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DESCRIPTION OF THE MAIN COMPONENTS SOLAR SPRING PUMP AND MOTOR

Solar Spring pumps are highly efficient economic submersible SOLAR pumps. They are positive displacement pumps. They use single action coaxial pistons. The Solar Spring system has been developed from grass roots to solve at origin duration and efficiency problems traditionally connected with small submersible units. They are especially useful in the most extreme and isolated conditions with alternative energy solutions such as photovoltaic cells. They offer real global sub-system efficiency readings (pump together with motor, energy input to water output) of up to 59%. Because of their high efficiency, they are capable of pumping water from great depths and/or of forcing it over many hundreds of meters in situations where traditional products simply cannot be used.

The Solar Spring pumps can be used at any voltage from 20V (or 2 x 12V or 3 x 12V batteries in series) to 80V, and current from 1 ampere to 4 amperes. They are fitted with a 200W direct current brushed permanent magnet motor, which can be used with any photovoltaic panel array from 20 watts up to 360-peak watts nominal installed power. The motor can turn at any speed from 0 rpm to 3000 rpm, and is optimised at 2000 rpm. In contrast with conventional equipment, the Solar Spring motor is insulated against the water and air-cooled and can therefore run dry. Where the pump is operated directly from photovoltaic panels, the use of the Sunprimer electronic booster is necessary. Existing booster technologies MAY NOT WORK with the Solar Spring pumps and/or they may well burn out the pump motors. This is because they were designed to operate with "diaphragm" pumps and not with horizontal axis piston pumps. NEVER attempt to use booster technologies, which have not been duly authorised by the manufacturers of the Solar Spring pumps.

FEATURES

Uses power of one light-bulb

Positive displacement

Pumps from 200m (600 ft)

Capacity up to 11m³ per day

Submergence to 50m (150ft)

Air-cooled motor can run dry

Made from stainless steel

Up to 60% subsystem efficiency

Easy to install

Fits in a 4 inch well casing

Tolerates sand and aggressive water

No trackers or batteries needed

HIGHLY COST EFFECTIVE

ELECTRONIC AND HYDRAULIC BOOSTERS

Booster units are used together with Solar Spring pumps in order to extend their use over as many hours as possible and to increase their hourly and/or daily capacity. This is done with the help of: The SUNPRIMER booster/kick starter. This is a simple device, which is designed to start turning the motor when the ambient insulation value is approaching the minimum required for the pump to continue turning once started. The kick-starter stores energy and releases it as a shock charge to the motor. It is designed in such manner that it will not operate when the pump cannot subsequently continue turning with the power then available, that it cannot give a charge greater than the motor can absorb without over-heating, and that it cannot repeat charges at frequencies where their accumulated effect could result in over-heating the motor.

MAINTENANCE GUARANTEE.

Solar Spring pumps should give you, with a bare minimum of maintenance, many years of trouble free running. They are normally supplied sealed for the protection of the end-user, and should be opened and maintained only by authorised maintenance staff who should at all times be equipped with a simple maintenance kit containing the few tools required, together with spare parts sufficient for several pumps. The pumps can be withdrawn from the bore-hole or well in just a few minutes and a complete maintenance of the pump (opening and checking all pump parts, re-assembly, and re-installation) all carried out on site within the space of one half hour.

ALL PROPOSE SOLAR PUMPS



Water with the Sun

Solution to small-scale pumping problems in off-grid applications including water for livestock, alternative living, nurseries, micro-horticultural and industrial projects, high pressure washing, water for missions, schools, hospitals, refugee camps, nomadic groups, DRINKING WATER SUPPLY IN RURAL LOCATIONS, mobile units with batteries, fountains, week-end and holiday houses and camps, and isolated locations generally.

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Solar pumping systems

Photovoltaic (PV) panels generate electricity directly from the sun's light, with no moving parts. They may be mounted on a fixed structure or on a solar tracker, which follows the sun to extend daily operation. The solar array may be mounted some distance away from the water source. Most systems are designed to pump only during the daytime to fill a storage tank or pond. This is usually more economical and reliable than using batteries. Solar Spring systems use an electronics device to connect the photovoltaic (PV) panels directly with the pump motor, eliminating the need for inverters and/or battery storage, but they also work with batteries and with wind generators.

