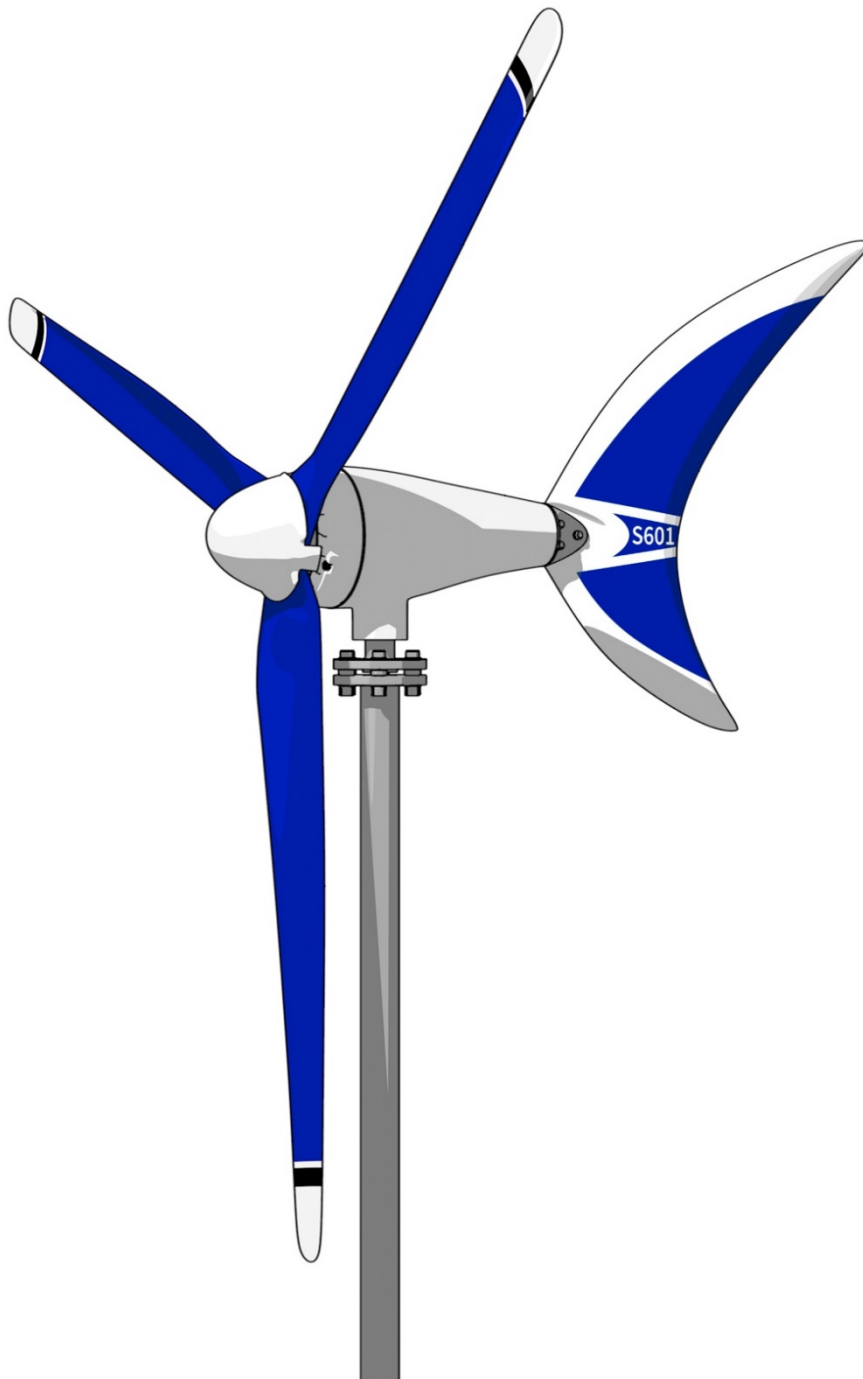


User manual and installation guide

SilentShark S601

12V / 24V / 48V



Dear customer!

Congratulations on your decision to purchase the **SilentShark S601**. Compared to conventional wind generators, it is characterized by high safety, enormous efficiency and very low noise levels over the entire range.

You also benefit from our more than 30 years of experience with various wind generators in use on the high seas (Silent Wind from Spreco on sailing boats).

Electricity is particularly important there and ensures safety and comfort on board.

Please note that this user manual is part of the product. We recommend that you read this manual carefully before installing the **SilentShark S601** and follow the instructions. Please keep this user manual in a safe place.

Good luck and always enough wind

wishes you your

Spreco Team

Table of contents:

1. Use and area of application.....	4
2. Safety instructions	4
2.1 Mechanical hazards	4
2.2 Electrical hazards	5
2.3 Hazards during installation	6
3 Technical data	6
3.1 Wind generator	6
3.1.1 Electrical data	6
3.1.2 Dimensions, properties, space requirements	6
3.1.3 Power curve.....	7
3.2 Hybrid charge controller	7
3.2.1 Electrical data.....	8
3.2.2 Dimensions, weights	8
4 Scope of delivery	8
5 Before installation -	
5.1 Functional description and system components	9
5.2 Cable dimensioning.....	9
5.3 Selecting a suitable installation location.....	10
5.4.1 Stationary installation.....	10
5.4.2 Mobile installation on a sailing yacht.....	11
5.5 Necessary tools.....	12
6 Assembly	
6.1 Mounting the mast	12
6.2 Mounting the generator.....	12
6.2.1 Mounting the rotor blades in the blade holder	13
6.2.2 Mounting the fin (wind vane) on the generator	13
6.2.3 Mounting the upper flange part on the generator.....	13
6.2.4 Mounting the generator on the mast.....	13
6.2.5 Mounting the hub on the generator shaft.....	13
7 Commissioning	14
8 Starting and stopping	15
9. Charging indicator	15
10. Controls	15
10.1 Rotor blades	15
10.2 Screwed connections	15
10.3 Bearings, seals	15
10.4 Corrosion protection	16
10.5 Electrical system	16
11 Maintenance work	16
12 Troubleshooting	16
13 Warranty	18
14. Contact details.....	19

