

# COMMANDER PRO 75 COMMANDER PRO 100 COMMANDER PRO 150

## Constant Pressure Water Systems

### Owners Guide to Installation and Operation

<p style="text-align: center;"><b>WARNING</b> <b>IMPORTANT SAFETY INSTRUCTIONS</b> <b>RULES FOR SAFE INSTALLATION AND OPERATION</b></p>
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1. Read these warnings and instructions carefully. Failure to follow them could cause serious bodily injury and/or property damage.
  2. Follow all local electrical and safety codes as well as the National Electrical Code (NEC) and the Occupational Safety and Health Act (OSHA).
  3. The power supply should be a separate circuit, independent of all other circuits. Be sure it is equipped with a fuse and disconnect box of ample capacity.
  4. For fire protection, the power supply should be free of any building, preferably on a direct line from the transformer. In the event of fire, the wires will not be destroyed and the water supply not cut-off.
  5. **Always** disconnect power source before performing any work on or near the motor or its connected load. If the power disconnect point is out-of-sight, lock it in the open position and tag it to prevent unexpected application of power. Failure to do so could result in fatal electrical shock.
  6. **DO NOT** handle pump with wet hands or when standing in water as fatal electrical shock could occur. Disconnect main power supply before handling pump for any reason.
  7. Shut off power source when voltage drops 10% below the rated voltage of the motor.
  8. Protect the power cable from coming in contact with sharp objects, oil, grease, hot surfaces or chemicals. **DO NOT** kink the power cable. If damaged replace immediately.
  9. **NEVER** leave the control box, fused disconnect switch, or covers open (either partially or completely) when not being worked on by a competent electrician or repairman.
  10. Always use caution when operating electrical controls in damp areas. If possible, avoid all contact with electrical equipment during thunderstorms or extreme damp conditions.
  11. Install all electrical equipment in protected area to prevent mechanical damage which could produce serious electrical shock and/or equipment failure.
  12. Pump is designed to pump cold ground water that is free of air or gases. Decreased pump performance and life expectancy can occur if the ground water is not cold (86° F/30° C) or contains air or gases.
  13. Pump and controls must be securely and adequately grounded as specified in section 250-43 item (A) of the U.S.A. National Electric Code (NEC) and Section 26-954 Canadian Electrical Code. Failure to do so could result in a fatal injury.
  14. **DO NOT** use this pump to pump flammable liquids such as gasoline, fuel oil, kerosene, etc. Failure to follow the above warning could result in property damage and/or personal injury.  
**▲ WARNING** *The pump is intended for use in a well. Motor frame must be connected to power supply ground or fatal electrical shock may result. Do not use this pump in swimming pools.*
  15. **▲ WARNING** *Capacitors inside CP WATER Subdrive controllers can still hold a lethal voltage even after power has been removed. Allow 10 minutes for dangerous internal voltage to discharge before operating the unit.*
  16. **▲ CAUTION** *Use of this unit with motors from other manufacturers may result in damage to both motor and electronics.*
  17. **▲ CAUTION** *Do not use power factor correction capacitor with the CP WATER Subdrive. Damage will result to both motor and electronics.*
- NOTE: Pumps with the "CSA" mark are tested to UL standard UL778 and certified to CSA standard C22.2 No. 108.

