



SOLBIAN

**FLEXIBLE
PHOTOVOLTAIC
PANELS**

MADE IN ITALY

 **2014**



SOLBIAN

Solbian has been operating in the Marine photovoltaic sector **since 2007**.

Giovanni Soldini has made several photovoltaic installations on international racing yachts with Solbian.

Companies and professionals, operating in the energy and photovoltaic sector since many years, joined Solbian Energie Alternative in 2009, to scale up the early technical developments to industrial dimensions.

The mission of the company is the production of **innovative photovoltaic panels**, with the aim to bring "energy where it is really needed".

The special features of **flexibility, lightness** and **high efficiency** represent fundamental standards requested for these innovative applications.

Solbian panels are particularly suitable for **sailing boats, electric mobility, caravans** and **motorhomes, trekking, tents** and **shelters, emergency buildings** and for **Building Integrated Photovoltaics**.

lightness,
efficiency
and flexibility



Giovanni **SOLDINI**,
has **tested** SOLBIANFLEX panels
under **extreme conditions**

SOLBIAN

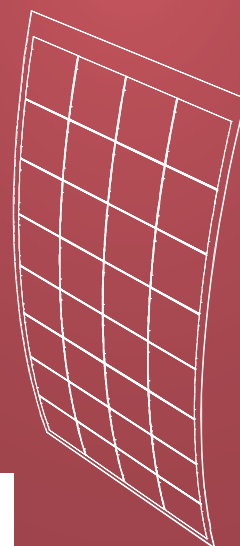
WHY INSTALL A SOLBIANFLEX PANEL?

- ✓ Because it is a **FLEXIBLE** panel with high-efficiency crystalline silicon cells that can adapt to curved surfaces, such as the deck of your boat.
- ✓ Because it is an **ULTRALIGHT** panel. Only 2.1 kg per square meter, compared to more than 12 kg for traditional panels.
- ✓ Because it offers different installation solutions. From **STRUCTURAL ADHESIVE** that will make it part of your boat to **STAINLESS STEEL EYELETS** enabling easy installation and removal.
- ✓ Because it comes with a **WIDE RANGE OF ACCESSORIES** designed and manufactured for the marine industry and for easy installation.
- ✓ Because it has an exceptional testimonial, **GIOVANNI SOLDINI**, who has tested SolbianFlex panels under extreme conditions.



powered by

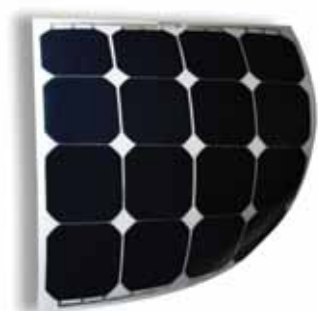
SUNPOWER



SOLBIAN.EU

MARINE MARKET - SP SERIES

SolbianFlex panels are designed to meet the different needs of our customers.



SP-50Q



SP-50L



SP-100

SP series panels use special monocrystalline silicon cells with **efficiency greater than 22.5%**. SunPower™ back-contact cells represent **the most advanced available technology** on the market, and make the SP Solbian panels the **highest-efficiency flexible panels**.

MECHANICAL DATA	SP-100	SP-50L	SP-50Q
Length	1109 mm	1109 mm	601 mm
Width	546 mm	292 mm	546 mm
Thickness	2 mm	2 mm	2 mm
Weight	1.5 kg	0.8 kg	0.8 kg
Num. of cells	32	16	16
ELECTRICAL DATA	SP-100	SP-50L	SP-50Q
Peak Power ($\pm 5\%$) - Pmax	102 W	51 W	51 W
Rated Voltage - Vmp	18 V	9 V	9 V
Rated Current - Imp	5.7 A	5.7 A	5.7 A
Open Circuit Voltage - Voc	21.8 V	10.9 V	10.9 V
Short Circuit Current - Isc	6 A	6 A	6 A
Temp. Coeff. of Pmax	-0.38%/°C	-0.38%/°C	-0.38%/°C
Temp. Coeff. of Voc	-0.27%/°C	-0.27%/°C	-0.27%/°C
Temp. Coeff. of Isc	0.05%/°C	0.05%/°C	0.05%/°C

MARINE MARKET - SP SERIES

High efficiency or top efficiency cells? Discover the most suitable for you!



