



10KW WIND HYBRID ELECTRIFICATION

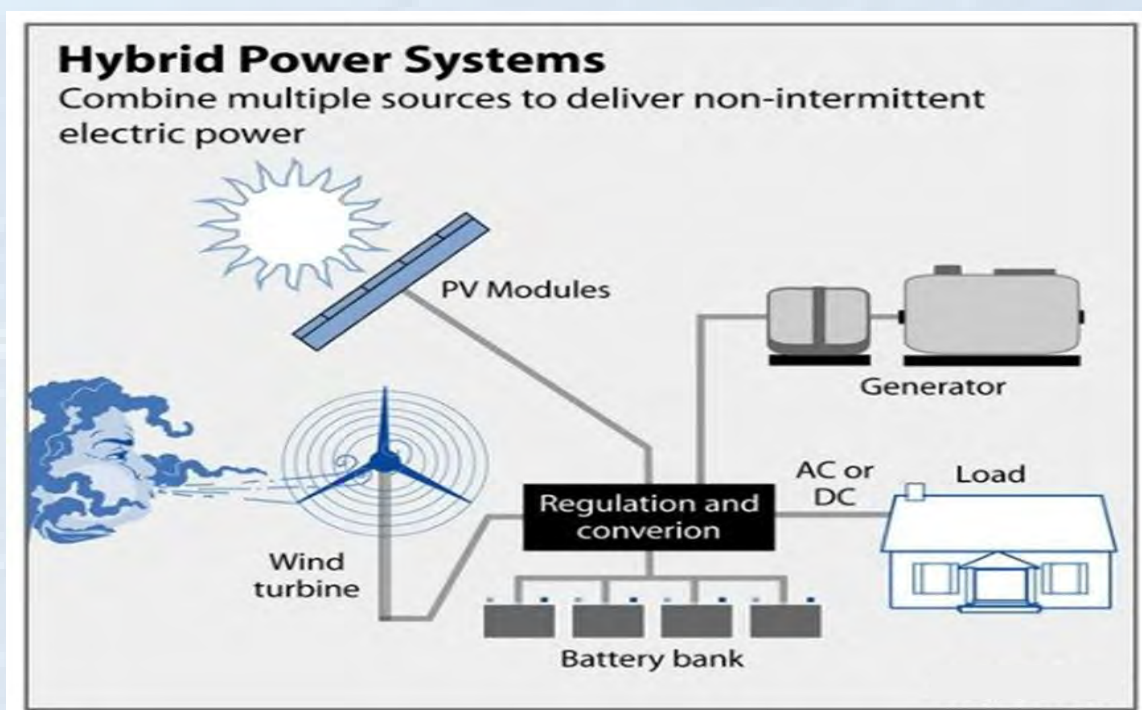
SPECIFICATION :

- 1) 2 * 5KW WIND TURBINE
- 2) 10KW SOLAR POWER SYSTEM
- 3) 40* 12V/ 200AH BATTERY
- 4) 15KVA PCU

The Hybrid Electrification consist of following component

- a) Wind Turbine
- b) Solar Module
- c) Power Conditioning Unit (PCU)
- d) Battery Bank

Hybrid Electrification Line Diagram



Advantages of Wind Hybrid Electrification :-

- ❖ Complementary resource characteristics: Wind and Solar energy resources are complementary on a diurnal basis, with peak wind times after sunset and before sunrise and peak solar times aligning with periods of lower wind resource.
- ❖ Efficient use of land: To make efficient use of land between wind turbines & solar which are duly spaced apart to avoid row effects.
- ❖ Analogous technical processes: Both Wind and Solar rely on natural sources and can be integrated into common AC or DC output to feed into the local utility grid.
- ❖ Cost efficiency from shared infrastructure: Shared data collection systems, O&M service facilities, asset management and common point of interconnection are beneficial for cost efficiency, especially for projects with higher capacities.

Additional Benefits Of Wind Hybrid Electrification :-

- ❖ Hybrid Renewable System – Combining wind and solar energy resources in a fully integrated platform.
- ❖ High Energy Density – Wind and Solar energy generation within a compact footprint, creates the greatest energy density (Energy/sq. Meter) of any product on the market.
- ❖ Scalable – The units can be interconnected to increase a user’s energy production capability.
- ❖ Unique – The hybrid power plant seamlessly integrates wind and solar energy generation in a single unit. This allows the product to be an effective solution in markets where the natural resources available for wind and solar energy generation.

