Kiss Extractor™

USER MANUAL

Seabourne Solutions LLC

Introduction

Congratulations on purchasing a Kiss Extractor™. The Extractor™ has several advantages when used to control the Kiss wind generator:

- More energy is harvested at wind speeds below 12 knots.
- The wind generator rotates at lower speed, reducing blade noise.
- When the batteries are fully charged, the wind generator will Stop automatically. When the batteries lose charge and if there is enough wind, the wind generator will Run automatically.
- An overheat condition can be anticipated, stopping the wind generator and allowing a cool-down period before overheating.

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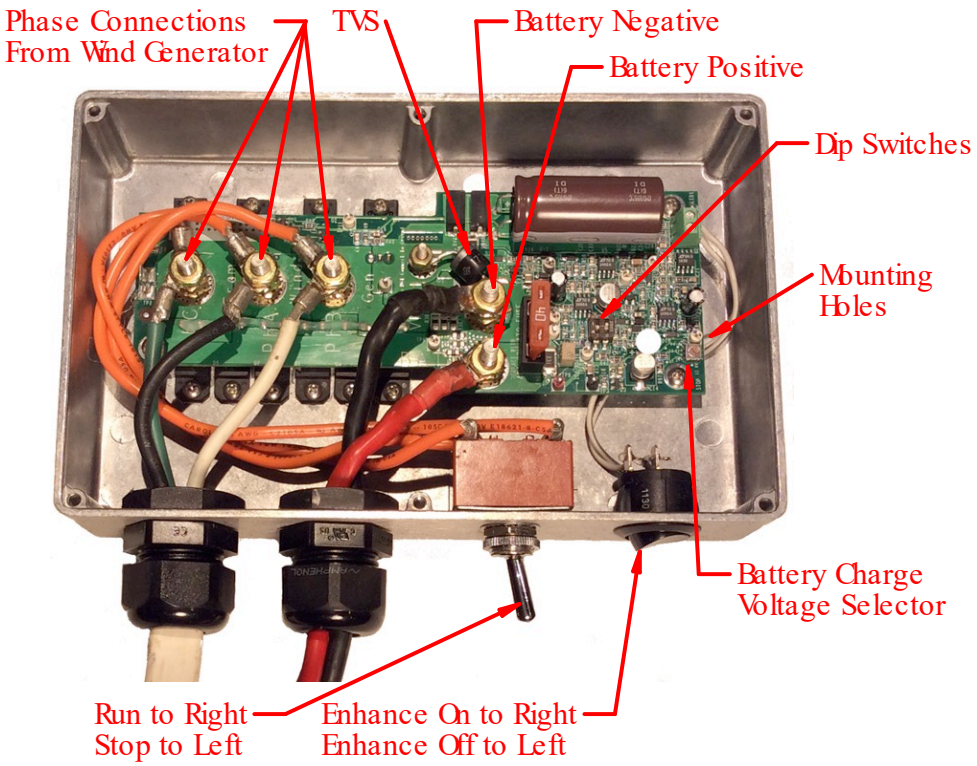
Important Notice!

Always Stop the Kiss wind generator and if possible, tether a blade whenever disconnecting the Kiss from a battery. Like any running alternator, high voltage and current spikes will occur when disconnected from a battery. These voltage spikes may damage the Kiss Extractor™ as well as any other electronics still connected to the Kiss or to the Extractor™. Damage to the Extractor™ due to a battery disconnect will void the warranty.

Definitions

Stop	Refers to a condition where the wind generator blades are stopped from rotation electrically. The blades may rotate very slowly in light winds.
Run	Refers to a condition where the wind generator blades are freely rotating.
Enhance	Refers to when the Extractor™ harvests more energy, especially at low-to-mid wind speeds. Usually the wind generator rotates slower and is quieter. This is sometimes called enhanced circuitry.
On	Refers to when the Extractor™ operates in enhanced mode.
Off	Refers to when the Extractor™ enhancing circuitry is turned off. The normal bypass circuit still operates when the Extractor™ enhancing circuitry is off.
Bypass	Refers to a portion of the circuit that either shares energy harvest with the enhancing circuitry, or manages the bulk of the energy harvest in high wind conditions. Bypass is similar to the old three-phase rectifier originally supplied for the Kiss. More efficient diodes are used in the Extractor™.

