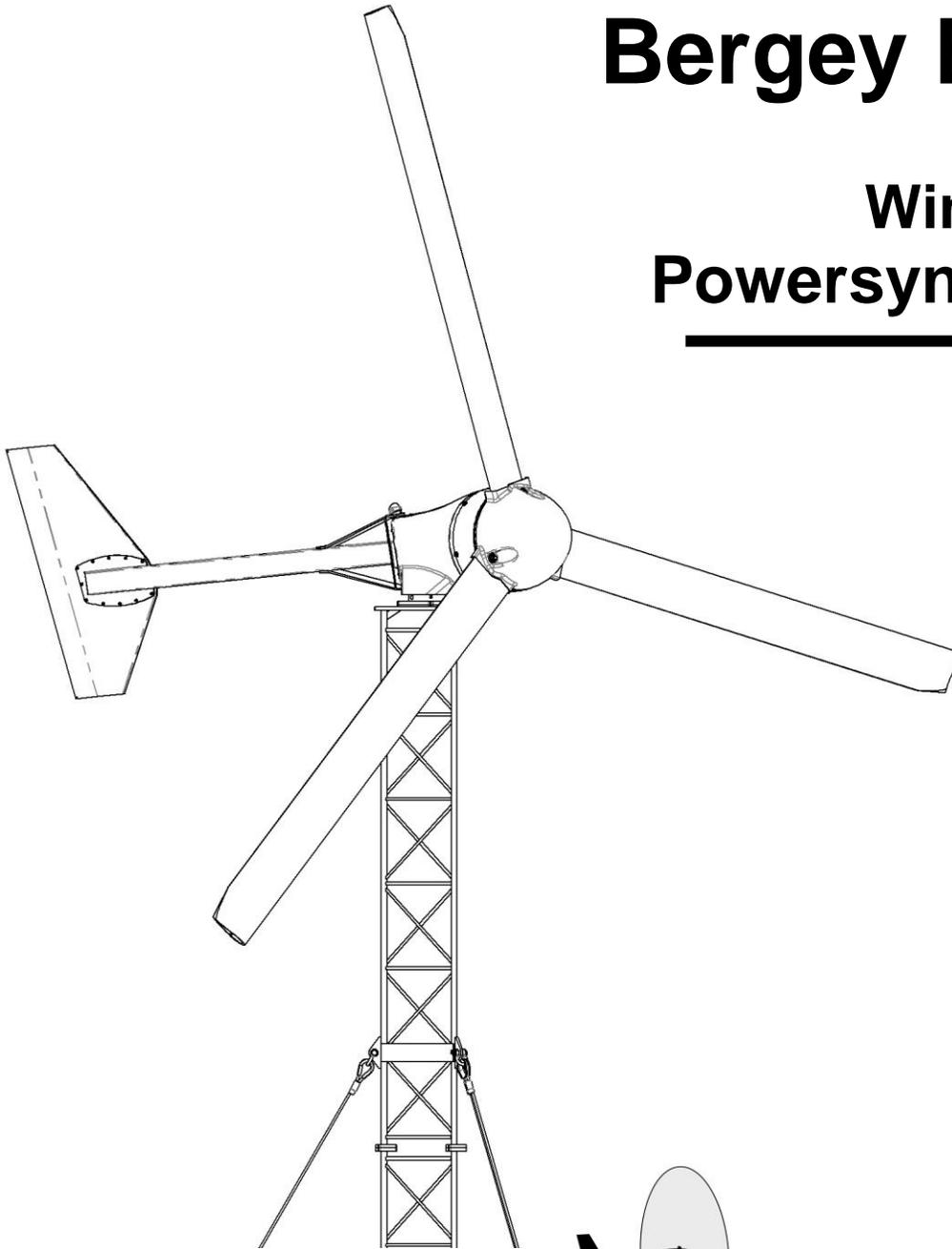


Owner's Manual

Bergey EXCEL 5

Grid-Intertie Wind Turbine & Powersync II Inverter



Rev. 3 August, 2012

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BERGEY EXCEL 5 SPECIFICATIONS

