SUPER SILENT

Designed by Spreco in Germany

User Manual and Installation Guide

Super Silent 400 (4. Generation) 12V / 24V / 48V

Dear customer!

We congratulate you on your decision to purchase the **Super Silent 400**. Compared to conventional wind generators, it is characterized by high safety, enormous efficiency and very low noise levels across 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 **Super Silent 400** and follow the instructions. Please keep this user manual in a safe place.

Good luck and always enough wind,

your Spreco Team

Table of contents:

1. USE AND APPLICATION:

New battery technologies allow and require high-performance charging technology. With a **Super Silent 400** wind generator, you have the best technology at your disposal! You can achieve the greatest regenerative energy yield by combining a wind generator and solar module(s), storing the energy generated in a battery system and thus utilizing the available wind energy and daylight. Our charge controller is designed to connect an additional maximum of 800 Wp solar power (hybrid charge controller).
The application possibilities are diverse and are suitable for stationary and mobile island systems via the battery voltage with a connected 230 V inverter.

Our wind generator is aerodynamically optimized and very efficient. If the energy requirement is higher, several **Super Silent 400** wind generators can be used in parallel. In this case, additional charge controllers are necessary. Due to the low noise level, the **Super Silent 400** can be installed in residential areas and on sailing yachts without disturbing the neighbors.
The included hybrid charge controller is designed for the **Super Silent 400** and has inputs for solar modules and the wind generator.

Another advantage of the **Super Silent 400** is that there is almost no electronics built into the housing. This drastically reduces maintenance work.

The electrical energy is fed from the generator down to the charge controller via three AC (alternating current) lines. This minimizes power losses. In the charge controller, the alternating current is converted into DC (direct current) and the battery is charged.

The hand-laminated carbon fiber blades of the new generation have been successfully tested in the wind tunnel according to the DIN EN-614002 standard. You don't need to worry about the **Super Silent 400** in storms, as a specially developed, patented strong wind brake is built in. Braking takes place at 140 degrees C° on the stator, and is switched on again after cooling down.

Application examples:

- E – car charging station in conjunction with photovoltaics
- Stationary island systems, weekend homes
- mobile island systems on boats
- On-grid / off-grid measuring stations, emergency call systems, street lighting, development aid projects, wireless LAN access points
- Holiday homes with 230V (110V) inverter or anywhere where there is no power connection

2. SAFETY INSTRUCTIONS:

Wind generators are not without danger due to the high speed and the voltage they generate. Therefore, please read the following safety instructions very carefully!

2.1 MECHANICAL HAZARDS:

The rotating rotor is a major danger. At a certain wind speed, it may even appear transparent, so that the danger cannot be recognized visually. Our blades are painted in several colors so that they can be more easily recognized visually by people and animals due to the bright rotor circle that appears on the wing tips. Never touch the rotating rotor! Never try to stop the rotating rotor with your hand or an object!

DANGER

Please keep your distance!

Only install the generator in places where it is impossible for anyone to touch the wind generator! This is especially **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 that can withstand even hurricane-force wind speeds. Always stay away from 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 taken out of operation immediately by manually operating the stop switch. Damage to a rotor blade can result in significant imbalances, which can endanger the entire mast on which the wind generator is mounted. Please also take this into account when selecting your installation location 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.

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

The mast and the mast fastening must be designed in such a way that it can withstand the resulting wind forces and fluctuating loads. Furthermore, the mast fastening and rigging should be installed in such a way that any vibrations that may arise are not amplified. **It is advisable to call in a specialist**.

2.2 ELECTRICAL HAZARDS:

Only connect all components if you have the necessary knowledge. Otherwise, assembly is only to be carried out by qualified personnel! Make all electrical connections correctly before the wind generator rotates for the first time. The resulting voltages/currents can cause fire or serious injury if safety precautions are ignored.

Be careful 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 handle at least 60 A at 12 V. For protection, a 60-amp fuse at 12 volts (30-A at 24 volts, 15 A at 48 volts) must be installed in the supply line (+) to the battery, as close to the battery as possible.

Warning: Cables with insufficiently dimensioned cross-sections can heat up so much that a fire can start. Cables must be laid in a protected manner so that mechanical damage to the cable is excluded. A frayed cable poses a safety risk.

Warning: Sparks may occur when connecting the batteries. Avoid short-circuiting the batteries. Batteries, especially lead-acid batteries, can give off gases when charging and the resulting gases can form an explosive mixture with oxygen. Always ensure there is sufficient ventilation!

