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Solar Panel Guide Specification Data Sheet

**Waaree Energies Ltd
Surya Series WS-3-37
WS-24/24V**

Also available on the web at
EnergyPal.com/waaree-energies-ltd-solar-panels/ws-24-24v

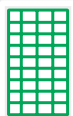
SURYA SERIES

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..



500 MW

Module
Manufacturing Capacity

- 5 years Limited Product Warranty**
- 25 years Limited Power Output Warranty**
♦ Minimum 90% at the end of 10 years
♦ Minimum 80% at the end of 25 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 _m (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 _{sc} (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 _{mp} (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 _{mp} (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/m² 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

Poly 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 _{sc}), α (%/°C)	0.0681
Temperature coefficient of Voltage (V _{oc}), β (%/°C)	-0.2941
Temperature coefficient of Power (P _m), 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 _m (W)*	15	18	20	24	24	25	30	35	37
Power tolerance	Positive tolerance only								
Open Circuit Voltage, Voc (V)*	21.12	21.15	21.17	21.21	43.50	21.22	21.27	21.32	21.34
Short Circuit Current, Isc (A)*	0.95	1.13	1.26	1.51	0.74	1.57	1.88	2.19	2.31
Voltage at Maximum Power, V _{mp} (V)*	17.06	17.07	17.08	17.10	35.20	17.11	17.13	17.16	17.17
Current at Maximum Power, I _{mp} (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/m² 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	485 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	245.00	345.00	345.00	345.00	380.00	245.00	245.00
Mounting Holes Pitch (X) – mm	322.00	322.00	322.00	313.00	313.00	313.00	318.00	633.00	633.00
Weight (kg)	1.75	1.95	1.98	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)	72 / (18 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	Poly 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 _{sc}), α (%/°C)	0.0681
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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 power solution 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's & Process Control Instrumentation.

Our 500 MW State of the Art facility in Surat, Gujarat manufactures mono & poly crystalline Si PV modules from 3 Wp to 400 Wp. 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 won some major awards such as Make in India Award for Excellence - 2015, Energy and Environment Foundation Global Excellence Award - 2013, 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



PV MODULES



EPC SERVICES



INDEPENDENT POWER PRODUCERS



PROJECT DEVELOPER



ROOF TOP SOLUTIONS



SOLAR WATER PUMP



SOLAR THERMAL



SOLAR PRODUCTS

** Refer to Waaree's Warranty document for Terms and Conditions.

*The Specifications are for reference purpose only.

Waaree reserves the right to change the specifications without prior notice.

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