

## Sunmodule<sup>+</sup> SW 220/225/230/235 mono

High-quality, high performance, and high reliability – the Sunmodule Plus<sup>®</sup> is designed and built for long-term yield stability and ease of use.

Every module is factory flashed at standard test conditions (STC) to determine the power output and then sorted in 5 watt increments. Only modules with a flashed power that is greater than or equal to the nameplate rated power are delivered. Flash report data is provided with every order.

The proven design of the patented low profile Sunbox junction box, has been installed on over 4,000,000 modules. Integrated by-pass diodes and sealed welded connections ensure reliability and eliminate failures resulting from exposure to the elements. The molded fins on the exterior housing dissipate heat quickly to maximize power output.

The patented box channel frame design provides extraordinary stiffness in bending and torsion. The laminate with 4mm glass is set deep in the frame channel and secured with precision applied adhesive. The frame is assembled by press fit to maximize strength and longevity. The result is an extremely robust package that can be mounted in any orientation and can withstand static loads of up to 113 psf.

SolarWorld provides a 5-year workmanship warranty\* and 25-year linear performance guarantee\*

\*See warranty statement for details.



We turn sunlight into power.

## SW 220/225/230/235 mono

### Performance under standard test conditions (STC\*)

		SW 220	SW 225	SW 230	SW 235
Maximum power	$P_{max}$	220 Wp	225 Wp	230 Wp	235 Wp
Open circuit voltage	$V_{oc}$	37.2 V	37.3 V	37.4 V	37.5 V
Maximum power point voltage	$V_{mpp}$	29.4 V	29.7 V	30 V	30.3 V
Short circuit current	$I_{sc}$	8.10 A	8.13 A	8.16 A	8.19 A
Maximum power point current	$I_{mpp}$	7.50 A	7.59 A	7.68 A	7.77 A

\*STC: 1000W/m<sup>2</sup>, 25°C, AM 1.5

### Performance at 800 W/m<sup>2</sup>, NOCT, AM 1.5

		SW 220	SW 225	SW 230	SW 235
Maximum power	$P_{max}$	159 Wp	163 Wp	167 Wp	171 Wp
Open circuit voltage	$V_{oc}$	33.5 V	33.7 V	33.9 V	34 V
Maximum power point voltage	$V_{mpp}$	26.5 V	26.8 V	27.2 V	27.5 V
Short circuit current	$I_{sc}$	6.53 A	6.56 A	6.58 A	6.60 A
Maximum power point current	$I_{mpp}$	6.00 A	6.07 A	6.14 A	6.22 A

Minor reduction in efficiency under partial load conditions at 25°C: at 220 W/m<sup>2</sup>, 95% (+/- 3%) of the STC efficiency (1000 W/m<sup>2</sup>) is achieved.

### Component materials

Cells per module	60
Cell type	monocrystalline silicon
Cell dimensions	156 x 156 mm <sup>2</sup>

