SOLAR PUMPING INVERTER-VFD (SPI)

ALL IN ONE SOLAR SYSTEM FOR INDUSTRIAL PUMPING

- Direct Solar to 3 phase AC Pumps
- Solar Variable Frequency Drive (S-VFD)
- Pump Protection Controller
- Pump PLC Application Controller
- Pump Remote Communication Controller

World's First Solar System for Industrial Pumping Applications
OPERATES PUMPS WITH 30% LESS PVS THAN SOLAR INVERTERS

Operates All Types of Pumps up to 750 HP with Solar power

Intelligent
- Integrated Solar /Hybrid AC Power Management
- Plug and Operate Technology
- Smart Pumping Volume Control
- VFD Control with Auto Pump Protection
- Easy to operate

Efficient
- Optimized Smart Adaptive MPPT
- Direct DC Injection Reduces Power Loss by 30%
- Max. Power Efficiency up to 98.5%
- Pump Independent-Operates All Types of Pumps
- Reduces Pumping cost by more than 50%

Optimized
- Automatic energy optimization
- End of curve detection
- Dry run detection
- Flying start and kinetic backup
- Time set actions
- Remote set up and data monitoring

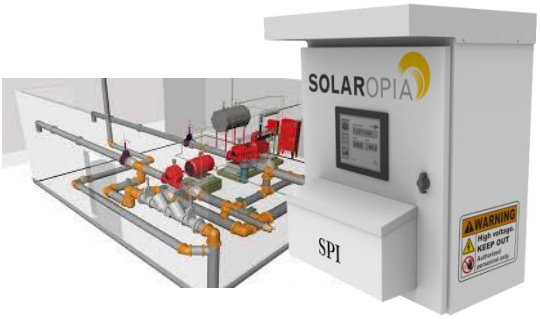
Industrial
- Operates all Pumps from 5 to 750 HP
- No need to change existing Pumps in plants
- Heavy-Duty High Temperature Resistant
- Long Life Cycle up to 15 Years
- NEMA 3 R Environment Protection Rating
- MADE IN USA

3944 Murphy Canyon Rd –C10 6 San Diego, CA 92123 USA

THE SOLAR PUMPING INVERTER –VFD (SPI)

All S-ROC models are supplied with solar-VFDs ready-to-plugs in and operate plants feed and RO pumps

- Built-in solar VFD for efficient Pumps control
- 30% more power efficient than commercial solar inverters (reduces PVs by 30%)
- Pump Independent -operate all 3phase AC pumps of any manufacturers
- Grid Independent –Operates with and without grid power (Solar and Hybrid modes)
- Solar Mode: off-grid (during solar hours)
- Hybrid mode: Solar and AC Power (24 Hours)



BUILT–IN PUMP PROTECTION

PUMP ELECTRICAL PROTECTION

- High voltage protection
- Power surge protection
- Phase loss protection
- GFIC protection
- Emergency halt protection
- Main turbulence protection

PUMP OPERATION PROTECTION

- Soft-start and Soft-shutdown.
- Dry-Run protection
- High pressure protection
- Pipe leakage protection
- Flow compensation
- Pipe fill protection

BUILT–IN PUMPING APPLICATIONS CONTROLLER (PLC)

- Auto start in Solar mode (No need to turn pumps ON/OFF)
- Auto-switching between power modes (Hybrid Mode)
- Boost –Decrease Flow Rate (Manual, Time Set, Remote)
- Built in monitoring and distant transmission
  (Flow-Rate , Daily Pumped Volume , Solar Power (kW), AC (kW)

BUILT–IN PUMP COMMUNICATION CONTROLLERS

- SPI Communicates with other pumps, data servers, PLCs, and control rooms remotely using standard industrial Protocols (Modbus, Profibus)
- Operation and Data Transmission via GPRS(option).