Implementation Strategy -

The implementation of a Wind Hybrid Electrification System will depend on different configurations and use of technology.

Wind Hybrid Electrification - DC integration:

DC integration is possible in case of variable speed drive wind turbines using converter - inverter. In this configuration, the DC output of both the Wind and Solar PV plant is connected to a common DC bus and a common inverter suitable for combined output AC capacity is used to convert this DC power into AC power. The DC-coupling topology has the advantages of simplified hardware, lower cost and higher energy efficiency.



ESTIMATED ENERGY GENERATION PER DAY

Daily energy output at different annual average wind speed

Below is Table which shows per day energy output from the system

Sr. No	Equipment	Rated wattage	Equip Qty	Wind speed 3.5m/s Kwh	Wind speed 4.5m/s Kwh	Wind speed 5.5m/s Kwh
1	Wind turbine Windy star 5000	5kW	1	10	12	19

Applications

WISH Energy's modular, clean energy systems can be deployed for providing power for a variety of applications such as:



SYSTEM DESIGN & SPECIFICATION
SYSTEM CONFIGURATION AEROGENERATOR WINDI STAR 5000

Model	WINDISTAR 5000
Rotor Diameter	4.6 m
Swept Area	16.61 m ²
Weight	113 kg (Including blades and tail boom)
Mount	127mm diameter Pipe Mounted
Start-Up Wind Speed	3.5 m/s
Rated wind speed	12.5 m/s
Generator	PM 3 Phase Alternator
Generator Efficiency	90 %
Magnets	NdFeb N35,Nickel Plating
Insulation Class	Class 'H'
Voltage Configuration (H.V. Model.)	48V Nominal
Rated Power	5000 watt @ 12.5 m/s,600 R.P.M
Number of Blades	3
Material of Blades	Carbon fiber composite ,fiber glass & Epoxy Bonding
Material of Body	Powder coated MS with marine Treatment
Survival Wind Speed	55 m/s
Over-speed Protection	Furling ,Dump Load & Manual Brake Switch
Controller	External Regulator
Bearings	Low Friction, totally enclosed self-lubricated
Controller Output	,48V (LV) (5000 watts)

TOWER FOR WIND TURBINE

Type	9 Meter Tripod Tower with guy wire support
Material & Protection from corrosion	Galvanised
Other accessories	Nuts and bolts, guy ropes & foundation bolts

WIND CHARGE CONTROLLER SPECIFICATION

Wind Charge controller with dump load for 5000 Watt wind turbine.
<ul style="list-style-type: none"> • Capacity 48 volts/ 5 kW • Modular construction • Auto change over to dump load through PWM switching in case of battery over charge along with manual over ride option for periodic equalizing charge of battery • Status monitoring of battery low & battery high annunciation LCD display on front panel. • Digital LCD display of the following:- <ol style="list-style-type: none"> (a) Wind turbine charging current. (b) Wind turbine charging voltage. (c) Wind turbine charging power in watts. (d) Monthly energy output in Kwh. (e) Cumulative energy output in Kwh. (f) Instantaneous wind speed in m/s. (g) Monthly average wind speed in m/s. (h) Cumulative average wind speed in m/s. • Powder coated surface for anti-corrosion. • Built-in battery reverse current protection • Output short circuit protection • 5 Kw dump load for transfer of charging current from battery in case of over charge protection activation.



KEY FEATURES

Low cut in wind speeds

- Lightweight, rugged design
- Suitable for remote locations installations
- Suitable for standalone or multiple parallel module application to suit different power rating.
- Modular construction for easy installation and dismantling
- PWM based state of art architecture providing overcharge protection / load diversion (in auto mode).
- Status monitoring of battery low & battery high - LCD display on front panel.
- Automatic diversion of power to dump load at battery overcharge / very high turbine speed.
- Ambient operating temperature up to 52°C.



