Contents

1 Important Safety Instructions

Read these instructions before assembling, installing and operating SF-series wind turbine.

1)Keep this manual.This manual contains important instructions that must be followed during assembly,installation and maintenance .

2)Read, understand and respect all warnings.

3)Do not install our wind turbine on windy day.

4)If unusual noise or status is experienced,turn off machine and contact authorized technician.

5)Properly torque all fasteners during assembly and installation.

6)Only use proper grounding techniques as established by the NEC.National Electrical Codes.

7)Properly fill in and return “warranty Registration Card”.

8)Our wind turbine must be installed in accordance with this manual and local related stipulation.Failure to comply with this manual and local related stipulation may affect and void your warranty.

9)Rotating blades are a serious mechanical hazard.Ensure that nobody comes into contact with blades while installing our wind turbine.

10)Comply with the stipulation about wiring,including wire size and fuse recommendations.

You will see the following icons in this manual:

WARNING: Indicates risk of severe injury or death or possible severe damage to equipment - proceed with caution and follow instructions.

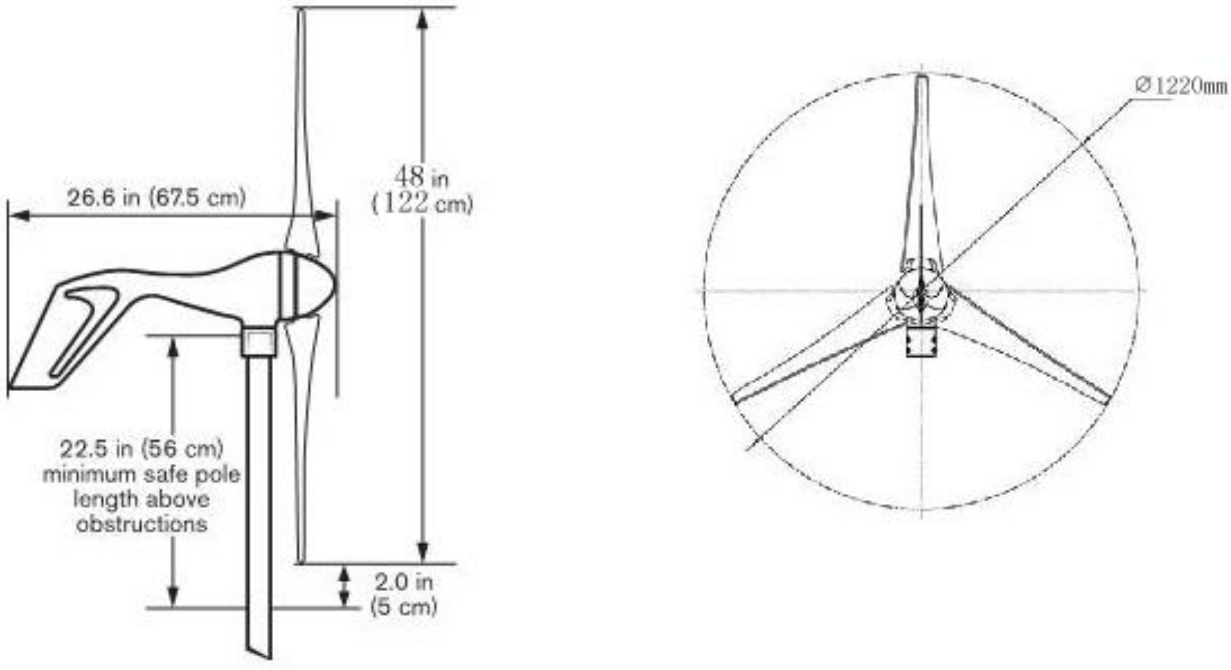
IMPORTANT: Indicates instruction or advice that is critical for correct assembly or operation. Damage to equipment may result if not heeded.

TIP: Indicates instruction or advice that may simplify or ease task or operation.

2 Technical Specifications

Model	SF-600-3	SF-600-5
Weight	8KG	9.3KG
Blades	3	5
Rotor diameter	1.22M	
Start up wind speed	3.0M/S	2.5M/S
Kilowatt hours/month	30kph	42kph
Maximum wind speed	50M/S	
Rated power	400W	
Max Capacity	600W	
Condition	-20～80℃	

*Power generation per mouth refers to 3.5m/s avg.wind speed throughout the year



Wind Turbine Dimension

3 Wind turbine Assembly

Your wind turbine is delivered partially assembled.Assembly requires mounting the blades on the blade hub,securing the hub to the turbine body and installing the nosecone on the blade hub.The necessary hex key (Allen) wrenches are furnished with wind turbine.

3-1 Torque Specifications:

Blade to hub bolts,1/4-20×1.25 inch,Socket Head Bolt,7.0lb-ft(13.6N·m)
Hub to rotor nut,5/8-18inch,Jam nut,50-lb-ft(68N·m)
Yaw Clamp Bolts,M5×35mm,Socket Head Bolt,4.0lb-ft(5.4 N·m)

3-2 Assembly Procedure

3-2-1 Start the assembly by examining how the blades mount to the hub,refer to Fig.1.

1.Coating the hub and blades with Tef-Gel place a nylock nut (Item 4) in the detent on the back of the blade hub while positioning a blade on the hub.
2.Pass a bolt through the blade and screw it into the nylock nut –do not fully tighten the bolt yet.
3.Install the second bolt and nylock nut and torque both bolts to 7 ft-lbs(9.4Nm).
4.Install the remaining two blades following the same procedure.

