



## 3.5KW WIND HYBRID ELECTRIFICATION

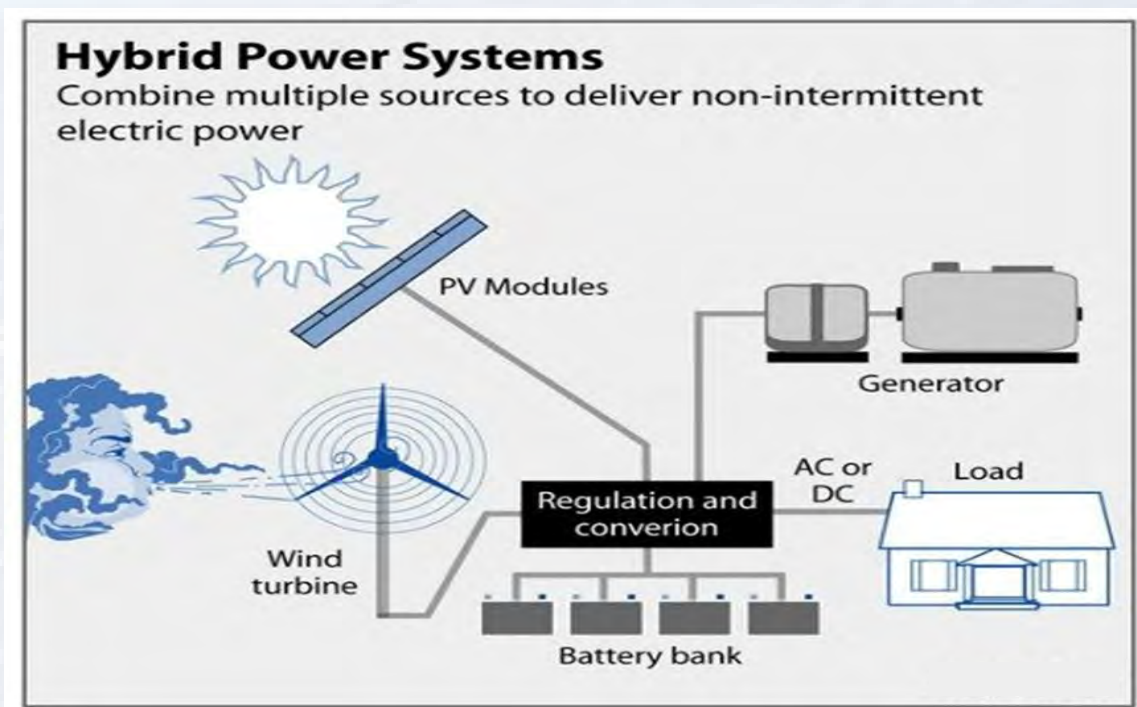
### SPECIFICATION :

- 1) 3.5KW WIND TURBINE
- 2) 3.2KW SOLAR POWER SYSTEM
- 3) 12\* 12V/200AH BATTERY
- 4) 5 KVA 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.

## Horizontal Wind Turbine



- MS Marine 14 Coating as per ASTM - B-117.
- 3 Bladed Epoxy With Carbon fiber .
- Furling & dump load for over speed Protection.

Rotor	4.60 m
Mount	5 Inches
Start up	3.1 m/s
Voltage	48V to 240V
Rated	<b>3500 watts @ 12 m/s</b>
Survival	55 m/s

### Applications

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



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The Wind Turbine 3500 is indigenously designed & developed and is a high performance, high powered wind turbine. It is available in both offgrid and grid ti configuraatioThe Wind Turbine 3500 provides a peak power of more than 3.5kW at a much lower rotor speed resulting in quiet and noiseless operation It has numerous applications such as in the hospiality sector, remote military bases and island electrificacation.

## KEY FEATURES

### Low cut in wind speeds

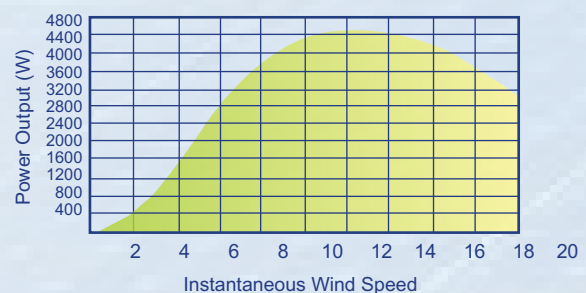
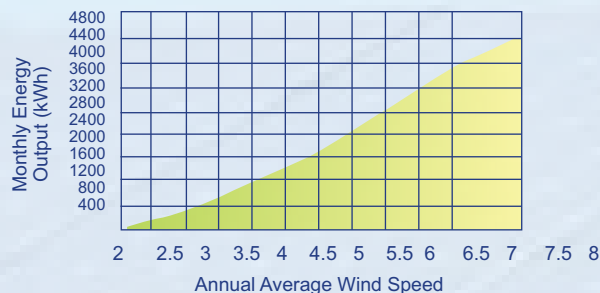
- Lightweight, rugged design
- Suitable for remote locations installations
- Suitable for standalone or multiple parallel module application to suit different power rating.
- Modular construction for easy installation and dismantling
- PWM based state of art architecture providing overcharge protection / 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.

