



Solar Systems
for water sport, off-road
& outdoor use



About SunWare

Solar Systems for Yachting, Caravans, Off-road & Outdoor

Since our foundation in 1987, we develop and produce solar panels and charge controllers.

SunWare products are specifically designed and manufactured for long-term use in extreme applications and environmental conditions. Our products have stood the test for many years, on yachts and vehicles, as well as in high altitudes and on all types of buoys in coastal waters.

SunWare is an OEM for shipyards, off-road vehicles and buoy manufacturers.

Made in Germany

SunWare solar panels are developed and manufactured in Duisburg - Germany. All components, with the exception of the solar cells, are also produced in Germany or nearby European countries.

Quality Claim

We test our products in our in-house climate exposure test cabi-

nets and saltwater test facilities using real North Seawater already during development and with random samples from ongoing production.

No matter if bending test, vibration test, overvoltage test, movement test, . . . , only if all these tests are passed successfully, a SunWare product starts its partly long journey to our customers around the globe.

Development and Research

Next to the production of our solar panels and charge controllers, we are consistently focused on optimising our existing products whilst investing in the development of new production processes and products.

SunWare products have been in use all over the world for more than 25 years. And we can proudly say: they have proven themselves optimally!

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Photo: hallberg-rassy.com

Power for Refridgerator, Light and Navi

What can I use a solar system for ?

Imagine perfectly chilled drinks at any time!

Even a 100 Wp solar panel generates enough electricity to power your refrigerator and lights. No more running the engine just to charge the batteries.

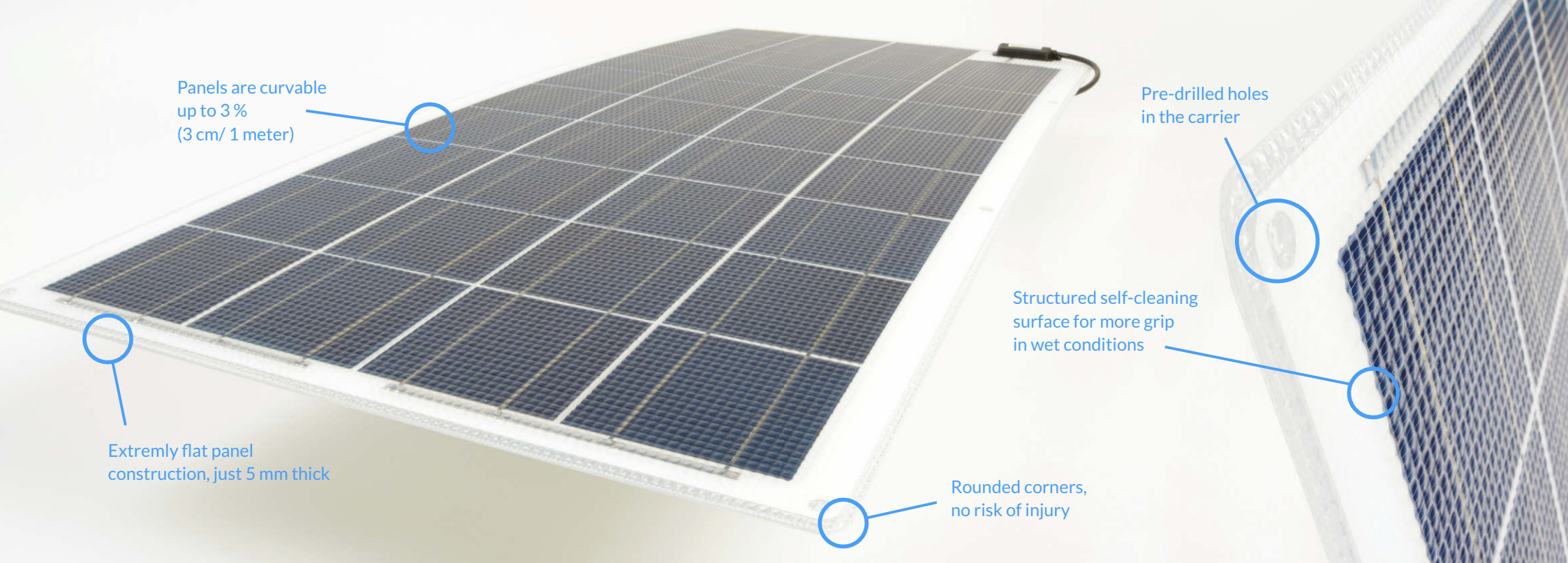
When the engine is turned off and the plug is pulled, power supply quickly becomes a problem. SatNav, laptop, refrigerator, TV, tablet and pumps all need power.

The answer is solar panels.

For charter boats and rental caravans that are not usually fitted with solar panels, the RX-series offers plug & play solar panels with controller and vehicle plug as the ideal solution.



Photo: ExTec



Design & Material

Superior in Detail-1

SunWare solar panels are designed for use in sea and salt water.

All panel components are selected to withstand the harsh realities on board and undergo thorough testing. The first SunWare panel saw the light of day in 1989. Since then, it has seen several up-grades, incorporating sophisticated detail solutions and new concepts.

This explains why, over the years, SunWare solar panels have come to be known and valued for their robust and reliable perfor-

mance even under extreme conditions. All SunWare solar panels are made in Germany, with manufacturing based in Duisburg.

The high-performance fluoropolymer film applied to the front and back is a modified ETFE film. Thanks to its superior self-cleaning properties, even stubborn soiling will easily come off in the next shower. Unlike most synthetic materials, this premium film will not turn dull or brown as a result of exposure to UV light and weather.

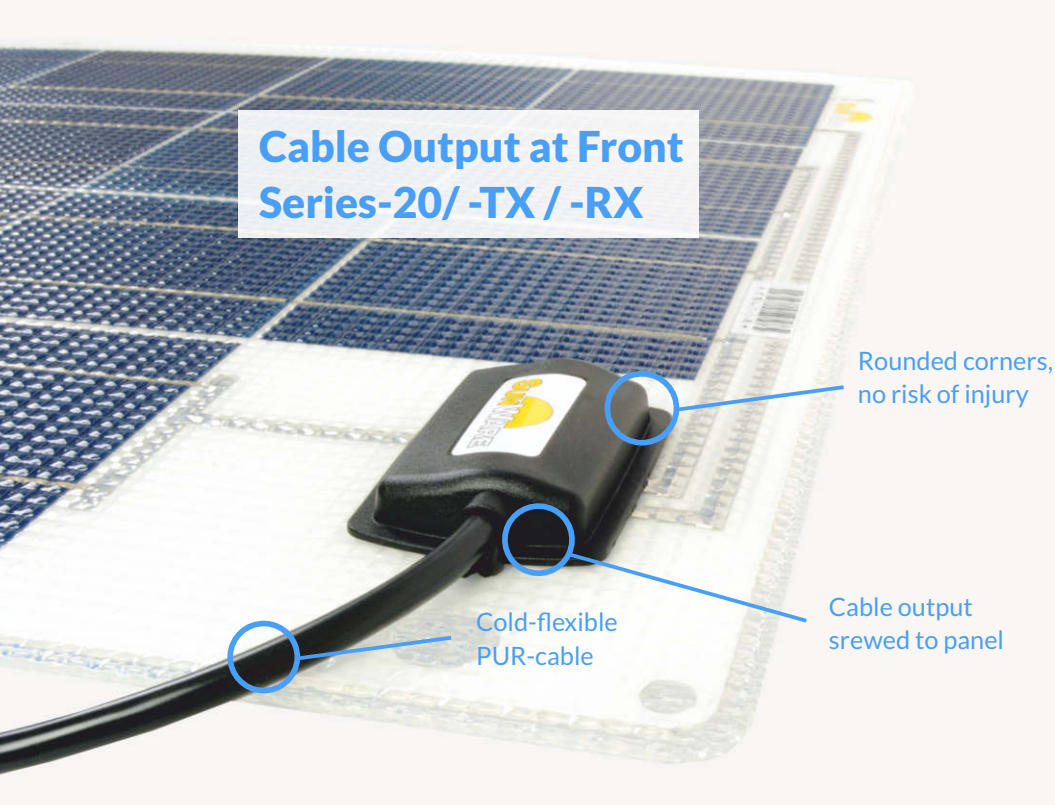
Even after 20 years of travelling the waters, our panels display no obvious signs of browning or brittleness.