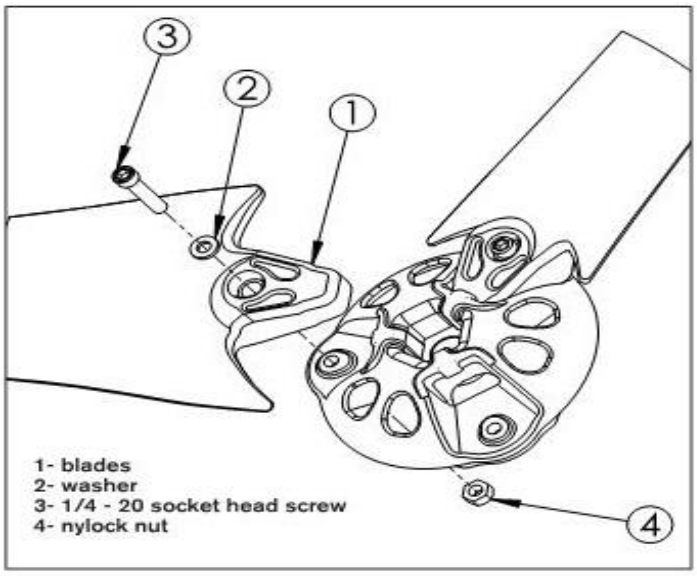


Fig.1 Blade Attachment Detail

3-2-2 Wind turbine is to be installed on a “tilt-up” tower

If wind turbine is to be installed on a “tilt-up” tower,here is the step

WARNING: Don’t attempt to mount the turbine while blades are spinning.

1.Mount the blade/hub assembly to the turbine now.
2.Start the 5/8-18 hub nut on shaft threads “spin” the hub completely onto the turbine alternator shaft.
3.Fully tighten the hub to 50 ft-lbs(68Nm) by inserting a 5/16 inch hex key wrench in the turbine alternator shaft and turning the shaft while turning the blades.
3-2-3 Snap the nosecone into position over the outside edges of the blade hub. Make sure all three edges of the nosecone snap over the edge of the blade hub.
After installation tug on the nosecone to make sure it is securely attached

4 Sitting

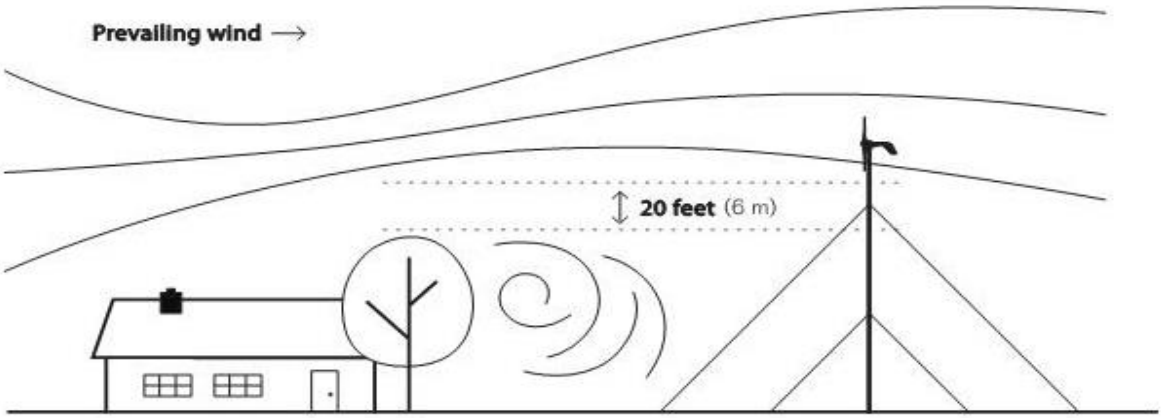
Small changes in wind speed can have a dramatic effect on power production.The sitting of your wind turbine should be carefully considered. Each installation is different and is often a compromise among tower height,distance from the battery bank,local zoning requirements and obstacles such as buildings and trees.

In general the higher the tower,the greater the wind speed and ultimately power production.However,towers are expensive and can easily exceed the cost of the turbine.

Our wind turbine recommended tower height is 25ft(7.6m)on open ground or 20 ft(6m) above nearby obstructions.(Fig.2)Try to locate the wind turbine in the “cleanest” turbulent free air as possible.Turbulence will reduce the efficiency of the wind turbine and may accelerate wear on rotating components.

Safety must be the primary concern when selecting the mounting location.Install our wind turbine so there is no possibility of accidental contact with rotating blades even if it requires installing the wind turbine in a less than ideal location.Safety has precedence over efficiency.

WARNING:Install wind turbine so there is no Possibility of accidental contact with rotating blades even if it requires installing the wind turbine in a less than ideal location.



5 Towers

Wind turbine is designed to mount on tubing or pipe with a nominal 1.875-1.900 inch outside diameter.This dimension enables constructing a tower from a range of readily available materials including 1 1/2 inch Schedule 40 steel pipe and 2 inch SS-20 galvanized fence tubing (0.090 inch wall thickness). Under no circumstances should plastic pipe be used to construct a tower.

