



Instructions for use / installation manual

SILENTWIND ***12V / 24V / 48V***



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Dear customer

Thank you for buying our product. You have selected a new generation of wind generators.

Compared to traditional wind generators, the essential advantages of our product are:

- safety,
- efficiency
- very low noise emission

You will also profit from our experience of more than 30 years with various wind generators used in offshore sailing. For long distance cruising the availability of electric energy without the possibility of grid connection is essential.

Fair winds at any time

The Silentwind Team

Please note that this manual is part of the product and must be read carefully. Please study the information thoroughly before installing the SILENTWIND. This manual should always be kept near the product and passed on to future owners.

This manual is particularly addressed to the person installing the SILENTWIND. This person should be familiar with electric wiring and the use of appropriate tools. Otherwise the SILENTWIND should be installed by a specialist.

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1. Operation and use

It is certainly an advantage being able to use the renewable energy of both wind and sun combined. You can charge batteries by making use of daylight and wind 24 hours per day. Our hybrid charge controller is suitable for both sources, wind and solar (maximum 40A wind and 20A solar power).

You can also charge the batteries of an electric vehicle with this unit.

Further applications are:

Any location without an electricity grid connection, research units, traffic management systems, emergency systems, street lamps, billboard illumination, projects in developing countries, wireless LAN access points, holiday homes with inverters for independent provision of electricity, wherever there is no grid connection available or too complicated to install.

The SILENTWIND is light and aerodynamic. It is possible to connect several wind generators if your energy demand is high. As noise emission is very low you can operate the SILENTWIND in residential areas and on sailing yachts without annoying your neighbours.

Our charge controller HYBRID BOOST is suitable for 12, 24 or 48 volt usage and can be connected to the SILENTWIND and solar panels.

Another advantage of the SILENTWIND is that it does not have any inbuilt control electronics, which means that there is hardly any maintenance work on a functioning SILENTWIND generator. The electric power is connected to the charge controller by 3 cables.

The hand laminated carbon fibre blades were successfully tested in a wind tunnel up to wind speeds of 35 m/s (63 knots) according to DIN EN 61400-2. Therefore you need not worry about the SILENTWIND in any storm conditions. For maintenance work there is an additional manual stop switch.

2. Safety instructions

Due to the high RPM and electric energy that wind generators create, care should be taken in their operation. Therefore, thoroughly read the following safety instructions.

2.1. Mechanical risks

For a number of reasons the turning rotor system must be handled with caution. You cannot see the end of the blades in high wind speeds so you may not recognise the inherent danger. Due to their aerodynamic shape the blades have very sharp edges which can cause you severe injury in high wind conditions.

Never ever try to touch the turning rotor system!
Never ever try to stop the turning rotor system manually!

Make sure that you install the wind generator in a position where nobody can touch the blades. On boats, always ensure it is mounted a sufficient height above the deck. The blades are produced from carbon fibre, which is extremely hard and therefore potentially dangerous at high wind speeds. Always keep clear of the turning blades in all circumstances. However, Blades can break due to ropes or other objects touching them in very strong winds.

If one of the blades is damaged, immediately activate the BRAKE function using the stop switch on the charge controller. If one of the blades is damaged, the rotor system will be out of balance which may be a risk for the whole mounting construction. This has to be considered before mounting the wind generator in a safe position.

Before you install the wind generator on a mast make sure that the 3-phase wiring is disconnected from the charge controller and the three wires shorted together. This has the same effect as the BRAKE switch on the controller but should be the method used during installation. If possible, it is best to attach the hub with the blades to the shaft at the very end of the mounting procedure. The mast must be well secured so that it is safe in strong winds and adverse sea conditions. Additionally, the mast and the mast stays should be assembled in such a way that vibrations will be not magnified. Please ask a professional who is able to assess the load that the mounting system can handle in strong wind conditions.

2.2. Electrical risks

A running wind generator can generate a considerable AC voltage and current per phase. Only connect the components if you are familiar with electric wiring. The high voltage can cause serious injury and fire if you do not pay attention to safety. **Caution** is recommended for people with cardiac pacemakers, etc. Never touch the open end of the wires. The current when charging the batteries can reach more than 30A. The whole wiring and connection points must be able to carry a current of 40A. Information about suitable cable size is on page 9.

Warning: Wires with inadequate diameter can cause fire.

Make sure all wires are placed so that mechanical damage cannot occur. A damaged cable is a severe safety risk. Install a fuse between the charge controller and the battery positive pole; as close as possible to the battery. The required value of the fuse depends on the rated current of the wind generator and solar panels connected to the charge controller. Please contact a professional for this purpose. We recommend a fuse with the double nominal current of the connected devices.

Warning: When connecting charge controller to the battery, sparks can occur.
A short circuit is to be avoided.
Always ensure sufficient ventilation!

Only persons with appropriate technical skills and knowledge should carry out the electrical installation. Before a storm the SILENTWIND should be manually stopped with the stop switch on the charge controller. In case of storms we recommend fixing one rotorblade to the mast due to the risk of damage by flying objects.

2.3. Installation risks

Only use or build mounting/support systems that can handle the load of the generator and the blast pressure of the wind in any condition.

Working on the mounting system should only be carried out on a calm day. Make sure that nobody is close to the mast.

Disconnect the battery from the charge controller when working in the system. The turning of the blades must be avoided by fixing one blade to the mast. If not the charge controller will be destroyed.

3. Technical data

3.1. Wind generator

3.1.1. Electrical data

Type of generator	Permanent magnet generator, 3 phases, AC
Rated voltage	12 VDC / 24 VDC / 48 VDC
Rated power	420 Watt / 450 Watt / 500 Watt
Rated peak power at	14.5 m/s
Start up speed	2 m/s
Start of charging	2.2 m/s
Charge indicator	Blue LED on the bottom of housing

3.1.2. Mechanical data

Safety test in wind tunnel	122 km/h without failure
Rotordiameter	1.15m
Number of blades	3
Weight of blades	150g/blade
Material of blades	Carbon fibre, hand laminated
RPM range	550 - 1700 Upm
weight	6.8kg (Generator)
Package dimensions	780x400x210mm weight: 10 kg
Colour	white RAL 9010, powder coated
Warranty	36 months

3.2. Charge controller

- Charge and power management in the provided external hybrid-charge controller Hybrid BOOST
- Maximum voltage adjustable for acid, gel and AGM batteries.
- Brake mode: electronically or manually with integrated Stop switch (see enclosed manual)