1. Use and area of application

New battery technologies allow and require powerful charging technology. With a **SilentShark S601** wind generator, you have the best technology in use! With its high power potential, the **SilentShark S601** is also ideal for direct feeding into the grid!

You can achieve the greatest regenerative energy yield by combining a wind generator and solar module, storing the energy generated in a battery system and thus utilizing daylight and the available wind energy. Our charge controllers are designed to connect a maximum of 300 Wp of solar power (hybrid charge controller).

The possible applications are diverse and suitable for stationary and mobile stand-alone systems via the battery voltage with a 230 V inverter.

Our wind generator is aerodynamically optimized and very efficient. If the energy requirement is higher, several **SilentShark S601** wind generators can be used in parallel. Additional charge controllers are then required. Due to the low noise level, the **SilentShark S601** wind generator can be installed in residential areas and on sailing yachts without disturbing the neighbors. The hybrid charge controller supplied is designed for the **SilentShark S601** and has inputs for the wind generator and solar modules.

Another advantage of the **SilentShark S601** is that virtually no electronics are installed in the housing. This drastically reduces maintenance work.

The electrical energy is fed from the generator to the charge controller via three AC (alternating current) cables with low losses (downwards). In the charge controller, the alternating current is converted into DC direct current and used to charge the battery or fed directly into the grid via an inverter.

The hand-laminated carbon fiber blades of the new generation have been successfully tested in a wind tunnel up to 122 km/h (hurricane force) in accordance with the DIN EN-61400-2 standard. You don't need to worry about the **SilentShark S601** in storms, as it has a specially developed patented storm brake. The brake starts at 130 C° at the stator and is switched off once it has cooled down.

Examples of use:

E - car charging station in conjunction with photovoltaics

Stationary stand-alone systems, e.g. weekend homes / mobile stand-alone systems, e.g. on boats.

Measuring stations, on-grid / off-grid applications, emergency call systems, street lighting, development aid projects, wireless LAN access points, vacation homes with 230V (110V) with inverter or anywhere where there is no power connection.

2. Safety instructions

Wind generators are not without danger due to the high rotational speed and the voltage generated. Therefore, please read the following safety instructions carefully:

2.1 Mechanical hazards

The spinning rotor is a major hazard. Above a certain wind speed, this even appears transparent, so that there is a risk that the rotor circle can no longer be reliably recognized visually. Our blades are coated with two colors to make them easier to see. Never touch the spinning rotor! Never try to stop the spinning rotor with your hand or an object!

Attention



Please keep your distance!

Only install the generator in places where it is impossible for anyone to touch the wind generator! This is particularly important on sailing yachts. Install the wind generator at a sufficient distance from the deck.

The rotor blades are made of hand-laminated carbon fiber material, which can withstand even hurricane-force wind speeds. Always keep clear of the rotating rotor blades to avoid injury.

Flying parts or lines can still cause the rotor blades to break. If a rotor blade is damaged, the system must be shut down immediately by manually actuating the stop switch. Damage to a rotor blade can result in considerable imbalance, so that the entire mast on which the wind generator is mounted may be at risk. Please also bear this in mind when selecting your installation site to ensure that it is really safe. During installation, the three AC connection cables to the generator must be disconnected from the charge controller and short-circuited or **one blade must be tied down** to the mast.

For safety reasons, we recommend switching off the wind generator using the stop switch before entering the port and mooring maneuvers.

The mast and the attachment of the mast must be designed to withstand the resulting wind forces and fluctuating loads. Furthermore, the mast attachment and bracing should be installed in such a way that any vibrations that may occur are not amplified. The involvement of a specialist is recommended.

2.2 Electrical hazards

Only connect all components if you have the **relevant knowledge**. Otherwise, installation is reserved for specialist personnel! Make all electrical connections in accordance with the regulations before the wind generator turns for the first time. The resulting voltages/currents can cause burns, fire or serious injury if safety is not observed.

Take care with pacemakers, etc.! Never touch stripped cable ends. The current when charging batteries can reach more than 50 A direct current (DC). All cables, electrical components and connection points must be able to withstand at least 60 A at 12 V. For protection, a 60 A fuse must be installed in the supply line (+) to the battery, as close as possible to the battery.

Warning: Cables with an insufficiently dimensioned cross-section can heat up to such an extent that a fire can occur.

Cables must be laid protected so that mechanical damage to the cables is ruled out. A chafed cable poses a safety hazard.



Warning: Connecting the batteries can cause sparks.
Avoid short-circuiting the batteries at all costs.



Warning: Batteries can gas during charging and the resulting gases can form an explosive mixture with oxygen. Always ensure adequate ventilation!

It must be ensured that the electrical installation is only carried out by persons with specialist knowledge.

