HIND

Hind Hybrid Electrification

1KW WIND HYBRID ELECTRIFICATION

SPECIFICATION :

1) 1KW WIND TURBINE

2) 1.5KW SOLAR POWER SYSTEM

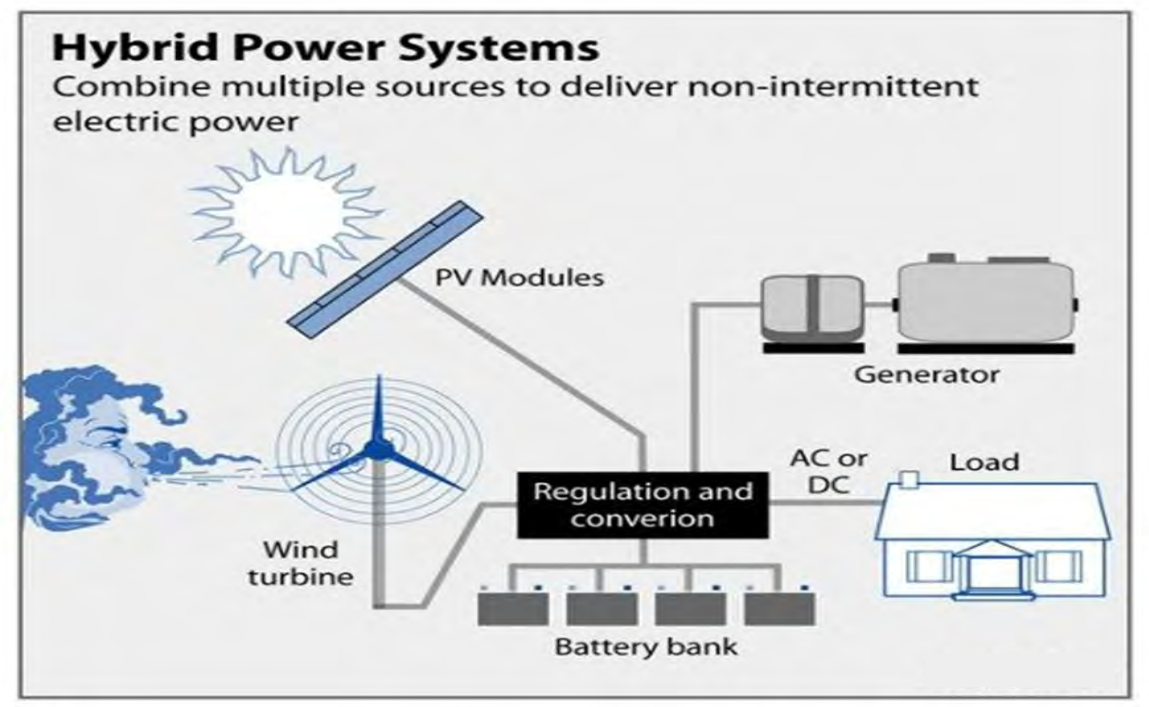
3) 4* 12V/150AH BATTERY

4) 2 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



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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.

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The Wind Turbine is one of the most widely recognized Micro Wind Turbines in the world and has its roots in the Wind Turbine design from SWPP (Southwest Wind Power). It has been type tested & certified as per IEC 61400 for power performance & for safety & functional test by NIWE (National Institute for Wind Energy) which was formerly known as CWET (Center for Wind Energy Technology, India).

This turbine is among the most efficient wind turbines in its class, capable of generating power even at low wind speeds, with a wide range of functionality and applications.

KEY FEATURES

- Low cut in wind speeds.
- Lightweight, rugged design.
- Suitable for remote locations installations.
- International recognition - IEC & CE certifications.
- 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.

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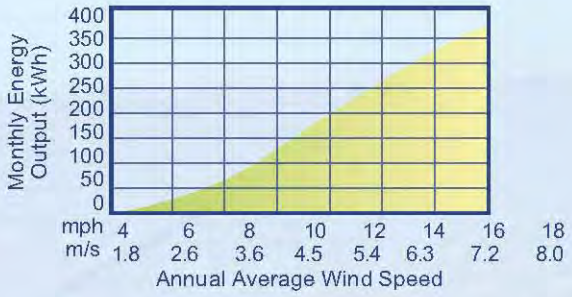
APPLICATIONS

- Rural electrification
- Water pumping
- Offshore oil platforms
- Telecom towers
- Rooftop installations
- Pipeline cathodic protection
- 230 V AC mains grid tie (with interface controller & grid tie inverter)

TURBINE SPECIFICATIONS

GENERAL CONFIGURATION	
Model	Wind Mill
Rotation axis	Horizontal
orientation	Up wind
Rotation direction	Clockwise looking upwind
Number of blades	3
Material of blades	Polypropylene/Carbon reinforced
Material of blade extenders & rotor shaft material	SS 304
Rotor diameter	2.72 M
Body/Housing	Cast aluminum & MS duly marinecoated as per ASTM B -117
Mount	2.5 inches
Weight	30 kg
Certification	ISO 9001-2008,CE, IEC 61400

