Franklin Electric High Efficiency system supplies monks on Mount Athos with solar-powered drinking water

Mount Athos with its ancient monastery complex has no electricity grid. The 4″ High Efficiency Solar System supplies the monks with solar-powered drinking water from the 50-metre-deep well.

Solar-powered drinking water supply

On Mount Athos in the Agio Oros region of north-eastern Greece, a new 4″ High efficiency solar pumping system of Franklin Electric supplies an Orthodox monastic community with drinking water from a well. The particular challenge was that the area has no connection to the electricity grid. It was therefore decided to use a solar application to pump the necessary water from the 50-metre-deep well.

Fluida Pumps and pump equipment from Bulgaria took on this project and explored the possibilities. Looking for the best efficiency at a flow rate of 2 to 5 m^3/h, they quickly decided on the High Efficiency pumping system of Franklin Electric. As the area has no connection to the electricity grid, a solar application had to be installed. A system with 10 solar modules was installed for this purpose.

4″ High Efficiency Solar pumping system

- 4″ submersible pump VS 4/14
- 4″ permanent magnet PM motor 1.1 kW / 220V / 100 Hz / 4000N
- Solar Variable Frequency converter DrivE-Tech MINI Solar 2.011 MP

Another difficulty with the installation was that the area also has no internet access. So it was not possible to control and set up the system remotely. All data was coordinated in advance with the Franklin Electric support team so that the installation could take place smoothly on site.

Coordination with the customer was also difficult, because the monk was only available once a day at 6 a.m. to clarify open questions. Today, the well produces water reliably and supplies the monks with water every day.

Mount Athos has been inhabited since ancient times and is known for its long Christian presence and historic monastic traditions dating back to 800 AD in the Byzantine period. The mountain and most of the Athos Peninsula are administered autonomously by the monastic community.

In 1988, Mount Athos was included in the UNESCO World Heritage List because of its long religious history, the well-preserved agricultural architecture in the monasteries and also because of the preservation of the flora and fauna around the mountain. Women, by the way, are forbidden to enter the area administered by the monastic community.

HIGH EFFICIENCY

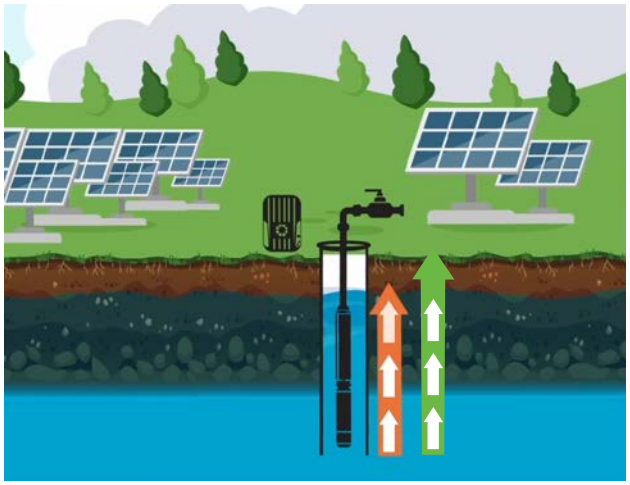
Voltage boost and reduction of solar modules

Solar applications are about converting sunlight into electricity. The most important value is the so-called solar radiation (measured in W/m²). This number tells you how much energy you can get from the actual sunlight. The solar radiation depends on your location and changes with the time of day, with the weather conditions and also during the year. Each day you only have a certain window of time where you have enough sunlight to keep your system running at full speed. So the solar system must be carefully sized to achieve the desired system performance. In addition to solar irradiance, this will depend heavily on the number of solar panels and how well your solar drive controls motor and pump. The MVPT algorithm of the High Efficiency system maximizes system performance.

So, when operating a pump with solar energy, it is important to generate sufficient electrical power, but even more important is sufficient voltage. The pump speed and thus the system performance is determined by the electrical voltage. To generate enough voltage, you need to connect enough solar panels in series. This will generate the voltage level needed to operate at full speed.

But if weather conditions change, the voltage can drop, causing the system to immediately reduce pump speed to keep running. This reduces the amount of water pumped, but not just linearly. Due to pump affinity laws, the pump head or pressure is reduced squared, which then leads to a further reduction in water flow as you run at a different pump operating point.

So, if you haven't sized your system carefully, or if you're using low efficiency components, you run the risk of running in what's called a dead head situation. The pump is still operating, but it's not generating enough head to overcome a certain level, and the result is that water flow stops. With the lower energy consumption of the High Efficiency System, you have an additional safety reserve that allows you to pump more water, or longer.



Franklin Electric has further enhanced this feature on its smaller 4" systems by adding a solar frequency inverter to provide an advanced voltage boost function. This voltage boost feature makes it possible to size your system based on power rather than voltage, saving you up to 50% on solar panels compared to a standard system without the voltage boost feature. The bottom line is that you need fewer solar modules, which reduces the initial investment and installation cost, and you also save on solar module mounting.

4" HIGH EFFICIENCY SOLAR SYSTEM

- Superior efficiency
- Up to 15 points (21 %) improved motor efficiency*
- Reduced motor current / cable cross-section
- Synchronous speed (no slip)
- Excellent partial load behaviour (Reduced stock levels)
- Less temperature heat rise
- motor range:
  1.1 / 2.2 / 3.0 / 4.0 / 5.5 / 7.5 kW (100 Hz - 3000 rpm)
  1.2 / 2.5 / 3.4 / 4.6 / 8.6 kW (120 Hz - 3600 rpm)
- System Power Supply:≤ 2.2 kW: 90-400 V DC / AC
  Backup: 90-265 V
  ≥ 3.0 kW: 160-850 V DC / AC Backup: 190-520 V

EXTENDED LIFETIME

- One-stop shop and perfectly matching components guarantee first-class performance/efficiency
- Direct DC feeding
- Suitable for the use in remote areas and harsh environments
- Robust Electronics enclosure designs
- The special Franklin Electric MPPT algorithm for borehole applications maximizes the system performance.

4" SOLAR VOLTAGE BOOST

- Sizing in power rather than voltage
- Reduction of required Solar panels
- Saving of investments and installation work

For more information on Franklin Electric High Efficiency Systems, visit franklinwater.eu.