PERFORMANCE

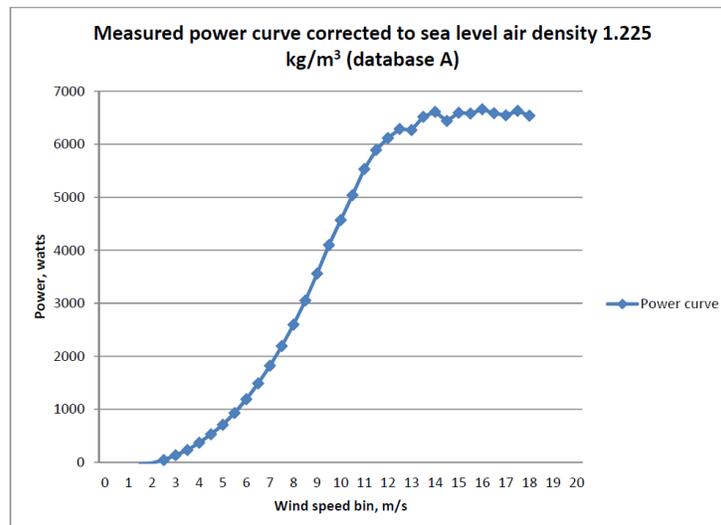
| | |
|--|-----------------------|
| START-UP WIND SPEED..... | 5 mph (2.2 m/s) |
| CUT-IN WIND SPEED..... | 4.5 mph (2 m/s) |
| RATED WIND SPEED..... | 25 mph (11 m/s) |
| AWEA RATED POWER (at 11 m/s or 25 mph) | 5.53 kW |
| AWEA ANNUAL ENERGY (at 5 m/s average) | 9,920 kWh |
| CUT-OUT WIND SPEED..... | none |
| FURLING WIND SPEED..... | 31-45 mph (14-20 m/s) |
| MAXIMUM DESIGN WIND SPEED..... | 134 mph (60m/s) |
| PEAK POWER..... | 6.7 kW |
| ROTOR SPEED..... | 0-400 RPM |

MECHANICAL

| | |
|---------------------------|-------------------------------------|
| TYPE..... | 3-Blade Upwind, Horizontal-Axis |
| ROTOR DIAMETER..... | 20.3 ft (6.2m) |
| WEIGHT..... | 772 lbs (350 kgs) |
| GEARBOX | none |
| BLADE PITCH CONTROL..... | none |
| OVERSPEED PROTECTION..... | AUTOFURL® |
| TEMPERATURE RANGE..... | -40 to 140 deg. F (-40 to 60deg. C) |

ELECTRICAL

| | |
|-----------------------|---|
| OUTPUT FORM..... | 240VAC, 1-Phase, 60Hz or 220VAC, 1-Phase, 50Hz |
| GENERATOR | Permanent Magnet Alternator |
| POWER PROCESSOR | Powersync II Inverter |



INTRODUCTION

This manual contains important information concerning your Bergey EXCEL 5 wind turbine system and its operational characteristics. We strongly recommend that you read and familiarize yourself with its contents.

At several points in this manual items of special interest or significant impact are highlighted by one of the following symbols:



DANGER

Hazards or unsafe practices that could cause personal injury or death.



WARNING

Hazards or unsafe practices which could cause product damage.

NOTE

Significant points of interest.

Serial Numbers

Each Bergey EXCEL 5 wind turbine has a serial number located on the alternator, near the rear bearing attachment bolts. The mainframe serial number is stamped adjacent to the port cover. The turbine serial number can also be found on the outside of the shipping carton and on the warranty registration card. We recommend that the serial number be copied to this manual for possible future reference.

Bergey EXCEL 5 Alternator Serial No.: _____

Bergey EXCEL 5 Mainframe Serial No.: _____

The Powersync II inverter has a serial number label on its right side. We recommend that this serial number also be copied to this manual.

Powersync II Serial No.: _____

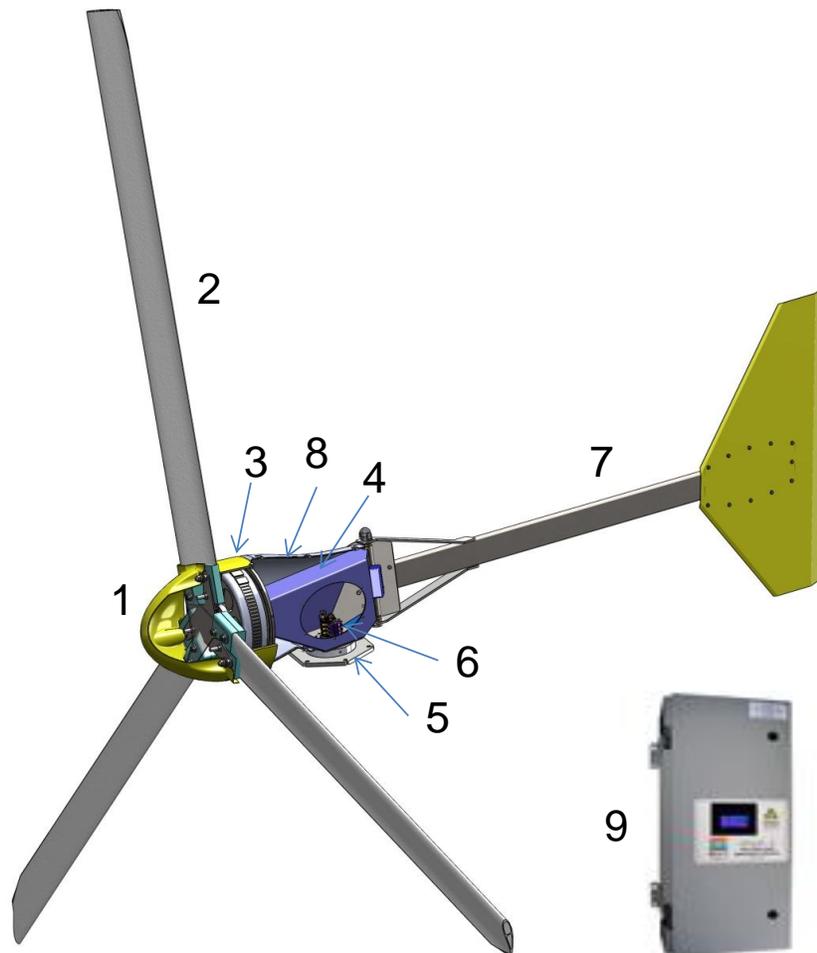
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1. SYSTEM DESCRIPTION