PERFORMANCE	
Average power	1000W at 11m/s (as per IEC 61400 standards)
Rated/Voltage	LV model 12 volts / 24volts / 36 volts / 48volts DC HV model / 120volts / 240volts DC
Rated wind speed	11.6 m/s to 13 m/s
Start-up/Cut in wind speed	3.1 m/s
Cut out wind speed	16 m/s to 18 m/s
Survival wind speed	55 m/s
ROTOR	
Swept area	5.8 meter square
Rotational speed	1200 rpm @ rated wind speed
Blade pitch	Fixed
Direction of rotation	Clockwise
Over speed control	Side furling & dump load
YAW SYSTEM	
Wind direction sensor	By tail fin & tail boom
Yaw control	Free/Passive yaw



WIND CHARGE CONTROLLER

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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HIND

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)	4mm² / 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

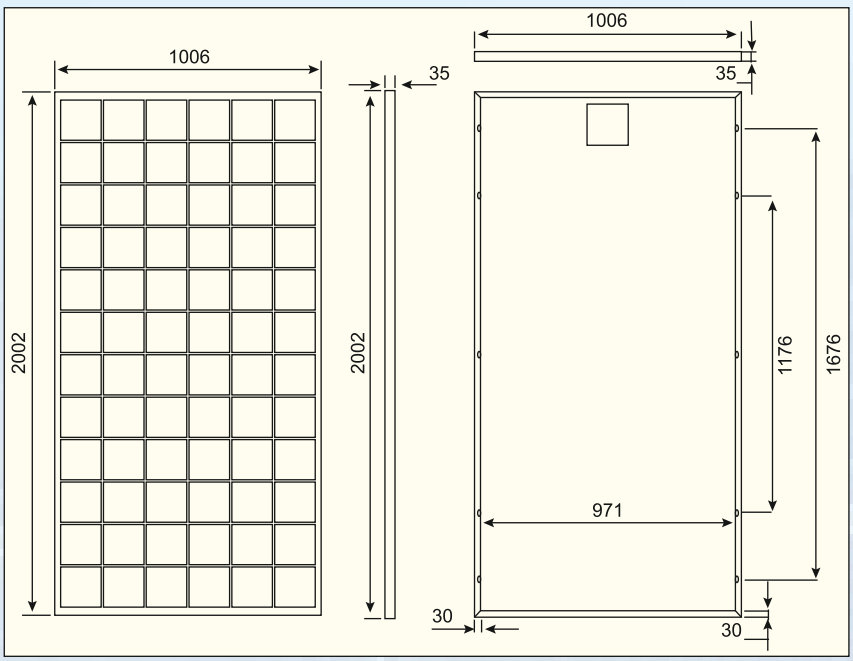
STC: 1000 W/m² irradiance, AM 1.5 spectrum and 25°C cell temperature

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



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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

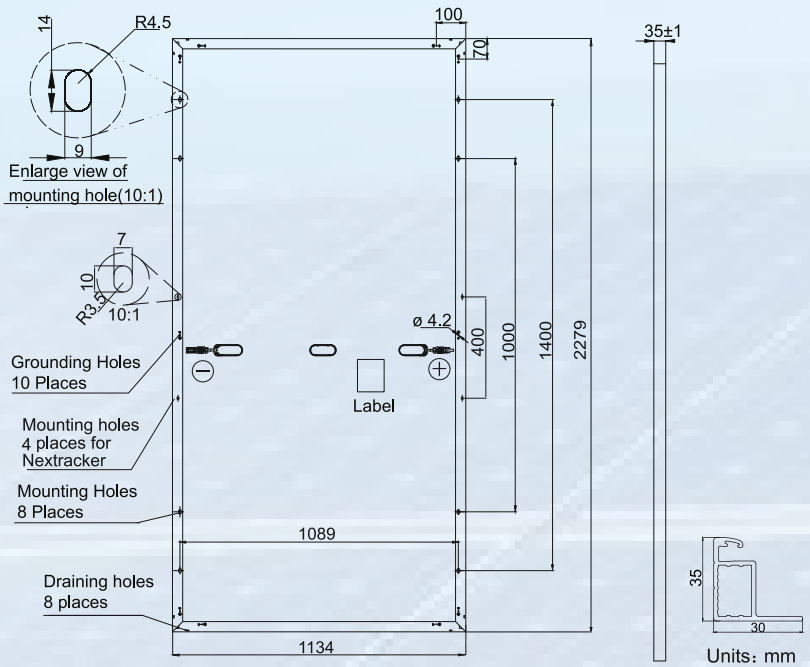
STC: 1000 W/m² irradiance, AM 1.5 spectrum and 25°C cell temperature

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



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POWER CONDITIONING UNIT (PCU)

Just Switch on and Simply Forget

Advance MICRO CONTROLLER based SOLAR PCU / INVERTER products have been carefully designed to operate in both industrial and commercial environments. In commercial applications, our PCU/ inverter products fit according to aesthetically into the environment and perform reliably for years.