Hind Defence Equipment Pvt Ltd

403, Fourth Floor, Wakefield House Bldg, Ballard Estate, N M Road, Mumbai 400001

Email : enquiry@hinddefence.com Tel No.: +91 22 2262 5803 / 0369 Fax No.: +91 22 2263 4830

Mobile : 9820998202 / 9773077920

CONTROLLER SPECIFICATIONS

CASE STUDY

- Wind Turbine charge controller comes in 12V, 24V, 48V, 96V, 120V and 240V configurations.
- Clear alpha-numeric digital LCD screen with user selectable display options.
- Equipped with advanced microcontroller based technology to provide easy access for monitoring and operation for the user.
- Field adjustable battery voltage set points
- Energy saving backlight operation.
- Controller diverts extra energy to dump load, when batteries are fully charged.
- Battery over voltage protection.
- Front panel LCD display with the following features

- > Displays battery voltage
- > battery charging current
- > kW and kWh reading
- > battery UV
- > OV status




- > Instantaneous / monthly / average wind speed (in m/s) can also be displayed if anemometer is configured in the controller.
- > Supervisory password provision

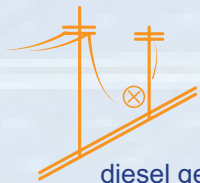


THE INDIAN ARMY
CUSTOMER:

BACKGROUND



Border defence is one of the most critical areas of focus for the government and the armed forces in particular. India is bordered by terrains of vast variety – from the deserts of Thar in Rajasthan to the snow-capped mountains  in the north and the dense jungles in  the north east – and each of these brings with it its own infrastructure limitations. The military installations  in these locations, therefore, face an enormous challenge in the delivery of essential services such as power and water



The remote locations of these defense installations often result in a lack of access to conventional electricity grids, as it is very difficult to add power infrastructure at these places. As a result, diesel generators become the alternative for generating electricity. Not only is diesel expensive and difficult to transport to these locations, it also poses a serious vulnerability when stored on-site.



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MONO SERIES

Mono Solar Modules offer several advantages over conventional solar modules due to their enhanced capability to absorb light. This allows user to opt for more module placement options without compromising much on the plant performance. Higher module efficiency ensure better payback period and value extraction from the system.

FEATURES: High module efficiency • PID resistant • 10 years of product warranty • 25 years of limited power output warranty • IP67 rated junction box suitable for outdoor application • Suitable for standard 1000V systems • Positive power tolerance

APPLICATIONS: Rooftop On-grid PV systems • Rooftop Off-grid and Hybrid PV Systems • Ground-mounted solar parks • Microgrids
• Wind-Solar Hybrid Power Plant.

SPECIFICATIONS

Electrical Characteristics*		
Pmax (Wp)	375	400
Power tolerance	+5W	
Module Efficiency (%)	19.32	19.86
Vmp (V)	41.46	42.42
Imp (A)	9.05	9.45
Voc (V)	48.40	49.23
Isc (A)	9.86	
NOCT (°C)	45±2	
Maximum System Voltage (V)	1000	
Mechanical Characteristics		
Cell Type	Monocrystalline	
Number of Cells/Arrangement	72 / 6 x 12	
Output Cable (CSA/Length)	4mm ² / 1000mm	
Connector	MC4 compatible	
Front cover	ARC coated, high transmission, low iron, tempered glass (3.2mm)	
Encapsulation	EVA	
Junction Box	IP67 (3 diode)	
Frame	35mm Anodized aluminium alloy	
Maximum front/rear load	5400 Pa / 2400 Pa	
Dimension- L x W x T (mm)	2002 x 1006 x 35	
Weight (kg)	23	

*All data measured in STC

Operational Characteristics

Operating Temperature Range	-40 to 85°C
Maximum Relative Humidity (%)	85%
Temp. Co-efficient of Voltage	-0.29%/°C
Temp. Co-efficient of Current	0.05%/°C
Temp. Co-efficient of Power	-0.38%/°C

