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SOLAR MILLING® PV CONFIGURATION OPTIONS FOR ZEBRA MILL

BACKGROUND

Zebra Mill by Solar Milling® is a machine itself (CE certified), which is able to process dry grains into edible flour. Mill has a standard electrical motor, squirrel cage type, 2,2kW power. For solar driven, our Control Panel is needed. Control panel function is to manage the motor (the mill) upon power supply configuration and includes electrical protections.

Mill performance is set at 40 kg/h for fine flour for a grade average of 500 microns fineness for grains below 12% moisture (corn) and about 55 kgs/h for millet. For coarser flour like livestock feed, production can raise up to 200kg/h or more. This rate must be considered as indicative, due there are many factors that affects the milling operation (type of grain, grain size and moisture contents to mention a few).

On regard the power supply system to run the Zebra Mill, this can be powered with different configuration possibilities.

1. Stand-alone configuration: mill is directly powered by solar modules during radiation hours, without batteries. It can be also powered from an external power source 1x230VAC if available (grid or genset). A change-over switch in the control panel selects DC coupled or AC coupled.).

2. Mini-grid configuration: mill machine works based on a mini-grid configuration, using direct radiation to drive the mill and deviating

surplus energy to the battery bank. In case of cloudy day, battery back up the supply to the mill and side appliances (lights, phone charging, etc…). So, 230V is available 24H/7 either from direct radiation and/or battery. Very convenient, due any single watt the PV array produces is taken and used by the system. System can be backup also with a genset if required.

Both configurations allow the mill to run on a smooth operation and have been tested by Solar Milling®, so we fully back these options.
Both configurations have their pros and cons, like:

STAND-ALONE CONFIGURATION		MINI-GRID CONFIGURATION	
PROS	CONS	PROS	CONS
No need of a battery bank, direct operation	Side appliance can't be powered	Can work with or without batteries. Side appliances powered (230V)	Higher price
Reduced price	High performance in sunny days but lower in cloudy days	Mill works steadily. If batteries are installed can supply extra energy in cloudy conditions	Performance subjected on battery quality / temperatures
Very low maintenance	Mill cannot be operated by night	Easier to monitor, locally or remotely	More hardware needs to be installed and commissioned
Easier to install		Modular system and easily expandable	

STAND-ALONE CONFIGURATION

- Zebra Mill, with electrical motor 2,2kW 3x230/400V 50 Hz
- PV Array: 1 string of 8 solar modules in serial, Sharp 440Wp each.*
- Total PV power installed: 3520 Wp
- Solar Milling® control panel dual AC/DC power supply.

- Expected mill performance per day: 5 to 7h per day of operation at the nominal performance in enough radiation conditions and depending on latitude.

MINI-GRID CONFIGURATION

- Zebra Mill, with electrical motor 2,2kW 3x230/400V 50 Hz.
- PV Array: 1 string of 10 solar modules in serial, SHARP 440Wp each.*
- Total PV power installed: 4400 Wp
- Type of inverter: All-in-one hybrid inverter (PV and battery) 6 kW AC rated power.
- Battery bank storage capacity: 8kWh
- Battery bank brand and model: Sonnenschein Powercycle PC12/180FT, 4 units in serial, including cables.
- AC/DC electrical board with protections and power distribution.
- Solar Milling® control panel dual AC/DC power supply.

- Expected mill performance per day: 5 to 7h per day of operation with extended time if batteries are installed.
  Refer to our Energy analysis doc for an example.
  Mini-Grid configuration is scalable, (i.e running 2 mills or extra machinery / devices)

*Due changes on solar modules manufacturer and availability, final model can differ from the model listed here. Modules model and specs to be attached at the time of request.