Before a storm, the **SilentShark S601** can be braked using the stop switch built into the charge controller or the optional external stop switch. In the event of an impending hurricane, it is advisable to tie a rotor blade to the mast. This is particularly recommended when operating the **SilentShark S601** on a sailing yacht.

2.3 Dangers during installation



Only use mast constructions that can withstand the loads caused by the wind generator and its wind pressure as well as any movements of the vessel (forces can add up) at any wind speed.

If possible, work on the mast should be carried out on a windless day. No persons should be in the danger zone of the generator mast.



The battery must be electrically disconnected from the system during all work on the system. The rotor must be prevented from running loose during work by tying down a rotor blade, otherwise the charge controller may be destroyed. The electrical installation must be fully completed before connecting the battery.

3. Technical data

3.1 Wind generator SilentShark S601

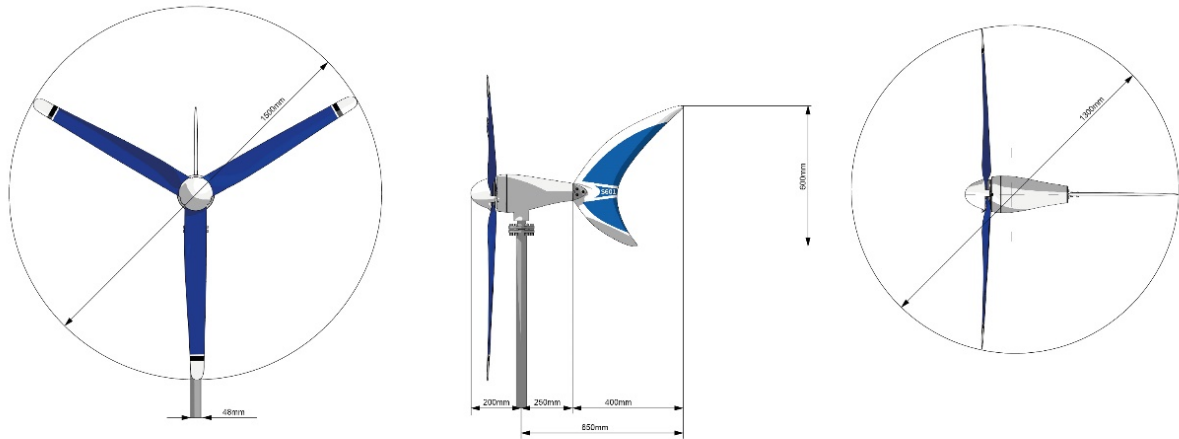
3.1.1 Electrical data

Type of generator	Permanent magnet generator, 3-phase, AC
Rated voltage	12 V DC / 24 V DC / 48V DC
Rated power	600 Watt / 700 Watt / 800 Watt
Nominal wind speed	Approx. 14 m/s
Start-up wind speed	Approx. 3 m/s
Start of charging *	Approx. 200 rpm

* The start of charging also depends on the charge status of the battery!

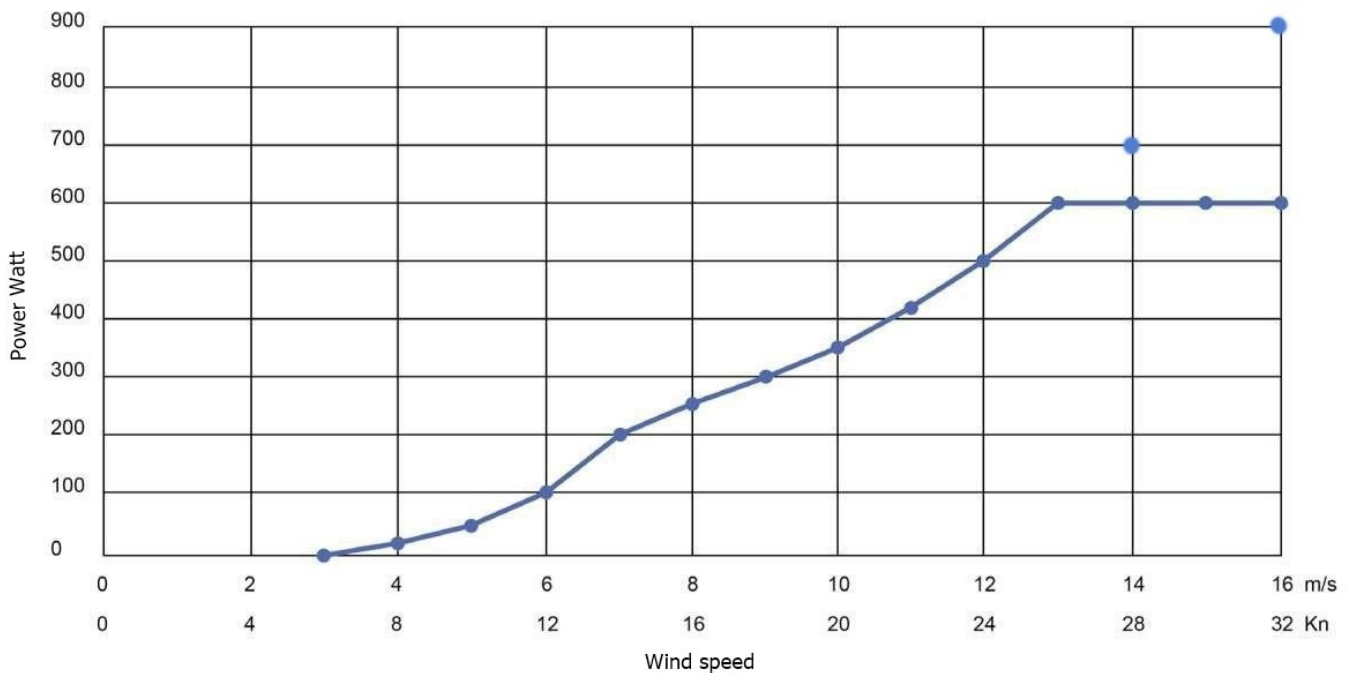
3.1.2 Properties, dimensions, space requirement