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

Before a storm, the Super Silent 400 should be braked using the optional external stop switch. In the case of an impending hurricane, it is advisable to secure one of the rotor blades to the mast. This is especially recommended when operating the Super Silent 400 on a sailing yacht.

2.3 HAZARDS DURING ASSEMBLY:

Only use mast constructions that can withstand the loads caused by the wind generator and its wind pressure as well as the movements of the ship (forces can add up) at any wind speed. Work on the mast should be carried out on a calm day if possible. No one should be in the danger zone of the generator mast.

During all work on the system, the system must be electrically disconnected from the battery. The rotor must be prevented from starting during work by tying down a rotor blade or by short-circuiting the three AC cables, otherwise the charge controller could be destroyed. The electrical installation must be completely finished before the battery should be connected.

3. Technical data

3.1 Super Silent 400

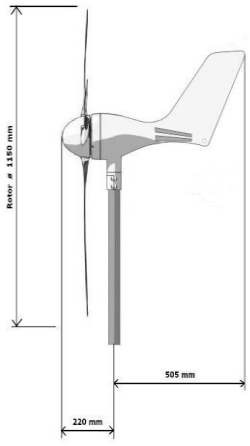
3.1.1 Electrical data

Generator type	Permanent magnet generator, 3-phase, AC
Nominal voltage	12 Volts DC / 24 Volts DC / 48 Volts DC (controller with WIFI)
Nominal power	400 Watts 450 Watts 500 Watts
Nominal wind speed	12 Meters / Second
Start-up wind speed	2,2 Meters / Second
Start of charging*	2,5 Meters / Second

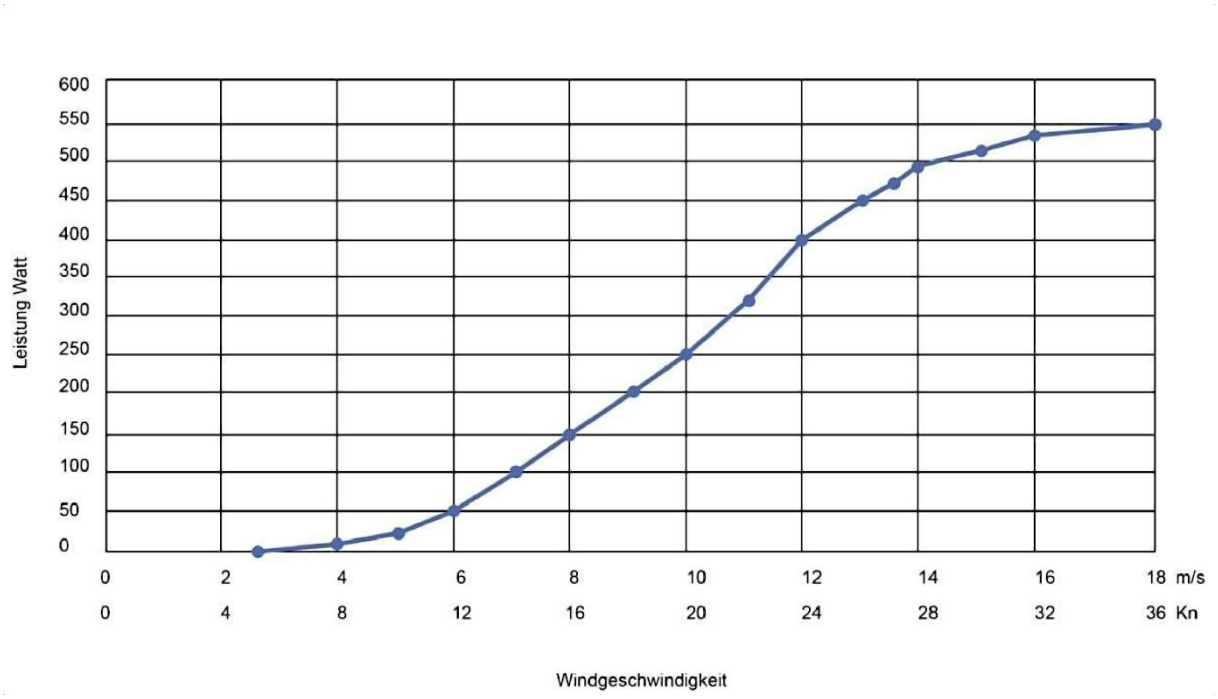
* The start of charging also depends on the charge level of the battery!

