



## **LOWER RESERVOIR TROUBLE**

### **Power Outage Generator Failure**

If the generator started during the power outage and ran as normal, it will not be necessary to touch anything. It is possible to verify the generator ran when no one was present by observing the temperature of the exhaust and block, that the water-cooling system is operational, and/or observing water present in the outflow ditch.

First and foremost, if no pumps are running, determine if it is an “across the board” power outage where the power is out at all stations or if the power is out in only certain areas of SunLand. The Upper Reservoir may have power then the Lower Reservoir does not.

When approaching the nonfunctioning reservoir, verify that the power meter outside the building to the left of the entry door is powered up. Confirm the meter shows all three phases of power is coming in. There is a pie chart on the new meters that provide this information. It is recommended to consult a PUD representative regarding proper interpretation of the pie chart as meters are changing styles.

Secondly, check to see if the LED display on the pump panel is illuminated. This is an indicator that power is making it into the pump panel. The grid power is also indicated on the transfer switch housing with LED lights displaying whether the pumps are on grid or generator power. If the LED panel is not lit, there is no grid power and no generator power making it into the pump panel. Check the main power breakers to see they are tripped. If there are no tripped breakers, then check the bus fuses for pass-through power.

Thirdly, if power is making it through the main power meter with all three phases, and making it through the breakers and fuses, then look to the transfer switch



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panel where power passes through several phase switches and then on to the VFD's (Variable Frequency Drive) and pumps.

Fourth, and most common, a VFD may have tripped out. If so, did it trip out all four pumps? This is verified by opening the pump control panel cabinet to see if a blinking red light is present on one or two VFD's. *(See information on resetting the VFD's in the following paragraphs.)*

If the generator has failed at the Lower Reservoir, it may have developed an air bubble and fail to start. Turn the generator auto start switch to "Manual". The generator will start and power to the VFD and pumps should now be available. Do not forget to turn the generator start switch to OFF and, after shutdown, to AUTO after the A.C. comes back on.

Most errors with pumps occur after A.C. power is restored. If pumps are in error after AC is restored, push the reset red tab in the LCD panel display window. If this does not restore the pumps, open the panel and check for a failed VFD. It will be flashing a red light. There are two VFD's, one for each pump. If errors are present on VFD's and/or the VFD window, then a reset of the entire skid will be necessary. Pump failures can be confusing as they are mostly due to switching malfunctions from the VFD's. If the LCD panel red reset doesn't reset the pumps, check the VFD.

Reset VFD: The VFD's can malfunction with serious spikes, fast pump stops, or out-of-sync phases. In order to reset, use a small screw driver to bypass the electrical panel safety latch by inserting in to a small hole under the latch. Press straight in and the latch depressing can be felt. Open the stainless-steel handle on the panel. The whole panel will swing open. If the light on the VFD is blinking red or is a steady red, the VFD is tripped out. Press RESET on the keypad. Then press HOME and f1. Press RESET again if necessary. The VFD should now reset and ready to run.



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In the event a soft reset is not successful, the following applies:

Reset Skid: Open the electrical access panel. One VFD may be tripped out. Consider the condition of Upper Reservoir readiness to fill in completely in the place of the Lower Reservoir.

If the Upper Reservoir is operational, power down the Lower Reservoir completely. To do this, the safety lock on the power handle at the electrical panel will have to be bypassed. Grab the large black handle on the Lower reservoir electrical control panel. It is a very large, black plastic handle on the righthand side of the panel. Swing it to the right. It will resist a little as it is spring loaded. It will shift to OFF and the whole skid will stop and go dark. Wait two and a half to three minutes before swinging the main power handle back on. The VFD's must discharge for two to three minutes, discharging the capacitor to avoid damage by restoring power too fast. This explains why it is good for the Upper Reservoir to be in service at this time.

If the Upper Reservoir is not operational, and a skid restore is imperative at the Lower Reservoir due to VFD errors, then a skid reset will be more serious as the pressure of the distribution system will be in peril. Complete the skid reset and note how much the pressure has dropped. Depressurization of the water distribution lines for too long a period can introduce contamination to the lines.

In the event the Upper Reservoir is not functioning, a skid reset of the VFD's at the Lower Reservoir can be done expediently; however, the VFD's must still be allowed two minutes to discharge before powering up. Fortunately, the SunLand Water District has never experienced this scenario.

There may or may not be pumps left running after a VFD error. Fatal errors can disable all four pumps, making the skid reset non-conditional. Other, less serious VFD errors, can leave some pumps running and can be corrected with a soft reset.

The VFD's are set to run only two pumps...one per VFD. When the first two pumps are in operation, they will be on the VFD's with ramp up and down capabilities. They will be running at 57 Hz and will be multi-speed, depending on demand.



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The other two pumps run on extra demand and will run “Across the Line” so the third and fourth pump to come on will be running in manual mode at a full 60 Hz and without the VFD ramp going up and down.

### **NEVER leave a pump switch on manual!**

It is prudent to always focus on the Lower Reservoir to produce most of the water being consumed by the entire SunLand system. The Lower Reservoir has VFD’s for two of the pumps. This saves money during the winter months, as the pumps controlled by the VFD drives will ramp down on power consumption that is not needed.

The Upper Reservoir has yet to achieve power-saving and pressure-logic abilities and is controlled solely by PRV’s (Pressure Reducing Valves). The Lower Reservoir has been upgraded more recently, making it the leader in SunLand water production.