

SubDrive Duplex Alternator Installation Manual

SubDrive Duplex Alternator

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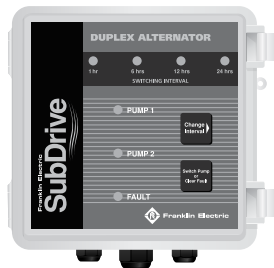
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Table 1: SubDrive and MonoDrive Models

Model Name	Part Number	Use with SubDrive Series
SubDrive Duplex Alternator	5850012000	5870203380 SubDrive75 NEMA 1
		5870203384 SubDrive75 NEMA 4
		5870204100 SubDrive100 NEMA 1
		5870204104 SubDrive100 NEMA 4
		5870204150 SubDrive150 NEMA 1
		5870204154 SubDrive150 NEMA 4
		5870206300 SubDrive300 NEMA 4
		5870203223 SubDrive2W
		5870203110 MonoDrive NEMA 1
		5870203114 MonoDrive NEMA 4
		5870204110 MonoDriveXT NEMA 1
		5870204114 MonoDriveXT NEMA 4
		90401101 Inline 1100
		90411101 Inline CP

Note: SubDrive Duplex Alternator will work with any combination of the listed Franklin Electric **SubDrives/MonoDrives**.

Descriptions and Features



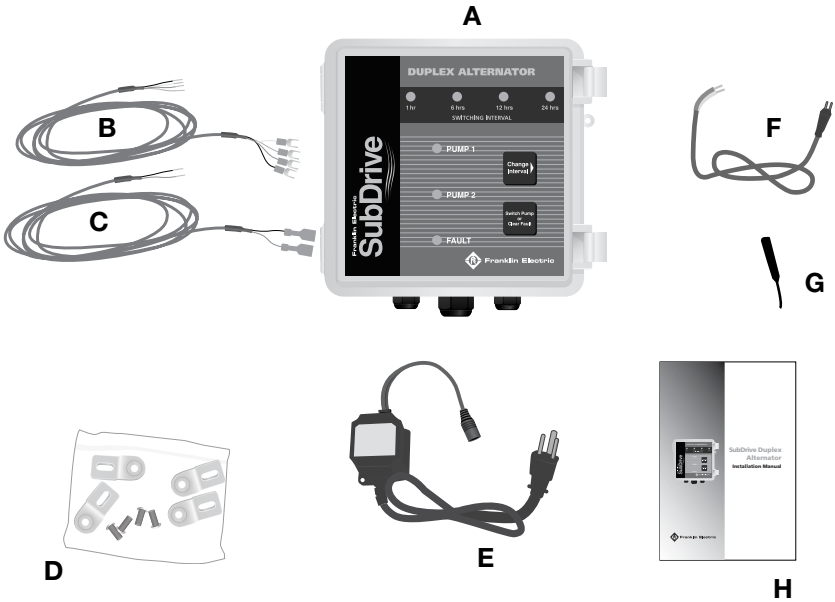
The Franklin Electric SubDrive Duplex Alternator allows for two Franklin Electric SubDrive units to operate on the same water system and share the work load equally. The Alternator will alternate between the two SubDrive units when the defined amount of run time has been reached. The Alternator is specifically designed for use with Franklin Electric SubDrive products (see Table 1 above).

Key features of the Alternator include the following:

- Works with entire SubDrive product family
- Selectable alternate timing
- Pump status indicator lights
- Fault detection
- Fail safe operation
- Manual override push-button
- Alarm circuit contacts
- NEMA 4 enclosure
- Low voltage wiring connections

