thread the pipe directly into the pump discharge and tighten. For 1 in. pipe, you will also need a 1-1/4 in. x 1 in. reducer bushing, not shown. **(Fig. 1a)**

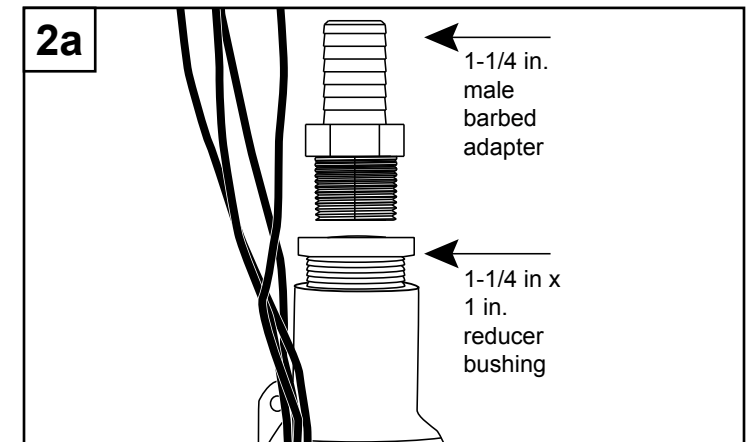


1b. Slide the two hose clamps packaged with the torque arrestor over the end of a short piece of Schedule 80 pipe (approximately 4 ft. long). The pump will be easier to handle if a short piece is installed first. Continue to Step 3. **(Fig. 1b)**

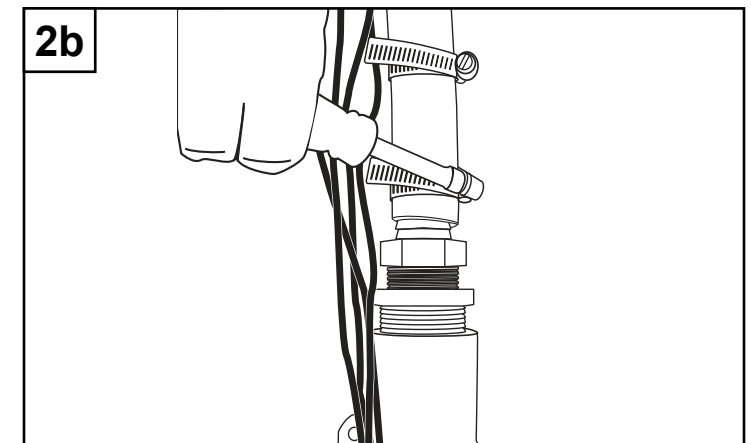


Black poly pipe

2a. Apply thread tape and thread a 1-1/4 in. male barbed adaptor into the top of the pump and tighten. If using 1 in. black poly pipe, install a 1-1/4 in. x 1 in. reducer bushing as shown. **(Fig. 2a)**

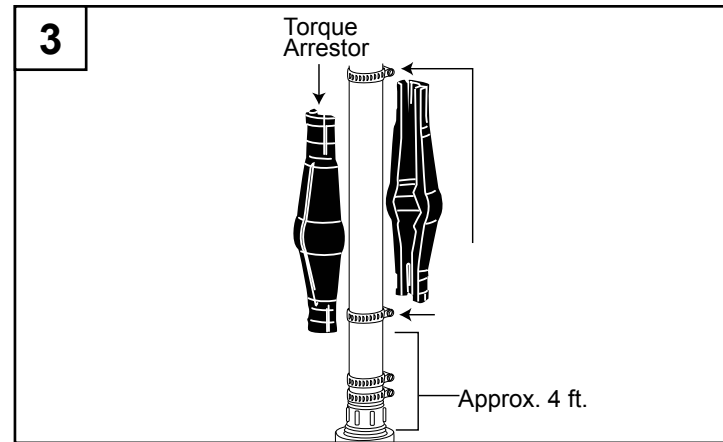


2b. Clamp pipe onto barbed end of male adaptor with two hose clamps. **(Fig. 2b)**



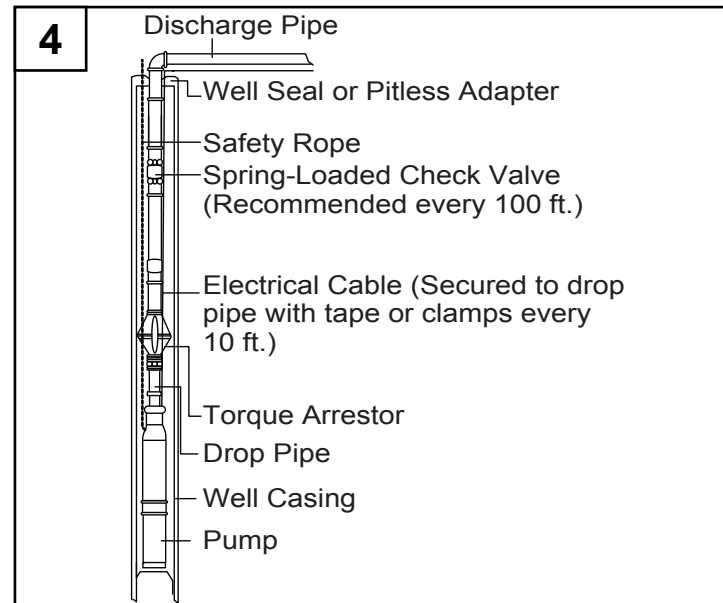
ASSEMBLY INSTRUCTRIONS

3. Firmly clamp the torque arrestor to the pipe approximately 2 to 4 ft. above the pump, using the two clamps provided with the torque arrestor. (Fig. 3)



4. Typical installations include the following components. Purchase these items separately depending on your need. (Fig. 4)

- Discharge pipe - delivers water to home
- Well seal or pitless adapter - keeps debris out of well
- Safety rope - prevents pump from falling
- Check valve - keeps water in pipe
- Electrical cable - connects to house electricity
- Torque arrestor - keeps pump stable
- Drop pipe - connects pump to discharge
- Well casing - holds all components



ELECTRICAL HOOKUP AT THE PUMP

Submersible Cable Splicing

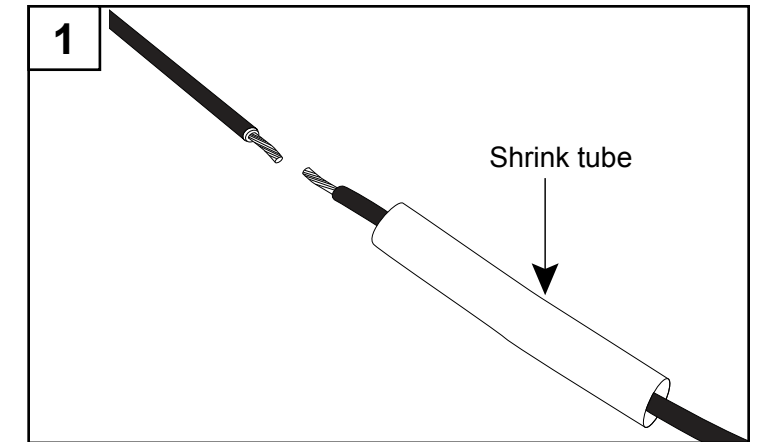
Pump is equipped with a lead wire assembly. The length of wire needed to attach to this lead wire assembly is equal to the distance from the pump in the well to the top of the well. Additional wire will be needed to run from the top of the well to the house.

CAUTION: Follow instructions carefully to make a watertight splice. A leak in the splice can result in pump damage, blown fuses, overload protector tripping or electric shock hazard.