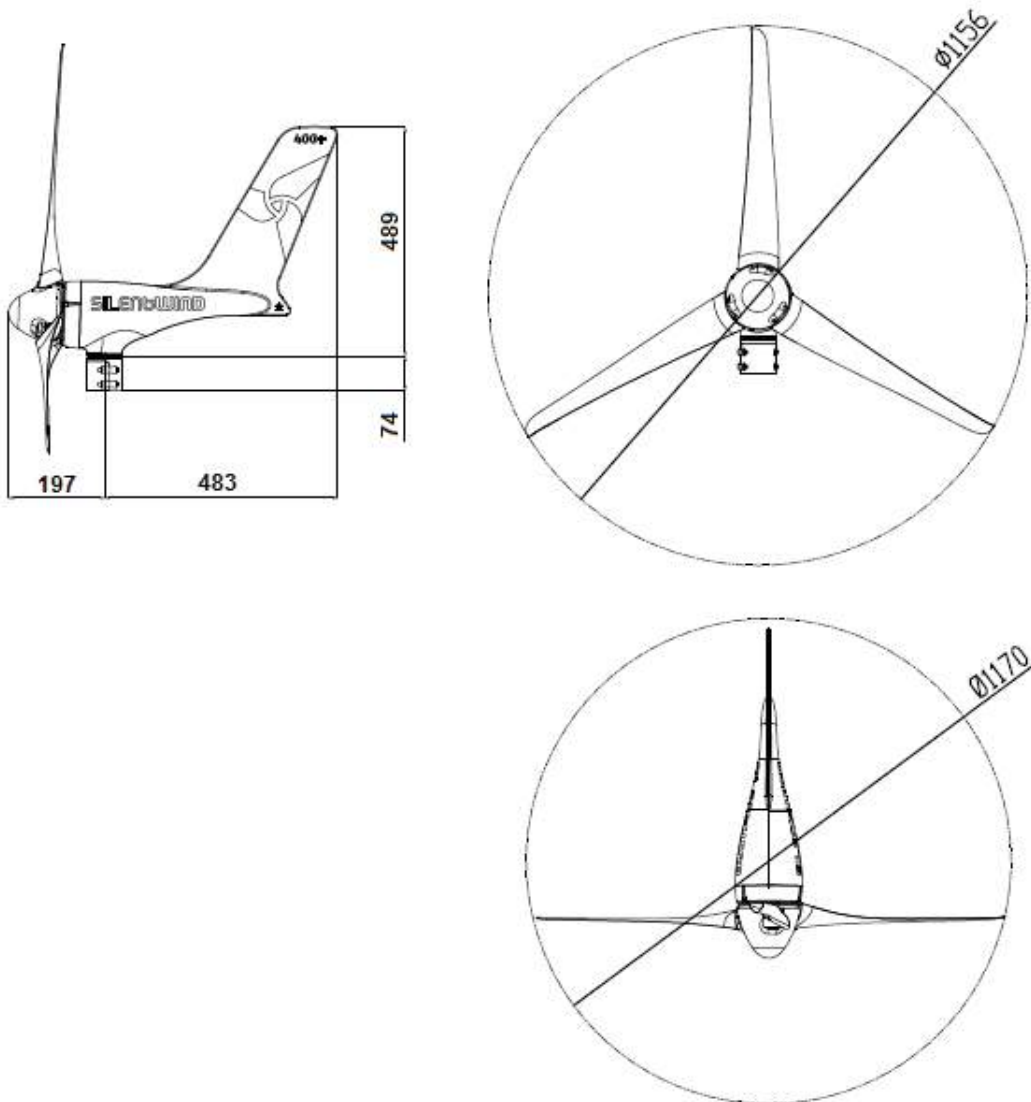
3.2.1. Electrical data

System voltage	12/24/48 VDC
Max. power input wind generator	600 W
Max. current input wind generator	40 A
Max. power input solar	300Wp
Max. current input solar	20/ 10/ 5 A
Max. open circuit voltage input solar	50VDC
LCD + LED displays	W, V, A

3.2.2 Mechanical data

Weight	2.80kg (controller)
Package dimensions	220x150x82mm
Warranty	24 months

3.3 Dimensions



3.4. Installation Recommendation for Silentwind Wind Generator

Cruising vessels/motorhomes equipped with wind generators typically have a dedicated mast used as the mounting post for the wind generator.

Silentwind is very well engineered with quality bearings, housing and the whisper quiet blades which make it one of the quietest small wind generators available. However, vibrations generated by all wind generators will be transferred down into the vessels hull or the motorhomes walls via the mast and the fittings. These are called 'harmonics'.

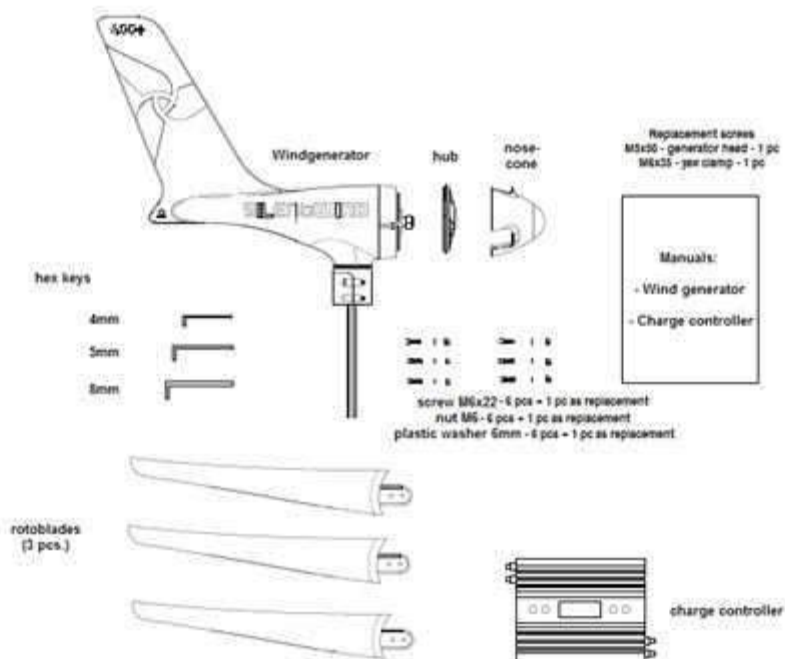
Therefore how the mast is fitted to the deck/motorhomes is one of the most important parts of the installation.

In order to eliminate harmonics and get the best performance out of the wind generator we recommend the following when installing on a yacht/motorhome:

- 1) Do not position Silentwind in line with a backstay or centered position on your stern. It needs to be positioned above the bimini, coach house or any other construction. To work most efficiently and with the lowest noise emission all wind generators need 'clean air'. During our own wind tunnel testing it was clearly proven that any turbulence influenced wind generator performance. Any power output data (Amps) are measured with the wind speed at the generator height not on top of mast.
- 2) Avoid attaching the mast on any existing structure; for instance, a frame which holds solar panels, biminis, rail fittings etc.
- 3) The three AC cables need to have the same diameter and the correct mm²/AWG.
- 4) Make sure the electrical connections (crimping) are done 100%. Any voltage drops can influence the control of brake functions. Use tinned copper cables for marine installations.
- 5) The distance between the blade tips has to be the same. Take a measuring tape and measure the distance from all three tips of the blades and adjust accordingly. (Approximately 990 mm)
- 6) The arrow on the central nut should point towards generator head. Do not over tighten the central nut.
- 7) All brackets, like mast clamps, need rubber strip insertions (3–4 mm thickness and of medium density) between parts.
- 8) Use the supplied rubber insert between the generator and the mast.
- 9) An upper mast bracket should be installed approximately 20 cm below the lowest part of the blades tip to stabilize the mast. The mast should be as short as possible but high enough that the blades do not interfere with any objects and nobody can get hit by the blades. Make sure that Silentwind gets 'clean air'.
- 10) Use rubber inserts between deck and mast base, rubber washer for screws or bolts to remove any latent vibrations before entering the hull/motorhome.
- 11) After a week or so check the central nut which connects rotor hub to shaft for tightness. Also check the 6 bolts which fix the blades to the hub.
- 12) To avoid any damage to the powder coated aluminum housing please touch up any scratches, chipping of paint work during installation. Sea water will penetrate the scratches and peel off the paint slowly.

13) As an additional precaution against electrolytic corrosion between dissimilar metals, you can use 'Duralac' or 'Tefgel' on the 4 yaw bearing mast bolts/nuts.

4. List of enclosed parts



All provided information is reliable. RULIS Electrica, Lda. will not be liable for damages resulting from a wrong installation and/or operation of the wind generator. All specifications are subject to change without notice.

5. Operation description

All wind generators use the kinetic energy of the wind. This energy is captured by the turning motion of the blades and consequently transformed into 3-phase AC power. The energy output increases in line with the wind speed, exponentially. This means that doubling the wind speed generates octuple power. This must be especially considered in storm conditions.

Our **spb^Ω** blades are made of high-tensile carbon fibre and are hand laminated with epoxy resin. This material provides the maximum consistency with the lowest weight. This material is also used in Formula 1 and aerospace industry. Therefore these carbon fibre blades are extremely light, but can resist even the strongest wind conditions. They have been successfully tested at German WindGuard – according to (DIN EN61400-2 VDE 0 127-2) at windspeed of 122 km/h at 5480 RPM. This is an equivalent of sonic velocity at the tips of the blades. For everyday use and safety reasons we have equipped the charge controller with an automatic electronic and manual stop switch.

6. Diameters of cables

System voltage 12 Volt

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

System voltage 24 Volt

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

System voltage 48 Volt

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

7. Installation

Before mounting the SILENTWIND onshore find a suitable position for the wind generator. It is an ideal position if the wind flows against the blades without any obstructions. The generator should be mounted as high as possible.

Fixed/land installation:

The height depends on the distraction of the wind by surrounding objects. You can simply test this by fixing a 3 metre long by 4 cm wide strip of plastic at the top of a 4 metre (or longer) pole. You can use a second strip at 2 metre height. Note: This does not apply when mounting the wind generator on boats.

If the upper plastic strip flows horizontally or up to 30 degrees from the horizontal you have found the suitable position. In case the plastic strip shows more than 30 degrees from the horizontal or turns round the mast, the position is unsuitable. This test should be carried out at moderate wind conditions and only gives an orientation.

We recommend doing a number test for an optimal site assessment. However, you do not need to do this test if the wind generator is mounted far away from obstructions. You can also get help from a specialist on small wind generators.

Installation on a sailing boat:

The assembly height must be chosen in a way that no member of the crew is endangered by the rotor blades. The mechanical fixation of the mast foot has to withstand the mechanical loads occurring specially in rough sea conditions. We recommend additional rigging to the sea rail or the deck of the ship.

Note: Please note that the SILENTWIND can never be fully efficient if it is not mounted in the prevailing wind direction or distracted by obstructions. Therefore it is important to find a position without obstructions!

Having found a suitable position, an appropriate mast with suitable hardware must be chosen. **The outer mast diameter must be 48mm** and it should be made of stainless steel or aluminum. Please also consider possible future maintenance work. The mast with mounted wind generator should be able to take a wind blast pressure of 250 Nm. Earthing of the mast is highly recommended. On boats you can use the central earthing point for mast and engine. Ask a specialist for advice.