SP-112Q



SP-112L



SP-125



SP-137

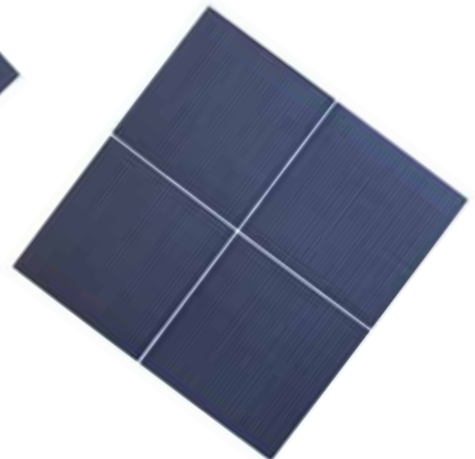
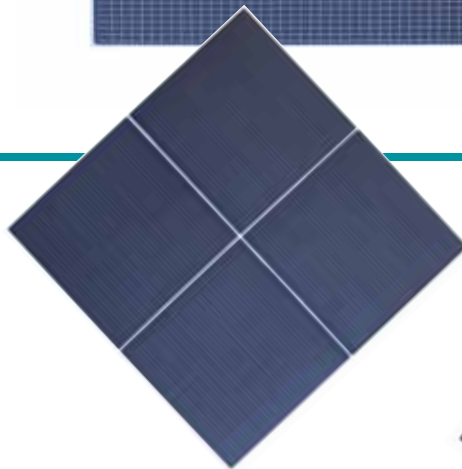
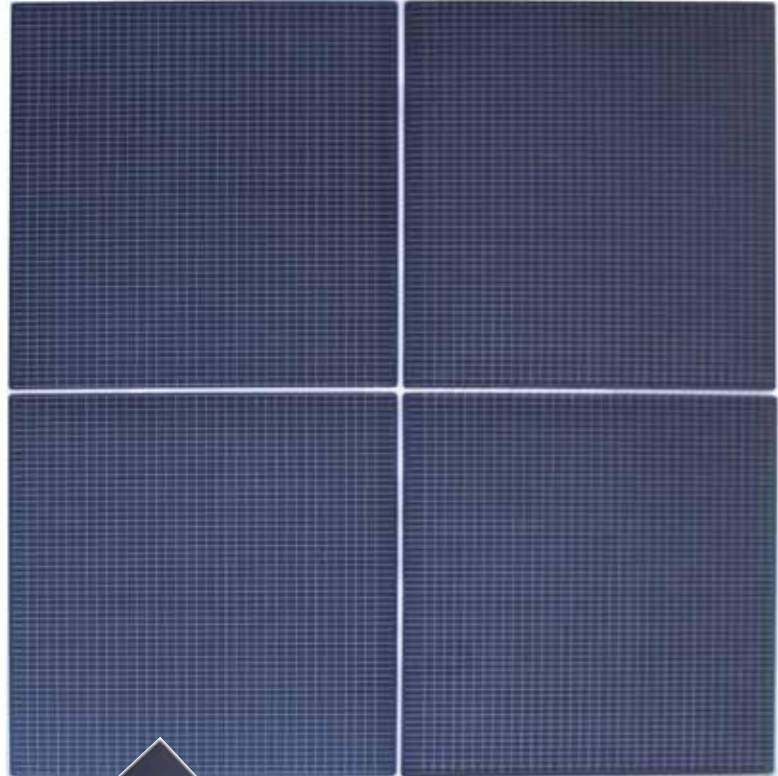
MECHANICAL DATA	SP-112Q	SP-112L	SP-125	SP-137
Lenght	855 mm	1236 mm	1363 mm	1490 mm
Width	800 mm	546 mm	546 mm	546 mm
Thickness	2 mm	2 mm	2 mm	2 mm
Weight	1.7 kg	1.7 kg	1.8 kg	2 kg
Num. of cells	36	36	40	44
ELECTRICAL DATA	SP-112Q	SP-112L	SP-125	SP-137
Peak Power (±5%) - Pmax	112 W	112 W	125W	137 W
Rated Voltage - Vmp	20 V	20 V	22 V	24 V
Rated Current - Imp	5.7 A	5.7 A	5.7 A	5.7 A
Open Circuit Voltage - Voc	24.3 V	24.3 V	26.9 V	29.1 V
Short Circuit Current - Isc	6 A	6 A	6 A	6 A
Temp. coeff. of Pmax	-0.38%/°C	-0.38%/°C	-0.38%/°C	-0.38%/°C
Temp. coeff. of Voc	-0.27%/°C	-0.27%/°C	-0.27%/°C	-0.27%/°C
Temp. coeff. of Isc	0.05%/°C	0.05%/°C	0.05%/°C	0.05%/°C

MARINE MARKET - SX SERIES



The mono crystalline solar cells used in the new **SX series** are electrically connected using ultra-thin copper wires that form a very fine mesh on the cell surface, resulting in thousand of contact points. This alternative to the standard bus bar method allows a higher module power and increases the energy yield.