Figure 1



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Installation

The Extractor™ does not require special electrical knowledge for installation. The necessary tools are:

1. Wire strippers.
2. Wire crimpers. For efficient and robust installation, connector soldering is recommended. Always crimp first for a mechanical connection then solder.
3. Screw drivers.
4. Adjustable wrench capable of opening to just over 1 inch.
5. 3/8" socket wrench.

Existing Kiss Wind Generator

The Extractor™ was not designed to charge the batteries through a diode isolator. Battery connections should lead directly the battery.

If a Kiss wind generator is already installed, the Extractor™ simply replaces the original Kiss control box. Perform the following steps:

1. Ensure the new Extractor™ enclosure can be mounted in the location of the old Kiss control box. The Extractor™ should be mounted on a vertical surface to ensure proper cooling behind the base. It is recommended that the cable glands and switches be on the bottom of the enclosure when mounted. The cables should have excess loop near the Extractor™ to allow access into the box and for connections to be made.
2. Stop the Kiss wind generator by flipping the old Kiss Stop/Run switch to the Stop position.
3. Lash a blade of the wind generator to prevent rotation.
4. Disconnect the positive wire leading to the control box at the battery or at an in-between location.
5. Open the original Kiss control box and disconnect the wires from the switch and the rectifier. Pay attention to the wires attached to the rectifier. One is connected to battery positive and another is connected to battery negative. Mark the wires or note the color to prevent mix up.
6. Remove the original Kiss control box and store in a dry location.
7. Set the Extractor™ Stop/Run switch to Stop and depress the On/Off switch to Off.
8. Open the Extractor™ lid by removing the six screws on the lid.
9. Mount the Extractor™ base to a vertical surface.
10. There are three wires coming from the Kiss wind generator. In Figure 1 the cable jacket is white and the three wires are black, green, and white. Your wires may be different colors. These wires will be fed through the left cable gland leading into Extractor™ and then they will be attached to the three 10-32 studs marked PhA, PhB, and PhC on the circuit board.

a. Cut the existing ring terminals from the ends of the wires coming from the wind generator.
b. Strip approximately ¼" of the wire insulation from the ends of the wires. Check the wires to ensure the copper has not corroded up into the insulation. If so, cut a little more off the wires and re-strip till un-corroded copper is found.
c. Remove the upper nuts and ring terminals from the phase studs.
d. Feed the cable through the cable gland as shown in Figure 1.
e. The order of attachment does not matter. Any one of the wires can be attached to any one of the phase studs. Cutting different lengths makes for a neater installation.
f. Crimp the ring terminals on to the end of the wire. These are high current connections, so crimp hard. For best results, solder the wire and crimped portion of the ring terminal.
g. Strip the jacket of the three wires back far enough to allow connection of the ring terminals to the phase studs while ensuring that the jacketed portion of the cable can be clamped in the cable gland. Remove the excess jacket between the ring connectors and the cable gland.
h. Attach the three wires coming from the wind generator to the phase A, B, and C studs, one wire each per phase stud.
i. Tighten the nuts on the studs firmly with a 3/8" socket and ratchet wrench. Do not over tighten.
j. Inspect the phase connections to ensure they are all separated, do not touch other board components, and allow room for bringing in the BAT+ and BAT- wires. Also inspect the orange Stop/Run switch ring terminals to ensure they do not touch any solder connections on the circuit board.