Once the mast is mounted you can start the relatively simple installation of the SILENTWIND. First connect the 3 carbon fibre blades to the assembly hub (see page 15, sketch 4) with the enclosed screws (page 16, sketch 9, assembly- and safety instructions inside the rotor-blade box). The enclosed nylon discs protect against electrolytic corrosion. The fastening torque is 7-8 Nm equivalent to a weight of 7-8 kg on a 10 cm long lever arm, upright to the lever arm.

If the fastening torque is too high, this will destroy or damage the blades. If the fastening torque is not high enough, the blades can get lose. A wrong fastening torque is a considerable safety risk.

Before the final tightening of the blade screws, make sure that the distance between the blade tips is exactly the same, in order to avoid vibrations. **Move each rotorblade in running direction towards the edge of the blade guide of the hub. The running direction is clockwise looking from the front.** Then fix the blades as described above. The blades should then be 'in balance': The blades have been balanced statically and dynamically.

In case of damage of only one blade you can buy a single one. When ordering one blade, be sure to inform RULIS Electrica, Lda. on the exact weight of the undamaged blades.

**An incorrect tightening torque represents a significant security risk.
Regularly control the fixation of the blades!**

After attaching the blades to the hub, the set is fixed to the generator shaft with the enclosed screw nut (use the enclosed hexagon socket screw key). After that, snap the nose cone into place on the assembly hub. (see page 17, sketch 5, 6 and 7)

Then you must connect the three AC outlet cables which have to be led from the SILENTWIND to the charge controller.

Attention During this procedure the 3 AC wires of the extension cable at the end must be connected together. Otherwise the rotor system may start running and you can get injured.

Finally you mount the SILENTWIND on the mast. Fix the 4 hexagon screws to the yaw clamp after inserting the rubber pad (see page 18, sketch 8)

When tightening the screws take care for a uniform, circumferential tightening of the 4 screws. The tightening should be made with small increments in order to avoid damaging the marine grade painting.

8. Getting started

Before getting your SILENTWIND started check the correct mounting and installation according to the following check list:

OK	Test
	<p><u>Mast construction:</u> Optional; check according to instruction, especially all screw connections, bracing, vertical position. Grounding and lightning protection according to local regulations?</p>
	<p><u>Electric installation:</u> Check battery status and correct polarity</p>
	<p><u>Charge controller:</u> Charge controller securely fastened to the mounting location? battery connected with correct polarity, otherwise controller will be destroyed Caution: Connect always first the battery to the charge controller. Are all screw terminals firmly tightened?</p>

	Is stop switch in position “O”?
	<u>Fuse:</u> Fuse connected as close as possible to the battery?
OK	Test
	<u>STOP switch:</u> If a stop switch from a previous installation is installed in the connection cable at the AC- or DC-side of the charge controller, it must always be removed or secured against switching off. The activation of the stop switch while the wind generator is running will immediately destroy the wind generator and/or the charge controller.
	<u>Wiring:</u> All cables connected in line with plan? Check the polarity of all wires in the screw connection poles. Is the 3-phase cable of the SILENTWIND connected to the charge controller? Are the cables correctly crimped and is the strain relief inserted?
	<u>Yaw shaft:</u> Is the rubber pad well placed?
	<u>Rotor blades:</u> Mounted in line with instructions?
	<u>Assembly hub:</u> Is the assembly hub fixed to the generator shaft? Is the central screw nut fastened with 30 Nm?

Connect to a 3-phase rectifier (optional) or the included charge controller. Please read the charge controller manual for details on its installation.

Now you can go ahead!

9. Run and Stop

Switch the enclosed stop-switch or the stop-switch of the charge controller to position RUN. If the wires are correctly connected to the battery (without having mixed up the polarity) the SILENTWIND should start charging if windspeed is sufficient. You can control this on the LCD display of the charge controller.

10. Charging indicator

A blue LED at the bottom of the wind generator body shows you if the generator is producing electrical energy. The charging amount is shown on the display of the charge controller.

11. Check ups

Your SILENTWIND was constructed for long term use without any maintenance. However, simple and regular check ups ensure the necessary security.

Safety first!

Before you start the check up, make sure the blades are stopped and the battery is not connected to the charge controller.

The following check ups should be carried out at regular 12 months intervals:

11.1 Rotor blades

Check if the blades show damages like broken edges, damaged surface or cracks. If you notice any damage, the generator must not be used any longer. Check the screwing one day after mounting and after that every 3 months. Eventually then you can turn to a longer interval.

11.2 Screws

Check that all accessible screws are correctly fixed. Especially the hexagon screws from the hub, the central shaft nut and the fixing of the mast must be checked (see page 17, sketch 4, 5, 6, 7 and page 18, sketch 8, 9).

11.3 Bearings and gaskets

The bearing of the generator shaft and the yaw bearing of the shaft are permanently lubricated. Please check these bearings for free movement, bearing play and watertightness. Deficient bearings must be replaced.

11.4 Corrosion protection

The complete housing is made of seaworthy aluminum and additionally powder coated. If the outer layer is damaged, there is a risk of corrosion. Please paint these spots with suitable varnish (RAL9010)

11.5 Mounting system

Check the mounting system for stability and absence of loose screws (if applicable).

11.6 Electrical system

Please first stop the SILENTWIND generator so that all wires carry no voltage. Check if all connections are properly fixed and not corroded. If corroded they must be removed and treated with contact spray. Give special attention to the battery connections: they must be clean and greased with Vaseline. Check the battery in line with the instructions of the producer and (if necessary) refill with distilled water. In the case that more than one battery is used check if all batteries have the same capacity and state of charge.

12. Maintenance

Maintenance of the SILENTWIND is not necessary.
The SILENTWIND is produced for troublefree long-term use.

13. Trouble shooting

In case of problems, however, these can be easily solved by using the following check list:

Wind generator doesn't start to run:

<u>Possible Cause</u>	<u>Test</u>	<u>Solution</u>
Not enough wind	Measure the wind speed (Anemometer)	Wait for more wind, start up speed from 2m/s
Stop switch activated		Switch to RUN
Generator shaft sluggish	Turn manually	Connection wind generator- charge controller damaged, short circuit of AC cables, short circuit of generator, customer service

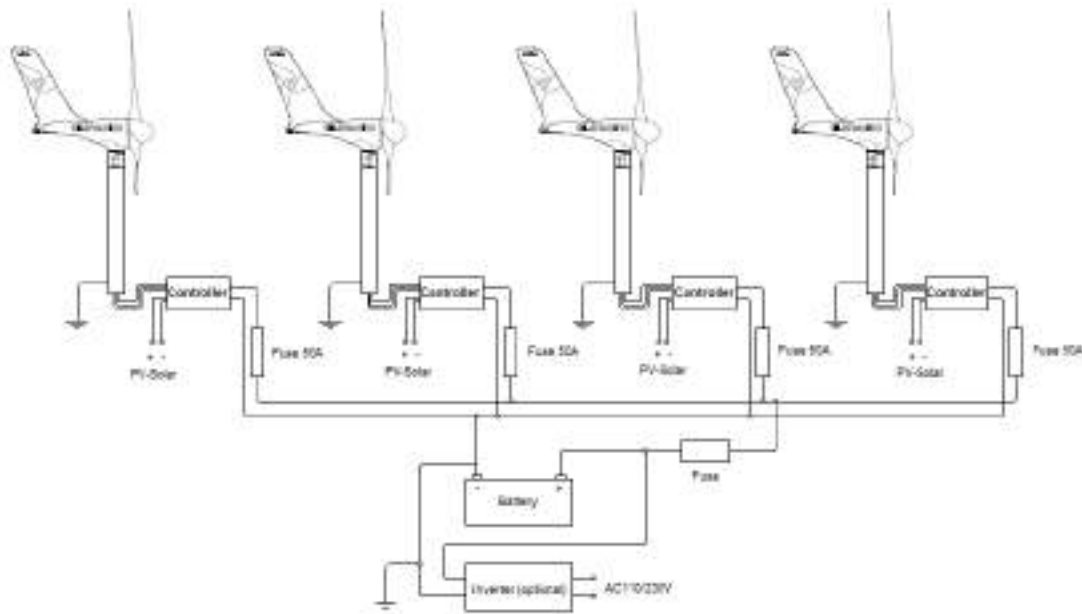
Wind generator doesn't charge:

<u>Possible cause</u>	<u>Test</u>	<u>Solution</u>
Not enough wind	Measure the wind speed at the rotor. (Wind speed on the main mast-top may be higher)	Start up of charging depends on the battery status, check the adjustment of the charge controller
Electric wiring interrupted	Check wires, connections and gadgets	Replace damaged wires or gadgets
Fuse is blown	Check fuse	Replace fuse or cool down the automatic circuit breaker
Carbon brushes in the yaw bearing have no contact	Check carbon brushes and springs	Replace carbon brushes and reactivate springs