## Typical Installation

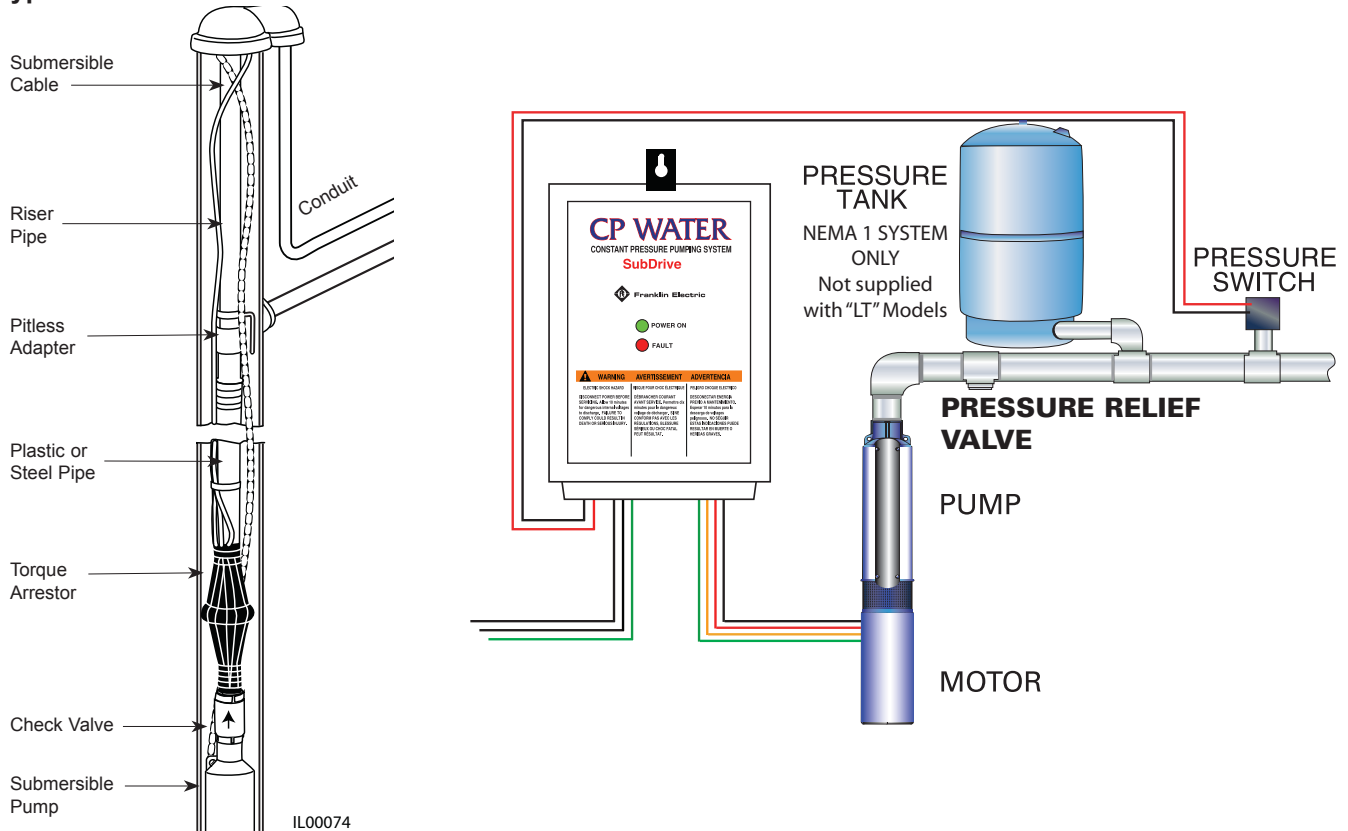


Figure 1 — Typical Installation with Pre-Charged Tank

## READ THESE INSTRUCTIONS COMPLETELY BEFORE INSTALLATION

1. Check that the pump and motor mounting faces are free from dirt.
2. Assemble the pump liquid end and motor together so that mounting faces are in contact. Then tighten assembly bolts evenly in a crossing pattern.

**NOTE:** Apply non-toxic FDA approved waterproof grease such as Mobile 102, Texaco CYGNUS2661 or equivalent to the coupling before assembly of pump coupling to motor shaft. This will prolong spline life and prevent abrasives from entering the spline area.

3. Check for free rotation of the pump and motor. A slight drag is permissible.
4. Assemble the pump lead guard over the motor leads.

**CAUTION** Do not cut or pinch lead wire during assembly.

5. Assemble suction screen to pump mounting ring.

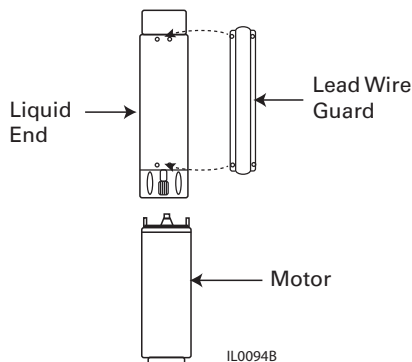


FIGURE 2

### PRE-INSTALLATION

To save possible added expense and extra trips, observe and complete as many as possible of the following precautions and pre-installation procedures before going to the job site or beginning the installation.

### IMPORTANT PRECAUTIONS

1. Prior to installation, inspect the pump for damage. Check for free pump and motor rotation. A slight drag is permissible.
2. Check to make certain that the voltage of the motor end and controls agree with the available phase and voltage. Check power source. Check electrical supply for correct fusing, correct wire size, and adequate grounding and transformer size.

**WARNING** Since most submersible pump problems are electrical, it is very important that all electrical work be done properly. Therefore, all electrical hook-up work or electrical service work should be done by a qualified electrician or service man only!

3. Throughout installation, take care not to damage the insulation of the electrical cable or motor leads. Never support the weight of the unit by electrical cable or motor leads.
4. Before the pump is installed, the well should be pumped free of sand and other foreign matter with a test pump. **The warranty is void if it is used to clean the well.**

## MAJOR WELL COMPONENTS

1. Submersible Pump — A submersible pump is a multi-stage centrifugal. Each stage consists of an impeller and diffuser. Water pressure increases in equal amounts as it passes from stage to stage. The more stages, the higher the pressure the pump will develop.
2. Submersible Motor — The submersible motor is powered by three phase electricity. Make sure the motor is designed for three phase operation.
3. Subdrive Controller — Subdrive is designed for use in residential and light commercial applications with a 3-phase submersible motor using single-phase input.

Motor Design Designation	
Subdrive 75 Controller	1-1/2 HP
Subdrive 100 Controller	2 HP
Subdrive 150 Controller	3 HP

This variable speed controller can be used to provide constant pressure delivery over a wide range of settings (25 to 80 PSI). Factory preset is 50 PSI.

4. The Well — The well should be sand free and have a sufficient flow of water to supply the pump. Clear well of sand and any other foreign matter with a test pump before installing the new submersible pump.