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Included Items

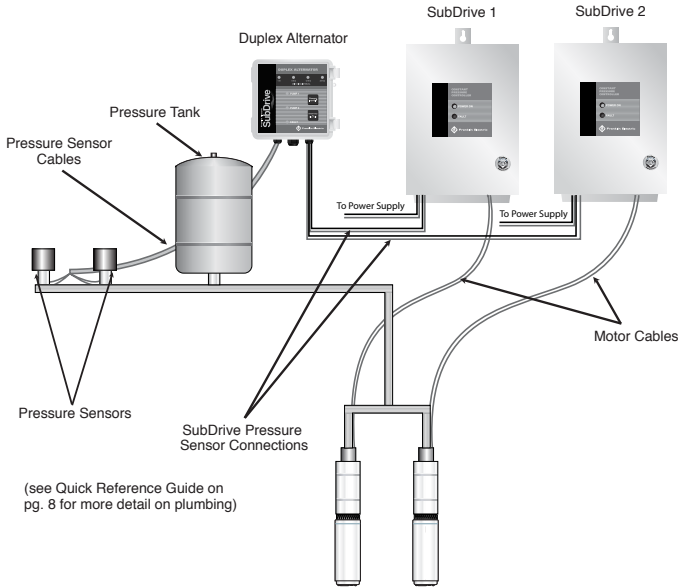


- A. Controller Unit
- B. Sensor Cable (Pressure Sensors, 4-conductor)
- C. Sensor Cable (SubDrives, 2-conductor) X2
- D. Mounting Brackets
- E. Outdoor Rated 120 VAC/12 VAC Transformer
- F. Transformer Output Cable
- G. Rubber Plug
- H. Installation Manual

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How It Works

The Franklin Electric SubDrive Duplex Alternator is designed to be part of two independent SubDrive systems. Below is an example of a typical Alternator System.



Alternating SubDrive Systems

The Alternator controls which drive is running the system by determining which pressure sensor each drive sees. The two pressure sensors in the system must have at least a 3 psi differential. The drive that uses the high set sensor will be in control of supplying water to the system. The other drive will be on the lower set sensor and will act as a backup. In the event that the primary drive cannot keep up with the water demand, the backup drive will automatically start and provide additional water. After the primary drive has reached its defined amount of run time, the Alternator will interchange the pressure sensors, thus causing the two drive units to switch roles.

System Diagnostics

In addition to alternating the two drive systems, the Alternator monitors the two systems to see if they are meeting the water demand as expected. If a system is not meeting the water demand as expected, the Alternator will lock the remaining system in as the primary system, declare a flash code indicating what kind of fault was found, close the alarm contacts, and not allow further alternation until the fault is cleared.

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Fail Safe Operation

The Alternator is designed so that both SubDrive units are always linked to one pressure sensor or the other. If the Alternator should fail, the system will turn into a lead-lag system without the alternate function. Therefore, water will still be delivered even if the Alternator should fail.

Additional Features

The Alternator has a manual override button for selecting which SubDrive unit should be the primary system. The Alternator also has four different (push button) selectable timing modes ranging from 1 hour to 24 hours. These timing modes are based on the run time of the SubDrive unit. When a unit has run the selected amount of time, the Alternator automatically interchanges the primary and backup systems. In addition, the Alternator can be used with any combination of SubDrive products from Franklin Electric; one model fits all!

Before Getting Started

WARNING

For the indoor/outdoor transformer note the following:

Risk of fire. If installation involves running wiring through a building structure, special wiring methods are needed. Consult a qualified electrician. Not for use with dimmers.

ATTENTION

This equipment should be installed by technically qualified personnel. Installation must comply with Franklin Electric's recommendations, national and local electrical codes. Failure to do so may result in electrical shock, fire hazard, unsatisfactory performance, or equipment failure. Installation information is available through pump manufacturers and distributors, or directly from Franklin Electric at our toll-free number 1-800-348-2420.

CAUTION

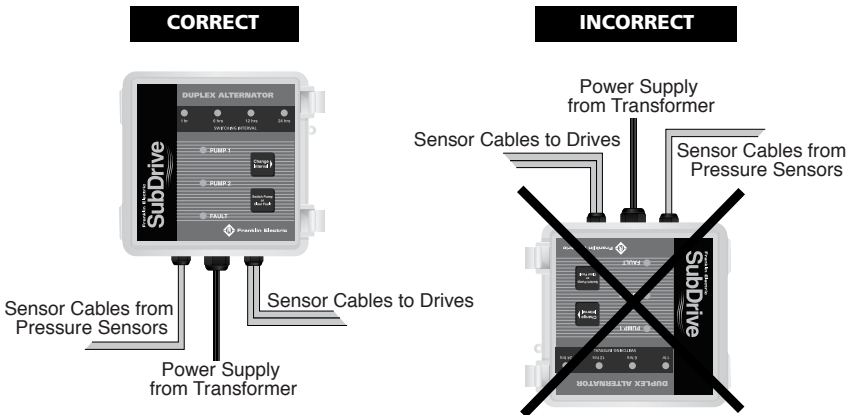
Use the SubDrive Duplex Alternator only with Franklin Electric SubDrive units as specified in this manual (see Table 1). Use of this unit with Variable Frequency Drives (VFDs) from other manufacturers may result in damage to both sets of electronics.