SunWare uses only the best crystalline solar cells for maximum performance. Using our own laser cutters, the cells are cut to size for panels of varying dimensions. The cells in the panel laminate are bonded using a special, flexible bonding technique developed by SunWare to minimise the mechanical stress between the cells down to negligible levels.

Design, Development & Production Made in Germany - by SunWare

This solution has proved itself for now almost 20 years.

The solar cells are fully encapsulated in exceptionally strong EVA laminate. An aluminium sandwich panel as a base for the cells gives the panel rigidity and protects the cells from damage due to local stress. In addition, the aluminium sandwich core dissipates the heat from the cells for homogeneous heat distribution in the panel. If mounted on a rigid surface, the panel is even safe to walk on with deck shoes.



Cable Output at Front Series-20/ -TX / -RX

Rounded corners,
no risk of injury

Cold-flexible
PUR-cable

Cable output
screwed to panel



Cable Outlet on Backside Series-40

Extremely flat
panel construction
just 16 mm thick

16 mm

100% salt- &
sea water resistant

Tread-resistant housing,
completely potted

Cable Output & Connection Cable Superior in Detail-2

We advise, however, to install the panels away from usual walkways. The aluminium sandwich core is completely encapsulated by the laminate. For even greater protection, the panel's laminate extends a full 5mm beyond the mounting plate, keeping the aluminium sandwich core well protected against salt water.

The cable outlet is screwed to the panel, completely sealed and designed without sharp edges. It is secured inside the junction box by a strain relief connector.

All panels in the 20/40-series can be combined as required. For 24V systems, SunWare offers special 24V panels or recommends connecting two 12V panels (for 24V systems) in series. All panels are designed for a maximum system voltage of 48V.

SunWare solar panels come in a range of types for different applications and installation scenarios:

1. 20/40-series panels for fixed installation. Designed with a large number of cells, the

solar panels in this series can be installed without rear ventilation. The higher voltage compensates for the voltage drop with increasing cell temperatures. All larger panels feature a cell protector for each panel that must be mounted and operated in a dry place. The cell protector includes 2 bypass diodes to prevent hot spots.

2. TX-series panels for bimini, sprayhood and tarpaulin. These panels feature LOXX fasteners that

are easy to clip onto textile surfaces. The panel cable runs along the frame to the deck. Each TX panel is supplied with all necessary components and tools for proper attachment.

3. RX-series panels for mobile use. These panels are provided with eyelets for mobile applications, a 5m connection cable and a mini charge controller with car plug. Plug & play solution. Unpack panel, plug in charge controller – done.

Salt & Sea Water-Resistant Components for Extreme Conditions

Solar Panels

20-series, 40-series

For Walk-On, Flat Deck Mounting

The right solar panel for any application.

You can now optimise the available space. Be it long and narrow or square, our wide range of panel types means you'll always find a size to suit your needs.

All panels in the 20- and 40-series are similar in design but different in terms of cable outlet. Solar panels in the 20-series have a front-side outlet, with cable routing to the right, and a completely flat rear. Modules in the 40-series are designed with a rear outlet, which requires a cut-out or recess for flat mounting on deck to accommodate the junction box on the back of the panel.

Modules in the 20/40-series are made for permanent, fixed installation. The rear is pretreated with a one-component polyurethane adhesive. Alternatively, the panel can be screwed to the mounting plate in the intended locations. The panels can also be mounted on uniaxially curved deck/roof surfaces with a curving of up to 3 cm per metre.

Perfect for **Deck,**
Sliding Hatches and **Hardtop**
for **12V & 24V**





20/-40-Series Cable Outlet on the Front/ Rear

For Gluing & Screwing



Screw rosettes



Cable entry point



Walkable

Solar Panels Series-20/-40

12V system voltage

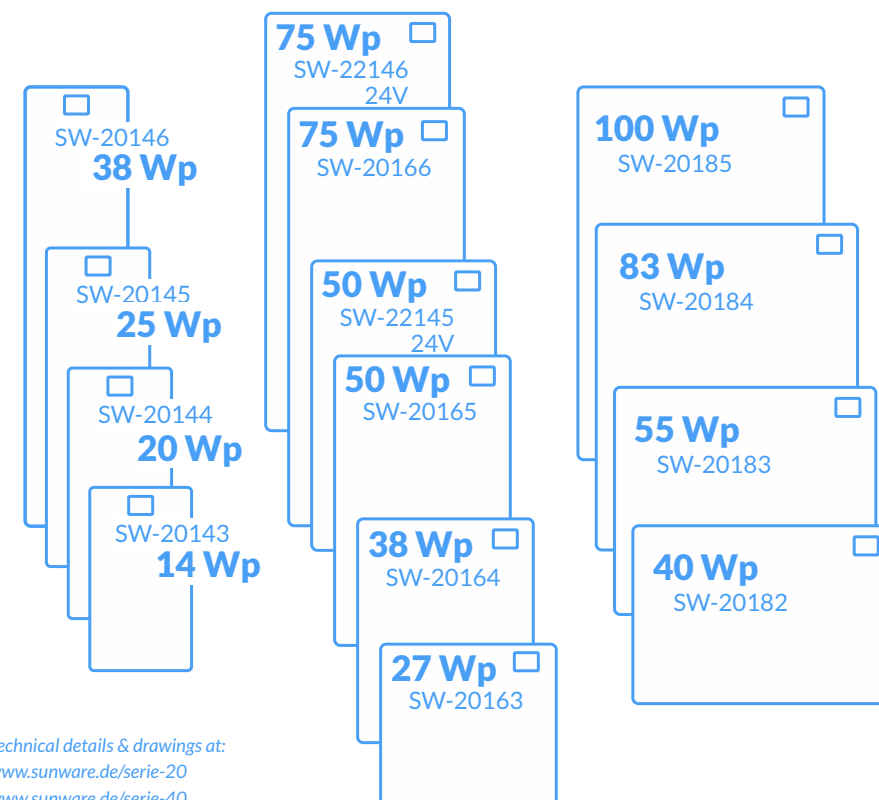
Dimension & Current Output

Panel Type	Power	Dimension	Weight	Current
SW-20185	100 Wp	1012 x 689 mm	4,7 kg	5.75 A
SW-20184	83 Wp	859 x 689 mm	4,2 kg	4.30 A
SW-20183	55 Wp	599 x 689 mm	3,0 kg	2.90 A
SW-20182	40 Wp	469 x 689 mm	2,5 kg	2.20 A
SW-20166	75 Wp	1119 x 481 mm	3,6 kg	3.84 A
SW-20165	50 Wp	772 x 481 mm	2,6 kg	2.54 A
SW-20164	38 Wp	599 x 481 mm	2,0 kg	1.92 A
SW-20163	27 Wp	426 x 481 mm	1,4 kg	1.44 A
SW-20146	38 Wp	1154 x 273 mm	2,2 kg	1.92 A
SW-20145	25 Wp	807 x 273 mm	1,6 kg	1.37 A
SW-20144	20 Wp	634 x 273 mm	1,2 kg	0.96 A
SW-20143	14 Wp	468 x 243 mm	0,8 kg	0.72 A

24V system voltage

SW-22146	75 Wp	1119 x 493 mm	3,6 kg	1.92 A
SW-22145	50 Wp	772 x 493 mm	2,6 kg	1.27 A