11. The battery positive and battery negative wires coming from the battery will be fed into the Extractor™ enclosure through the second cable gland and then connected to the BAT+ stud or the BAT- stud.
    a. Cut the old ring terminals off the two wires leading to the batteries. Strip ¼" of the insulation from the ends of the wires checking for copper corrosion. If there is corrosion, cut the wires till good copper is found. Note in Figure 1 that the black battery negative wire is longer than the red battery positive wire.
    b. Feed the battery cables through the cable gland as shown in Figure 1.
    c. Crimp the ring terminals on the wires tightly. Solder for best results.
    d. Cut back the jacket (not shown) of the cable far enough to allow the wires to be connected to the BAT+ and BAT- studs while also providing that the cable gland will grip the cable jacket.
    e. Attach the wire connected to the battery negative terminal to the BAT- stud.
    f. Attach the wire connected to the battery positive terminal to the BAT+ stud.

   g. Tighten the nuts on the studs firmly with a 3/8" socket and ratchet wrench. Do not over tighten.
   h. Ensure that all connections are separated from each other.
12. Ensure that the Battery Charge Voltage Selector switch is rotated for the desired stop voltage. Also check that the Overheat dip-switch and the Voltage dip switch are set to the desired positions. See Advanced Features instructions and Figure 2.
13. Attach the lid of the Extractor™.
   a. Silicone adhesive may be applied to the seal between the lid and the base if the Extractor™ is exposed to weather.
   b. Push the cables into the box slightly and tighten the cable glands snugly to prevent strain on wire connectors.
14. Reconnect the battery positive wire to the battery.
15. Ensure that the Stop/Run switch is in the Stop position.
16. Depress the Extractor™ switch to the On position.
17. Unleash the wind generator blades.
18. Move the Stop/Run switch to the Run position.

New Installation of Kiss Wind Generator

If a new Kiss wind generator is being installed, follow the installation directions of the generator manufacturer and the pertinent instructions above.

1. Consider placing the Extractor™ as close to the batteries as possible and out of the weather.
2. Some prefer to mount the Extractor™ such that the Stop/Run switch can be actuated from an open port in the cockpit. This allows manually stopping the wind generator in situations when a storm arises suddenly.
3. Use round-jacketed boat wire or finely stranded marine wire when available. The round-jacketed cable will seal more effectively in the cable glands. Finer stranded wire will be easier to bend when run from the wind generator or battery to the Extractor™ and then within the Extractor™ enclosure.
4. 10-gauge wire is recommended. The Kiss sometimes generates ~45 amps in wind gusts.
5. Install a fuse in the positive wire near the battery connection.
6. The Extractor™ was not designed to charge batteries through a diode isolator. If wired through a diode isolator, proper battery charging will not occur.

Operation

When a wind generator rotates in low and mid wind speeds, all or a portion of the generated energy is at too low a level to charge the batteries. The Extractor™ enhances that low level energy such that the batteries can be charged. As a result energy harvest is enhanced at low to mid wind speeds. If you listen carefully near the wind generator, you may hear a high pitched tone, similar to a tea-kettle whistle. When you hear this sound, the Extractor™ is enhancing low wind power output.

As the wind speed increases and as the generated energy achieves a higher level, a bypass circuit takes over energy harvest. The Extractor™ enhancing function may still be participating in energy harvest, but more of the energy load is transitioned to the bypass circuit. At some point, the bypass circuit handles all of the energy harvest. Usually, one can hear this transition because the wind generator blade speed increases.

Battery Disconnect

The Kiss wind generator is a type of alternator. Alternators will generate large damaging voltage spikes when running and when disconnected from the battery. These voltage spikes may permanently damage the Extractor™ and other sensitive components in the circuit. The voltage spikes will likely stop the Kiss from rotating because the voltages exceed the Stop voltage settings.

If the Extractor™ is disconnected from the 12V batteries (for example while changing out batteries, or cleaning battery terminals, or if a fuse blows), it will enter into a "limp" mode. In this mode, the Kiss will rotate for a second and then stop, repeating several times. Every once in awhile it will stop longer, but then it will stop and run every few seconds again. This mode of operation is potentially damaging to the Extractor™ electronics, especially in high winds, and will void the warranty if not corrected. If the Kiss is operating in "limp" mode, flip the Stop switch and lash the blades. Then troubleshoot the battery connection problem.