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Controller Location Selection

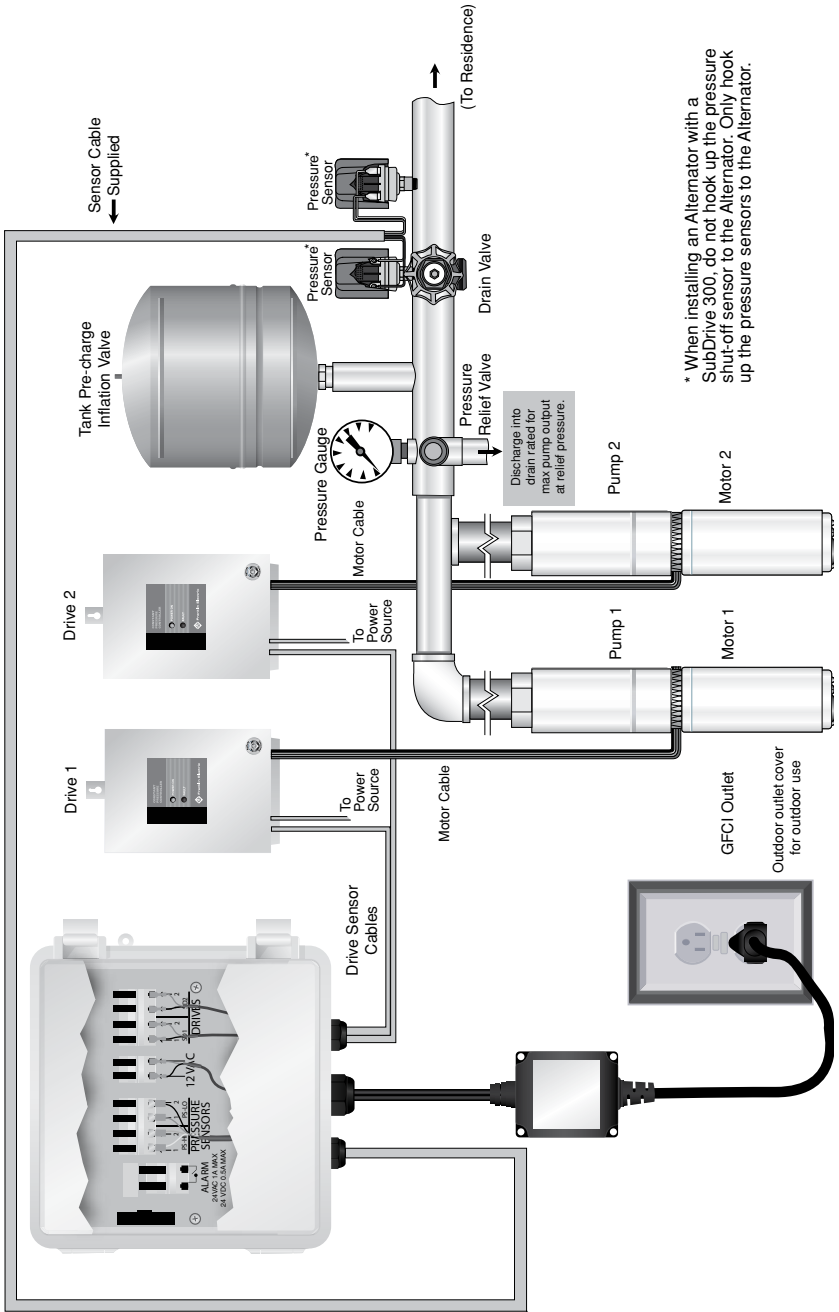
The following recommendations will help in the selection of the proper location of the Alternator unit.

1. A tee is recommended for mounting the two pressure sensors at one junction. If a tee is not used, the pressure sensors should be located within 6 feet (1.8 meters) of the pressure tank to minimize pressure fluctuations. The distance between the pressure sensors should be kept to a minimum. There should be no elbows between the tank and the pressure sensors.
2. The unit should be mounted on a sturdy supporting structure such as a wall or supporting post.
3. When installed properly, the Alternator enclosure is suitable for indoor or outdoor installations (see Installation Procedure section for details pg. 9).
4. The Alternator should only be mounted with the wiring end oriented downward. The controller should not be placed in direct sunlight.
5. The mounting location should have access to 115 VAC electrical supply. For outdoor installations the indoor/outdoor transformer must be connected to a GFCI outlet and follow all National, State, and Local electrical codes. Ensure that requirements of NEC 406.8 are met.
6. To assure maximum weather protection, the unit must be mounted vertically with the cover snaps engaged.