The Bergey EXCEL 5 is an upwind horizontal-axis wind turbine designed for distributed generation applications, connected to the power grid on the customer's side of the utility meter. The complete unit consists of the following major components, as shown in the figure below:

1. Spinner
2. PowerFlex® Blades
3. Alternator
4. Mainframe
5. Yaw Bearing
6. Slip-ring and Brushes
7. Tail Assembly
8. Nacelle Assembly
9. Powersync II Inverter



A. ROTOR SYSTEM

The rotor system consists of three PowerFlex® fiberglass blades. Acting like aircraft wings, the blades convert the energy of the wind into rotational forces that drive the alternator. The PowerFlex® blades are rigidly attached to the alternator and they are fixed pitch. The EXCEL 5 rotor blades have a proprietary airfoil, the BWC-7, which was custom designed to provide high efficiency and low noise.

The blades for the EXCEL 5 are extremely strong because they are made in a “pultrusion” process that puts more high-strength glass fibers in the structure than any other molding technique. This contributes to their long life and toughness. Blade sets are carefully matched for balance at the factory to ensure smooth operation of the wind turbine. Each blade has a serial number inscribed on its root pad at the inboard end.

B. ALTERNATOR

The alternator converts the rotational energy of the rotor into electricity. The alternator utilizes permanent magnets and has an inverted configuration in that the outside housing rotates, while the internal windings are stationary. It was specifically designed for the Bergey EXCEL 5 and produces power at low speeds, eliminating the need for a speed-increasing gearbox. Since it uses permanent magnets, the alternator is generating voltage whenever the rotor is turning.



DANGER

The output wiring of the BWC EXCEL 5 presents shock hazard whenever the rotor is turning. Caution must be exercised at all times to avoid electrical shock.

C. MAINFRAME

The mainframe is the structural backbone of the wind turbine. It serves as the attachment point for the yaw bearing and the housing for the yaw-axis slip-ring brushes. The yaw-axis is the full 360 degree pivot that allows the turbine to freely align itself to the wind direction.

D. SLIP-RINGS AND BRUSHES

The slip-rings and brushes conduct the electricity generated in the alternator from the moving (as it orients with the direction) wind turbine to the fixed tower wiring. The slip-rings are

enclosed in a metallic housing to help protect them from lightning.

E. TAIL ASSEMBLY AND AUTOFURL OPERATION

The tail assembly keeps the rotor aligned into the wind at wind speeds below approximately 31 miles per hour (14 m/s). At about 31 mph the AutoFurl® action begins to turn the rotor away from the wind to limit the rotor speed in high winds. The tail appears to fold, but in reality the tail stays stationary as the rotor turns sideways to the wind. The rotor furls to a maximum angle of 75 degrees (limited by rubber tail stops), so that the unit continues to produce power in high winds. When the high winds subside, the AutoFurl® system automatically restores the turbine into the normal straight position.

The rotor continues to spin even in very high winds and this actually makes the blades stiffer. The AutoFurl® system works whether the Powersync II inverter is on or not. Unlike many other turbines designs, the Bergey EXCEL 5 can operate safely without an electrical load connected to the turbine.

F. SPINNER AND NACELLE

The spinner (nose cone) and nacelle provide additional weather protection for the bearings and the slip-ring assembly. The nacelle also improves lightning protection.

G. Powersync II Inverter

The UL-approved Powersync II inverter converts the “variable AC” from the Bergey EXCEL 5 turbine into utility grade electricity so that it can be connected to the wiring in your home. This conversion requires sophisticated electronics and is designed to operate automatically. The Powersync II has a digital display that provides information on the status of the system, its current output power, and its cumulative energy production.

2. SYSTEM OPERATION

A. NORMAL OPERATION

The Bergey EXCEL 5 produces utility compatible power in the form of 240VAC, 60 Hz, single phase electricity (208 VAC/60Hz and 220 VAC/50 Hz options are available). It is connected through the Powersync II inverter to the utility distribution network in the same manner as household appliances. When the wind speed is too low to operate the wind turbine, all of the electrical power needed for the home will be supplied by the utility company. During these idle periods the Powersync II will consume approximately 0.3 kilowatt-hours of electricity per day.