How is the Solar Spring pump technology possible?

THE PUMP

Inside the patented Solar Spring pump there is an oval camshaft, which drives two large horizontally opposed pistons, which operate over a very short single action stroke. The pump mechanisms are bathed in non-toxic oil and are separated from the water in the system by means of stress-free gaskets. The pulsating flow of the single action system is made smooth by an internal damper and by the use of flexible drop pipe. All parts of the pump work within their normal materials stress levels to a depth of 150m (450 ft).

THE MOTOR

The specially developed 4-inch permanent magnet DC motor works efficiently at variable speeds. A brush type motor was chosen for reasons of efficiency, reliability and economy (brush less motors need complex electronics). Motor brushes, with normal solar daytime use, usually last 4 to 7 years. They can be replaced within a few minutes in the field without disturbing the wiring. The motor can turn at from 0-3000 rpm and is optimised to work best at 2000rpm.

THE CONTROLLER

The patented Sunprimer controller provides a surge to start the motor and boosts the current in low sun conditions to prevent stalling. Its simple and robust circuitry is placed in a watertight enclosure, which is usually fitted behind the photovoltaic panels. The controller is fitted with wires enabling float switches to be connected.

THE SOLAR ARRAY

Any combination of photovoltaic panels with a nominal power of up to 360Wp placed in series or in parallel can be used with the Solar Spring pump. Voltage can be anywhere between 24V and 80V. Direct current is fed directly from the photovoltaic panels (or through batteries) to the pump motor. Neither inverters nor batteries are necessary.

In contrast with other small submersible pumps, Solar Spring pumps can be installed at any depth below water level. This enhances their use in areas where seasonal variations in water level in a borehole are substantial, and seasonal re-installation would therefore otherwise be required. Solar Spring motors need just 1.5 amps to start up, with irradiance as low as 300W/m². They enjoy rugged service. They are also suitable for continuous 24 hours' service (brush wear is proportionate to the number of hours of operation). The performance and durability features of Solar Spring pumps are due to their patented piston configuration. Solar Spring pumps have two, very large, counter-weighting pistons operating over a very short stroke in balance on a horizontal axis. Other pumps have one or more smaller pistons operating (more or less) vertically over a much longer stroke. The Solar Spring pistons are activated by means of oil bathed cams and vertical bearings. Solar Spring pumps can further be optimised at the moment of supply for a given application by changing cam size and, therefore, piston stroke length, which can be varied from 0.9mm to 1.5mm according to requirements. The four standard versions are those with a 3mm cam for use in shallow installations with high capacities together with the Hyboost inertia amplifier (see notes below), a 2.6mm cam for medium depth installations and capacities, a 2.2mm cam for medium-high lifts, and a 2.0mm cam for very deep installations. The pump outlet is normally fitted with a non-return valve and an automatic bleeder system. A self-cleaning nipple acting as a bleeder relieves residual pressure in the pump system. This makes start-up under load easier, particularly where the pumps are installed many meters below the water level. All materials used have been specially chosen for their high resistance to corrosion, abrasion, and wear and tear. Most parts are made from stainless steel or long-lasting plastics, while the pump body is made from brass. All parts operate within their normal materials stress levels up to a depth of 150m. For deeper installations, normal wear and tear will occur. Notwithstanding the fact that all parts of the Solar Spring pump are to be considered extremely robust, the pump, motor, and Sunprimer electronics unit are to be considered FRAGILE from the point of view of transport and handling. Packets and cartons for transport must be marked FRAGILE and THIS WAY UP with the pumps packed in their natural position vertically. During handling and installation all parts of the pump must be treated with great care. Pumps, motors, and electronics should not be thrown around or dropped or otherwise mistreated. Failure to take care will void the manufacturer's warranty.

THE INERTIA AMPLIFIER

The Hyboost inertia amplifier is fitted to the shallow well model of the Solar Spring which is used for installations where the water level is not greater than 60m (180 ft). The Hyboost is advanced but simple technology enabling mismatch in the hydraulic system to be absorbed and returned to system at the appropriate moment of the pumping cycle. Available power from the photovoltaic panels can be fully used and motor absorption and pump capacity in some cases more than doubled.

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