

## DOCKETED

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*Comment Received From: Ian Stewart*

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## **Energy Saving Technology for Swimming Pools**

There are currently an estimated 1.8 million swimming pools in California. For pumping alone, these pools use approximately 3 gigawatts of power. SolarOpia LLC has developed a technology that takes advantage of solar power to greatly reduce the power drawn from the grid by pool pumps.

Our Solar Pumping Inverter-VFD (SPI) is more efficient than other solar technology for pumping water. Compared to a conventional Variable Frequency Drive (VFD), our SPI can pump 40% more water with the same number of solar panels.

Since most pumping can take place during the day, most of the pumping done can be done for free. At night the pump can be reduced to a minimum required speed to save even more energy. Taking pumping off the grid will reduce greenhouse gas emissions at power generation stations.

SPI uses Maximum Power Point Tracking to run as efficiently as possible, and also has protections in case of broken pipes and other issues that can cause water waste.

There are many homeowners in California who, to save energy, do not run their pool pump during the winter. The lack of filtration makes the water unsafe, and in many cases the pool must be drained and refilled. This is a waste of 25,000 gallons or more each time this is done. SPI will automatically run the pool pump through winter months at no additional cost to the homeowner, eliminating this waste.

There is a tremendous opportunity for water and energy savings in swimming pools. There should be a provision in the WET program for them.

*Additional submitted attachment is included below.*

## SOLAR PUMPING SYSTEMS FOR RESIDENTIAL AND COMMERCIAL POOLS



### **SPI** A NEW GENERATION OF SOLAR PUMPING TECHNOLOGY

**DAILY DOUBLE POOL VOLUME FILTRATION - OPERATES POOL AND SPA -  
LOWERS BY 75% POOL OPERATION COST**

**EMBEDS FIVE SYSTEMS IN ONE**

- Solar Inverter
- Solar VFD
- Pool Operation Controller
- Pump Protection controller
- Pump Communication Controller

**The Pool Pumping Technology of the 21 Century**

## SPI ADVANCED NEW SOLAR TECHNOLOGY

### ■ New Class OF Solar Inverters operating Pumps in 3 Power Modes

The world's first battery-less, transformer-less solar inverter technology that operate OFF –Grid , On-Grid and Hybrid mode (Solar, and AC) to Prolong day time operation with any available solar power

### ■ New Solar VFD with Adaptive MPPT Technology

SOLAROPIA SPI employs new efficient MPPT technology (patent pending- Adaptive MPPT Solar VFD) that decreases solar PV power by 40% to operate pumps compared with existing solar inverters

## Main Benefits

- Pump Brand Independent ( can operate any existing or new commercial pool pump)
- Easy to Install and Operate with Plugs-n-Play Technology
- Highly efficient – Daily double Pool Volume filtration with Solar power
- Operates both Pool and SPA with only solar power
- Automated self- start-up : daytime (Solar), Evening-time (Hybrid), and night time (AC mode)
- Remote Control of Pool and SPA Operation
- Extremely Economic – 75% less cost than Utility power – and 40% less than conventional Solar system



## Advanced Pump Protection

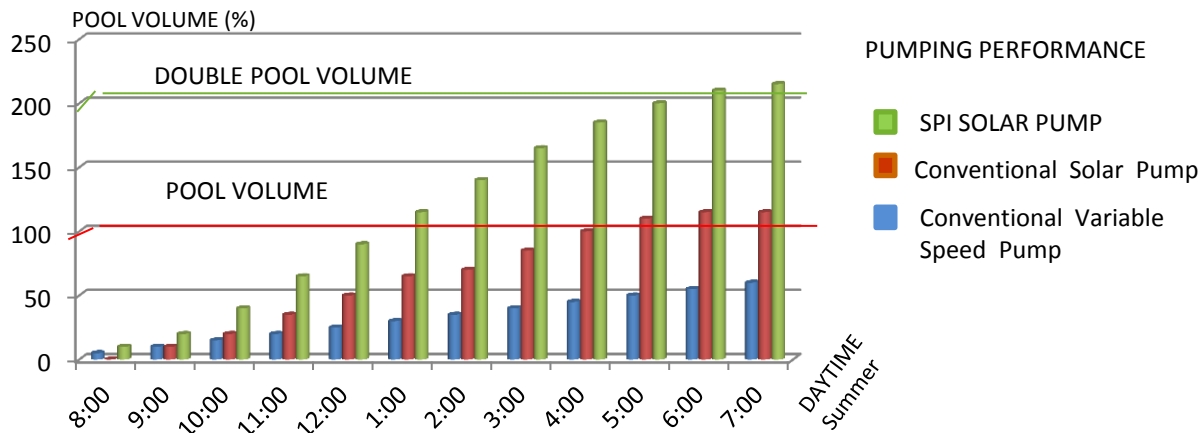
SPI implements high industrial standards pump protection functions that makes it maintenance free

- Soft-start and Soft-shutdown.
- Dry-Run Protection
- High Pressure Protection
- Pipe Breaks-leakage Protection
- Flow Compensation .
- Pipe fill Protection
- High Voltage Protection
- Surge Power protection
- Short circuit - phase loss Protection
- GFIC protection of electrical leakage
- Emergency stop button
- Main turbulence protection