3.1.2 Features, dimensions, space requirements

Safety test in the wind tunnel	Up to 5000 rpm, speed of sound at the tip of the blade. Successfully completed.
Rotor diameter	1150 mm
Rotation diameter generator	1010 mm
Number of blades	3
Blade weight	approx. 165 grams per blade
Rotor blade material	carbon fiber hand-laminated
Charging starts	Ca. 300 rpm
Weight	7 Kg
Casting	cast aluminum: white powder-coated (2x)
Total length of generator	725 mm



3.1.3 Performance Curve Super Silent 400 – 12 Volt:



3.2 HYBRID CHARGE CONTROLLER:

The hybrid charge controller should be installed vertically in a place that is as cool as possible near the batteries. Warning: Outgassing is possible, with the risk of explosion, particularly with lead-acid batteries! Make sure there is sufficient ventilation! The charging criteria are set using the external hybrid charge controller with boost function supplied. The final charging voltage is adjustable for lead-acid, gel, AGM and lithium batteries. Please follow the battery manufacturer's instructions!

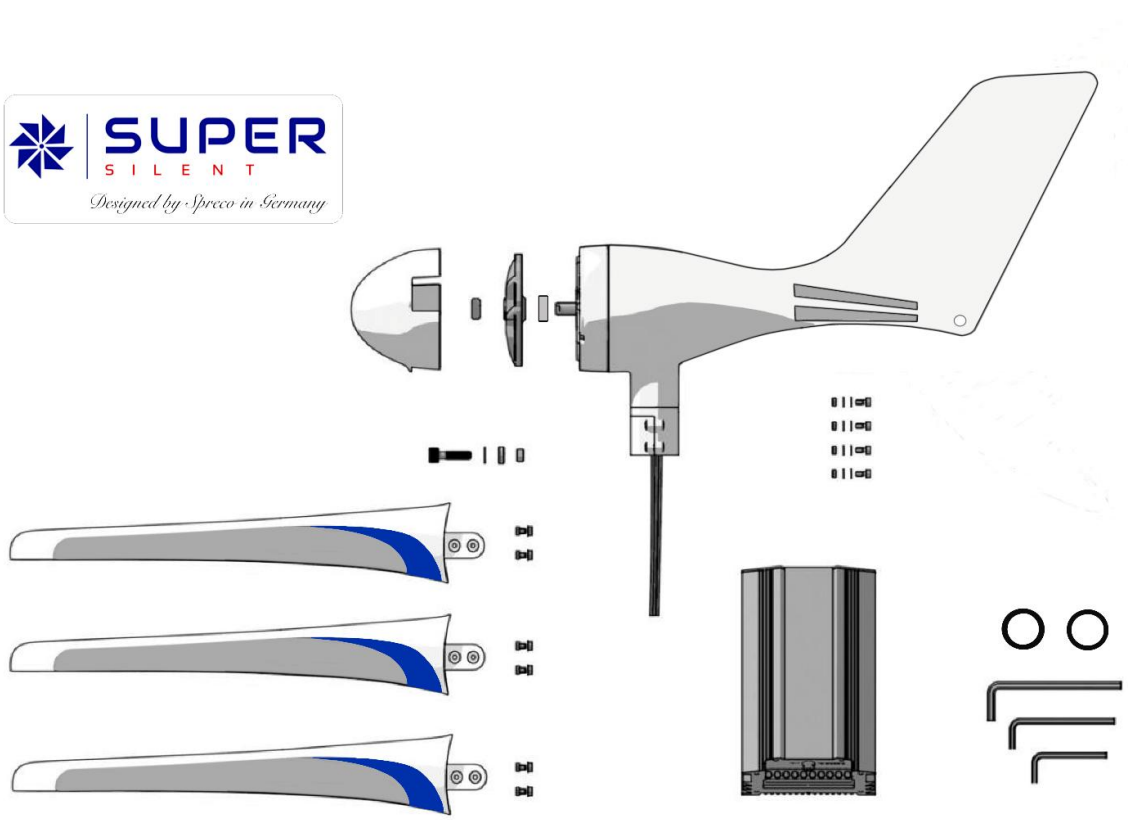
3.2.1 ELECTRICAL DATA:

System voltage	12 V	24 V	48 V
Max. input power wind generator	400 W	450 W	500 W
Max. input current wind generator	33 A	19 A	10 A
Max. input power solar	800 Wp	800 Wp	800 Wp
Max. input current solar	80 A	40 A	20 A
Max. open circuit voltage input solar	24 V DC	36 V DC	72 V DC
Multifunction display + LED	W-V-A-kWh-Ah		