SOLAR PUMPING SYSTEM PACKAGES AND SUPPORT

SolarOpia offers three support packages:

PAC1: Supplies only SPI-P system (installers supply PVs and Mounts)
PAC2: Supplies Complete Solar System (SPI with PVS and Mounts)-installers can select any 3phase AC pump.
PAC3: Complete Solar system with New Pump from US pump manufacturers

PAC 1	PAC2	PAC3 (A , B)
Supplies SPI only PVs and Mounts are not included –supplied by installers	Package for existing pumps Package includes complete solar system without pump: SPI , PV, PV ground Mounting, Combiner boxes	PAC3-A: Add new Pump with PAC1 PAC3-B: Add new Pump With PAC2 New Pump from Grandfos /or other US pumps manufacturers with efficiency above 70%

Ordering & Referencing

S-ROC	T	HP	V	P
	Class: W,S,B	**Pump HP**	**Pump Voltage Class:2 or 4**	**Package: 1,2,3**

MADE IN U. S. A.

SPI-C CLASSES /MODELS

Solar Deep Wells Pumps

SPI-C-W Class

SPI-W class offers ready to operate Deep-well pumps up to 50 hp. Applications for small town water plant, farming irrigation , Oil fields , Rural work camps.

MODELS REFERENCE: SPI-W XX (XX= the PV power in KW from the Ref. table)

Q:FLOW RATE		H: PUMPING HEAD Feet'-Meter (m)						
GPM	m3/h	150' 50m	250' 75m	350' 100m	500' 150m	700' 200m	1000' 300m	1200' 400m
100	25	6	9	12	18	24	36	48
200	50	12	18	24	36	48	75	120
300	75	18	24	36	60	75	120	150
400	100	24	36	48	90	120	150	180
600	150	36	48	75	120	150	240	300
800	200	48	60	90	150	180	330	420
1,000	250	60	90	120	180	240	480	540

Solar Surface Water Pumps

SPI-C-S

SPI-S class offers solar system to operate surface pumps in volume driven pumping applications for water plants, small sewage plants, farming irrigation and small industrial plants.

MODELS REFERENCE: SPI-C-S-XX (XX= the PV power in KW from the Ref. table)

Q: FLOW RATE		H: SURFACE PUMPING HEAD (feet', bars, meters)		
GPM	m3/h	30'-1 bar-10m	75'-2.5 bar-25m	150'- 5 bar-50 m
400	100	6	9	30
800	200	12	24	48
1,000	300	18	36	60
1,500	400	24	48	90
2,000	500	30	60	120
2,250	750	60	90	150
4,000	1,000	90	120	210
6,000	1,500	150	210	270
8,000	2,000	210	270	350
12,000	3,000	270	350	420
16,000	4,000	330	420	500
20,000	5,000	400	480	560

Solar Pressure-Booster Pumps

SPI-B

SPI-B class is designated for high pressure pumps 2-to7 bar (3 to-100PSI) . Typical applications for irrigation sprinklers, central pivots, oil field high pressure pumps, small town water distribution pumps .

MODELS REFERENCE: SPI-C-B-XX (XX= the PV power in KW from the Ref. table)

Q: FLOW RATE		H: Total RO Pump Pressure (bar-psi)				
GPM	m3/h	3bar 50 psi	5bar 75 psi	7 bar 100 psi	15bar 200 psi	20bar 300 psi
100	25	6	7.5	12	18	24
200	50	9	15	18	36	42
300	75	15	21	30	48	72
400	100	S 18	30	36	72	90
500	125	24	36	48	90	120
600	150	36	40	60	120	150
800	200	40	48	75	150	180
1,200	300	60	75	150	210	300
2,000	500	75	120	210	300	420
4,000	1,000	150	210	300	420	750

Ordering & Referencing

S-ROC	T	HP	V	P
	Class: W,S,B	Pump HP	Pump Voltage Class:2 or 4	Package: 1,2,3

MADE IN U. S. A.