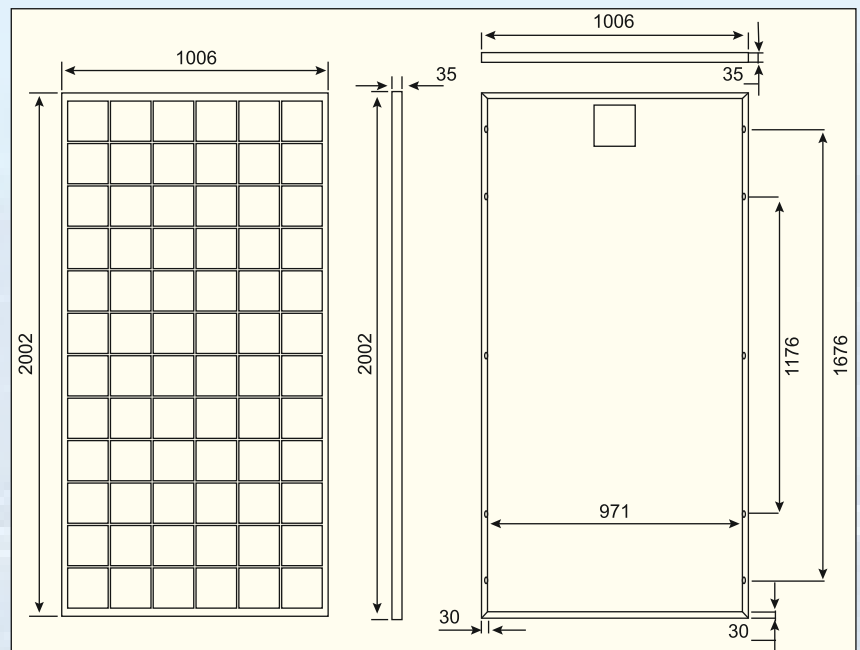
STC: 1000 W/m² irradiance, AM 1.5 spectrum and 25°C cell temperature

NOCT conditions: 800 W/m² irradiance, ambient temperature 25°C, wind speed 1m/sec

WARRANTY & CERTIFICATIONS

Product warranty: 10 years

Performance guarantee: 25 years power output guarantee with 90% power output at the end of 10 years and not less than 80% power output at the end of 25 years



MONO PERC SERIES

Mono PERC Solar Modules offer several advantages over conventional solar modules due to their enhanced capability to absorb light. This allows user to opt for more module placement options without compromising much on the plant performance. Higher module efficiency ensure better payback period and value extraction from the system.

FEATURES: High module efficiency • PID resistant • 10 years of product warranty • 27 years of limited power output warranty • IP67 rated junction box suitable for outdoor application • Suitable for standard 1000V systems • Positive power tolerance

APPLICATIONS: Rooftop On-grid PV systems • Rooftop Off-grid and Hybrid PV Systems • Ground-mounted solar parks • Microgrids
• Wind-Solar Hybrid Power Plant.

SPECIFICATIONS

ELECTRICAL DATA@STC

Module code* : SSXXX144 M10

Nominal Power	- P_{MPP} (Wp)	535	540	545	550	555
Power Tolerance	- (W)	0/+5	0/+5	0/+5	0/+5	0/+5
Nominal Power Voltage	- V_{MPP} (V)	41.47	41.64	41.80	41.96	42.00
Nominal Power Current	- I_{MPP} (A)	12.90	12.97	13.04	13.11	13.18
Open Circuit Voltage	- V_{OC} (V)	49.45	49.60	49.75	49.9	50.05
Short Circuit Current	- I_{SC} (A)	13.79	13.86	13.93	14.00	14.07
Panel Efficiency	- (%)	20.7	20.9	21.1	21.3	21.5

Values at standard test conditions STC (airmass AM 1.5, irradiance 1000 W/m², cell temperature 25°C).

*Where xxx indicates the nominal power class (P_{MPP}) at STC indicated above.

Operational Characteristics	
Operating Temperature Range	-40 to 85°C
Maximum Relative Humidity (%)	85%
Temp. Co-efficient of Voltage	-0.35%/°C
Temp. Co-efficient of Current	0.045%/°C
Temp. Co-efficient of Power	-0.275%/°C