This technology is optimally suited to flexible modules, due to its intrinsic insensitivity to micro-cracks, that are the most common cause of energy loss in solar modules. Another advantage is the decrease of shading effect, a quite important issue in marine and mobility applications.



MARINE MARKET - SX SERIES



SX-72Q



SX-72L



SX-54

SX series panels use “full square” monocrystalline silicon cells with **efficiency larger than 19%**. The new connection technology makes SX panels especially resistant to impacts and less sensitive to shading. **High energy yield and high reliability.**

MECHANICAL DATA	SX-72Q	SX-72L	SX-54
Lenght	725 mm	1357 mm	1041 mm
Width	680 mm	364 mm	364 mm
Thickness	2 mm	2 mm	2 mm
Weight	1.2 kg	1.2 kg	0.9 kg
Num. of cells	16	16	12
ELECTRICAL DATA	SX-72Q	SX-72L	SX-54
Peak Power ($\pm 5\%$) - Pmax	72 W	72 W	54 W
Rated Voltage - Vmp	8.7 V	8.7 V	6.5 V
Rated Current - Imp	8.3 A	8.3 A	8.3 A
Open Circuit Voltage - Voc	10 V	10 V	7.5 V
Short Circuit Current - Isc	9 A	9 A	9 A
Temp. Coeff. of Pmax	-0.44%/°C	-0.44%/°C	-0.44%/°C
Temp. Coeff. of Voc	-0.33%/°C	-0.33%/°C	-0.33%/°C
Temp. Coeff. of Isc	0.05%/°C	0.05%/°C	0.05%/°C

MARINE & CARAVAN - CP SERIES

SOLBIAN FLEX™

FLEXIBLE
PHOTOVOLTAIC
PANELS

FLEX CP SERIES



CP series products use standard 156x156 mono crystalline cells, the best established technology to offer powerful and reliable panels at the best price.



SOLBIAN

MARINE & CARAVAN - CP SERIES



CP-140L



CP-140Q

CP series panels use special monocrystalline silicon cells with **efficiency greater than 18%**, incorporated in **polymers with high strength**. These materials make the panels flexible, walkable, and 1/6 heavy compared to traditional glass panels.

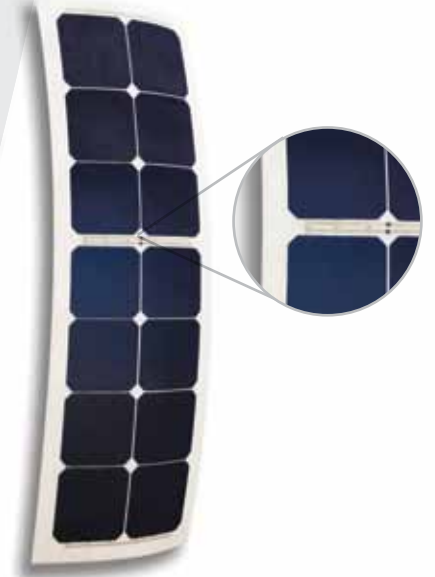
MECHANICAL DATA	CP-140L	CP-140Q
Length	1523 mm	1046 mm
Width	676 mm	996 mm
Thickness	2 mm	2 mm
Weight	2.6 kg	2.6 kg
Num. of cells	36	36
ELECTRICAL DATA	CP-140L	CP-140Q
Peak Power ($\pm 5\%$) - Pmax	144 W	144 W
Rated Voltage - Vmp	18 V	18 V
Rated Current - Imp	8 A	8 A
Open Circuit Voltage - Voc	23 V	23 V
Short Circuit Current - Isc	8.5 A	8.5 A
Temp. Coeff. of Pmax	-0.43%/°C	-0.43%/°C
Temp. Coeff. of Voc	-0.33%/°C	-0.33%/°C
Temp. Coeff. of Isc	0.05%/°C	0.05%/°C

CUSTOM PANELS

SolbianFlex panels are designed to meet the different needs of our customers. Number



**SOLBIAN
CUSTOM
PANELS**



Custom panel realized with laminated bypass diodes, to minimize shading effects on a flexible panel without Junction Box



SolbianFlex panel realized with transparent backsheet on a customer's request

of cells, color, electrical characteristics... discover the most flexible customization!