**▲ CAUTION** *Using the submersible pump to clean the well will void the warranty.*

- a. When drilling a new well in an area where sand is a problem, a sand screen should be installed to protect the pump and motor.
  - b. The well should be straight so damage during installation does not occur to the pump or motor by becoming lodged in a crooked well casing.
  - c. The complete pump and motor should be submerged at least ten feet below the draw down level of the well, and the motor should be a minimum of ten feet off the bottom of the well.
5. The Piping — Install the pump with pipe of the same diameter as the discharge port of the pump or larger.

**NOTE:** Use of pipe smaller than the discharge port of the pump will restrict the capacity of the pump and lower its operating performance.

6. Check Valve — A check valve is required on all submersible installations. This valve maintains water within the pipe when the pump is not running. A line check should be installed within 25 feet of the pump and below the draw down level of the water supply.
  - a. For well depths exceeding 200 feet, it is suggested that an additional check valve be installed every 125 feet.
  - b. An additional check valve should be installed in the horizontal line between the well top and the pressure tank.

**▲ CAUTION** *Make certain that the check valve is pointing in the right direction, arrow pointing towards the tank.*

7. Torque Arrester — To center the pump as it is being lowered into the well, a torque arrester is recommended.
8. Pressure Tank — Any change to operating system pressure will require that the precharge in the tank be modified to 70% of that pressure.

Pressure Setting Guide	
System Pressure (at Pressure Sensor)	Pressure Tank Setting (PSI) (+/- 2 psi)
25	18
30	21
35	25
40	28
45	32
50 (factory set)	35
55	39
60	42
65	46
70	49
75	53
80	56

Required Tank Size		
	10 gpm and smaller	19 gpm and larger
CP75	2 gallons	4 gallons
CP100	4 gallons	8 gallons
CP150	4 gallons	8 gallons

9. Pressure Relief Valve — The pressure relief valve and the discharge outlet need a flow rating which exceeds the flow capacity of the installation at the relief pressure. When located in an area where a water leak or relief valve blow-off may damage property, connect an adequate drain line to the pressure relief valve. Run the line to a suitable drain or to an area where the water will not damage property.

**▲ WARNING** *Not providing an adequate relief valve can cause extreme overpressure which could result in personal and/or property damage. It is recommended that you manually activate the valve monthly to keep it in good working condition.*

10. Pitless Adapter — A pitless adapter provides below grade discharge while maintaining above grade access to the well. Placed below the frost line they are frost proof and also prevent well contamination by providing a water tight seal between the vertical drop pipe and the horizontal service pipe connection.
11. Well Seal — On well seal installations the piping in the well projects above the well and is connected above ground to the system piping by means of a tee or elbow. Since the plumbing is above ground, it must be protected from freezing.
12. Submersible Cable — Submersible power cable must be UL listed for submersible pump application. Selecting the proper cable size is important. Undersized cable results in a too low voltage supply to the pump motor

and ultimate motor failure. Oversized cable is costly and not necessary. Refer to cable selection chart for proper cable selection. Cable is selected for the maximum pump setting plus the offset distance to the service entrance.

13. Ground Wire — The National Electric Code (NEC 250-43) requires a separate ground wire be run down the well to the submersible pump and to be connected to all exposed metal parts of the pump and motor. Refer to the most recent National Electric Code (NEC) for additional grounding information. All wiring should be done by a competent electrician.

## INSTALLATION

### SUBMERSIBLE CABLE INSTALLATION

1. Check power source. Check electrical supply for correct fusing, correct wire size, and adequate grounding and transformer size.

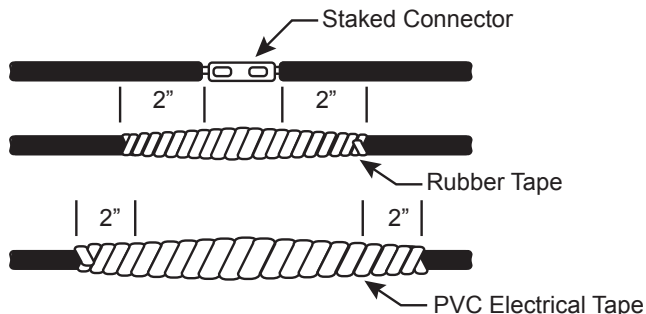
**▲ WARNING** *Since most submersible pump problems are electrical, it is very important that all electrical work be done properly. Therefore, all electrical hook-up work or electrical service work should be done by a qualified electrician or serviceman only!*

2. Follow wiring directions in installation and operations manual.
3. Check cable size against the Submersible Wire Size Chart. Use extreme care; this is a very important step. If required length falls between two wire sizes, use the larger of the two wire sizes (smaller number).

**IMPORTANT:** Use of wire sizes smaller than those specified in the charts will cause low starting voltage, may cause early pump failure and will void the warranty. Larger wire sizes may always be used for better operating economy.

Maximum wire lengths connecting the motor to the controller						
Subdrive	Copper Wire size (AWG)	14	12	10	8	6
Subdrive 75	Maximum Length (Ft.)	420	670	1060	1670	-
Subdrive 100	Maximum Length (Ft.)	320	510	810	1280	2010
Subdrive 150	Maximum Length (Ft.)	240	390	620	990	1540

4. Splice motor leads to submersible cable with commercially available potting, heat shrink splicing kits or by careful tape splicing. Tape splicing should use the following procedure.



