



# INSTALLATION MANUAL

## Talon2

featuring

**VARIABLE  
PITCH** technology



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**Prior to installation and operation, it is important that you thoroughly read this manual to ensure proper performance and safety.**



## 1. Statement from A&C Green Energy

For contents described in this specification, A&C Green Energy can not ensure its completeness and accuracy. For the any installations which lay beyond normal installation sites, A&C Green Energy will not make any instruction or guarantee.

A&C Green Energy is not responsible for any damage and/or injury caused under the following situations:

- \* Damage caused by any inappropriate operation
- \* Damage caused by lightning, typhoon and other force majeure
- \* Damage occurred after the warranty has expired

Notice: All installation instructions & drawings are valid only within the warranty period.

Note: Proper installation depends on the safety precautions and attention of the installer. Please follow common sense guidelines for correct operation, technique and installation. A&C Green Energy will not be responsible for any inappropriate operation which may cause any property damage or personal injury. All risks will be assumed by the end-user and his designated installer.

Please note: the annual electricity output from the wind generator is determined by the local wind resources and other factors, such as the installation elevation of wind generator, environmental temperature, maintenance, terrain and density of periphery buildings. A&C Green Energy can not make any guarantee for the actual power output and energy generated by the wind generator.

This product specification is a general installation guide only and cannot be used as a special maintenance guide.

## 2. Summary

### 2.1 Information

We have improved this product specification, but at the same time, A&C is improving its products unremittingly. There may be some undocumented differences between the product you received and this specification.

Please use original Talon parts. Do not refit the original assembled wind generator; otherwise it may void the repair warranty.

### 2.2 Mark Illustrations

Within this guide, please pay close attention to the following tips and warnings:



Warning: means there are risks that may cause personal injury, or perhaps death.



Caution: means there are risks that may cause wind turbine, equipment or property damage.



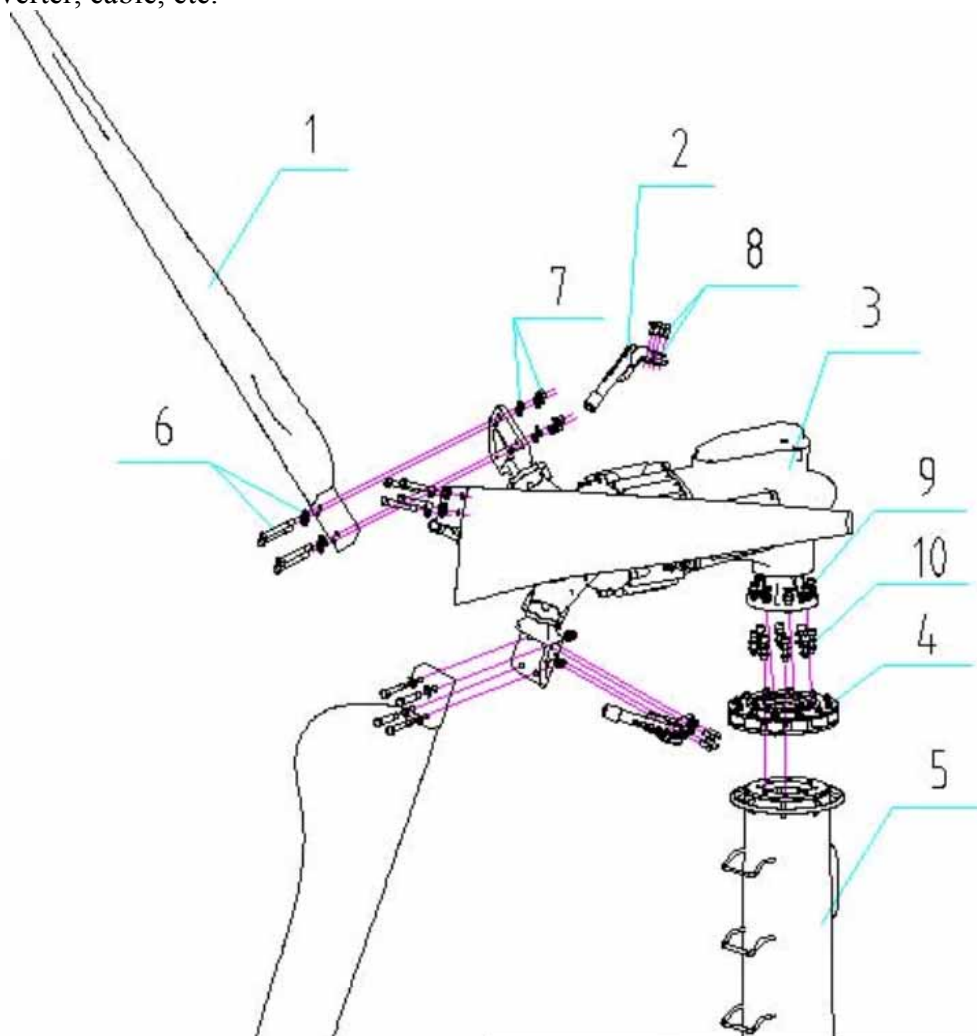
Advice: helpful installation & maintenance hints from the manufacturer.

### 2.3 Applications for Use

- Off-grid application: The electricity generated by the wind turbine can be stored into batteries. Through an off-grid inverter, the DC can be changed into stable AC for off-grid power supply.
- On-grid application: The electricity generated by the wind turbine can be rectified into DC. Through an on-grid inverter, the DC can be converted into stable AC and feed the local utility grid.

## 2.4 Structure and Main Property

This turbine is composed of pitch blade, permanent magnet generator, rotary body (including the slip ring and mechanical braking device), tower, braking switch, electric controller, battery bank, inverter, cable, etc.



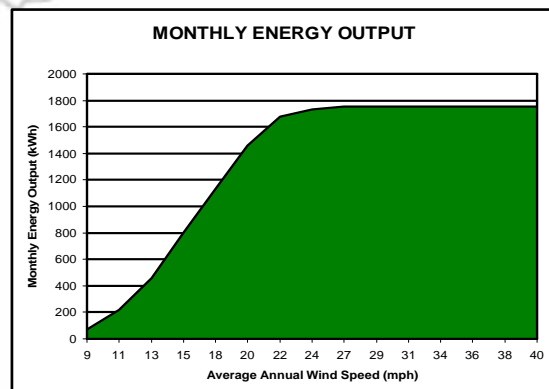
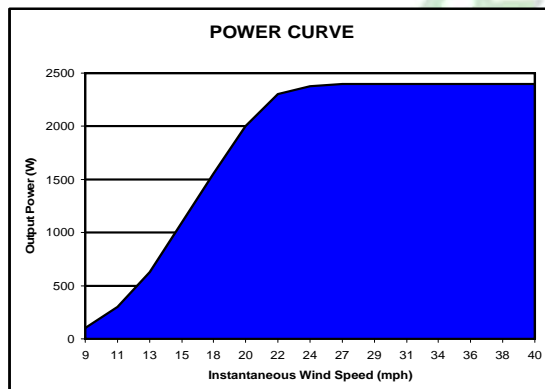
No.	Part name
1	blade
2	Centrifugal hammer
3	Wind turbine body
4	Shock absorber
5	Tower
6	Outer-hexagonal bolt M16*110
7	Inner hexagonal bolt M16
8	Inner hexagonal bolt M10*30
9	Outer-hexagonal bolt M16*55
10	Inner hexagonal bolt M16*55

## 2.5 Technical Specifications

# TECHNICAL SPECIFICATIONS

Blade Diameter	13.1 feet
Blade Material/Quantity	FRP/3
Rated Power	2,000 W
Peak Power	2400 W
Rated Wind Speed	20 mph
Start-Up Wind	5.6 mph
Working speed	5.6-56 mph
Survival Wind	112 mph
Rated Rotation Speed	360 rpm
Working Voltage (v)	Standard DC48V / DC240V
Generator Type	Three-phase AC PM
Power Supply Method	3-phase whole-wave bridge rectifier constant DC voltage charge with output voltage of AC220V/380V, it can feed the grid through an inverter
Speed Regulation	Variable Pitch Technology blade pitch (mechanical)
Shut Down Method	Hand/Electric Winch
Turbine Main Body	287 lbs
Generator Lifespan	15 years