The Stop/Run Switch

This switch is a "bat" switch mounted on the outside of the Extractor™. Moving the switch to the Stop position will stop the rotation of the wind generator blades. In winds up to 35-40 knots the blades may still rotate, but the wind generator will not be harvesting any energy. The Stop switch might be used for any of the following reasons:

- There is ample energy from other sources and the automatic Stop circuit that controls the wind generator is cycling on-and-off in a bothersome way.
- The vessel is tied up to a dock or slip, placing the wind generator close to where passersby could be harmed by the spinning blades.
- The wind generator blades are being removed for the season or when work is to be performed near the wind generator.
- A storm is expected or an ocean passage is anticipated, i.e. times when going out on deck to deal with a wind generator is to be avoided.
- The ship's batteries are being worked on and cables to the batteries are to be disconnected.

If high winds are anticipated, actuate the Stop switch and then lash off a blade to mechanically prevent rotation, or physically remove the blades from the rotor.

Above around 40 knots, the Stop switch will no longer be able to hold back the rotation of the blades. The wind generator will spin noisily. This may not cause any damage though it will contribute to raised anxiety for all aboard.

The On/Off Switch

If the On/Off switch is depressed Off, the wind generator energy harvest will be accomplished only via the bypass circuit. The Extractor™ enhancing function will be turned off. The automatic Stop of the wind generator, when the batteries are charged, will still operate. There will be a little more noise from the wind generator in low to mid wind conditions.

- Although the Extractor™ is designed to be tolerant of voltage spikes. Depressing the switch to the Off position provides added protection during lightening storms and when making any spark producing connections
- The switch allows one to verify the enhanced performance of the Extractor™.
- It is also useful if radio interference exists. The bypass circuit for a Kiss wind generator sometimes generates radio interference, but the enhanced circuitry may generate greater interference. If radio interference can be heard, try depressing the switch to the Off position during radio reception periods. If the noise continues, move the bat switch to Stop.

Off-Season and Return to Service

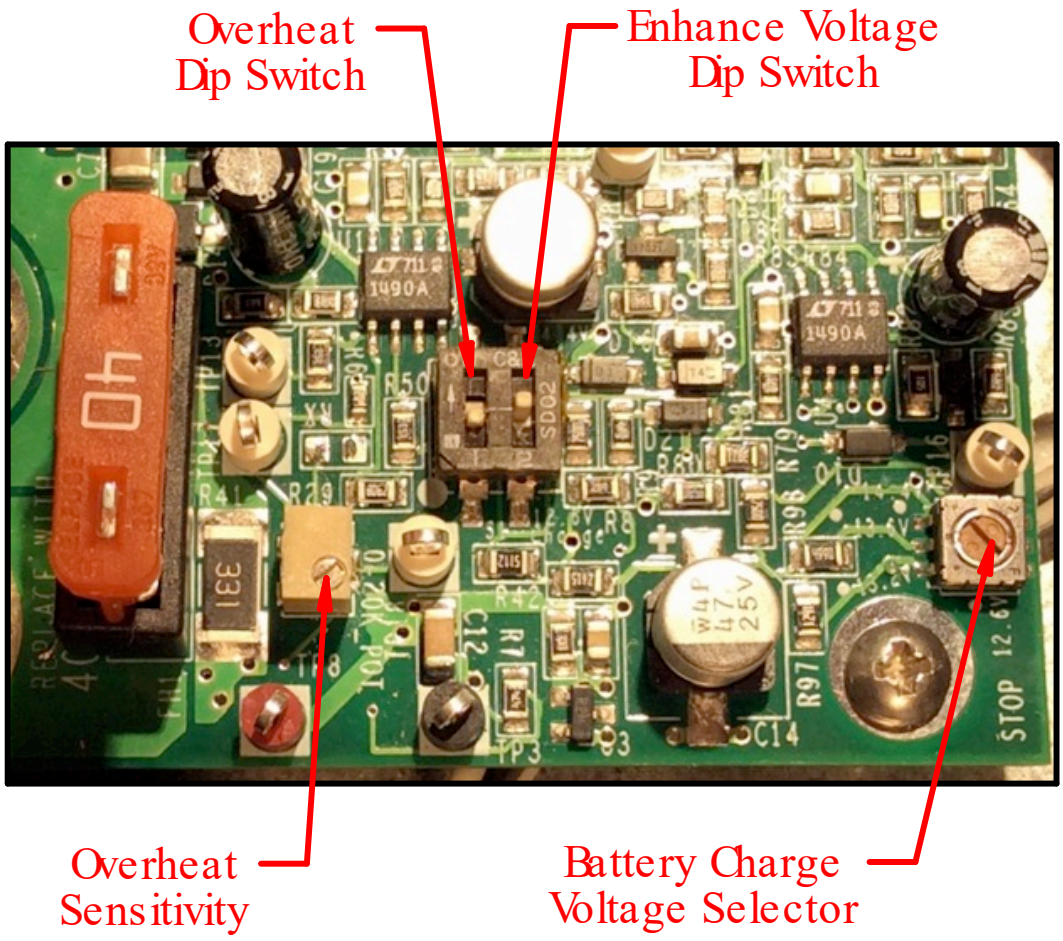
If the wind generator is not being used during off-season, consider lashing or removing the blades and also removing the fuse inside the Extractor™. The quiescent current of the Extractor™ is low (~3.2ma in On) but adds-up over time, especially when there is no other battery recharge source. Leave a note on the Stop switch as a reminder for next season that the fuse is disconnected.