Wp = Peak power (W) under standard conditions, irradiation 1000 W / m², 25 °C



Technical details & drawings at:
www.sunware.de/serie-20
www.sunware.de/serie-40



**20-Series
Cable Outlet on the Front**

Photo: SKAUT

Walkable, Flat Deck Mounting



Photo: kmy.nl



Photo: dragonfly.dk



Textile Panels for Bimini, Sprayhood and Tarpaulin

Solar Panels TX-Series

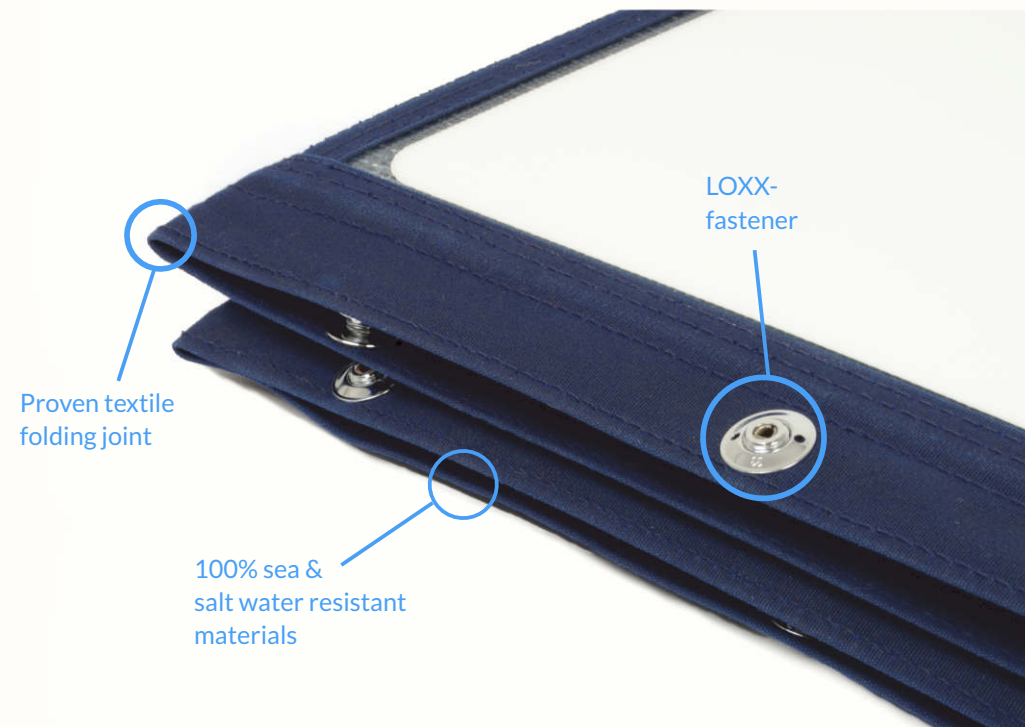
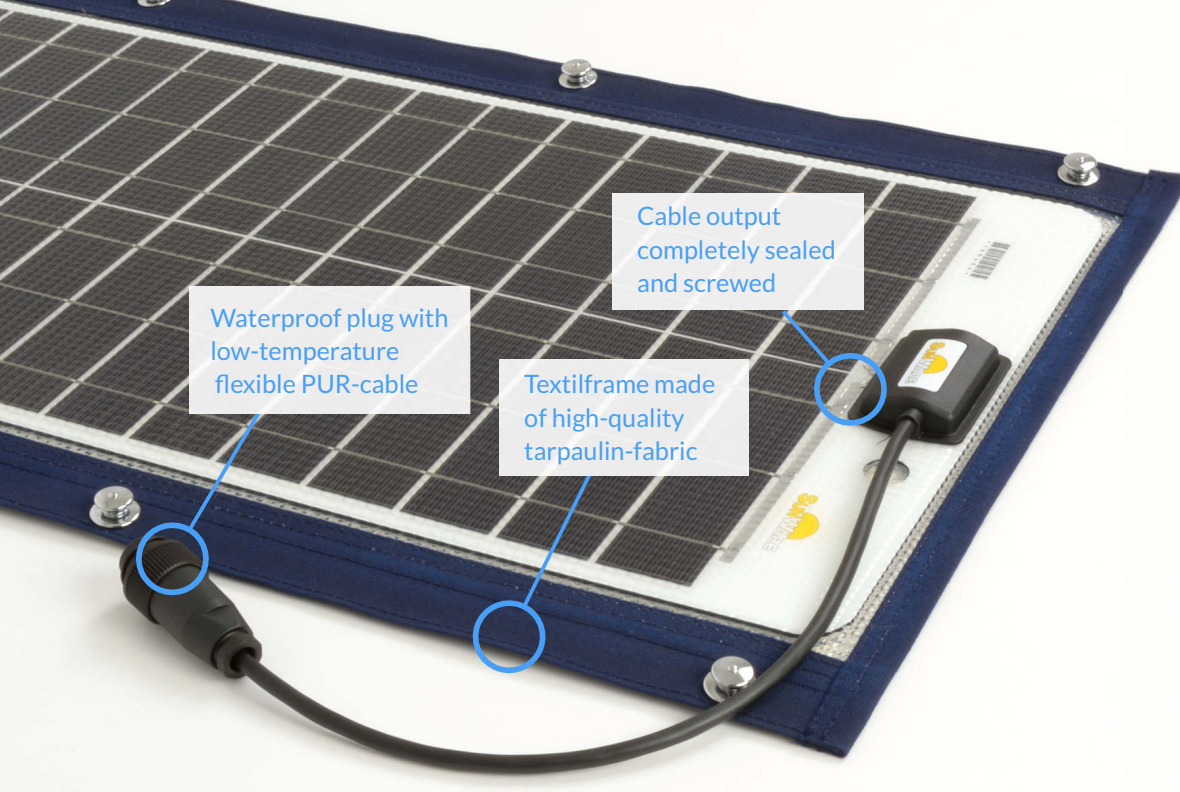
1- to 4-Wing Panels with Textile Edge

Solar energy on so-far unused boat surfaces.

Lightweight panels with textile edge made of high-quality tarpaulin. TX panels are specially designed for mounting on bimini or sprayhood.

The panels consist of one or more wings. Multi-wing panels are firmly connected by textile joints. The cable between the panels runs along the joints, so that tension and buckling can't affect the cable.

The panel's compact measurements make for easy transporting by car and storing almost anywhere on board. You can now even take a 200Wp panel – the TX-42052 – on a plane.



1- to 4-Wing Panels with Textile Edge TX-Solar Panels

Solar energy on board without permanent installation of the panels by drilling or gluing? Tarpaulin, sprayhood and bimini offer excellent, so-far unused surfaces for solar panels. How can they be used?

The SunWare innovation:

TX solar panels with textile edge for textile surfaces on board. Lightweight, flexible, foldable and to Go!

TX panels are made from materials that are light in weight, yet exceptionally strong,

making them ideal for mounting on textile surfaces.

Special cell connectors absorb vibrations to provide long-lasting protection – on the bimini and when transporting the folded panel.

Depending on the rating class, the panels consist of 1, 2 or 4 wings that can be folded for easy transport.

TX solar panels are designed with a tough tarpaulin surround.

Provided with LOXX fasteners (standard design), the panel is easy to clip onto sprayhood or bimini. Each panel comes with the relevant LOXX base parts for secure fastening on bimini, tarpaulin or sprayhood.

Special attention was paid to the panel fittings. Every TX panel comes as standard with a 10 m cable, cable ties, waterproof plug and socket, cover cap, LOXX base parts, sealing washers, punching tool – everything you need for secure fastening.

Soft Tarpaulin Surround for Mounting on Textile Surfaces/ Coverings

By car or plane, your TX panel is a lightweight, easily stowable companion when travelling to your boat.

Once the tarpaulin or bimini is provided with LOXX base parts, you can fasten your TX solar panel in a few simple steps. When you're ready to leave your boat again, simply detach the panel from the bimini and fold it back up for transportation or stowing below deck.