Wind tunnel safety test	122 km/h
Rotor diameter	1,50 m
Number of rotor blades	3
Rotor blade weight	250g / rotor blade
Rotor blade material	Hand-laminated carbon fiber Cfk
Rotational speed range	200 - 950 rpm
Weight	Approx. 12 kg (generator)
Housing color	white, powder-coated - Two-layer structure
Warranty	24 months



3.1.3 Performance curve

SilentShark S601 12V Performance Curve



3.2 Hybrid charge controller



The hybrid charge controller should be mounted vertically in as cool a location as possible near the batteries. Caution: Outgassing is possible with **lead-acid batteries in particular**, with the risk of **explosion!** Ensure adequate ventilation!

Charging criteria are set via the supplied external hybrid charge controller with boost function.

The end-of-charge voltage is adjustable for lead-acid, gel, AGM and lithium batteries. Please follow the battery manufacturer's instructions!

Braking process: **electronic** depending on the individual parameter setting, **manual** with the built-in stop switch or with the extended **external** switch (additional part).

The braking time can be set from 10 - 60 minutes.
 For details, please refer to the user manual of the hybrid charge controller!

Never apply voltage to the external stop switch. This will destroy the charge controller (loss of warranty).

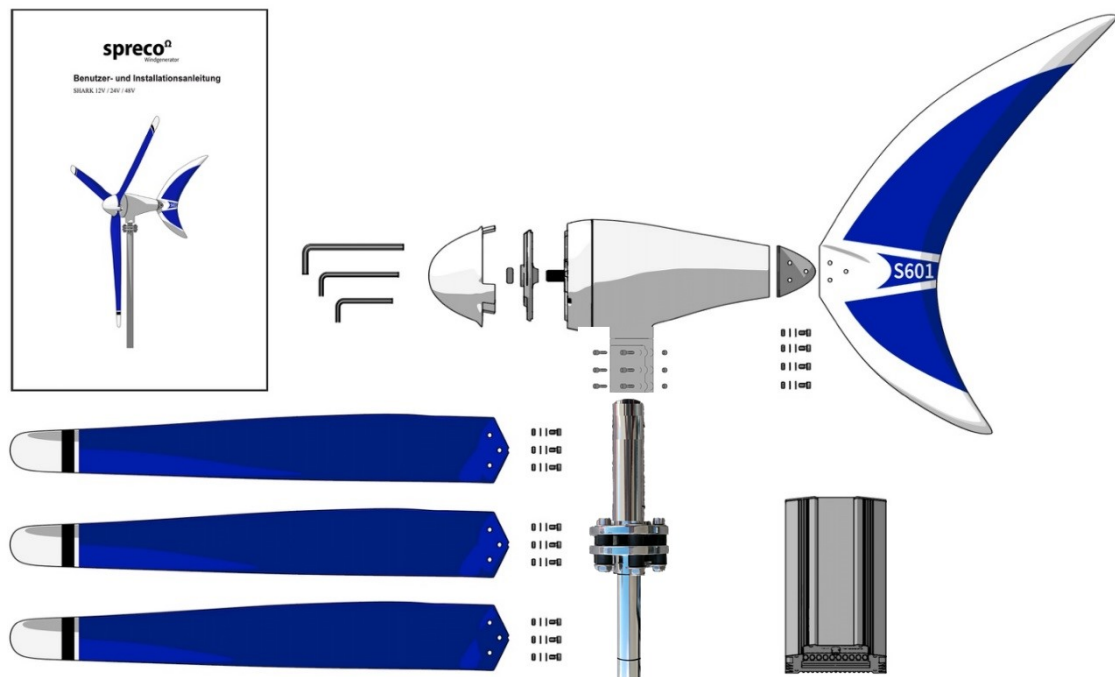
3.2.1 Electrical data Boost Hybrid charge controller

System voltage	12V	24V	48V
Max. Input power wind generator	600 W	/ 700W	/ 800W
Max. Input current wind generator	50A	/ 25A	/ 12,5A
Max. Solar input power	150 Wp	/ 300 Wp	/ 300Wp
Max. Solar input current	20A	/ 10 A	/ 5 A
Max. Open-circuit voltage input solar	24 V DC	/ 36 V DC	/ 72 V DC
LED multifunctional display	W, V, A, kWh, Ah,		

3.2.2 Dimensions, weights

Weight	2.8 kg (controller)
Dimensions	220 x 150 x 82 mm
Warranty	24 months

4. Scope of delivery



Generator, powder-coated	1	Quick Installation Guide	1
Fin, CfK Carbon	1	Screw set rotor blades	1
Rotor blade mounting hub Aluminum	1	Screw set fin	1
Nose, ABS	1	Allen key 4mm	1
Rotor blade Carbon CfK	3	Allen key 5mm	1
Boost hybrid charge controller	1	Allen key 8mm	1
Screw set connection flange	1	Silencer connection flange	1

5. Before mounting

5.1 Function description and system components

All wind generators use the kinetic energy contained in the wind. The rotor blades convert part of this energy (theoretically 58%) into a rotary motion, which is then converted into a 3-phase alternating current in the generator. The power of the energy in the wind increases proportionally to the 3rd power with the wind speed. This means that a doubling of the wind speed leads to an eightfold increase in power. This is particularly important to bear in mind during storms.