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Quick Reference Guide SubDrive Duplex Alternator



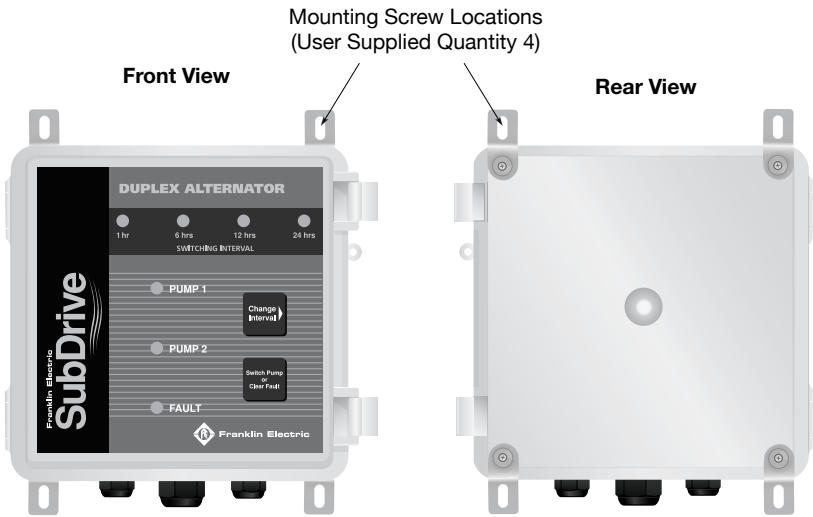
* When installing an Alternator with a SubDrive 300, do not hook up the pressure shut-off sensor to the Alternator. Only hook up the pressure sensors to the Alternator.

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Installation Procedure

1. Disconnect electrical power at the main breaker.
2. Drain the system (if applicable).
3. Install the two SubDrive or Inline units per their installation instructions.
4. Install the two pressure sensors on a tee downstream of the pressure tank (the pressure tank should be between the pressure sensors and the pump). The sensors have a ¼-18 National Pipe Thread (NPT) connection.
5. Mount the Alternator unit in a suitable location using four mounting screws (not included) as shown in Figure 1 below.

Figure 1: Mounting Screws



Note: For installation procedures for the Duplex Inline Constant Pressure System refer to the Duplex Inline Constant Pressure System Quick Reference Guide (Appendix 1).

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Wiring Connections

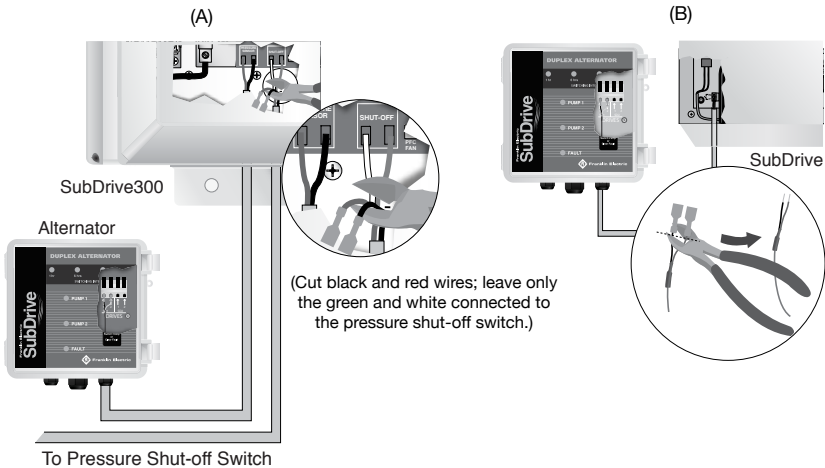
1. Verify that the power has been shut off at the main breaker.
2. Open the cover to the Alternator.

3. Drive Connections

Connect a two-conductor pressure sensor cable from Drive 1 to the Alternator's terminal block labeled SD1 on the right side. The red and black wire connections are interchangeable. (See Figure 2 below). Whichever Drive unit is connected to the SD1 terminal will be the primary system first. The Drive unit connected to the SD2 terminal will be the backup system first.

- A. If connecting to a SubDrive300, use the supplied two-conductor pressure sensor cable. Cut the terminals off both ends of the red and black leads from the existing four-conductor cable. Leave only the Green and White leads linking the pressure shut-off switch to its connections on the SubDrive300.
 - B. For all other SubDrives, cut off the quick connect ends and strip the wire to make a two-conductor cable with stripped leads at both ends.
4. Repeat step 3 for Drive 2, but connect Drive 2's pressure sensor cable to the Alternator's terminal block labeled SD2 on the right side.

Figure 2: Drive Sensor Cable Connections



Note: If using a NEMA 4 the quick connects or stripped leads may be used.