TX-Series With Tarpaulin Surround, Foldable



Expansion socket
at TX+ panels



LOXX lower parts
with sealing washer



Assembly set
included

Solar Panels TX-/TX+ Series

12V system voltage

Dimension & Current Output

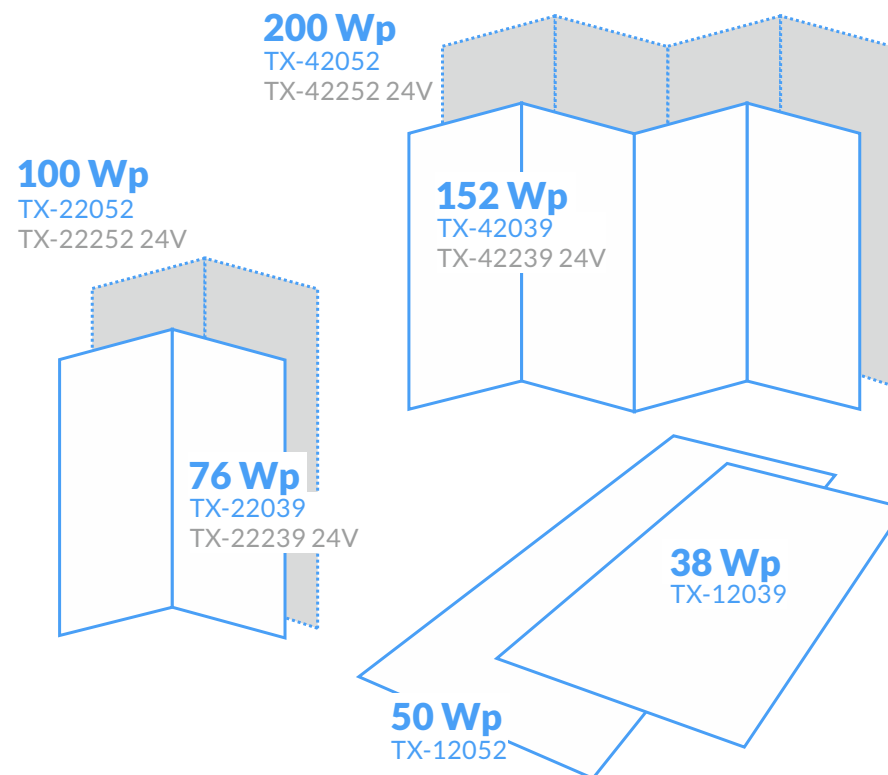
Panel Type	Power	Dimension	Weight	Charge Current
TX-42052 (+)	200 Wp	1164 x 1590 mm	10,9 kg	12,0 A
TX-42039 (+)	152 Wp	929 x 1590 mm	8,2 kg	8,8 A
TX-22052 (+)	100 Wp	1106 x 826 mm	5,1 kg	6,0 A
TX-22039 (+)	76 Wp	873 x 826 mm	4,2 kg	4,4 A
TX-12052 (+)	50 Wp	1106 x 431 mm	2,6 kg	3,0 A
TX-12039 (+)	38 Wp	873 x 431 mm	2,2 kg	2,2 A

24V system voltage

TX-42252	200 Wp	1164 x 1590 mm	10,9 kg	6,0 A
TX-42239	152 Wp	929 x 1590 mm	8,2 kg	4,4 A
TX-22252	100 Wp	1106 x 823 mm	5,1 kg	3,0 A
TX-22239	76 Wp	873 x 826 mm	4,2 kg	2,2 A

Wp = Peak power (W) under standard conditions, irradiation 1000 W / m², 25 °C

All TX+ panels: available with included expansion socket for parallel connection with other TX solar panels



TX-Series LOXX-Fastening

152 Wp

TX-42039



200 Wp

TX-42052



100 Wp

TX-22052



50 Wp

TX-12052



76 Wp

TX-22039



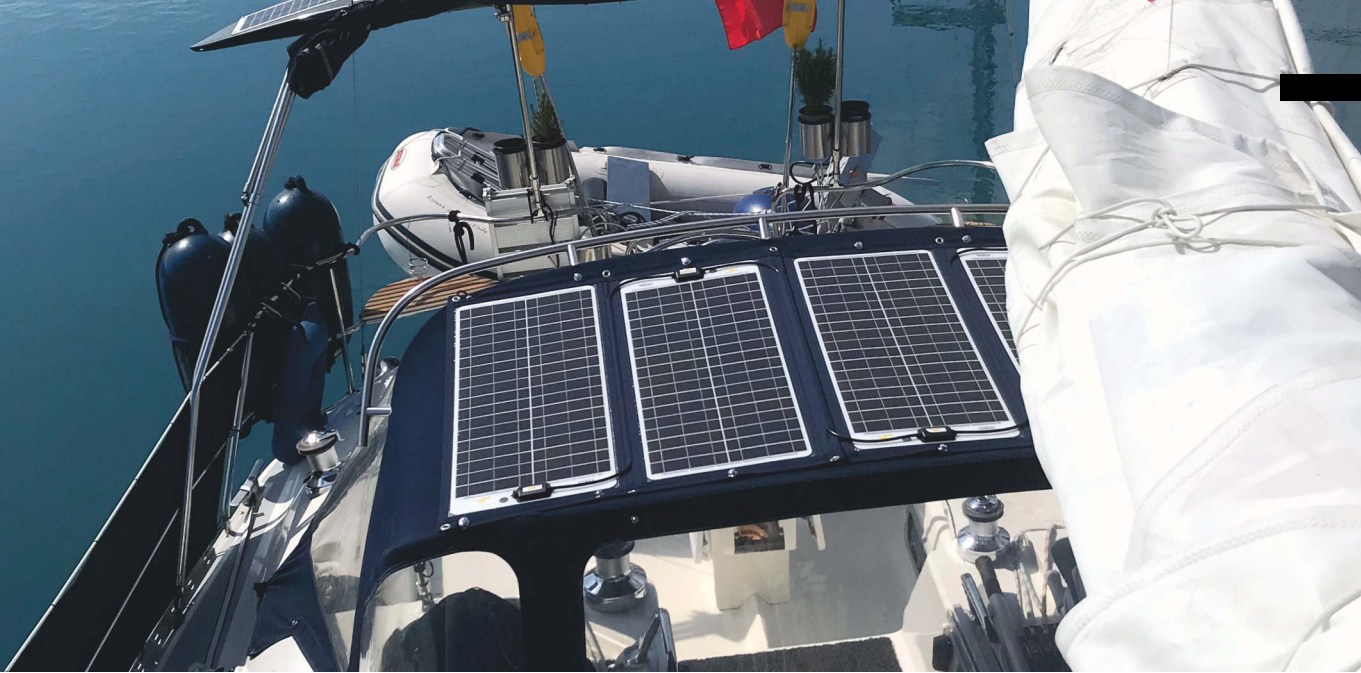
38 Wp

TX-12039

TX-Solar Panels for Bimini, Sprayhood & Rigging 1 to 4-Wing Panels with Textile Edge

- All 12V panels are also available with an expansion socket called TX+
- Tarpaulin surrounding for mounting on textile surfaces/coverings
- Appropriate LOXX base parts for fastening are enclosed
- Multi-wing panels are foldable
- With 12V panels, each wing of a TX panel works as a separate panel, with 24V panels in pairs
- Waterproof plug and sockets are enclosed, for simple and quick release
- 100% sea & salt water resistant
- 1m connecting cable & 10 meter extension cable (3m at TX-11027) are included
- Partly also available as 24V version
- Non-Glass-panels with unbreakable Nowoflon front foil
- Light-weight core plate, 2mm aluminium sandwich, powder-coated, white, fully encapsulated in EVA
- Cable output screwed, sealed and 100% water proof
- Ultra flat panel construction (5mm), at cable output 16mm
- 100% maintenance-free, self-cleaning surface
- 3 years warranty

Technical details & drawings at: www.sunware.de/serie-tx



**TX-Series
with Textile Frame
Foldable**

For Textile Surfaces on Deck
& for Mobile Use



Solar Panels **RX-Series**

Plug & Play Solution for Mobile Applications

Unpack panel, plug in controller – done!

