

### Solar pumping project

**Note:** Up-grading of Nertiti water yard No.8 (BBC) through solarized water pumping system-Nertiti-Central Darfur.

### Parameter

Location:	Sudan, Nyala (12° North; 25° East)	Water temperature:	25 °C		
Required daily output:	60 m³; Sizing for average month	Dirt loss:	5.0 %	Motor cable:	81 m
Pipe type:	steel, weldless, new comm. size galvanized: 0.160 mm	Static head:	52 m	Pipe length:	94 m

### Products

	Quantity	Details
PS2-4000 C-SJ8-15	1 pc.	Submersible pump system including controller with DataModule, motor and pump end
Solar cell 540W.P	12 pc.	6,480 Wp; 6 x 2 modules; 15 ° tilted
Motor cable	81 m	6 mm² 3-phase cable for power and 1-phase cable for ground
Pipeline	94 m	50 mm (inner diameter) Pipeline
Accessories	1 set	Well Probe V2

### Sun Sensor setting in PumpScanner

**min. 100 W/m²**

### Daily output in average month

**78 m³**

#### Daily values

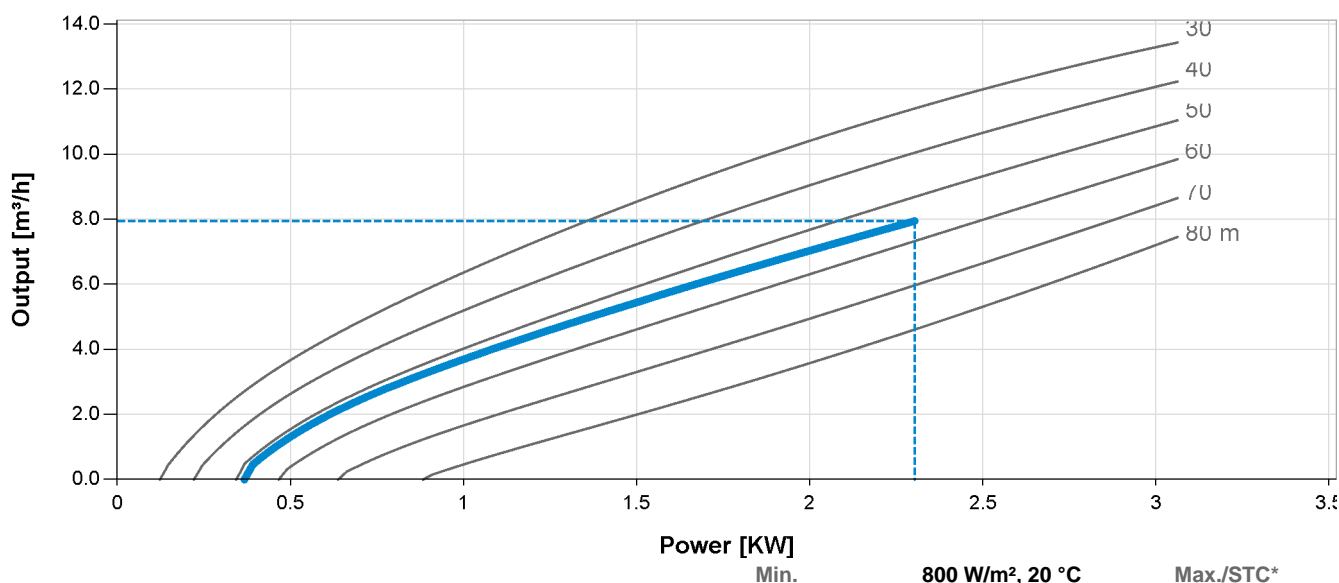
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Av.
Output [m³]	78	80	80	80	78	77	76	76	77	78	78	78	78
Energy [kWh]	36	38	38	36	33	31	29	30	32	34	36	35	34
Irradiation [kWh/m²]	6.4	6.9	7.1	6.9	6.2	5.8	5.3	5.5	6.0	6.3	6.6	6.3	6.3
Rainfall [mm]	0	0	0	0.067	0.50	1.4	3.6	4.3	2.1	0.57	0	0	1.0
Ambient temp. [°C]	22	24	27	29	28	26	24	24	26	28	26	23	26