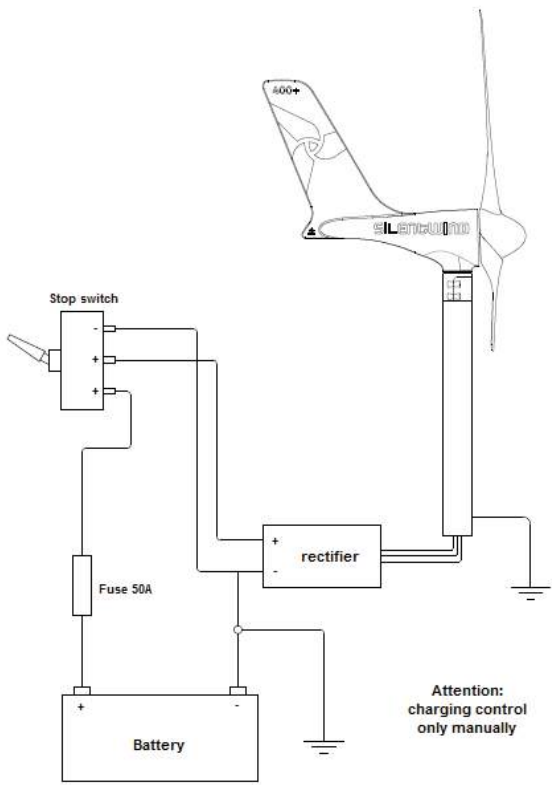
Battery is not fully charged:

<u>Possible cause</u>	<u>Test</u>	<u>Solution</u>
Old, damaged battery deficient	Test battery status and liquid of every battery	Replace battery, refill distilled water (not necessary for gel- or AGM-battery)
Fuse blown	Check fuse	Replace fuse, find cause of deficiencies
Charge controller wrongly installed	Check in line with manual	Correct installation
Charge controller stop-switch is in position STOP	Switch stop switch in position RUN	Observe manual instructions
Deficient generator	Check AC voltage, AC screw terminals	Check all 3 AC cables after disconnecting from charge controller as to short circuit
Deficient charge controller, mix up of polarity	Check adjustments according to instructions	Repair customer service / replacement

