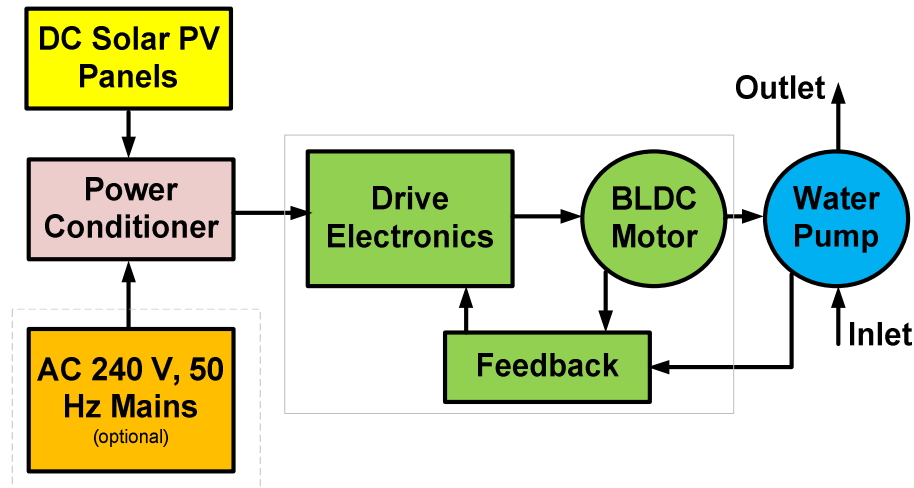


## Vita 300W-SWP (300 W Solar Water Pump)



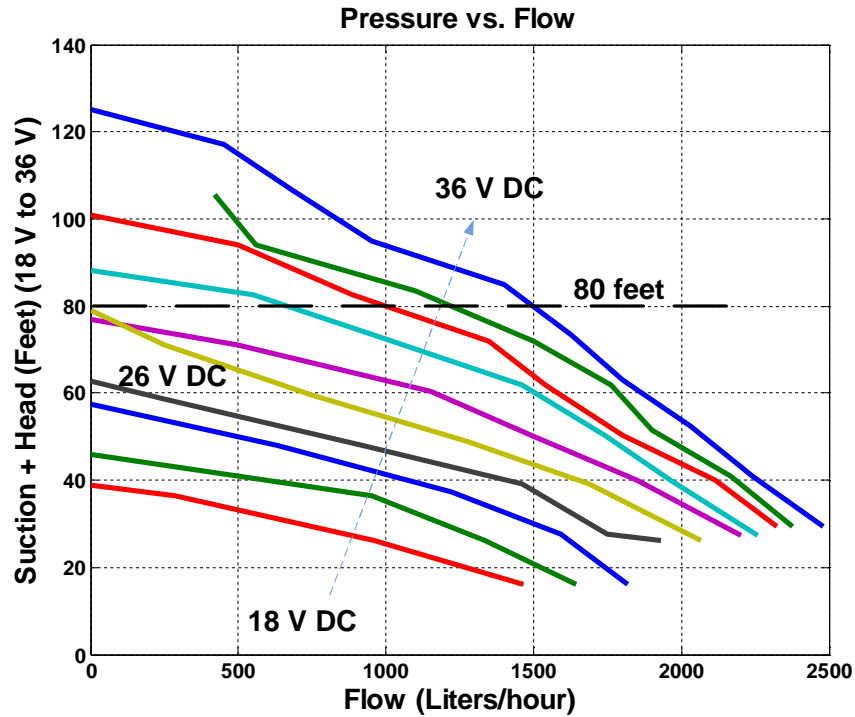
**Fig. 1: System Overview**

The heart of this system is the highly efficient brushless DC permanent magnet motor that is the prime mover for the pump. The brushless DC motor does not have brushes that require maintenance and have short life. There is no contact between the rotating part and the stationary portions of the motor and complete speed control is achieved by the drive electronics that switches current into the three phase windings of the motor. The overall system efficiency is high and the motor-pump runs smoothly and with low rise in heat above ambient as there is very low loss.

The pump has been specially design to operate in the motor speed range that is typically much faster than existing pumping systems to make the overall size smaller.