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5. Power Supply Connections.

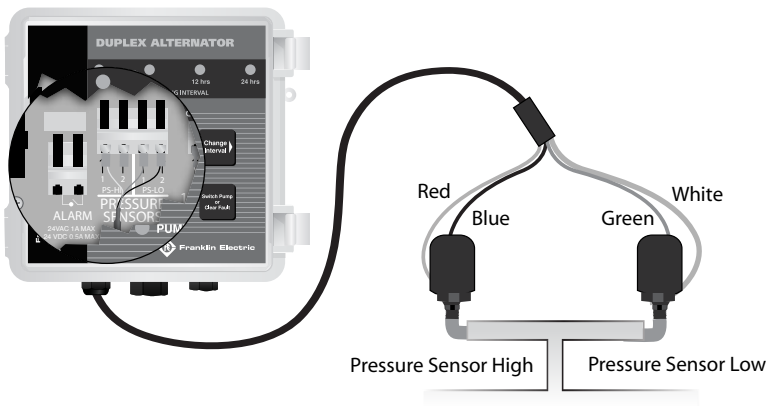
- A. Run the output cable from the indoor/outdoor transformer into the Alternator through the center liquid tight strain relief (this is the strain relief with the largest diameter).
- B. Connect the output cable's stripped leads to the terminal block labeled 12 VAC.
- C. Connect the other end of the output cable to the indoor/outdoor transformer's secondary winding (the two prong connector).
- D. Either plug the transformer into a GFCI protected 115 VAC outlet or cut off the plug and strip the wires to connect the stripped leads to a 115 VAC power supply. If using a GFCI protected outlet follow the NEC 406.8 guidelines for protecting the outlet from the environment.

Note: The transformer is rated for use indoor or outdoor so it can be mounted in any convenient location.

6. Open Circuit Check. After completing steps 1-5 do the following:

- A. Apply power to the Alternator without applying power to the drives.
- B. The indicator lights should all be **OFF** except for the orange "1 hour" switching interval light. If the Alternator's red light flashes, it means that there is an open circuit to one of the drives (see Diagnostic Fault Codes for specific flash code meaning pg. 16).
- C. Correct the open circuit; if one is found. The Alternator will stop flashing the red light when the open circuit is corrected.
- D. Disconnect power to the Alternator and continue to step 7.

Figure 3: Pressure Sensor Connections



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7. Pressure Sensor Connections.

- A. Connect the supplied four-conductor cable stripped leads to the Alternator's terminal block labeled "Pressure Sensors".
- B. Connect the Red and Black leads to the PS-HI part of the block. The Red and Black wire connections are interchangeable.
- C. Connect the White and Green leads to the PS-LO part of the block. The Green and White wire connections are interchangeable.
- D. Connect the other end of the four-conductor cable with the fork terminals to the two pressure sensors.
- E. Connect the Red and Black wires to the "high" set pressure sensor. Connect the stripped ends of the Red and Black wires to the Alternator (PS-HI). The Red and Black wire connections are interchangeable.
- F. Connect the Green and White wires to the "low" set pressure sensor. Connect the stripped ends of the Green and White wires to the Alternator (PS-LO). The Green and White wire connections are interchangeable. (See Figure 3 pg. 11).

8. The two pressure sensors communicate the system pressure to the SubDrive units. The Alternator requires that the pressure sensors have at least a 3 psi differential. The sensor connected to the Alternator's PS-HI terminal must be the one set higher than the other sensor. The sensors are preset at the factory to 50 psi, but must be adjusted by the installer using the following procedure:

- A. Remove the rubber end-cap (See Figure 3 pg. 11).
- B. Using a 7/32" Allen wrench, turn the adjusting screw clockwise to increase the pressure and counter-clockwise to decrease the pressure. The adjustment range is between 25 and 80 psi (1/4 turn = approximately 3 psi).
- C. Replace the rubber end cap.
- D. Cover the pressure sensor terminals with the rubber boot (See Figure 3 pg.11).

Note: If the pressure sensors are not adjusted properly or connected to the wrong terminals on the Alternator the unit may not function properly. Make sure that the PS-HI terminal is connected to the pressure sensor that is set higher than the other pressure sensor.