### System integration parameters

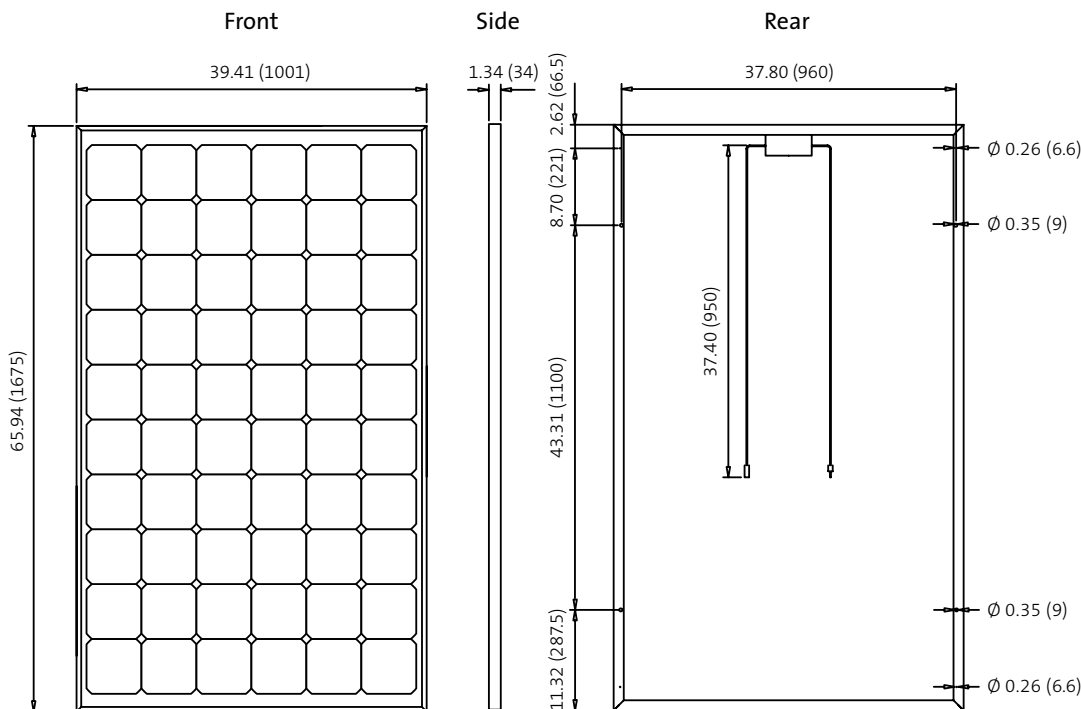
Maximum system voltage SC II	1000 V <sub>DC</sub>
Maximum system voltage USA NEC	600 V <sub>DC</sub>
Maximum series fuse rating	15 A
Maximum reverse current	Do not apply external voltages larger than V <sub>oc</sub> to the module

### Thermal characteristics

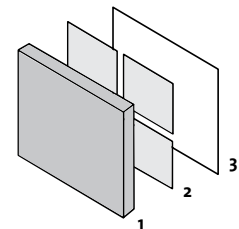
NOCT	46°C
TC I <sub>sc</sub>	0.042 %/K
TC V <sub>oc</sub>	-0.33 %/K
TC P <sub>max</sub>	-0.45 %/K

### Additional data

Power tolerance	+/- 3 %
Junction box	IP 65
Connector	MC type 4



### Construction



- 1] Front: tempered glass
- 2] Crystalline solar cells embedded in EVA (ethylene-vinyl-acetate)
- 3] Backsheet

Dimensions: inches (mm)

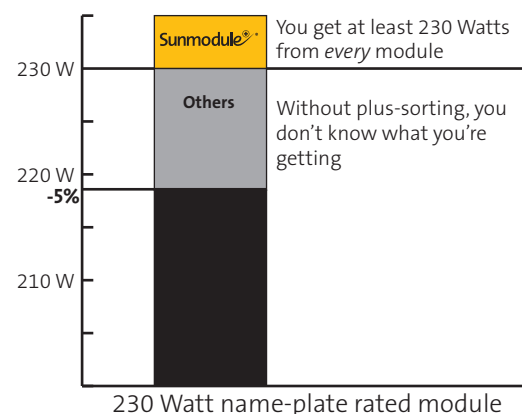
# Customer bulletin: New module rating and warranty

## • SolarWorld introduces plus-sorting to the Sunmodule® product line.

SolarWorld's unique plus-sorting method ensures that our customers receive the watts they pay for. Every module is factory flash tested (at standard test conditions) to determine the peak rated power output, then sorted in 5 watt bin increments. SolarWorld's power rating accounts for initial light-induced degradation (LID) so there are no surprises after installation.

With plus-sorting, SolarWorld only delivers modules that have greater than or equal to the nameplate rated power. These power ratings are backed up with the factory flash report.