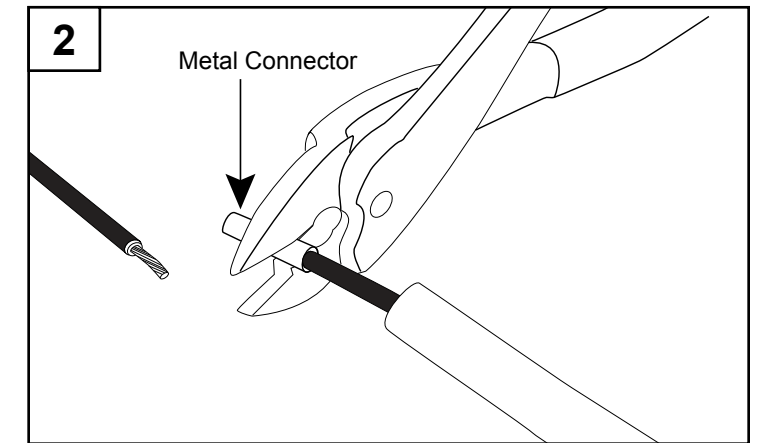
ELECTRICAL HOOKUP AT THE PUMP

Splicing instructions

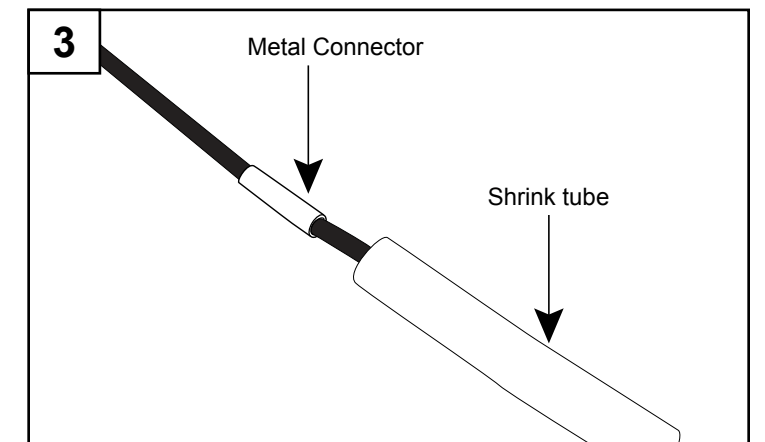
1. Slide one black shrink tube from a heat shrink splice kit over each wire (including the green ground wire) coming out of the pump. (Fig 1)



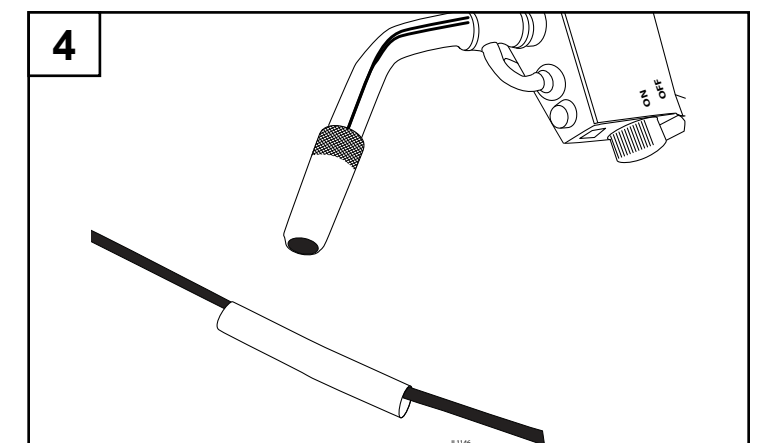
2. **NOTE:** For each wire coming out of the pump, including the green ground wire, slide the wire from the pump into one end of a metal connector from the splicing kit. Then slide stripped end of wire from electrical cable into other end of metal connector. Connector should be centered over both wires. Squeeze metal connector until it closes tightly over both wire ends. (Fig 2)



3. Slide one shrink tube over each crimped joint. (Fig 3)



4. Hold a torch approximately 6 in. from the center of the tubing and move it back and forth. Heat one set of wiring tubing at a time until seal is completed. During the heating process, keep all other wires/tubing away from heat to prevent melting together. Avoid overheating, as this may make the tubing brittle. When liquid oozes from end of tube, seal should be complete. (Fig 4)



CAUTION: Do not lift pump by power cable or motor leads! Damage to cable or leads will result.

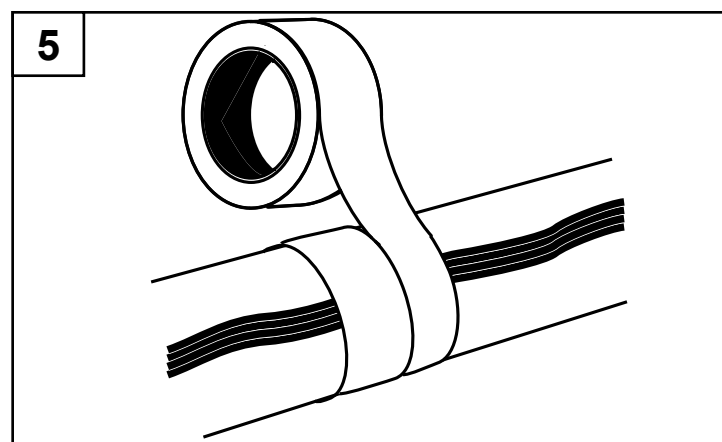
ELECTRICAL HOOKUP AT THE PUMP

Securing wires to pipe

5. Tape electrical cable to the pipe about every ten feet. Use a minimum of two wraps of tape to allow the cable to move slightly. Tape spliced connections to the pipe to eliminate rubbing against the well casing. A cable guard or plastic zip ties may also be used. (Fig 5)

Ground Wire Installation (REQUIRED)

⚠ DANGER: The green ground wire from Pump motor must be connected to power supply ground or fatal electrical shock may result.

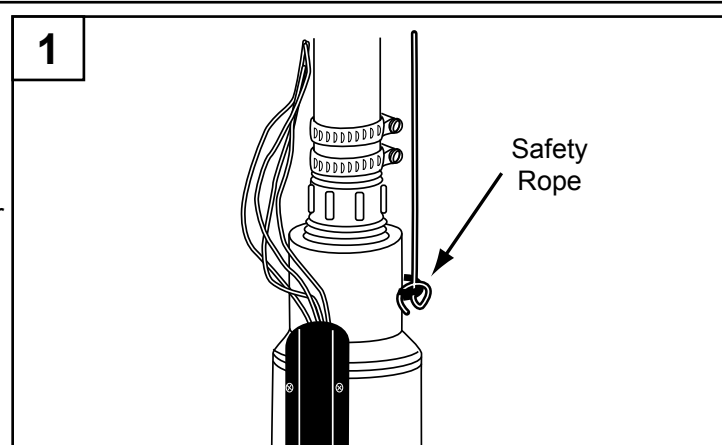


INSTALLATION

LOWERING PUMP INTO WELL

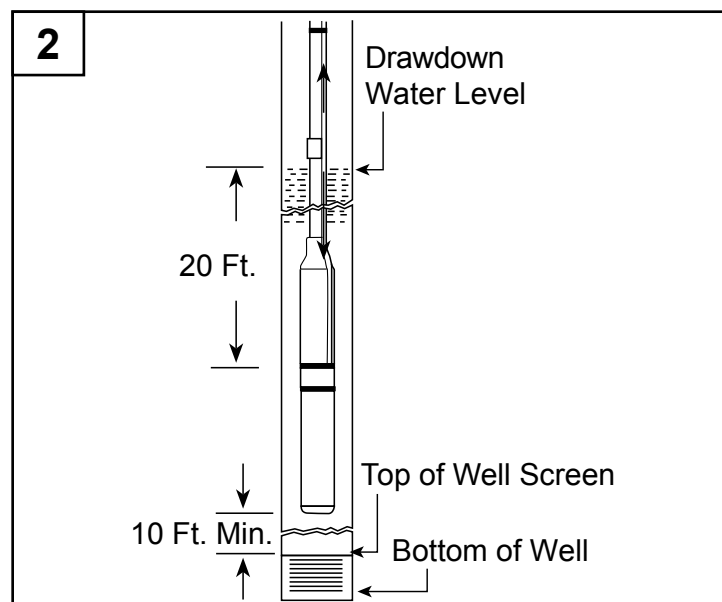
REMINDER: Pump and all piping must be assembled and securely connected before the assembly is lowered into the well.

1. Tie one end of safety rope securely to pump safety eyelet and the other end to the well cap. This is your only security against losing the pump down the well. (Fig 1)



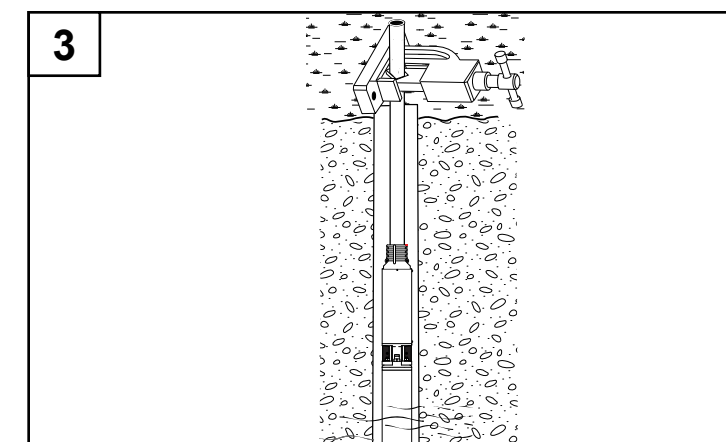
⚠ CAUTION: Be sure the top edge of the well casing is perfectly smooth. Sharp or jagged edges can cut or scrape the cable and cause a short. Do not let the cable drag over the edge of the well casing since this may cause damage to the insulation.