SALIENT FEATURES

- Built-in MPPT / PWM Solar Charge Controller.
- Micro Controller / DSP Based smart controller design.
- Pure Sine Wave Output.
- Electronic Overload and Short Circuit Protection.
- Easily Serviceable.
- Auto Changeover / Reset Feature.
- Mains Input Voltage Range Selection.
- Multi Stage Charging.
- Audio Visual Indications (Status & Fault).

CERTIFIED ISO 9001:2008 COMPANY

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PCU TECHNICAL FEATURES

Type	SOLAR PCU (POWER CONDITIONING UNIT)
INPUT	
Input Voltage Range	170V ~270V (Wide input voltage range)
	220V ~ 230V (Normal input voltage range)
Nominal Input Voltage(s) Supported	220V AC , 50Hz
Input connection type	Hard Wire
BATTERY Full Load Runtime (minutes)	Depends on Load & Battery AH
Solar Charge Controller	
Type	MPPT/PWM
Max.PV Open Circuit Array Volatge	44VDC
Minimum PV Voltage	34VDC
PV Current Capacity	60AMP
Charge Algorithm	3-stage Bulk / Acceptance / Float Plus Equalize
OUTPUT	
Output Volt Amp Capacity (VA)	2000
Output Watt Capacity (watts)	1600W
DC System Voltage (VDC)	24V
Load Capacity	>110% faulty after 300ms
Phases	1Phase - 3 Wire (L.N.E)
Output AC waveform	Pure Sine Wave
Efficiency	> 88%
GENERAL	
LCD Display	Customised LCD Display, Dual Colour Display,Mains Mode, UPS mode,Load percentage ,Battery voltage,Grid Input volatge, out put voltage,PV voltage,PV current,SPV charging Amp, Cumulative KWH Hours. **FAULTS**- shortcircuit error, battery low, over load,
Alarms	Pre alarm - overload conditions / short circuit
Switches	1)Switch control off / on power status
	2)Switch for mains input voltage range
	3)Switch to select the charging Low and High current
	4) Power Saving Mode,Priorty Seclection Switch(S-B-G)-(G-B)
Protection	> 300% Load (with manual reset function), battery low, battery overcharge, over temperature
Cooling Method	Forced air cooled
Transfer Time	Battery to line mode : 10-20 milliseconds / Line to battery mode : 20 milliseconds
Housing Material	Powder coated / painted MS
COMMUNICATION	
RMU (Remote monitoring Unit)	Optional GSM Based (**NOTE- GSM Sim in Customer Scope**)

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PCU TECHNICAL FEATURES

ENVIRONMENTAL

Operating Temperature Range	0°C to 50°C
Relative Humidity	95% (non-condensing)
Degree of Protection	IP 21
BATTERY	
Battery Charging Profile(Boost /Foat)	Boost , Absorption and Float Charging.
Max Charging Current(when battery is fully discharge)	Low Mode 8 amp High Mode 13 amp
SPECIAL FEATURES	
Cold Start (startup in battery mode during a power failure)	Cold-start operation supported
Solar Charge Cut-off	When Battery Reaches 14.2v/bat (28.4Vdc)
Battery Low Cut-Off	When Battery Reaches 10.5v/bat (21Vdc)
Grid Charge End Voltage	Grid charging stop when battery reaches 13.8V ±0.2V and transfer to backup mode (per battery)
Grid Recharge Voltage	Grid charging starts when battery reaches 11V ±0.2V and transfer to grid (per battery)

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AMARON®
QUANTA
LIFE UNINTERRUPTED

S-XEL
TUBULAR SERIES

Power packed Tubular Battery for every UPS needs

INSTANT SUPPLY • QUICK RE-CHARGE

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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	User Benefits
Hi-coerce™ spine cast	High pressure spine casting (> 100 bar) provides uni-directional grains orientation with micro hardness extradite superior life
Bountiful Boss™	Allows rapid charge & delivers high power. Optimized current dense & higher conductivity leading to last long
Panoptic Spine™	Mitigates corrosion prone zone, provides high life – Really long
Satiated wet paste™	Unique wet pasting process, lowers resistance to delivers consistent power & low self discharge
Endura cast™	Automated cast-on-strap delivers durability & performance
Unified TermiSeal™	Rigid & Integrated terminal connectivity provides sustainable strength
BIC™	Best in class vent design reduces acid spewing , built-in flame arrestor avoids acid mist exit
ACS	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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