

Surface Water Pumping Systems for Livestock Grazing

Watering livestock in remote locations for the purpose of grazing pasture and forage-based cover crops can be a challenge. In most situations in eastern Kansas, the water source is a pond, a stream or a shallow hand-dug well. The greatest need for water is during the warm months of the grass-growing season. There is also interest in water systems that can tolerate freezing weather.

This publication describes two systems which use a [100-watt solar panel with a charge controller](#). Solar panels connected to a voltage controller and a deep cycle marine-type battery provide the power for the pump systems (**Figure 1**). Some solar panels are not equipped with a mounting rack. A mounting rack can be constructed from angle iron and 2-inch pipe so that the solar panels can be mounted on a steel post at 45 degrees in winter or horizontally during the summer months.

Producers are encouraged to use the power/load output portion of the charge controller to power the pump rather than connecting directly to the battery. The advantage of this configuration is that the charge controller will stop the pump if the battery level drops below 10.5 volts. Running the system at lower voltages can damage the battery or pump. Directly connecting to a battery also can deplete the battery of charge in the case of a broken water line or overflowing tank.

Throughout this publication, there are links to specific products. However, these links do not constitute product or company endorsements; they are only suggestions or examples of how to create pumping systems.

System Type One:

The pump is operated on the soil surface above the surface level of the water. A positive displacement [SEAFLO Model 55](#) or similar pump can be used. The system requires a “Deep Cycle” marine-type battery, which is available from most battery supply outlets. In a test using the SeaFlo pump, the deep cycle battery pumped 2400 gallons over 10 hours, reducing the battery from 12.5 volts to 10.75 volts which causes the charge controller to shut the system off. The pump test was conducted with 6 ft. head or lift.

This pump type has an improved pressure switch system, as well as other benefits. These include:

- ability to pump 5 gal per min
- built-in pressure shut-off system
- ability to pump 100 feet in elevation
- rated for continuous duty



Figure 1. Various systems for use with surface water pumping.

- carries a 4-year warranty
- uses ½ inch NPT fittings

If a tiny leak in a hose or connection occurs, the pump will chatter (come on and off frequently). To combat this, adding an accumulation (pressure) tank will allow some leakage to occur before the pump start/stop/start/stop cycle. SEAFLO manufactures an accumulation tank, [SEAFLO model SFAT-075-125-01](#). A larger accumulator tank allows for greater leakage before the start/stop cycle. Initial systems used the [Eastman 2 Gallon Expansion Tank](#). The SeaFlo accumulator is also recommended.

For those producers who want a “plug and pump” system, the [SEAFLO 55-Series Water Pump and Accumulator Tank System](#) is available. This system has a built-in pressure gauge and mounting surfaces. A protein tub or other enclosure can be used to cover this system.

Adding a float valve to turn the pump on and off completes the system. [Hudson, Jobe](#) and Apex valves are examples of float valves which have a diaphragm shutoff system that causes them to shut off completely when full level occurs. Other float systems reduce the flow as the tank approaches full. The Hudson valves work from the surface of the water, while the Jobe or Apex valves are set in the bottom of the stock tank.

Garden hose and hose connections can be used on these systems, but the intake hose must be rigid enough to avoid vacuum closure during pumping. If garden hose is used as the intake line, heavy duty ¾ inch hose is recommended. An alternative is [HDPE \(High density Polyethylene Pipe\)](#) or PVC

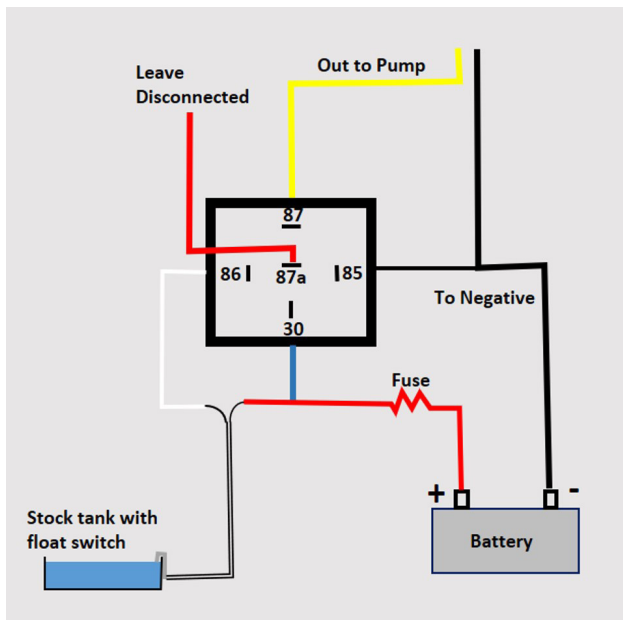


Figure 2. Wiring diagram for a float system.

pipe for the intake. Either type of pipe or garden hose can be used for the discharge (pressure) lines.

System Type Two:

The second pump system is a [12-Volt Submersible Water Pump](#), similar to a submersible sump pump. This system connects to a deep cycle battery and a 100-watt solar panel with charge controller. This pump is a centrifugal pump with no check valves and has good flow rate. It is limited to a maximum lift of 8 meters (26 ft.) and has no switch to turn the pump on/off. This system requires an electrical switch for an automatic system.

This pump type can handle more debris, such as algae or

dirt in the water, which makes it a good choice for pumping from ponds, streams, or shallow wells to nearby cattle. The pump's drain back characteristic can assist to freeze-proof the pump. The electric 2-wire sensor switch is recommended during winter freezing conditions.

The 12-volt systems have a higher amperage draw than the 24-volt systems on other solar pump systems. A relay or [continuous duty solenoid](#) is necessary to prevent burning out the lower amperage electrical switches. An [Advanced Systems ALC 1275](#) switch uses two sensor wires to control the switch and pump. This switch has an 8-second time delay when powering the pump on and off, so it does not chatter (turn on and off in quick succession) when the wind blows the water waves in the stock tank against the sensor wires. This switch is rated for an output of 7 amps; a continuous duty solenoid or switch relay must be used to prevent electrical burn out.

A relay switch connected to an electric float switch will also operate the electric circuit. The float system may be preferred because there are no probes to clean or adjust. When selecting a relay, select a holder (or pigtail), as shown in this [100 Amp relay](#). Relays can be purchased without the holders and in various amperages, so select a relay with sufficient amperage capacity. The [small stainless electric float switch](#) has been reliable in field tests. The small wires of the float will carry 1 amp, therefore a relay or solenoid is needed to carry the amperage load of the pump (**Figure 2**). A simple system would be the pump wired to a [tethered \(normally closed\) float switch](#) that could be anchored to the side of the stock tank.

Pump systems can use a quick connect, flat 12-gauge 2-pin plug (similar to 4-wheeler sprayer systems) available from local automotive repair shops. Whenever possible, purchase the 12-gauge wire and hardwire the system so only the pump has a connection plug to the power supply.

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