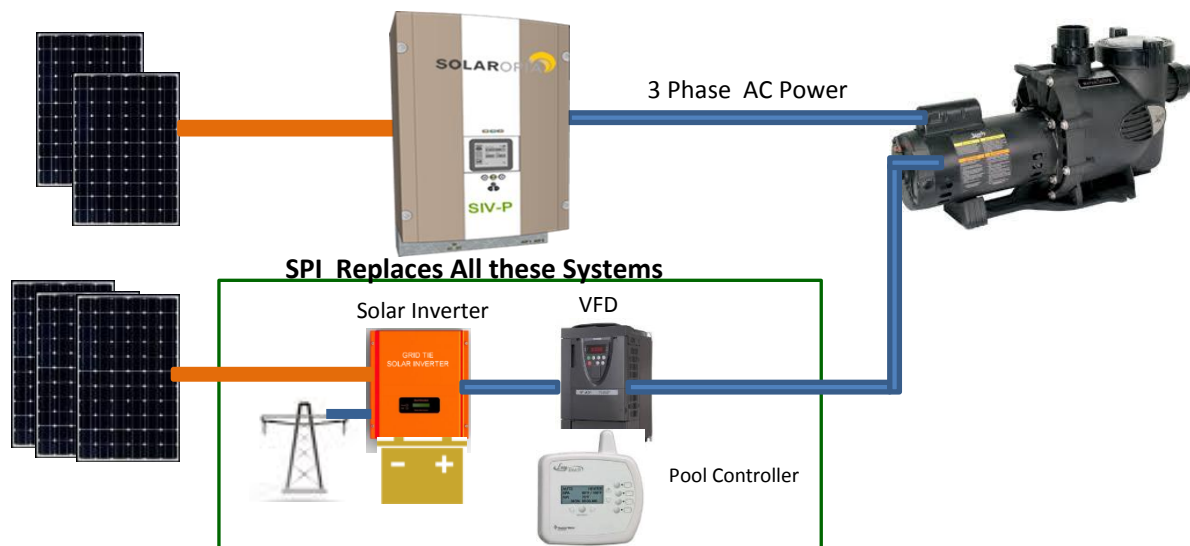
## HIGH PERFORMANCE

- SPI Solar pumps performs double pool filtration during daytime hours
- Conventional Solar Inverters filtrate pools only once and they need extra conventional Variable Speed Drive
- Conventional variable speed pumps filtrate only 55% during daytime (24 hours whole pool volume)



## SPI COMPARED WITH CONVENTIONAL SOLAR SYSTEMS

- SPI Pumps 40% more volume using the same PV Power ( reduces Solar PV Cost by 40% )
- SPI Replaces three systems required by Solar Inverters ( reduces System cost by another 40% )



## SPI-PUMPS OPERATING VOLTAGE REFERENCE

SPI operates all 3Phase pumps at standard 200V and 400V AC

The required DC voltage in serial PV array is provided below for each pump voltage type.

SPI Voltage Type REF.	SPI Feed AC Voltage	Pump Voltage (3 phase)	Required DC Voltage (Vmin - Voc )*	SPI MPPT Operating DC Voltage Range
1 2	1: 1 x 200 V 1 phase -AC 2: 3 x 240 V 3 phase-AC	200 V class	250 - 400 V DC	185 - 400 V DC
3 4	3: 1 x 400 V 1 Phase-AC 4: 3 x 400 V 3 Phase -AC	400 V Class	550 - 800 V DC	350 - 800 V DC

\*Vmin : Minimum Voltage of the Serial PV Array

Voc : Maximum Voltage of the open circuit Serial PV array

## SP-P Series for Residential and Commercial Solar Pool Pumping Systems

SP-P series offers solar pumping systems to operate pools from 15,000 G to 300,000 G

Solar System	15,000 G	25,000 G	50,000 G	100,000 G	150,000 G	200,000 G	300,000 G
Pool Pump (HP)	1	1.5	3-4 HP	5.5 HP	7.5 HP	10 HP	15 HP
Solar PV Power (KW)	0.75	1.5	3-4.5 KW	6 KW	7.5 KW	12 KW	15 KW
Rated Flow Rate (GPM) at 35' TDH –Solar Mode	45 GPM	80 GPM	180 GPM	350 GPM	450 GPM	600 GPM	900 GPM
Av. Pool Volume /Day in Solar mode (G)	25,000	40,000	85,000 G	180,000 G	280,000 G	360,000 G	550,000 G
SPI System Reference	SPI-1-P	SPI-1.5-P	SPI-3-P	SPI-5-P	SPI-7.5-P	SPI-10-P	SPI-15-P








### SPI COMPLETE SOLAR SOLUTIONS

SOLAROPIA offers ready to install complete SIP-P Systems in 3 packages:

**PAC1:** SPI-P (Solar Pumping inverter only - PVs and pumps are supplied by installers)

**PAC2:** Complete Solar System to upgrade Existing Pool Pumps to operate with solar power

**PAC3:** Complete Solar system with New Pump from US pump manufacturers (SOLAROPIA Partners)

PACKAGE	PAC 1	PAC2	PAC3
<b>SPI SYSTEM</b>	SIP-P Only Installers supply PVs and Mounts	Complete -Ready to Install Solar System Package (SIP-P , PV, PV Mounting, Combiner box , DC -AC cables)	PAC2 with New Pump
<b>RESIDENTIAL</b>		 R: ROOF  G:Ground	
<b>COMMERCIAL</b>		 Architectural Album For commercial Mount Selection 	

### SPI SYSTEMS REFRENCING

SPI	HP	V	P	N
	Pump HP	Voltage: Type : 1, 2 or 3		PAC No: 1, 2, or 3