

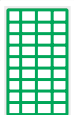
**SURYA SERIES**

**WS-3 to WS-37**



**APPLICATIONS**

**Telecommunication and Radio Relay Stations | Telemetry systems | Defence and Offshore Devices | Signage and Outdoor Media | Standalone Systems for Homes not connected to Grid | Power packs for Telemetry Stations | Billboard Lighting | Portable Mobile Phone Chargers | Street & Outdoor Lighting | Home & Indoor Lighting | Community Lighting | Solar Lanterns: LED, CFL | Standalone Power Packs | Railway Signaling | Surveillance Camera | Rural Electrification | Backup Power Systems & much more..**



**250MW**

Module  
Manufacturing Capacity

**- 5 years Limited Product Warranty  
- 10 years Limited Power Output Warranty  
♦ Minimum 90% at the end of 10 years**



Over 20 in house tests  
(DH: Damp heat test  
TC: Thermal cycling test  
HF: Humidity freeze test)

**INTERNATIONAL & NATIONAL CERTIFICATIONS**



ISO 9001:2008 | ISO 14001:2004 | OHSAS 18001:2007  
IEC 61215 | IEC 61730-1&2 | IEC 61701 |

## Electrical Characteristics \*

Model**	WS-3 / 6V	WS-3 / 12V	WS-5 / 6V	WS-5 / 12V	WS-6 / 12V	WS-8 / 12V	WS-10 / 6V	WS-10 / 12V	WS-12 / 6V	WS-12 / 12V
Nominal Maximum Power, P <sub>m</sub> (W)*	3	3	5	5	6	8	10	10	12	12
Power tolerance	Positive tolerance only									
Open Circuit Voltage, Voc (V)*	10.20	21.00	10.22	21.02	21.03	21.05	10.27	21.07	10.29	21.09
Short Circuit Current, I <sub>sc</sub> (A)*	0.39	0.19	0.65	0.32	0.38	0.51	1.30	0.63	1.55	0.76
Voltage at Maximum Power, V <sub>mp</sub> (V)*	8.70	17.00	8.72	17.00	17.01	17.02	8.77	17.03	8.79	17.04
Current at Maximum Power, I <sub>mp</sub> (A)*	0.35	0.18	0.58	0.30	0.36	0.48	1.15	0.59	1.37	0.71
Maximum System Voltage (V)	600									
Module Efficiency (%)*	8.77	6.36	9.32	9.32	11.18	9.14	9.52	9.52	10.55	10.55
Maximum Series Fuse Rating (A)	1	1	1	1	1	5	5	5	5	5
Limiting Reverse Current (A)	1	1	1	1	1	5	5	5	5	5

\*Under Standard Test Conditions (STC) of 1000 W/m<sup>2</sup> irradiance, AM 1.5 spectrum and 25°C cell temperature.

## Mechanical Characteristics

Model**	WS-3 / 6V	WS-3 / 12V	WS-5 / 6V	WS-5 / 12V	WS-6 / 12V	WS-8 / 12V	WS-10 / 6V	WS-10 / 12V	WS-12 / 6V	WS-12 / 12V
Length x Width x Thickness (L x W x T) - mm	185 x 185 x 16	255 x 185 x 22	290 x 185 x 16	290 x 185 x 22	290 x 185 x 22	250 x 350 x 22	300 x 350 x 22	300 x 350 x 22	325 x 350 x 22	325 x 350 x 22
Mounting Holes Pitch (Y) – mm	-	-	-	-	-	130.00	145.00	145.00	165.00	165.00
Mounting Holes Pitch (X) – mm	165.00	155.00	165.00	155.00	155.00	322.00	322.00	322.00	322.00	322.00
Weight (kg)	0.65	0.75	0.80	0.85	0.85	1.20	1.35	1.35	1.55	1.55
Solar Cells per Module (Units) / Arrangement	18 / (9 x 2)	36 / (18 x 2)	18 / (9 x 2)	36 / (18 x 2)	36 / (18 x 2)	36 / (9 x 4)	18 (9 x 2)	36 / (9 x 4)	18 / (9 x 2)	36 / (9 x 4)
Solar Cell Type	Multi crystalline Silicon									
Front Cover (Material / Thickness)	Tempered & Low Iron Glass / 3.2 mm									
Encapsulate	Ethylene Vinyl Acetate									
Frame Material	Anodized Aluminum Alloy									
Junction Box	Weatherproof PPO enclosure (with bypass diode for WS-37 / 12V)									
Connector	Optional									
Cable	Optional									
Fire safety class	C									
Safety application class	A									
Safety class	II									

\*\* " / xxV" in Model indicates the voltage rating of applicable battery

## Thermal Characteristics

Temperature coefficient of Current (I <sub>sc</sub> ), α (%/°C)	0.0681
Temperature coefficient of Voltage (V <sub>oc</sub> ), β (%/°C)	-0.2941
Temperature coefficient of Power (P <sub>m</sub> ), γ (%/°C)	-0.3845
NOCT (°C)	46 ± 2
Operating temperature range (°C)	-40 to 85

