

More Power  
More Revenue  
More Insight



Solar Hybrid Catalogue 2017

Hybrid Solar Power Conditioning Unit  
1 kW to 10 kW Single Phase

enviro 

  
**HAVELLS**

# About Havells



Havells India Limited is a leading Fast Moving Electrical Goods (FMEG) Company with a strong global presence. Havells enjoys enviable market dominance across a wide spectrum of products, including Industrial & Domestic Circuit Protection Devices, Cables & Wires, Motors, Fans, Modular Switches, Home Appliances, Electric Water Heaters, Power Capacitors, CFL Lamps, Luminaires for Domestic, Commercial and industrial Applications.

Today, Havells owns some of the most prestigious brands like Havells, Crabtree, Standard and Promptec. Its network constitutes of 4000 professionals, over 6000 dealers and 40 branches in the country and presence in over 50 countries globally. Its twelve state-of-the-art manufacturing plants in India located at Haridwar, Baddi, Sahibabad, Faridabad, Alwar, Neemrana and Guwahati are manufacturing globally acclaimed products, synonymous with excellence and precision in the electrical industry.

The company pioneered the concept of exclusive brand showroom in the electrical industry with 'Havells Galaxy'. Today over 400 Havells Galaxies across the country are helping customers, both domestic and commercial, to choose from a wide variety of products for different applications. Havells became the first FMEG Company to offer door step service via its initiative 'Havells Connect'. Thanks to the quality of products and quicker service, it has minimum customer complaints and highest customer satisfaction.

Havells along with its brands, have earned the distinction of being the preferred choice of electrical products for discerning individuals and industrial consumers both in India and abroad. Havells offers same quality products for both Indian and international markets. It is committed to keep powering the world with its state-of-the-art innovations and energy-efficient solutions. Currently over 90% of its product offering is energy efficient and manufactured in-house.

Social and environmental responsibility has been at the forefront of Havells operating philosophy and as a result the company consistently contributes to socially responsible activities. For instance, the company is providing mid-day meal in government schools in Alwar district, covering more than 58000 students per day. The company has also built over 2000 eco-friendly bio toilets in government schools thus contributing to nation's Swaach Bharat Mission. The group company, QRG Healthcare runs a 140 bed hospital in Faridabad. In the past, the company has generously contributed to the society during various national calamities like the Bihar Flood, Tsunami and Kargil National Relief Fund etc.

The essence of Havells' success lies in the expertise of its fine team of professionals, strong relationships with associates and the ability to adapt quickly and efficiently, coupled with the vision to always think ahead.



### Special Features

- Multiple 16 bit DSP controllers
- IGBT based power stage for Higher Power Inverter
- Inverter capacity = MPPT charger capacity
- 2/3 Channel Interleaved PWM MPPT for efficient charging
- Wide range MPPT input suitable for 36, 60 & 72 cell Solar PV Module
- MPPT achieved through Perturb & Observe Algorithm
- Higher open circuit voltage for better charging efficiency
- Auto selectable Priority mode (Solar/ Grid Priority mode) for uninterrupted power & savings on Grid power
- Pure sine wave technology- recommend for better life of Industrial/ Commercial equipment
- Intelligent battery charging- 3 Stage (Bulk, absorption & float) charging for enhanced battery life
- Compatible charger to support all type of batteries i.e Flooded Lead acid Tubular/VRLA/GEL
- Automatic transfer from grid to solar when battery full & Solar available
- Twin DC Fan for optimum thermal management
- Noiseless inverter operation
- Sleek & Aesthetic design
- Works as standalone Solar Inverter in case of no grid
- LED/LCD Display for showing monitoring & instantaneous system data display

### Operation Modes

- **Solar Priority Mode:** Under this mode, solar power is used to charge the batteries to full when available and once the battery becomes full, the site load is shifted to the battery and solar till a predefined battery voltage level thereby solar energy is utilized full
- **Grid Priority Mode:** Under this mode, batteries are charged from grid as well as from solar. Loads are normally powered by grid when available. Under grid failure, loads are supported by solar. This mode is suitable for non sunny days

### Protections

- \*Protection against battery high/low, overload, short circuit, Array reverse, battery reverse and over temperature.
- \*Additional protection in the battery line via fuse. Grid & output protected via MCB.