WARNING: Plastic pipe should NEVER be used to build as the tower

6 Wiring Options

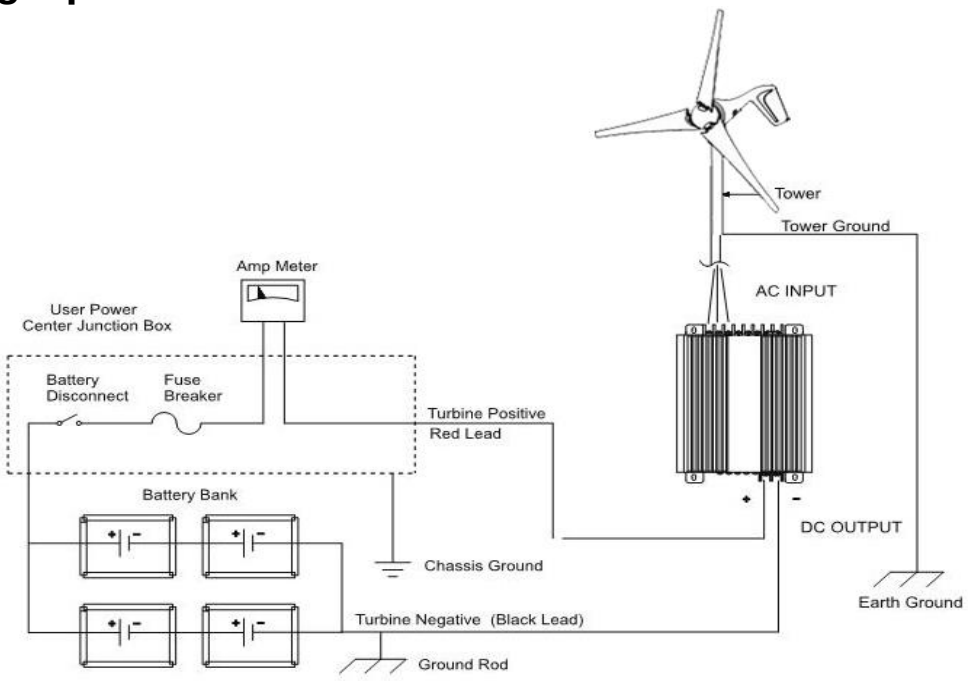


Fig.3 Single Turbine Installation

Fig.3 represents a single turbine installation.Higher input voltages from additional wind generators,solar panels,fuel-powered generators etc.,can trick the wind generator's controller into sensing the battery in full charge,and the controller will prematurely stop charging. It will not harm the wind generator,just cause to slow down or stop spin.Please disconnect the other charging sources to determine the possible interference source.

You can wire the wind generator through most "power centers".However,if you experience interference,you must bypass it and wire the wind generator directly to the battery bank to its own set of battery posts.Allow the wind generator to operate independently,monitor the battery and charge is necessary.

<u>CAUTION:</u>DO NOT CONNECT WIND GENERATOR POSITIVE TO BATTERY NEGATIVE AND WIND GENERATOR NEGATIVE TO BATTERY POSITIVE FOR EVEN A SECOND,OR ELSE WILL DAMAGE THE WIND GENERATOR'S CONTROLLER AND VOID YOUR WARRANTY.(IF YOU ARE UNCERTAIN OF THE POLARLTY OF THE WIRES,SIMPLY SPIN THE ROTOR SHAFT AND MEASURE THE VOLTAGE DIRECTION WITH A VOLT METER.)

NOTE: One bad battery can create high voltages(16-18 volts) and stop the Wind Generator from charging,check the condition of each individual battery.
Consult the battery manufacturer for testing individual batteries or cells.

