

# **SOMA Wind Generators**

Making Australian Wind Turbines Since 1978

## **SOMA 1000 OWNER'S MANUAL**

**VERSION 2.0**



**HORIZONTAL WIND TURBINES**

[www.somawindgenerators.com.au](http://www.somawindgenerators.com.au)

## WELCOME TO YOUR RENEWABLE ENERGY SYSTEM

**ELECTRICITY FROM THE WIND AND SUN:** Renewable electric power systems provide independent (no utility grid) electric power for boats, homeowners, farms, villages and commercial applications such as telecommunications. If utility power is available, your renewable energy system can reduce the electric bill and provide back up electricity during storms or line failure. The most common sources of renewable electric power in these systems are small wind powered generators and solar photovoltaic (PV) modules that convert sunlight directly to electricity. Renewable means power sources that do not deplete the world's finite fossil fuel resources, do not pollute or warm the atmosphere and do not generate hazardous waste. Electricity means your children can study at night for a better future and you can benefit from appliances, power tools and communication technologies that make life easier and more rewarding. Nearly three billion people in the world do not have electricity and by necessity most will ultimately get their electricity from renewable resources to the benefit of everybody. You are a pioneer and part of the solution.

**BEFORE YOU BEGIN:** Reading and following instructions given in this manual is essential for trouble free performance of this unit. The instructions and recommendations in this manual will help assure safe and enjoyable use of your new renewable energy system.

**SAFETY INFORMATION:** These systems *could possibly* present mechanical, electrical and chemical (battery) hazards that can be life threatening. The tower or support structure *could* fall and cause injury or death and property destruction. A component of the wind generator *could* come loose causing injury or death and property destruction. Contact with the high speed propeller *might* result in severe injury or death. High voltage from the wind generator or the inverter *might* cause injury or electrocution. A burn injury *might* result from an electrical short. A severe chemical burn including blinding *might* occur from a battery explosion or contact with the sulfuric acid in a lead-acid battery.

These conditions are addressed in the following safety messages:

**STOP! DANGER!** It is your responsibility to obtain all required permits and engineering certifications for your tower and tower location. Soil and wind conditions vary and towers and tower foundations must be designed for your specific location. Tower must not be able to fall on occupied buildings, neighbour'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 (tower) well away from occupied buildings and power lines; a minimum of 20m is recommended. It is recommended that you install the compatible SOMA tower for your turbine.

**STOP! DANGER!** If the generator appears or sounds loose in the tower or is making an unusual sound, the condition must be corrected immediately. A loose generator 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 an operating propeller.

**STOP! DANGER!** Provide climbing protection against all unauthorized persons or children. Never allow an untrained person or someone without the proper safety equipment to climb the tower. Always stop the propeller before climbing the tower. Both falling from the tower and contact with the operating propeller can be lethal.

**STOP! DANGER!** All battery systems and grid connected 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.

**STOP! DANGER!** Some batteries may emit explosive and irritating gas while charging. This may present a spark hazard. Never turn on a light switch or make any other electrical connection or make any type of spark near a recently-charged battery. Use protective gloves and eyeglasses when working around a battery. Turn off all loads, wear safety glasses, and look away when making a final battery connection.

**STOP! DANGER!** NEVER place objects on top or near the controller enclosure. These devices must dissipate heat as part of normal operation. FIRE AND FAILURE can result if airflow is blocked.