## 2.6. Output Power and Performance Curves



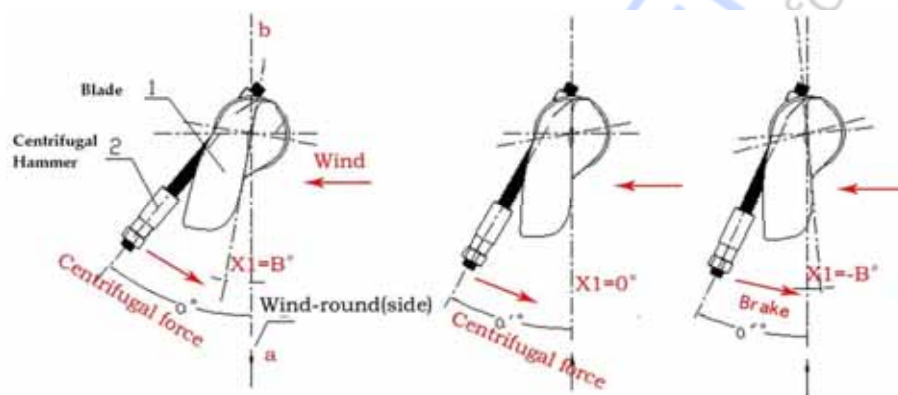
Wind Speed (m/s)	4	5	6	7	8	9	10	11	12	13	14	15	16
Wind Speed (mph)	9	11	13	15	18	20	22	24	27	29	31	33	36
Output Power (W)	100	300	625	1100	1550	2000	2300	2375	2400	2400	2400	2400	2400
kWh	73	219	457	804	1132	1461	1680	1735	1753	1753	1753	1753	1753

## 2.7 Wind Turbine Features

**2.7.1 Blades:** With a tip-speed ratio exceeding 0.4 and a noise lower than 65db, the blades have been aerodynamically optimized for better performance. The blades have passed extensive wind tunnel tests. Made of special purpose gel-coat resin and reinforced FRP, each Talon blade set is highly durable and will guarantee safe operation under a wind speed of up to 2 times the rated wind speed.

**2.7.2 Generator:** Made of strong magnet material, and a good quality shaft, the generator housing has adopted the F-grade insulation and IP54 protection, as well as a maintenance free design. All this has contributed to over a 30,000 hour lifespan. The motor shell has been aluminum coated with power generating efficiency of over 90%.

### 2.7.3 Variable Pitch Technology:



When the wind speed is below 7 mph (3m/s), the turbine blade angle remains static and the angle ( $X1$ ) formed between the blade and turbine plane is  $B^\circ$  ( $X1=B^\circ$ ). This is the ideal angle for the blades to begin their rotation. As long as the wind speed reaches 7 mph, the blades will begin to rotate. While rotating, the outermost edge of the blade will be driven by the centrifugal force generated by the rotation of the blade to tilt toward the turbine plane. As the wind speed increases, the blade angle ( $X1$ ) will then decrease to  $0^\circ$  so that the blade is parallel with the turbine plane. At this angle, the turbine has nearly reached its rated output power. When the wind speed is between 20 mph - 55 mph (9m/s - 25m/s), the blade angle ( $X1$ ) will stay near  $0^\circ$  with slight fluctuations in order to maintain its rated power. When the wind speed is between 55 mph - 112 mph (25m/s - 50m/s), the wind will draw the blade by the centrifugal force, so the angle ( $X1$ ) will continue to decrease to a negative angle ( $X1 = -B^\circ$ ) [ $B^\circ$  and  $-B^\circ$  are not the same]. Under this negative angle, the blade angle will produce a resistance on the rotation of turbine blades to slow down the turbine, thus protecting it from over-speed operation. The maximum rotation of the turbine will be no more than 300 RPM.

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### 3. Safety Rules

- Do not allow the turbine to run without a load, or at continual high speeds.
- If applicable, check the guyed tower and guy wires regularly to ensure proper tension.
- Do not stand under a wind turbine during high winds.
- When the wind speed is over 24m/s (~54mph), manually shut down the wind turbine.
- If there is an unprecedented vibration or strange noise being detected during turbine operation, stop the wind turbine for inspection.
- When wiring the wind turbine system, connect the battery bank first, then the output cable of the generator; in disassembling the turbine system, please disconnect the output cable of the generator before cutting off the battery line. (See appendix 5)
- The switch on the breaker panel should be in the “on” position. This should only be turned off when the batteries have been fully charged or to protect the system from devastating gusts. This switch should be touched only when the turbine is rotating slowly.
- The battery bank should be kept away from fire, heat, and direct sunlight. Any harmful gasses from the battery charging and discharging should be exhausted on a timely basis.
- Keep the rotor balanced to eliminate any vibration: In the case that the blades become unbalanced, the wind generator must be shut down for a check. Once the trouble has been eliminated, the unbalanced torque should be no larger than 0.02N.m.

#### CAUTION

Do not touch the “off” switch on the breaker panel when the wind turbine is rotating fast. The electric breaker can only be turned off when the turbine is stopped or rotating slowly!

#### WARNING

Keep the battery far away from heat or fire. All harmful gas emitted during the charging process should be discharged outdoors. To prevent a short circuit, please use a well insulated tool to wire the batteries.

## 4. Preparation

### 4.1 Foundation Construction for Guy Tower (as shown in Appendix 2)

1. Dig a hole that is 30"x30" and 24" deep for the tower base piling. Dig four triangular holes that are 30"x30"x30" and 39" deep for the guy support pilings (ABCD) all evenly spaced from the center hole. The crossing point of line A-C and B-D should be the center of the first square pit). These 4 anchor pits should be 5 meters (~15') from the tower base.
2. A suggested concrete mixture ratio is 1 : 2.2 : 3.5 (cement : sand : pebbles)
3. Fix the tower base plate with the four foundation bolts and screw on M16 screw nuts (until about 1/2 inch of the bolt head gets through the nut). Set the base plate level about 1 1/2 inches above the ground with its pins aligned with the A-C or B-D line. After this, fill the hole with concrete until the foundation is flat and level.
4. Put a ground anchor into the outer most position of the triangle pit with the chain link inclined towards the center. Pave a layer of crushed stone onto the bottom of the pit, and cast one layer of concrete, pile up a layer of stone (unit weight of about 5-10 lbs) on to the first layer of concrete then add another layer of concrete. Repeat this alternating process until the pit has been filled. Then, pull the chain link towards the center of the ground so as to let the chain link form a 50°-60° angle with the ground.
5. Wait around 100 hours to allow the foundation to set. During this period do not touch it or attempt to install the wind turbine.

### 4.2 Foundation Construction for Free-Standing Tower or Monopole (as shown in Appendix 3)

1. Dig a 31"x31" square hole that is 6.5' deep
2. Construct a steel frame grid basket as shown in appendix 3. The proper construction of this reinforcement is crucial to the strength of the tower base.
3. Fill the hole with a 4" concrete base and put the steel frame grid basket into the bottom.
4. Fix two layers of boxed boards into the pit and put the steel frame in, fix the position of ground bolts by upper and lower hole plates at a stipulated depth.
5. Pour the concrete
6. Wait around 100 hours to allow the foundation to set. During this period do not touch it or attempt to install the wind turbine.
7. Refill the soil and stone. Tamp it.

### 4.3 Installation Preparation

1. Check the components with the packing list. If you encounter any packaging discrepancies, contact your Talon reseller immediately.
2. To protect against wind and rain, place the charge controller and inverter into a weather-resistant box.
3. Have four sets of  $\phi 6\text{mm}$  stainless steel or galvanized rope each with a length of 12m (adjustable based on the tower height.) For the guyed tower and  $\phi 6\text{mm}$  stainless or galvanized steel rope with suitable length for the braking.
4. Prepare a suitably long cable that is  $6\text{m}^2$  in cross section with a current intensity of around  $4\text{A/m}^2$ . If the cable is rather long, enlarge the cross section properly.
5. The distance between the turbine and controller, inverter, and battery bank should be no longer than 50m.
6. The turbine should be installed when the wind is not strong.