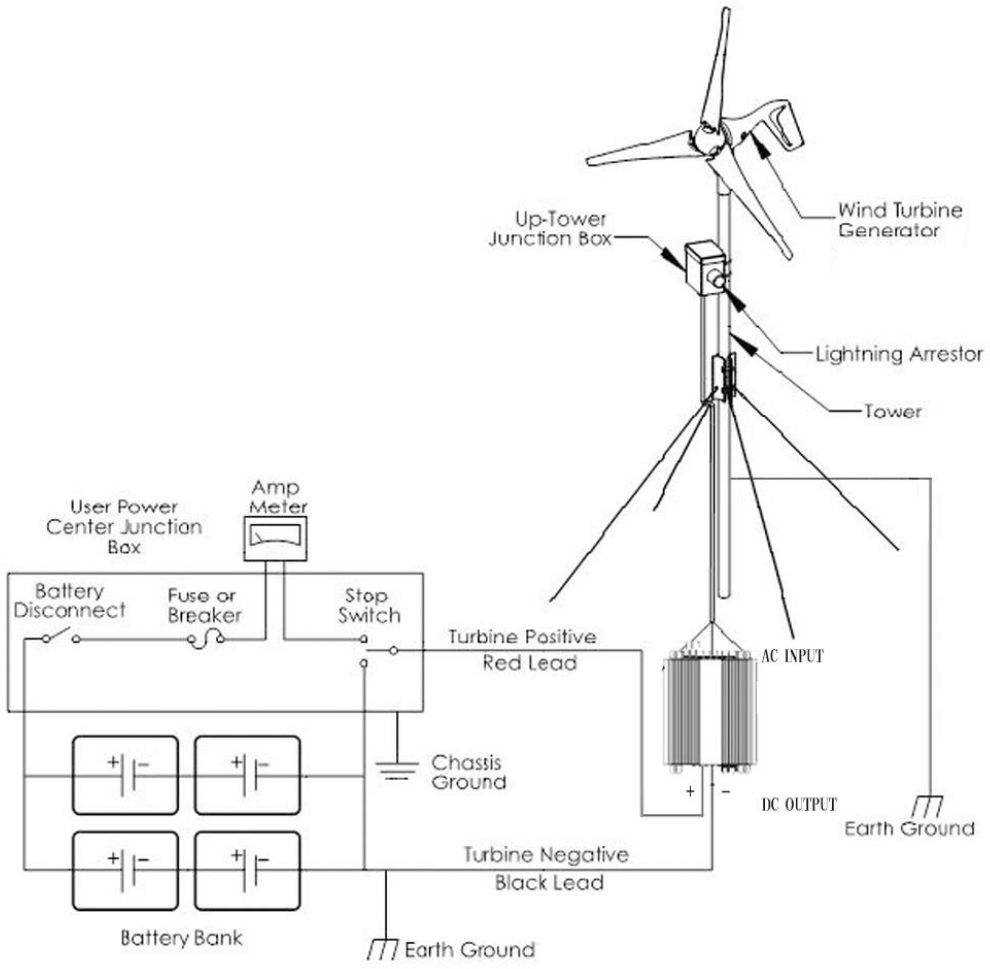


Fig.4 Single Turbine Installation with Up-Tower Junction Box

Fig.4 represents a system with an Up Tower Junction Box.The junction box may be installed close to the top of the tower to ease installing a Lightning Arrestor.Typically installing the box will require drilling holes in the tower to install the box-be careful not to compromise the tower strength.

6-1 Hybrid System Wiring

Fig.5 represents a typical “hybrid” system with solar panels.Some charging sources (solar panels,fuel-powered generators,additional wind generators,etc.) connected to the same system may cause interference with our wind turbine internal electronic and result in pre-regulation.The interference will not harm the turbine;it will just cause it to spin slowly as if “braked”or it may stop the turbine. If this occurs, test for possible interference by disconnecting the other charging sources to determine the possible

cause.If possible wire the turbine and PV panels to their own set of battery posts.

TIP:In figure5. the wind turbine internal regulator is used.A diversion type external regulator could also have been used

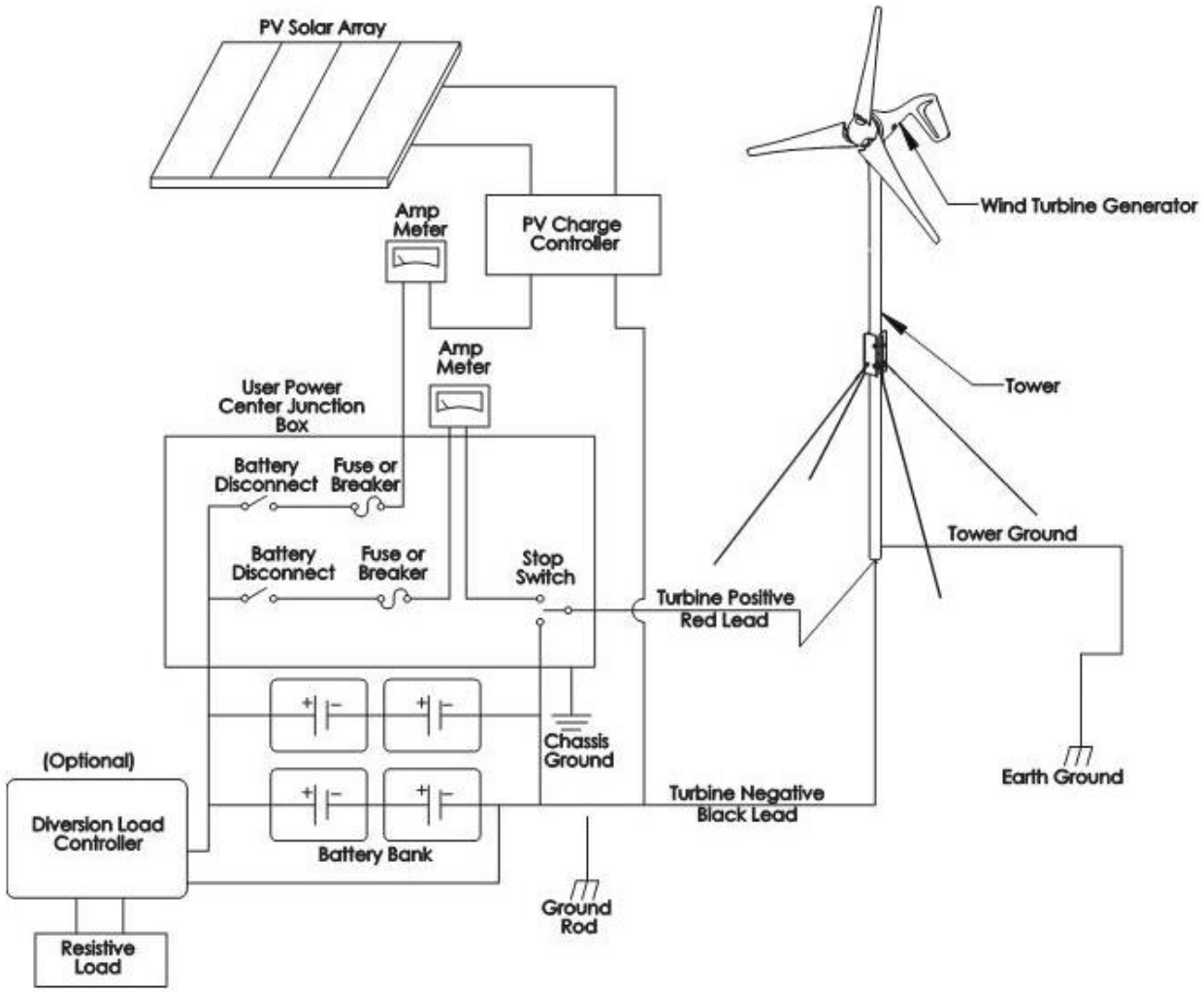


Fig.5 Hybrid System with Solar Panels

6-2 Multiple Wiring

It is possible to wire multiple wind turbines together.A typical multi-turbine system is depicted in figure 6.

There are two methods used to accomplish this task.

