

Tales of the Mzungu  
Episode V  
By the water boy



*“Just one more wire,” the young engineer announced to the villagers dramatically with all the confidence of a master magician, “and off we go!” A solar pump! At last no more long walks to the well for water. A flip of the switch; the light turned green and... nothing. A moment. Two. Three. Nothing at all...”*

### **Water Supply – Kyamagemule**

The elementary school at Kyamagemule has long been a project for WeDev Water, the birthplace of our slow sand filter, solar salt chlorination, and the rapid sand filter to control color and turbidity. Kyamagemule had the good fortune to have a water well. Although periodically contaminated with bacteria, it provided a permanent water supply. But from the beginning, the 40 m deep water well has been plagued with difficulties. For cost reasons, the pump riser pipe was built out of PVC without spacers. But the pipe became brittle and had to be replaced annually. It was learned through WeDev that the movement of the hand pump caused a whipping action of the pipe that over time caused the pipe to become brittle and porous. In 2017, the pipe was replaced with ductile iron, still semi-flexible, but more sturdy.

Within months, the water turned first orange and then black. The return trip in 2018 determined that the well water was highly corrosive. Fortunately, the rapid sand filter, built in the same year, had minimized the problem. But a more permanent solution was needed.

In 2019, the WeDev Water team determined to both enhance the water well and the ease of access by designing and building an HDPE pump column fitted with a solar pump. Since piping is relatively inexpensive, additional pipe was purchased to move access to the school site itself.

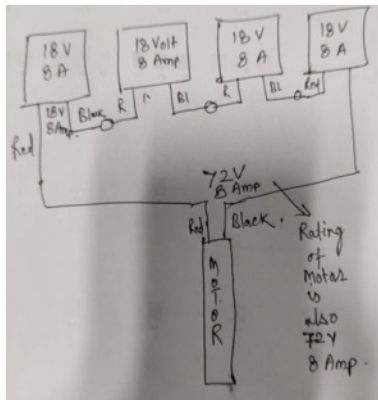
The HDPE piping functioned as intended and the project provided the young engineers an opportunity to learn about solar systems. Since the water was supplied to a storage tank, the time of day of filling the tank was irrelevant. The school decided that solar batteries would not be needed. Since sunshine is prevalent, the pump would run solely on solar energy and the engineer was very experienced. The pump would be turned on whenever there was sunlight until the tank was full.



“Never done it that way before, by hey, we’re in Africa, not Minnesota, plenty of sunshine!”

Installation went smoothly, lowered the pump in, hooked up the wiring, threw the switch and...

Nothing, nothing at all. Now you start digging. Loose wire? Pump failure? Had one of those just the week before. Checked them all. No pumping. We had power though, so that eliminated some things.



Do we have enough power? But flipping the switch resulted in no water. The connections were checked and the series/parallel orientation of the solar panels was reviewed.

4 Solar Panels		
Solar Panels in series		
74.28 V	>72 V	OK
8.35 A	>8 A	OK
620 W	>600 W	OK

DURALAST  lasts longer	
Maximum Power	155 W
Open Circuit Voltage (Voc)	22.68V
Short Circuit Current (Isc)	8.8V
Voltage at Maximum Power (Vmp)	18.57V
Current at Maximum Power (Imp)	8.35A
Maximum System Voltage	1000V
Power Measured in Standard condition (STC) : Irradiation: 1000W/m <sup>2</sup> , AM 1.5, cell	
Make in India	
Manufactured by: HVR SOLAR PVT LTD. PLOT NO. 35, PHASE 1, INDUSTRIAL ESTATE, HSIIDC BARHI, HARYANA (INDIA)	
Electrical Hazard: This unit produces electricity. Do not disconnect under load	

Confirming that the wiring was correct, the team dug deeper. As is often the case, the solution was the simplest of things. The design engineer had neglected to take into account the efficiency of the solar panels, a problem he wouldn’t have had if solar batteries had been used.

The moral of the story? Sometimes mistakes are a good thing. It gives us a chance to learn, more so than when things work the first time. And far from losing confidence in their more experienced engineers, the young engineers learn from how you respond when things don’t work the way you planned. And, of course, doing things on the cheap isn’t always cheaper, even on the advice of a good engineer.

*In the end, we purchased another panel and a solar battery, but didn’t have time on this trip to see the fruits of our labor. So we boarded the plane and waited impatiently for the results. A few weeks later the pictures came, young children cooling off under the clear flow from the well water into the school compound.*