Advanced Extractor™ Settings

There are three sets of switches on the Extractor™ circuit board.

- Battery Charge Voltage Selector rotary switch- for changing the battery voltage at which the wind generator automatically stops. 13.6V is recommended for lead-acid batteries.
- A CHARGE dip-switch for changing the maximum voltage at which the enhanced circuitry charges the batteries. 14.4V dip-switch up recommended.
- An Overheat dip-switch that optionally avoids Kiss overheating. Overheat dip-switch in the up position recommended.

Figure 2



STOP VOLTAGES- Recommend 13.6V float setting

The battery voltage at which the wind generator automatically stops can be set using the STOP rotary switch. Some battery manufacturers recommend that solar panel and wind generator charging be limited to the battery float voltage. This float voltage value varies, but for most lead-acid batteries, 13.6V is in a float voltage range.

Typically when there is a gust of wind, there is an excess of charge current provided by a wind generator. Lead acid batteries that are fully charged (above 12.8V) cannot absorb all this charge current as quickly as the wind generator provides it. The voltages can easily go to 16.5V or higher. This overcharge situation may reduce the service life of batteries.

The automatic Stop feature of the Extractor™ prevents battery overcharge by automatically stopping the wind generator rotation when the batteries have reached a

STOP voltage setting. Once a Stop is engaged, the wind generator may spin down or rotate slowly but it does not harvest energy.

As the battery voltage drops below the Stop voltage set point, a timer circuit will become active. If the battery voltage remains below the Stop voltage for 60-90 seconds, the wind generator will automatically be allowed to rotate or Run.

During periods of ample wind or low energy usage, the wind generator may cycle between Stop and Run. If this constant cycling becomes bothersome, consider rotating the wind generator off the wind with a string tied to the tail. This reduces the power generation of the Kiss and lengthens the period between automatic Run and Stop cycles.

The Battery Charge Voltage Selector rotary switch setting allows a preferred automatic Stop voltage to be set. When setting the rotary for a particular voltage, rotate the switch such that the detent is in line with the desired voltage. In Figure 2, the rotary switch is set for 14.4V. Rotating counterclockwise adjusts to 13.6, 13.2, or 12.6V settings.

Following are some considerations when setting STOP voltages:

- If the wind generator is used for long-term maintenance of the batteries during storage, consider using the 13.2V switch position. Especially in the tropics, this will reduce loss of battery electrolyte; yet keep the batteries at adequate charge.
- The 13.6V setting keeps the batteries charged, at no more than a float voltage, via the wind generator. This is probably the safest choice for those using AGM and gel cell batteries.
- The 14.4V Stop setting might be used if the wind generator is the sole charging source. In mid to strong wind conditions, the batteries will be given a full charge often, which might reduce their service life.
- The 12.6V Stop setting would be recommended for some lithium battery systems.