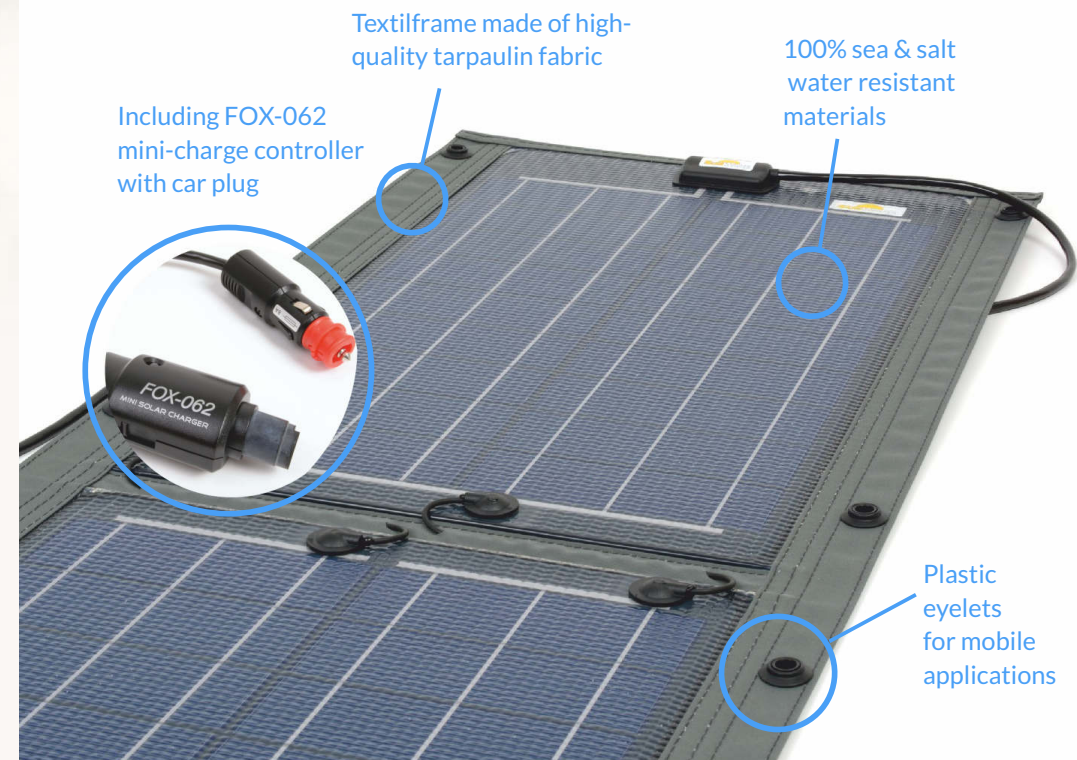
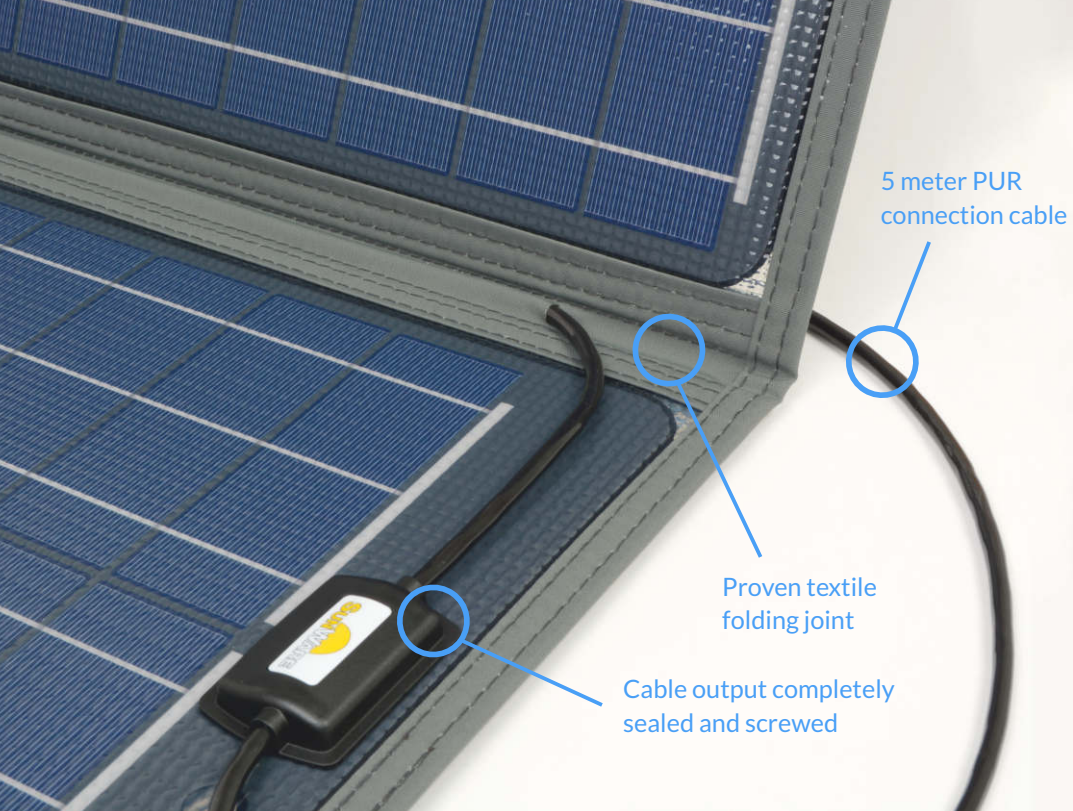
One panel for many applications. Be it boat, caravan, holiday home, off-road or outdoors, simply plug the panel with the controller into a 12V socket, and you're ready to go. No installation necessary!

RX panels can be folded to a convenient size for easy transport and storage on travels. The folded panels are designed to protect the cells tucked inside. Several 9mm eyelets around the textile edge allow fastening of the panel in a variety of ways using tent pegs, rope, bungee cords, etc.

The panel comes with an integral 5m cable, which can be extended by an optional plug-in ready 5m extension cable, ensuring optimal positioning of the panel in the sun for maximum efficiency while the vehicle is parked in the shade.

Solar to Go
for **All-Wheel, Off-Road**
and **Outdoor**





Foldable Plug & Play Solar Panels

RX-Solar Panels

Unpack panel, plug in controller – done!

RX series panels are designed as a plug & play solution with charge controller. Simply connect the controller to a 12V socket or 12V cigarette lighter and plug the panel cable into the controller to charge the battery. No installation necessary!

The ideal travel companion

The RX-series has 9 mm eyelets all around for easy attachment. Each panel comes with

the appropriate controller with car plug to charge AGM, gel, lead acid and LiFePO4 batteries.

The cabling is designed and tested to withstand thousands of bends. Each panel is double-stitched into the robust textile frame.

RX panels can be folded to a convenient size for easy transport and storage on travels. The folded panels are designed to protect

the cells tucked inside.

Several plastic eyelets around the textile edge allow fastening of the panel in a variety of ways using tent pegs, rope, bungee cords, etc.

RX panel comes with an integral 5m cable, which can be extended by an optional plug-in ready 5m extension cable, ensuring optimal positioning of the panel in the sun for **maximum efficiency while the vehicle is**

RX Panels – Unpack, Plug in – Done, incl. Plug-In Charge Controller

parked in the shade!

TIP: Take an RX panel with you when you hire a caravan or charter a boat. A single RX-22039 or RX-22052 generates enough electricity to power your refrigerator, for perfectly chilled drinks at any time.



Solar Panels **RX-Series**

12V system voltage

Dimension & Current Output

Panel Type	Power	Dimension	Weight	Charge Current
RX-22052	100 Wp	1106 x 826 mm	5,1 kg	6,0 A
RX-22039	76 Wp	873 x 826 mm	4,2 kg	4,4 A
RX-21052	50 Wp	1265 x 431 mm	2,6 kg	3,0 A

24V system voltage

RX-22252	100 Wp	1106 x 826 mm	5,1 kg	3,0 A
RX-22239	76 Wp	873 x 826 mm	4,2 kg	2,2 A

Wp = Peak power (W) under standard conditions, irradiation 1000 W / m², 25 °C

The charge controller FOX-062 is included in the scope of delivery for all RX panels.

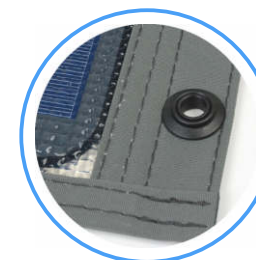
Its integrated LED shows the state of charge of the connected battery and provides reliable protection against overcharging. Reverse current protection is also integrated.

Technical details & drawings at: www.sunware.de/serie-rx

RX-Series Plug & Play Panels, Foldable



Foldable



Plastic eyelets



Mini charge controller incl.