#### WARNING

#### Installation notes:

- For installing wind generator equipment, special technical abilities, appropriate tools and experience is needed. All the information offered by A&C Green Energy and our suppliers concerning the equipment installation, operation and maintenance is established on the bases that the installation staffs have required technical ability, experience and suitable tools. Any unqualified person is not allowed to climb the tower, operate or conduct generator maintenance.
- Before carrying out site selection, installation, operation or equipment utilization, this specification manual should be read carefully.
- A suitable installation site should be chosen, so as to ensure the work can be carried out safely and smoothly.
- Personal safety must be took care very seriously, Do not install the wind generator in during harsh weather conditions, such as lightening storms, sleet, etc.

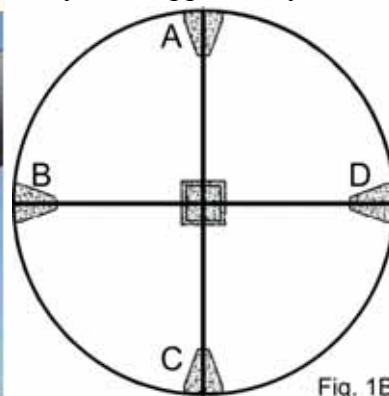
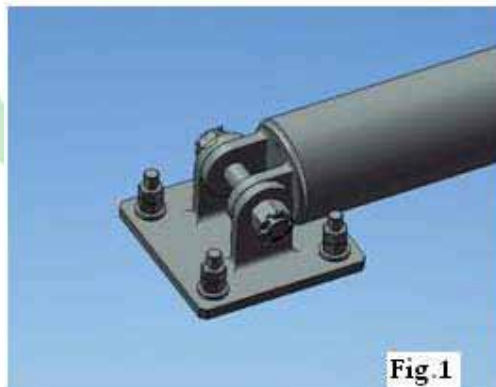
## 5 Installation

### 5.1 Tower Installation

#### 5.1.1 Assembly of a Guy Tower



1. Set the base plate horizontally over the protruding anchor bolts. Then put the washers onto the bolts. (Fig 1) Tighten the nuts with a proper torque (see Appendix 1). Fit together the upper and lower tower segments. Lay down the tower beside the anchor pit A (Fig 1). Connect the tower bottom with the base plate by a  $\phi 30$  gemel, then put on the washer and insert the slip pin.
2. Pull the guy wires toward the four separate anchor bases ABCD. Hook the ferrule (on each end of the guy wires) over the hanging ear.
3. A turnbuckle with O-ring on both ends should be used to allow for any future cable adjustments.
4. The turnbuckle should be adjusted to have a middle length at first. Wrap one end of the ring with steel wire (the lapping part of the rope should be no shorter than 6 inches), fixing them by a rope clasp temporarily. Connect the turnbuckle of the anchor pits ABD with their respective ground anchors. Erect the tower then hook up the last ground anchor with the turnbuckles of the anchor C. Erect the tower vertically by adjusting the length of the wires. There should be a wire block on each end of the wires, fixing it at last.
5. Tighten all the screws.
6. Put a bracket (3 feet in height) at the pit A. Tighten the turnbuckles of anchor pits B & D properly (around 2 inches). Release the connector link between the turnbuckles of anchor pit C and ground anchor. Lay down the vertical bar slowly and support it by the bracket.



## 5.1.2 Assembly of a Free-Standing Tower

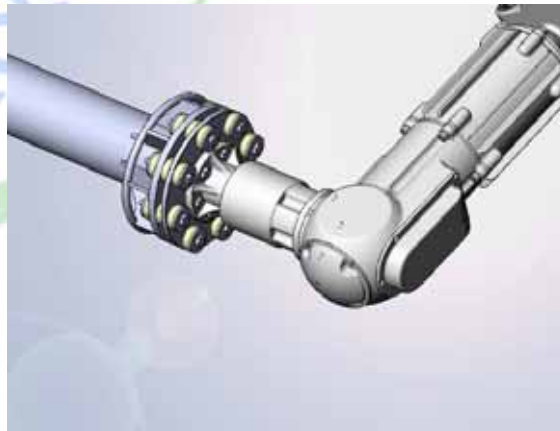


1. Connect the upper and lower tower rod together by plug-in or butt-joint; tighten the flange bolts.
2. Lay down the tower rod with the base near the foundation; put a bracket beneath the tower about 1 1/2 feet from the tower top to support it.
3. Insert the cable and steel rope of the winch into the tower bottom and draw at least 18 inches of them out from the tower top by using a steel wire ( $\varnothing$  2~3 mm).

## 5.2 Wind Turbine Body Installation

### 5.2.1 Assembly of a Generator with a Rotary Body

1. Fix the attached patch board inside the top end of the tower rod, wire the exposed power cable from the vertical rod with three terminals on one side of the patch board and tie three turbine output cables onto the terminals on the other side of the patch board respectively; pull the power cable outside the tower rod and connect it with the controller.
2. Take the vibration isolator out, align the flange holes of the vibration isolator with the flange hole of the tower top, and tighten the eight M16×70 inner hexagonal bolts (including the spring washer and flat washer). Lift the wind turbine main body to align the flange of the vertical shaft with the flange of the vibration isolator, finally connect the turbine vertical shaft with the vibration isolator by another eight M16×70 inner hexagonal bolts (shown below).



### 5.2.2 Turbine Assembly

1. Once the turbine body has been connected to the tower rod, lift the turbine body so that the blade hub is facing upward. (see figures below)
2. Short-connect the three output cables to lock the rotation of the blade hub.
3. Assemble the three blades onto their respective positions of the blade hub by 12 M16×110 hex bolts (with big washer, spring washer and nuts). The blades should match the hub, so follow the A, B & C that are on these pieces. The torque of the bolts should be 180~210Nm.



#### WARNING

Short-connect the cables to prevent hub rotation.



### 5.2.3 Assembly of the Centrifugal Hammers

Hold the centrifugal hammer downward.

Affix each centrifugal hammer onto each blade hub, using the four included M12×20 hexagon bolts and spring washers. (as shown below)



## 5.2.4 Winch Installation

Install the winch at the tower bottom with the provided bolts. Connect it with the steel wire from the turbine main body. (see fig 9,10)

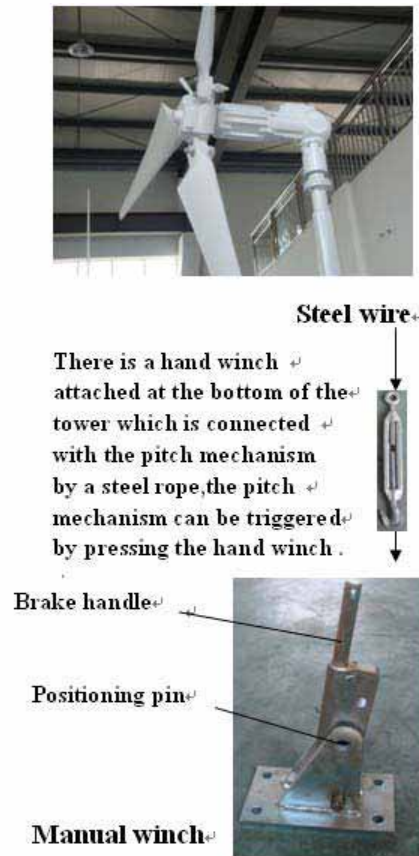


Fig.9



Fig.10



## 5.3 Erecting the Wind Turbine

### 5.3.1 Erecting a Guy Tower

1. Connect the steel guy wires to their positions. Use a crane and a flexible lifting belt to lift the turbine and tower. Carefully align the tower with the base plate and connect them by stud-bolt, while lifting the turbine, fix the turbine by using a rope. Adjust the tower position to let it stand against the ground as vertical as possible, tie the steel guy rope with the ground earth anchor and adjust the perpendicularity of the tower by screwing and adjusting the four turnbuckles.
2. Have an overview on the rope clamp, turnbuckles and all the fasteners, if they have all been fixed firmly, lock them by a galvanized iron wire, and spread anticorrosion grease around the turnbuckles silk pole, connecting pin and rope clamps.