3.2.2 DIMENSIONS / WEIGHT:

Weight:	7.0 Kg	Dimensions:	755 x 415 x 220 mm

4. SCOPE OF DELIVERY:



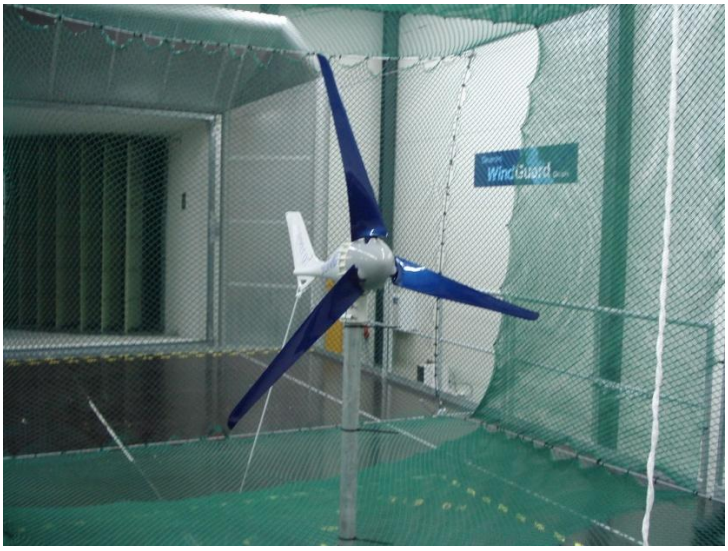
Generator powder-coated	1	set of rotor blade screws	1
Rotor blade hub (aluminum)	1	Allen key 4 mm	1
Nose, ABS	1	Allen key 5 mm	1
Rotor blade carbon fiber	3	Allen key 8 mm	1
Hybrid charge controller set	1	Spacer ring 4 and 7 mm	1
Quick installation guide	1	Nut for shaft	1

5. BEFORE ASSEMBLY:

5.1 FUNCTIONAL DESCRIPTION:

All wind generators use the kinetic energy contained in the wind. The rotor blades convert some 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 of the wind speed. This means that doubling the wind speed leads to an eightfold increase in power. This is especially important to consider in storms.

Our rotor blades are made from carbon fiber using a hand-lamination process with epoxy resin. This material offers the highest strength at the lowest weight. This means that the newly developed blades are light and cannot be destroyed by air forces during operation.
The rotors were tested in the wind tunnel at up to 5000 rpm, with the blade tips reaching the speed of sound.



For safety reasons, the generator housing also contains a patented high-wind brake. 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 bimetal switch and is released again after it has cooled down.

5.2 CABLE DIMENSIONING:

Please note: Undersized cable cross-sections lead to poor performance and pose a significant risk of overheating of the cables, which could result in fire! If in doubt, choose a cable cross-section one size larger!

System voltage 12 volts:

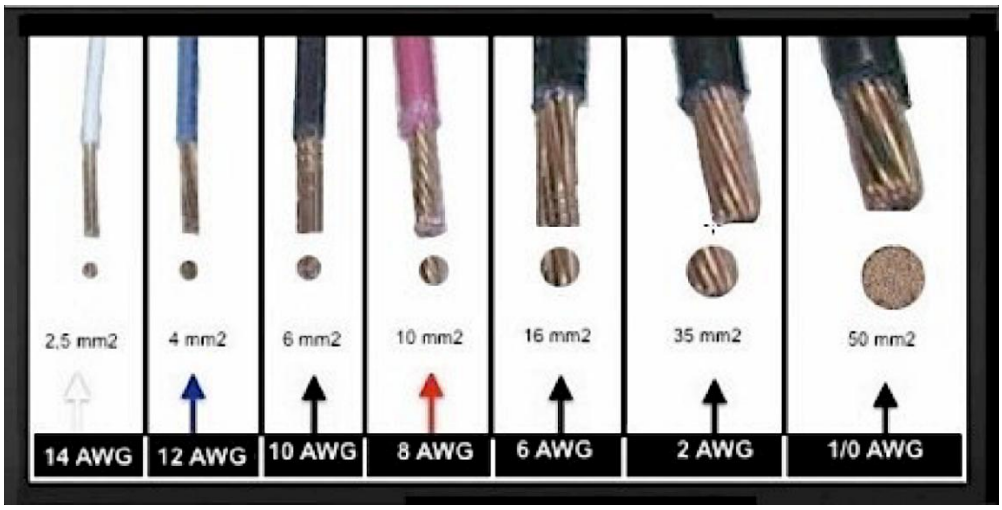
Distance from the wind generator to the charge controller in meters	0 – 9	10-19	20-29	30-44	45-69	70-110
Cable cross-section in mm2	6	10	16	25	35	50
AWG	10	8	6	4	2	1
Distance from charge controller to battery in m	0-9	10-19	20-29	30-44	45-69	70-110
Cable cross-section in mm2	10	16	25	35	N/A	N/A
AWG	8	6	4	2	N/A	N/A