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Figure 3

- a) Strip individual conductor of insulation only as far as necessary to provide room for a stake type connector. Tubular connectors of the staked type are preferred. If connector OD is not as large as cable insulation, build-up with rubber electrical tape.
  - b) Tape individual joints with rubber electrical tape, using two layers; the first extending two inches beyond each end of the conductor insulation end, the second layer two inches beyond the ends of the first layer. Wrap tightly, eliminating air spaces as much as possible.
  - c) Tape over the rubber electrical tape with #33 Scotch electrical tape, (Minnesota Mining Co.) or equivalent, using two layers as in step "b" and making each layer overlap the end of the preceding layer at least two inches.
5. In the case of a cable with three conductors encased in a single outer sheath, tape individual conductors as described, staggering joints. Total thickness of tape should be less than the thickness of the conductor insulation.

### GROUND WIRE INSTALLATION

**▲ WARNING** *Motor frame must be connected to power supply ground or fatal electrical shock may result.*

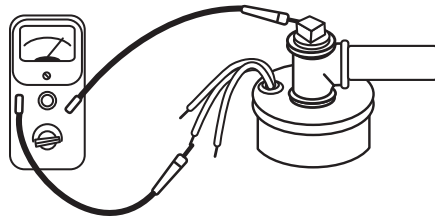
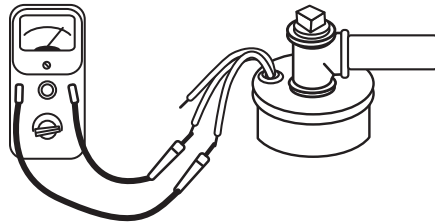
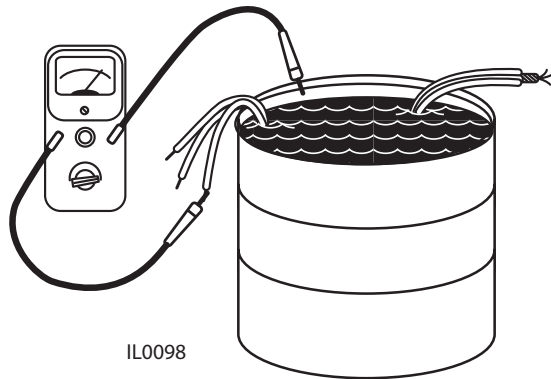
**NOTE:** All electrical wiring should be done by a competent electrician.

1. Grounding the submersible pump is accomplished by running a copper grounding wire from the pump motor to the main electrical system ground.
2. The ground wire to be used must be of the same size as the submersible power cable. It may be insulated or bare. If insulated, it must be green, with or without yellow stripe(s). The ground wire may be part of, or separate from, the supply cable. It may be continuous or spliced above the pump along with the supply cable.
3. The motor lead wire assembly includes a green insulated ground lead. Splice the ground wire to the green insulated lead.
4. The other end of the ground wire will be connected to the power supply grounding terminal or to the control panel ground bar if it is connected to the power supply ground.

**NOTE:** See section entitled Grounding for detailed grounding instructions.

### INSULATION AND CONTINUITY TEST

1. It is recommended that this test be done when the splicing is complete and pump is being test run in a tank of water. This test can be repeated after installation in well but before the final electrical hook-up is made to the control box or pressure switch.



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Figure 4

2. Zero the ohmmeter by clipping the leads together and adjusting the zero ohm knob until the needle indicates zero. Zero the ohmmeter before each use or every time selector switch is changed.
3. Clip one ohmmeter lead to bare cable end.
4. Clip the other lead to edge of steel tank in which pump and cable are submerged. If pump is already in the well, clip lead to discharge pipe metal well casing or bare ground wire.
5. A reading of less than 1,000,000 ohms indicates that cable or splice is grounded. Slowly raise cable from the water at the ohmmeter end. When trouble spot moves clear of the water, needle will move toward infinity reading. In an old installation with the pump in the well, a reading of 20,000 ohms or less indicates a breakdown in the insulation; in this case pull the pump.

## PUMP INSTALLATION

1. The following pump installation instructions use Schedule 80 PVC pipe or galvanized pipe. If either of these two types are used, a foot clamp or vise will be required to hold the PVC or galvanized pipe when connecting the next pipe length.
2. Install the pump in a well which is sand-free, straight, and has sufficient flow of water to supply the pump. Clear well of sand and any other foreign matter with a test pump before installing the submersible pump.

**NOTE:** Using the submersible pump to clean the well will void the warranty. When drilling a new well in an area where sand is a problem, a sand screen must be installed to protect the pump and motor.

3. Chlorinate the well first. Drop 24 to 48 HTH (chlorine) tablets into the well before lowering the pump into the well. This will prevent contamination and the growth of iron bacteria which could later plug the well and the pump. The chlorinated water will be pumped out of the system when testing the pump flow.
4. 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.
5. Install a line check valve within 25 feet of the pump and below the draw down level of the water supply. The check valve should be the same size as the discharge outlet of the pump or larger.