Our rotor blades are manufactured from high-tensile carbon fiber mats using a hand-lamination process with epoxy resin. This material offers maximum strength with minimum weight. As a result, the newly developed blades are extremely light and cannot be destroyed by air forces during operation.

For normal operation, we have installed an additional safety feature in our controllers in the form of an electronic and manual brake.

There is also a patented high-wind brake in the generator housing. If a large amount of current is drawn, the stator can become very hot and there is a risk of fire. The brake is then activated via a bimetallic switch and released again once it has cooled down.

5.2 Cable dimensioning

Please note: Undersized cable cross-sections lead to poor performance and pose a considerable risk of overheating and fire! If in doubt, select a cable cross-section that is one size larger!

System voltage 12 Volt:

Distance from wind generator to charge controller in m	0 - 9	10 – 19	20 – 29	30 – 44	45 – 69	70 – 110
Cable cross-section in mm ²	6	10	16	25	35	50
AWG	10	8	6	4	2	1
Distance from charge controller to the battery in m	0 - 9	10 – 19	20 – 29	30 – 44	45 – 69	70 – 110
Cable cross-section in mm ²	10	16	25	35	---	---
AWG	8	6	4	2	---	---

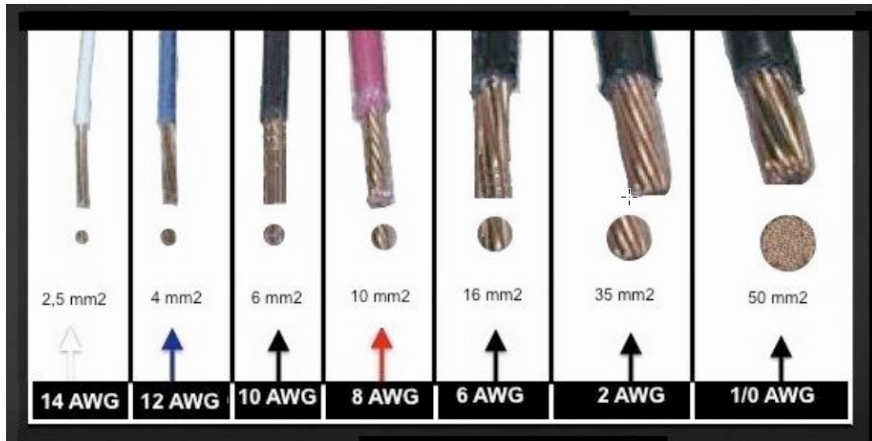
System voltage 24 Volt:

Distance from wind generator to charge controller in m	0 - 10	11 – 19	20 – 29	30 – 44	45 – 69	70 – 110
Cable cross-section in mm ²	2.5	4	6	10	16	25
AWG	14	12	10	8	6	4
Distance from charge controller to the battery in m	0 - 9	10 – 19	20 – 29	30 – 44	45 – 69	70 – 110
Cable cross-section in mm ²	10	16	25	35	---	---
AWG	8	6	4	2	---	---



System voltage 48 Volt:

Distance from wind generator to charge controller /Inverter in m	0 - 29	30 – 79	80 – 99	100 – 150
Cable cross-section in mm ²	2.5	4	6	10
AWG	14	12	10	8
Distance from the charge controller/inverter to the battery in m	0 – 29	30 – 69	70 – 99	100 – 150
Cable cross-section in mm ²	4	6	10	16
AWG	12	10	8	6



5.3 Selecting a suitable installation location

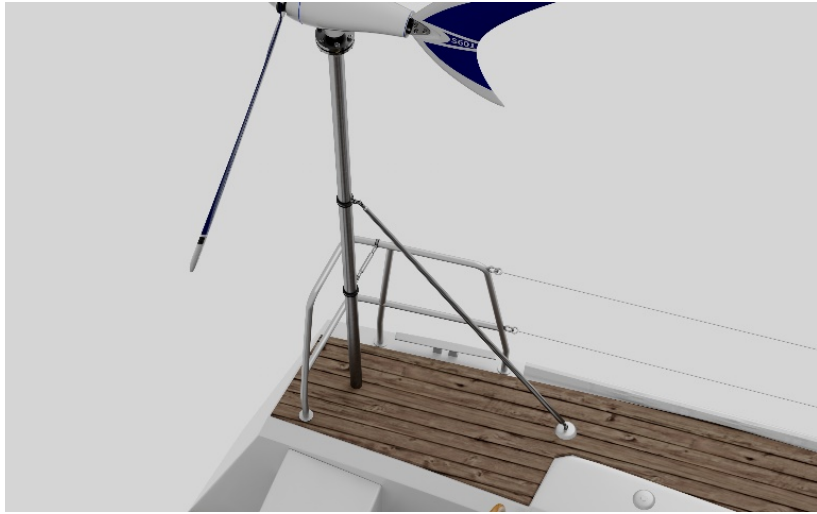
Before you install the wind generator, you should find the optimum installation location. This is often the most difficult task. Ideally, the rotor blades should always receive an even flow. This assumes that the wind generator is mounted high enough and free of obstacles.