System voltage 24 volts:

Distance from the wind generator to the charge controller in meters	0 – 10	11-19	20-29	30-44	45-69	70-110
Cable cross-section in mm2	2,5	4	6	10	16	25
AWG	14	12	10	8	6	4
Distance from charge controller to battery in m	0-9	10-19	20-29	30-44	45-69	70-110
Cable cross-section in mm2	10	16	25	35	N/A	N/A
AWG	8	6	4	2	N/A	N/A

System voltage 48 volts:

Distance from the wind generator to the charge controller in meters	0-29	30-79	80-99	100-150
Cable cross-section in mm2	2.5	4	6	10
AWG	14	12	10	8
Distance from charge controller to battery in m	0-29	30-69	70-99	100-150
Cable cross-section in mm2	4	6	10	16
AWG	12	10	8	6



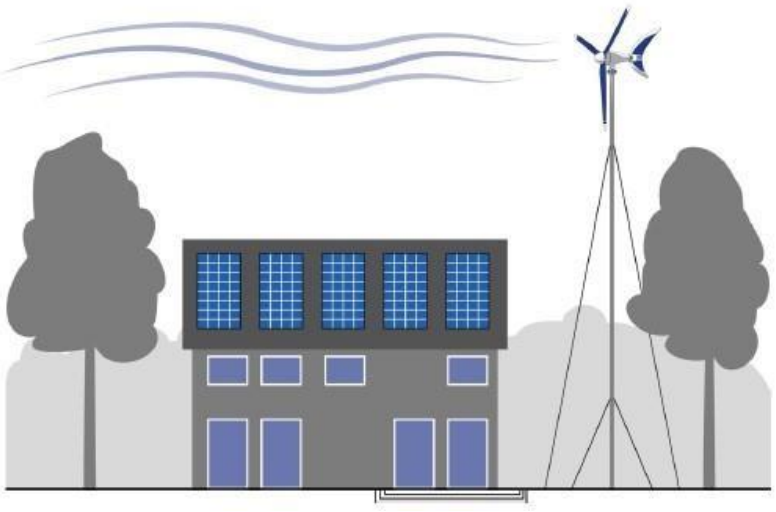
5.3 SELECTION OF LOCATION:

Before you install the wind generator, you should find the optimal location. This is often the most difficult task. Ideally, the wind should always be evenly blown across the rotor blades. This requires that the wind generator is installed high enough and free of obstacles.

5.4 STATIONARY INSTALLATION:

The required installation height depends on how much the surrounding objects deflect the wind from the main direction. To do this, you can first carry out a simple test by attaching a plastic band approximately three meters long and four centimeters wide (available from hardware stores) to the Top of a pole that is at least 4 meters long and then attaching a second band two meters lower.

If the upper band blows 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 estimate and should only be carried out in moderate winds. We recommend making several attempts to get a better feel for it. You do not need to do this test if the wind generator is completely free-standing.



5.4.1 MOBILE INSTALLATION ON A SAILING YACHT:

The installation height must be selected so that no crew member is 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 stresses that occur, especially in rough seas. We recommend an additional double stay to the railing or, better yet, directly to the deck of the ship. To prevent the mast from swinging, we recommend attaching the stay approximately 25cm below the blade on the mast.

Note: Please remember that the Super Silent 400 can never achieve its full performance if it is not in the main wind direction or is deflected. Therefore, it is important to find a suitable location that is free of obstacles in the main wind direction!

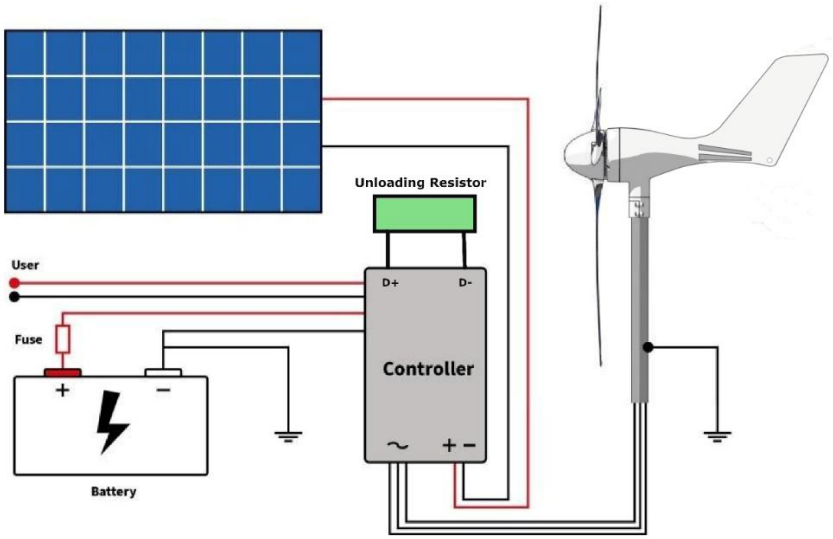
Once you have found the right location, you need to select the right mast and accessories. The mast outer diameter should be 48 mm and made of stainless steel with a wall thickness of at least 2.5 mm. Please also think about possible maintenance work. Grounding the mast is also recommended. For sailing yachts, the grounded sailing mast is suitable for this.

