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1. Wind Turbine

Before you begin installing

Reading this entire owner’s manual. Identify and note your model wind turbine where it appears in this manual. Following the instruction and recommendations in this manual will help assure safe and enjoyable use of your new renewable energy system.

Safety Information

Wind turbine system may present mechanical, electrical and chemical hazards that can be life threatening during installation, operation and maintenance. These conditions are addressed belong:

◎ It is your responsibility to obtain all required permits and engineering certification for tower and tower location. Soil and wind conditions vary and tower foundations must be design for your special location. Tower must not be able to fall on occupied buildings, neighbor’s property or power lines. Tower climbing is dangerous and should be attempted only by experienced personnel using proper safety equipment. A fold-over tower can eliminate climbing. Locate your mounting mast well away from occupied buildings and power lines; a minimum of 100m (300 ft) is recommended.

◎ If the turbine appears or sounds loose in the tower or is making an unusual sound, the condition must be corrected immediately. A loose turbine or component will soon damage itself further and may fall from the tower or lose parts that could be lethal. Never stand in line with a spinning blade.

◎ High voltage systems represent a dangerous shock hazard and could be lethal. All high voltage systems should be wired and maintained by a qualified and licensed electrician.

◎ Batteries may emit explosive and irritating gas while charging. Never turn on a light switch or make any other electrical connection or light a match or make any type of spark near a recently-charged battery. Use protective gloves ad eyeglass when working around a battery.

⚠️ Attention: Turn off all loads, wear safe glasses and look away when making final
battery connection.

Never place object on top or near the controller enclosure. These devices must dissipate heat as part of normal operation. *Failure and fire* may result if airflow is blocked.

### 1.1 Introduction of Wind Turbine System “BOWIND-0300”

Standard wind turbine system is composed of a Wind Turbine and Controller (including Resistance Box). The user supplies the battery, tower, inverter and wiring. Batteries store electricity so you have power during windless periods as well as periods of high demand. A deep cycle type of battery must be used. If you have wind turbine only, use this manual to help size the battery and inverter.

The schematic drawing below depicts a typical installation. For more information regarding specifications of wind turbine and inverter systems, contact our company and we will reply soon.
1. Wind turbine transfers wind energy to mechanical energy that can rotate the generator, and then transfers mechanical energy to electric energy.
2. The controller transfers the alternating current generated by wind turbine to the direct current that can be stored for battery.
3. The inverter can transfer the electricity stored in the battery to 110V or 220V that can supply electric device to use.
4. The electricity for family use, for example: light, computer and so on.
Major Components of wind turbine “BOWIND-0300”
1.2 Tower Installation and Location Selection

Tower height minimum is 6 meters above trees or obstacles within 100m (300 feet). The highest point on your property is generally best. Besides, install a lightning rod and its height should be higher than tower.

For example:
Tower height: 8M
Caliber: 60.5mm (thickness: 3.6mm)
Maximum loading of tower: 130kg (under 60m/s wind speed)
Deformity condition: wind velocity<60 m/s and total deformity is 0.5%
Minimum gap between blade and tower is 172mm
Tower size illustrates belong:
Crane size:
Single host & rope
Loading over 300kg (include tower)
Crane’s height should higher than tower over 1.5 meter
Loading of rope & hook should over the total weight of goods

1.3 Wind Turbine Electrical Tests

Before installing the wind turbine, please test the wind turbine first to check it can work normally.

(1) Open Circuit Test :
The wind Turbine should spin freely when the wires are unconnected.

(2) Short Circuit Test :
The wind turbine should turn hard when all the wires are shorted together.

(3) Phase to Phase Test:

Using digital multi meter to measure any two wires of the wind turbine, it should reveal short circuit condition.

⚠️ The wind turbine electrical tests should satisfy above three conditions at the same time. If any one is unsatisfied, it means the wind turbine is broken down. Please contact factory or distributor soon.
1.4 Wind Turbine components assembly schematic drawing

1.4.1 Blades & Nose Cone

Referring to the under drawing, align the fix column of blade and hub, then install blade on hub and lock with bolts. Put pin on the pin slot of generator shaft. And align the pin of hub and shaft, put hub on generator and install shaft and hub with M16 Nut. Lock the nut with 20 N-m. Then install nose cone on hub and Lock it with 8 N-m.