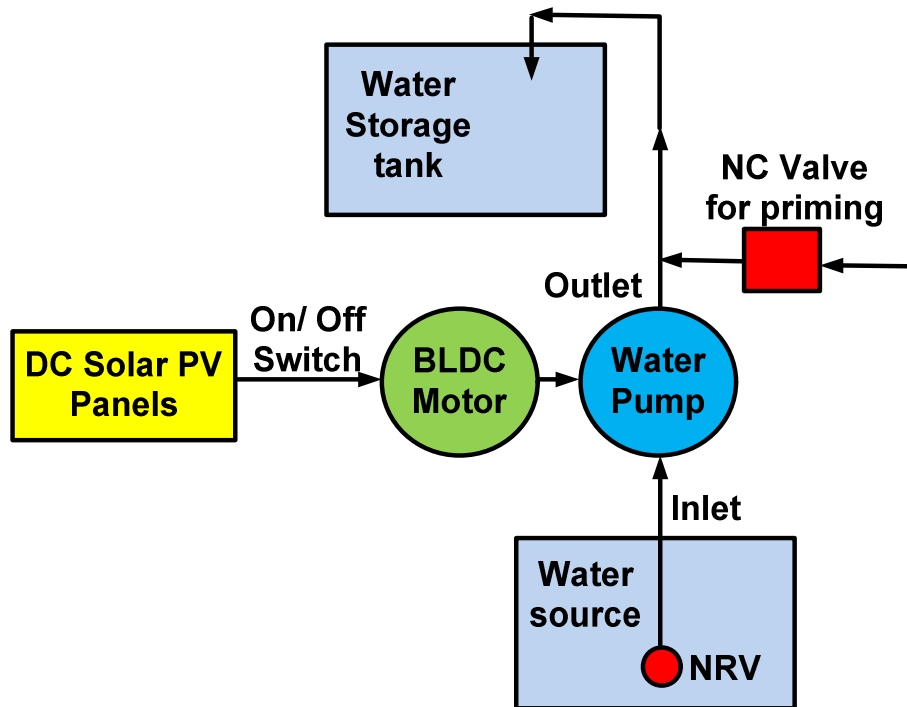
These are a family of mono-bloc surface pumps that move water from wells, sumps, or sources of water less than about 20 feet in depth to heights of over 100 feet.

The photovoltaic panel is usually located facing south at an angle from the horizontal equal to the longitude of installation. For example, 13 to 15 degrees facing south in Bangalore as its longitude is 13 degrees north. The opposite will be true in the southern hemisphere.



**Fig. 2:** Total Head vs. Flow of 300 W Pump. The curves are from 18 V to 36 V DC in intervals of 2 V DC.

Depending on the sunlight available at any given instant of time, the speed of the motor keeps changing due to variations in the input power. The set of curves shown in Fig. (2) can be used to estimate the overall flow during daylight. During installation, the overall suction depth and pumping head will be known and is a constant which does not change. Mark this height on the y-axis of the graph and draw a line parallel to the x-axis that intersects all the curves shown. The performance of the pump will be along this line and depending on the voltage available it moves just horizontally increasing or decreasing the flow. If any of the pump curves does not intersect the horizontal line drawn, then the pump will not provide any flow at that DC voltage. An example is shown at a total head of 80 feet. There will not be any flow below 30 V DC as the pump curves do not intersect the head horizontal line below 30 V DC. But at higher voltages the flow varies from 0 to up to 1500 liters/hour.



**Fig 3:** Typical Connection for Normal Usage

The pump is powered by the solar photo-voltaic panel. The solar panel has standard MC-4 connector sets. Heavy gauge lead wires are run from the panel to the pump to minimize parasitic voltage drop in the lead wires and a polarized heavy duty connector is used to power the pump.