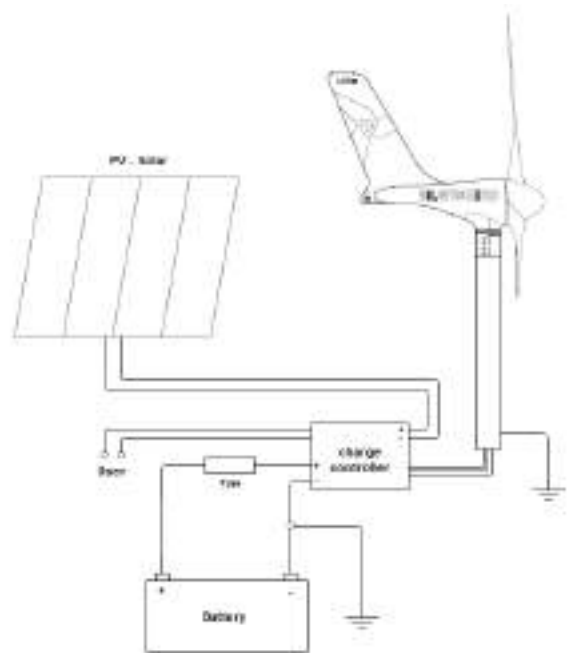
14. Attachment / sketches



sketch 1



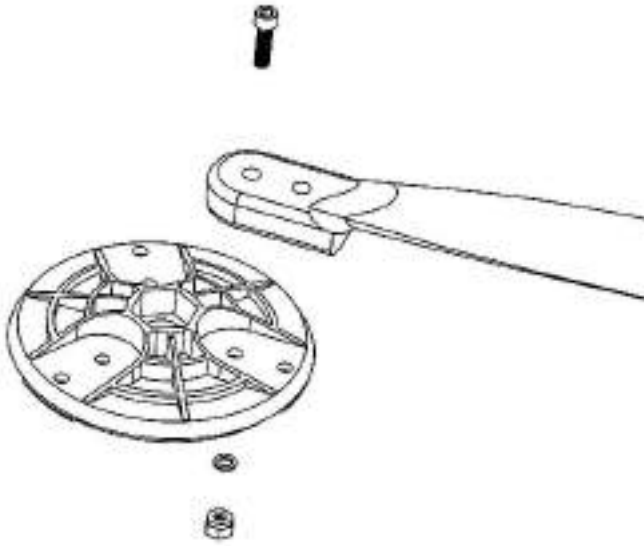
Sketch 2



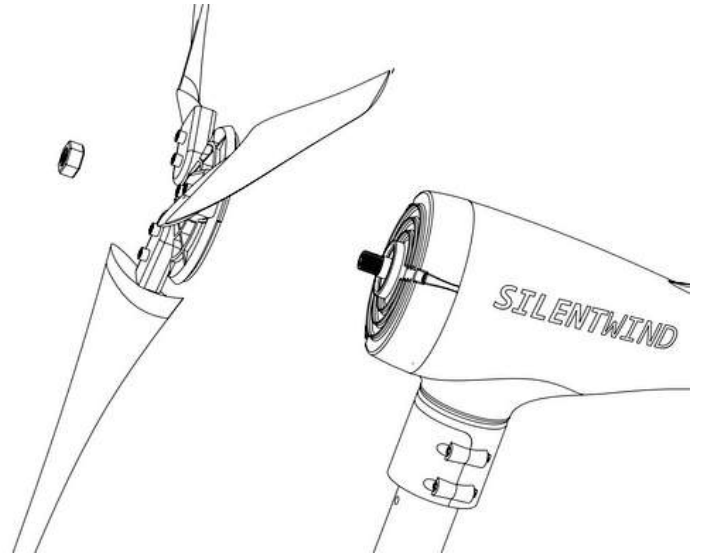
Sketch 3

sketch 2

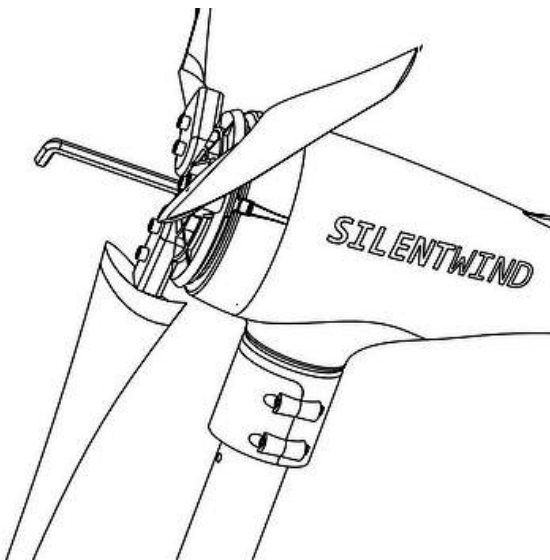
sketch 3



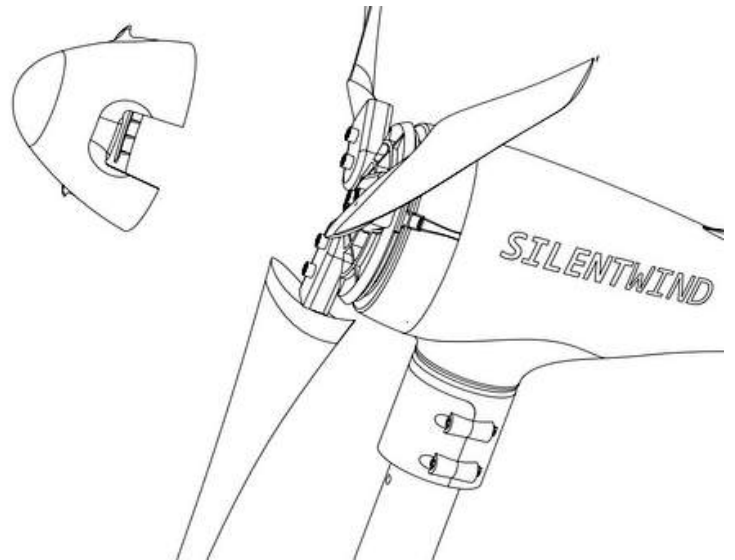
sketch 4



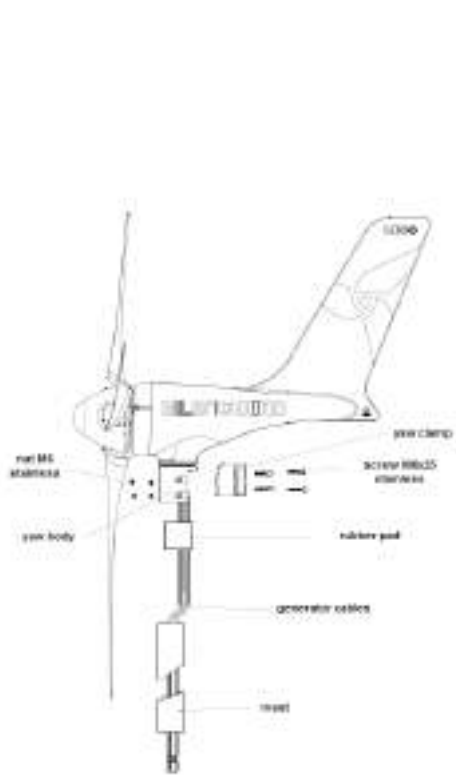
sketch 5



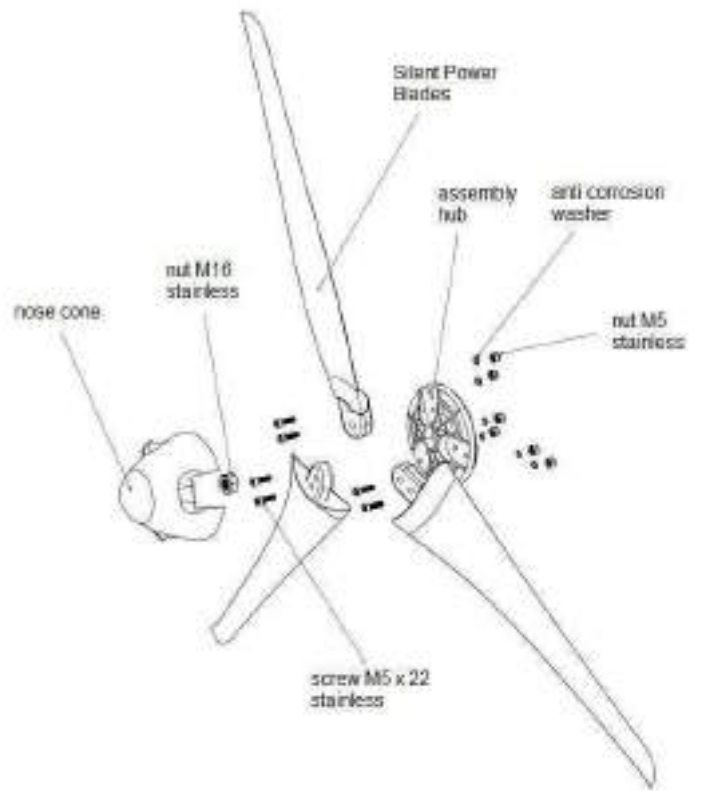
sketch 6



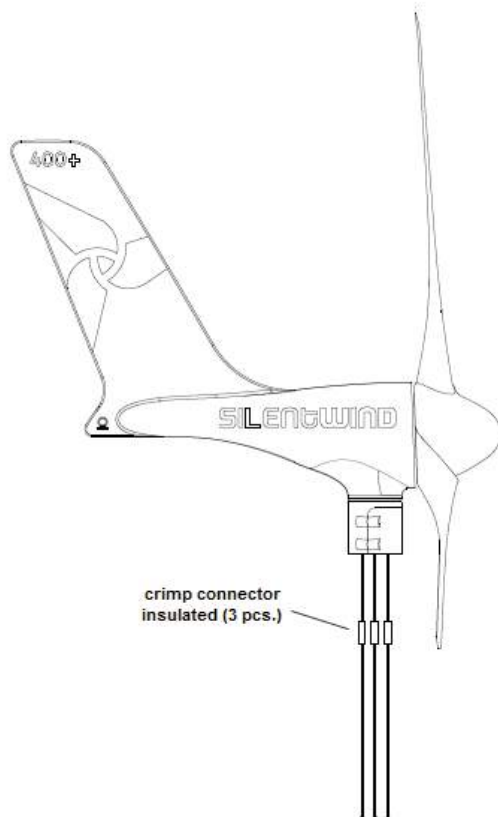
sketch 7



sketch 8



sketch 9





sketch 10

15. Warranty

RULIS Electrica Lda. guarantees that all the equipment sold by the company will not show any material or processing defects within the period of warranty.

Period of warranty for	Silentwind generator:	36 months
	Charge controller HYBRID BOOST	24 months

What is Covered

Rulis Electrica Lda warrants the Silentwind Generator against defects in factory-supplied materials and/or factory workmanship under normal authorized use consistent with the Owner's Manual, except for the limitations set forth in this Limited Warranty.

How Long Coverage Lasts

This limited warranty begins on the following dates, whichever occurs first:
Date of installation of the Wind Generator, or ninety (90) days after the date the original end-user purchaser ('Customer') purchased the Silentwind Generator. You will be requested to provide proof of ownership satisfactory to Rulis Electrica, Lda. prior to receiving warranty services. This Limited Warranty applies to the wind generator only provided the owner follows the maintenance procedures outlined in the owner's manual. Should the product prove to be irreparable, Rulis Electrica, Lda. reserves the right to substitute an equivalent product if available. This Limited Warranty extends to the original Customer and may not be transferred if the wind generator is sold.

How to Register a Claim Against Warranty

If a defect arises with regard to any Wind Generator part and a valid claim is received within the Warranty Period, Customer's sole and exclusive remedy and the entire liability of Rulis Electrica, Lda., its dealers, suppliers and affiliates under this Limited Warranty is, at Rulis Electrica, Lda. sole option, either (i) to repair free of charge the defective part, or (ii) exchange free of charge the defective part with a new or remanufactured part or wind generator that is new or equivalent to new in performance and reliability and is at least functionally equivalent to the original wind generator part. Repaired or exchanged wind generator parts will be warranted for the remainder of the Warranty Period. If you experience any problem with your Silentwind Generator, please contact an authorized service dealer or Rulis Electrica, Lda. directly. Retain all information and documents until the problem is resolved. Your authorized service dealer can provide you with a solution and start the claims process. For best possible service, you MUST demonstrate ownership with a copy of the original receipt indicating that you are the primary owner of the wind generator. To find a Silentwind authorized service dealer or to report a claim, please send an email to info@silentwindgenerator.com or see our website <http://www.silentwindgenerator.com/en/sales-representatives>

Warranty claims notification must include a description of the defect, the serial number of the Silentwind Generator at issue, and the original purchase date in addition to the name, address, and telephone number of the party requesting warranty service under this Limited Warranty. After Rulis Electrica, Lda is notified, Rulis Electrica, Lda representatives will make all reasonable efforts via phone and



email to ascertain the nature of the problem to determine whether any part is defective for purposes of coverage under this Limited Warranty. There is no charge for such diagnosis. Any repair or replacement will be provided only after Rulis Electrica's diagnosis and its agreement to the defective condition. Certain diagnostic checks may be required to be performed by the enduser or designee at Rulis Electrica, Lda. representatives' request. All claims for defect shall be deemed waived unless made in writing and delivered to your Silentwind Generator dealer during the Warranty Period and not later than thirty (30) days after discovery of the defect. If Rulis Electrica, Lda. representatives determine that the Silentwind Generator requires service and that Customer's service request constitutes a valid claim under this Warranty, Rulis Electrica, Lda. will provide warranty service, at Rulis Electrica, Lda's sole option, either (i) through an authorized dealer, with service to be performed at the servicer's location; (ii) by sending replacement Wind Generator or parts to the Customer or (iii) by providing the Customer with a Return Merchandise Authorization (RMA) number to authorize the Customer to ship the defective Wind Generator or Wind Generator parts to Rulis Electrica, Lda. for service. Any Wind Generator part(s) requiring warranty repair shall be transported at the expense and risk of the party requiring warranty service, including but not limited to proper packaging of the part(s). Rulis Electrica, Lda. will return to sender any Wind Generator and/or part(s) that do not have a valid RMA number. Rulis Electrica, Lda. will use all reasonable efforts to repair/replace the defective Wind Generator and/or parts. Repaired or replaced wind generators and replacement parts will be delivered to the Customer at Rulis Electrica, Lda. expense. If a warranty claim is invalid for any reason, Customer may be charged at Rulis Electricas, Lda. and/or the authorized service dealer's then current rate for repair services performed. In such event, the Customer will be informed of the repair charges for prior approval, and, upon approval, will be charged for the approved repairs and return freight. If the Customer refuses to approve repair charges, return freight charges may apply. When a Wind Generator part is replaced for a new or remanufactured part, such new or remanufactured part becomes Customer's property and the replaced part becomes Rulis Electrica, Lda. property. Customer property remaining at Rulis Electrica, Lda. repair facilities for more than ninety (90) days without required Customer approval of return freight charges, becomes the property of Rulis Electrica, Lda.

