PPS Enviro Power
Powering The Future

MNRE
CRISIL GRADE
2012-2014
SP 1A

HYBRID POWER SYSTEMS

OVERVIEW

The Hybrid Power Conditioner (HPC) is designed to operate in conjunction with a diesel generator to enhance the system capacity or operate as a standalone unit. The unit can automatically configure as either a charger or inverter and will intelligently start and stop the generator if the battery reserve cannot be maintained by the renewables contribution.

In charging mode the system maintains the battery voltage at a user specified value and charges the battery in accordance with manufacturer procedures, thus maximising the life of the battery bank. The generator is optimally loaded to achieve the highest fuel and operating efficiency. The HPC can operate in parallel with the generator to meet peak loads. A second diesel generator can be also controlled for added redundancy if required (special option only).

BASIC SYSTEM OPERATION:

Under light to medium load conditions the inverter will supply the site load from the battery bank and/or renewables .

In the event the battery capacity dropped below approximately 50% DOD or the site load increased above a preset level, Genset will be automatically started and brought on line in parallel with the inverter to supply the load and/or charge the batteries.

The genset will be brought off line once the batteries have reached a predetermined level of charge and the loading on the genset is less than 50%.

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System Configuration:

There are three common configurations

Series
simple, low cost, used on small systems, lower system efficiency

Switched
higher efficiency, low cost, used in small to medium systems

Parallel Hybrid
high efficiency, high flexibility, more expensive, used in medium to large systems
For this project, we will be using this Parallel Hybrid Unit

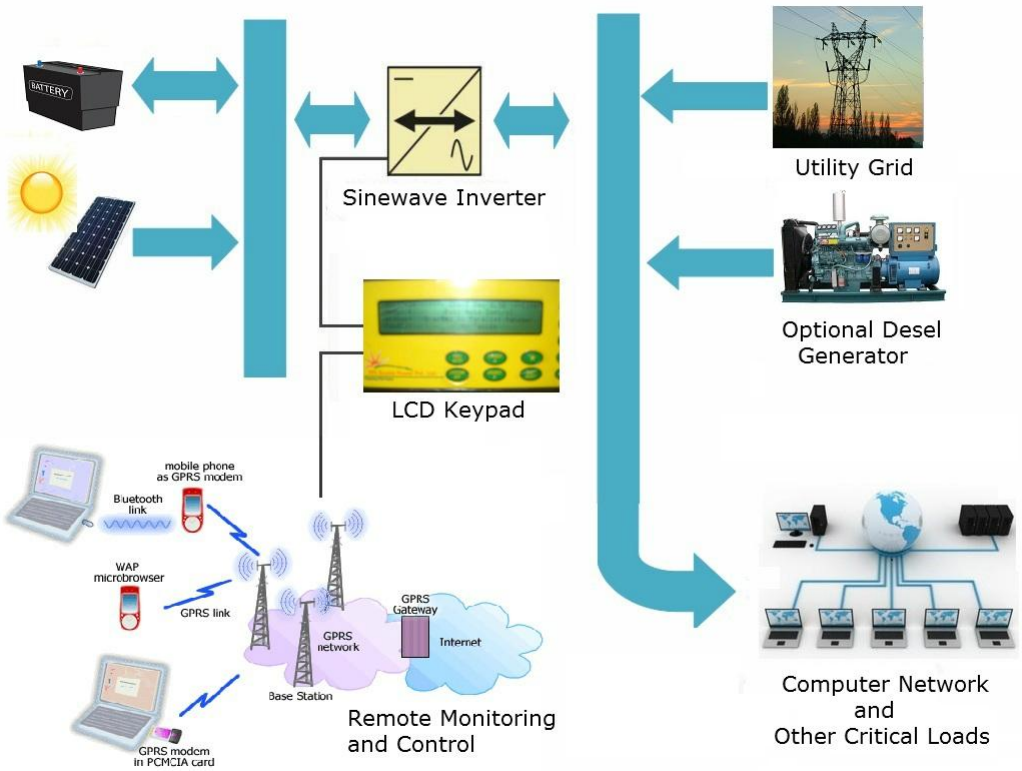
Parallel Hybrid System:

Parallel Diesel Systems

- Selects most efficient DG based on load and available renewables
- Provides backup if one DG is unavailable
- Peak = Inverter + DG A + DG B
- Diesels can be of different capacity
- Diesel paralleling / synchronizers required

HPC Features:

- Full automatic operation with no break to the supply during transitions from inverter to genset operation.
- No loss of supply on dual genset systems if a diesel generator fails to start as the alternate genset will automatically be selected.
- Diesel generator loading is kept relatively high during its required operating period giving high fuel efficiency and lower overall maintenance.
- Solar resources are fed directly to the site load via the inverter as much as possible.
- Local LCD (liquid crystal display) and keypad for system control, monitoring instantaneous system data, event logs, data logs and changing set points.
- Time and date stamped system data logs and event logs available for importation into a spreadsheet for analysis via a local RS232 connection.
- Remote control and monitoring option available (with local dedicated telephone line).
- Integrated MPPT solar regulator.