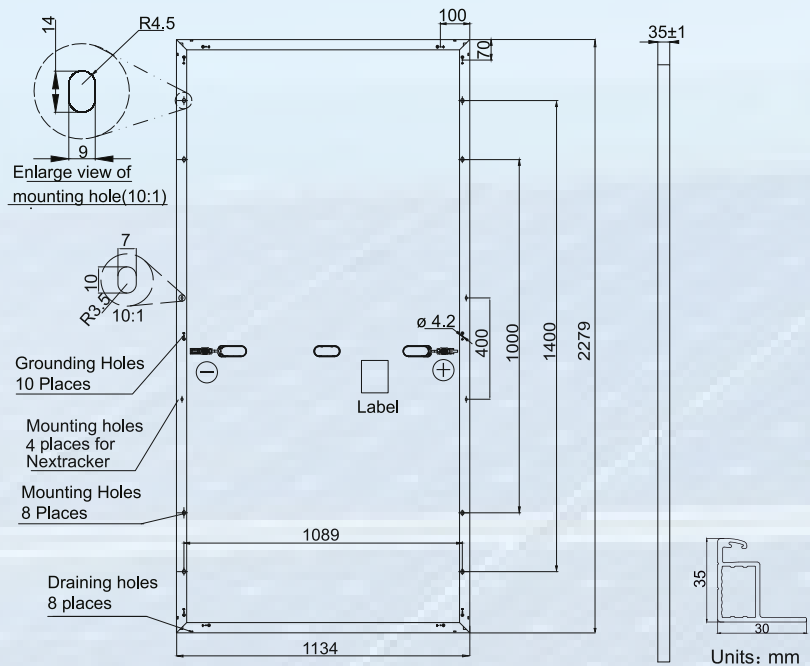
STC: 1000 W/m² irradiance, AM 1.5 spectrum and 25°C cell temperature

NOCT conditions: 800 W/m² irradiance, ambient temperature 25°C, wind speed 1m/sec

WARRANTY & CERTIFICATIONS

Product warranty: 15 years

Performance guarantee: 27 years power output guarantee with 90% power output at the end of 10 years and not less than 80% power output at the end of 27 years



STATIC INVERTER / PCU



CONVENIENCE

Solar Hybrid PCU uses both Solar Power as well as A.C. Mains for charging the battery bank according to priority setting providing the users availability of uninterrupted power supply.

SALIENT FEATURES

- ▶▶ User friendly Wide LCD display for battery user interface.
- ▶▶ Smart Load sharing compatibility.
- ▶▶ Monitoring/data logging feature for better system information at user end (optional)
- ▶▶ Selectable charging current with high charging (HI) and Normal Charging (Low).
- ▶▶ PV availability, battery charging from solar power indication with solar power priority
- ▶▶ User friendly, control and selection switches with LCD indication on front panel
- ▶▶ Protections such as Mains MCB Trip, Overload, Short circuit, Battery low, over temperature indication with buzzer as well as display on LCD available
- ▶▶ Power Saving through No Load Shutdown Feature
- ▶▶ Maximum Solar Power Utilization during charging and backup mode
- ▶▶ PV pole reversal protection indication on LCD
- ▶▶ Deep discharge battery charging from A.C. Mains as well as Solar
- ▶▶ No humming Noise (Silent UPS)
- ▶▶ AC Mains available, battery charging/charged and it voltage indication provided on LCD display

Technical Specifications

Rating	10KW to 100KW
AC INPUT	415V + 20% -15%, Three Phase Input
Frequency	50Hz \pm 6%
DC BUS VOLTAGE:	120 / 180 / 240V
Mains Charging Current	10A max
SOLAR	
Solar Array Input voltage Range	160 to 220V / 240 to 320V / 320V to 440V - VOC
Solar Charger Type	IGBT based MPPT
Solar Charger Rating	Equal to PCU KW Rating
INVERTER:	
Technology	DSP based, IGBT Switching
Output Voltage	400/415V AC Three Phase
Voltage Regulation	\pm 2 %
Frequency	50Hz \pm 0.1Hz
Waveform	PWM Sine wave
Harmonic Distortion	Less than 3% on Linear Load
Inverter Efficiency	Upto 92%
Power Factor	0.8
Overload	110 % for 5 min, 150% for 30 sec
Crest Factor	3 : 1
Audible Noise	Less than 65 dB at 1 Meter
DISPLAY :	
Digital LCD Display for	Array voltage current and Power, Output Voltages, Output current & Frequency, Battery and Load Percentage and All Faults
GENERAL:	
Operating temperature	0 ⁰ C to 40 ⁰ C
Humidity	Max 95%, Non-condensing
PROTECTIONS :	Array Reverse current, Output Overload & Short circuit, Output Under & Overvoltage, DC Under & Overvoltage
PRIORITY	Solar – Grid - Battery / Solar – Battery - Grid (Selectable)
INDICATIONS & ALARMS:	
a) Mains on	LED Indication
b) Inverter	LED Indication
c) Batt Low	LED Indication & Alarm
d) Fault	LED Indication & Alarm
e) Solar	LED Indication & Alarm

* Specifications are subject to change without prior notice due to constant improvement in design & technology



HIND AMARON[®] QUANTA

LIFE UNINTERRUPTED



Engineering Excellence. Enduring Power Back Up.