<table>
<thead>
<tr>
<th>No.</th>
<th>Component Name &amp; Size</th>
<th>Quality</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Cap Hex Bolt M6X15</td>
<td>1</td>
</tr>
<tr>
<td>2</td>
<td>Nosecone</td>
<td>1</td>
</tr>
<tr>
<td>3</td>
<td>Nut M16</td>
<td>1</td>
</tr>
<tr>
<td>4</td>
<td>Wisher M16</td>
<td>1</td>
</tr>
<tr>
<td>5</td>
<td>Hex Bolt M8X45</td>
<td>6</td>
</tr>
<tr>
<td>6</td>
<td>Wisher M8</td>
<td>6</td>
</tr>
<tr>
<td>7</td>
<td>Blade</td>
<td>3</td>
</tr>
<tr>
<td>8</td>
<td>Nylon Nut M8</td>
<td>6</td>
</tr>
<tr>
<td>9</td>
<td>Hub</td>
<td>1</td>
</tr>
<tr>
<td>10</td>
<td>Pin 6X6X16</td>
<td>1</td>
</tr>
<tr>
<td>11</td>
<td>Generator</td>
<td>1</td>
</tr>
</tbody>
</table>
1.4.2 Wind Turbine & Tower

Put yaw set into tower, and lock with M8 hex bolt.

<table>
<thead>
<tr>
<th>No</th>
<th>Component Name &amp; Size</th>
<th>Quality</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Yaw Set</td>
<td>1</td>
</tr>
<tr>
<td>2</td>
<td>Spring Washer</td>
<td>5</td>
</tr>
<tr>
<td>3</td>
<td>Washer M8</td>
<td>5</td>
</tr>
<tr>
<td>4</td>
<td>Hex Bolt M8 X 16</td>
<td>5</td>
</tr>
</tbody>
</table>
2. Controller

Installation Information

◎ Do not make it repaired and/or disassembled by unqualified person. If this happens, the warranty becomes ineffective.
◎ Do not place the controller in the humidity, and high temperature environment, or directly under sun.
◎ Use only the battery with the same brand and type. Use of other battery is prohibited.
◎ Do not place any other substance close to the controller and resistor box.
◎ Connection electrical wires according to the wire connection diagram provided in manual.

Safety Warning (Read the details before installation)

◎ Pay attention to the polarity of battery, and do not make short circuit for battery polarity.
◎ During running, the electricity power will be generated in R.S.T conductors. Do not touch them.
◎ Controller shall be installed indoor with appropriate water protection.
◎ Resistor box can be installed outdoor with appropriate ventilation and water protection. Do not make it directly under rain shower.
◎ Resistor box shall be placed out of the reach of child to prevent the risk of electric shock.
◎ The R.S.T doctors with minimum size of 12 AWG (4mm2) shall be used for R.S.T.
◎ For battery load and unload conductors (Bat +, Bat -, R+, R-), the copper conductors with minimum size of 10AWG(6mm2) shall be used.
◎ Before installation, check to ensure if every battery voltage is within the limit of (12±2)V.
◎ If any problem is found in the wire connection of controller. Stop operation of wind turbine first, and check to ensure that the R.S.T conductors are well connected to
Before typhoon and/or hurricane, dismount the wind blade from wind turbine, and well fixed them in appropriate location so as to prevent the damage to the wind turbine and/or injury to the person.

Be sure to dress electricity protection gloves during making wire connection.

2.1 Controller outlook and connection points

The controller outlook is as the following drawing, its dimension is 315mm * 240mm *95mm with 8P wire connection terminals as the following:

- R.S.T terminal: Power input ports (The input conductors could be connected arbitrarily)
- 24V Battery connection terminals: marked with “BAT+”, and “BAT-”.
- Unload discharge connection terminals: marked with “R+”, and “R-”.
- Earth connection terminals: marked with “⊥”.
- Controller max input unloaded voltage 60Vac.
- Battery max voltage 15Vdc.
- The max current 45 AMP.
Circuit Breaker:

Before maintenance, typhoon, or hurricane, switch the circuit breaker to “STOP” position, and making sure that the wind turbine stops running completely, then you can access to the wire connection circuit to carry out the maintenance and/or disassembly work.

2.2 Indicator Explanation

Three LEDs (Green/Yellow/Red) are used on the controller to indicate the battery and controller working conditions as the following explanation:

Controller start: Green-Yellow-Red (light one cycle)

Whenever the battery is not fully charged, the LED lights as the following.

- Green Lights 80%~95% charged
- Green & Yellow Light 60%~80% charged
- Yellow Lights 35%~60% charged
- Yellow & red Light 0%~35% charged
- Red Lights Battery Low

Green Flashes Battery Full

The indicators as above mentioned indicate the situation of battery charging, it will be different if you use other battery.

In case there is any other indication, it means that some abnormal situation is detected. For this case, stop operation immediately and keep us informed for repair.