SOLAROPIA

SPI DATASHEET

Q4.2015

Specifications -Features	Description			
Operating Power Modes	1.Solar Mode (S) : Solar DC Input Only 2.Hybrid Mode(H): Solar and AC input (AC Complementary to Solar-No switching needed)			
Output Power Rating HP/ 3Phase-AC (Both Modes)	3 to 50 HP (up 37KW AC)	50 to 120 HP (up to 90KW AC)	120 to 400HP (up to 250KW)	400 to 750 HP (up to 450 KW)
Enclosure Dimensions (H x Wx D) (inches/mm)	29 x 21.75 x 21.75 in 735 x 553 x 553 mm	42 x 34.5 x 29 in 1066 x 876 x 736 mm	68 x 38 x 33 in 1727 x 965 x 838 mm	97 x 55 x 43 in 2463 x1397 x 1092 mm
Enclosure Environmental Rating and Protection	NEMA 3R, UL Type 3R, CSA Type 3R / Indoor-outdoor installations UV Resistance Enclosure , Ambient Temperature: (15-130F, -10—55C°), Humidity : 5%-95% .			
Pumps AC Voltage Classification				
System Output Voltage Classes	**Class 2** (200 V 3Phase-AC Class)		**Class 4** (400V 3Phase- AC Class)	
AC input Voltage Range	3phase –AC 200 – 240 V @ 50/60 Hz		3Phase - AC 380 – 480 V @ 50/60 Hz	
DC Input Voltage				
Input voltage (DC) in Serial PV array	335 VDC – 400 VDC max		600 – 800 VDC max	
MPPT Operating Voltage (DC)	290 VDC -400 V DC max		550-800 VDC max	
SPI Solar VFD Output 3Phase- AC to Pump				
Voltage Range and Frequency	208–240V 3Phase –AC 50/60 Hz ~ Frequency		380– 480V 3Phase-AC 50/60 Hz ~ Frequency	
Power factors (cos ϕ / λ)	> 0.98/ ≥ 0.9			
Built-In PLC Functions for External Command &Operation, Communication and Integration				
Operation and control (O&C) Via standard Analog -Digital interface	**D/I Commands (4):** Start/Stop, INC/DEC RPM, Change mode (Solar/Hybrid), Emergency stop 4 Sensor Driven Start/Stop (such as level Tank , Pressure , others) (option) **D/O: (2)** : System status (On/Off) , Power Mode (S/H) **A/I : Command (1)** : Change RPM by external command (option) **A/O for Data Export (4)** : Pumping Performance Data -see data monitoring below (option)			
Communications Protocols	Modbus (RTU, TCP), Profibus , GPRS: (option) customized for data monitoring & Pump Control			
Data Monitoring /Data Logging &Transmission				
HMI Types	**Local:** TFT Touch screen 4" (8" Option) for system parameters setting and Monitoring **Local** : LCP 3" menu driven with key pad for pump parameters setting /Pump data Monitoring			
Local /Remote Data Monitoring	**Basic Data :** Power mode (S, H) RPM, Operating Frequency, Pump Operating Power (KW) **Additional :** Flow Rate, Daily Pumping Volume (in Solar Mode), Solar Operating Hours , Daily Solar mode Power(KW), Total Solar Power since Installation (option)			
Data Logging / Transmission	**Local:** All monitoring data logging for 12 Months at 15 minutes intervals (option) **Remote**: All monitoring data at 5 seconds intervals Modbus /Profibus (GPRS:Option)			
Built-In Automatic Pump Protection				
Pump Electrical Protection	Over Voltage, Power surge, Over load, Mains turbulence, phase loose, short-circuit			
Pump Operation Protection	Dry run, High Pressure, Pipes leakage detection, emergency stop, end of curve operation			
System Operational Features				
RFI filter	Built-in RFI filter for long motor cable (According to IEC 618000-3 and EN 55011)			
Cooling concept	Back channel cooling -No ambient air flow over electronics			
Sine Wave Filter	Option: Add system for long cable installations > 200 m (600 Feet)			
External Power option	Option: Add 24VDC output to operate external devices (such as PLC)			
Service Life /Warranty /Origin	10 years /3 years / USA			

MADE IN U. S. A.