## Electrical Characteristics \*

Model**	WS-15 / 12V	WS-18 / 12V	WS-20 / 12V	WS-24 / 12V	WS-24 / 24V	WS-25 / 12V	WS-30 / 12V	WS-35 / 12V	WS-37 / 12V
Nominal Maximum Power, P <sub>m</sub> (W)*	15	18	20	24	24	25	30	35	37
Power tolerance	Positive tolerance only								
Open Circuit Voltage, V <sub>oc</sub> (V)*	21.12	21.15	21.17	21.21	43.50	21.22	21.27	21.32	21.34
Short Circuit Current, I <sub>sc</sub> (A)*	0.95	1.13	1.26	1.51	0.74	1.57	1.88	2.19	2.31
Voltage at Maximum Power, V <sub>mp</sub> (V)*	17.06	17.07	17.08	17.10	35.20	17.11	17.13	17.16	17.17
Current at Maximum Power, I <sub>mp</sub> (A)*	0.88	1.06	1.18	1.41	0.69	1.47	1.76	2.04	2.16
Maximum System Voltage (V)	600								
Module Efficiency (%)*	10.85	11.18	12.42	12.29	12.29	12.80	11.75	10.69	11.30
Maximum Series Fuse Rating (A)	5	5	10	10	10	10	10	10	10
Limiting Reverse Current (A)	5	5	10	10	10	10	10	10	10

\*Under Standard Test Conditions (STC) of 1000 W/m<sup>2</sup> irradiance, AM 1.5 spectrum and 25°C cell temperature.

## Mechanical Characteristics

Model**	WS-15 / 12V	WS-18 / 12V	WS-20 / 12V	WS-24 / 12V	WS-24 / 24V	WS-25 / 12V	WS-30 / 12V	WS-35 / 12V	WS-37 / 12V
Length x Width x Thickness (L x W x T) - mm	395 x 350 x 22	460 x 350 x 22	460 x 350 x 22	550 x 355 x 22	550 x 355 x 22	550 x 355 x 22	740 x 345 x 22	485 x 675 x 35	485 x 675 x 35
Mounting Holes Pitch (Y) - mm	195.00	240.00	240	345.00	345.00	345	380.00	245.00	245.00
Mounting Holes Pitch (X) - mm	322.00	322.00	322	313.00	313.00	313	318.00	633.00	633.00
Weight (kg)	1.75	1.95	1.95	2.20	2.20	2.2	3.30	4.25	4.25
Solar Cells per Module (Units) / Arrangement	36 / (9 x 4)	36 / (9 x 4)	36 / (9 x 4)	36 / (9 x 4)	72 / (18 x 4)	36 / (9 x 4)	36 / (18 x 2)	36 / (9 x 4)	36 / (9 x 4)
Solar Cell Type	Multi crystalline Silicon								
Front Cover (Material / Thickness)	Tempered & Low Iron Glass / 3.2 mm								
Encapsulate	Ethylene Vinyl Acetate								
Frame Material	Anodized Aluminum Alloy								
Junction Box	Weatherproof PPO enclosure (with bypass diode for WS-37 / 12V)								
Connector	Optional								
Cable	Optional								
Fire safety class	C								
Safety application class	A								
Safety class	II								

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NOCT (°C)	46 ± 2
Operating temperature range (°C)	-40 to 85

# ABOUT WAAREE

Waaree Energies Ltd. is one of India's most diversified & fastest growing solar energy solutions company launched in 2007, a part of the consortium of Waaree Group in business since 1989. Waaree is India's premier multi-diverse technology group having its forte in multifarious verticals such as Solar Energy, Industrial Valves, Petroleum Equipment & Process Control Instrumentation.

Our 250 MW State of the Art facility in Surat, Gujarat manufactures mono & poly crystalline Si PV modules from 3Wp to 400Wp. Our modules are certified by all major national & international accreditation bodies. Apart from being one of the most successful solar PV module manufacturers in India, Waaree Energies Ltd is on the forefront of developing newer solar products, solutions and services towards enabling our customers to gain the best returns on their investments.

We have been growing at a CAGR of 163% in the last 4 years and have won some major awards such as India SME Excellence Award - 2013, ET NOW Indiamart Leader of Tomorrow Award 2012, Soft Disk Solar Power Companies of the Year Award 2012, and EEPC award for 4 consecutive years. Our group is strengthened by our qualified and experienced team of more than 700 people with 26 sales offices across India and 5 global offices.

## WAAREE ENERGIES / BUSINESS VERTICALS

<b>EPC MW PROJECTS</b>	Mega Watt (M.W.) Scale Utility
<b>OFF GRID/KW ROOFTOP</b>	Kilo Watt (K.W.) Systems----- <b>OFF GRID</b> <b>ON GRID</b> <b>Hybrid (With DG)</b>
<b>MODULES &amp; PRODUCTS</b>	PV Modules   Solar Street Lights   Solar Lanterns   Home Lighting Systems
<b>SOLAR WATER PUMP</b>	Complete replacement of Diesel pump used for irrigation
<b>SOLAR THERMAL</b>	Solar Water Heating Systems for large residential & commercial usage Heat/Steam generation & cooling solutions for Industrial Application
<b>POWER GENERATION</b>	Independent Solar Power Generation

◆The Specifications are for reference purpose only. Waaree reserves the right to change the specifications without prior notice.

## WAAREE Energies Ltd.

### CORPORATE OFFICE

602, Western Edge-1, Off. Western Express Highway, Borivali (E), Mumbai- 400 066. Maharashtra, India.

Board Line : +91-22-66 44 44 44  
Fax Line : +91-22-66 44 44 00  
Toll Free : 1800 212 1321  
E-mail : waaree@waaree.com  
Website : www.waaree.com