Method One:

Each wind turbine is treated separately.Each turbine will have its own wires,stop switch and fuse and will connect directly to battery using the internal regulator to

control charging.

Method Two:

Wire each turbine is a “bus” and then run one set of wires from the bus to the battery.Each turbine’s internal regulator or an external diversion type regulator may be utilized.

A “bus” system typically results in reduced wire costs.

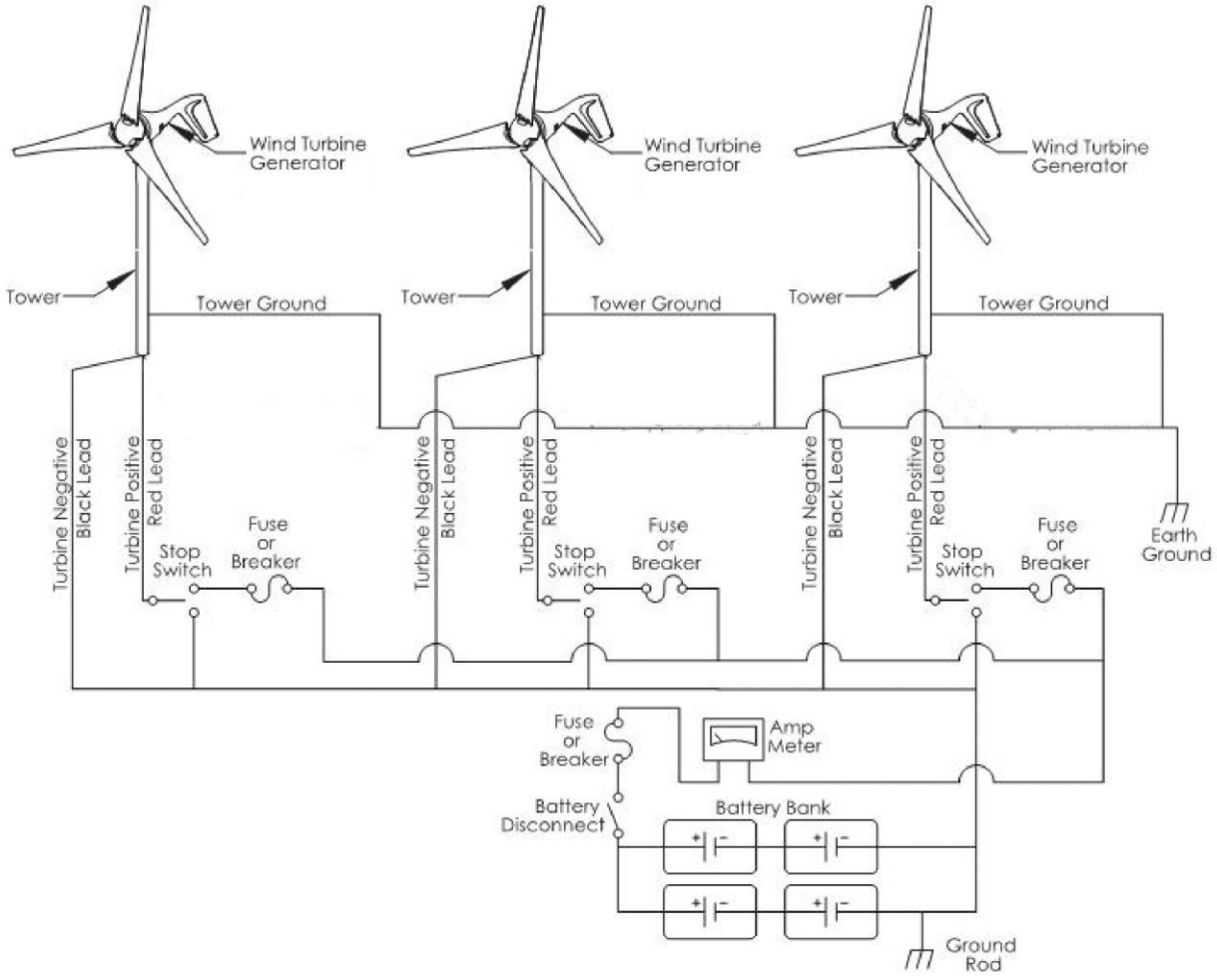


Fig.6 Multiple wind turbine Wiring

6-3 Wire Size

All electrical systems lose energy due to resistance in conductors.

Large wires have less resistance but can be considerably more costly..

Resistance losses will also increase with increasing current,therefore,if yours is a high wind site,it may be worthwhile to go with a larger size wire to take advantage of the greater energy production potential of your site.

Conversely,in low wind sites it may not be cost effective to increase the wire size

since power production will be low.

The following wiring sizes provide maximum annual energy losses of 5% or less for sites with a 12 mph average wind speed (assuming the standard Rayleigh distribution of wind speeds)which is sufficient for most sites.
To determine the size wire,measure the distance from the batteries to your wind turbine.Be sure to include height of the tower,Refer to the appropriate chart for your system voltage and number of turbines and select the wire size.

We recommend these as the minimum wire sizes; for optimal performance use the largest wires that are practical and affordable.Local,state,and national electrical codes have precedence over these recommendations and must be followed to ensure the safety of your system.