**NOTE:** Use of pipe smaller than the discharge tapping of the pump will restrict the capacity of the pump and lower its operating performance.

6. When connecting the first length of pipe and placing the pump in the well casing, care should be maintained to center the pump in the well. It is easier to handle the pump if a short piece of pipe is installed first, rather than a long piece. Install the check valve at the end of the first piece of pipe prior to lowering the pump into the well. Maintain alignment as the pump is placed and lowered into the well, a torque arrester is recommended to keep the pump centered in well. Wrap the pipe with enough tape at top and bottom of torque arrester to keep it from sliding up the pipe while the pump is being lowered into the well.
7. If not already done, splice the electrical cable to the motor leads. The cable and ground wire should be taped to the discharge pipe. Tape the cable about 5 feet above the discharge and every 20 feet thereafter. Install cable guards if required to eliminate rubbing against the well casing. Do not let the cable drag over the edge of the well casing. Never allow the weight of the pump to hang on the cable alone.
8. Lower the pump into the well slowly without forcing. Use a vise or foot clamp to hold the pipe while connecting the next length. A boom, tripod or pump setting rig is recommended. Lower pump to approximately 10 feet below maximum draw down of the water if possible and keep approximately 10 feet from the bottom. DO NOT set pump on bottom of well. Before each new length of pipe is added, attach the coupling to the top of the pipe length. This will provide a stop for the foot clamp to hold while the next section of pipe is being installed.

## WELL SEAL/PITLESS ADAPTER INSTALLATION

1. All installations should have a well seal. Make sure the seal is seated and tighten the bolts evenly.

**NOTE:** Be sure to assemble the tee to the pipe above the well seal to prevent dropping the pipe and pump down the well as you lower it.

**IMPORTANT:** Well seal and piping must be protected from freezing.

- On a pitless adapter installation, the connection to the system supply line is made below ground. Install the pitless adapter following the instructions included with particular brand or design being used in the installation.

**NOTE:** Follow ALL applicable state and local plumbing codes.

**PRELIMINARY TEST RUN**

- When pump is at desired depth, install throttle valve for preliminary test run. Test cable for continuity with an ohmmeter.
- With pump discharge throttled, run pump until water is clear of sand or any other impurities. Gradually open discharge.

**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 will lock.*

- If pump lowers water in the well far enough to lose prime lower pump in the well.

**CONTROLLER LOCATION SELECTION**

The CP WATER Subdrive standard NEMA 1 controller is intended for indoor use and for operation in ambient temperatures up to 125° F (50° C) at rated input voltage. For outdoor installations, a system with a NEMA 4 rated controller must be used. (Models with 8th and 9th characters of "N4"). To ensure maximum weather protection, the unit must be mounted vertically with the cover properly aligned and secured with all lid screws. The following recommendations will help in selection of the proper location of the CP WATER Subdrive 100 unit:

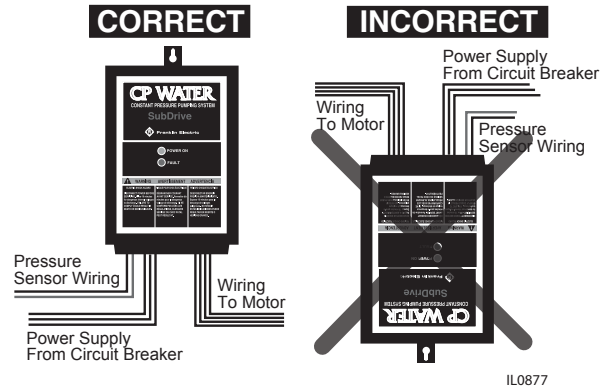
- A tank tee is recommended for mounting the tank, pressure sensor, pressure gauge, and pressure relief valve at one junction. If a tank tee is not used, the pressure sensor should be located within 6 ft. (1.8 meters) of the pressure tank to minimize pressure fluctuations. There should be no elbows between the tank and pressure sensor.
- The unit should be mounted on a sturdy structure such as a wall or supporting post.

Model	Unit Weight	
	NEMA 1	NEMA 4
Subdrive 75	15.0 lbs.	24.14 lbs.
Subdrive 100	17.5 lbs.	28.32 lbs.
Subdrive 150	17.5 lbs.	28.32 lbs.

- The electronics inside the CP WATER Subdrive are air-cooled. Allow room for air flow when installing.

**CAUTION** *There should be at least six inches of clearance on each side and below the unit to allow room for airflow.*

- The CP WATER Subdrive should only be mounted with the wiring end oriented downward. The controller should not be placed in direct sunlight or other locations subject to extreme temperatures or condensation).



**Figure 5**

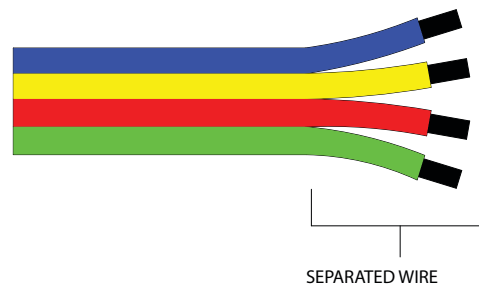
- The mounting location should have access to 230V, electrical supply and to the submersible motor wiring.