SP-94C



SP-75C



SP-31C

MECHANICAL DATA	SP-94C	SP-75C	SP-31C
Lenght	1350 mm	850 mm	685 mm
Width	411 mm	540 mm	285 mm
ELECTRICAL DATA	SP-94C	SP-75C	SP-31C
Peak Power ($\pm 5\%$) - Pmax	94 W	75 W	31 W
Rated Voltage - Vmp	16.5 V	13.2 V	5.4 V
Rated Current - Imp	5.7 A	5.7 A	5.7 A
Open Circuit Voltage - Voc	20 V	16 V	6.7 V
Short Circuit Current - Isc	6 A	6 A	6 A

The **world's highest-efficiency flexible panels** made with the **top quality SunPower™ cells**.
Back-contact cells which hold the record for efficiency in commercial products: **sailing toward 23%!**

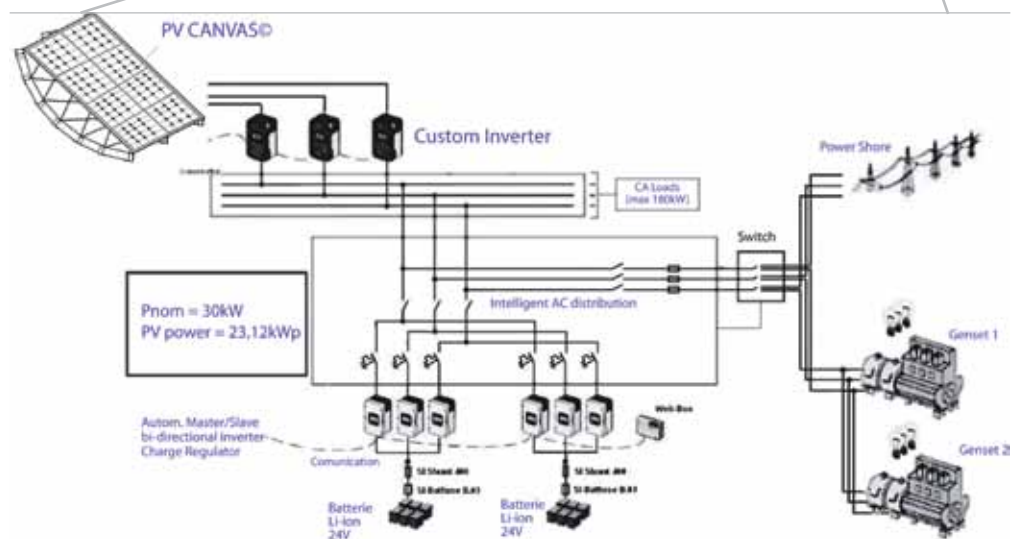
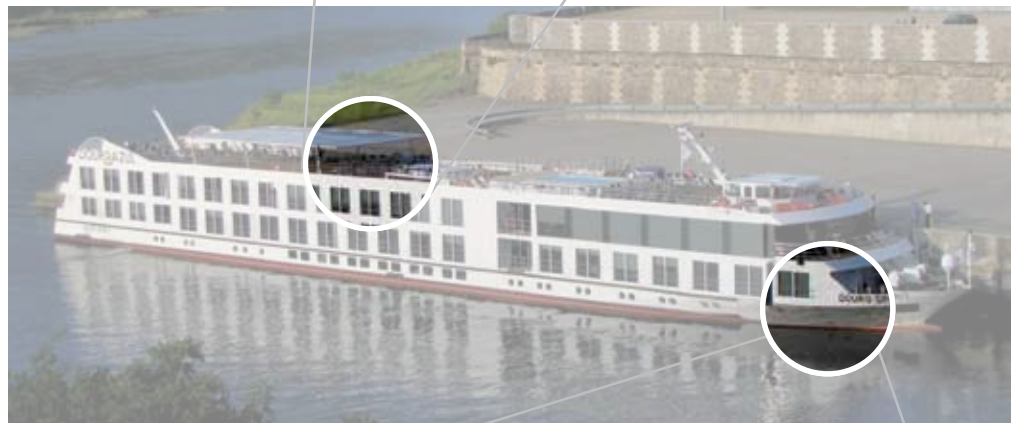
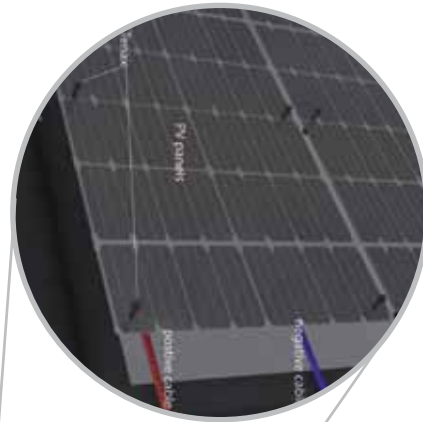
ENGINEERING DIVISION

SolbianFlex panels are designed to meet the different needs of our customers.