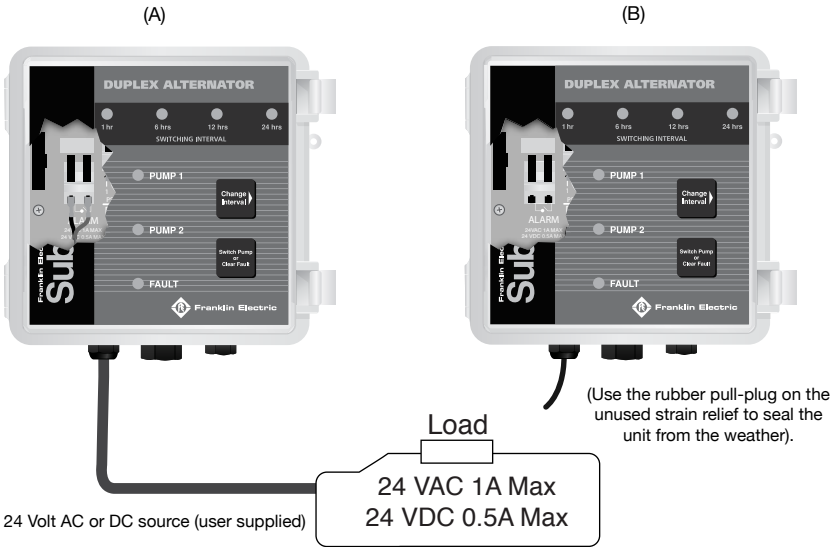
CAUTION

When increasing the pressure, do not exceed the mechanical stop on the pressure sensor or 80 psi. The pressure sensor may be damaged.

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9. The Alarm Contacts are an optional feature. The Alarm Contacts are a set of dry contacts that close when the Alternator declares a fault. These contacts are rated for a maximum of 24 VAC at 1A (amps) or 24 VDC at 0.5A (amps). Any type of external alarm indicating load may be attached to these dry contacts as long as the maximum voltage and current criteria is not exceeded. If the Alarm Contacts are not used; use the rubber pull-plug on the unused strain relief to seal the unit from the weather. (See Figure 4 below).

Figure 4: Alarm Connections



10. When all the cables have been connected to the Alternator, tighten the 4 smaller liquid-tight strain relieves around the cables to 25-30 in. lbs. and tighten the larger center strain relief to 55-60 in. lbs. to maximize the unit's weather protection.

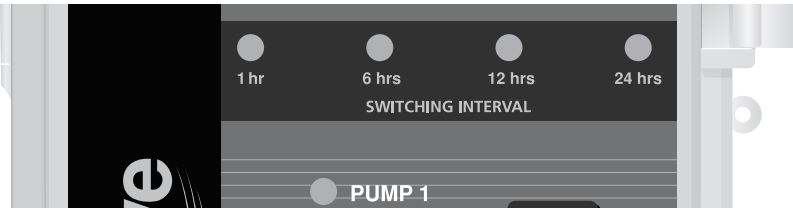
Start-Up and Operation

Apply power to the Alternator controller and the SubDrive units. Only the timing indicator light will be illuminated until the Alternator detects the presence of the SubDrive units. This will require letting the system come up to pressure. A steady green light indicates which pump system is the primary system and that it has no demand. A flashing green light indicates that a system has demand.

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Setting the Alternate Time

The alternate time is set by pressing the button labeled “Change Interval”. One press will move the orange indicator light over one position; each position is labeled with a different alternate time. When the primary system has accumulated an amount of run time equal to the selected alternate time, the Alternator will switch the primary system to the backup system and the backup system to the primary system.



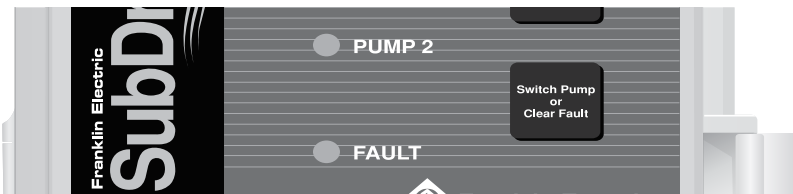
Note: Changing the alternator time will **NOT** reset the cumulative clock.

Fault Detection

The Alternator continuously monitors the water system demand, checking to see if the water demand is being met as expected. If the water demand is not being met as expected, the Alternator will begin looking for possible problems with the system. While it's looking, the Alternator will alternate the two drives back and forth a few times. After performing the check, the Alternator will either declare a fault or leave the system as it was if no problem was found.

Manual Override/Clear Fault Button

The manual override button allows the user to switch which SubDrive system is the primary system at any time. When the user presses the “Switch Pump or Clear Fault” button, the Alternator switches the primary system to the backup system and the backup system to the primary system. When this happens, the cumulative clock is **RESET** and begins counting again.