Note:Wiring Resistance and Regulation
Depending on your exact system configuration including other charging sources in your system,wiring resistance may affect the regulation set point of the turbine.Higher wiring resistance (smaller wires)will tend to lower the voltage at which the turbine enters regulation and stops charging.The recommended wiring sizes should provide little effect on the regulation set point,but all installations should be observed over time to ensure that the

12 Volt Systems,AWG/Metric Wire Size mm2

Wind Turbine	0-9M	9-10M	18-27M	27-46M	46-58M
1	4mm2	6mm2	10mm2	16mm2	90mm2
2	10mm2	16mm2	25mm2	25mm2	25mm2
3	10mm2	16mm2	25mm2	35mm2	50mm2

**** If your system requires this length of wire,consider using parallel wires.

24 Volt Systems,AWG/Metric Wire Size mm2

Wind Turbine	0-9M	9-10M	18-27M	27-46M	46-58M
1	2.5mm2	4mm2	6mm2	10mm2	16mm2
2	4mm2	10mm2	16mm2	25mm2	25mm2
3	6mm2	10mm2	16mm2	25mm2	35mm2

6-4 Fuses,Circuit Breakers and Ammeter

Our wind turbine is capable of producing high amperages. As with all electrical installations,you must protect each of your turbines with a fuse or circuit breaker. Wire wind turbine with an appropriate size ”slow-blow” fuse or circuit breaker between it and the batteries.Refer to installation figures at the start of Section 5. If a stop switch is used,the fuse or circuit breaker should be placed between the switch and the batteries.

Recommended Sizes for Circuit Breakers or Slow-Blow Fuses

● 12-volt model:40 amp DC,part number 3-ELOT -1147-04

● 24-volt model:20 amp DC,part number 3-ELOT -1147-03

Circuit Breakers can be bought by yourself

While not necessary,an ammeter(sometimes called an Amp Meter) is an excellent addition to any system.The Amp Meter allows you to monitor the current output of your turbine.Place it in between your turbine and the battery on the positive lead. It will give you instantaneous reading of output in amps.

6-5 Batteries

There are many battery choices available-flooded lead acid,absorbed glass mat (AGM), gel cell and Nicad.The type of Battery utilized will depend largely on the battery bank location and cost. For battery installations where fumes can be safely ventilated and the potential for acid leakage accommodated,the flooded lead acid battery is typically the most economical choice.

Mini recommended battery bank size:

●12-Volt systems -400 Amp-hours

●24-Volt systems -200 Amp-hours

IMPORTANT: Never use “automotive” batteries or any

6-6 Wind Turbine Grounding

Proper grounding of the wind turbine provides protection to individuals and equipment by elimination the possibility of dangerous voltage potentials.

There are two aspects to grounding any electrical system-grounding one of the

conductors of the electrical system and grounding all metal structures in the system that may have a voltage potential caused by an electrical failure.
In a typical wind turbine installation grounding one of the conductors is accomplished by connecting the wind turbine negative (black) conductor to an “earth”ground close to the battery bank.Installation and connection to grounding rods is described in the following section on Tower Grounding.

Grounding the metal structures in the system-typically this includes the tower and turbine-is accomplished by connecting the structures together using conductors of the same size as the positive and negative conductors and then routing a conductor to an earth ground.

6-7 Tower grounding

Every wind turbine and turbine tower should be grounded at the tower base even though the system may be grounded at the battery bank or service panel by means of the yaw ground lead.Grounding the tower at its base may prevent shocks to persons touching the tower due to lightning or electrical faults.

The following sections are provided as a guide to properly grounding the tower and should not be considered completely comprehensive.You are encouraged to reference the National Electrical Code (NEC) and local building and zoning regulations for complete requirements. Relevant sections of the National Electrical Code are referenced.

Tower grounding may be accomplished in several ways;the most common method is a copper clad steel electrode(s) driven into the soil and connected to the tower using a wire conductor.

6-7-1 Electrodes Driven In Soil

Electrodes should to a minimum of 8ft (2.5m)in length and free of non-conductive coatings such as paint.Hollow electrodes of pipe or conduit should not be smaller than trade size 3/4(metric designator 21) and must be galvanized or otherwise protected from corrosion.Solid rod electrodes must be at least 5/8 inch (16mm)diameter.Stainless steel rods less than 5/8 inch diameter,nonferrous rods or their equivalent less than 1/2 inch diameter shall be “listed”by an organization having jurisdiction in the area.For example:UL in the USA and CSA in Canada.

Electrodes shall be installed such that 8ft (2.5m) is in contact with the soil.They should be driven into undisturbed soil within 1ft of the tower foundation.Electrodes should be driven to a depth of 8 ft (2.5m) except where rock is encountered;then the electrode may be driven at an angle not to exceed 45 degrees from vertical.Some local authorties permit burial of the electrode in a trench that is a minimum of 30inch (76cm)deep.

The upper and of the electrode and its connection to the grounding conductor should be below grade or if above ground,must be protected from damage.

Bonding the grounding conductor to the electrode and to the tower may be accomplished by exothermic weld or by a “listed”mechanical connector. Solder connections are not permitted.Most local authorities require a minimum grounding conductor size of 6 AWG for copper and 4AWG for aluminum(if aluminum is permitted).

The grounding conductor may be buried directly or contained in conduit;in either case it is important that it have no sharp bends to keep its inductance low.
The accompanying figure depicts a typical tower grounding technique and the following sections of the NEC are listed for reference.