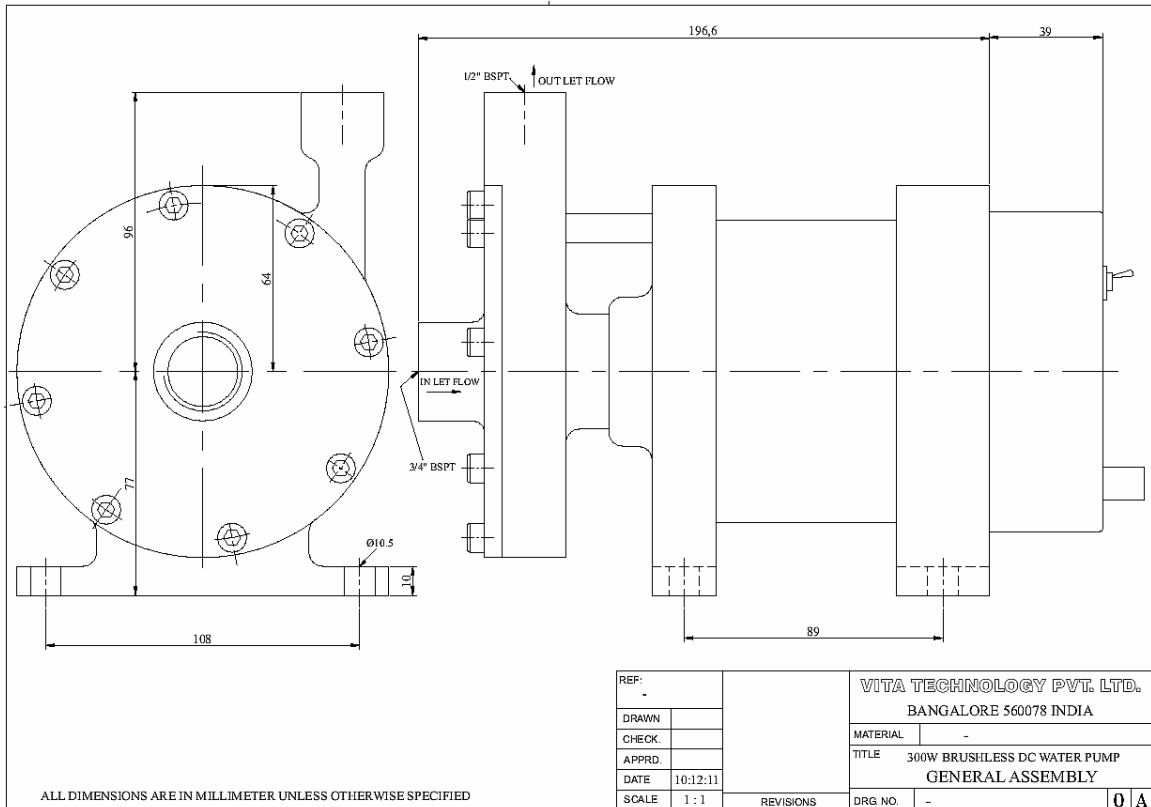
**Do not connect the power leads to the pump drive electronics with reverse polarity as it does not have reverse polarity protection and will result in permanent failure of the drive. Do not connect the motor to single phase line voltage AC, it will permanently damage the motor and destroy the drive electronics.**

Provide proper earthing from the pump frame by using one of the feet bolts connected to the solar PV panel earth and then to a high quality domestic earth or with a proper earthing system in remote areas. Ensure that the cross sectional copper area of the earthing cable is at least one half of the lead cables. Danger of severe electrical shock that can cause serious damage or death to animals and humans may result if proper earthing is not provided to keep the system at earth potential,

A non-return valve is used at the end of the inlet plumbing. This is to ensure that water remains in the intake pipe after the motor has been switched off, to prevent unnecessary priming. A normally closed priming valve is required on the outlet to prime the pump after initial installation. An On/Off switch turns on or switches off the pump. A rotary wet type seal prevents water leakage from the pump and

requires periodic replacement. Avoid dry running the pump as it will reduce the life of the seal or may permanently damage the seal if dry run for more than a few minutes.

The drive electronics has under-voltage protection and switches off the pump when the speed is insufficient due to lack of proper sun light. It tries to reach speed after being in sleep-mode for approximately 10 seconds by turning on the pump.



**Fig 4:** Package Drawing. The On/Off switch and power connector are located at the rear of the pump. For reference only, The package dimensions are subject to change.

### Electrical Specification for PV Panel:

Solar PV panel	300 W Multi-crystalline, 72 Cells	
Rated power	300	W
Open circuit voltage	45 (maximum)	V DC
Max power voltage	36	V DC
Short circuit current	8.65	A DC
Max power current	8.22	A DC

Recommended manufacturer: HHV Solar, Bangalore (72 cell, 300 W, Multi-crystalline series)

Different panel ratings will be used for different pumps. Panels can be either connected in series or parallel. The electrical specification of the pump can also change depending on the type of pump and panel power.

### Electrical Specification for Motor-Pump:

1	Maximum input voltage	45	V DC
2	Max input current	< 10	A DC
3	Max motor efficiency	88	%
4	Flow, pressure	See Fig. (1)	-



300 W pump in operation



Panel installation

**Fig 5:** For reference