2.3 Unload resistor box outlook and function

The unload resistor box outlook is as the following diagram. It’s dimension is 440mm * 330mm * 120mm.
During the operation of wind turbine, some additional generated power will be delivered to the “unload resistor” depending upon the situation of battery charging. The power delivered to the resistor will be transferred into heating power. So, the unload resistor box shall be located outdoor with appropriate ventilation, protection against rain shower, and out of the reach of Child. During operation of wind turbine, it is prohibited to touch the “unload resistor box”.
2.4 Recommended battery specification and cable size

(1) Single battery voltage: 12 (Volts).
(2) Battery capacity: 75 (Amp/Hours).
(3) Lead acid deeply cycle battery without water adding.

◎ Battery circuit:

Connect the two 12 Bolts lead acid battery in series with appropriate polarity as indicated on the following drawing so as to get the 24 Bolts battery charging circuit. During connection, pay attention to the right polarity. In case of error, it will result in the damage to controller.

```
+  12 V  +  12 V  +  12 V
-                  -                  -
```

◎ Cable:

The power cable for R.S.T shall be at least 12 AWG (4 mm2) Copper Conductor with Voltage rating 600V, current rating 30A, and temperature rating 105℃.

The cable for battery charging and unload circuit shall be at least 10AWG(6 mm2) copper conductor with 600V, 45A, 105℃.

In case the cable is exposed outdoor, it shall be protected by using appropriate cable conduit.
2.5 Installation Steps

⚠️ The wire connection for controller and Loading Resistor Box shall be completed prior to the running of wind turbine.

1. Switch the circuit breaker to “Stop” position.
2. Connect the battery and loading resistor box with proper polarity, and check to ensure that battery and resistor can work normally.
3. Connect the power conductors from wind turbine to R/S/T terminals.
4. Set up the generator of wind turbine for operation.
5. Switch the circuit breaker to “Start” position so as to start the operation of wind turbine.

![Boltun Controller Diagram](image)
2.6 Recommended Inverter Specification

For this series of wind turbine, we strongly recommended 2 set of batteries used alternatively instead of inverter. However, if required you may use appropriate inverter to transfer 12 Vdc power to the appropriate local power specification ranging from 100 Vac~240Vac/50~60Hz so as to make it supply the appropriate power to your electrical equipments.

![Diagram of battery and inverter connection]

OUTPUT 100~240Vac / 50~60Hz
3. Operation & Maintenance

◎ Attention: Before proceeding routine maintenance, must observe the wind turbine close-down procedure

3.1 Wind Turbine Operation Model

(1) Normal Model:

After installing completely the wind turbine system, switch the brake on controller to work model, namely enter normal model. Wind Turbine can operate normally to generate electricity.

(2) Manual-braked Model:

When you want to make the inspection, maintenance or before the typhoon coming, switch the brake on controller to STOP model manually. The wind turbine will stop rotating in order to make the inspection conveniently.

(3) Mechanical Auto-braked Model:

This wind turbine has mechanical braking structure. When the wind velocity over than 12 m/s, lets the face of blade deviate the wind direction and reduce wind turbine’s rotational speed to protects the generator, and reduces the occurrence of dangerous.

※ According to IEC 61400-2 related rules, they pointed out that this wind turbine defines the specific external condition does not use in the wind situation like covering the disembark type or the hurricane, the tropical cyclone and the typhoon and so on tropical storm. Therefore when the typhoon or the hurricane comes, please lower the wind turbine from the tower to avoid the wind turbine suffering damage, and can protect the wind turbine, the residence and the personal safety.
3.2 Maintenance

◎ Attention: Before proceeding to the maintenance, make the following close-down procedure:

(1) First transfers the brake to the position of stop rotation.

(2) Disassembles the both electrode of battery. (Attention: when you disassemble the battery, please don’t short in order to avoid the accident.)

(3) Before proceeding to the maintenance, make sure that the wind turbine doesn’t rotate.

(4) Needing to disassemble the wind turbine from the tower by crane.

(5) Forbids proceeding the maintenance under high wind velocity to ensure personal security.

(1) Maintenance - Monthly

◎ Noise Intensity:

Choose a calm day to hear whether there is any noise occurred underneath the wind turbine while the wind turbine is rotating. Then, close the switch of manual-braked, and hear whether there is any noise at the same time. Try to find the noise if indicated. Check whether there is any bolts slipped and whether there is any damage on the wind turbine or the tower. And repair it in shortest time to avoid the accident.