2. Lower pump to approximately 20 ft. below maximum drawdown of the water or a minimum of 10 ft. off the bottom. **Do NOT** set pump on bottom of well. (Fig 2)

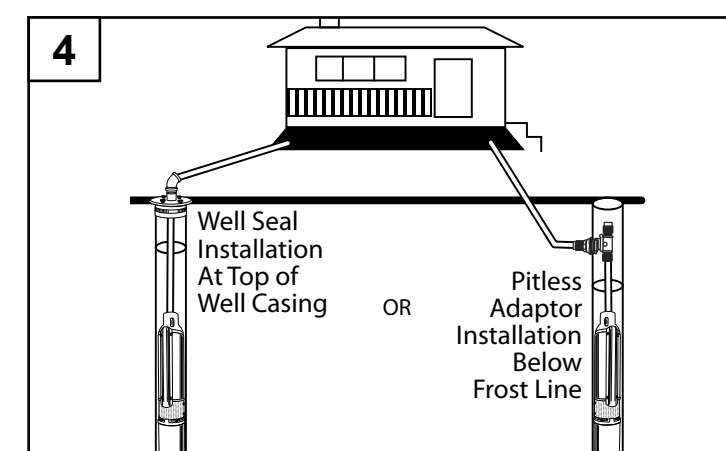


INSTALLATION

3. Use a pipe vise to prevent the pump and pipe from dropping into the well. (Fig 3)

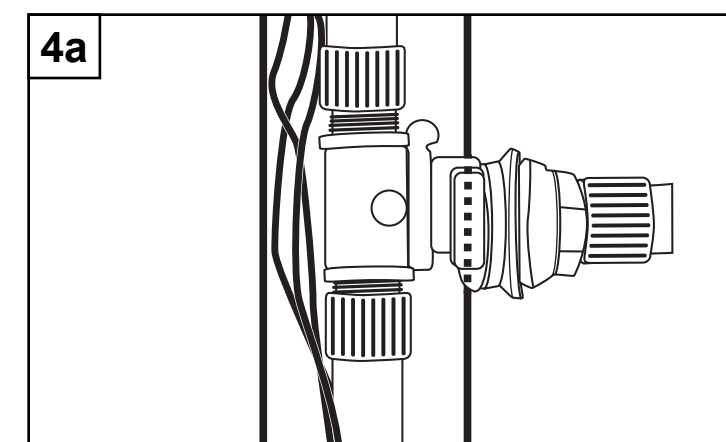


4. Add a well seal or pitless adaptor to allow for the pipe to be connected to house service. (Fig. 4)

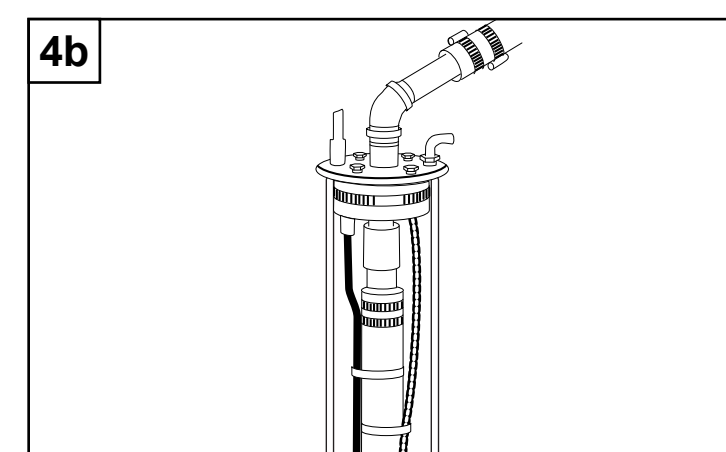


4a. Pitless Adaptor Installation. Pitless adaptor should be installed below the frost line, and on the side of the well casing where the supply line will run from well, in accordance with the manufacturer's instructions. (Fig. 4a)

NOTE: Pitless adaptor models vary according to each application.



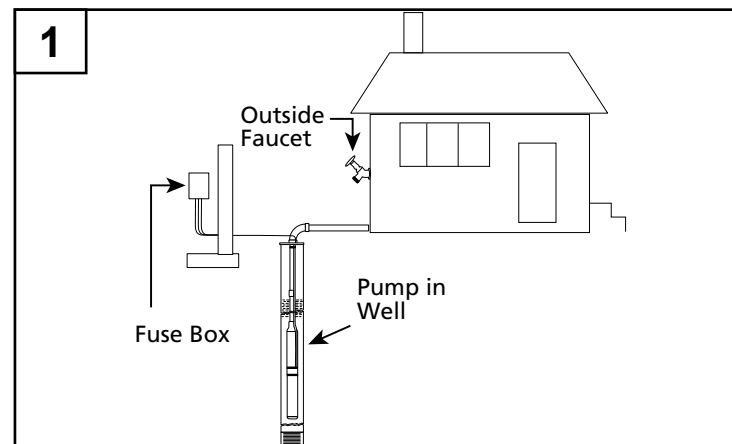
4b. Well Seal Installation: After the pump assembly is lowered into the well, mount the well seal onto the well casing and tighten the four bolts in the well seal evenly. (Fig. 4b)



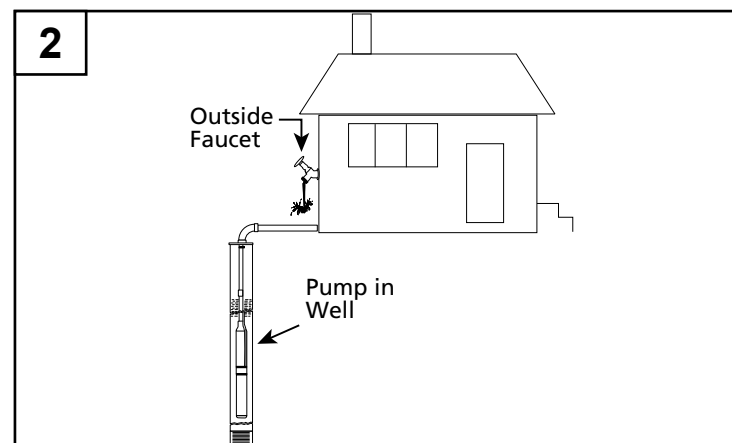
PRELIMINARY TEST RUN

⚠ WARNING: All electrical wiring or service should be done by qualified electrician. Be sure to test cable for continuity with an ohmmeter before starting the pump.

1. All wells should be flushed clear before allowing water into the house. **(Fig. 1)**

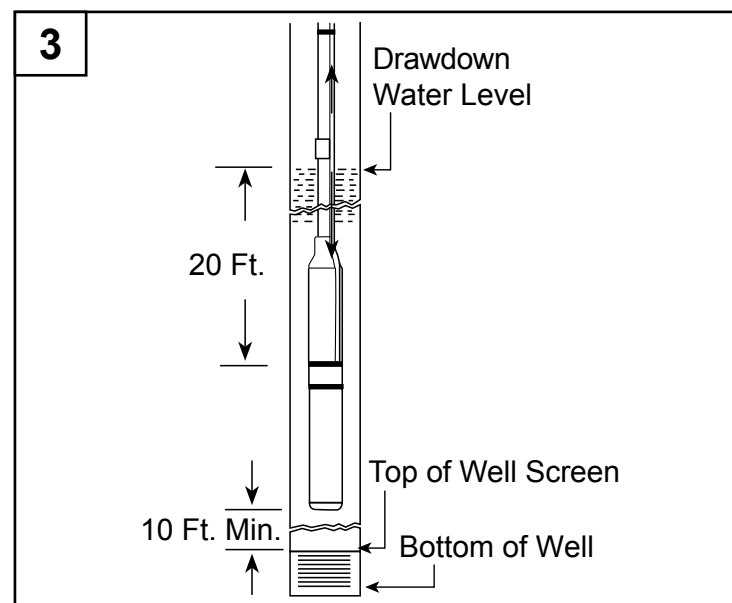


2. Open an outside faucet and allow water to run until water is clear of sand or any other impurities. If an outside faucet is not available, place softener in bypass position, remove aerator from a high-flow faucet and allow water to run until it is clear of impurities. Once clear, turn off water flow, replace aerator and put softener back into service position. **(Fig. 2)**



⚠ CAUTION: Be sure you do not stop pump before water runs clear. This may take several hours. If pump stops with sand in it, it may lock.