ENHANCE VOLTAGES- Recommend 14.4V dip-switch UP.

For most situations an Extractor™ enhance voltage of 14.4V provides the best performance in terms of enhanced energy harvesting. For some lithium ion battery systems, where 12.6V is a maximum recommended charge, set the dip-switch down.

Note. It is not recommended that a wind generator be used for long-term storage battery charging, or even short-term storage charging. Storms may cause damage to the wind generator. A solar panel provides a better storage charging solution.

OVERHEAT SWITCH- Recommend Overheat dip-switch UP.

When the Kiss wind generator is used in >22 knot continuous wind speeds or produces >22 amps for long periods, it may overheat, pop the thermostat switches, and then spin fast and noisily. The overheat might also occur in gusts. Although not harmful, in high winds the noise can lead to increased stress aboard ship. The blade rotation can only be stopped if the wind dies long enough for the Kiss to cool, or if the Kiss is turned out of the wind.

The Overheat dip-switch provides the user with an option to automatically attempt to stop the Kiss before an overheat condition occurs. The Kiss will stop for approximately 60 seconds, giving a period to cool down, and then restart. If the wind speeds are still high, the Overheat option will again attempt to stop the Kiss for 60 seconds.

The Overheat option is set for >15.5 amps for long periods and for gusts. It may not always be able to stop the Kiss from rotating, since the stopping of the blades electrically (by the bat switch, the auto stop, or the overheat stop) injects significant heat into the Kiss enclosure, adding to the overheat.

The Overheat dip-switch is an option since it does limit the maximum charging output of the Kiss. In Figure 2, where the dip switch is down, the Overheat option is turned off. It should be understood that when the Kiss is in an overheated condition, it does not contribute to battery charging.

Troubleshooting

1. Wind generator will not rotate freely:
   a. Stop switch on- flip the bat switch to Run
   b. Batteries are charged above STOP voltage setting- wait for batteries to discharge or other charging sources to stop charging.
   c. Short in wind generator AC phase wiring- check for wiring shorts.
   d. Old bearings, loss of metal coatings on rotor, bad rotor seal, and/or misaligned shaft may be the culprit.
   e. Wind speeds too low. The wind must overcome starting friction to induce rotation.
2. Rumble noise when generator runs and especially when stopped electrically
   a. Check wind generator AC phase wire connections- one phase may be disconnected or loose.
   b. Wind generator thermostats need repair or replacement
   c. Blades unbalanced- remove blades and rebalance.
   d. Worn bearings.
3. Extractor™ not enhancing power
   a. On/Off switch depressed to Off- depress to On position.
   b. ENHANCE dip-switch down at 12.6V- set to 14.4V up position.
   c. Wind speeds above 12 knots.

4. Extractor™ output voltage too high, overcharging batteries- STOP voltage setting too high.
5. No wind generator output- Wind generator rotating normal speed
   a. Poor connections at BAT+ or BAT- terminals.
   b. Open wind generator phase wiring or connections- check for poor connections.
   c. Wind generator overheated or thermal switches defective.
6. No wind generator output- wind generator rotating fast and noisily
   a. Wind generator overheated- turn out of wind till cooled
   b. Wind generator phase wires disconnected.
   c. Burned out bridge rectifiers- try installing original Kiss control unit
7. Auto Stop not working
   a. Battery voltage lower than Stop voltage rotary switch set point
   b. Phase wires disconnected.
8. Kiss runs for several seconds then stops for a few seconds repeating. Battery voltage below Stop setting.
   a. Extractor disconnected from 12V battery. STOP Kiss immediately.
   b. Fuse blown. STOP Kiss immediately.
9. Kiss runs for a few seconds then stops for >90 seconds repeating. Battery voltage around Stop setting.
   a. Normal operation in high wind conditions when battery is charged.
   b. Consider turning Kiss slightly to one side out of wind.
10. Fuse blown inside Kiss Extractor™- Replacement fuse can be purchased in many auto or hardware stores.
   a. Positive and negative battery connections reversed during installation.
   b. TVS has been damaged. This occurs when the battery is disconnected in high winds. Purchase replacement from Digikey.com. (5KP18A)
11. Radio noise
   a. The Extractor™ enclosure is isolated; from battery negative; from the AC phases; and from the battery positive.
   b. Turn Extractor™ switch to Off
   c. If radio interference arises, one might test a ground wire from BAT- to the Extractor™ enclosure.
   d. Alternatively, one might run a ground strap from the vessel ground plane to the enclosure.
   e. Avoid running both the ground strap and the BAT- wire to the enclosure.
   f. Otherwise, Stop the Kiss during radio transmissions.