5.5 REQUIRED TOOLS:

For assembly you will need wire end ferrules, cable connectors, wire strippers, crimping pliers for wire end ferrules, shrink tubing or insulating tape, wrenches and various screwdrivers.

6. ASSEMBLY:

Please follow the instructions for mast mounting and connecting the charge controller in the respective operating manuals! Please note the special features of grounding on metal ships!



6.1 ASSEMBLY OF THE MAST:

Install the mast according to the mast manufacturer's instructions and ensure that there is sufficient support, preferably double support. The mast should have a diameter of 48 to 50 mm and a wall thickness of 2.5 mm.

When mounting on a boat, we recommend using screws that go through the deck, as screwed-in screws tend to loosen under the constantly changing load moments. Observe the safety instructions mentioned above! Make sure that the rotor circuit cannot be reached by a crew member under any circumstances during regular ship operation! There is a risk of serious injury!

Make sure that no one is in the danger zone when installing the mast!

Once the mast is mounted in the right location, the simple installation of the **Super Silent 400** can begin.

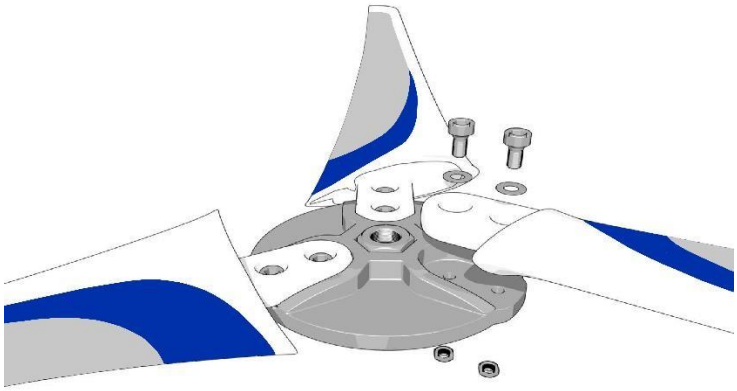
6.2 INSTALLATION OF THE GENERATOR:

We recommend the following order:

1. Mounting the rotor blades on the blade holder (hub)
2. Mounting the generator on the mast
3. Mounting the hub with the rotor blades on the generator and the nose

6.2.1 MOUNTING THE ROTOR BLADES IN THE BLADE HOLDERS:

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

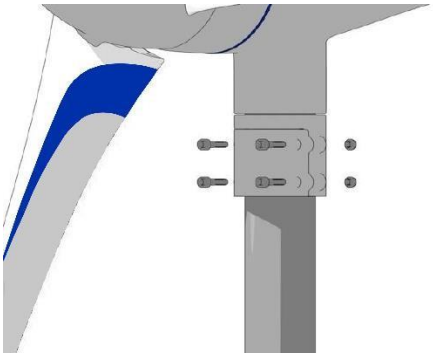


(symbolic image)

The rotors are automatically centered by the shape and design of the hub disk (conical mount). The three blades in a set have exactly the same blade weight. Blades from different sets cannot be assembled together, as this is likely to cause imbalances. Incorrect tightening torque poses a significant safety risk.

Check the rotor blades regularly to ensure they are firmly seated, visually and mechanically. If a blade is damaged by external influences, a single blade can be ordered by providing the exact blade weight.

6.2.2 INSTALLING THE GENERATOR ON THE MAST:



When working on a boat, it is advisable to secure the generator with a rope to prevent it from falling! Only work on the wind generator on windless days! First connect the cables for the supply line to the charge controller.