### 5.3.2 Installation of a Free-Standing Tower

1. Screw two positioning pin into the feet bolts diagonally.
2. Lift the rotary body and the tower top by a flexible hanging belt, aiming at the positioning pin, move the belt to let the tower sit onto it's foundation accurately, put on the flat washer and spring washer, screw on the M24 nuts. (See fig 12)
3. Screw off the positioning pin, put the flat washer, spring washer and screw onto the nuts.
4. Adjust the perpendicularity of the tower against the ground into  $0.002 \times \text{height (m)}$  by screwing the 24 nuts of the tower base flange, keep this perpendicularity and tighten all the nuts diagonally with each upper and lower nuts of the same pair being tightened simultaneously. (See figs 12, 13, 14)

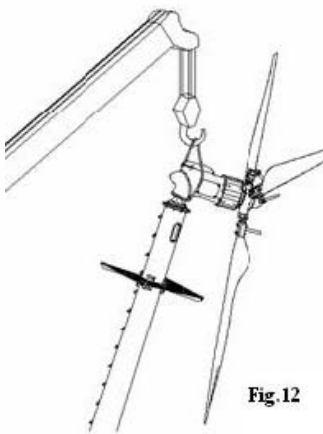


Fig. 12



Fig.13



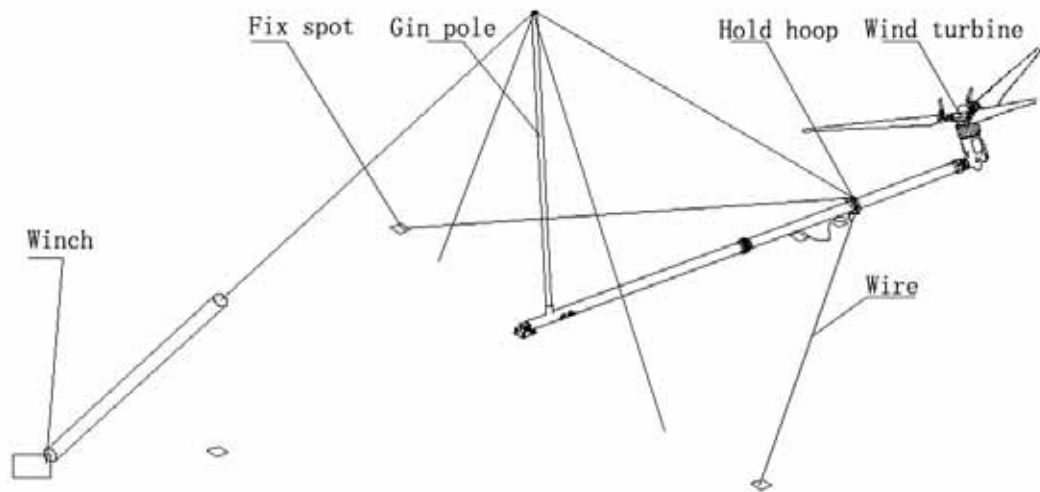
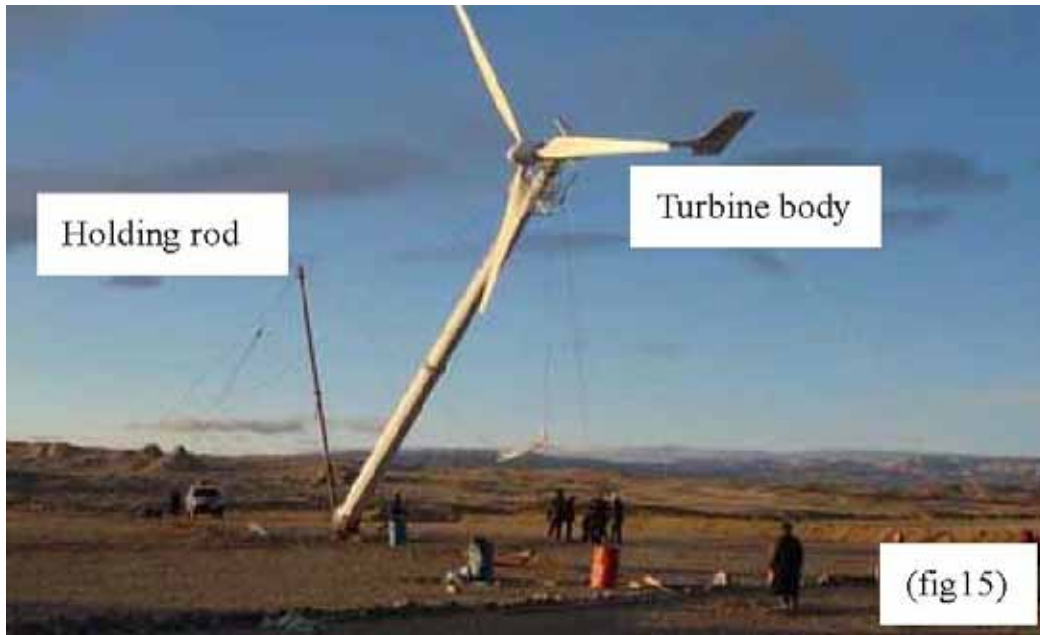
Fig.14



*During the installation, please short connect the three output cable first in order to prevent the rotation of blade, fix the turbine by rope.*

### 5.3.3 Using a Jin Pole

If a crane is not available for the tower installation, a jin pole or holding rod method should be considered. For detail please refer to a tower consultant in your area.



## 6. Assembly and Connection of the System



The wiring diagram for different types of turbines may vary. The wiring diagrams attached in appendices 4 and 5 are only valid for the turbine controller and inverter from A&C Green Energy. During assembly, short-out the three output cables and affix the turbine by rope to prevent rotation of the turbine body and spinning of the blades.

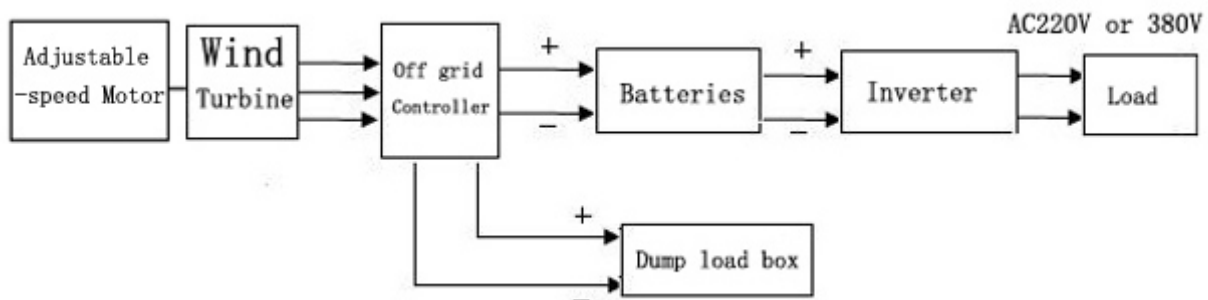
### 6.1 Off-Grid System with Batteries

1. Battery bank combination: combine the batteries into a battery bank by using copper cable to connect batteries. Mark the “+” pole with red paint, the “-” pole with black, yellow or blue paint. Fix the wire connecting part by clasp to guarantee strong conductivity. Spread a grease layer around the terminal and wire clasp to prevent corrosion. Connect the three power output cable with the three terminal of the electric box.
2. Connect the three turbine output cables with the three terminals on the controller respectively.
3. Connect the output cable of the controller with the “+”“-” poles of the battery bank.
4. If the dump load box is separate from the controller, connect it with a 6mm<sup>2</sup> wire.

### 6.2 Off-Grid Supply System

#### 6.2.1 System Diagram (see appendix 4)

#### 6.2.2 System Brief



The off-grid wind generator powers the load through a battery bank, and the electricity will be stored in the batteries after being converted into DC by the controller. When there is enough wind blowing, the generator will generate electricity and charge the batteries, thus the electricity from the batteries will be converted by an inverter before it can be used by the load.