**WIRING**

Maximum wire lengths connecting the CP controller to the main circuit box									
Subdrive	Copper Wire size (AWG)	14	12	10	8	6	4	3	2
		Subdrive 75	Max. Length (Ft.)	85	135	225	345	550	865
Subdrive 100	Max. Length (Ft.)		85*	140*	220	345	550	680	895
Subdrive 150	Max. Length (Ft.)			115*	180	285	455	560	740

\*Wire with 90°C insulation only.

**CAUTION** *Due to the inherent voltage changing characteristics of variable frequency drives (VFD), there is additional stress placed on the insulation of the wire between the controller and the motor compared to a standard pump system. Extra care must be taken when using Unjacketed Flat Parallel Pump Cable to ensure that the insulation on each of the separated wires is the same thickness. Care must also be taken to ensure a proper seal with shrink tubing on any splices. Failure to take these precautions can lead to "wire burn through" that will shut down the system. Under these circumstances, no permanent damage usually occurs to the controller or motor. For further details call Technical Support at 1-800-742-5044.*



**Figure 6**

**NOTE: DO NOT USE ALUMINUM WIRE.**

## INSTALLATION PROCEDURE

1. Disconnect electrical power at the main breaker
2. Drain the system (if applicable)
3. Install pressure sensor. The pressure sensor has a 1/4-18 National Pipe Thread (NPT) connection.
4. Use Figure 7 as a guide to locating drill holes into the wall. Remove the CP WATER Subdrive cover by removing the three lid screws. Install the unit to the wall using the three mounting screws (not included).

## WIRING CONNECTION

**⚠ WARNING** *Serious or fatal electrical shock may result from failure to connect the ground terminal to the motor, CP WATER Subdrive controller, metal plumbing or other metal near the motor or cable, using wire no smaller than motor cable wires. To minimize the risk of electric shock, disconnect power before working on or around the CP WATER Subdrive system.*

**⚠ WARNING** CAPACITORS INSIDE THE CP WATER SubDrive CONTROLLER CAN STILL HOLD A LETHAL VOLTAGE EVEN AFTER POWER HAS BEEN DISCONNECTED.

**⚠ WARNING** ALLOW 10 MINUTES FOR DANGEROUS INTERNAL VOLTAGE TO DISCHARGE BEFORE REMOVING CP WATER COVER.

**⚠ WARNING** DO NOT USE MOTOR IN SWIMMING AREA.

1. Verify that the power has been shut off at the main breaker.

2. A circuit breaker must be available for the Subdrive. Wire from the supply panel to the Subdrive must be the correct size.

Model	Circuit Breaker	Wire Size
Subdrive 75	15-Amp	14 AWG or larger
Subdrive 100	20-Amp	12 AWG or larger
Subdrive 150	25-Amp	10 AWG or larger

3. Remove the CP WATER Subdrive lid.
4. Feed the motor leads through the opening on the bottom right side of the unit and connect them to the terminal block positions marked (green ground wire), Red (Black) Yellow (Brown) and Black (Blue).
5. Feed the 230V power leads through the large opening on the bottom left side of the CP WATER Subdrive controller and connect them to the terminals marked L1, GND, and L2.
6. Feed the pressure sensor leads through the smaller opening on the bottom left side of the CP WATER SubDrive unit and connect the red and black leads to the terminals marked "1" and "2" (interchangeable) with a small screwdriver (provided).
7. Use the appropriate strain relief or conduit connectors.
8. Replace the cover. Do not over-tighten the screws.
9. Connect the other end of the pressure sensor cable with the two spade terminals to the pressure sensor. The connections are interchangeable. (Figure 8)