Exclusions and Limitations

Rulis Electrica, Lda. does not warrant that the operation of the Wind Generator will be uninterrupted, nor does this Limited Warranty guarantee specific performance or energy production under any conditions. This Limited Warranty does not apply to claims arising from installation of your Silentwind at improper or deficient site locations as described in the Silentwind Owner's Manual. This Limited Warranty does not cover any part that was not manufactured by ulis Electrica, Lda., nor does it cover the costs of any repairs or adjustments to your Silentwind Generator that might be needed because of the use of non-Rulis Electrica, lda. parts, components, equipment, or materials. This Limited Warranty does not apply to: (i) consumable parts; (ii) cosmetic damage, including scratches or dents unless such damage compromises the product's function; (iii) damage caused by overload, surges, use with any unsuitable power source, voltage irregularities or utility system failures that enter the Silentwind Generator through the output side; (iv) damage caused by acts of God (including flood, fire, earthquake, lightening, hail damage, flying debris, wind speeds in excess of 190 Kmh, tornadoes, hurricanes or other cyclonic windstorms), misuse, negligence, accident, abuse, or vandalism; (v) damage due to a failure to service and maintain, and/or operate the Silentwind Generator in accordance with its Owner's Manual or provided instructions; (vi) a Wind Generator or any of its parts



that has been modified to alter functionality or capability without the written permission of Rulis Electrica, Lda.; (vii) any Wind Generator part whose serial number has been removed or defaced; (viii) damage or loss to any items or products not manufactured by Rulis Electrica, Lda. that are connected to, powered by, or otherwise attached to, the Silentwind Generator; (ix) any expenses incurred from travel to and from the repair location, troubleshooting, diagnostic and repair services, equipment expenses, or; (x) damage due to improper installation of the Silentwind Generator that is not in accordance to the owner's manual.

Disclaimer of Warranty

This Limited Warranty gives you specific legal rights, and you may also have other rights which vary from country to country and state to state. TO THE EXTENT PERMITTED BY LAW, THIS EXPRESS LIMITED WARRANTY AND THE REMEDIES SET FORTH ABOVE ARE EXCLUSIVE AND IN LIEU OF ALL OTHER WARRANTIES, REMEDIES AND CONDITIONS, WHETHER ORAL, WRITTEN, STATUTORY, EXPRESS OR IMPLIED. AS PERMITTED BY APPLICABLE LAW, Rulis Electrica, Lda. DISCLAIMS ANY AND ALL STATUTORY OR IMPLIED WARRANTIES, INCLUDING, WITHOUT LIMITATION, THE IMPLIED WARRANTIES OF FITNESS FOR A PARTICULAR PURPOSE, MERCHANTABILITY, NON-INFRINGEMENT AND WARRANTIES AGAINST HIDDEN OR LATENT DEFECTS. IF Rulis Electrica, Lda. CANNOT LAWFULLY DISCLAIM STATUTORY OR IMPLIED WARRANTIES THEN, TO THE EXTENT PERMITTED BY LAW, ALL SUCH WARRANTIES SHALL BE LIMITED IN DURATION TO THE DURATION OF THIS EXPRESS LIMITED WARRANTY. Rulis Electrica, Lda. does not grant to any person or entity (including its field representatives, dealers or distributors) the authority to create for it any obligation or liability in connection with your Silentwind Generator. Limitation of Liability EXCEPT AS PROVIDED IN THIS EXPRESS LIMITED WARRANTY AND TO THE MAXIMUM EXTENT PERMITTED BY LAW, UNDER NO CIRCUMSTANCES WILL Rulis Electrica, Lda., OR ITS AFFILIATES, SUPPLIERS, DEALERS, DIRECTORS, OFFICERS, EMPLOYEES, OR AGENTS (THE "RELEASED PARTIES") BE LIABLE OR RESPONSIBLE FOR, EVEN IF SUCH RELEASED PARTY HAS BEEN ADVISED OF THE POSSIBILITY OF SUCH DAMAGE, ANY DIRECT, SPECIAL, INCIDENTAL OR CONSEQUENTIAL DAMAGES RESULTING FROM ANY BREACH OF WARRANTY OR CONDITION, OR UNDER ANY OTHER LEGAL THEORY OR FORM OF ACTION (WHETHER IN CONTRACT, TORT (INCLUDING NEGLIGENCE), STRICT LIABILITY OR OTHERWISE), INCLUDING, BUT NOT LIMITED TO, ANY LOSS OF USE, INTERRUPTION OF OR LOSS OF BUSINESS, LOST OF ACTUAL OR ANTICIPATED PROFITS (INCLUDING LOSS OF PROFITS ON CONTRACTS), LOSS OF REVENUE, LOSS OF THE USE OF MONEY, LOSS OF ANTICIPATED SAVINGS, LOSS OF OPPORTUNITY, LOSS OF GOODWILL, LOSS OF REPUTATION, LOSS OF, DAMAGE TO OR CORRUPTION OF DATA, OR ANY INDIRECT OR CONSEQUENTIAL DAMAGES HOWEVER CAUSED, INCLUDING THE REPLACEMENT OF EQUIPMENT AND PROPERTY, BODILY INJURY OR DEATH. (Note: some states do not allow the exclusion or limitation of incidental or consequential damages, so these limitations may not apply to you.) The total cumulative liability to Customer, from all causes of action and all theories of liability, will be limited to and will not exceed the purchase price of the Silentwind Generator paid by Customer.

Product Changes

Rulis Electrica, Lda. reserves the right to make changes, improvements or additions to its products in the future without incurring obligations to make such changes, improvements, or additions to its products previously manufactured. Occasionally, a



product change, improvement or addition will be made that either prevents future failure of a product or part or eliminates a safety hazard. Rulis Electrica, Lda. will then issue a field change order to correct this problem. Installation of the mandatory field change order must be done within thirty (30) days of field change order issuance or this Limited Warranty will be void should failure occur as a result of not installing said parts. Rulis Electrica, Lda. reserves the right to change the terms of this Limited Warranty in the future without incurring any obligations to make the changed terms applicable to products previously manufactured.

Notes:

Certificate of warranty

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Garantieschein Warranty card

Name und Anschrift des Käufers / Name and address of the purchaser:	
Seriennummer Windgenerator / Serial number wind generator:	
Seriennummer Laderegler Serial number charge controller:	
Verkäufer (Firmenstempel / Unterschrift) / Purchaser (company stamp / signature):	
Kaufdatum / Date of purchase:	

Die genauen Garantie-Bedingungen finden Sie in der Gebrauchsanweisung auf Seite 19.
The exact warranty conditions you can find in the user manual on page 19.

✂-----



Instruction Manual

Hybrid – BOOST Charge Controller with Bluetooth connection



WWW.
silentwindgenerator.com

Email: info@silentwindgenerator.com

Phone: +351253572763

Congratulations, you have bought a high-quality SILENTWIND hybrid charge regulator HYBRID BOOST

Before first using this gadget please carefully read this manual.

General information:

The Silentwind-Charge controller HYBRID BOOST is a combined wind and solar charge regulator with an inbuilt micro-controller. The HYBRID BOOST was especially developed for the Silentwind Generator and enables you additionally to install solar panels up to a wattage of 300 Watt peak or to a max. current of 20A.

Consumers with a maximum current of 10 Amps that are connected to the deep cycle output can be automatically switched off or on by a deep cycle protection function.

All operating parameters can be seen on a LCD-display or on a tablet or smartphone over the Bluetooth connection. You can also set all operating parameter over the APP provided. It is suitable for all Android and IOS devices.

The Silentwind Generator generates 3phase AC-voltage. In the charge controller AC is transformed to DC voltage. 12 / 24 or 48 must be chosen in accordance with the system voltage of the customer. All types of batteries (Gel, AGM, acid and Lithium) can be charged.

The suitable maximum charge voltage - depending on the type of battery - must be adjusted in the Setup.

The charge-controller is



Advise:

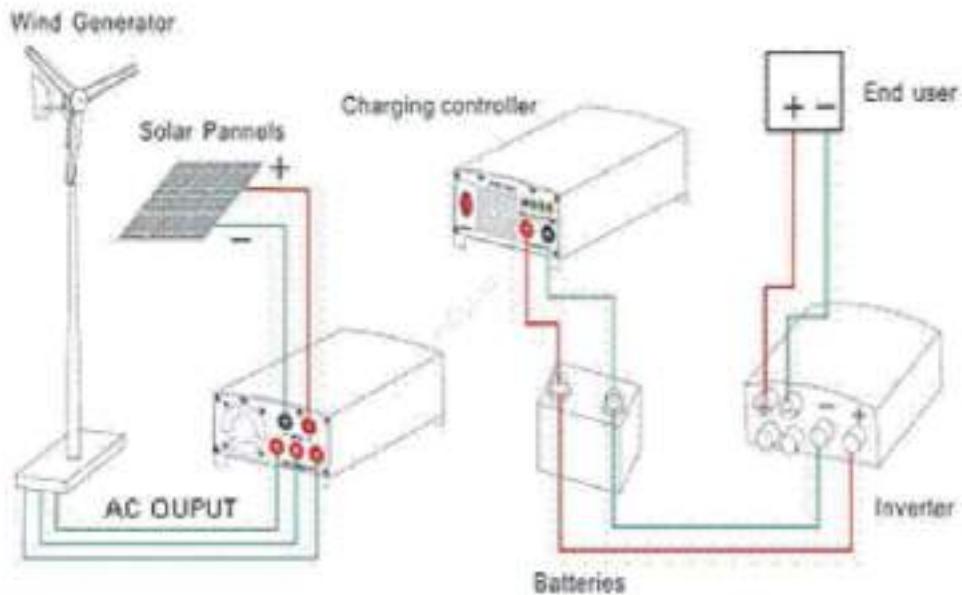
Please keep in mind that liquid acid batteries can emit dangerous explosive gas. If the place where you mount the charge controller is close to these batteries, ensure efficient ventilation. Gel or AGM batteries are normally maintenance free and do not emit gas if properly charged.