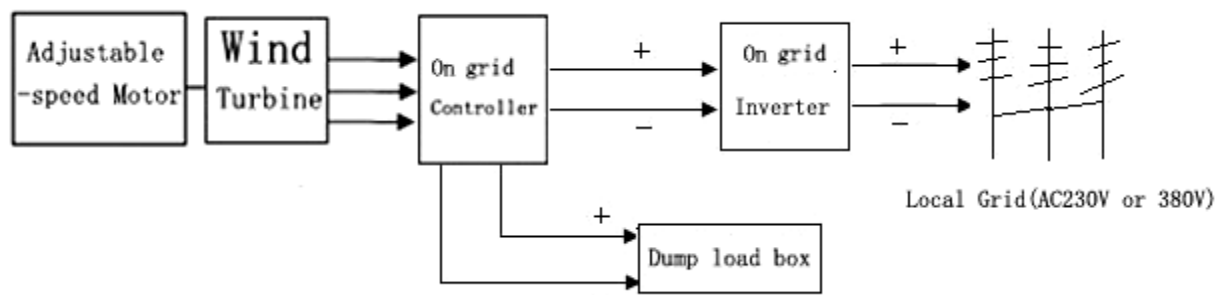
1. Wire the turbine, controller, battery bank and dump load following the depiction in Section 6.1. Connect the input terminal of the inverter with the “+” “-” of battery bank. Connect the load with the output (AC220V) terminal of the inverter. For details, refer to the controller and inverter users manuals.
2. The off-grid turbine system will be available for use after the completion of the wind turbine system assembly. Please start the turbine to charge the batteries before the inverter has begun to power the load.

3. Much of the electricity from the off-grid turbine will be stored into the batteries. Periodically refill the batteries to maintain their lifespan. Adjust the load consumption based on the local wind condition and power generation status.
4. The voltage level of the batteries should match those of the wind turbine. The inverter output voltage level should also be consistent with that of the wind turbine's voltage. The inverter capacity should satisfy the peak power of the load.

## 6.3 On-Grid Supply System

### 6.3.1 System Diagram (wiring diagram see appendix 5)

#### 6.3.2 System Brief



An on-grid turbine system consists of a wind turbine, on-grid controller, dump load box, inverter and utility/electric system (the “grid”). The turbine will convert the kinetic power of wind into unstable AC, which is then rectified into DC by the on-grid inverter. It will be converted into stable AC. Then it can either be used by the load (appliances and household electronics) or fed back into the power grid.

#### 6.3.3 Wiring of an On-Grid Wind Turbine System

1. Wire the turbine system based on the turbine controller and inverter manuals.
2. The on-grid inverter efficiently feeds the AC220V/AC380 grid, but it needs a dump load, a power-off automatic shut-down, etc.
3. For safety, the capacity of the controller's dump load should be 2-3 times that of the rated capacity of the turbine and load.

#### WARNING

The system wiring diagram attached in the appendix 4、 5 is suitable for the controller and inverter purchased from our company only.

## **7. Operation Manual**

### **7.1 Testing Examination**

1. Check the tightness of the blades, turbine rotor, nose cone, generator, rotary body and centrifugal hammers.
2. Check to see if the installation angle of each blade and centrifugal hammer is proper.
3. Check the connection of the tower and base bolts
4. Try to turn the turbine to see if the generator is sticking.

### **7.2 Checking the Generator Output Line**

1. Open the nacelle window to see if the output cable and brush have a good connection.
2. Check the tightness between the three turbine output cables and power cable to see if the terminal has been fixed or whether the cables or steel wires have become twisted.

### **7.3 Check Blade Pitch and Braking Mechanism**

1. Check the tightness of the steel rope and winch connection.
2. Stop the turbine by hand, hand-crank the winch by 2-3times to tighten the steel rope, and then check the blade position.
3. Start the machine and slowly hand-crank the winch until the steel rope is loose. Watch for the turbine to begin rotating.

### **7.4 Checking the Turbine's Electric System**

Check all electrical equipment including: controller, battery bank, inverter and dump load. Make sure they have been properly connected and are in good working order.

### **7.5 Trial Operating**

1. The turbine should be static before the trial test.
2. Start the turbine and check the flexibility of how the turbine tracks the wind direction: when the wind speed reaches 4m/s, the turbine should be able to track the wind direction.
3. The turbine will begin to rotate when the wind speed has exceeded 4m/s, the rotation speed of the turbine will be a slightly higher during the first several startups, becoming gradually normal.
4. During the trial running period, the turbine should remain stable with little vibration. The voltage of the three output cables should be identical. The blade will change its position when the wind speed has exceeded the rated speed. The peak output power of the turbine should be no larger than 1.5 times that of the rated power.
5. During the trial running of the turbine, maintain and operate the turbine following the depiction of the operating manual, the controller, batteries, inverter should be able to power the load or feed the grid normally.
6. If the turbine has passed the above trial run, it is ready normal operation.
7. Initially, the wind turbine will have a relative higher start up wind speed, but it is normal phenomenon.

## 7.6 Normal Operation

1. The turbine system should be put into service only after all of all its components have passed the trial test.
2. The turbine should be serviced only by an authorized professional. Call your Talon reseller should you need help finding a technician.

## 7.7 Shut-Down Methods

### **Automatic Shut-Down :**

The controller will detect the signal from the turbine system, including the output voltage of generator and working time of the dump load box. If either of the two signals exceeds the normal range, the controller will shut down the turbine automatically.

### **Manual Shut-Down :**

1. The turbine can be shut down by the braking switch on either the controller or the electric/manual winch, if necessary, for maintenance, approaching storm, etc). After the braking switch has been triggered, the turbine blades will change angles gradually, slowing the rotation of the turbine.
2. During the normal shut down of the turbine, there is no need to turn off the turbine controller and inverter. When the turbine is being shut down for a long time, the controller and inverter should be turned off, in order to save the power of the batteries and protect the turbine.

**Restart:** The wind turbine should be restarted by an electric winch, regardless if the turbine is stopped by either manual or automatic braking method.

### **WARNING**

When turning off the controller and inverter, shut down the controller before the inverter. When starting up, follow the same procedure.

## 8. Maintenance

### 8.1 Routine check

1. If there is abnormal vibration or noise, shut down the turbine for further inspection.
2. Check if the yawing is stable and smooth when there is over-speed wind.
3. Check if the 3 phase output is stable, making sure its load dumping is smooth and reliable.
4. Check if the batteries have been fully charged, and which is in good state.
5. Open the nacelle window; check if the spine shaft has been well lubricated and clean.
6. Open the nose cone, check if the joint bearing is clean and has been lubricated.

### 8.2 Maintenance after first 1,000 hours

#### 8.2.1 Check all nuts and bolts, and tighten them in accordance with the stipulated torque.

Checking emphasis is as follows:

- Tower foundation/base bolts
- Linkup flange bolts of tower rods
- Bolts between the vertical shaft flange and the tower top
- Rotor hub nuts
- Blade bolts
- Air flow diversion cover bolts
- Bolts between the generator and nacelle
- Round nut on the vertical shaft bearing
- Main tail pin bolts

#### 8.2.2 Check welding positions of the tower rod to ensure that there are no cracks or flaws.

Checking emphasis is as follows:

- root part
- linkup flanges
- tower top flange
- rotor hub
- tail beams

**8.2.3** Check hand-turning and winch-driving tail folding action (tail fold to  $45^{\circ}\sim 60^{\circ}$ ) to see whether there are any blocking phenomena. Check whether the tail vane can retract easily after releasing. If there are any unusual conditions, please ascertain the reasons and eliminate the breakdowns.

**8.2.4** Check whether the blade bolts are loose or missed. Check whether the bolts to the air flow diversion cover are loose or missing. Tighten if necessary.

#### 8.2.5 Generator output cable check

1. Check to see if the three power output cable has been fixed firmly inside the nacelle, if the sheath has been damaged.
2. Check if the wire has been connected firmly with the brush, and in good touching.
3. Check if the contact of six electric brushes with slip ring is firm and smooth, is there any overheat damage.
4. If the three phase voltage of the generator is balanced.