## APPLICATIONS

- Telecom towers.
- Fuel stations & resorts.
- Rural electrification & farm power and water supply.
- 230V AC mains grid tie roof top installation on high rise buildings.
- Water pumping model is also available (WS4500 with WiSH Energy pump controller can be connected to any 3 phase submersible or surface water pump and can pump water from bore wells of 200/300 ft.)
- Military / Para Military camp power supply.
- Island and lighthouse continuous power

## TURBINE SPECIFICATIONS

GENERAL CONFIGURATION			
Model	Wind Turbine 3500watt	Rated power	3500 watt @ 12.5 m/s, 600 R.P.M
Rotor diameter	4.6 m	Number of blades	3
Swept area	16.61 m <sup>2</sup>	Material of blades	Carbon fibre composite & epoxy bonding
Weight	113 kg (Including blades and tail boom)	Material of body	Powder coated MS with marinization treatment
Mount	5 inch mounted	Survival wind speed	55 m/s
Start-up wind speed	3.5 m/s	Over-speed protection	Furling ,dump load & manual brake switch
Rated wind speed	12.5 m/s	Controller	External regulator
Alternator	PM 3 phase alternator	Bearings	Low friction, totally enclosed self-lubricated
Alternator efficiency	90 %	Controller output	Voltage options : 48V DC (LV) 96V, 120V, 240VDC (HV) Rated power: 4500 watts
Magnets	NdFeb N35,Nickel Plating	Max. lateral thrust	420 KGF
Insulation class	Class 'H'		
Voltage configuration (L.V. model)	48 V Nominal		
Voltage configuration (H.V. model)	96V/120V/240V Nominal		
Average power	3200W at 11m/s		



## WIND CHARGE CONTROLLER

Wind Turbine 3500 charge controller is an intelligent wind charge controller which provides safe, secure and productive wind generator operation. The PWM (Pulse Width Modulation) controller is capable of monitoring various parameters such as battery voltage, battery charging, load diversion and cumulative energy generation. The controller contains a 3 phase full wave bridge rectifier for converting AC power generated from the wind turbine, to DC power. PWM technique is used for diverting excess power to a dump load as required.



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# 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
Power tolerance	+5W
Module Efficiency (%)	19.32
Vmp (V)	41.46
Imp (A)	9.05
Voc (V)	48.40
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 <sup>2</sup> / 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

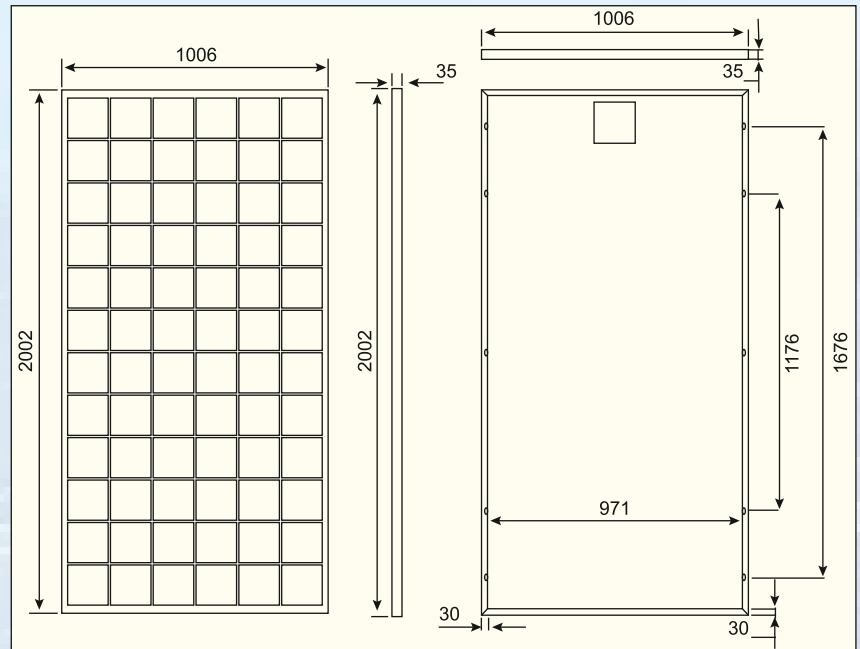
STC: 1000 W/m<sup>2</sup> irradiance, AM 1.5 spectrum and 25°C cell temperature

NOCT conditions: 800 W/m<sup>2</sup> 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/m<sup>2</sup>, 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