NEW SOLUTIONS with SolbianFlex

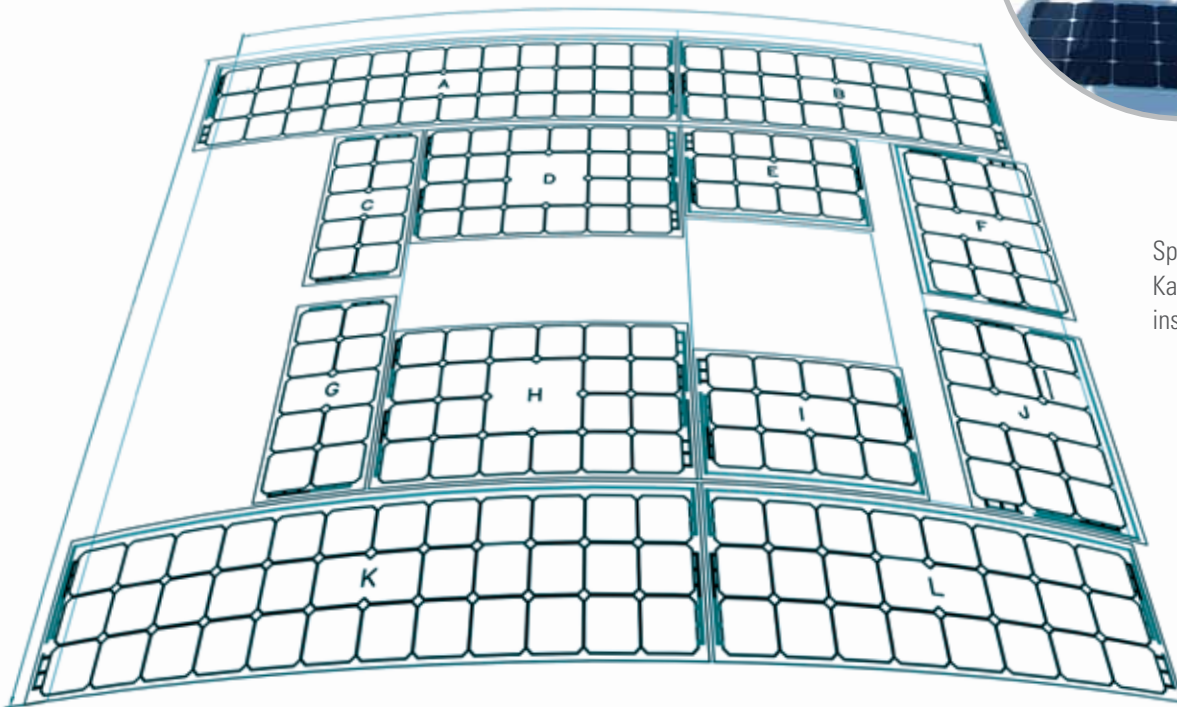
The Engineering division of Solbian Energie Alternative develops turnkey and new solutions with SolbianFlex panels. A **highly specialized team of engineers, physicists and researchers**, will be able to follow you **from planning to realization**.

So far unexplored applications of photovoltaic energy have been developed, from panel layout to complete electrical network planning.



special applications and detailed planning

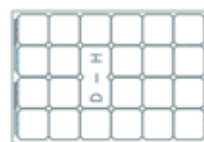
Special custom projects can be realized. Discover the most flexible customization!



Special project for a Kanter Yacht. Up to 800Wp installed on the hard top.



A + K	
Lenght	1580 mm
Width	440 mm
Cells	12 x 3 = 36
Wp	206 W



D + H	
Lenght	815 mm
Width	540 mm
Cells	6 x 4 = 24
Wp	150 W



B + L	
Lenght	1070 mm
Width	440 mm
Cells	8 x 3 = 24
Wp	150 W



E + I	
Lenght	564 mm
Width	440 mm
Cells	4 x 3 = 12
Wp	74 W



C + G	
Lenght	683 mm
Width	285 mm
Cells	2 x 5 = 10
Wp	62 W



F + J	
Lenght	689 mm
Width	440 mm
Cells	3 x 5 = 15
Wp	94 W

CHARGE CONTROLLERS

Solbian is proud to offer some of the most advanced charge controllers for optimal solar energy harvesting in any condition.