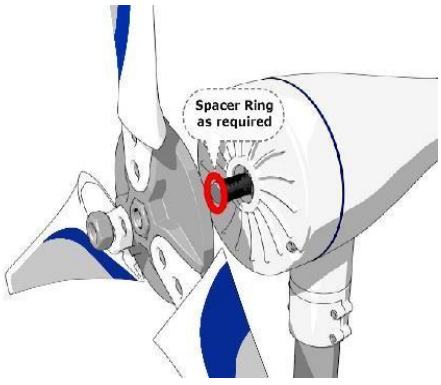
These are laid in the mast. We recommend that you leave enough reserve cable length so that assembly and possible disassembly is easier!

Now attach the plastic insert, which is used for noise isolation, to the End of the mast.
Tip: It may be easier if you first fix the plastic insert with some adhesive tape! Now slide the generator over the plastic insert and tighten the 4 fastening screws alternately and evenly.

Check that the screws are firmly in place a few days After the first installation!

6.2.3 MOUNTING THE HUB WITH THE ROTOR BLADES ON THE GENERATOR AXLE:

Now put the supplied 3.5mm spacer ring and the rotor set onto the generator axle and screw it tight with the enclosed nut and the enclosed Allen key. Tightening torque approx. 30Nm. Then put the nose (hub cover) on from the front until it is fully engaged on all three sides.



Attention When working on the rotor, you must ensure that the rotor cannot start. The 3-core AC cable must be short-circuited by securely connecting all three cable ends (near the charge controller). Otherwise, the rotor may start and you may injure yourself. Alternatively, you can tie a rotor blade to the mast with a piece of rope.

Disassembly is carried out in reverse order.

7. COMMISSIONING:

Before you start using your **Super Silent 400**, you must first connect the charge controller to the battery pole correctly (!). Don't forget the 60A fuse in the positive cable near the batteries! Now connect the three AC cables coming from the generator to the charge controller. There is no need to pay attention to the polarity. Follow the instructions in the charge controller manual!

Before commissioning, please check the correct assembly and installation using the following checklist:

OK	CONTROL
	Mast construction (not included in delivery); check according to enclosed instructions, especially all screw connections, guy wires, vertical alignment.
	Is earthing and lightning protection connected according to local regulations?
	Electrical installation: Check the battery condition. Is the charge controller pole correctly connected to the battery?
	Charge controller: Is the charge controller securely attached to the installation location? (Choose a cool location) Connect the battery with the correct polarity, otherwise the controller will be destroyed (guarantee voided!). Attention: Always connect the battery to the charge controller first!
	Are all screw terminals tightened? Is the external stop switch (option) set to ON? CAUTION: Mount the discharge resistor at a safe distance from flammable materials. It can become very hot.
	Circuit breaker: Circuit breaker, at least 60 amps, connected between battery and charge controller?
	Cables: Are all cables/lines connected according to the connection plan? Has the polarity of the lines been checked at all connection points? Is the three-pole cable from the generator to the charge controller connected? Are the cables correctly crimped?
	Mast mount: Is the damping rubber on the mast mount correctly and precisely inserted and checked for tightness?
	Rotor blades: Has the assembly been carried out according to the instructions?
	Wing hub disc: Is the hub disc mounted on the generator shaft? Is the spacer ring mounted or not necessary? (included) Is the central fastening screw tightened to 30 Nm?

If you have completed the checklist without any problems, **YOU CAN START NOW!**

8. STARTING AND STOPPING:

Set the external stop switch (available from the user or optionally in our shop) to “ON”. If the positive/negative cable is connected to the battery with the correct polarity, the wind generator should now run if there is enough wind. You can read this on the LCD display of the charge controller. (The blade symbol rotates).

9. CHARGING INDICATOR:

The charge level is shown on the display of the charge controller. The blue LED on the bottom of the housing lights up.

10. CONTROLS:

Your Super Silent 400 is designed for years of operation without any maintenance. However, simple and regular checks are always necessary to ensure the necessary operational safety.

Attention

Your safety is important to us!

Before you start checking, make sure that the rotor is stopped and the battery is disconnected from the system during any work on the system.

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

10.1 ROTORS:

Check the rotors for possible damage, such as broken edges, surface damage, cracks. If you find any damage, do not continue to operate the generator. Check the screw connection after one day of operation and then after one month. After that, you can move to longer intervals.

10.2 SCREW CONNECTIONS:

Check all screw connections accessible from the outside to ensure they are tight and have the correct tightening torque. The rotor blade screws, the central hub nut and the mast fastenings should be checked in particular.

10.3 BEARINGS AND SEALS:

The bearings of the generator shaft and the azimuth bearing for the wind tracking are designed as

permanently lubricated ball bearings. Please check these bearings for smooth running, bearing play and tightness. Please replace defective bearings or have them replaced by a service center. The rotor is supported on both sides and therefore has a longer service life and runs more smoothly due to the more even load.