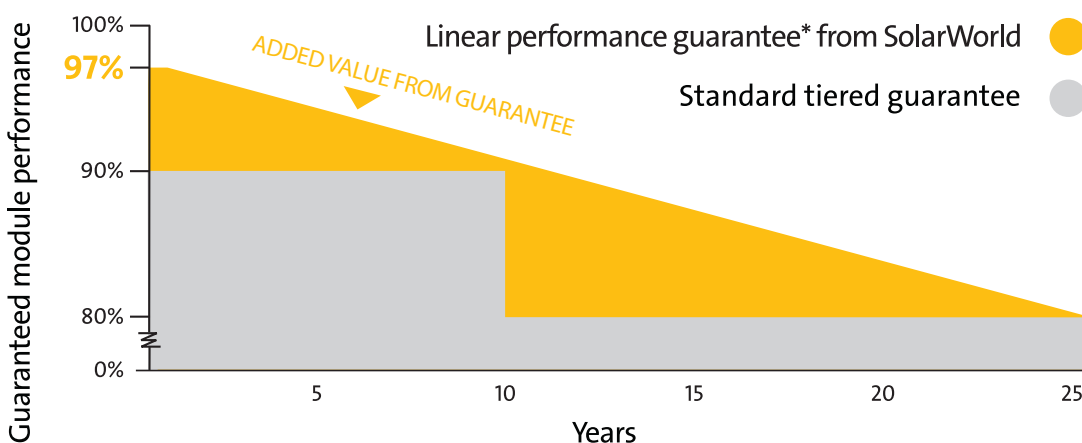
By delivering actual power, plus-sorting ensures that systems operate at top efficiency which results in maximum energy yield year after year. Plus-sorting eliminates nameplate uncertainty and our 5 W bin size makes mismatch losses negligible. This means that the associated de-rate factors in system modeling programs, like PVWatts, PVsyst, and OnGrid can be minimized, predicting up to 5% greater annual yield.



## • SolarWorld introduces new linear performance guarantee

Because SolarWorld produces the highest quality, we can guarantee the best performance. That's why SolarWorld is the first solar company to offer a 25-year linear performance guarantee\* for all modules installed as of January 1, 2010.

According to our guarantee, the actual power of a new module cannot deviate from the specified rated power by more than 3% during the first year; and afterward, the power will not decrease by more than 0.7 percent of the rated power per year. So at year 3, the Sunmodule's capacity is guaranteed to be at least 95.6% of the nameplate as opposed to the industry standard guarantee of 90%. And at year 20, it's still at least 83% as opposed to the industry standard 80%. SolarWorld's linear performance guarantee provides clear added value that you can take to the bank.



Clear added value compared to standard tiered guarantees.

## • SolarWorld extends workmanship warranty to 5 years

As a further expression of SolarWorld's industry-leading quality, we have extended the Sunmodule® product workmanship warranty to 5 years\*.



\* See limited warranty statement on reverse

# Limited Warranty (valid from 01.01.2010)

By purchasing the Solar modules from SolarWorld California Inc. ("SolarWorld") (hereinafter referred to as: products), you have chosen a level of quality, which meets the highest requirements. SolarWorld assumes that use in accordance with this Limited Warranty will reliably maintain the function of the products to produce electricity (hereinafter referred to as: functional capability) as well as reliably maintaining the performance of the products. As a sign of our confidence in this quality, SolarWorld is happy to grant you as the end-user of the products (i.e. the person who put the products into operation correctly for the first time or the person who has legitimately purchased the products from such an end-customer without any modifications) a Five Year Limited Product Warranty and Twenty-Five Year Limited Service Warranty as presented below:

## A Five Year Limited Product Warranty:

1. SolarWorld guarantees the functional capability of the products for five years beyond the purchase of the product and that the product

- > will not suffer from any mechanical adverse effects, which limit the stability of the solar module. A condition for this is correct installation and use in accordance with regulations, as described in the installation instructions enclosed with the product.
- > will not be subject to any clouding or discolouration of the glass.
- > with its cable and connector plug will remain safe and operational, if they are installed professionally and are not permanently positioned in water (puddle). However, damage to the cable, which is caused by abrasion on a rough lower surface owing to insufficient fixing or owing to unprotected running of the cable over sharp edges, is excluded. Any damage caused by animals (e.g. rodent bites, birds, insects) is also exempted.
- > with its aluminium frames will not freeze up when it is frosty if it is installed correctly.