When the system begins producing power, the amount of power which must be purchased from the utility is reduced by an amount equal to the output of the wind system. From the perspective of the utility company the wind system output reduces the electrical load they have to supply, just as if you turned off lights and appliances. The output of the wind system fluctuates with the speed of the wind so the instantaneous amount of electricity being saved will be constantly changing. Quite often your home will be served simultaneously by the utility and your Bergey wind turbine.

When the output of the wind system exceeds the power requirements of the house the excess electricity is sold back to the utility. Both the consumer's right to interconnect a wind system and the utilities obligation to purchase excess power are prescribed by federal law (PURPA, Section 210). The amount you will be credited or paid for this excess production varies state-to-state and sometimes utility-to-utility. If your utility company offers "net metering" then your meter is allowed to turn backwards so that you essentially bank energy, at full value, for less windy periods. This banking can be done over a month or over a year depending on the policy of your state or your utility. If you do not get "net metering" then you will have a second utility meter to register excess production and your utility will pay or credit you for this, typically at less than full value.

If your utility experiences an outage (blackout) the wind system will cease to produce power so that it does not present an electrical safety hazard to utility repair crews. Although the wind turbine will continue to operate, no power will be transferred from the Powersync II inverter to your circuit breaker panel. When utility power is restored, the Powersync II will automatically return the wind system to full working status following a five minute delay and then a two minute countdown. These time delays are dictated in the UL standards required by the utilities.

The rotor of the EXCEL 5 should begin to rotate when the wind speed reaches approximately 4.5 mph (2 m/s). Once started, the rotor may continue to turn in winds below 4.5 mph (2 m/s),

but the system will not be producing power below this wind speed.

NOTE

All operational wind speeds given assume steady winds, sea-level conditions and moderate temperatures. Hot weather, high altitude, turbulence and gusting winds will reduce system performance.

The rotor speed will increase with increasing wind speed and the system will produce a higher output. This output increases rapidly because the energy available in the wind varies as the third power (cube) of the wind speed. For example, if the wind speed increased from 5 mph to 10 mph, a factor of two, the energy in the wind would increase from one unit to eight units, a factor of eight (2 to the 3rd power). One result of this relationship is that there is very little energy available in light winds. For the average site, winds in the range of 12-20 mph (5.5 – 9 m/s) will provide most of the system's energy production on an annual basis.

B. HIGH WINDS - AUTOFURL®

During periods of high wind speeds the AutoFurl® system will automatically protect the wind turbine. Furling means that the rotor is turned away from the wind. When furling, the power output of the turbine will be reduced. In winds between 31 mph (14 m/s) and 45 mph (20 m/s) it is normal for the turbine to repeatedly furl and then unfurl and then furl again. During intermittent cycling the turbine may produce output surges up to approximately 6,600 watts.

C. UNLOADED OPERATION

If an abnormal condition occurs on the utility line, such as a voltage fluctuation or a complete interruption, the Powersync II inverter will automatically disconnect the wind turbine from the power grid. If sufficient wind is present, the rotor will continue to operate. Since it is unloaded it will spin at a higher speed and some increase in blade sound is to be expected. This is a perfectly safe and permissible condition as the AutoFurl system will continue to protect the turbine.

**DANGER**

During unloaded operation the alternator can still generate high voltages, so the EXCEL 5 electrical system should be handled with the same caution used during normal operation.

In order to enhance the systems reliability, the power output of the EXCEL 5 is limited to

approximately 6.6 kilowatts. Since this output is reached at 31 mph (14 m/s), the rotor will become progressively unloaded as wind speeds increase up to the maximum furling point of approximately 45 mph (20 m/s).

D. POWERSYNC II INVERTER

The Powersync II inverter is connected to the household circuit through a dedicated 40 amp breaker. Before opening the Powersync II enclosure, the breaker must be turned off and the tower disconnect switch must be switched OFF, to avoid electrical shock.



DANGER

Always remember that the system operates at 240 volts, so electrical shocks can be fatal!

Using the utility grid as a reference, the Powersync II inverter converts the output of the wind turbine into utility-compatible alternating current (AC). The Powersync II inverter has been designed for automatic, unattended operation and it is programmed to provide maximum performance from your Bergey EXCEL 5 wind turbine. It is also programmed to safely disconnect the wind turbine in the event of a problem with the utility power and to automatically reconnect the turbine after the problem is remedied.

The LCD digital display on the front of the Powersync II provides information on the status of your Bergey EXCEL 5 wind turbine. The contrast can be adjusted UP or DOWN using hidden buttons on the right side of the display.