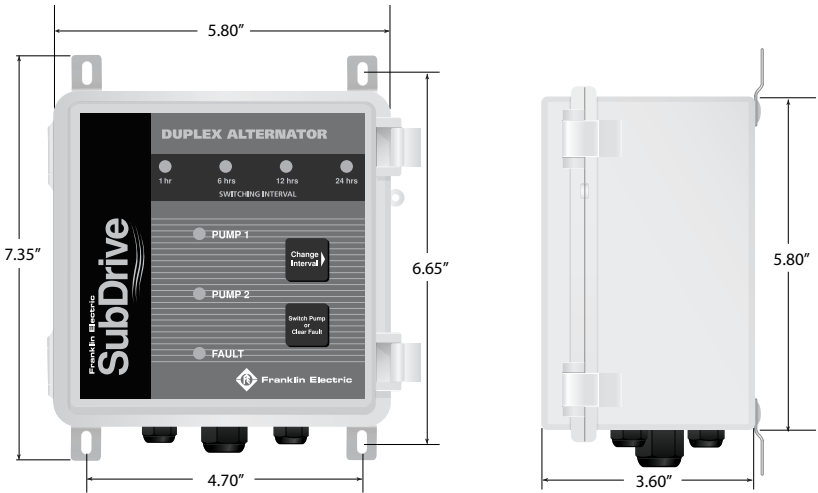


The second function of this button is to clear a fault from the Alternator's memory. If this button is held down for 5 seconds, the red **FAULT** light will clear and the Alarm Relay will open.

Note: If the Alternator loses power, it will not retain any faults found and will reset the cumulative clock. The Alternator will “relearn” a fault that was lost during loss of power.

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Mounting Dimensions



Accessories

Duplex to Pressure Sensor Cable Kit - 22 AWG 4-conductor pressure sensor cable:

10 feet: 225597901

100 feet: 225597902

Drive to Duplex Cable Kit - 22 AWG 2-conductor pressure sensor cable:

10 feet: 225597903

100 feet: 225597904

Indoor/Outdoor Transformer Kit

225597905

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Diagnostic Fault Codes

In the event that a problem occurs with one of the two Drive systems and the unit is unable to meet demand properly, the Alternator's diagnostics will detect the problem and alert the user with a "Fault" light and close a set of dry contacts that can be connected to an external alarm. The red "Fault" light will flash a given number of times to indicate the nature of the fault. After a fault has been corrected, the Alternator can be reset by holding down the "Switch Pump or Clear Fault" button for 5 seconds or by removing power. The Alternator may also see that the system is functioning normal again and self clear the **FAULT** light and alarm. Fault codes and the recommended corrective action for each are listed in the chart.

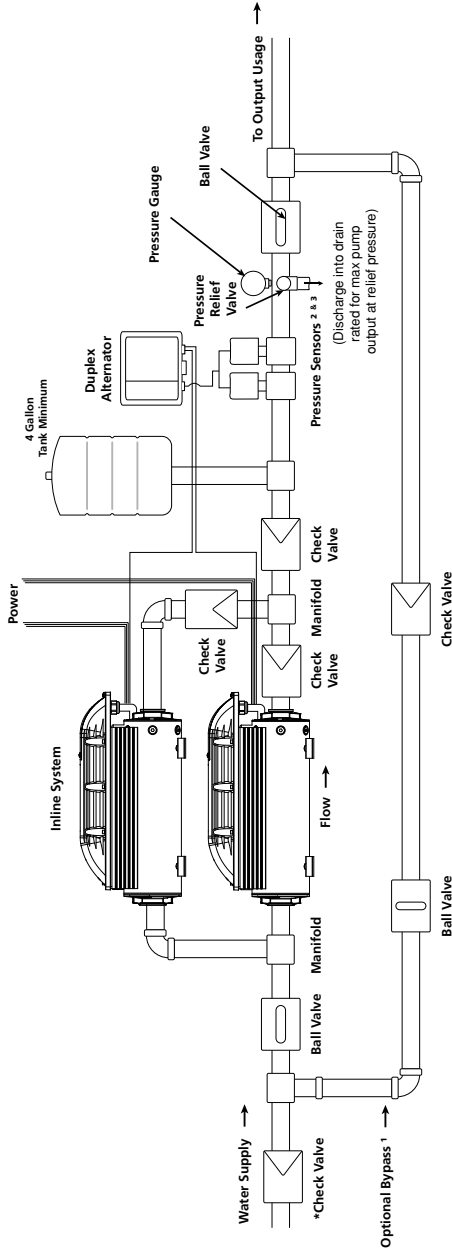
# of Flashes	Fault	Possible Cause	Corrective Action
1	System 1 down or shorted low pressure sensor	System 1 is not meeting demand properly or lower set pressure sensor is shorted	Check Drive 1's front panel for possible fault code and follow corrective actions for that fault code. Make sure that Drive 1 has a green light (i.e. it has power). If there is no fault code and a green light is present, check the lower set pressure sensor to see if its contacts are shorted together.
2	System 2 down or shorted low pressure sensor	System 2 is not meeting demand properly or lower set pressure sensor is shorted	Check Drive 2's front panel for possible fault code and follow corrective actions for that fault code. Make sure that Drive 2 has a green light (i.e. it has power). If there is no fault code and a green light is present, check the lower set pressure sensor to see if its contacts are shorted together.
3	Open high pressure sensor	Leads to higher set pressure sensor may be open or broken or the sensor itself may have failed to open	Check the leads to the higher set pressure sensor. Check the sensor itself. Check the leads to Alternator's terminal block.
4	Leads to Drive 1 are open circuit	Leads from Drive 1 to Alternator are damaged or not connected	Check leads from Drive 1 to Alternator. Check connection at terminal block of Drive 1 and connection at Alternator terminal block.
5	Leads to Drive 2 are open circuit	Leads from Drive 2 to Alternator are damaged or not connected	Check leads from Drive 2 to Alternator. Check connection at terminal block of Drive 2 and connection at Alternator terminal block.
6	Pressure sensors not set far enough apart	Pressure sensor differential's too close. Both Drives are trying to meet system demand at the same time	Adjust pressure sensors so the PSI difference is great enough to get only one drive to run at a time; at least 3 psi should be enough difference.