◎ Mechanical Condition:

Use binocular to check whether there is no mechanical noise, rattle or vibration. And the propeller and tail must not wobble. Lower or climb the tower for inspection, if indicated. There should be no buzzing either heard or felt with your hand on the tower base.
Tower Inspect:

Follow all inspection and maintenance requirements of the tower manufacturer. Tighten all nuts and bolts, especially wire clips. Check for cracks and bent or broken parts at the anchors and base structure. Check for broken strands and tighten guys.

Battery:

As using Lead-acid battery, you should check the height of electrolyte. If it’s low, refill it. Check the surface and both electrode of battery. Then clean it.

(2) Maintenance - Monthly

Lowers the tower and does a completely mechanical inspection to wind turbine. Fixes or replaces any worn or Loose Parts. And spurts WD-40 rust remover around various attached parts.

Checks the fixed bolts and nuts on tower base, and makes sure that they are locked tighten. And the wind turbine is also.

Checks all bearings, and rotates them gently by your hand to check it is smooth. Cleans the dust and fragment on wind turbine and avoids abrasion its surface. Checks the blades, and if they have the breakage or damage, replace the blades.

Attention: Above steps can be proceeding by training operator, and do not need receiving special training servicemen.
3.3 Maintenance Log

Observe the monthly and annual inspection required! Record all maintenance and repair works!

<table>
<thead>
<tr>
<th>Date</th>
<th>Problem/Observation</th>
<th>Action take</th>
</tr>
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<tbody>
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</table>
### 3.4 Troubleshoot & Repair

The following steps may be proceeding by training operator, and do not need receiving special training servicemen. Other problem only can be proceeding to installation and maintenance by receiving special training servicemen.

First, it’s necessary to determine if the problem is mechanical or electrical. Refer to the drawings below and then proceed to the appropriate section.

<table>
<thead>
<tr>
<th>Description</th>
<th>Diagnosis</th>
</tr>
</thead>
<tbody>
<tr>
<td>Blade does not turn (Or turns slowly)</td>
<td>mechanical problem.</td>
</tr>
<tr>
<td>Blade turns slowly</td>
<td>Electrical problem.</td>
</tr>
</tbody>
</table>

Proceeds according to **Table: Symptoms of Mechanical Problems**
<table>
<thead>
<tr>
<th>Symptom</th>
<th>Possible Cause</th>
<th>Correction</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Propeller is stationary, even in high winds</td>
<td>a. Loose, broken or rubbing magnet</td>
<td>a. Contact factory or distributor to replace it</td>
</tr>
<tr>
<td></td>
<td>b. Bad or worn bearing</td>
<td>b. Contact factory or distributor to replace it</td>
</tr>
<tr>
<td>2. Propeller will not turn at all except in high wind, scraping or rubbing sound at low rpm, always at same propeller position</td>
<td>a. Same as above, expect more likely to be high magnet or bad bearing</td>
<td>a. Contact factory or distributor to replace it</td>
</tr>
<tr>
<td>3. Propeller is harder rotating, output is lower &amp; there is more propeller noise than usual, and seems out of balance</td>
<td>a. Split, warped or damaged blade</td>
<td>a. Contact factory or distributor to replace broken or damage blade.</td>
</tr>
<tr>
<td>4. Tail, generator and tower vibrate or shack excessively at all or some wind speeds</td>
<td>a. Blade out of balance</td>
<td>a. Contact factory to replace blade</td>
</tr>
<tr>
<td></td>
<td>b. Blade not tracking</td>
<td>b. Contact factory to replace hub</td>
</tr>
<tr>
<td></td>
<td>c. Rotor (magnet can) out of balance</td>
<td>c. Return to factory or distributor</td>
</tr>
<tr>
<td>5. Rattle or clunking from generator</td>
<td>a. Generator loose in tower, tail set loose, tail wing loose, and wires slapping inside of tower. b. Worn bearings or shaft broken</td>
<td>a. Inspect for damage, repair as required, retighten various attached parts b. Contact factory to replace bearings or shaft</td>
</tr>
<tr>
<td></td>
<td>Possible reasons</td>
<td>Recommended Handling Provisions</td>
</tr>
<tr>
<td>--------------------------------</td>
<td>-------------------------------------------------------</td>
<td>------------------------------------------------------</td>
</tr>
<tr>
<td><strong>Blade is stand still, even in high wind speed</strong></td>
<td>1. The circuit breaker is not switched to “start” position</td>
<td>1. Switch circuit breaker to “start” position</td>
</tr>
<tr>
<td><strong>Blade can not be braked</strong></td>
<td>2. The cable of wind turbine is not connected to controller</td>
<td>2. Connect the R/S/T conductor cable to the R/S/T terminals of controller</td>
</tr>
<tr>
<td><strong>In high wind speed condition for a long period of time, but the battery is still in low charge condition</strong></td>
<td>3. Battery break, or battery is out of maintenance.</td>
<td>3. Maintain battery or replace battery if it breaks.</td>
</tr>
</tbody>
</table>
3.5 Mechanical Repair & Parts Replacement

※WARNING: Do not attempt these repairs on top of the tower. Perform repairs only after tower has been lowered.