#### Hourly values

	6:00	7:00	8:00	9:00	10:00	11:00	12:00	13:00	14:00	15:00	16:00	17:00	18:00
Output [m³/h]	0	3.8	7.5	8	8	8	8	8	8	8	7.3	3.6	0
Energy [kWh]	0.049	1.1	2.3	3.3	4.0	4.4	4.5	4.3	3.9	3.1	2.2	1.0	0.047
Irradiation [kWh/m²]	0.008	0.18	0.39	0.58	0.73	0.83	0.86	0.83	0.73	0.58	0.39	0.18	0.008
Ambient temp. [°C]	21	21	22	24	26	28	30	31	31	31	31	30	30

**Solar pumping project**

**System characteristic**

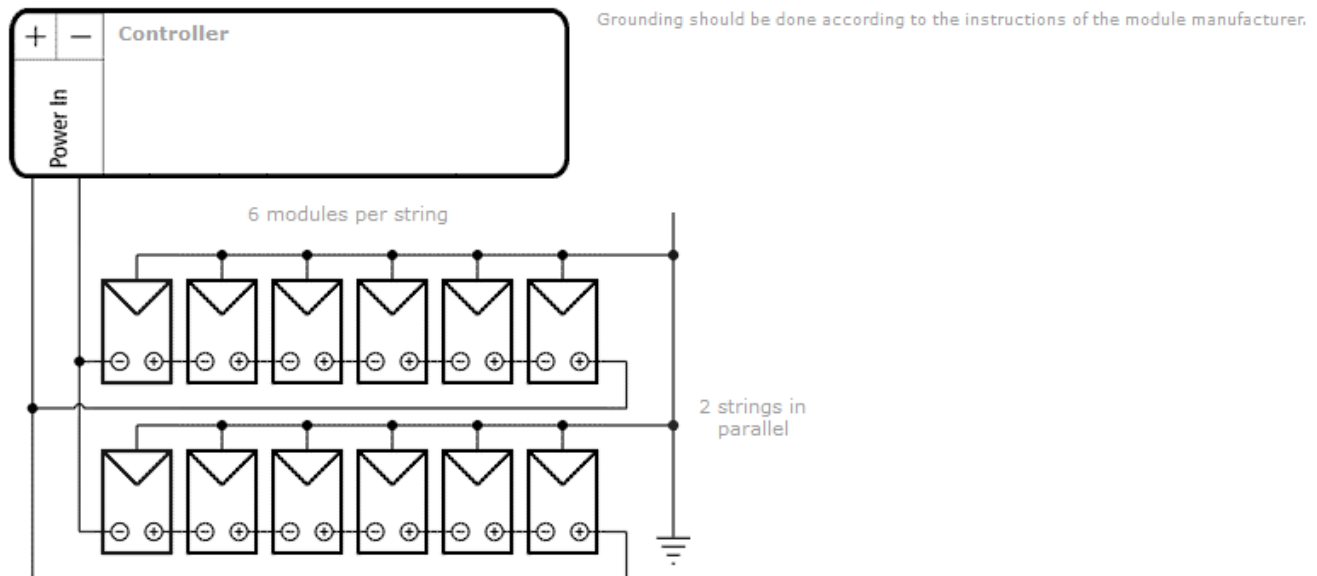


			Min.	800 W/m², 20 °C	Max./STC*
<b>PV generator</b>	Cell temperature	[°C]		46	25
	Temperature loss	[%]		11	-
	Dirt loss	[%]		5.0	-
	Pmax	[Wp]		4,410	6,480
	Vmp	[V]		267	298
	Imp	[A]		17	22
	Voc	[V]		230	250
	Isc	[A]		20	26
	Pout	[W]		2,400	-
	Vout	[V]		300	-
	Iout	[A]		8.3	-
<b>Motor cable</b>	Power loss	[%]	1.0	2.9	2.9
<b>Pump systems</b>	Motor power	[W]	367	2,305	2,305
	Motor voltage	[V EC]	132	192	192
	Motor current	[A]	2.8	12	12
	Motor speed	[rpm]	2,260	2,775	2,775
	Flow rate	[m³/h]	0	8.0	8.0
	Efficiency	[%]	0	51	52
<b>Pipeline</b>	Flow speed	[m/s]	0	1.1	1.1
	Friction loss	[m]	0.004	3.5	3.5