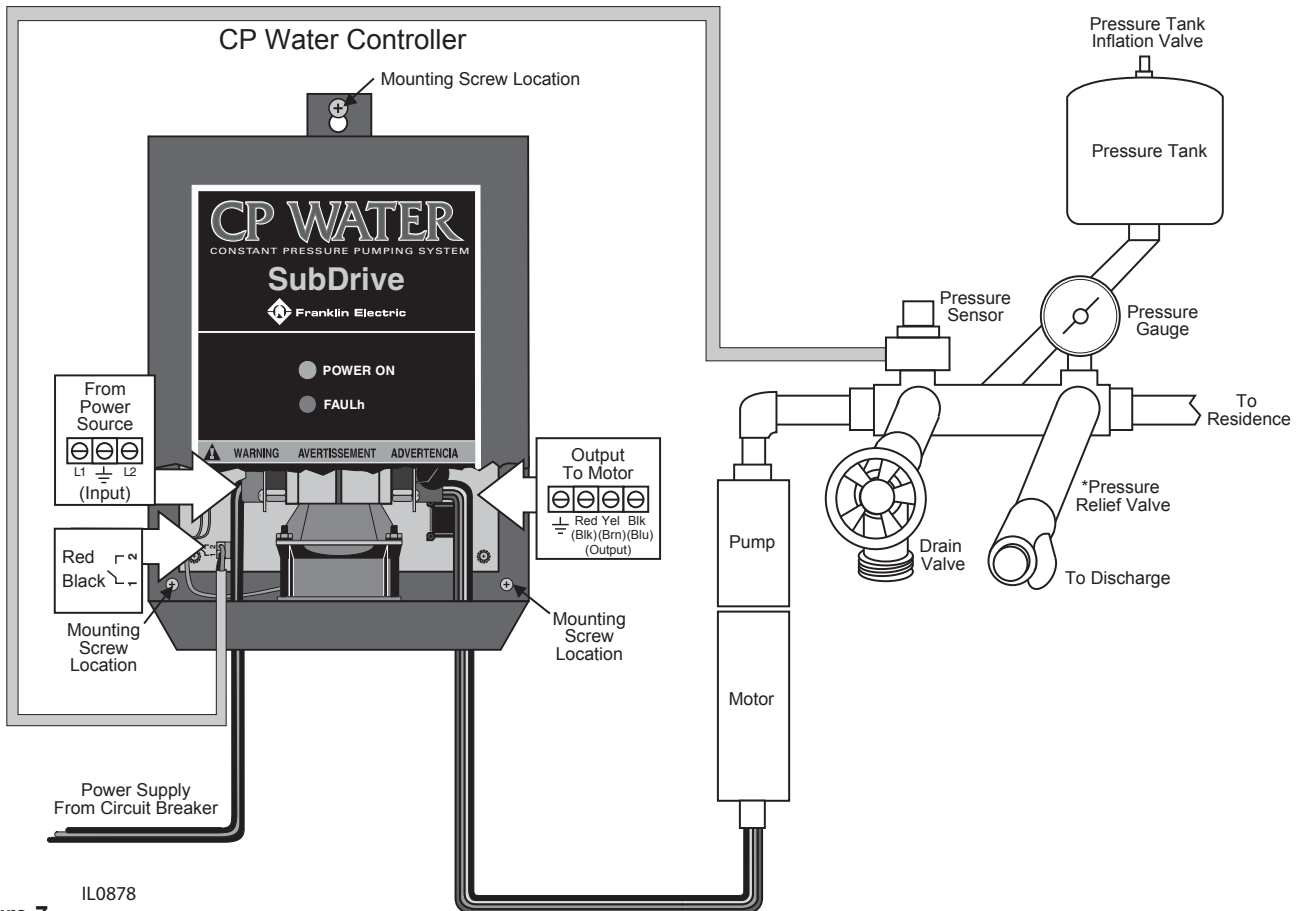
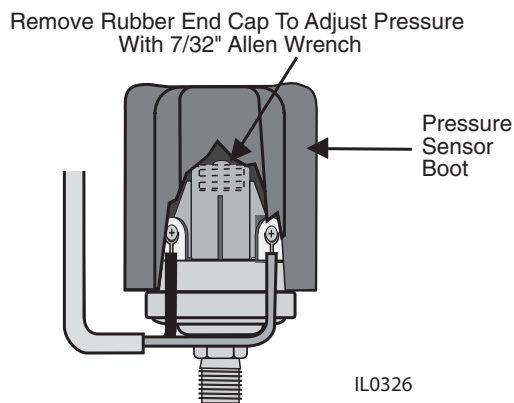


Figure 7

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10. Set the pressure tank pre-charge at 30% below the desired water pressure setting (as per the table on Page 3). To check the tank's pre-charge, de-pressurize the water system by opening a tap. Measure the tank pre-charge with a pressure gauge at its inflation valve and make the necessary adjustments.



**Figure 8**

**A 10 foot section of cable is provided with the CP WATER to connect to the pressure sensor. Lengths of up to 100 feet can be used, provided the appropriate shielded cabling is used. Consult the factory for proper cable specification.**

11. The pressure sensor communicates the system pressure to the CP WATER SubDrive controller. The sensor is preset at the factory to 50 PSI, but can be adjusted by the installer using the following procedure:
  - A. Remove the rubber end-cap (Figure 8).
  - B. Using a 7/32" Allen wrench (provided), turn the adjusting screw clockwise to increase pressure and counter-clockwise to decrease pressure. The adjustment range is between 25 and 80 PSI (1/4 turn = approximately 3 PSI).
  - C. Replace the rubber end cap.
  - D. Reset the pressure tank pre-charge to the appropriate pressure.

**▲ CAUTION** *When increasing the pressure, do not exceed the mechanical stop on the pressure sensor or 80 PSI. The pressure sensor may be damaged.*

12. Cover the pressure sensor terminals with the rubber boot provided (Figure 8).

### **START-UP OPERATION**

Apply power to the controller. A steady green light indicates that the CP WATER SubDrive has power but the pump is not running. The green light will flash continuously when the pump is running.

**NOTE:** Conventional private water systems intermittently fill a pressure tank as commanded by a standard pressure switch (e.g. 30-50 PSI). The CP WATER SubDrive maintains a constant pressure at the pressure sensor up to the maximum capability of the motor and pump. Although the pressure is constant at the pressure sensor, pressure drops may be noticeable in other areas of the home when additional taps are opened. This is due to limitations in the plumbing and will be more pronounced the further the taps are from the pressure sensor. This would be true of any system, and if observed, should not be interpreted as a failure in the performance of the CP WATER SubDrive.