The appearance of the product as well as any scratches, stains, mechanical wear, rust, mould, optical deterioration, discoloration and other changes, which occurred after delivery by SolarWorld, do not represent defects, insofar as the change in appearance does not lead to a deterioration in the functional capability of the product. A claim in the event of glass breakage arises only to the extent that there was no external influence.

2. If the products exhibit one of the above-mentioned defects during this period and this has an effect on the functional capability of the product, SolarWorld will repair the defective products, supply replacement products or provide the customer with an appropriate residual value of the products as compensation at its discretion.

## B Twenty-Five Year Limited Service Warranty:

1. The products which you have purchased have a performance specification within a certain tolerance range of 3% with regard to the power output (the so-called effective output). The relevant effective output can be found on the nameplate on the reverse of the product. SolarWorld assumes that the actual output of the products will decline only slightly over a period of 25 years as of the purchase of the product.

2. SolarWorld guarantees that the actual output of the product will amount to at least 97% of effective output during the first year of operation of the product and as of the second year of the operation of the product, the effective output will decline annually by no more than 0.7% for a period of 24 years, so that by the end of the 25th year of operation an actual output of at least 80.2% of effective output will be achieved. In the event of a negative deviation of actual product performance from the so-called threshold values, SolarWorld will either supply you with replacement products, which make it possible to maintain actual performance, take other measures, which make it possible to achieve actual performance or reimburse you with the time value percentage of your product exclusively at its discretion.

3. When replacement products are supplied, there is no entitlement for the use of new products or those which are as good as new. On the contrary, SolarWorld is authorised to also supply used and/or repaired products as replacements.

## C Further conditions of entitlement

1. The period of the Limited Service Warranty under B) is restricted to a period of 25 years as of the purchase of the product and will not be extended even in the event of a repair or exchange of a product.

2. The effective output and the actual output of the products are to be determined for the verification of any guarantee case using standard test conditions, as described under IEC 60904. The decisive measurement of performance is carried out by a recognised measuring institute or through SolarWorld's own measurements (the assessment of measurement tolerances is undertaken in accordance with EN 50380). The guarantee does not cover transport costs to return the products or for a new delivery of repaired or replacement products. It also does not cover the costs of the installation or re-installation of products, as well as other expenditure by the end-customer or seller.

3. All products which have been replaced pass to the ownership of SolarWorld.

4. The term of the rights granted to you in this Limited Warranty in paragraphs A) and B) starts with the original purchase of the products, insofar as they were purchased by the original end-customer after 01.01.2010. SolarWorld retains the right to adjust voluntary special services in accordance with this document at any time. However, any product purchases, which have already been concluded, remain unaffected by this – including the voluntary special services in accordance with this document. You can find out about the current status of this document at any time at [www.solarworld-usa.com](http://www.solarworld-usa.com).

## D Assertion of claims

The assertion of the services specified under A) and B) requires you (i) to inform the authorized seller/dealer of the product of the alleged defect in writing, or (ii) to send this written notification directly to the address mentioned in G), if the seller/dealer who should be informed no longer exists (e.g. owing to business closure or insolvency). Any notification of defects is to be added to the original sales receipt as evidence of the purchase and the time of the purchase of the SolarWorld products. The assertion should take place within 14 days of the occurrence of the defect. The return of products is permitted only after the written consent of SolarWorld has been obtained.