5.4.1 Stationary installation: The required mounting height depends on how much the surrounding objects deflect the wind from the main direction. You can first carry out a simple test by attaching a plastic tape (available from DIY stores) approximately three meters long and four centimeters wide to the top end of a pole at least 4 m long and also attaching a second tape two meters lower down.

If the upper band blows out horizontally or moves back and forth up to 30 degrees, you have found a suitable location. If the band moves more or even wraps around the mast, the location is unsuitable. This test is only a rough indication and should only be carried out in medium winds. We recommend that you make several attempts to get a better feel for this. You do not need to carry out this test if the wind generator is completely free-standing.



5.4.2 Mobile installation on a sailing yacht: The installation height must be selected so that no crew member can be endangered by the rotor. The mechanical anchoring of the base of the generator mast and the mast itself must be able to withstand the mechanical loads that occur, especially in rough seas. We recommend additional double bracing to the railing if possible or, better still, directly to the deck of the ship. To prevent the mast from swaying, we recommend attaching the bracing to the mast approximately 25 cm below the wing.



Note: Please bear in mind that the **SilentShark S601** can never achieve its full performance if it is not positioned in the main wind direction or is deflected. It is therefore important to find a suitable location that is free of obstacles in the main wind direction!

Once you have found the right location, the appropriate mast and accessories must be selected.

The pole outer diameter should be 48 mm and made of stainless steel with a wall thickness of at least 2.5 mm. Please also consider possible maintenance work. Earthing of the mast is also recommended. For sailing yachts, the earthed sail mast is suitable for this purpose.

5.5 Required tools

For installation, you will need wire end ferrules, cable connectors, stripping tool, crimping pliers for wire end ferrules, heat-shrink tubing or insulating tape, a set of wrenches if necessary, various screwdrivers

6. Installation

6.1 Mounting the pole

Install the mast according to the mast manufacturer's instructions and ensure that it is sufficiently braced. When mounting on a boat, we recommend the use of screws bolted through the deck, as screwed-in screws tend to loosen under the constantly changing load torques. Observe the above safety instructions! Make sure that under no circumstances can the rotor circle be reached by a crew member during regular ship operation! There is a risk of serious injury! Make sure that nobody is in the danger zone when the mast is being installed!

We generally recommend attaching the **SilentShark S601** flange base of the damping plate to the mast **before** final mast installation.

There are two options for this:
Either with 2 screws (Figure 1) or welded on (Figure 2).

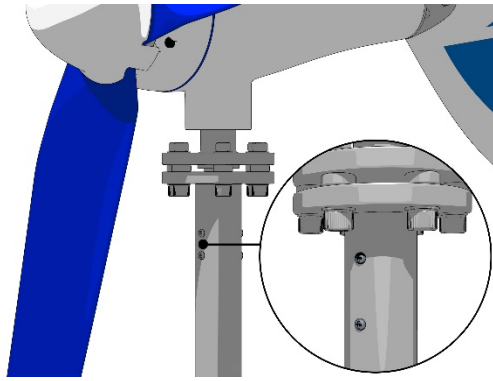


Fig.1: Mounting with 2 screws

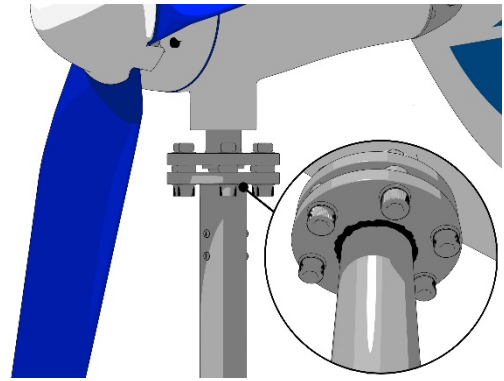



Fig.2: Fastening by welding

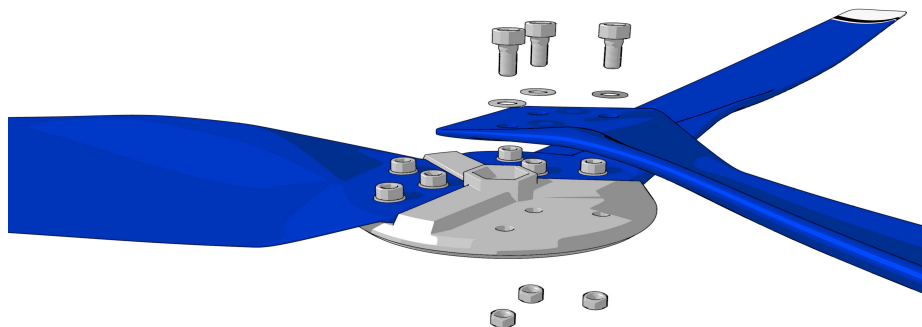
 When using our segment mast, the top part of the mast and the lower flange part can be easily transported and professionally welded! Once the mast has been mounted in the correct location, the relatively simple assembly of the **SilentShark S601** can begin.

6.2 Mounting the generator

We recommend the following sequence:

1. mounting the rotor blades on the blade holder (hub)
2. mounting the fin on the generator
3. mounting the upper part of the silencer connection flange
4. mounting the generator on the mast
5. mounting the hub with the rotor blades on the generator and the nose

6.2.1. Mounting the rotor blades in the blade holder



Make sure that the rotor blades are relatively sharp at the rear! Fit the three carbon fiber blades to the blade mounting plate using the respective screw set. Note - The screws must be well tightened (the tightening torque is 7 - 8 Nm).