In normal operation the Powersync II will show the status as "Running" and will display the instantaneous Output Power in Watts. Other operating modes that may be indicated are as follows:

| Status Message | Description |
|----------------------------|---|
| Waiting Initializing | The inverter has been reset or that the 5 minute countdown delay is in progress |
| Waiting For Wind | The voltage from the turbine is lower than the factory set auto-start voltage threshold |
| AC Running | The active rectifier is regulating the internal DC Boost voltage |
| Running | The inverter is transferring power to the utility grid |
| Fault | A fault has occurred. See fault messages |
| Manual Stop Press Reset | The manual stop button has been pressed |
| Fault Limit Press Reset | Three faults have occurred in an hours time |
| Disconnected | Indicates that a communication problem exists between the display and the inverter. Check for bad cable connection. |
| Soft Grid | The inverter has detected that the output voltage is approaching the over voltage limit and is reducing its output to compensate for the less than ideal current carrying ability of grid connection. |

Using the Up and DOWN arrows you can scroll through the additional Powersync II information available, as shown below.

| Parameter | Description |
|------------------|--|
| Grid Voltage | Magnitude of the connected single phase grid voltage |
| Grid Frequency | Frequency of the connected single phase grid voltage |
| Bus Voltage | Magnitude of the actively rectified DC bus voltage |
| DC Current | Averaged value of the DC current |
| Turbine Volts | Averaged value of the rectified AC voltage from the Input |
| Output Power | Output power displayed in watts |
| Accum. Energy | Output Power accumulated over time of operation. Accuracy within 10%. |
| VRef | Used for factory setup** |
| IRef | Used for factory setup** |
| Last Fault | Displays the last fault that occurred since the inverter was powered up along with a fault code that may be useful when troubleshooting. |

When the Powersync II is starting up after initialization, or after the RESET button has been pushed, or after a power outage, it will go through a 300 second (5 minute) countdown that is required by UL 1741. This UL standard also dictates high and low limits for utility voltage and frequency, outside of which the inverter is required to shut down until they return to the acceptable range. This is called a FAULT condition.

There are a number of possible FAULT conditions during which the Powersync II will be protecting itself or the power grid. When a FAULT occurs the Powersync II will shut down (no power production) and a Fault Code will be displayed on the digital display. A list of the Fault Codes can be found in the detailed instructions for the Powersync II inverter provided in the

Appendix. FAULTS will reset themselves automatically; assuming the underlying cause of the fault has been cleared, unless the inverter experiences three (3) FAULTS of any type in a one hour period. In this case a manual RESET is required on the digital display.

**CAUTION**

If a manual reset is required we highly recommend that you check the FAULT CODE list for indications that there is an equipment or wiring problem that needs addressing.

One unique feature of the Powersync II inverter is its Soft Grid power limiting capability that can reduce the number of nuisance FAULTS on weak power lines during periods of high turbine power output. On a weak power line the EXCEL 5 wind turbine can, on a windy day, raise the local utility voltage above the UL 1741 threshold, causing a FAULT. The Soft Grid feature tries to prevent these FAULTS by reducing power output from the wind turbine. When the Powersync II is in this mode the digital display will show "Soft Grid".

The STOP pad on the digital display will shut down the Powersync II inverter. Press the RESET pad to restart (which will start the 300 sec. countdown).

If the circuit breaker in your home or business load center (circuit breaker panel) trips, it should be reset by first switching it to the OFF position and then to the ON position. If the breaker trips again immediately, or if it continues to trip after brief periods of normal operation, switch the breaker OFF and contact your Bergey dealer for assistance.

The following recommendations will help ensure the safe operation of the Powersync II inverter:

1. Keep all sources of moisture away from the Powersync II enclosure.
2. Do not work near the Powersync II with gasoline, paint thinner, or any material which produces flammable vapor. Do not store flammable materials near the Powersync II enclosure.
3. Do not open the Powersync II enclosure unless the circuit breaker and Accessible Disconnect Switch (ADC) at the base of the tower have been switched OFF. **Note that even with the circuit breaker and ADC switched OFF, a shock hazard will still be present inside the Powersync II enclosure for approximately 15 minutes (as the capacitor voltage drains down).**
4. Do not block airflow around the Powersync II enclosure in any way. A six-inch clearance must be maintained around the sides, top, and bottom of the enclosure for adequate air circulation.

3. INSTALLATION

Please use the following instructions in assembling and commissioning your system. If you need any additional information, please contact us.

A. BWC EXCEL 5 WIND TURBINE and TOWER

Please refer to the BWC EXCEL 5 Installation Manual, and any addendum for the specific tower design, for instructions on installing the wind turbine and tower.

B. FUSED DISCONNECT SWITCH

The electrical output of the wind turbine is a three-phase alternating current (AC). We strongly recommend the installation of a fused three-phase AC disconnect switch between the wind turbine and the Powersync II, as shown in the drawing on Page 16. This switch is commonly referred to as an Accessible Disconnect Switch (ADC) and most utilities will require one to be installed. A 60A weather-tight switch box with 45A fuses for the 240 VAC, 60Hz or 220VAC, 50Hz system is recommended. The fuses will help protect the alternator in the event of a wiring, controller, or load short circuit. The fused disconnect switch is normally installed at the base of the tower.