## E Use in accordance with this Limited Warranty

1. The services described above can additionally be ensured only if the product is used and/or operated in accordance with this Limited Warranty as well as not having been dismantled and re-assembled in the meantime. Services provided by SolarWorld must therefore be with-

drawn if the defects to the product are not exclusively based on the products themselves. This is e.g. the case if:

- a Delays on your part or on the part of the fitter in observing the assembly, operational and maintenance instructions or information.
- b Exchange, repair or modification of the products by persons who were not authorised by SolarWorld.
- c Incorrect use of the products.
- d Vandalism, destruction through external influences and/or persons/animals.
- e Incorrect storage or inappropriate transport before installation.
- f Damage to the customer system or incompatibility of the customer's system equipment with the products.
- g Use of products on mobile units such as vehicles or ships.
- h Influences such as dirt or contamination on the face-plate; contamination or damage by e.g. smoke, extraordinary salt contamination, or other chemicals.
- i Force majeure such as flooding, fire, explosions, rock-falls, direct or indirect lightning strikes, or other extreme weather conditions such as hail, hurricanes, whirlwinds, sandstorms or other circumstances outside the control of SolarWorld.

2. The entitlements referred to under A) and B) will not be granted if and as soon as the manufacturer's labels or serial numbers on the PV modules have been changed, deleted, peeled off or made unrecognizable.

## F Exclusion of liability

The remedies set forth in this Limited Warranty are the exclusive remedies available to you as a product purchaser. SolarWorld shall not be liable for damage, injury or loss arising out of or related to a product except as set forth in this Limited Warranty. In particular, under no circumstances shall SolarWorld be liable for incidental, consequential, special or other indirect damages in any way connected with a product. SolarWorld's aggregate liability, if any, shall be limited to a product's purchase price or any service furnished in connection with a product, as the case may be.

## G Your contacts

To receive service under this Limited Warranty, please contact the authorized seller/dealer of your product or SolarWorld at the following address: Customer Service, SolarWorld California Inc., 4650 Adohr Lane, Camarillo, CA 93012, USA.

## H Choice of law

The rights and responsibilities granted under this Limited Warranty shall be governed and construed in accordance with the laws of the State of California, without regard to its conflict of law principles.

## I Validity

The following table contains all the current products to which this Limited Warranty is to be applied. Products, which do not appear in this list, are not subject to this Limited Warranty.

### Sunmodule/Sunmodule Plus/laminate/black

SW 135 mono	SW 195 mono	SW 170 poly	SW 120 Compact poly
SW 140 mono	SW 200 mono	SW 175 poly	SW 125 Compact poly
SW 145 mono	SW 205 mono	SW 180 poly	SW 130 Compact poly
SW 150 mono	SW 210 mono	SW 185 poly	SW 135 Compact poly
SW 155 mono	SW 214 mono	SW 190 poly	SW 140 Compact poly
SW 160 mono	SW 215 mono	SW 195 poly	SW 145 Compact poly
SW 165 mono	SW 220 mono	SW 200 poly	SW 150 Compact poly
SW 170 mono	SW 225 mono	SW 205 poly	
SW 175 mono	SW 230 mono	SW 210 poly	
SW 180 mono	SW 235 mono	SW 214 poly	SW 130 Compact mono
SW 185 mono	SW 240 mono	SW 215 poly	SW 135 Compact mono
SW 190 mono	SW 245 mono	SW 220 poly	SW 140 Compact mono
		SW 225 poly	SW 145 Compact mono
		SW 230 poly	SW 150 Compact mono
		SW 235 poly	SW 155 Compact mono
		SW 240 poly	SW 160 Compact mono

## J State Law

This Limited Warranty is expressly intended to exclude all other express or implied warranties, including without limitation the warranties of merchantability and fitness for a particular purpose, to the periods set forth herein. This Limited Warranty gives you specific legal rights, and you may also have other rights which vary from state to state. Some states do not allow limitations on implied warranties or the exclusion or limitation of damages, so some of the above limitations may not apply to you.

Revised January 2010



Kevin Kilkelly  
President  
SolarWorld California, LLC



Raju Yenamandra  
Vice President, Sales and Marketing  
SolarWorld California, LLC