## Hybrid PCU Specifications:

Model No.	SI1000 PRO	SI2000 PRO	SI3000 PRO	SI4000 PRO	SI5000 PRO	SI6000 PRO	SI7500 PRO	SI10000 PRO
PCU Capacity (KVA)	1.25 kVA	2.5 kVA	3.75 kVA	5 kVA	6.25 kVA	7.5 kVA	9.4 kVA	12.5 kVA
Nominal Battery Voltage (V dc)	24	48		96	96	120		180

SOLAR PHOTOVOLTAIC INPUT								
Maximum PV Power Recommended	1 kW	2 kW	3 kW	4 kW	5 kW	6 kW	7.5 kW	10 kW
Solar Charger Type	Maximum Power Point Tracking (MPPT)							
Maximum DC link Voltage (Voc)	90	150		300		400		450
MPPT Range (V)	35-69	70-125	70-125	150-250		160-250		300-400
Capacity	30 A Single Channel			50 Amp Single Channel				
Switching Power device	MOSFET			IGBT				

GRID INPUT	
Voltage	220 V - 2% Single phase
Mode	Solar Priority or Grid Priority - User selectable
INPUT VOLTAGE RANGE	
Acceptable Voltage Range	110-290 Vac
Low Voltage Cutoff	110±10 Vac
Low Voltage Recovery	120±10 Vac
High Voltage Cutoff	290±10 Vac
High Voltage Recovery	275±10 Vac
Frequency	Same as Mains input (47-53) Hz
OUTPUT VOLTAGE RANGE	
Voltage Regulation on Mains	Same as Mains input
Voltage Regulation in Battery mode	220 VAC Nominal +/-2% (Range 210 V - 240 V selectable)
Frequency Battery Mode	50 Hz ± 0.1 Hz
Wave Form	Pure Sine Wave
Power Factor	0.8
THD	≤3%
Efficiency	≥85%

## Hybrid PCU Specifications:

Model No.	SI1000 PRO	SI2000 PRO	SI3000 PRO	SI4000 PRO	SI5000 PRO	SI6000 PRO	SI7500 PRO	SI10000 PRO
<b>PROTECTIONS</b>								
Over Load	At 100% Load, Audible Indication. > 101% Load Trips. Retry for 4 times. If the load is not reduced, inverter will shut down after 4 retry. (Manual restart required)							
Output Short Circuit	Circuit Breaker on Mains, Shutdown on Inverter							
Battery Reverse Protection	Fuse							
Low Battery	Load Disconnection							
Thermal Shutdown	Unit inside Temperature at 90° C							
Lightening/Surge Protection	4 kV / 6 kA							
Solar Reverse	Blocking Diode is provided to Prevent reverse flow of current							
Current Limiting for battery \ Charging	Available							
Battery Charging Current	Optional Battery current limit during low load on solar panel							

<b>ENVIRONMENT</b>	
Operating Ambient Temperature	-10° C to 50° C
Relative Humidity	0-95%
Change Over Time	< 20 ms

<b>DISPLAY</b>	
LED Display	Mains, Charger, Output, Fault
LCD Display	Batter Voltage; I/P Voltage; I/P Frequency; O/P Voltage; Grid Charging Current; Solar Voltage; Solar Charging Current; Solar Units Saved kWh (upto 999.9 Units); Load%, Over Load; Battery Low; UPS/INV Mode

<b>DIMENSIONS</b>						
Model No.	SI1000 PRO	SI2000/3000 PRO	SI4000 PRO	SI5000/6000 PRO	SI7500 PRO	SI10000 PRO
L*W*H (mm)	305*215*340	365*240*425	790*330*670	790*330*670	790*350*670	790*350*670
Weight (kg)	19	41	78	79	84	92

## Enviro Vs Competitors

Sr. No.	Features	Havells Enviro PCU	Competitors PCU
1	Wide Range MPPT - 36 , 60 or 72 Cell PV Module	✓	Few have this feature
2	Instant Change over b/w Solar & Grid	✓	Few have this feature
3	Solar Charge Controller	MPPT	MPPT or PWM
4	Switching by MOSFET / IGBT	✓	✓
5	Type of Charger	2/3 Channel PWM with MPPT	PWM with MPPT
6	Input Supply – 230 VAC 50 Hz 1 Phase 2 wire	✓	✓
7	Output Voltage – 230 VAC 50 Hz	✓	✓
8	Galvanic Isolation	✓	✓
9	Cooling – Forced Air	✓	✓
10	Protections (Overload, O/P Short circuit, Batt Reverse, Low Batt, Over Temp, Surge etc.)	✓	✓
11	LED Indication (mains, batt, Over load, low batt, Solar, Fault)	✓	Few have this feature
12	LCD Display	✓	✓