The golden rule of marine solar states that the best solution is “one panel - one controller” but this can only be achieved when creating the perfect match between the solar generator and the battery to be charged. Maximum Power Point Tracking (MPPT) and the Boost DC/DC converters are the choice made by professional sailors, to obtain all the energy possible from the sun.



Western&Co has been manufacturing charge controllers for more than 25 years in Italy. Both PWM and MPPT charge controllers are offered, loaded with special features such as: integrated blocking diode, 12V - 24V automatic battery voltage detection, deep battery discharge protection, over temperature, reverse polarity and overload protection. Moreover several programs of load management, selectable by the user, make them a versatile solution for every use. A wide display shows the working status of the controller, either through simple and intuitive icons, or displaying all the important electric values like the panels current and voltage, instantaneous solar power, battery charge and load power usage. Western&Co controllers are suited both for sealed, gel or flooded lead-acid batteries and for lithium batteries.

WRM15

This model of charge controller uses MPPT algorithms to ensure that the panel is working at the maximum power allowed by the actual light conditions. With a maximum current of 15 A it can drive panels with 225W maximum power if charging a 12V battery and up to 450W for a 24V battery.

WMARINE10

MPPT buck-boost charge controller able to drive panels with a nominal voltage that can be either higher or lower than that of battery. Allows all the flexibility needed in special installations where the choice of the panels is dictated by space constraints typical of nautical applications.



Genasun was founded in 2005 by a group of MIT engineers who wanted to commercialize advanced solar charging technology and lithium battery storage system developed on the MIT solar car. Genasun controllers are made in the USA and reach conversion efficiency greater than 99%. They feature Continuous Maximum Power Point Tracking (C-MPPT): clever electronics adapt to changing light conditions 1,200 times faster than standard MPPT controllers, ensuring that you collect every bit of energy that hits your solar panel. Genasun controllers are suited both for lithium and lead-acid batteries, and all of them are marine-grade.

GV-10 (10,2 A - 12 V)

Designed to maximize the usable energy from a 80-140W panel. The ultra high-speed MPPT in the GV-10 is so effective it reduces your system cost per Watt. This is the right choice if mission-critical power is needed.

GV-BOOST (8A 12/24/36/48V)

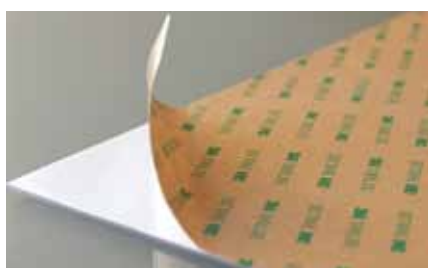
The industry's most efficient boost controllers. They boost lower-voltage solar panels up to charge higher-voltage lead-acid batteries, up to 48V nominal.

CONNECTION AND FIXING OPTIONS



JUNCTION BOX

SolbianFlex panels can be supplied with a Junction Box to allow connection to the charge controller. Solbian supplies a complete kit with connectors and cables, for an easy installation.



STRUCTURAL ADHESIVE

SolbianFlex flexible panels can become part of your boat through a special structural double-sided adhesive. The electrical connection can be realized still via a Junction Box or by direct connection to the positive and negative poles of the panels (back strip connection).



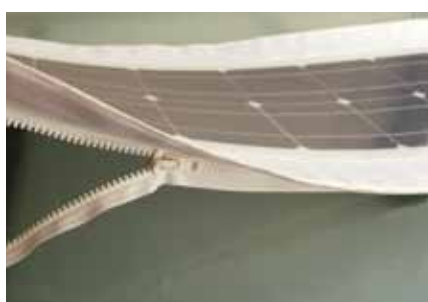
STAINLESS STEEL EYELETS

SolbianFlex panels can be fitted along the edge by stainless steel eyelets to allow easy installation and removal, based on specific needs of the boat. This solution makes it possible to secure the panel by ropes to the deckhouse or to the boat canopy.



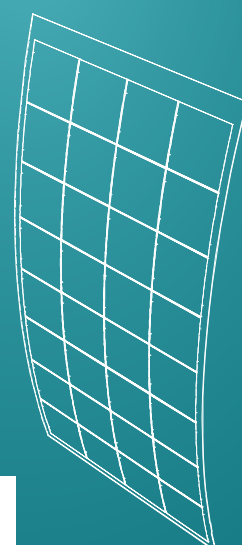
TENAX

TENAX fasteners are ideal for easy removal, suitable for installation on the bimini or on the deck.