#### 8.2.6 Lubricate the Key Position

1. Open the nacelle window, cleaning the spine shaft and lubricate it.
2. Open the nose cone, cleaning the joint bearing and lubricate it.

### **8.3 Checking After Heavy Winds**

After strong wind (>25m/s), repeat those checks in 8.2.1, 8.2.2, 8.2.3, 8.2.4, 8.2.5 again.

### **8.4 Routine Maintenance (every 3,000 hours)**

**8.4.1** Repeat every check and maintenance process detailed in section 8.2.

**8.4.2** Check the technical conditions of the rotor.

**8.4.2.1** Checking the contour of the blades, with emphasis on the tips and front edges, to see whether there are any cracks or damage.

**8.4.2.2** Check the blades to detect any changes which can result in unbalanced deformation, translocation or change of setting angle.

**8.4.3** Clean the electricity conveying slip ring and electric brushes, polishing the conducting contact face. Any worn electric brush should be replaced by a new one. The contact area between the brush and slip ring should reach 95% or more.

### **8.5 Maintenance**

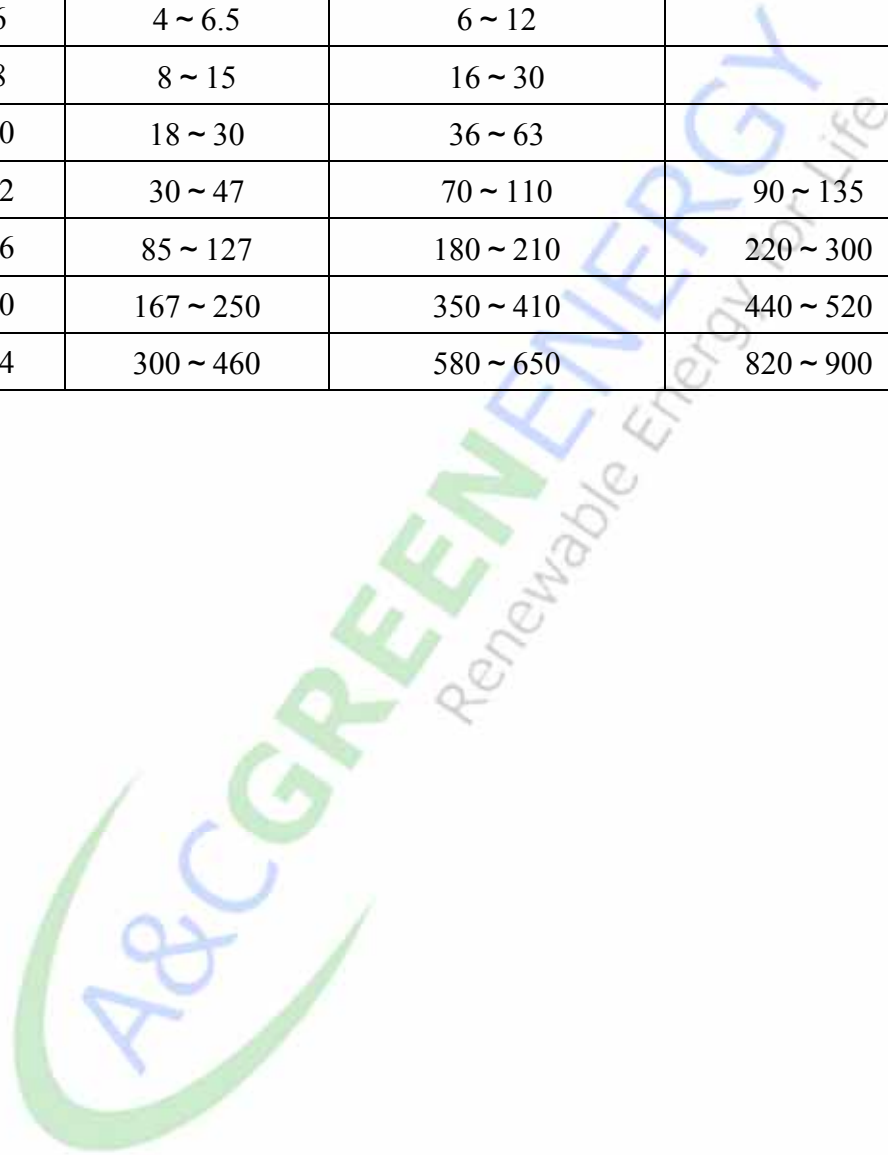
1. Lubricate the blade hub, joint bearing and spine hub every year.
2. The spring position inside the rotary body should be checked every year, replacing any damaged springs.
3. Check the fasteners and brushes regularly.
4. Check the steel rope regularly, replacing any damaged rope.

## 9 Troubleshooting

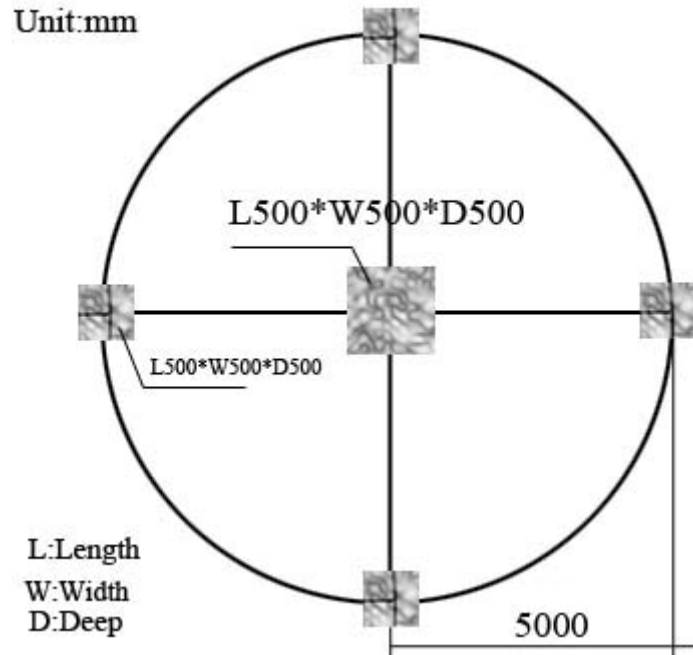
Problem	Possible Reasons	Possible Solutions
Excess Vibration	<ol style="list-style-type: none"> <li>1. Pull rope of steel wire is loosen.</li> <li>2. Blade fixing bolts are loosen.</li> <li>3. Blade is defective caused by external force.</li> <li>4. Blade lost balance because of the ice accumulation on the blade.</li> </ol>	<ol style="list-style-type: none"> <li>1. Tighten the steel wire rope appropriately.</li> <li>2. Tighten the loosen parts.</li> <li>3. Replace a new one and adjust the blade balance.</li> <li>4. Remove the ice.</li> </ol>
Turbine Head won't track the wind and pivoting is hindered.	<ol style="list-style-type: none"> <li>1. There is too much oil sludge and dirt in the vertical shaft and bearing.</li> <li>2. Rotating part is deformed by external force.</li> <li>3. There is little or even no gap between vertical shaft and sleeve.</li> </ol>	<ol style="list-style-type: none"> <li>1. Clean and remove the dirt, lubricate it.</li> <li>2. Recover and correct the deformation.</li> <li>3. Repair it to meet the requirement.</li> </ol>
Abnormal Noise	<ol style="list-style-type: none"> <li>1. Fixed parts are loose.</li> <li>2. Generator bearing is loose from its seat.</li> <li>3. Generator bearing is damaged.</li> <li>Wind rotor is rubbing with another part.</li> </ol>	<ol style="list-style-type: none"> <li>1. Lower turbine and tighten loose parts.</li> <li>2. Detect and repair the loose part.</li> <li>3. Replace the damaged bearing.</li> <li>4. Detect and eliminate the trouble.</li> </ol>
The rotation speed of the rotor is reduced noticeably.	<ol style="list-style-type: none"> <li>1. Variable Pitch system is ineffective.</li> <li>2. Stator winding is short-circuited or output circuit is short-pass.</li> <li>3. Brake disk is rubbing.</li> <li>4. Switch is set at "close" position.</li> </ol>	<ol style="list-style-type: none"> <li>1. Check and eliminate the trouble. Lubrication and maintenance.</li> <li>2. Detect the short-circuit, split the lines and isolate them.</li> <li>3. Readjust the brake gap.</li> <li>4. Set switch to "open".</li> </ol>
The output voltage of the generator is low.	<ol style="list-style-type: none"> <li>1. Rotation of the generator is too low.</li> <li>2. Permanant magnet rotor has lost its magnet.</li> <li>3. The conductivity of connect point between slip ring and output circuit is weak.</li> <li>4. There is a short circuit in the rectifier.</li> <li>5. Circuit line of low voltage electricity transmit is too long, or the diameter of wire is too thin.</li> </ol>	<ol style="list-style-type: none"> <li>1. Upon detection, restore to normal rotation (rpm).</li> <li>2. Change magnet or generator rotor.</li> <li>3. Clean slip ring and contact point to reduce resistance.</li> <li>4. Replace this equipment.</li> <li>5. Shorten the circuit line or decrease the diameter of the wires to reduce electricity loss.</li> </ol>
There is no output electric current in the AC circuit of the generator.	<ol style="list-style-type: none"> <li>1. There is a circuit break in the AC lines of the generator.</li> <li>2. Fuse is blown.</li> <li>3. Stator winding is burnt, circuit is broken.</li> </ol>	<ol style="list-style-type: none"> <li>1. Detect and reconnect the wires.</li> <li>2. Replace the fuse.</li> <li>3. Disassemble, repair, recover.</li> </ol>
AC output is normal, but there is no DC output current.	<ol style="list-style-type: none"> <li>1. DC fuse is blown.</li> <li>2. Output circuit is broken.</li> <li>3. Rectifier is damaged.</li> </ol>	<ol style="list-style-type: none"> <li>1. Replace the fuse.</li> <li>2. Detect the breaking point and reconnect the wires.</li> <li>3. Replace this equipment.</li> </ol>
Output capacity of the batteries is insufficient.	<ol style="list-style-type: none"> <li>1. Output voltage of the generator is too low, or no electricity is being generated at all.</li> <li>2. The connector of the battery is corroded by acid, resulting in weak conductivity.</li> <li>3. Battery failure.</li> </ol>	<ol style="list-style-type: none"> <li>1. Check and eliminate the trouble.</li> <li>2. Clean the connectors. Tighten and coat with anti-corrosive grease.</li> <li>3. Replace the damaged battery.</li> </ol>