\*STC: Standard test conditions for photovoltaic modules, 1000 W/m² solar irradiance, 25 °C cell temperature

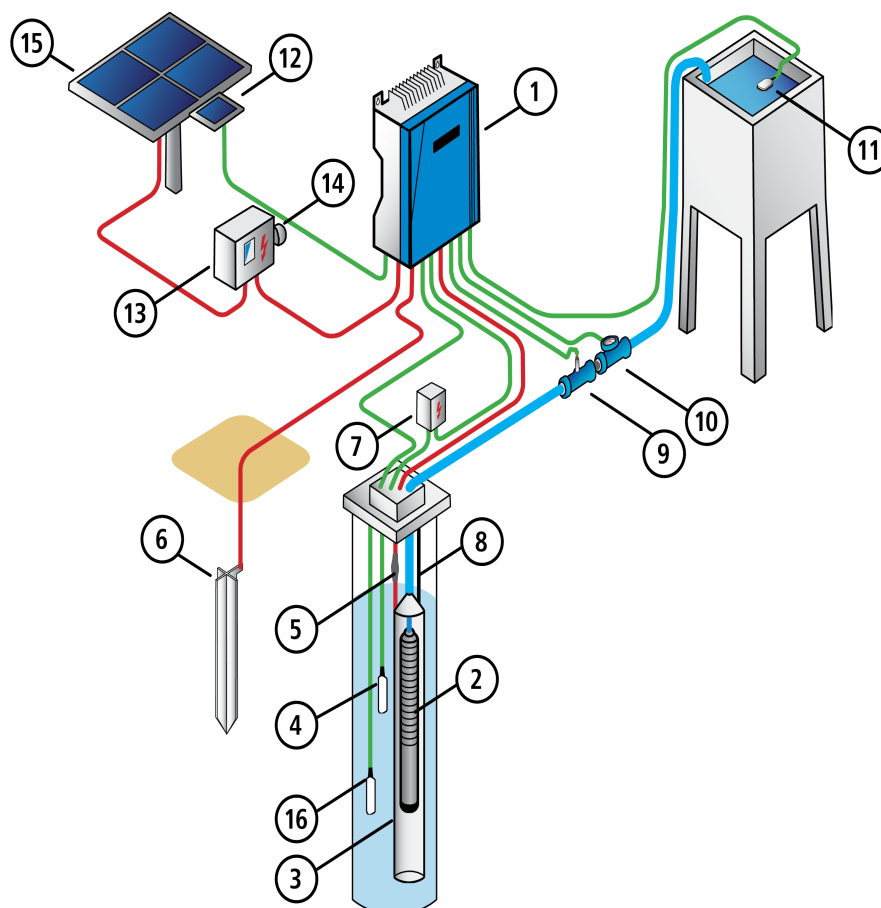
**Solar pumping project**

**Wiring diagram**



**Solar pumping project**

**System Layout**



1: PS2 Controller

2: Submersible Pump

3: Flow Sleeve

4: Well Probe

5: Cable Splice Kit

6: Grounding Rod

7: Surge Protector\*

8: Safety Rope

9: Water Meter

10: Pressure Sensor

11: Float Switch

12: Sun Switch

13: PV Disconnect

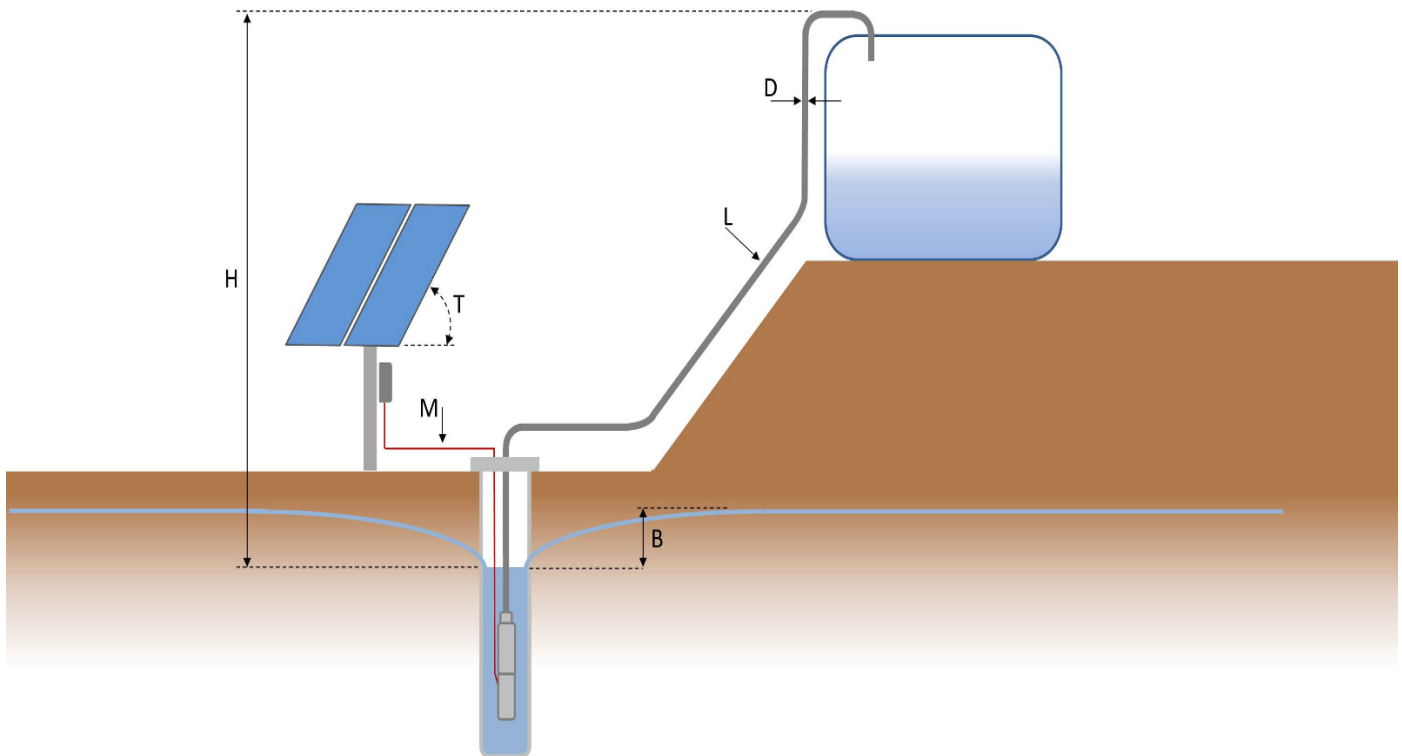
14: Lightning Surge Protector

15: PV Generator

\*It is recommended to install a Surge Protector at each controller sensor input.

**Solar pumping project**

**Sizing Layout**



<b>H (Static head):</b>	Vertical height from the dynamic water level to the highest point of delivery.
<b>B (Drawdown):</b>	Lowering of water level depending on flow rate and recovery rate of the well.
<b>D (Pipeline inner diameter)</b>	
<b>L (Pipe length):</b>	Entire pipeline from the pump outlet to the point of delivery. Ellbows and armatures must be added as an equivalent length of pipeline.
<b>M (Motor cable):</b>	The cable between controller and pump unit.
<b>T (Tilt angle):</b>	Angle of the PV generator surface from the horizontal plane.

# Well Probe V2

## Mechanical float switch for dry run protection of LORENTZ solar pumps

The well probe provides a reliable method of run dry protection for LORENTZ pumps. The well probe detects that water is present within a well, tank or other water source. The well probe is typically attached to the riser pipe above the pump and connected to the controller. When the well probe becomes dry (water level is below the probe) the pump switches off to avoid dry running.

### Order Information

**Item no.:** 19-000005    **Product name:** Well probe sensor V2

### Features

- Reliable dry run protection
- Simple to install using 3 cable ties
- Improved tolerance to dirt
- Splicing kit and cable ties for fixing are included

### Technical Data

- Max. operating temperature 55°C
- Enclosure class: IP68
- Submersion depth: max 50 m (164 ft)
- Cable length: 1.5 m
- Wire size: 2 x 0.50 mm<sup>2</sup> or AWG 20, waterproofed
- Must be mounted in a vertical position
- Meets the requirements for CE

### Dimensions / Weight

- Packaging dimensions: 255 x 170 x 40 mm  
10.0 x 6.7 x 1.6 in
- Total weight: 0.1 kg / 0.2 lbs