ZIPPER

A zip fastener can be sewn onto the panel. This allows for removable installation on boat canopies. Easy to install and to remove. Ideal for those seeking maximum versatility for SolbianFlex products.



FREQUENTLY ASKED QUESTIONS

CHARGE CONTROLLERS AND ELECTRICAL CONNECTIONS

What is a charge controller and when it is necessary to buy one?

The charge controller is an essential element of an isolated photovoltaic system. Its main function is that of providing the right current and voltage to the batteries, to properly charge them. A "solar" charge controller is a more complex device, that in addition to charging the battery, also optimizes energy production. Solbian offer a wide range of solar charge controllers, including the most up-to-date electronic tools capable of interrupting the charge if the battery is fully charged or preventing overloads that would lead to mal functioning over time. Most of our controllers are provided with Maximum Power Point Tracking (MPPT) technology.

Why is MPPT technology is so important in the nautical field and what it is exactly?

MPPT is a technique that charge controllers and similar devices use to get the maximum possible power from one or more solar panels. This is especially important when the solar radiation on the panel is not homogeneous or stable, which is the usual case on a boat. Using a fast MPPT technology, it is possible to obtain the maximum power the solar panel can supply in every solar radiation condition. Using a controller with MPPT technology can increase the energy production by up to 30%.

SP50 panel has an output voltage of around 9V. How can I charge my 12 V battery?

In this specific case, it is necessary to install a "Step-up" (or Boost) charge controller, that is able to increase the voltage to the value needed to properly charge the battery. Genasun Boost controllers and WMarine one can be used in this case, also to charge 24 or 48 V batteries.

The WRM-15 and WMarine controllers have a display. Which information is shown?

The most important informations are the charge level of the battery, the instantaneous panel power, the input and output current and the total energy production.

How many charge controllers do I need if I install two or more panels?

In the nautical field the best solution is "one panel, one controller", needed to have the best energy harvesting in any condition. A trade off between performance and cost can be naturally achieved and Solbian technical staff will be available to provide you all the necessary support to choose the right installation. In any case, it is important to stress some important points.

Series connection of the panels increases the voltage (total voltage = sum of the single panels' voltage) keeping the current steady (only panels that generate the same current can be connected in series). This kind of connection however suffers from shading problems, since even a single panel shadowed, can cause an important reduction in the efficiency of all the series.

Parallel connection can be set up between panels generating the same voltage. In this case, the generated current increases (total current = sum of the single panels' current) while the voltage remains the same of the single panels. Parallel connection makes the panels independent as far as shading is concerned, but the current increase can represent a problem for the electrical network. In any case a single MPPT controller used with more panels connected in parallel gives a poorer performance than the "one panel, one controller" solution.

Some examples

A single SP50 (or SX72) needs a boost controller. WMarine10 or Genasun GVB can deal with them by increasing the voltage to the proper battery value. Two series connected SP50 panels generate, at their maximum power point, 18 V and 5.7 A. The right choice for them is a WMarine10. GV 10 is an alternative best buy if you want to choose Genasun models. Two series connected SP100 need a WRM15. The same controller can deal with three SP100 in parallel but with only two parallel CP125 panels.

For more details see: http://www.solbian.eu/images/stories/pdf_eng/panels-charge-controllersENG.jpg

How to choose a panel with back strips or one with a Junction Box?

Panels with back strips are used to avoid external wiring on the boat deck. It is necessary to drill the deckhouse and to make the electrical connections from below deck. The panel is fixed on the deckhouse by use of a double sided adhesive or other kind of glue. Solbian advice is to refer to skilled personnel to make that kind of installation.

The use of the Junction Box (JB) is essential whenever you want to make a removable installation or in other cases where there is not a rigid substrate where to glue the panels, for example on a canvas bimini. The Junction Box is terminated with waterproof standard photovoltaic connectors (MC3 or MC4). Every JB contains one or more bypass diodes.

What is a bypass diode?

It is an electronic device that is able to reduce the shading problems and minimize the risk of overheating cells. It is usually located in the JB. For the more powerful panels that need to be applied without JB, Solbian uses a new kind of bypass diode that can be laminated into the module during manufacturing. This latest development assures Solbian customers increased energy production and highest safety of use.

How can you make the electrical connections and which materials do you need?

In case of installation with back strips, it is necessary to solder electrical cables of a suitable size (2.5 - 4 mm² according to the length) to the strips, and to isolate these junctions using heat shrink sheathing. It is also suggested to use silicone product to protect the exit point of the strips from the back of the panel. The outgoing cables will then reach the charge controller and then the battery. In case of panels with JB, connectors and cable are needed to reach the charge controller (on request, Solbian provides cables and connectors).