**Appendix 1 Bolt Torque (Nm)**

<b>Grade</b>	<b>35、45</b> HB101 ~ 207 5.6 ( $\sigma_s = 300\text{MPa}$ )	<b>16MnVB、45</b> HB285 ~ 321 8.8 ( $\sigma_s = 640\text{MPa}$ )	<b>40Cr、40MnB</b> HRC35 ~ 40 10.9 ( $\sigma_s = 800\text{MPa}$ )
M6	4 ~ 6.5	6 ~ 12	
M8	8 ~ 15	16 ~ 30	
M10	18 ~ 30	36 ~ 63	
M12	30 ~ 47	70 ~ 110	90 ~ 135
M16	85 ~ 127	180 ~ 210	220 ~ 300
M20	167 ~ 250	350 ~ 410	440 ~ 520
M24	300 ~ 460	580 ~ 650	820 ~ 900



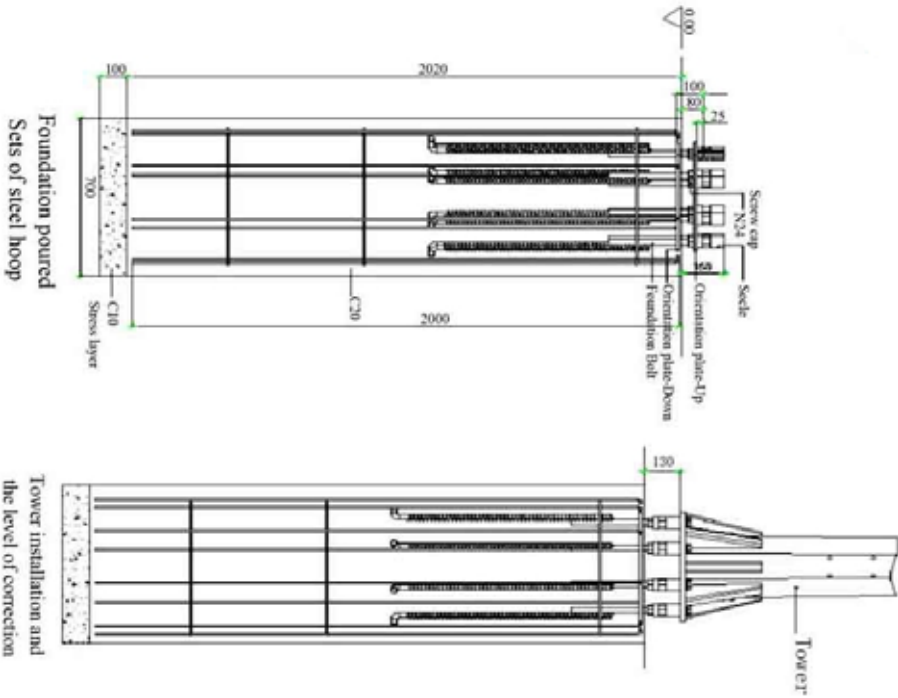
## Appendix 2 Guyed Tower Foundation



A&CGREE  
Renewable Energy Solutions  
For Life

## Appendix 3 Free-Standing Tower Foundation

### Foundation of 6M Freestanding tower



#### Foundation structure specification

一、 The data of foundation design as follows:

Weight : 400kg      Height : 6m

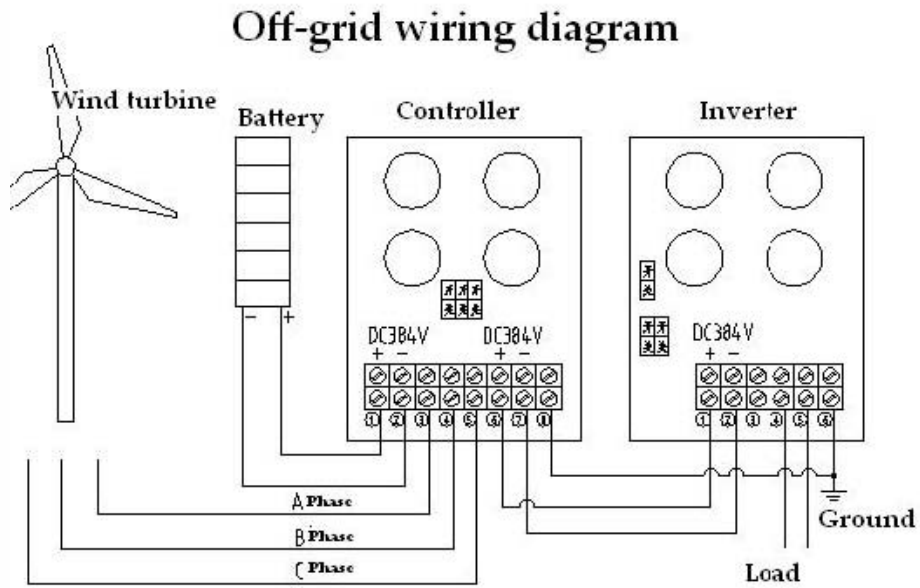
二、 Construction step:

1. Dig a hole, diameter 0.7m, depth 2.12m.
2. Lashed the steel bar according to the drawing, and putting into the hole.
3. Set 5 units foundation bolts on the template till to the bottom of screw thread and fixed by steel bar. Set 5 units M24 screw cap separately. Set the upper template on the foundation bolts and fastened by strut, and the size according to the left drawings and please note the horizontal degree of the every foundation bolts.
4. Put the fastened foundation bolts on the lashed steel bar, the other principle bar are lashed stagger.
5. Check the location of each Foundation bolts and make sure all of them are Average distribution and consistent with a high level. After finished the pouring with C20 concrete, ensuring the foundation bolt above the concrete surface 50mm.
6. Concrete ratio: Cement : Stone : Sand : Water  