Foldable Panels with 2 Wings with Mini Charge Controller & Car Plug

- Plug & Play panels, ready to plug in
- Foldable, light weight and robust
- Each wings of RX-22039 and RX-22052 working independently
- At RX-21052 and the 24V panels two wings are connected in series
- Textile edge with 9 mm eyelets for easy attachment
- 5m connection cable with SureSeal-plug
- Charge regulator FOX-062 with car plug for socket and cigarette lighter
- Charge controller FOX-062 must be protected against humidity
- Unbreakable Nowoflon front foil
- Crystalline cells of highest performance class
- Partly also available as 24V version
- 100% sea- & salt water resistant
- Light-weight core, made out of 2mm aluminium sandwich, dark-grey, fully capsulated by the laminate
- cable output screwed, sealed and absolutely water proof
- Ultra flat panel construction only 5mm thick, at cable output 16mm
- 100% maintenance-free, self-cleaning surface
- 3 years warranty

Photo: defender2travel.com



RX-Series Eyelets for Attachment

Photo: Tristan Brailey



For Mobile Applications

Photo: Per Ragnar Schjelderup

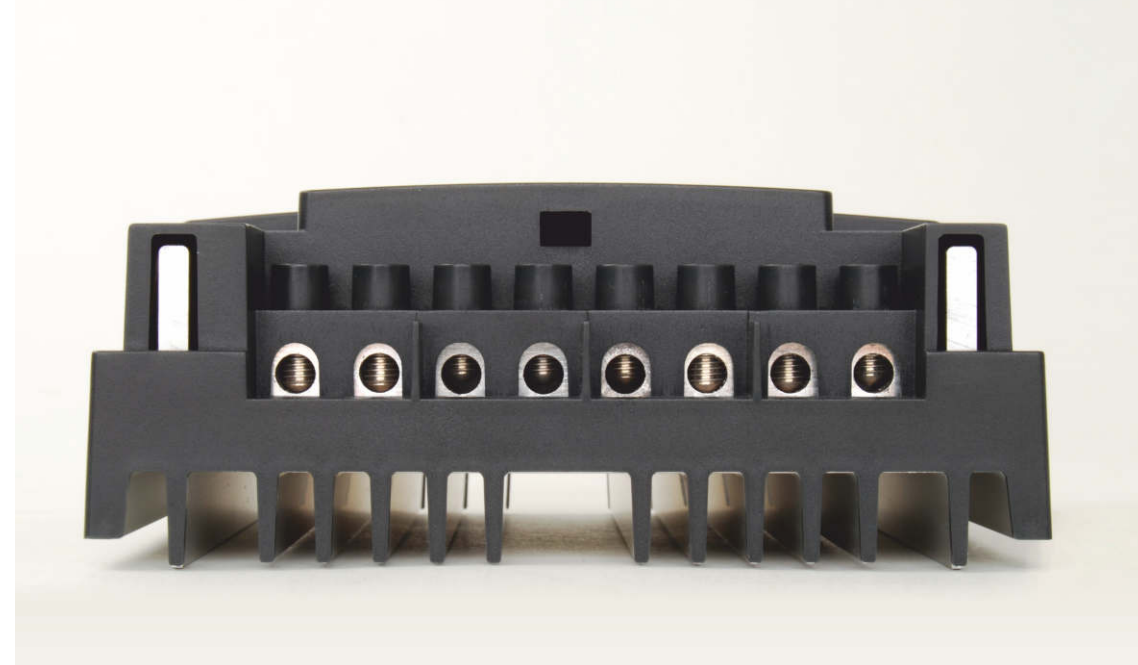


Photo: ExTec



Robust and **Long-Lasting** FOX- Charge Controllers

Multi-Step Charging Characteristic



Long-Lasting Construction & High Quality Materials

FOX charge controllers have proven their efficiency in decades of use. We have systematically enhanced the charge algorithm for the gentle and highly efficient charging of your battery systems. By combining advanced technology with sturdy components, FOX charge controllers are 100% reliable, safe and long-lasting. Especially on board, there are often high battery capacities. FOX charge controllers protect your battery system, both on long journeys and while you are absent.

SunWare charge controllers use stainless steel terminals for cables of up to 16 mm². Thus even large charge currents are conducted to the batteries without losses. The large heat sinks of FOX charge controllers enable the operation even at high indoor temperatures, such as are usual on a boat or in a caravan.

Made to last, FOX charge controllers have operated reliably for decades. Simply install and leave to run.

Compact and Efficient

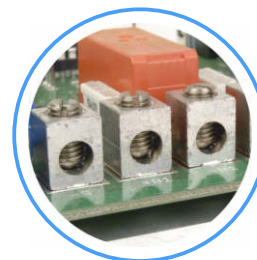


Solar Charge Controller with LED Display FOX-X20-Series

These FOX charge controllers feature an LED display showing the battery condition and system status. The compact controllers are installed in the vicinity of the batteries. FOX-X20 charge controllers are free of maintenance and designed for decades of operation. FOX-320 and FOX-220 are solar charge controllers for panel currents up to 20A and suitable for AGM, GEL and lead-acid batteries. The FOX-320 is a dual battery solar charge controller with the capability to

charge two battery systems independently (house/engine). Integrated deep discharge protection is designed for currents up to 20A. The controllers can be connected to the optional remote display FOX-MD1 using a prefabricated cable. Controller and display can be mounted at a distance of up to 10m. The FOX-MD1 displays the exact voltages and currents and allows you to program various parameters, such as battery type and charge ratios.

X20-Series



Terminals
16 mm²



Extra large heat sink for
high ambient temperatures



Extendable with remote
display FOX-MD1

Charge Controller with LED Display Extendable with FOX-MD1

- LED display for the state of charge of the battery & charging current
- Overcharge protection 20A is equal to solarmodules of 340 Watt 12V (680W @ 24V)
- Adaptive deep discharge protection
- Automatic 12/ 24V detection
- FOX-320 for 2 battery banks
- Loads are supplied always of battery 1
- Extendable with remote display FOX-MD1
- Night light function adjustable (max. 20A), shut-off threshold adjustable via FOX-MD1
- for AGM, GEL and Lead-acid batteries

FOX-X20-Series

12V/ 24V system voltage

Controller	Batteries quantity	Solar Power @12/ 24V max.	Charge Current max.	Dimensions L x W x H
FOX-220	1 system	340 W/ 680 W	20 A	107 x 126 x 55 mm
FOX-320	2 systems	340 W/ 680 W	20 A	107 x 126 x 55 mm

Technical details & drawings at: www.sunware.de/fox-x20

Elegant and Compact



Remote Display & Programming Unit for FOX-220/320

FOX-MD1

The controller is connected to the remote display FOX-MD1 using the prefabricated cable supplied. Plug in the cable at either end – done!

Controller and display can be mounted at a distance of up to 10m.

The FOX-MD1 (remote display and programming unit) displays measured values and allows you to change the battery type and charge parameters, such as battery

selection (AGM, gel, lead-acid) or charge ratio B1 to B2 (e.g. 90% to 10%). The high contrast, 2-line display shows the present charge current (Ic), solar current (Is), discharge current (IL) and the battery voltage. An arrow on the display indicates which battery is currently charged.

Thanks to the large backlit display, the data are easy to read even in dark environments.

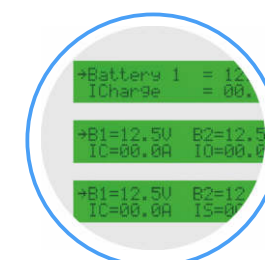
X20-Series



Incl. mounting frame



Incl. 5 meters
connection cable



Extra large display with
backlight

Remote Display & Programming Unit

Plug'n Play Extension for FOX-220/ 320

- Remote display for FOX-220/ FOX-320
- 2-line display with 20 characters
- Backlit display
- Clear menu navigation for easy operation
- Extensive data displays & setting options
- Charge ratio from B1 to B2 adjustable
- Display of current
 - charging current (Ic)
 - solar power (Is)
 - discharge current (IL)
 - battery voltage
- Suitable as built-in and surface-mounted device, surface-mounted housing always included
- Connection cable with 5m length is included

FOX-MD1

12V/ 24V system voltage

Remote Display	Fitting to	Mounting Type	Cable Length	Dimensions
FOX-MD1	FOX-220/320	built-in/ surface mounting	5 meter	150 x 58 x 34 mm

Cutout for FOX-MD1

126 x 54 mm

Technical details & drawings at: www.sunware.de/fox-x20

Compact Everything in View



FOX-360
for 2 Battery Systems



FOX-260
for 1 Battery System

Solar Charge Controller with Display FOX-X60-Series

Convenient operation, easy installation and a variety of display features are characteristic of the FOX-X60 controller series.