Complete components of wind turbine BOWIND-0300 was listed as follows:

<table>
<thead>
<tr>
<th>NO.</th>
<th>Part Name &amp; Character</th>
<th>Quality</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Cap Hex Bolt M6X15</td>
<td>1</td>
</tr>
<tr>
<td>2</td>
<td>Nosecone</td>
<td>1</td>
</tr>
<tr>
<td>3</td>
<td>Nut M16</td>
<td>1</td>
</tr>
<tr>
<td>4</td>
<td>Washer M16</td>
<td>1</td>
</tr>
<tr>
<td>5</td>
<td>Hex Bolt M6X35</td>
<td>6</td>
</tr>
<tr>
<td>6</td>
<td>Washer M6</td>
<td>6</td>
</tr>
<tr>
<td>7</td>
<td>Blade</td>
<td>3</td>
</tr>
<tr>
<td>8</td>
<td>Nylon Nut M6</td>
<td>6</td>
</tr>
<tr>
<td>9</td>
<td>Hub</td>
<td>1</td>
</tr>
<tr>
<td>10</td>
<td>Pin 6X6X16</td>
<td>1</td>
</tr>
<tr>
<td>11</td>
<td>Generator</td>
<td>1</td>
</tr>
<tr>
<td>12</td>
<td>Yaw Set</td>
<td>1</td>
</tr>
<tr>
<td>13</td>
<td>Hex Bolt M8X16</td>
<td>5</td>
</tr>
<tr>
<td>14</td>
<td>Washer M8</td>
<td>5</td>
</tr>
<tr>
<td>15</td>
<td>Spring Washer M8</td>
<td>5</td>
</tr>
</tbody>
</table>
4. The related condition of our product guarantees against damage

From the purchased date in two years, so long as any component of the wind turbine suffers damage or the flaw, may be free replaced by a new one. But except the following situation which causes the wind turbine to suffer damage, please pay attention:

a. Under fierce wind speed (typhoon or hurricane)
b. The wrong way of wind turbine installing
c. The wrong connection of the circuit of battery system.
d. The fragment in air causes the blade damaged.
e. Natural disaster (earthquake and flood)
f. Disassembles the controller without permission.
Appendix A

1. Combination wrench:
   The specification is 13mm, and suggested you prepares two, as soon as may also prepare to put up matches the socketfix wrench use, uses in installing tail set, tail stalk and tail wing.

2. Socketfix wrench & socket set:
   Suggest you prepares 1 set, uses the 10mm socket to match the 10mm combination wrench to operate the wrench to install the hub and blades.

3. Adjustable wrench:
   Model 250mm(10”) above, uses to lock the M16 nut on the hub and the shaft of generator.

4. Hexagon wrench:
   Model 5mm, uses to lock the hub and the nose cone.

5. Electronic side cutter:
   Use to Cut out wind turbine’s three-phase electric wire, as well as overall system's electric wire (controller, battery and so on), make the three-phase line connection.

6. Terminal:
   Use to fix the three-phase electric line of wind turbine, the three-phase input of the controller, and the positive and negative electrode of battery to connect all circuit of system.

7. Wire Crimping:
   Use to fix the terminal clamped on wire without falling off.

8. Single & three core electric wire:
   The single-core electric wire uses to make the battery series-parallel connection, but three-core electric wire uses for to link up the wind turbine and the controller system, causes the electricity which the wind turbine sends to deliver the controller. Then the controller transfers the alternating current to the direct current, and charges the battery.

9. Electric tape:
   Use to paste the electric wire exposed place, the post fixed place and the engagement
place, let the wiring work is safer, reduces the occurrence of the situation which the wind turbine burns down because of the three-phase short circuit or the personnel receives an electric shock and so on dangerous situation.

10. Digital multi meter:

When you finish the installation of wind turbine and the connection of controller system, use digital multi meter to measure the circuit of wind turbine is connected.

11. Cross-type screwdriver:

When you connect the three-phase electric line of wind turbine with the controller, you can use Cross-type screwdriver to lock electric line on the controller.
Boltun Corporation
No.1, Hsin-Tien 2nd St, Jen-Der Xiang
Tainan Hsien, Taiwan
TEL: 886-6-2794013
FAX: 886-6-2706186
E-mail: sales@boltun.com
http://www.boltun.com/energy