The blades are automatically centered due to the shape and design of the hub plate (conical mount). The three blades in a set have exactly the same blade weight. Blades from different sets cannot be fitted together as this is likely to cause imbalance.

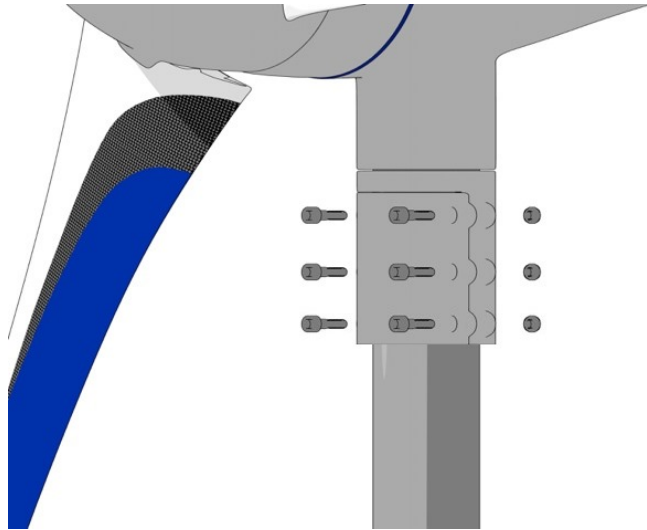
An incorrect tightening torque represents a considerable safety risk. Check the rotor blades regularly for tightness, visually and mechanically

If a blade is damaged due to external influences, a single blade can be ordered by providing the exact blade weight.

6.2.2. Fitting the fin to the generator

Attach the fin to the generator using the screw set provided. The higher part of the fin is at the top.

6.2.3 Mounting the upper part of the silencer connection flange



Mount the generator on the upper flange part with a diameter of 48.3 mm.

TIP: The white plastic part to prevent sound transmission is preferably wrapped with adhesive tape and fixed to the upper end of the pipe. This makes installation easier!

Tighten the 6 screws firmly!

6.2.4 Mounting the generator on the mast

When working on a boat, it is advisable to secure the generator against falling with a rope! Only work on the wind generator on windless days!

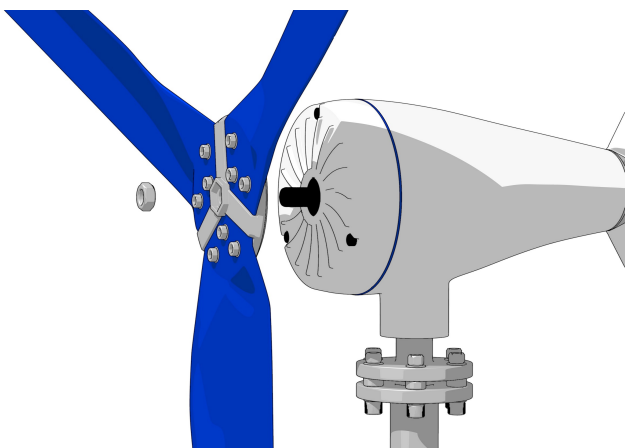
First connect the cables of the supply line to the charge controller. These are laid in the mast. We recommend that you allow sufficient reserve in the cable length to make installation and possible disassembly easier!

Now mount the generator on the flange base as shown in the illustration.



6.2.5 Mounting the hub with the rotor blades on the generator axis

Once the blade set has been fitted, it is placed on the generator axle and screwed tight using the enclosed nut and Allen key. Then push the nose (blade cover) onto it from the front until it is fully engaged on all sides.



The prescribed torque is 30 nm.

Caution: During this work on the rotor, it must be ensured that the rotor cannot start up.

The 3-core cable must be short-circuited by securely connecting all three cable ends together. Otherwise the rotor may run loose and you may injure yourself.

Alternatively, you can also tie a rotor blade to the mast with a piece of rope.



If you dismantle the **SilentShark S601** from the mast, you must ensure that the blades do not start moving before you have completed the work (3 AC cable short-circuit).

7. Putting into operation

Before starting up your **SilentShark S601** you must first connect the charge controller to the battery with the **correct polarity** (!). Do not forget the 60A fuse in the positive lead near the battery! Now connect the three AC cables coming from the generator to the charge controller. Polarity is not important here. **Follow the instructions in the charge controller manual!**

Before commissioning your **SilentShark S601**, please check that it has been correctly mounted and installed using the following checklist:

O.K.	Check
	Mast construction (not included in the scope of delivery); Check according to the enclosed instructions, in particular all screw connections, bracing, vertical alignment. Are earthing and lightning protection connected in accordance with local regulations?
	Electrical installation: Check battery condition. Is the charge controller connected to the battery with the correct polarity?
	Charge controller: Charge controller securely fastened at the installation location? (Choose a cool location) Connect the battery with the correct polarity, otherwise the controller will be destroyed (loss of warranty!). Attention: Always connect the battery to the charge controller first! Are all screw terminals firmly tightened? Is the external stop switch set to ON? CAUTION: No voltage may be applied to the socket of the external stop switch (additional part)! This will destroy the controller. Only connect the enclosed wiring harness with socket there.
	Circuit breaker: Circuit breaker or fuse, at least 60 amps, installed between battery and charge controller?
	Wiring: Are all cables/wires connected according to the wiring diagram? Has the polarity of the cables been checked at all connection points? Is the three-pole cable from the generator connected to the charge controller? Are the cables crimped correctly?
	Mast support: Have the damping elements of the mast mount been inserted correctly and accurately and checked for tight fit?
	Rotor blades: Has the assembly been carried out according to the instructions?
	Blade hub disk: Is the hub disk mounted on the generator shaft? Is the central fastening screw tightened to 30 Nm?
O.K.	control

If the checklist has been ticked off without any objections,
YOU CAN NOW GET STARTED!