Typical SMD System

TÜV INTER CERT SAAR
ISO 9001:2008
ISO 14001:2004
Certificate No.: 12-QE-1800043-TIC

See reverse for Technical Specifications

VERSION 1.0

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TECHNICAL SPECIFICATIONS - SINGLE PHASE UNITS

Model	5kVA	6kVA	7.5kVA	10kVA	15kVA	20kVA
Nominal Output Voltage	230Vac, Single Phase, 2 Wire Output					
Inbuilt MPPT Solar Charge Controller	5KWp	6KWp	7.5KWp	10KWp	15 KWp	20 KWp
System Voltage (DC) Nominal	96 V	96/120 V	96/120 V	120 V	120/240 V	120/240 V
Continous Rating	5 kVA	6 kVA	7.5 kVA	10 kVA	15 kVA	20 kVA
Height x Width x Depth (mm)	1000 x 450 x 800	1000 x 550 x 800	1000 x 550 x 1000		1800 x 1000 x 500	
Weight in Kgs	**230**	**300**	**410**	**480**	600	750

TECHNICAL SPECIFICATIONS – THREE PHASE UNITS

Model	10kVA	15kVA	20kVA	25kVA	30kVA	45kVA	50kVA	60kVA	90kVA
Nominal Output Voltage	415Vac, Three Phase, 4 Wire Output								
Inbuilt MPPT Solar Charge Controller	10 kWP	15 KWp	20 KWp	25 KWp	30 Kwp	45 KWp	50kWP	60 kWP	90 kWP
System Voltage (DC) Nominal	120/240 V DC				240 V DC				
Continous Rating	10kVA	15 kVA	7.5 kVA	10 kVA	15 kVA	20 kVA	50 kVA	60 kVA	90 kVA
Height x Width x Depth (mm)	1000 x 450 x 800	1000 x 550 x 800	1000 x 550 x 1000		1800 x 1000 x 500	1800 x 1200 x 800			
Weight in Kgs	480	650	700	780	850	950	1000	1200	1350

Parameters	Information
Output Voltage	Stand Alone Mode: Inverter output set at nominal voltage Parallel Mode: inverter to follow generator voltage to ±10% of the nominal output voltage before switching to stand alone mode.
Output Frequency	Stand Alone Mode: Inverter output set at nominal frequency Parallel Mode: AC Synchronized operation. Synchronization window can be operator adjusted via set points. Maximum Range: ±3Hz
Surge Rating	150% of rated output for 30 seconds
Nominal Output Frequency	50Hz
Efficiency	> 92% (Max 94%) at full load
GRID	
Nominal Capacity	Same as nominal inverter rating
Grid Acceptable Range	AC voltage ± 17%, Frequency ± 3
Waveform	Pure Sine Wave
Total Harmonic Distortion	< 3%
Crest Factor	3:1

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Front Panel Interface	• **40 x 4 LCD panel with keypad for display** • **Output Voltage / Current / Frequency / Power** • **Input Voltage / Current** • **Accumulated Output kWhrs** **Temperature (either from ambient or panel sensor)**
RFI	Designed to minimize both conducted and radiated RFI emissions
Cooling	Fan forced
Earthing Provisions	AC Bypassing to earth on inverter and DC Inputs
Control Type	Voltage source, microprocessor assisted output regulation
Power Control	Phase Controlled Pulse Width Modulation (PWM)
Power Switching	High Efficiency IGBT
Metering	
LCD Keypad Display	• Instantaneous Grid or Diesel and Inverter per phase kW, voltage, PF and Frequency • Grid or Diesel on-line status • Battery Voltage, Current, Temperature • Solar Charge Current • Solar Radiation • Wind Charge Current • Wind Speed • Inverter kWh Summation (Input / Output) • Grid kWh Summation (Import/Export) • Solar kWh Summation • Battery (import/export) Summation • Delivered Energy (to load) kWh
Data Logging	
GSC Link Software Capabilities	• Instantaneous feedback of power, voltage, power factor and frequency of the grid, diesel and the inverter system • Instantaneous site power • Periodic logging of power, voltage, power factor and frequency of the grid diesel and the inverter system • Periodic logging of battery statistics including battery voltage, current, temperature and renewable current contribution • Adjustable logging period from 60 second averages to 24 hour daily logs • Time and date stamped log entries • Time and date annotated fault log, holding the fault description, operating statistics and fault source • Bulk log download for immediate data importation into a spreadsheet
Download Log Capabilities	Date and time stamped with selectable log periods from 1 minute to 24 hours: • Solar Charge Voltage / Current • Wind Charge Current • Battery Voltage / Current / Temperature • Grid or Diesel kW, Voltage, pf, Frequency • Inverter kW, Voltage, pf, Frequency • Download System Faults • System Overload • Grid Fault / Inverter Fault • Download System Summations • Inverter Input / Output kWh • Grid kWh Summation (Import / Export) • Solar kWh Summation • Battery (Import / Export) Summation • Delivered Energy (to load) kWh
Computer Port Isolation	Standard non-isolated RS 232

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