3. If pump lowers water in the well far enough to lose prime, either lower pump in the well (if possible) or throttle (slow down) the discharge of the well with the gate valve to match the capacity of the well. **(Fig. 3)**



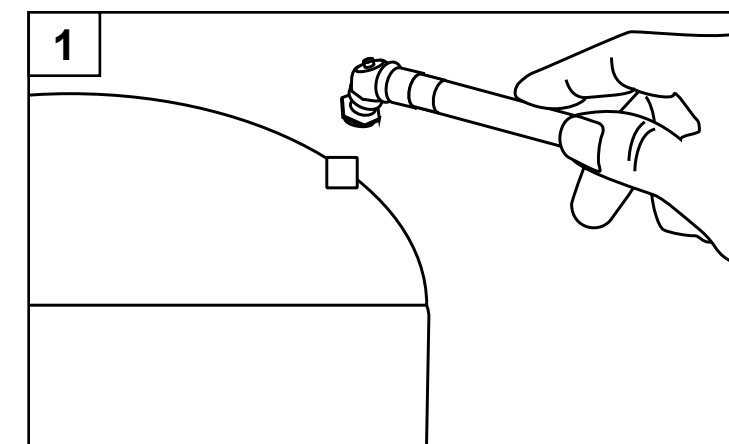
NOTE: If the well is low capacity, use a low water level control.

PRESSURE TANK INSTALLATION

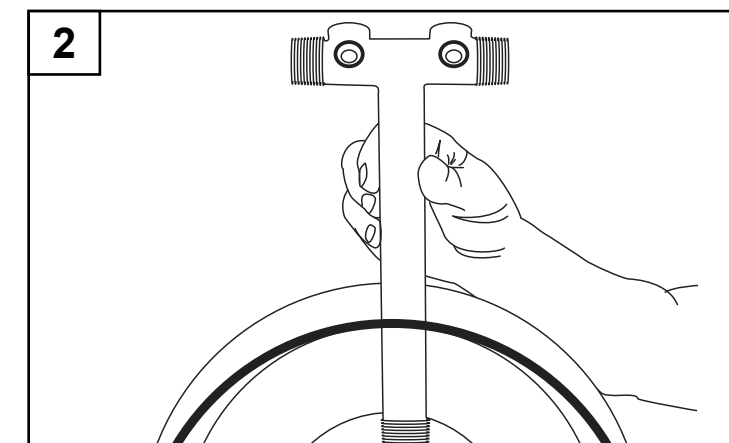
The purpose of the pressure tank is to allow a certain amount of water to be used before the pressure drops enough to cause the pump to start. Without a pressure tank, the pump would start and stop constantly, every time water is used.

NOTE: Use thread tape and thread paste on all threaded connections.

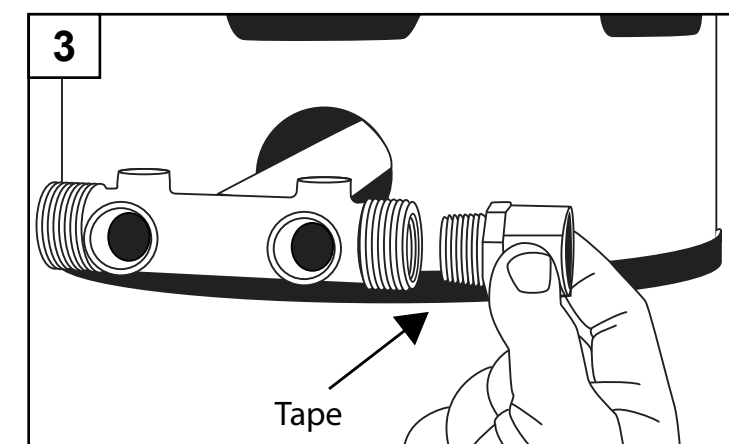
1. **NOTE:** Check the air pressure of the tank with a tire gauge before the system is charged with water. The pressure should be 2 lbs. less than the low pressure cut in on the pressure switch. For instance, for a 30-50 switch, set the tank pressure at 28 lbs. or less. **(Fig. 1)**



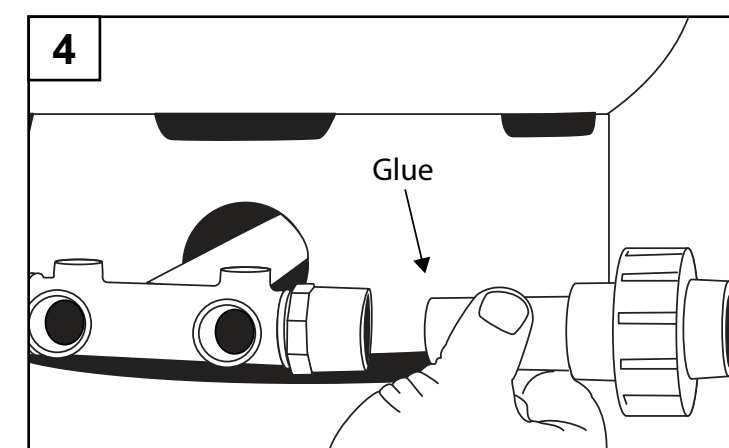
2. Apply five wraps of thread tape and thread paste, insert a tank tee through the opening in the bottom of the pressure tank, and tighten securely. **(Fig. 2)**



3. Connect a 3/4 in. fitting to the 3/4 in. opening on the pipe tee. **(Fig. 3)**

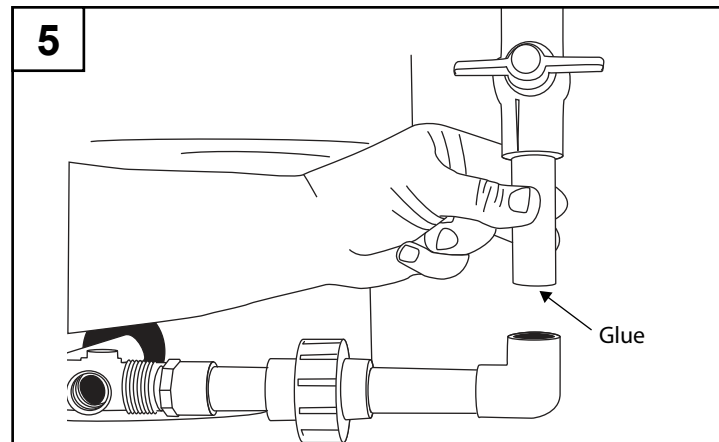


4. Connect a 3/4 in. pipe and union to the 3/4 in. fitting. **(Fig. 4)**

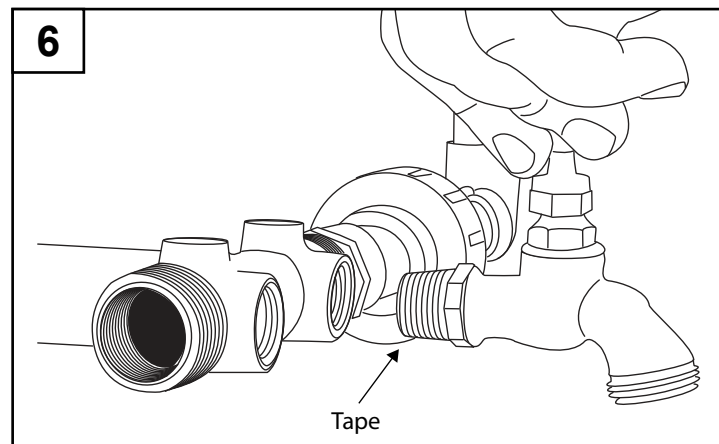


PRESSURE TANK INSTALLATION

5. Connect elbows, additional pipe and ball valve (all sold separately) as needed for your particular installation. (Fig. 5)