CAUTION

Do not install a permanent “short circuiting switch” that will provide dynamic braking of the alternator. These switches can be easily misused, leading to serious damage to the alternator. Such damage is not covered by the BWC warranty.

C. WIRE RUN AND WIRE SIZES

Please refer to the BWC EXCEL 5 Installation Manual for recommended wire and conduit sizes for the tower-to-Powersync II wire run.

D. POWERSYNC II INVERTER

The Powersync II inverter should be installed near the main breaker enclosure if possible. A minimum of six inches of clearance is required on the top, bottom and sides of the Powersync II to ensure adequate air flow through the enclosure.

The Powersync II should be connected to a dedicated 40A breaker installed in the main breaker box. System grounding is accomplished by attaching a wire, # 8 AWG minimum, from the grounding lug inside the Powersync II enclosure to the panel ground inside the main breaker box. Additionally, the tower "bond" ground wire should be connected to the grounding lug inside the Powersync II enclosure. A typical system wiring schematic for the Bergey EXCEL 5 is shown below. The three AC connections from the wind turbine can be connected to the Powersync II terminals in any order; there is no required phase orientation.



DANGER

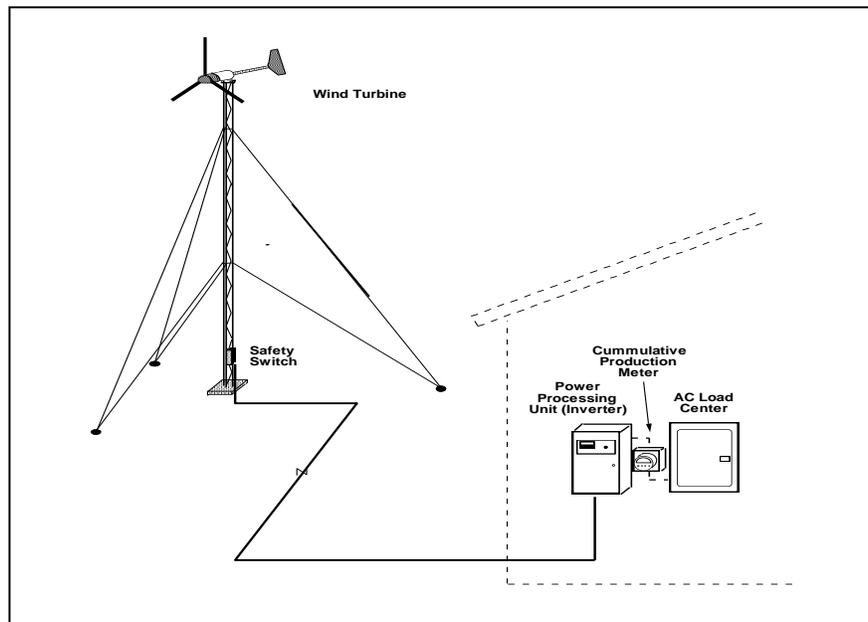
Do not attempt to make the Powersync II connections with energized leads. Always have the wind turbine fully disconnected and the circuit breaker switched to "off" before making the Powersync II connections.

All wiring should conform to the National Electric Code or other governing local electrical code. The use of electrical conduit for wiring between components is highly recommended. All terminations should be coated with an anti-oxidation compound to prevent corrosion.



CAUTION

All loads should be equipped with fuses or circuit breakers to avoid hazards from accidental short circuits.



4. INSPECTIONS AND MAINTENANCE

The Bergey EXCEL 5 turbine and tower should be inspected 30 days after installation, and then again 180 days after installation.

Following these two inspections the installation should be inspected every two years and after any particularly severe weather. Inspections should be done on days when the wind is below 16 mph (7 m/s).

Check List for Inspections

1. Inspect each of the anchor points. Ensure that all hardware is secure and the guy wires are properly tensioned. Check to ensure that no strands are broken and the turnbuckle safety cables are in place.
2. Disconnect the inverter and short the alternator using the procedure given in the installation manuals. Climb the tower. Always use proper safety climbing gear and safe climbing practices.
3. Inspect the blades for:
 - A. Cracks outboard of the hub pad, in the blade pultrusion itself. Cracks in the molded hub pad are normal after a few weeks of operation and will not affect the strength or reliability of the blade.
 - B. Condition of the leading edge protection tape. Torn or peeling tape will need replacing.
 - C. Leading or trailing edge damage.
 - D. Condition of the paint.
4. Remove the spinner and hang it from the machine. Check the torque on the blade nuts; the recommended value is 150 ft-lbs. Check the front bearing for seal integrity and grease loss. Reattach the spinner and check that it is secure.
5. Remove the side of the nacelle. Hang it from the tower or tail boom while you inspect the turbine.
6. Check the rear alternator bearing for seal integrity and grease loss.
7. Inspect the mainframe for cracks.
8. Remove the slip-ring cover plate. Make the following inspections:

- A. Check brushes for ease or movement in the brush holder.
 - B. Check slip rings for signs of arcing damage.
 - C. Clean excessive grease from yaw bearing leakage onto the slip-rings.
9. Check for cracks or loose hardware on the tail boom and fin.
 10. Check the tail pivot pin and particularly its fasteners.
 11. Close the nacelle and check that all of its fasteners are secure.
 12. Inspect the integrity of the yaw bearing seal. Add grease if necessary – roughly in proportion to the grease loss observed. There should be a coating of grease on the seal to improve water tightness.
 13. While descending the tower, inspect the following:
 - A. Check that the tower wiring is properly secure.
 - B. Check all fasteners.
 - C. Look for any cracks in the tower structure.
 - D. Check the condition of the guy wire attachment, if present.
 14. Check the connection on all ground rods and hardware.
 15. Remove the alternator shorting connection. Check the disconnect switch.
 16. Switch the disconnect switch to "OFF." Listen to the sound of the machine as it speeds up. No mechanical sounds, such as a "clunking" or "banging," should be heard. Also watch for any new or significant vibration. The turbine operation should be smooth.
 17. Inspect the wire run, particularly all electrical connections.
 18. Check condition of all wiring connections into and out of the Powersync II.
 19. Check the fan filters on the Powersync II.
 20. At the second annual inspection, and at each alternate inspection thereafter, inspect the condition of the brushes and internal fasteners.

**DANGER**

Only qualified personnel with proper safety equipment should climb the tower. Never climb the tower when the rotor is turning at a rate greater than 10 rpm.

5. Trouble-Shooting Problems

The following guide can help to pin-point the cause of operational problems with the Bergey EXCEL 5 wind turbine and the Powersync II inverter. For problems or symptoms not found in the following listing please contact the Service Department at Bergey Windpower Co. at Tel. No. 1-405-364-4212, Telefax No. 1-405-364-2078, or E-mail: service@bergey.com

| Problem | Cause(s) | Diagnosis | Remedy |
|--|---|---|--|
| Turbine makes an unusual blade sound, such as whistling or buzzing | 1. Damaged blade leading edge tape | 1. Have leading edge tape inspected | 1. Replace tape as necessary |
| | 2. Blade (pultrusion) structural damage | 2. Have blades inspected. <u>Cracks outboard of the molded hub can lead to blade failure.</u> | 2. If blade damage is suspected, the turbine should be inspected. Contact your dealer. |
| Rotor is unbalanced, causing the turbine to move slightly back and forth as it spins | 1. Uneven ice build-up on blades | 1. Ice on turbine and tower. Turbine ran smoothly before ice storm. Slow rotor speed. | 1. Do nothing – ice will dislodge in a few days. |
| | 2. Blade damage | 2. No ice. Turbine ran smoothly before | 2. If blade damage is suspected, the turbine should be inspected. Contact your dealer. |

| Problem | Cause(s) | Diagnosis | Remedy |
|--|--|--|--|
| Turbine makes a banging or rattling sound once per revolution, particularly at low speeds | 1. Loose spinner | 1. More likely on pre-2004 turbines (when design was changed) | 1. Have spinner inspected |
| | 2. Alternator rear bearing ring fasteners loose or missing | 2. Requires inspection | 2. Have alternator inspected |
| | 3. Alternator bearings | 3. Excessive grease leakage. Squeaking sounds at low speed. | 3. Have alternator inspected |
| Turbine makes a "fog horn" sound at certain, typically low, wind speeds | Electro-mechanical interaction between alternator and inverter that causes transient vibrations in the turbine | Sound comes and goes, but occurs at the same wind speed(s) | This is normal, but contact your dealer or the Bergey Service Department if the noise is excessive |
| Turbine makes a continuous growling or rumbling sound, which reduces at higher wind speeds | | Switch fused disconnect on tower to OFF. If growling disappears an electrical problem is indicated. If growling continues a mechanical problem is indicated | |
| | 1. Wiring fault | 1. Check fuses. Check wiring for continuity, phase-to-phase fault, or short to ground. | 1. Repair or replace as needed |
| | 2. Inverter fault | 2. After completing the wiring check, disconnect the inverter and reconnect wiring to the turbine. If the noise disappears an inverter problem is indicated. | 2. Contact your dealer |
| | 3. Alternator bearings | 3. Check for excessive grease loss | 3. Have the alternator inspected |

| Problem | Cause(s) | Diagnosis | Remedy |
|--|--|---|--|
| Rotor turns slowly and does not speed up in higher winds | 1. Ice build-up on blades | 1. Check for ice | 1. Do nothing – ice will dislodge in a few days. |
| | 2. Short circuit in wiring or inverter | 2. Open tower disconnect. If turbine spins freely an electrical system problem is indicated | 2. Contact your dealer |
| | 3. Short circuit in tower wiring, slip-rings, or alternator | 3. The most likely problem is a shorted alternator. Diagnosis requires tower climbing | 3. Contact your dealer |
| Rotor does not turn at all | Mechanical failure inside alternator | Rotor does not turn even when winds exceed 15 mph (6.7 m/s) | Contact your dealer |
| Powersync II display not functioning | 1. No power to inverter 2. Display or other inverter component not functioning properly | | 1. Turn off utility power to inverter, using the dedicated breaker in your breaker panel, for a minimum of 20 seconds. Then turn power back on using the breaker. Wait 300 seconds (5 minutes). If inverter does not resume operation, with full display functionality, contact your dealer |