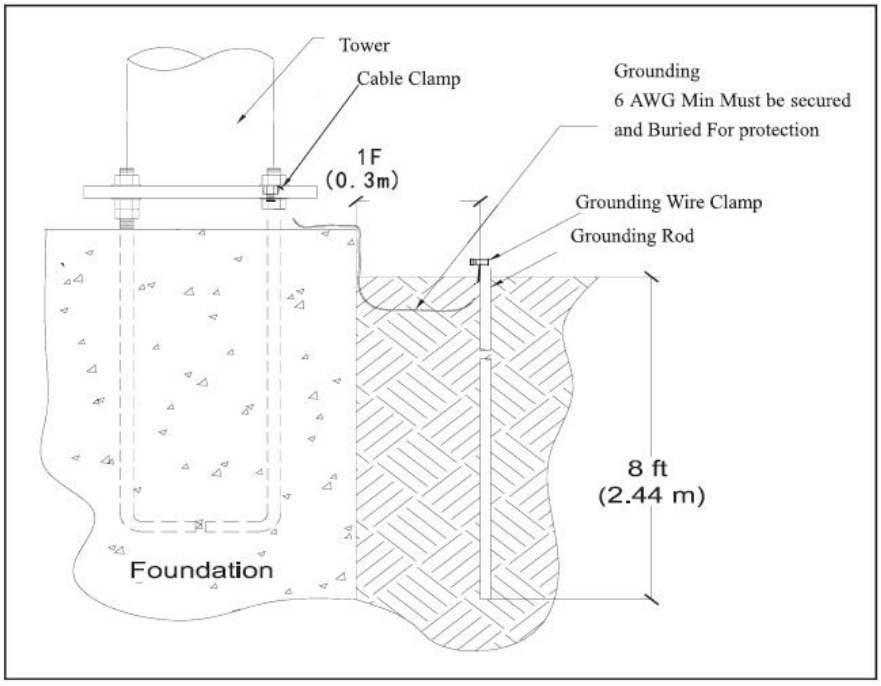


FIG.7

7 Installation

The following are general guidelines for the installation of wind turbine.Because each wind turbine installation is unique,specific step-by-step installation instructions cannot be provided.However,before attempting final installation the following basic steps should be completed.

● Completely review the Owner's Manual

● Select tower and site and install tower.See sections 4.0 and 5.0 and 6.0

● Determine wire size.See section 6.3.

● Design system including batteries,switches,circuit breakers-draw wiring diagram.

● Obtain required components.

● Assemble turbine –See Section 3.0 Turbine Assembly.

Once these steps are completed,final assembly is fairly simple and consists primarily of making good electrical connections according to the wiring diagram and mounting wind turbine on the tower.

7-1 Wire Connections

Connect wire leads from wind turbine to wires to be run down the tower using "split bolt"or solder connectors.Follow good practice and use color coded wires-red for battery positive,black for battery negative, and yellow for earth. wires must be sized based on turbine to battery bank distance.Refer to Section 5.Insulate connections with heat shrink tubing or good quality electrical tape.Leave sufficient service loop in the wires to accommodate removal of the turbine from the tower.

Follow system wiring diagram and run wires to disconnect swith,fuse or circuit breaker and ammeter.If a stop switch is utilized (highly recommended)turn switch to OFF until all connections are completed.

7-2 Mounting on Tower

After wires are connected to wind turbine,route the wires down the tower and slide

the turbine yaw over tower top. After the yaw is completely lowered onto tower top,lift the yaw approximately 1/8 inch(3mm)to 1/4 inch (6mm) so that the only contact between the yaw and tower top is through the rubber isolation pad.This will reduce noise and vibration transmission to the tower.

Once the yaw is positioned on the tower,secure the yaw clamp screws using the supplied 5/32 inch hex key wrench.Torque to 5 ft –lbs (6.8Nm).

If blade/hub assembly is not already installed on turbine,it may be installed now.Position the 5/8-18 nut in the hexagonal detent at the center of the hub.Coat the shaft threads and blade hub bore with Tef-Gel and “spin”the hub completely onto the turbine alternator shaft.Fully tighten hub to 50lb-ft by inserting a 5/16 inch hex key wrench in the turbine alternator shaft and attempting to turn the shaft while holding the blades.

Snap the nosecone into position over the outside edges of the blade hub.Make sure all three edges of the nosecone snap over the edge of the blade hub.After installation tug on the nosecone to make sure it is securely attached.

7-3 Final Connections

Before making final connections to the batteries,make sure circuit breakers and stop switch are in the OFF position.Attach wires to battery;red to positive battery terminal and black to negative battery terminal.
The installation is now complete.

ARNING:If the battery connections are reversed,wind turbine electronics will be damaged.The polarity of wind turbine’s wires may be checked by connecting a volt-meter to the wires and spinning the rotor by hand.

8 Operation

8-1Operational Summary

Wind turbines operate by capturing the kinetic energy of moving air:the wind.They convert it to rotational motion to turn an alternator that produces electrical power.The

electrical power must be regulated to a voltage to charge the system batteries,and there must be a system to prevent over-charging the batteries and resume charging as the battery voltage drops.

The A means to protect the wind turbine from extreme wind damage must also be provided.

Our wind generator accomplishes all these goals by incorporating a three phase brushless permanent magnet alternator and microprocessor controlled electronic to optimize its power production capability.The microprocessor continuously adjusts the loading of the alternator to keep the blades operating at their optimal angle of attack The result:

- high power production;
- high blade efficiency;and
- lower blade noise

8-2 Operating Modes

Charging: With our wind turbine connected to batteries with the voltage below the voltage regulation set point,the blades will spin in response to the wind.With an available wind,the blades will continue to spin until the battery voltage matches the regulation set point.

Note that our wind turbine requires a minimum battery bank voltage(approximately 10.5 volts on a 12-volt system)or the controller will behave as if an open circuit condition exists.Refer to open circuit/Free spinning section.

Stall Mode:stall mode is marked by a dramatic reduction in turbine speed to approximately 500-700rpm.Our wind turbine will enter stall mode when a wind speed to 35 mph(15.6m/s)is sensed,and it will remain in stall mode until the speed drops to 32mph(14m/s), If a wind speed of 50mph (22 m/s)is detected ,the turbine will completely shut down for 5 minutes.

