2.2 KW Solar Water Pumping System

Taiwan Jia Yi Energy/Topco Group
2.2KW Pumping System Site Picture
Traditional Solar Water Pumping System

- Solar panels
- On/off switch
- Solar charge controller
- Battery
- Solar pump
- Driven torque
- Costly
- Small scaled
- DC motor running during the day and night
New Solar Water Pumping System

Genset → AC Panel → Solar pumping inverter → DC Panel → PV Strings

No battery bank → cost effectively
AC motor → larger scaled
Running only during the “sunny day”
Solar Water Pumping System Structure

- No battery bank → cost effectively
- AC motor → larger scaled
- Running only during “sunny day”
Submersible Water Pump

• Model: 4SP3-19
• Motor power: 2.2 kW/3HP
• Single phase
• 220Vac/60Hz
• Outlet diameter: 1-1/4G (30mm)
• Capacity vs Total head (table below)

<table>
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<tr>
<th>Q (m³/h)</th>
<th>0</th>
<th>2.4</th>
<th>3</th>
<th>3.6</th>
<th>4.2</th>
<th>4.8</th>
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<td>Q (lpm)</td>
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<td>ΣH (m)</td>
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<td>158</td>
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</table>
Solar Pumping Inverter

- Model: HSPH2200L
- Rated power: 2.2kW
- DC input (Solar)
  - MPPT: 200-450Vdc
  - Vmp: $\geq 300$ Vdc (solar only)
  - Voc: $\leq 450$Vdc (max Vdc)
- AC input (Grid or Genset)
  - 220V ±25%, 1ph
  - 50/60Hz
- AC output (Pump motor)
  - 220/230/240V, 1 or 3 ph
  - 50/60Hz
  - rated power: <2.2kW
Solar Water Pumping Test Setup

- PV array
- Solar pumping inverter
- 3HP 1phase 220V/60Hz Submersible water pump
### PV Array

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<tr>
<th>No</th>
<th>Panel Model</th>
<th>Temp</th>
<th>H W/m²</th>
<th>Voc</th>
<th>Isc</th>
<th>Vmp</th>
<th>Imp</th>
<th>Pm</th>
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- 2  1  4  3
8  7  9  5
6  10 11 12 +
2.2kW Testing and Observations

- Pump starts working at 210W/m² with 30Hz above.
- Water supply estimated more than 30m³ at a sunny day.

<table>
<thead>
<tr>
<th>H_W/m²</th>
<th>f_Hz</th>
<th>PV_kW</th>
<th>Q_m³/h</th>
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<td>53.3</td>
<td>1.5</td>
<td>5.33</td>
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</table>
2.2 kW Solar Water Pumping Features

• Cost effectiveness
  – No battery required makes cost much less
  – Higher solar availability enables to supply more demanded water even without fossil fuel power
  – Tremendously to save fossil fuel power cost

• Applicability and Convenience
  – Water supply for the fields without the access of grid lines
  – Saving fuel cost for the fields using fuel generators for water pumping
  – Even no fuel supply issues

• Durability
  – PV modules’ Long life performance warranty

• Environmental Friendliness
  – No loud noise
  – No green-house gas emission
2.2 kW Solar Water Pumping Package

- 240 Wp PV modules x 10 pieces
- 2.2 kW (3HP) submersible water pump x 1 unit
- 2.2 kW water pumping inverter x 1 unit
- PV module mounting system x 1 unit
- Control main panel x 1 unit
- PV module connectors x 1 pairs
Application Fields

Pump scale: 1kW → 40 kW+

- Faming water irrigation
- Livestock water supply
- Village community water supply
- Facility water supply (dormitory, etc.)
Thanks for Attention