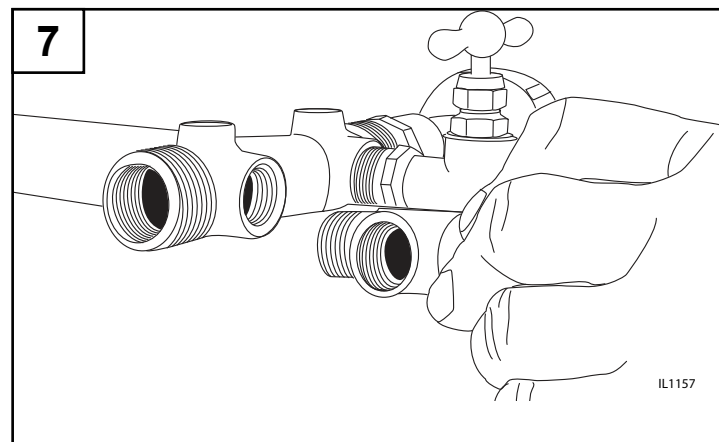
6. Connect a drain valve to one of the 1/2 in. openings in the tank tee. (Fig. 6)



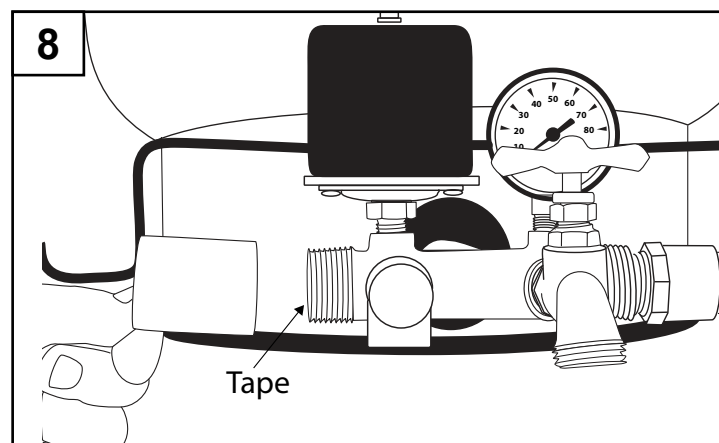
⚠ WARNING: Not providing a relief valve can cause extreme overpressure that could result in personal injury and/or property damage.

A properly sized pressure relief valve must be installed on any installation where the pump pressure can exceed the pressure tank's maximum working pressure or on systems where the discharge line can be shut off or obstructed. The relief valve drain port should be piped to a drain.

7. Attach the pressure relief valve to the remaining 1/2 in. opening in the tank tee. (Fig 7)



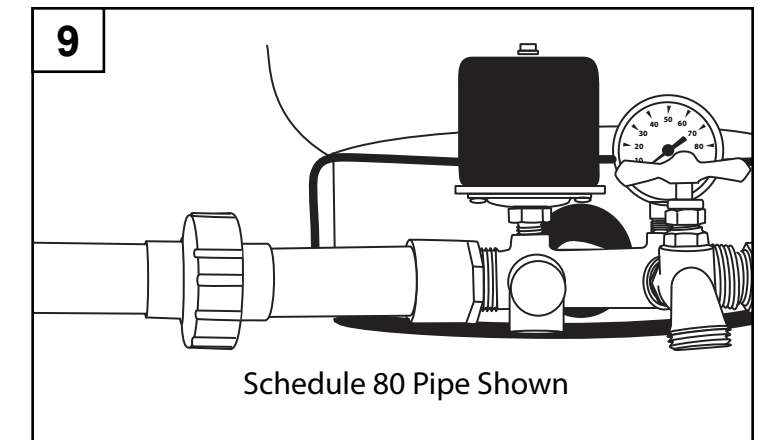
8. To connect the pressure tank to the pump, begin by threading a 1 in. coupling onto the pipe tee. (Fig. 8)



PRESSURE TANK INSTALLATION

9. Add additional couplings, unions and pipe (all sold separately) as necessary to reach the pump. (Fig. 9)

NOTE: Schedule 80 pipe recommended



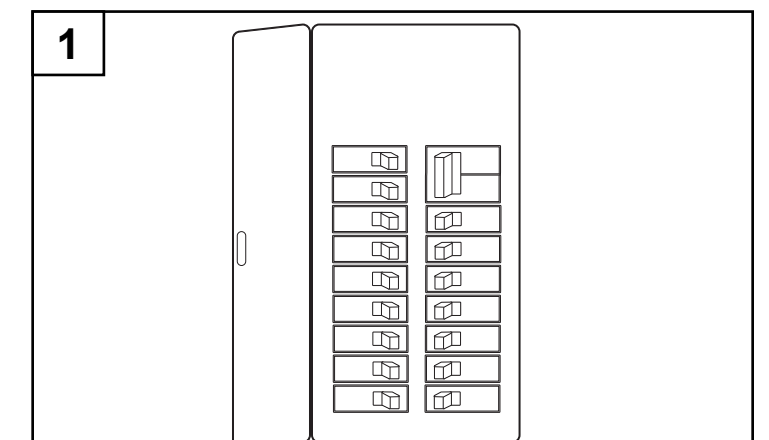
ELECTRICAL HOOKUP FROM THE HOUSE TO PUMP AND PRESSURE TANK

For - 2-Wire Pumps - No Control Box Required.

⚠ WARNING: This equipment is intended for installation by technically qualified personnel. Failure to install it in compliance with national and local electrical codes may result in electrical shock or fire hazard, unsatisfactory performance, and equipment failure.

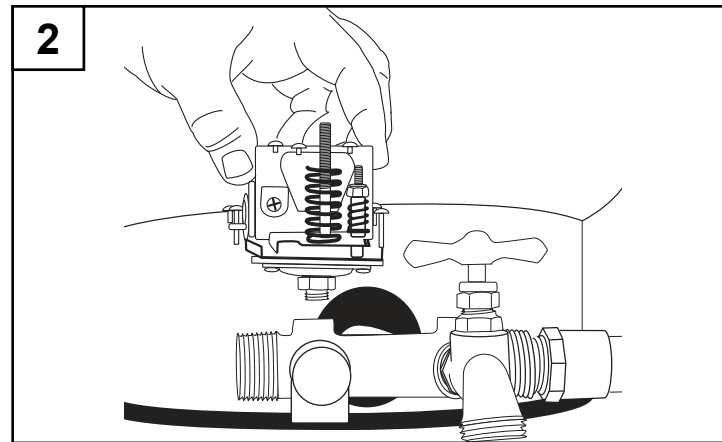
⚠ WARNING: Always disconnect power source before working on or near the pump, its connected load and wiring. If the power disconnect is out of sight, lock it in the open position and tag to prevent unexpected application of power.

1. Determine proper voltage from breaker box to pressure switch. (Fig. 1)



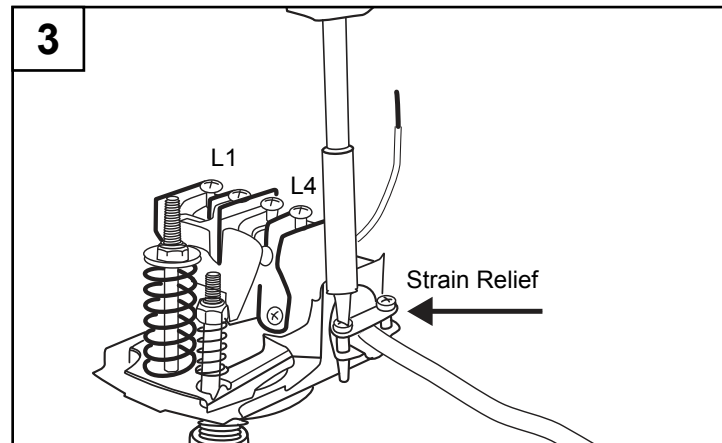
ELECTRICAL HOOKUP FROM THE HOUSE TO PUMP AND PRESSURE TANK

2. Remove cover from pressure switch and screw the switch into the 1/4 in. opening on the top of the pipe tee. (Fig. 2)

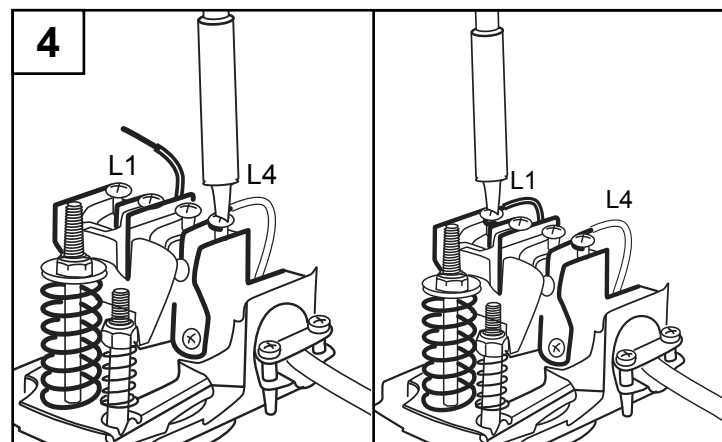


3. Thread the cable from the house electrical service through one of the holes in the side of the pressure switch and tighten down the electric wire strain relief. (Fig. 3)