## System Configuration – Load Wise

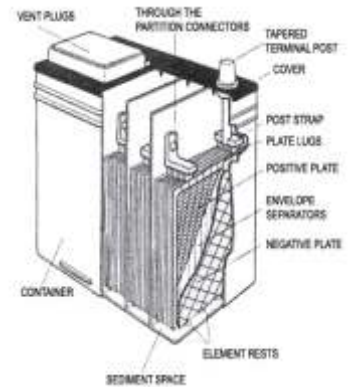
Sr. No.	System	System Voltage	Solar PV Module	Solar PCU		Load	Battery Qty	Battery Size & Backup		
				MPPT (kW)	Inverter (kVA)			12 V 120 (Ah)	12 V 150 (Ah)	12 V 200 (Ah)
1	1 kW	24	250 Wp x 4 nos	1 kW	1.25 kVA	600 W	2 N	3.5 hours	4.5 hours	NA
						800 W	2 N	2.5 hours	3 hours	NA
						1000 W	2 N	2 hours	2.5 hours	NA
2	2 kW	48	250 Wp x 8 nos	2 kW	2.5 kVA	1200 W	4 N	3.5 hours	4.2 hours	NA
						1500 W	4 N	2.75 hours	3.5 hours	NA
						2000 W	4 N	2 hours	2.5 hours	NA
3	3 kW	48	250 Wp x 12 nos	3 kW	3.75 kVA	2000 W	4 N	2 hours	2.5 hours	3.5 hours
						2500 W	4 N	NA	2 hours	3 hours
						3000 W	4 N	NA	1.75 hours	2.5 hours
4	4 kW	96	250 Wp x 16 nos	4 kW	5 kVA	2500 W	8 N	NA	4 hours	NA
						3000 W	8 N	3 hours	3.25 hours	NA
						4000 W	8 N	2 hours	NA	NA
5	5 kW	96	250 Wp x 20 nos	5 kW	6.25 kVA	3000 W	8 N	3.5 hours	4 hours	NA
						4000 W	8 N	2.5 hours	3 hours	NA
						5000 W	8 N	2 hours	2.5 hours	NA
6	6 kW	120	250 Wp x 24 nos	6 kW	7.5 kVA	4000 W	10 N	3.5 hours	NA	NA
						5000 W	10 N	2.5 hours	3 hours	NA
						6000 W	10 N	NA	2.5 hours	NA
7	7.5 kW	120	250 Wp x 30 nos	7.5 kW	9.5 kVA	5000 W	10 N	2.75 hours	3.25 hours	3.75 hours
						6000 W	10 N	2.25 hours	2.75 hours	3 hours
						7500 W	10 N	1.75 hours	2 hours	2.5 hours
8	10 kW	180	250 Wp x 40 nos	10 kW	12.5 kVA	5000 W	15 N	3 hours	5 hours	NA
						7500 W	15 N	2.25 hours	3.25 hours	NA
						10000W	15 N	NA	2.5 hours	NA

Solar Module	
Solar Module (250Wp)	
Maximum Power (W)	250
Operating Power Voltage (Vmp)	31.02
Optimum Operating current (Imp)	8.06
Open circuit voltage Voc	36.99
Short circuit current Isc	8.62
Module efficiency	15.37
Tolerance wattage	0 + 3%
NOCT	45+/-2C
Module dimension	1640x992x35
Matrix	60 cells
Weight	18.6
Front cover	3.2mm thickness, low iron tempered glass
Frame Material	Silver Anodized Aluminium Alloy



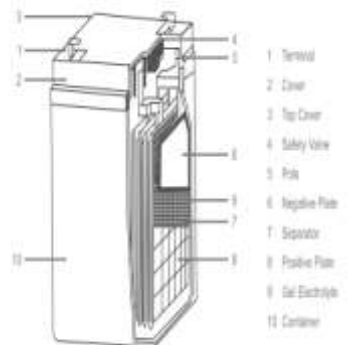
## Solar Battery – Tubular LMLA

Tubular LMLA (Lead Acid Low Maintenance)
Battery Range from 12 V 40 Ah to 12 V 200 Ah
Unique tubular positive plates designed for longer life.
Plate designed with active material to get quick recovery from deep discharge.
Superior active material and special alloy used for low maintenance of the battery
Cycle life of 1000 cycles at 75 % DOD
Battery Container made up of PPCP (Polypropylene Co-Polymer) material
Compliance - IS 13369 / 1651



## Solar Battery – VRLA Gel

VRLA (Valve regulated Lead Acid ) Solar Gel battery are maintenance free batteries
Battery Range from 12 V 35 Ah to 12 V 200 Ah
Special Gel electrolyte made by mixing acid electrolyte with pyrogenic silica
High purity Lead Calcium Tin Silver alloy for good corrosion resistance
Microporous synthetic separators provide low electrical resistance
Cycle life of 500 cycles at 100 % DOD
Battery Container made up of ABS (Acrylonitrile Butadiene Styrene) material
Compliance - IEC 61427, IS 15549



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