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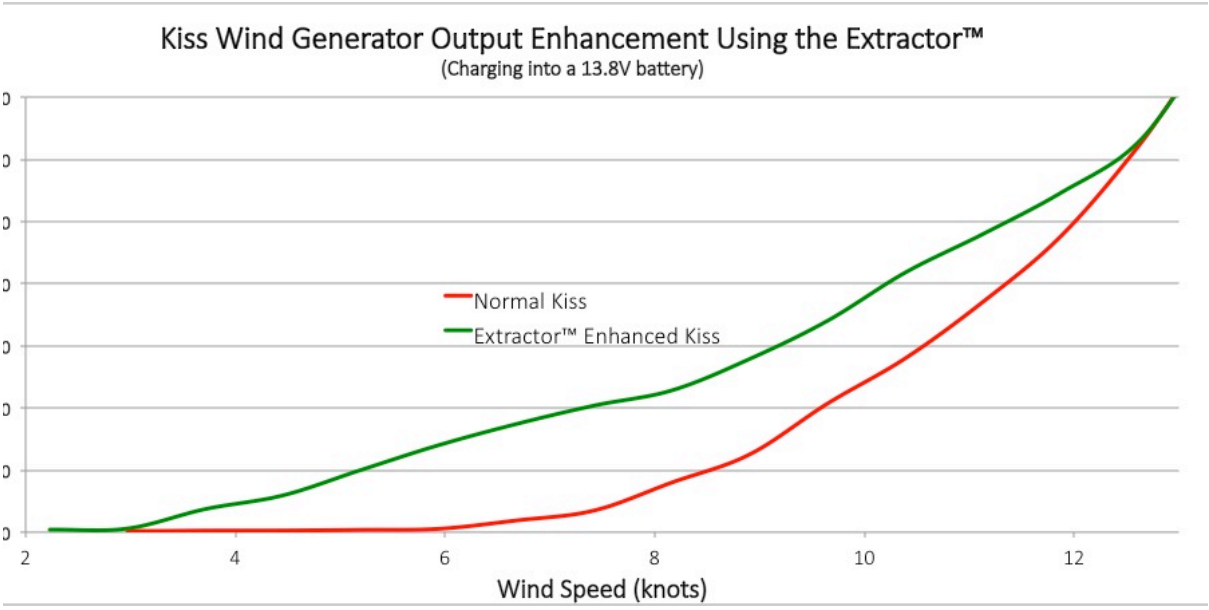
Specifications

Nominal Voltage	12V DC
Maximum Voltage	18V DC
Maximum Current	45 Amps DC
Extractor™ Enhancement Current	2.5 Amps DC
Wind Generator Stop Voltages	12.6, 13.2, 13.6, or 14.4V DC
Extractor™ Enhancement Voltages	12.6 or 14.4V DC
Recommended Entry/Exit Wire	10 gauge stranded, round
Fuse	40 amp ATO 32V
TVS (P6 to BAT-)	Vishay 5KP18A-E3/54
Quiescent Current ON	3.2 ma
Quiescent Current OFF	4.0 ma
Reverse Polarity and Surge Resistant	
Warranty-Limited from Date of Sale	1 year



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