Braking Mode: our wind turbine may be placed in braking mode by directly shorting the turbine positive and negative wires together or by the use of a stop switch.The stop switch first disconnects the turbine from the battery and then shorts the positive and negative wires.In very strong winds the blades may rotate slowly even with the switch activated,

No load Operation /Open Circuit /Free Spinning :our wind turbine will spin freely if disconnected from an electrical load.This results in a cycle of rapid blade speed followed by rapid braking this mode of operation may accelerate wear of the turbine and is also non-productive.

8-3 Using An Alternate Charge Controller

There are some conditions under which our wind turbine internal regulator is not appropriate as the primary regulator.These conditions include:

●Systems where battery temperature varies widely

Battery charge efficiency varies in extreme temperatures.If these conditions exist an external regulator with a temperature compensation sensor should be used to optimize the charge rate.There are several regulators available that adjust the charge rate based on ambient battery temperature.

●Batteries that are extremely sensitive to charge voltage

Follow the recommendations of the battery manufacturer.For most battery systems our wind turbine internal voltage regulator is completely adequate.

● Multiple turbines with a bus system

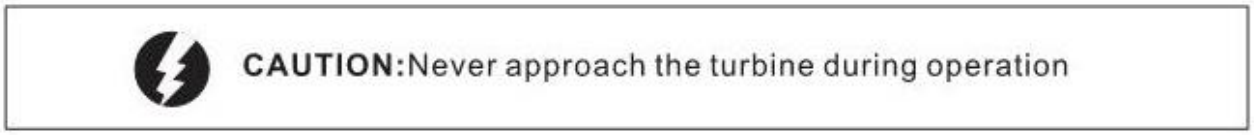
Multiple turbine installations will typically function best using a single voltage regulator close to the battery bank.This is particularly true if the wire lengths connecting each turbine to the bus vary by distance or wire gauge.

If a charge controller other than our mind turbine internal controller is utilized,it must be a diversion style regulator.A diversion style regulator charges the batteries,and as the batteries become charged,the excess power is diverted to a resistive load.This technique allows for the capture of full turbine power even after the batteries are charged.

CAUTION: Most controllers designed to work with solar panels are not suitable for use with our wind turbine .These controllers “disconnect”the solar panels –or in this case our mind turbine from the battery bank when the batteries are charged,allowing our wind turbine

9. Maintenance

Although your wind turbine has been designed to run for long periods without requiring any maintenance,reliability and performance will be enhanced if you periodically inspect your system.



After one month and every six months thereafter:

- Check blades for chips or nicks.Replace blades if damaged.Do not operate the turbine with chipped or unbalanced blades.This can cause severe wear,damage,and possible failure.Do not install individual blades.The blades are balanced as sets.
- Check the blade bolts and the hub nut for tightness.
- Check nosecone for cracks and proper fit.
- Wash off any built-up dirt or debris from the blades.
- Check all electrical connections to make sure they are tight and free from corrosion.
- As with all charging systems,check your battery water levels and add distilled water in accordance with manufacturer’s recommendation.
- Our wind turbine suggests replacing the blades and bearings every five years for optimal performance.

10. Trouble shooting

Three quick bench tests can verify if your wind turbine is working correctly.Test 1 does not require any equipment.For tests 2 and 3you will need a battery bank and a power drill.

Test 1

1)Remove the blade/hub assembly from the turbine and place in a safe location.Replace the rotor hub nut on the rotor shaft.

2)Attempt to quickly spin the rotor shaft with your fingers while connecting and disconnecting the red and black wires (turbine must not be connected to batteries).A

second person may be helpful to perform this test.

3)With the red and black wires connected to each other,the shaft should be more difficult to turn.Replace the rotor hub nut on the rotor shaft.With the yaw wires disconnected it should spin freely.Spinning the shaft quickly makes difference easier to detect.If these conditions do not exist,you should contact your turbine dealer.

11.Exploded Views &Parts List

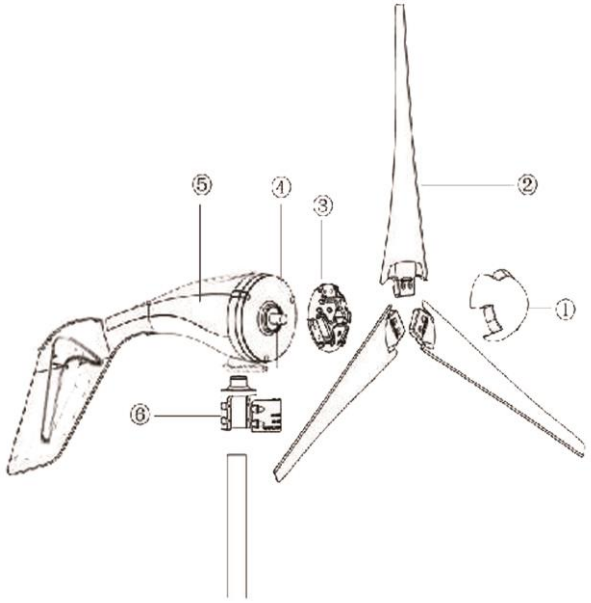


FIG.8 BODY ASSSEMBLY EXPLODED VIEW

Item	Description	QTY	
		SF-600-3	SF-600-5
1	Nose Cone	1	
2	Blade	3	5
3	Hub	1	
4	Motor	1	
5	Wind turbine body	1	
6	Yaw Assembly	1	