8. Starting and stopping

Set the external stop switch (provided by the user or optionally available from us in the store) to "ON". If the positive/minus cable is connected to the battery with the correct polarity, the wind generator should now run if there is sufficient wind. You can read this on the LCD display of the charge controller. (blade symbol rotates).

9. Charging indicator

The charging power is shown on the charge controller display.

10. Inspections

Your **SilentShark S601** has been designed for years of operation without any maintenance. However, simple and regular checks are always required to ensure the necessary operational safety.

Attention



Your safety is very important to us!

Before starting the check, make sure that during all work on the system, the rotor is first brought to a standstill and then the battery is disconnected from the system.

The following checks should be carried out regularly every 12 months:

10.1 Rotor blades

Check the rotor blades for possible damage, such as broken edges, surface damage or cracks. If you notice any damage, the generator must not be operated any further. Check the screw connection after just one day of operation and then after one month. You can then switch to longer intervals.

10.2 Screwed connections

Check all externally accessible screw connections for tightness and correct tightening torque. In particular, check the rotor blade bolts, the central hub nut and the mast fastenings.

10.3 Bearings, seals

The bearings of the generator shaft and the azimuth bearing for wind tracking are designed as permanently lubricated ball bearings. Please check these bearings for ease of movement, bearing play and tightness. Please replace defective bearings or have them replaced by a service center. The Sharky rotor has bearings on both sides and therefore has a longer service life and smoother running due to the more even load.

10.4 Anti-corrosion protection

All housing parts are made of a seawater-resistant aluminum alloy and are additionally treated with a powder coating (2-layer structure). If this layer is damaged, there is a risk of corrosion. Please repair with suitable paint.

10.5 Electrical system

First bring the wind generator to a standstill so that all cables are de-energized.

Check all connections for tightness and corrosion. Remove any corrosion that may have occurred and treat with contact spray. Pay particular attention to the battery connections. These must be cleaned and treated with terminal grease. The battery must be checked and repaired in accordance with the manufacturer's instructions. If you have several batteries, you should also check for different capacities (self-discharge). Only connect batteries of the same size (Ah) and the same age in parallel!

11. Maintenance work

Maintenance work is **not** required for the **SilentShark S601**.

The **SilentShark S601** has been designed for years of trouble-free operation. This goal was very important to us.

12. Troubleshooting

If a problem occurs, you should be able to solve it yourself using the following checklist:

Wind generator is not starting:

Possible cause	Test	Fixing the problem
Stop switch is set to "STOP"		Set to "RUN" or "On"
Generator shaft stiff	Turn by hand	Connection cable Generator to charge controller damaged, short circuit in AC cable, generator short circuit, customer service
Battery has reached end-of-charge voltage		Check voltage

Wind generator does not generate any power:

Possible cause	Test	Fixing the problem
Not enough wind	Measure the wind speed at the rotor. (Wind speed at the top of the main mast is higher)	Wait for more wind, start charging depending on the state of charge of the battery, Check charge controller setting
Electrical connection interrupted	Checking the electrical permeability of the cables	Replace defective cables or devices
Fuse interrupted	Check electrical continuity of the fuse	Replace fuse, or wait for automatic circuit breaker to cool down
Built-in current collector (slip ring unit) has no contact	Check carbon brushes and springs in the housing	Clean slip ring and/or replace carbon brushes, make springs workable

Battery is not fully charged:

(Thailand) alone shall decide whether repair or replacement is appropriate or necessary. If neither repair nor new delivery is possible, the Customer is only entitled to withdraw from the contract. Unless otherwise provided for by mandatory law, the claims of the purchaser against SPRECO Thailand are limited to these warranty provisions, and neither SPRECO Thailand nor the distributors of the products assume any further liability for direct or indirect damages.

All information is reliable. However, the manufacturer accepts no responsibility for any inaccuracies or omissions. The user of this information and the product bears full responsibility and risk.

All specifications are subject to change without notice.

If our hybrid charge controller is not used:

A connection to a three-phase rectifier (optionally available in our store) can be found in the respective operating instructions. This allows you to provide the energy generated by the wind generator directly to downstream systems, e.g. inverter input, energy management systems, stand-alone systems.

Proof of warranty:

Name	
Adress	
Purchase date	
SilentShark S601 Serial No.	
Charge controller Boost Serial No.	
Dealer	
Dealer's address	

14. Contact details

www.Sprecowindgenerators.com

SPRECO (Thailand) Co., Ltd.,
137/2 Thuwang Road, Moo 5, T. Pawong,
M. Songkhla
90100 Songkhla / Thailand
Phone +66 (0)94 587 2899

Mail: mail@sprecowindgenerators.com
Time zone UTC +7 !

Please contact us by e-mail if possible!
We will get back to you as soon as possible!
Thank you very much!



A Thai company under German management