CAUTION: Do not crush wire. (Fig. 3)

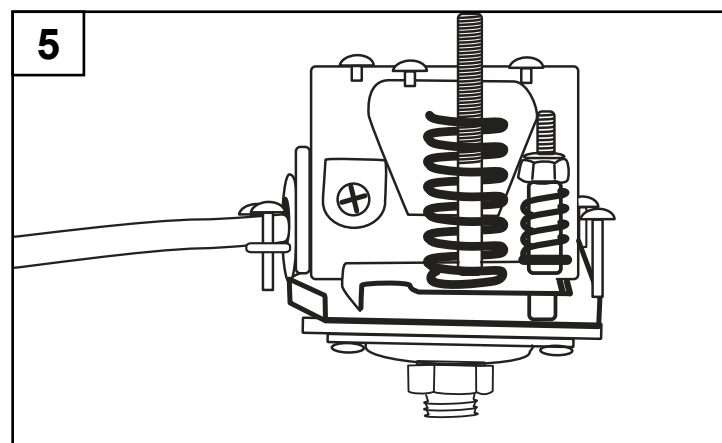


4. Connect the two wires from the house electrical service to the outside pressure switch terminals (L1 and L4). (Fig. 4)



5. Thread the cable from the pump through the remaining hole in the side of the pressure switch and tighten down the electric wire strain relief.

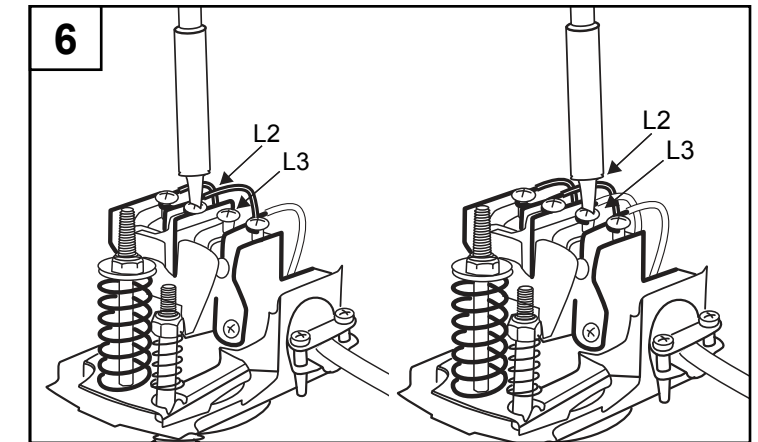
CAUTION: Do not crush wire.



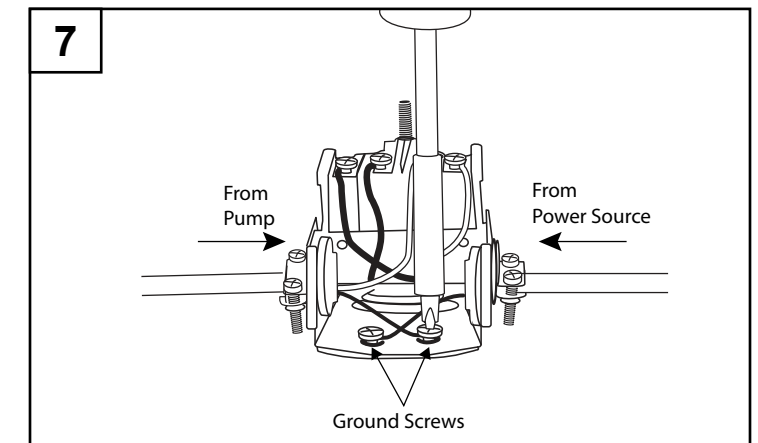
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ELECTRICAL HOOKUP FROM THE HOUSE TO PUMP AND PRESSURE TANK

6. Connect the two wires from the pump to the inside pressure switch terminals (L2 and L3). (Fig. 6)



7. Connect green ground wires from the pump cable and the house electric cable to the two ground green screws on base of pressure switch. Replace switch cover. (Fig. 7)



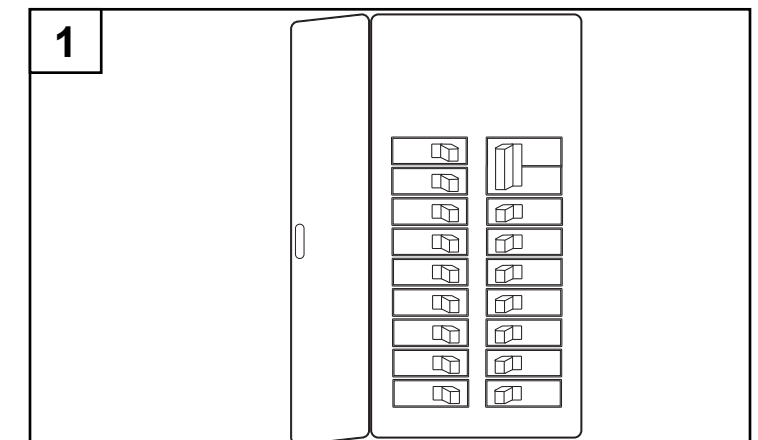
For - 3-Wire Pumps - Control Box Is Required.

⚠ WARNING: This equipment is intended for installation by a technically qualified electrician. Failure to install it in compliance with national and local electrical codes may result in electrical shock or fire hazard, unsatisfactory performance, and equipment failure.

⚠ WARNING: Always disconnect power source before working on or near the pump, its connected load and wiring. If the power disconnect is out of sight, lock it in the open position and tag to prevent unexpected application of power.

NOTE: 3-wire pumps require a control box (See chart on page 6).

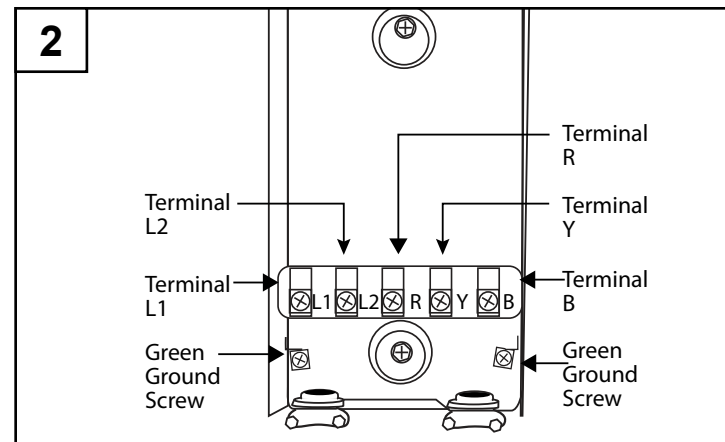
1. Determine proper voltage from breaker box to pressure switch. (Fig. 1)



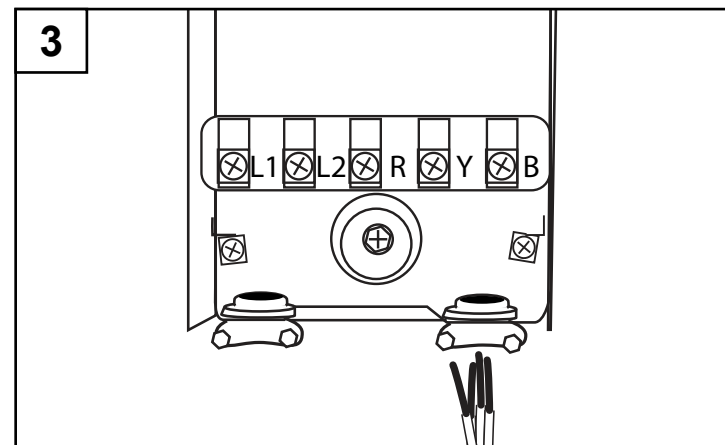
15

ELECTRICAL HOOKUP FROM THE HOUSE TO PUMP AND PRESSURE TANK

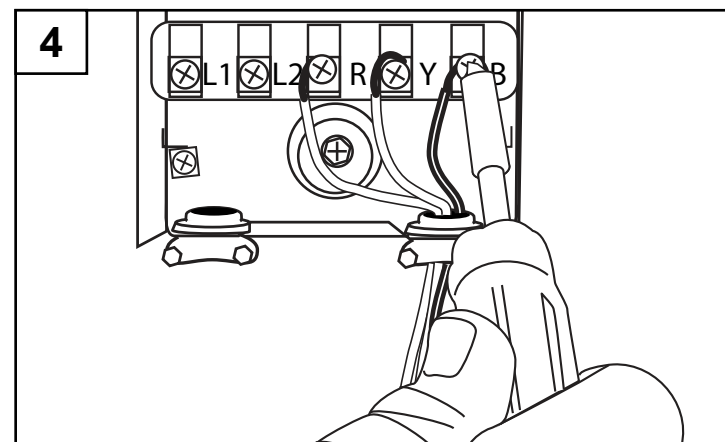
2. Remove the cover from the control box and mount it in an indoor location protected from moisture. **(Fig. 2)**