Always make sure charge controller is mounted in a dry and as cool as possible place.

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1. wiring diagramm



2. Technical data

hybrid-charge controller type	HYBRID BOOST
Battery system voltage (automatically detected)	12 / 24 / 48 Volt
Max. power input of the wind generator	600 W
Max. current input of the wind generator	40A / 30A / 15A
Max. power input of the solar panel	300Wp
Max. current input of the solar panel	20A / 10A / 5A
Max. open circuit voltage input of the solar panel	50VDC
Max. total charge current	60 A
Max. switch off current at LOAD-output (Load)	2 x 10 A
Max. voltage adjustable for the battery types	acid, gel or AGM
Dimensions (LxWxH) in mm	220 x 150 x 82
Weight	2,80 kg
Suitable for	acid, gel and AGM
Warranty	24 months
Features	
Cable connection	screw terminals
Integrated electronic brake	charge limitation, storm brake
Integrated manual brake switch	service
LCD-display of all relevant working data	W, A, V/Ah, kWh, Ah
External stop switch	Plug connector

3. Components of the charge controller

3.1 Down side panel

On the down side of the charge controller there are screw terminals to connect the battery, the wind generator, the solar panels and DC consumers. The connections for the remote brake are also below.

Down side panel:



3.2 LCD-Display

On the top of the charge controller there is an LCD-display that shows you all operating data during the working process.



4. Cable cross section

As you can see from the wiring diagram in paragraph 1 a 3-pole cable with suitable cross section must be wired from the Silentwind-Generator to the charge controller. The charge power gets from the charge controller to the batteries through two wires (on the AC entrance through three wires) Therefore the cross section of the two wires on the DC output should be larger, we recommend a minimum cross section of 10mm².

See below table to find the correct cable cross section:

System voltage 12 Volt

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

System voltage 24 Volt

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

5. Installation and connection of the charge controller:

The charge controller should be mounted close to the battery in a ventilated and cool location which enables you to read the information shown on the LCD display and to operate the manual brake switch easily.

Safety advice:

Especially acid batteries can emit gas when charging. Therefore the charge controller must not be installed close to those batteries. In case of high concentration of dangerous gas there is a risk of explosion. Please note the safety regulations, -advice of the battery producer.

If the acid batteries are equipped with ventilation pipes to the exterior or if the storage room of the batteries is otherwise ventilated, the charge controller can be installed close to the batteries.

Please find a sketch of the wiring diagram in the paragraph 1 of this manual.

Make sure that you fix the wires properly to prevent them from getting loose due to vibrations. Fix the screws sufficiently to ensure electric contact.

Connect the free end of the wire with your wires coming from the wind generator and the battery with suitable insulating screw joints.

In case you do not use the connecting wires we recommend the use of crimp type cable sockets to fix your wires directly to the charge controller. After having fixed the crimp type cable sockets with the bared wires these can be fixed to the cable sockets.

It is most important that you first connect the charge controller to the battery with the right polarity.

Please connect a suitable fuse (50Amp. or more) close to the battery in the positive wire.

Please take note:

After the connection of the battery you can connect the Silentwind Generator, the solar panel and if required a load output with maximum 10A. On the 3-phase output wires of the Silentwind you need not to pay attention to polarity.

Attention: *The confusion of Plus and Minus will definitely destroy your charge controller. In that case warranty is gone.*

If there is sufficient wind speed when connecting the Silentwind Generator, this will immediately generate electric power at the end of the 3 AC-wires without being connected to the charge controller. Therefore we recommend blocking the Silentwind Generator blades with a rope before connecting the wires to the charger. The 3 AC output wires must be connected to the 3 screw terminals on the back of the charge regulator. (See paragraph 3.1). In a 3 phase AC system the connection order / polarity does not matter.

In case you want to connect additional solarpower (max. 300Wp) to the charge controller, this should be done by using the PV screw terminals.

Please make always sure that you do not confuse polarity. You can find the connection diagram in paragraph 7.

6. External Stop Switch

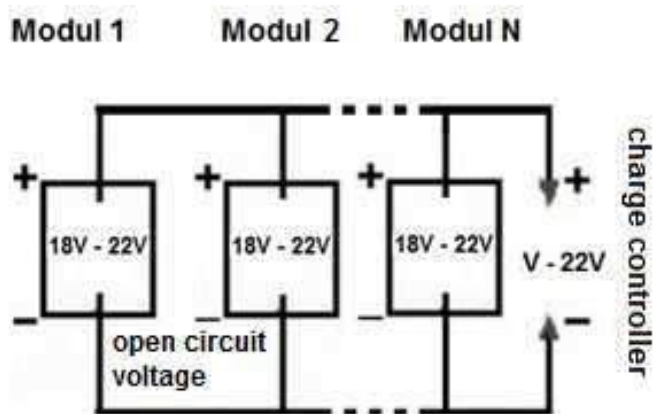
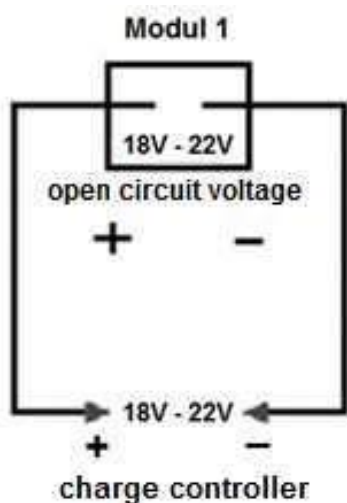
You can connect an external stop switch to the charge controller (see picture on page 5). You can choose the type of stop switch suitable to your instrument panel.

7. Connecting solar panels

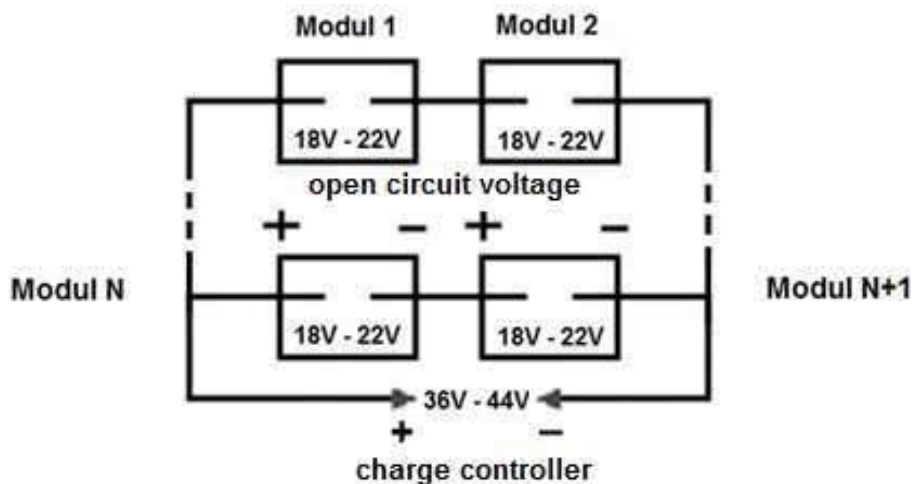
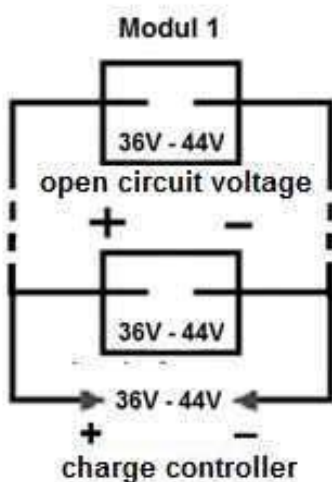
The charge controller Hybrid BOOST is a hybrid controller both for wind and solar energy. Solar panels with a max power of 300 Wp (20 A for 12V / 10 A for 24V and 5 A for 48V) can be connected, See technical details page 4.

Connect the solar panels according to the following sketch.

12 volt system:



24 volt system:



8. Programming charge controller

Before first using the charge controller it must be adjusted to the type of battery (acid, gel, AGM) you want to use, the Storm brake and the absorption modus according to your system.