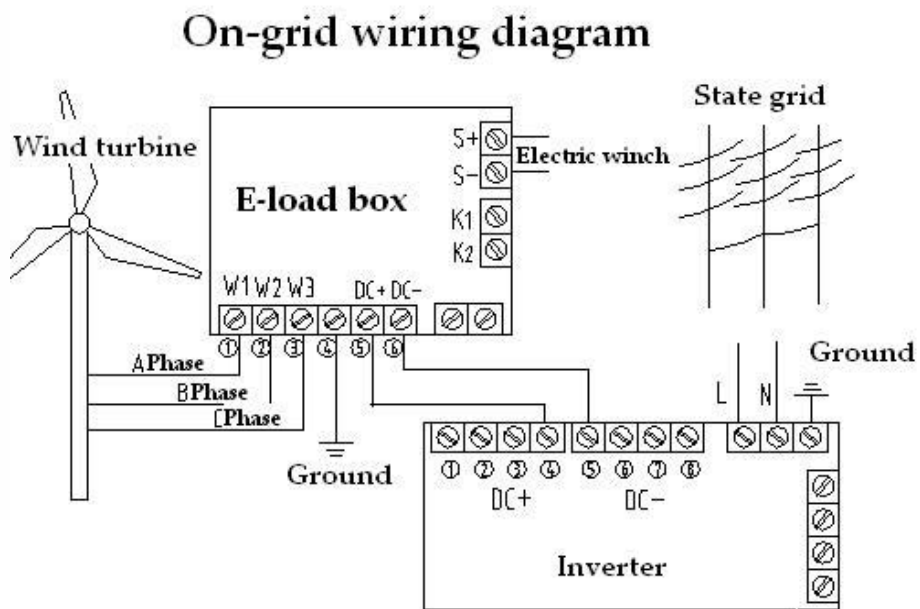
C10 (1325#Cement)	2.45	1.64	0.5 (Weight ratio)
C10 (1425#Cement)	2.55	1.7	0.5 (Weight ratio)
7. All of the steel materials should be derusting. Grade is S12, lay on the red lead (Anti-rust lacquer, alloyed or bakelite anti-rust lacquer). Pre-coating 2 times. Red alloy magnet adalquer 2 times.
- Fire protection treatment.
8. After installed the tower, concreting by C10 and pouring on the bottom of the pole. Avoiding to rust of bolt.

三、 If there is any problems, it should be discussed with our engineers.

## Appendix 4 Off-Grid Wiring



## Appendix 5 On-Grid Wiring



## Limited Warranty Information

### A&C GREEN ENERGY 5 YEAR LIMITED WARRANTY

Talon wind turbines, electronics, and associated equipment manufactured by/for A&C Green Energy, Inc. are warranted against defects in design, material, and workmanship, under normal use for which intended, for five years after installation and as set forth below.

**Parts:** For a period of Five (5) Years from the original date of purchase of product ("Parts Warranty"), A&C Green Energy will supply replacement parts in exchange for parts determined to be defective.

**Labor:** For a period of Five (5) Years from the original date of purchase of product ("Labor Warranty"), A&C Green Energy will, at its option, repair or replace this Product, should it be deemed defective.

**Proper Registration:** Your registration must be completed within 30 calendar days of your dated receipt in order to validate this Limited Warranty. You may complete registration by filling out the online registration form online at <http://www.acgreenenergy.com/registerwarranty> or by completing the mail-in registration card as stated on the A&C Green Energy Registration Form and mailing it to:

**A&C Green Energy  
P.O. Box 941122  
Plano, TX 75094**

Upon your registration you shall receive a confirmation via email to inform you that your product has been properly registered. Both proper registration and a dated proof of purchase are required prior to obtaining warranty service.

**Instructions: To obtain warranty service, simply call (800) 963-7973.**

When calling ensure to have all proof of purchase documentation and service material available including all serial and part numbers to help us quickly assist you.

**Repair/Replacement Warranty:** This Limited Warranty shall apply to any repair, replacement part or replacement product for the remainder of the original Limited Warranty period or for Five (5) years whichever is longer. Any parts or product replaced under this Limited Warranty will become the property of A&C Green Energy.

This limited warranty covers only the hardware components packaged with the Product. It does not cover technical assistance for hardware or software usage and it does not cover any software products whether or not contained in the Product; any such software is provided "AS IS" unless expressly provided for in any enclosed software Limited Warranty. Please refer to the End User License Agreements included with the product for your rights and obligations with respect to the software.

This Limited Warranty only covers product issues caused by defects in material or workmanship during ordinary consumer use; it does not cover product issues caused by any other reason or use. This includes but is not limited to acts of God, misuse, limitations of technology, or modification of any part of the product. This Limited

Warranty does not cover products sold "AS-IS" or "WITH ALL FAULTS" or consumables (such as fuses or batteries). This Limited Warranty is invalid if the factory-applied serial number has been altered or removed from the product. This Limited Warranty is valid only in the United States.

This limited warranty does not cover:

- 1) Towers, equipment, materials, or supplies not manufactured by/for A&C Green Energy;
- 2) A&C Green Energy equipment that has been modified or altered without prior factory approval;
- 3) Damage or loss of function sustained during periods with wind speeds exceeding 50 m/s (110 mph)
- 4) Repairs performed by other than authorized A&C Green Energy service personnel;
- 5) Acts of God; or
- 6) Incidental or consequential damages.

Pursuant to this Limited Warranty, A&C Green Energy, will, at its option (1) repair the product using new or refurbished parts or (2) replace this product with a new or refurbished product. For the purposes of this Limited Warranty "refurbished" means a product or part that has been restored to its original specification. In the event of a defect the above represents your exclusive remedies.

**LIMITATIONS ON DAMAGES:** A&C GREEN ENERGY SHALL NOT BE LIABLE FOR ANY INCIDENTAL OR CONSEQUENTIAL DAMAGES FOR BREACH OF ANY EXPRESS OR IMPLIED WARRANTY ON THIS PRODUCT.

**DURATION OF IMPLIED WARRANTIES:** EXCEPT TO THE EXTENT PROHIBITED BY APPLICABLE LAW, ANY IMPLIED WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE ON THIS PRODUCT IS LIMITED TO THE DURATION OF THIS WARRANTY.

**INSURANCE:**

**Mailing Address:**

A&C Green Energy  
PO Box 941122  
Plano, TX 75094

**Shipping Address:**

A&C Green Energy  
1108 Summit Ave., Ste 8  
Plano, TX 75024  
972-516-0692

This Agreement is not a contract of insurance; however, the obligations hereunder are fully insured by A&C Green Energy's insurance company.

Some states do not allow the exclusion or limitation of incidental or consequential damages, or allow limitations on how long an implied warranty lasts, so the above limitation or exclusions may not apply to you. This Limited Warranty gives you legal rights and you may have other rights which vary from state to state.

## Talon Warranty Registration Card

Talon Model: \_\_\_\_\_ Talon2 \_\_\_\_\_

Serial Number: \_\_\_\_\_

Where was this unit purchased? \_\_\_\_\_

Purchase Date: \_\_\_\_\_

Purchaser Information:

Name: \_\_\_\_\_

Address: \_\_\_\_\_

City: \_\_\_\_\_ State: \_\_\_\_\_ Zip: \_\_\_\_\_

Phone: \_\_\_\_\_ Email: \_\_\_\_\_

Keep this half for your personal records

Talon Model: \_\_\_\_\_ Talon2 \_\_\_\_\_

Serial Number: \_\_\_\_\_

Where was this unit purchased? \_\_\_\_\_

Purchase Date: \_\_\_\_\_

Purchaser Information:

Name: \_\_\_\_\_

Address: \_\_\_\_\_

City: \_\_\_\_\_ State: \_\_\_\_\_ Zip: \_\_\_\_\_

Phone: \_\_\_\_\_ Email: \_\_\_\_\_

Mail or fax this half to A&C Green Energy at fax# **972-516-0697**