The illuminated display with large lettering is exceptionally easy to read over an unusually wide viewing angle – even in low-light conditions.

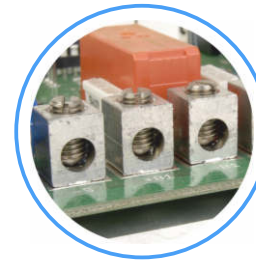
Information shown on the display includes the battery voltages, charge/discharge currents and the power generated by the

panel. Alternatively, battery levels can be read off bar charts. All data is quick and easy to access via the keyboard.

Special charge characteristics are available for gel, LiFePO₄, lead-acid and AGM batteries – the battery type can be specified individually for each battery.

Overcharge and deep discharge protection are each designed for up to 20A.

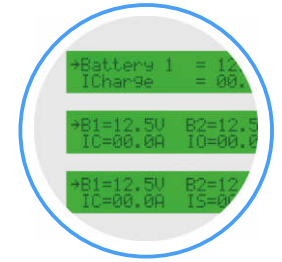
X60-Series



Screw terminals
16 mm²



Extra large heat sink for
high ambient temperatures



Extra large display with
backlight

Adjustable Charge Controller with Integrated LCD Display

- Display with backlight
- Programmable charge controller
- Overload protection 20A, corresponds to 340 watts, solar panels at 12V (680W @ 24V)
- Deep discharge protection or night light function adjustable (max. 20A)
- System voltage 12V or 24V (automatic detection)
- FOX-360 for 2 battery systems
- Extensive data displays & setting options for:
 - battery voltage (B1, B2)
 - charging current (Ic)
 - generated panel current (Is)
 - power consumption (IL)
 - Battery charge status as bar graph
 - Charge ratio B1 to B2 adjustable (5/95% to 95/5%)
- Battery type separately adjustable on AGM, gel, lead acid, LiFePO₄

FOX-X60-Series

12V/ 24V system voltage

Controller	Batteries quantity	Solar Power @12/ 24V max.	Charge Current max.	Dimensions L x W x H
FOX-260	1 system	340 W/ 680 W	20 A	107 x 126 x 55 mm
FOX-360	2 systems	340 W/ 680 W	20 A	107 x 126 x 55 mm

Technical details & drawings at: www.sunware.de/fox-x60

Plug'n Play



Plug for car socket
or cigarette lighter

Charge controller
FOX-062

Plug'n Play Miniature Charge Controller with Car Connector FOX-062

The FOX-062 is an advanced miniature charge controller for 12V and 24V solar systems.

Despite its small size the overcharge protection is designed for a solar current of 6A. Reverse current protection is integrated.

Easy plug and play!
Simply plug the controller into the vehicle socket or cigarette lighter, connect the

panel cable on the input side - ready!

The battery is instantly charged by the solar panel.

Charging characteristics can be set to lead acid, LiFePO4, gel or AGM batteries.

Supplied with 1m adapter cable with Sure Seal plug for connection of conventional solar panels.

FOX-062



Backside / legend of
charge level indicator



Switch for selection
charging characteristics



Plug vehicle socket/
cigarette lighter

Plug'n Play Charge Controller Ready to Plug in without Tools

- Overcharge protection 6A, is equal to solar panels of approx 100 Watt 12V, or 200W 24V
- Plug suitable for car cigarette lighter and 12V socket, thanks to the removable red adapter
- Car plug with integrated fuse (8A)
- Active reverse current protection
- System voltage 12V or 24V (automatic detection)
- 98% charging efficiency
- Battery type adjustable for AGM, GEL, Lead acid and LiFePO4 batteries
- Ready to plug solution – usage without tools

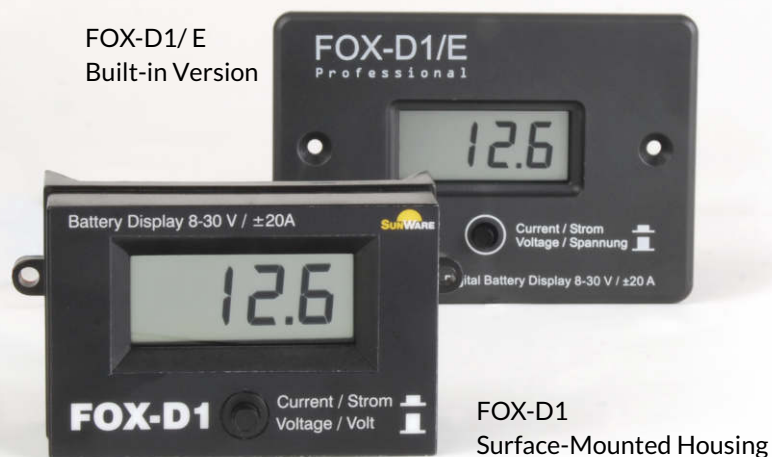
FOX-062

12V/ 24V system voltage

Controller	Batteries	Solar Power @12/ 24V	Charge Current	Dimensions
	quantity	max.	max.	L x W x H
FOX-062	for 1 system	100 W/ 200 W	6 A	50 x 70 x 30 mm

Technical details & drawings at: www.sunware.de/fox-mini

Compact and Functional



Digital Current and Voltage Displays FOX-D1 & FOX-D1/E

FOX-D1 and FOX-D1/E have been designed as universal digital displays. Available with flush or surface mount casing, they show the current battery voltage and the current charge or discharge current.

Both are suitable for 12V and 24V systems of up to 20A.

Advantages: Particularly easy installation by means of integrated shunts.

Minimum internal consumption (1.8mA only), the display can remain activated at all times. Possibility of switching between voltage and current display.

The FOX digital displays are optionally available with built-in (FOX-D1) or surface-mounted housing (FOX-D1/E).

FOX-Digital Displays



Large display



Connection sketch on back of housing

Current and Voltage Displays for Flush- and Surface Mount

- Integrated display
- For 12V or 24V (automatic detection)
- Pressure switch for changing from current to voltage display
- Optionally in surface (FOX-D1) or built-in housing (FOX-D1 / E)
- Display of the current flowing current or battery voltage
- Very low self-consumption - display can always remain switched on
- Easy installation

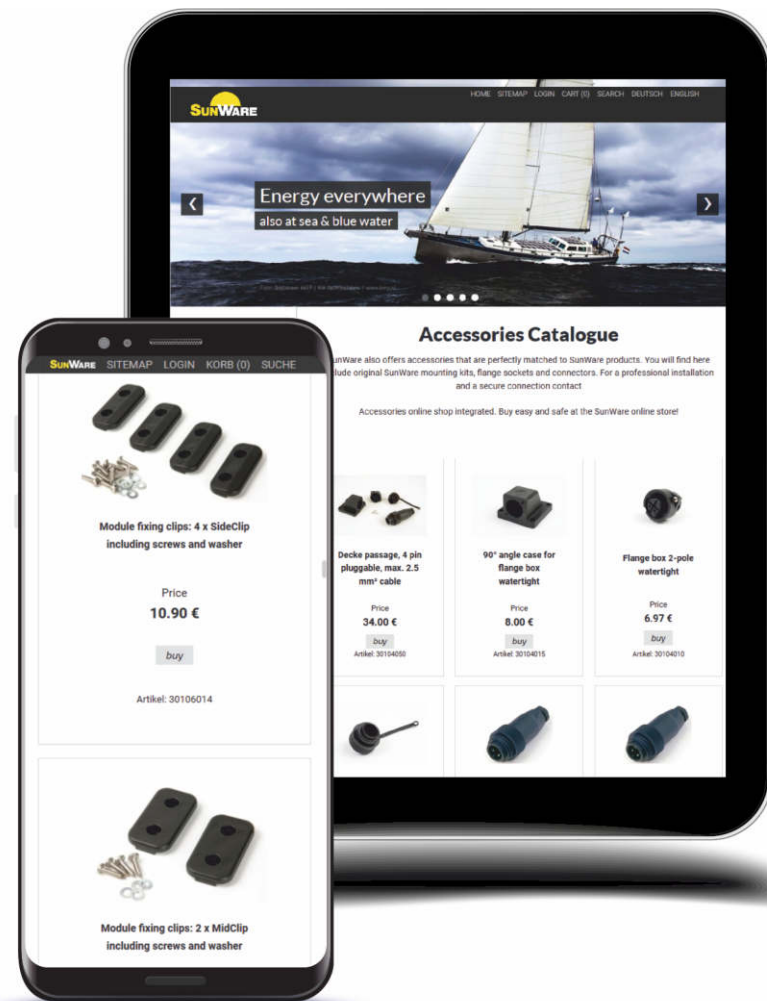
FOX-D1 & D1/E

12V/ 24V system voltage

Display Type	Mounting Type	Current max.	Dimension L x W x H
FOX-D1	Surface-mounted	20 A	100 x 65 x 44 mm
FOX-D1/E	Built-in	20 A	115 x 78 x 35 mm
Cutout for FOX-D1/E			56 x 84 mm