A special feature of this charge controller is that you can programme everything thru your Smartphone or Tablet. Download the APP for your operating system (Android or IOS) from our website or on the App Store. If the charge end voltage – according to the type of battery – is reached, the charge controller will switch off the Silentwind Generator under step “Over voltage”. Additionally the maximum charge current can be adjusted. You have to programme the requested switch off current at the step “Brake Current”.

We also recommend making use of the additional adjustments according to your individual requirements, like the switch on- and switching off-voltage of the load settings.

If the charge end voltage or maximum charge current is reached, the Silentwind Generator will stop for approx. 5 minutes.

The break mode of the charge regulator generates internal rising temperatures that are thermically detected. Therefore the break time of the Silentwind Generator will be increased in high wind speeds until the internal temperature is reduced by dissipation.

For this reason the charge controller should be installed on a place as cool as possible. Never install the controller at direct solar radiation or sunlight.

This means that the Silentwind Generator can also be operated with a larger battery capacity. If a large battery capacity is discharged, a higher charge current will flow in high wind speeds. As you can set the maximum charge current you can prevent overheating of the charge controller. As described in step “Brake Current” you can reduce the max. charge current according to the requirements.

Advice:

If the capacity of the batteries is less than 150 Ah, or old batteries have lost their original capacity, the point of max. Voltage can be reached very fast although the battery is not fully charged yet. In this case it can be useful to connect an electric consumer to the Load-output, as this will reduce the voltage and thus prevent that the break mode is activated too early.

9. Programming instruction

9.1 APP Download

For Android devices please go to our website under following link: <http://www.silentwindgenerator.com/en/downloads> and download the APP Win-Power directly to your Smartphone or Tablet.

For IOS devices, please go to the App Store and search for Win-Power. Download the APP directly to your iPhone or iPad.

9.2 Settings

Open the APP on your device. You will be requested to enable the Bluetooth.

Go to “searching device”



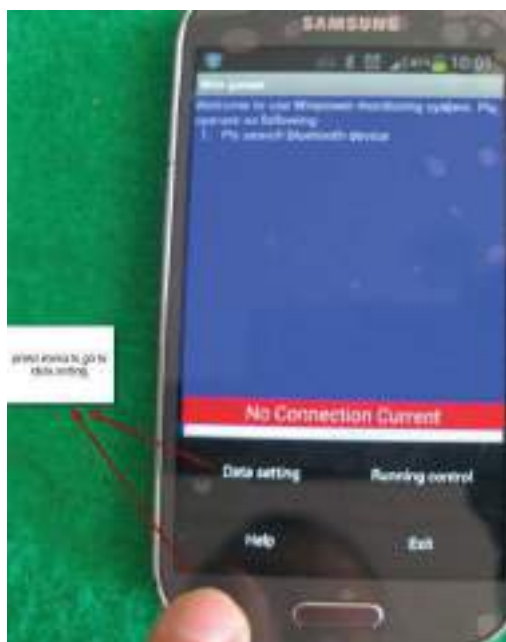
Check all Bluetooth devices and choose the one for your system. For Android choose “win-power”. For IOS choose “IOS win-power”.

Go to “Connect Device”

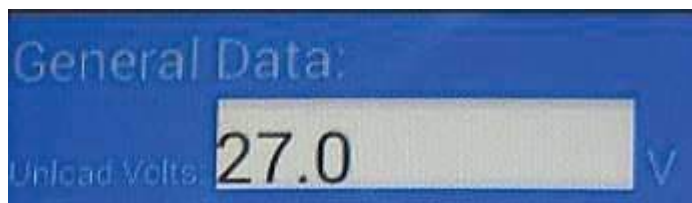
The password for the connection is “1234”.

9.2.1 Setting parameters

Go to menu key on your device and then “Data Setting”

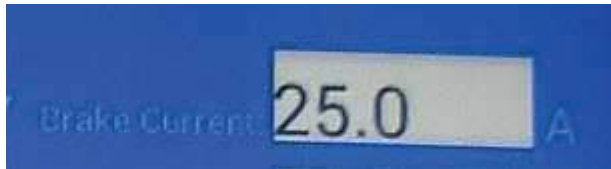


9.2.2 Absorption Charge modus



In the display mode shown above „**Unload Volts**“ you can set the absorption modus of your batteries by clicking on the field and change the values. Usually this stage is to slowly keep charging the batteries until the charge end voltage is reached. The values depend on the system voltage (12/24/48V). The approx. values are 0.5% less than the maximum possible voltage. For instance for a charge end voltage of 14.4V (12V system) the value should be 13.4V.

9.2.3 Brake adjustment



You can set the current when you want to stop the Silentwind Generator. This prevents overheating, especially with big battery banks and high loading currents. This function can also be used to reduce the RPM of the Silentwind Generator.

You can calculate the max. charge current value as follows: The max. power of the Silentwind Generator 400 Watts divided by the max. cut-off voltage e.g. 14,4 Volt at a AGM battery. The max. possible charge current in this example is $400\text{VA} / 14,4\text{V} = 27,7\text{Amp}$.

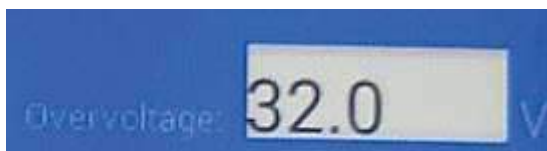
9.2.4 Boost function



With this parameter you can set the Boost to achieve an earlier start of charging in to the batteries. The recommended values are:

- 12V** – 2.0 V
- 24V** – 4.0 V
- 48V** – 8.0 V

9.2.5 Charge cut-off voltage

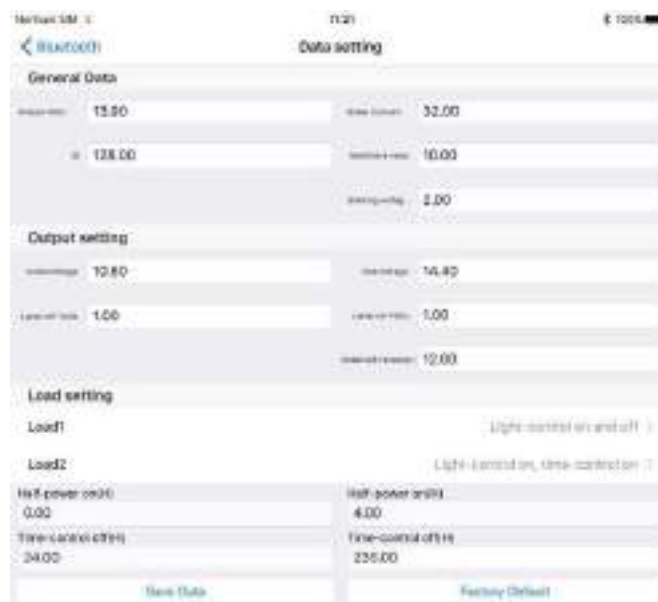


In the display mode shown above „**Overvoltage**“ you can set the charge end voltage of your battery. Please note the instructions of the manufacturer of the batteries. The maximum possible voltage is dependent on the system voltage (12/24/48V) and the type of battery (Acid, Gel, AGM or Lithium). For instance 12V-AGM-Batterie: appr. 14,4V.

9.2.6 Save settings



Click on save data to save the settings.



Safety advice:

Please **never** disconnect the battery wires while the Silentwind Generator is charging. This will immediately destroy the charge controller. If you want to measure the current flowing, an amp-meter must be installed in the positive battery wire. Mind the polarity of the amp-meter. The flowing current can be seen at the LCD-display.

10. Troubleshooting

The blades of your Silentwind Generator are turning too slowly

- The manual stop switch of the charge controller is in position “BRAKE”.
- Connecting the wires possibly caused a short circuit between the wires.
- The wind speed is too low.
- The fuse connected to the battery is gone.
- Your Silentwind Generator or the charge regulator has an internal problem. Please contact your dealer.

In order to find the mistake you have to check the installation chain starting at the 3 wires of the Silentwind Generator connected to the charge controller. In case the Silentwind Generator does now start (without connection to the charge controller) the failure is between charge regulator and battery. BE CAREFULL, don't touch the end of the cables because of the electric power that occurs at these ends. If the Silentwind Generator continues to turn slowly, the failure is between charge controller and Silentwind Generator.

Mind the recommended cross section of the wire as well as the recommended minimum capacity of the battery that you want to charge.

If the Silentwind Generator generates too little power

- The wind speed is too low, see the performance diagrams shown in the manual of the Silentwind. *The wind speed measured on top of the mast is higher than at the position of the wind generator!*
- Turbulences by obstacles in the wind direction or the location is unsuitable, mast too short.
- The wire cross section is not in line with the length of the wires installed. (see page 3).
- The battery-capacity is below 100Ah so that the maximum possible voltage is generated too fast.
- The battery is too old and has lost capacity so that the maximum power voltage is achieved too fast.

Enjoy collecting regenerative power. You contribute protecting the environment and saving your money !

Your Silentwind Team



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