Amara Raja yet again proves its passion for cutting edge technology, by introducing an advanced and smart performing battery Amaron Quanta S-XEL, a Tubular Power Packed Back Up Battery.

A source of 'Uninterrupted Power' for various core industries, this new generation Tubular battery is big in power storage and enduring in performance. As a company that is known for its obsession with technology, Amara Raja has been behind some of the best innovations in technology that India has seen.



S-XEL
TUBULAR SERIES

Amaron Quanta S-XEL is a fail safe, fool proof battery, produced and tested in our state-of-the-art manufacturing facility. Built with the highest technical competence in its class, the Amaron Quanta S-XEL is an example of Amara Raja's commitment to bring the best of its technology. Amaron Quanta S-XEL is the industry's first product of acid circulation formation process technology among tubular batteries which enhances the life of the battery.

Truly, Amaron Quanta S-XEL, the Tubular battery is an innovative excellence that supplies instant power with consistent delivery and low self-discharge for uninterrupted power supply across every work segment.

Where Amaron Quanta S-XEL Finds Application

- Banks
- IT Parks
- Corporate Establishments
- Tele communications
- Railways
- Power Plants & Substation
- Wind Solar Hybrid Power Plat

Design Features

Hi-coerce™ spine cast
Bountiful Boss™
Panoptic Spine™
Satiated wet paste™
Endura cast™
Unified TermiSeal™
BIC™
ACS

User Benefits

High pressure spine casting (> 100 bar) provides uni-directional grains orientation with micro hardness extradite superior life
Allows rapid charge & delivers high power. Optimized current dense & higher conductivity leading to last long
Mitigates corrosion prone zone, provides high life – Really long
Unique wet pasting process, lowers resistance to delivers consistent power & low self discharge
Automated cast-on-strap delivers durability & performance
Rigid & Integrated terminal connectivity provides sustainable strength
Best in class vent design reduces acid spewing , built-in flame arrestor avoids acid mist exit
Industry first acid circulation formation process enhances battery life

Amaron Quanta S-Xel Tubular batteries Range

Model	Nominal Voltage (V) at 27°C	Capacity @C10hr at 1.80 ECV at 27°C (Ah)	Approx. Battery weight ± 5% (Kgs) with acid	Overall Dimension (±3mm)			Constant potential limiting current (Amps)
				Length (L)	Width (W)	Height (H)*	
12ATL075	12	75	30.7	410	176	281	18.75
12ATL100	12	100	47.5	521	230	281	25
12ATL120	12	120	49	500	190	343	30
12ATL130	12	130	50	500	190	343	32.5
12ATL150	12	150	58	500	190	400	37.5
12ATL160	12	160	59	500	190	400	40
12ATL180	12	180	63	500	190	400	45
12ATL 200	12	200	63	500	190	400	45
12ATL 225	12	225	68.5	500	190	400	45

Charging Parameters

Dual Mode Charge	
The charging facility should have auto float change over and charge mode facilities with the recommended voltage settings	
Charging current	Min. 10% of rated Ah capacity
Float Voltage	14.4 ± 0.1V /battery
Boost Voltage	15.0 ± 0.1V /battery
Over cutoff voltage	15.2V
Under cutoff voltage	10.8V

Product Details

Type of +ve Plate	Tubular
Type of -ve Plate	Flat Pasted
AH efficiency	>90%
WH efficiency	>80%
Terminal Type	L-Terminal with Antimony Lead Alloy
Self discharge for 28 days	≤ 5% (As per OS13369≤10%)
Recommended Max Period of Storage	Max. 60 Days at 27°C
Electrolyte specific gravity of the end discharge at 27°C	1.24
Electrolyte specific gravity of the end discharge	1.13



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