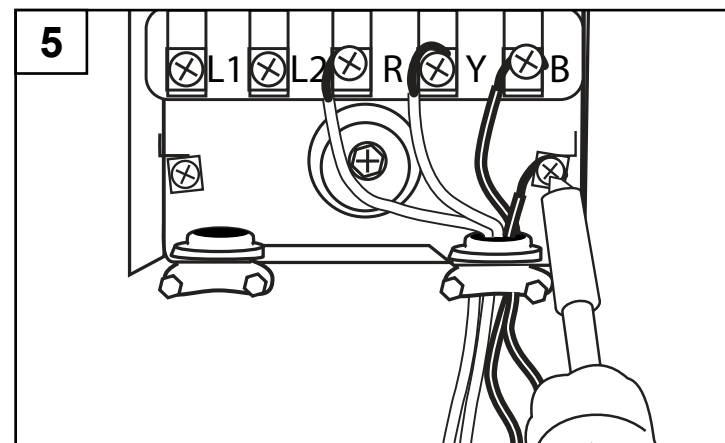
3. Thread the electrical wire from pump into the right opening in the bottom of the control box and tighten the electric wire strain relief securely. **(Fig. 3)**



4. Attach the black, yellow and red wires to the appropriate terminals marked "B", "Y" and "R". **(Fig. 4)**



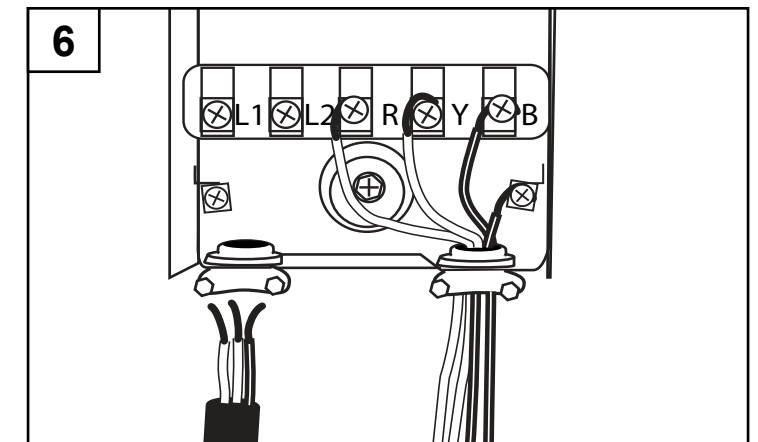
5. Connect the green ground wire from the pump to the green ground screw in the lower right corner of the control box. **(Fig. 5)**



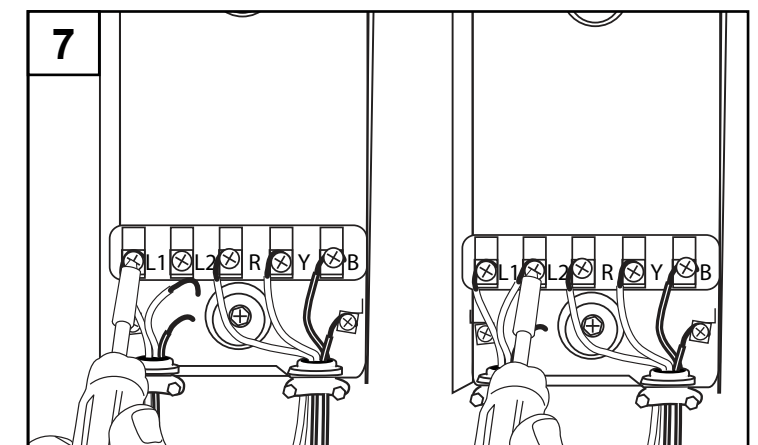
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ELECTRICAL HOOKUP FROM THE HOUSE TO PUMP AND PRESSURE TANK

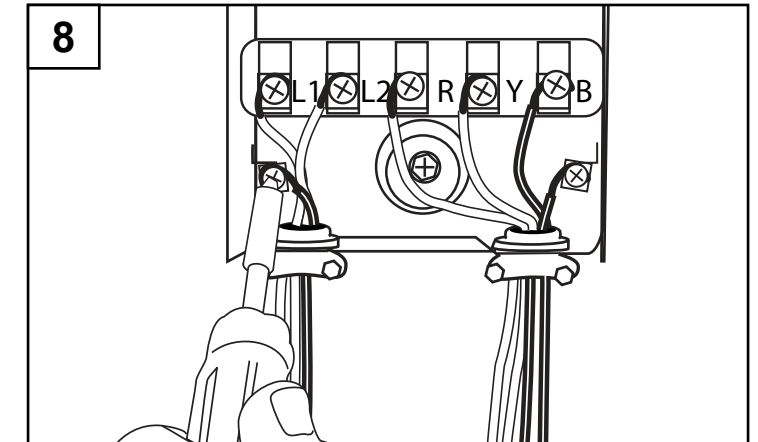
6. Thread the electrical wire from the pressure switch into the left opening at the bottom of the control box and tighten the electric wire strain relief securely. **(Fig. 6)**



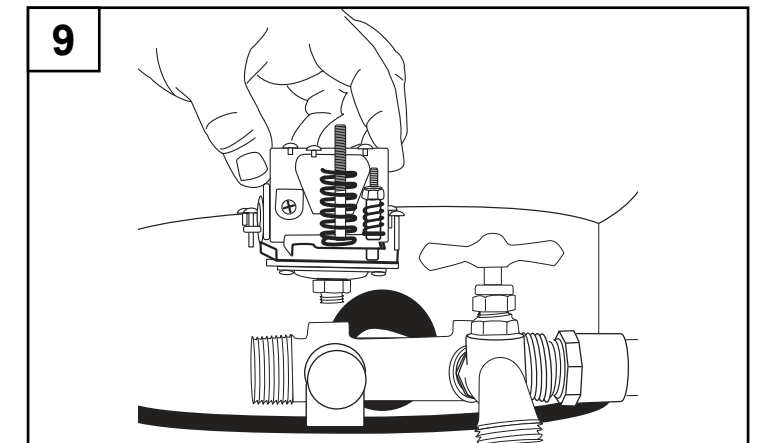
7. Connect the two wires from the pressure switch to the terminals in the control box marked L1 and L2. **(Fig. 7)**



8. Connect the green ground wire from the pressure switch to the green ground screw in the lower left corner of the control box and re-install the control box cover. **(Fig. 8)**



9. Remove cover from pressure switch and screw the switch into the 1/4 in. opening on the top of the pipe tee. **(Fig. 9)**