Appendix

5 Year Limited Warranty

BWC Excel 5 Wind Turbine

Bergey Windpower Company

Wind turbines, their associated electronics and towers supplied by Bergey Windpower Company (BWC) are warranted against defects in design, material and workmanship under normal use for which intended. BWC Excel 5 wind turbines and blades carry a five (5) year warranty after date of installation. Electronic components and towers supplied by BWC also carry a five (5) year warranty after date of installation. During the warranty period BWC will repair or replace, at its discretion, defective components or assemblies. BWC will also pay one-way shipping charges. For customers not in the USA, shipping and insurance charges will be pre-paid to the port of entry into the customer's country. This limited warranty is transferable.

Warranty coverage is extended only to customers who have submitted a properly completed BWC Warranty Registration Form and acceptable proof of correct system installation as requested in the BWC Registration Form. Customer must also perform and document recommended inspections and any maintenance tasks that may be identified during inspections.

This limited warranty does not cover:

1. Towers and equipment, materials or supplies not manufactured or supplied by BWC;
2. BWC equipment that has been modified without prior factory approval;
3. Repairs performed by personnel not authorized by BWC;
4. Damage resulting from use of equipment not supplied by BWC;
5. Damage or loss of function sustained during periods when wind speed exceeds 60 m/s (135 mph);
6. Acts of God;
7. Incidental or consequential damages.

This limited warranty is in lieu of all other BWC guarantees or warranties expressed or implied. No employee, agent, dealer, or other person is authorized to offer warranties on behalf of BWC. BWC reserves the right to make design changes, improvements and additions to its products without obligation to install such in products previously manufactured.

RETURN THIS CARD TO BWC ALONG WITH PHOTOS DOCUMENTING INSTALLATION
 NOTE: DIGITAL PHOTOGRAPHS PREFERRED IF AVAILABLE)

June 8, 2009
 Return to: Bergey Windpower Company
 2200 Industrial Blvd.
 Norman, Oklahoma 73069
 (405) 364-4212

BWC WIND TURBINE SYSTEM REGISTRATION CARD

OWNER NAME _____

Address _____

City, State, Postal Code _____

Country _____

Phone (_____) _____

DEALER NAME _____

Address _____

City, State, Postal Code _____

Country _____

Phone (_____) _____

LOCAL UTILITY COMPANY INFORMATION (if grid-connected system)
 Name of Utility _____

Net Metering? Yes No

HYBRID SYSTEM (If applicable)
 Is turbine part of hybrid wind-PV-diesel system? Yes No

PV array? Yes No PV Power rating _____ kW

Diesel Gen-set? Yes No Generator rating _____ kW

WIND SYSTEM MODEL _____

Serial No. (e.g. 2009866; near top of mainframe tube)

Controller: PowerSync II VCS-10 Powercenter

Controller Serial No. _____

Blade Serial Numbers (e.g. 10080025; stamped on blade root pad)

Tower Type _____ Height _____

Anchor Type _____

Wiring Run Length (Tower-to-Controller): _____ ft

Wire Size _____ gauge

Wire Type Copper Aluminum

BATTERY BANK INFORMATION (if applicable)
 Battery Manufacturer & Model _____

Battery Bank Voltage 24V 48V 120V 240V

Battery Bank Amp Hours _____

Number of Battery Strings _____

Inverter Manufacturer and Model _____

OWNER'S or DEALER'S SIGNATURE _____

DATE SYSTEM INSTALLED _____

WARRANTY REPAIR IS PERFORMED ONLY AFTER FACTORY AUTHORIZATION. PLEASE RETURN THIS CARD AND PHOTOGRAPHS OF INSTALLATION PROMPTLY IN ORDER TO ASSURE COVERAGE.

Required Photographs

1. Complete tower - turbine system view
2. Anchor photos including all anchor hardware
3. Photos showing all grounding connections
4. Turnbuckle photos showing safety cables
5. Installed rebar cages for anchors, pads, piers and any other concrete items
6. Controller location and environment
7. Controller interior showing wiring connections
8. Interior of tower-base disconnect switch showing fuses and wiring connections

**Powersync II - 240 VAC (AMFA-35)
and
Powersync II - 208 VAC (AMFA-39)**

**Operator's Manual
&
Installation Instructions**

Rev. 1.0

Date: 15 July, 2011