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Specifications

Input from Power Source to Indoor/Outdoor Transformer	Voltage	115 VAC
	Frequency	60 Hz
Input to Controller Unit	Voltage	12 VAC
	Frequency	60 Hz
	Power (A)	1.4 Watts
Pressure Setting (B)	Factory preset	50 psi
	Adjustment range	25-80 psi
Operating Conditions	NEMA 4 (indoor/outdoor)	Model 5850012000
	Temperature	-13 to 125 °F (-25 to 51 °C)
	Relative humidity	0-100%, non-condensing or condensing
Controller Size (approximate)	Outer dimensions	5.9" H x 5.9" W x 3.6" D
	Weight	1.3 lbs (0.59 kg)
For Use With	Franklin Electric SubDrives/ MonoDrives	All models (see Table 1 pg. 3 for details)

- Note:** (A) Power is on the secondary side of Transformer.
 (B) Pressure sensors must be set at least 3 psi apart.

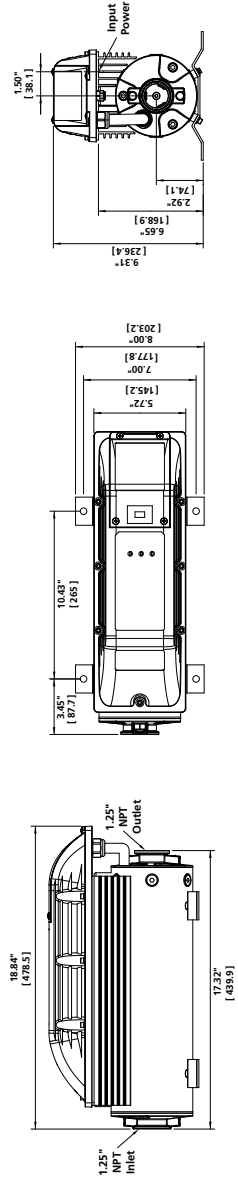


*NOTICE: If system plumbing does not have a backflow prevention device a check valve is required on the incoming water supply line.

NOTES:

1. These optional components are shown in a typical installation diagram. They should be used at the installer's discretion as required for particular applications.
2. If the optional high pressure shut-off kits (005707912) are being used on this duplex inline Constant Pressure System, they should be installed as per the standard inline Constant Pressure System Owner's Manual, with one high pressure cut-off being wired directly to each inline drive unit.
3. 3 psi differential required between these two sensors for proper operation of the system. Prior to wiring any components adjust the pressure setting in one of the sensors lower. This is done by turning the hex pressure adjustment screw on the top of the switch by at least 1/4" turn counter clockwise (or 3 psi).

Dimensions



Notes

TOLL-FREE HELP FROM A FRIEND
Franklin Electric
Submersible Service Hotline
800-348-2420



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