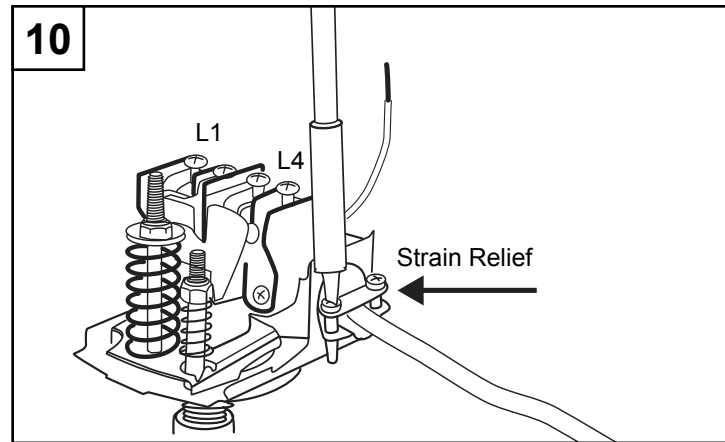


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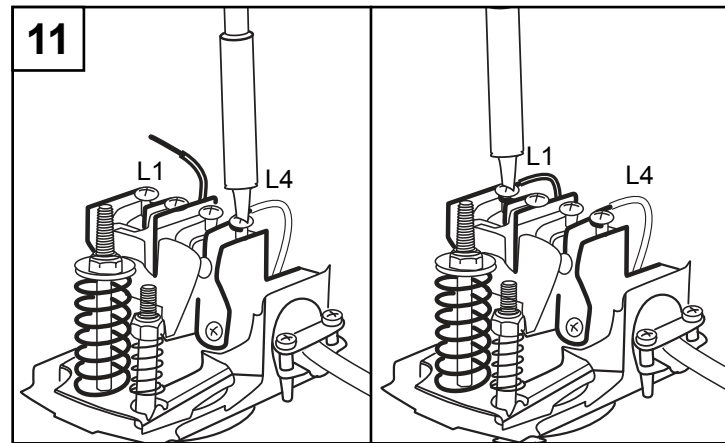
ELECTRICAL HOOKUP FROM THE HOUSE TO PUMP AND PRESSURE TANK

10. Thread the cable from the house electrical service through one of the holes in the side of the pressure switch and tighten down the electric wire strain relief. (Fig. 10)

CAUTION: Do not crush wire. (Fig. 10)

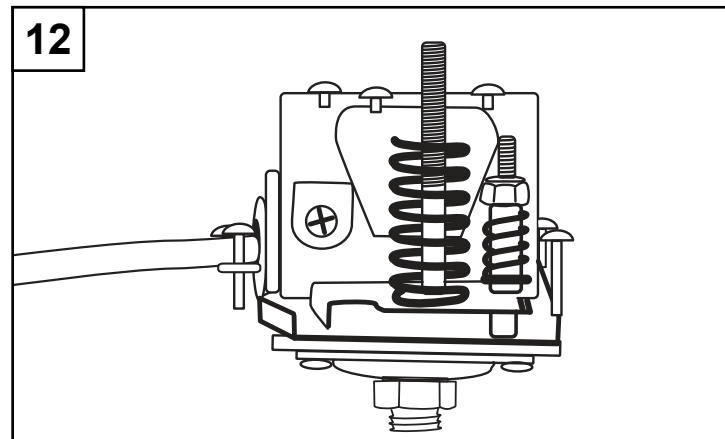


11. Connect the two wires from the house electrical service to the outside pressure switch terminals (L1 and L4). (Fig. 11)

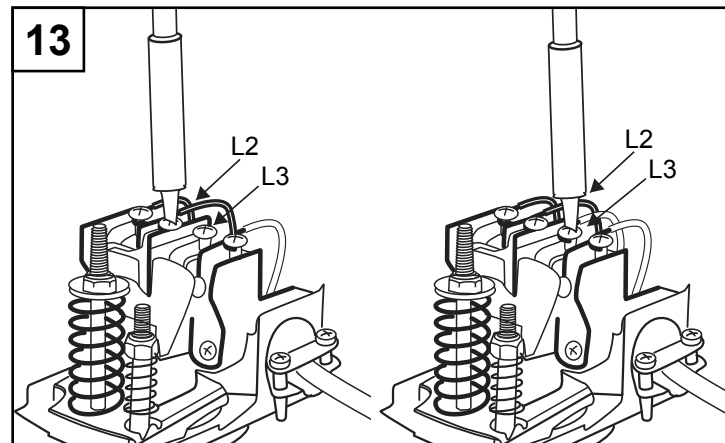


12. Thread the cable from the control box through the remaining hole in the side of the pressure switch and tighten down the electric wire strain relief. (Fig. 12)

CAUTION: Do not crush wire. (Fig. 12)



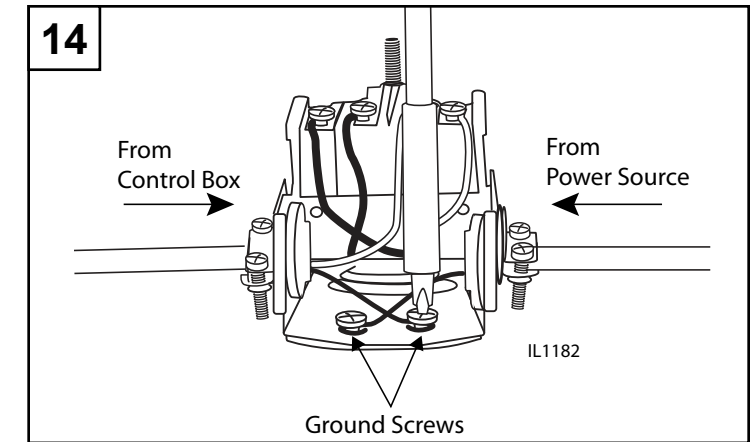
13. Connect the two wires from the control box to the inside pressure switch terminals (L2 and L3). (Fig. 13)



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ELECTRICAL HOOKUP FROM THE HOUSE TO PUMP AND PRESSURE TANK

14. Connect green ground wires from the control box cable and the house electric cable to the two ground screws on base of pressure switch. Replace switch cover. (Fig 14)



TROUBLESHOOTING

Problem	Possible Cause	Corrective Action
Fuses blow	1. Incorrect voltage at motor	1. Check for correct wire size. Replace undersize wire. Check line voltage, contact power company if voltage is incorrect
	2. Defective fuse box or incorrect fuses	2. Inspect fuse box wiring and correct. Install the proper fuses
	3. Defective pressure switch	3. Replace pressure switch or clean contacts
	4. Control box malfunction	4. See control box checking and repairing procedures. Replace defective components
	5. Defective drop cable insulation	5. Check drop cable insulation resistance. Pump must be pulled to replace defective cable
	6. Motor malfunction	6. Check motor winding resistance. Pump must be pulled to replace defective motor
	7. Pump malfunction	7. If all above checks are good, then pump is probably bound. Pump must be pulled. Check for sand or pump shaft misalignment. Correct well condition if sand is the problem
Motor won't start. Fuses don't blow	1. No power to start motor	1. Check voltage at line side of fuse box. Contact power company if no power is reaching box. Check voltage at load side of fuse box and at other control devices in circuit. Make necessary corrections
	2. Defective drop cable or motor	2. Check motor winding resistance. Pump must be pulled to replace defective cable or motor

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TROUBLESHOOTING

Problem	Possible Cause	Corrective Action
Motor runs, but delivers little or no water	1. Air locked pump	1. Normal delivery may resume if water pump is started and stopped at one minute intervals
	2. Gas or air in well water	2. Connect hose to service valve. Run water thru hose submerged in water in clear jar. Observe for air bubbles from hose outlet. If tank is standard type, the air volume control may be defective - replace; otherwise, have well checked for proper water level as pump may be drawing air. Lower pump and/or correct well condition
	3. Low water level in well or pumping too much from well	3. Throttle pump with gate valve. Lower pump setting if depth of well is adequate
	4. Defective or improperly installed check valve	4. Pump must be raised to replace or reinstall correctly
	5. Leak in drop pipe damaged section	5. Raise pump, check pipe for leak and replace
	6. Pump inlet screen blocked	6. Raise pump and clean screen. Verify that well is clean. Reset pump at less depth if possible
	7. Worn pump	7. Pull pump and replace damaged components
	8. Broken pump shaft or motor shaft or worn coupling	8. Pull pump, inspect shafts and coupling for damage. Replace defective components
Pump operates properly, but won't shut off	1. Pressure switch	1. Readjust switch to lower shut off pressure setting, clean contacts or replace switch
	2. Low water level	2. Throttle pump outlet at gate valve or readjust pressure switch to lower shutoff pressure setting
	3. Leak in drop pipe or worn pump	3. Throttle pump output at gate valve or readjust pressure switch to lower shut off pressure setting. If pump does not shut off, pump must be raised and defect repaired
Pump starts too often	1. Pressure switch	1. Readjust switch to wider operating pressure limits; replace defective switch
	2. Air volume in tank incorrect	2. Check pressure in tank. Set at 2 lbs. below turn on pressure of the pressure switch. i.e. 30/50 pressure switch should have tank pressure of 28 lbs.
	3. Check valve defect or leak in drop pipe	3. Throttle pump output at gate valve. If pump does not shut off, pump must be raised and defect repaired