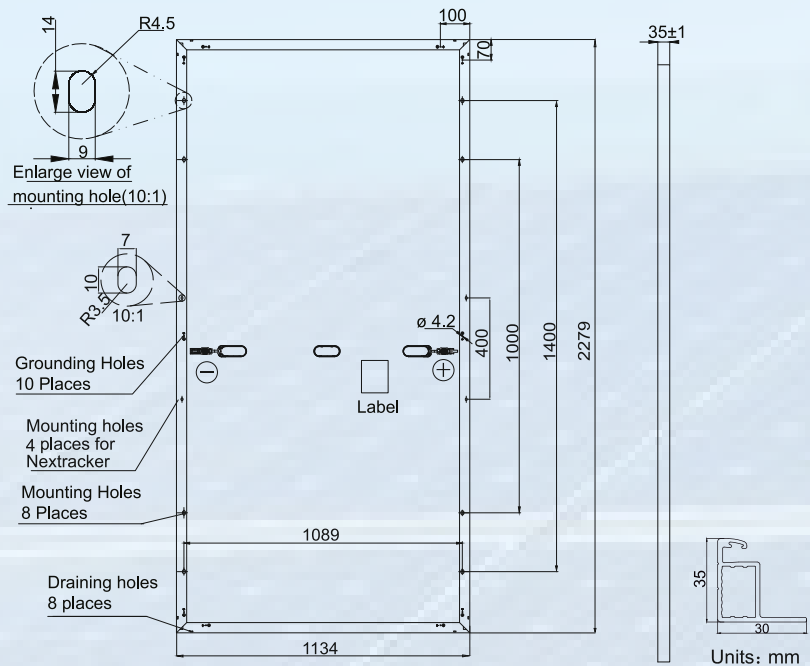
STC: 1000 W/m<sup>2</sup> irradiance, AM 1.5 spectrum and 25°C cell temperature

NOCT conditions: 800 W/m<sup>2</sup> 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

# STATIC INVERTER / PCU

## TECHNICAL SPECIFICATIONS HYBRID USP/SPCU

System Capacity	2.5KVA		3.5KVA	5KVA	7.5KVA	10KVA
Max PV Panel Power	2500W	2500W	3500W	5000W	7500W	10000W
Battery Voltage	36V	48V	48V	48V/96V	96V/120V	120V/192V
No Load Current	≤2.2A					
Output Voltage @ No Load	220V±5V			230V±5V		
Output Voltage @ Full Load	195V-220V			210V-230V		
DC Current @ Full Load	<63A±2A	<46A±2A	<63A±2A	<102 & 46A±2A	<76 & 53A±2A	<66A & 55A±2A
Output Frequency	50HZ±1HZ					
Solar Charger Type	PWM					

### UPS MODE

Low Cut Voltage	180V±10A
Low Cut Recovery	9V-12V HYSTERSIS
High Cut	260V±10V
High Cut Recovery	9V-12V HYSTERSIS
Charge Over Mains to UPS	<=10ms
Charge Over UPS TO Mains	<=10ms

### NORMAL MODE

Low Cut Voltage	100V±10A
Low Cut Recovery	9V-12V HYSTERSIS
High Cut	280V±10V
High Cut Recovery	9V-12V HYSTERSIS
Charge Over Mains to UPS	<=50ms
Charge Over UPS TO Mains	<=10ms

### CHARGING MODE (HC/QC)

Max Charging @ Mains Only	20A±2A
Max Charging @ Solar Only	30A±1A
Max Charging @ Solar + Mains	25A±1A

Solar + Mains Charging Current Adding in HC Mode, Max charging current below 13.7V Battery voltage; above 13.7 Battery Voltage charging current i

### CHARGING MODE (NC/EC)

Max Charging @ Mains Only	20A ± 2A
Max Charging @ Solar Only	30A ± 1A
Max Charging @ Solar + Mains	25A ± 1A

Mains Charging Current will be zero if solar current is >13A, Max charging current below 13.7V Battery Voltage; above 13.7V Battery Voltage, charging current is 15A±1A, system will cut off the mains when battery voltage reaches Boost voltage level and Output load is transferred to Solar + Battery Power.

### BATTERY CHARGING VOLTAGE

Boost Voltage	14.4V ± 0.2V / Battery
Float Voltage	13.7V ± 0.2V / Battery

### PROTECTION

Over Load Protection, Battery Low Protection, Over Temperature Protection, Short Circuit Protection (Battery Mode),PV Reverse Protection	Yes
Over Load Warning	Yes
Battery Low Alarm	Yes
Over Temperature Alarm	Yes
Short Ckts (Mains Mode)	Mains MCB Trip
Short Circuit Retry (Battery Mode)	Yes
Mains MCB Trip/Fuse Trip	Yes

\* All Protections are resetable through PCU Switch & Mains.

\* Above mentioned specifications are subjected to change as per development without prior notice.

### WEIGHT AND DIMENSTIONS

With Packaging LxWxH in mm	470x440x610	470x440x610	470x440x610	500x495x660	600x500x740	600x500x740
With Out Packaging LxWxH in mm	310x290x450	310x290x450	310x290x450	350x300x540	550x350x660	550x350x660
Net Weight	32	32	32	54	78	89
Gross Weight	39	39	39	58	89	100



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# AMARON<sup>®</sup>

# QUANTA

LIFE UNINTERRUPTED

## S-XEL TUBULAR SERIES

Power packed Tubular Battery  
for every UPS needs



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# HIND AMARON<sup>®</sup> 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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