## SYSTEM TROUBLESHOOTING

The built-in diagnostics will protect the system against an application or system problem. The red "FAULT" light on the front of the CP WATER SubDrive controller will flash a given number of times to indicate the nature of the fault. In some cases the system will shut itself off until corrective action has been taken. Fault codes and the recommended corrective action for each are listed in the following table.

# of Flashes	Fault	Possible Cause	Corrective Action
1	Motor under load	Over pumped or dry well. Worn pump. Broken motor shaft. Blocked pump or screen.	Wait for well to recover and automatically reset timer to time out. If the problem does not correct, check motor and pump. See description on "Smart Reset" at the end of this document.
2	Under voltage	Low line voltage.	Check the loose connection. Check the line voltage. Report low voltage to power company. Unit will start automatically when proper line voltage will restore. See "Extended Input Voltage Range" at the end of this document.
3	Locked pump	Motor/pump is misaligned. Abrasive/sand bound pump.	Unit will attempt to free a locked pump. If unsuccessful, check the motor and pump.
4	Not used		
5	Open circuit	Loose connection, defective motor or cable.	Check motor wiring. Make certain all connections are tight. Make certain proper motor is installed. Cycle input power * to reset.
6	Short circuit	Defective cable, splice or motor.	Check motor wiring. Cycle input power * to reset.
7	Overheated controller	High ambient temperature. Direct sunlight. Obstruction of airflow.	This fault automatically resets when the temperature returns to safe level.
* Cycle input power means, turn the power off and until both lights fade off and apply power again.			

TROUBLESHOOTING GUIDE		
Symptom	Possible Cause	Corrective Action
Water flow rate is not as high as expected	Motor is running backwards	Switch two of the three wires leading from the controller to the motor (3-phase motor)
	Temperature in the controller is too high. If the controller's heat exchanger becomes too hot, the controller will reduce the speed of the pump to lower the pump consumption.	Make sure there is at least six inches of room around the controller for movement of air.
	Pump capacity cannot supply demand.	Use pump with higher flow rating (if head requirement is still satisfied).
	Lower input line voltage.	Check the loose connection. Check the line voltage. Report low voltage to power company.
Excessive pressure fluctuations	Waterlogged tank	Check tank for bladder damage-replace if necessary.
		Reset the tank -pre charge. (Should be 70% of pressure sensor setting).
	Pressure tank is too small for flow rating of the pump.	Use larger tank (8 gal tank minimum).
Motor runs continuously with no flow demand from the house	Leak in pitless adapter.	Re-seat the pitless adapter.
	Leak in the household plumbing or outdoor plumbing.	Check for leaky faucets and pipe fittings and repair.

## SMART RESET

If a motor underload fault condition occurs, the most likely cause is an over pumped or dry well. To allow the well to recover, the CP WATER SubDrive will wait 30 seconds to 5 minutes, determined by duration of the previous run time, before restarting the motor. For example, the first time the fault occurs, the CP WATER SubDrive will wait 30 seconds before attempting to restart the pump. If the system would then run for 1 minute and an underload fault reoccurs, the controller will wait 4 minutes before attempting to restart the pump. This schedule allows for the minimum off-time possible based on the recovery time of the well.



CP Water Pump Underload "Smart Reset"

## EXTENDED INPUT VOLTAGE RANGE:

The CP WATER SubDrive is designed to provide full performance with an input supply voltage of 200 to 260V AC. If the input supply voltage drops below 200V AC, SubDrive will continue to run at reduced output while flashing an undervolt warning signal flash code #2. Output power will continue to decrease with supply voltage until it reaches the trip level near 130V AC and show flash code #2. The CP WATER SubDrive will automatically restart (at reduced output) when the supply voltage rises to approximately 145VAC. When supply voltage restores 200VAC the undervolt warning signal will stop flashing and full output performance will resume.

Subdrive 75	
Description	Part #
Pressure Switch	020627
100 ft. Pressure Switch Cord	020628
4.5 Gal. Tank	020629
Controller - Standard	020143
Controller - NEMA 4	022956
Motor	137458
Pump end for CP7507	CP7507RP
Pump end for CP7510	CP7510RP
Pump end for CP7519	CP7519RP
Pump end for CP7527	CP7527RP
Pump end for CP7535	CP7535RP

Subdrive 100	
Description	Part #
Pressure Switch	020627
100' Pressure Switch Cord	020628
Controller - Standard	023045
Controller - N4	023046
Motor 2 HP	137462
Pump end for CP10007	CP10007RP
Pump end for CP10010	CP10010RP
Pump end for CP10019	CP10019RP
Pump end for CP10027	CP10027RP
Pump end for CP10035	CP10035RP
Pump end for CP10055	CP10055RP

Subdrive 150	
Description	Part #
Pressure Switch	020627
100 ft. Pressure Switch Cord	020628
14 Gal. Tank	132661
Controller - Standard	020475
Controller - NEMA 4	022957
Motor	139424
Pump end for CP15007	CP15007RP
Pump end for CP15010	CP15010RP
Pump end for CP15019	CP15019RP
Pump end for CP15027	CP15027RP
Pump end for CP15035	CP15035RP
Pump end for CP15055	CP15055RP
Pump end for CP15085	CP15085RP