Technical details & drawings at: www.sunware.de/fox-dx

Accessories for **Mounting** and **Connection**



Accessoires

Examples from
the offer:

Panel bag blue
TX-x2039



Cable 10m
2x1,5qmm



Extension
cord 2-pin

Single component
PUR glue, black



Deck-
passage

Cable cover VA



Panel fixing clips
4x SideClip



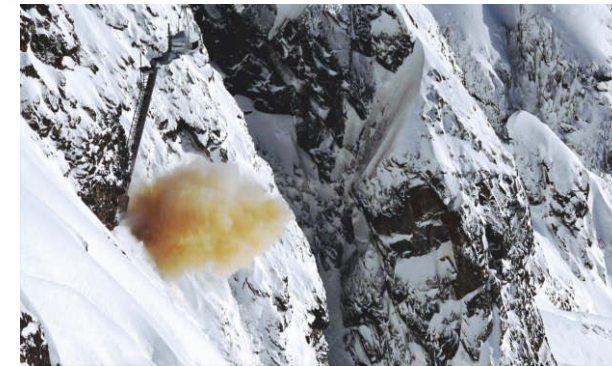
Accessories catalog at:
www.sunware.de/zubehoer

SWITZERLAND

Avalanche blasting masts

Temperature: -40° C

Height: 4000m nN



STORY- I

When Reliability Matters

Remote-Controlled Blasting for Avalanche Control

Avalanche towers are designed to trigger avalanches prophylactically with remote-controlled blasting.

The towers have a deployment box that contains prepared explosive charges, which can be individually dropped by remote control. When the explosive charge is dropped, two igniters are pulled and the explosion is set off after a time delay.

A blasting installation must be extremely reliable and effective as well as easy to operate and maintain. This requires a consistent supply of solar power over months, particularly for the control unit of the dropping mechanism that triggers the explosion.

The conditions for an installation high up in the mountains poses special challenges to solar panels: the extremely low temperatures, in combination with intense UV exposure and the frequent temperature cycles over the course of the day cause many synthetic materials to become brittle and compromise the electrical connections within the panels.

Addressing this issue, SunWare has developed unique bonding techniques. In combination with special embedding materials within the panels and the use of an extremely UV-resistant front film, SunWare solar panels have mastered these challenges for many years now.

DUBAI

Coastal - Monitoring

Temperature: 50 °C

Humidity: 70-80%

Water salinity: 4%



Photos:Osil



STORY- 2

Autonomous Marine Data Buoys

Coastal, Estuarine & Offshore Monitoring

Increasing demand on coastal resources has led to a greater demand for real-time monitoring of environmental factors such as waves, currents, tides and pollutants.

Many of these data are supplied in real time by monitoring and measurement systems for coastal regions. These buoys are deployed across the world under at times extreme conditions. Measurement buoys off the coast of Dubai are equipped with SunWare panels.

A challenge for any material – the temperatures in summer can reach up to 50°C in the shade, with humidity levels of 70%-80% and a high salt content in the air. These are conditions that few solar panels can cope with. SunWare has risen to the challenge and established itself for many years now as an accredited supplier to buoy manufacturers for worldwide use.

North pacific

The Ocean Cleanup

Temperature: 27 ° C

Humidity: 75%

Water salinity: 3,45%



Photos: The Ocean Cleanup

STORY- 3

Ocean Cleanup

World's First Ocean Cleanup System Launched

Every year, millions of tons of plastic enter the oceans, of which the majority spills out from rivers. A portion of this plastic travels to ocean garbage patches, getting caught in a vortex of circulating currents. If no action is taken, the plastic will increasingly impact our ecosystems, health and economies.

The Ocean Cleanup is developing a passive cleanup method, which uses the natural oceanic forces to rapidly and cost-effectively clean up the plastic already in the oceans.

With a full fleet of cleanup systems, 50% of the plastic in the Great Pacific Garbage Patch are aimed to be collected in about five years.

In 2018, Boyan Slat, founder and CEO of The Ocean Cleanup project, performed the first live test 90 km off the coast of San Francisco in the Pacific Ocean. Measurement, control and drive systems of the floating barrier are powered by solar energy.

The solar panels are supplied by SunWare and are mounted to the technology platforms at the tube ends.

Link: www.theoceancleanup.com

What You Should Know!

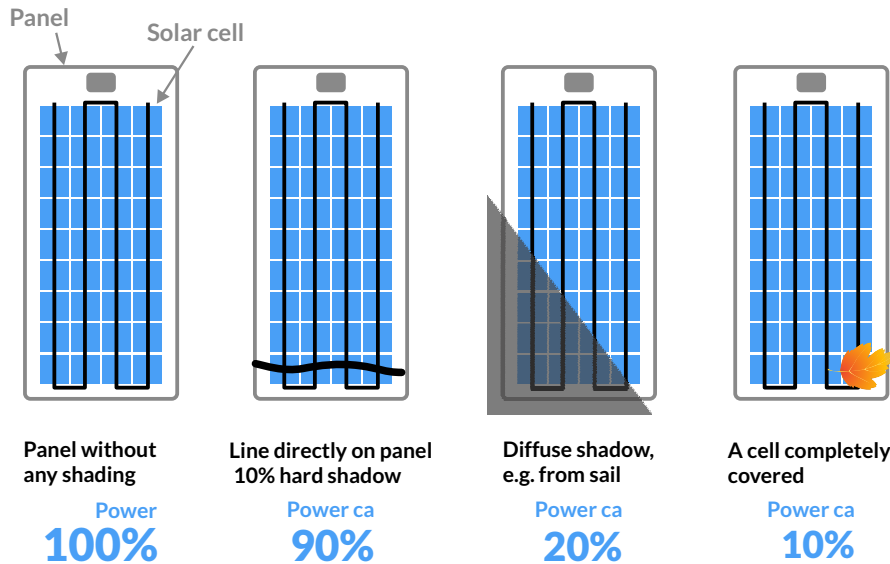
Power Supply at Partial Shading

Important: Make absolutely sure that no sub-areas of the panel are shadowed.

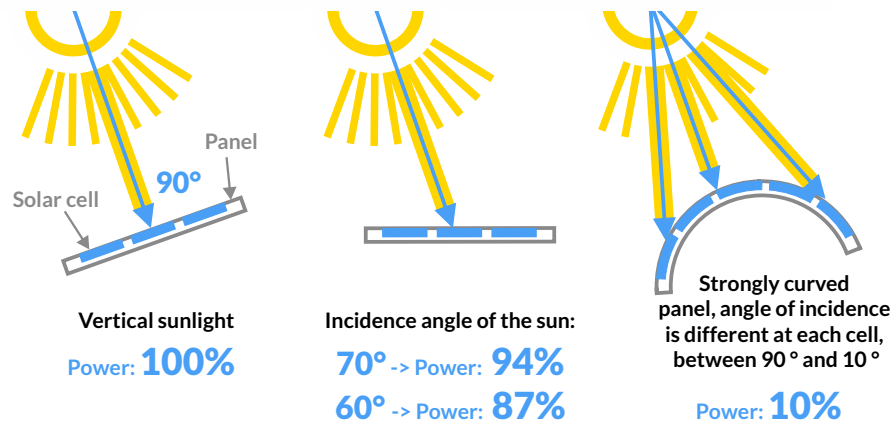
All cells of a panel are connected in series -

the weakest illuminated cell limits the performance!

See the following sketch:



Influence of the Angle of Incidence on Power Output





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Print: 03/2020