INSTALLATION CHOICES

How can you make an installation with adhesive? What are its advantages and disadvantages?

The panels with double sided adhesive are designed for permanent installations. This is a choice widely used by boat manufacturers and has the advantage of a clean and safe wiring makes theft impossible. The removal of the panel can be done by using, as an example, a thin steel cable, but it is likely to damage the panels. To have the technical data sheets of the adhesive used, please get in touch with Solbian. The intervention and support of qualified technical staff is strongly recommended, to avoid damages to the panels.

What is an eyelet installation? How do you use them? What are TENAX fasteners?

The panel provided with eyelets is designed for removable installations. Panels with eyelets need to be connected via a Junction Box. This solution is often adopted by the final customer who prefers not to drill his boat. The TENAX fastener, widely employed in the nautical sector, are special kind of eyelets that make the fixation and removal of the panels simpler. Solbian supplies the keys for the TENAX fastener fixing on the deckhouse or on the bimini canvas.

How do you use a zipper installation?

The panel provided with zippers (zip fasteners) is designed for removable installations. The zipper is applied during manufacturing. Thanks to the zipper it is also possible to connect several panels together.

Is it possible to buy a panel without any type of installation?

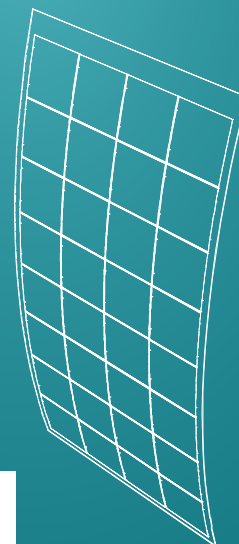
Certainly it is. All our products are versatile and that allows us to meet the clients' needs. Solbian technicians are available to discuss special request or customizations.

My boat hasn't enough space to set - up photovoltaic panels. How can I solve this problem?

"Asseaboat - Solarsolution" has developed the "SunBar Mini Rail" product using "SolbianFlex" solar panels. They can be installed on the guardrail avoiding the occupation of other spaces on the boat. For more details, please visit the site www.asseaboat.com

I would like to combine the photovoltaic panels with a SunBar. Which are the possible solutions?

"Asseaboat - Solarsolution" has developed the "SolaFlex Top Sail" product using "SolbianFlex" solar panels. They can be installed on a boat thanks to the use of a SunBar. For more details, please visit the site www.asseaboat.com



INSTALLATIONS

Professional installation
on racing boat **Maserati**



In 2011 Asseaboat and Solbian reached an agreement for the development of marine photovoltaic applications such as **Sun Bar**, **Solar Top**, **Solar Flex Top**, **Sun Bridge**.



The Sun Bar mini rail is the solution for customers looking for an easy installation. The solar panels for guardrails is light, rigid and thin: only 1.5 kg and just 3 mm thick.

Solar Yacht built in China:
up to 14.5kWp of flexible panels
with **SunPower™** technology



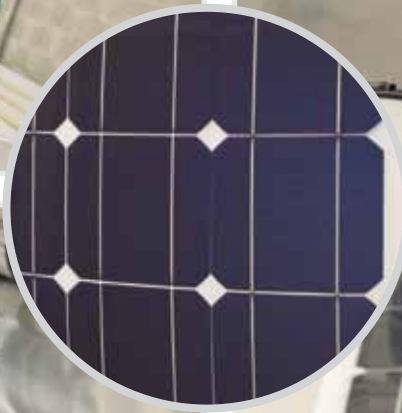
The Solar Flex Top line is designed to make the installation of the solar panels on the bimini easier and exploits a Solbian panel feature: **flexibility**.

SOLBIAN

PRODUCTION FACILITY

Solbian flexible panels are produced using modern manufacturing equipment, thus ensuring high-quality and reliable products.

- ✓ flexibility
- ✓ lightness
- ✓ high efficiency



SolbianFlex panels, visual and functional quality control

All SolbianFlex panels are inspected to ensure that aesthetic and functional standards are maintained.



SOLBIAN.EU



SOLBIAN ENERGIE ALTERNATIVE SRL

Legal and Operative Headquarter

Viale Gandhi n. 21B, 10051 Avigliana TORINO - ITALY
Phone: +39 011.966.35.12 - Fax: +39 011.966.47.20

sales@solbian.eu
info@solbian.eu
www.solbian.eu



OCTOBER 2013