10.4 CORROSION PROTECTION:

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

10.5 ELECTRICAL SYSTEM:

Please bring the wind generator to a standstill first so that all cables are de-energized. Check all connection points for tightness and corrosion. Remove any corrosion that may have occurred and treat with contact spray.

You should pay particular attention to the battery connections. These should be cleaned and treated with pole grease. The battery should be checked and repaired according to 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 Super Silent 400, was 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 resolve it yourself using the following checklist:

Wind generator does not start:

Possible cause	**Test**	**Remedy**
Stop switch is set to “STOP“	N/A	set “RUN” or “On”
Generator shaft stiff	Try turning by hand	Connection cable from generator to charge controller damaged, short circuit in AC cable, generator short circuit, Customer service
Battery has reached the final charge voltage	N/A	Check voltage

Wind generator does not produce any power:

Possible cause	Test	Remedy
Too little wind	Measure wind speed on the rotor. (Wind speed at the top of the main mast is higher)	Wait for more wind, Start of charging depends on battery charge level, Check charge controller setting
Electrical connection interrupted	Check continuity of cables	Defective cables or replace device
Fuse interrupted	Check continuity of fuse	Replace fuse, or wait for 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 work

Battery is not fully charged:

Possible cause	Test	Remedy
Battery defective	Check battery voltage and capacity with a battery tester. Acid test for open lead batteries	Replace battery, refill with distilled water (not for gel or AGM or lithium batteries)
Fuse defective	Check continuity	Replace defective fuse and find cause of defect

Charge controller connected incorrectly	Check the circuit diagram	Connect correctly
Charge controller, stop switch is set to “STOP”	Set stop switch to “ON”	Follow instructions in operating manual
Generator defective, cables short circuit	Check AC voltage at the input of the charge controller	Check all three cables for short circuits after disconnecting from the charge controller
Charge controller defective, battery polarity incorrect	Check settings according to instructions	Check fuse Repair, customer service, replacement

13. WARRANTY:

SPRECO guarantees that all devices sold by it are free from defects in materials and workmanship within the warranty period from the time of purchase.

The following warranty periods apply:

SUPER SILENT 400 GENERATOR	12 months
MPPT wind/solar hybrid solar charge controller	12 months

If defects in the device arise during this period that are due to defects in materials or workmanship, SPRECO Thailand will repair the device or replace the device itself or defective parts in accordance with the following conditions, without charging for labor and material costs.

Warranty services will only be provided if the warranty certificate, attached to these installation instructions, is completely filled out and the original invoice from the dealer is presented.

The warranty does not cover:

Regular inspections, maintenance, or repair or replacement of parts due to normal wear and tear. Transport, freight costs and freight risks that are directly or indirectly related to this device guarantee. Travel expenses to and from the repair site, troubleshooting, diagnostics and repair work. Damage caused by misuse and abuse of the device, especially when installed on an unsuitable mast. In the event of damage, the buyer must provide proof that the installation was carried out on a suitable mast. Damage caused by force majeure or other causes for which **SPRECO** is not responsible, in particular lightning, flooding, snow load, fire, hurricane, etc.

If the delivery item has to be dismantled and reassembled after repair or replacement as part of the warranty, the dismantling and reassembly costs will not be borne by SPRECO. SPRECO alone will decide whether repair or new delivery is appropriate or necessary. If neither repair nor new delivery is possible, the customer is only entitled to withdraw.

Unless mandatory law provides otherwise, the buyer's claims against SPRECO are limited to these warranty provisions, and neither **SPRECO** nor the distributors of the products assume liability for direct or indirect damages.

All information is reliable. However, the manufacturer assumes no responsibility for inaccuracies or completeness. The user of this information and the product bears full responsibility and risk. All specifications are subject to change without notice.

If you are not using our charge controller:

For information on connecting to a three-phase rectifier (sold separately), please refer to the relevant operating instructions. This allows you to directly provide the energy generated by the wind generator to downstream systems, e.g., inverter input, energy management systems, island systems and balcony power plants.

Proof of Garantie:

NAME:	
ADRESS:	
PURCHASE DATE:	
SUPER SILENT 400 SERIAL NO:	
MPPT HYBRID SOLAR CONTROLLER SERIAL NO:	
DEALER NAME & DEALER ADDRESS:	
TELEPHONE:	
COUNTRY / REGION:	

14. CONTACT DETAILS:

TO BE COMPLETED BY THE DISTRIBUTOR!

Please contact us by E-Mail if possible! We will get back to you as soon as possible!

Thank you!