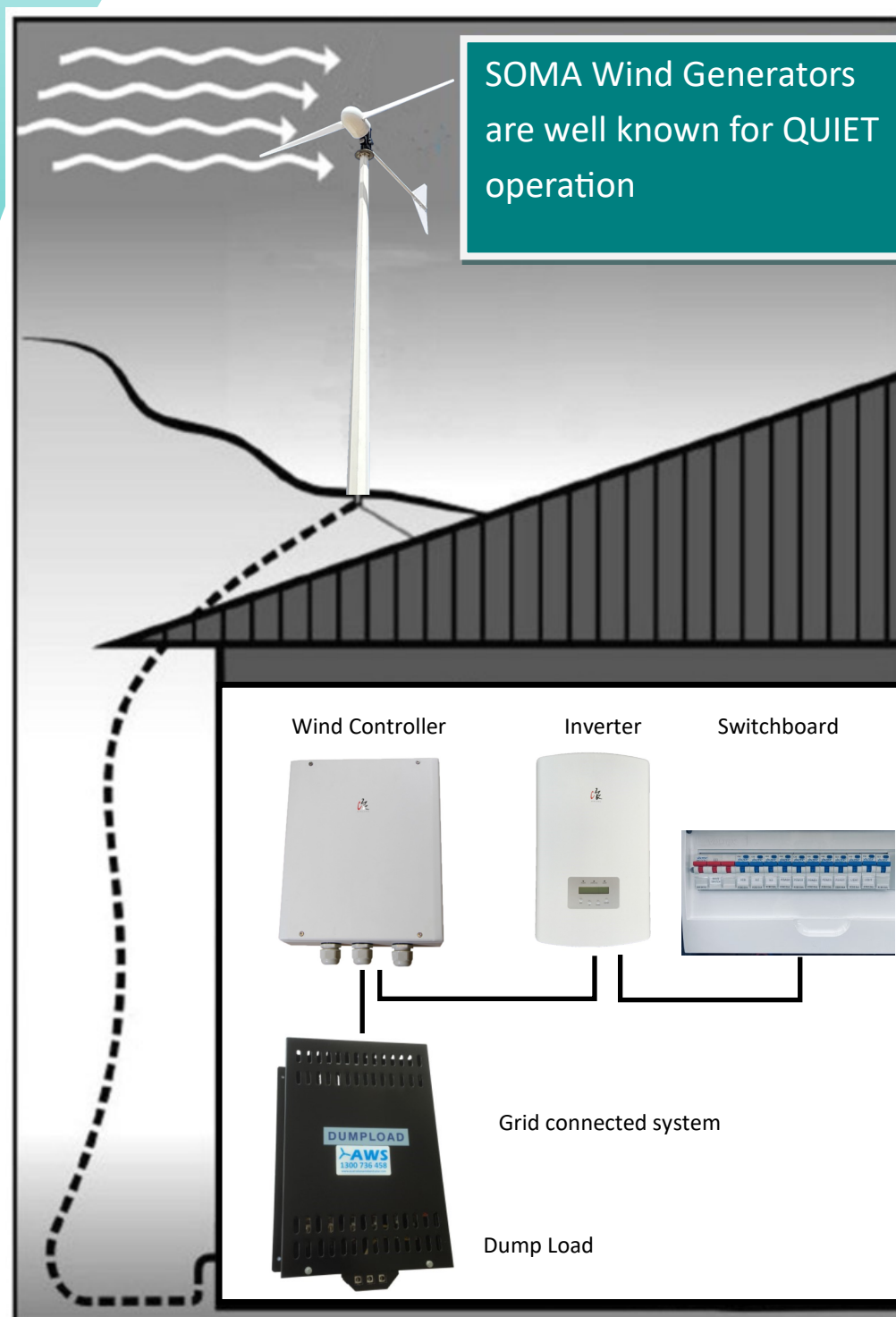
## DESCRIPTION OF SYSTEMS

The illustration below depicts a typical installation. For more information regarding specifications and content of the packaged wind, wind/solar and inverter systems, contact SOMA.

SOMA Wind Generators are configurable for off-grid 48V, grid connected and hybrid grid connected with storage applications.

In off-grid applications your SOMA wind generator could serve as the primary source of renewable energy or supplement the solar array to greatly increase battery autonomy and life expectancy.

In grid connected applications your SOMA wind generator will provide usable renewable energy over the 24 hour day, minimising feeding and greatly reducing your electricity bill.



## INSTALLATION

**SYSTEM VOLTAGE:** All system components, wind generator, solar PV panels, controller / System Centre, diversion load, transformer and inverter must match battery voltage according to the table below.

Default factory set voltages are as shown, it is also possible that all models can be wired from 48V up to 200V

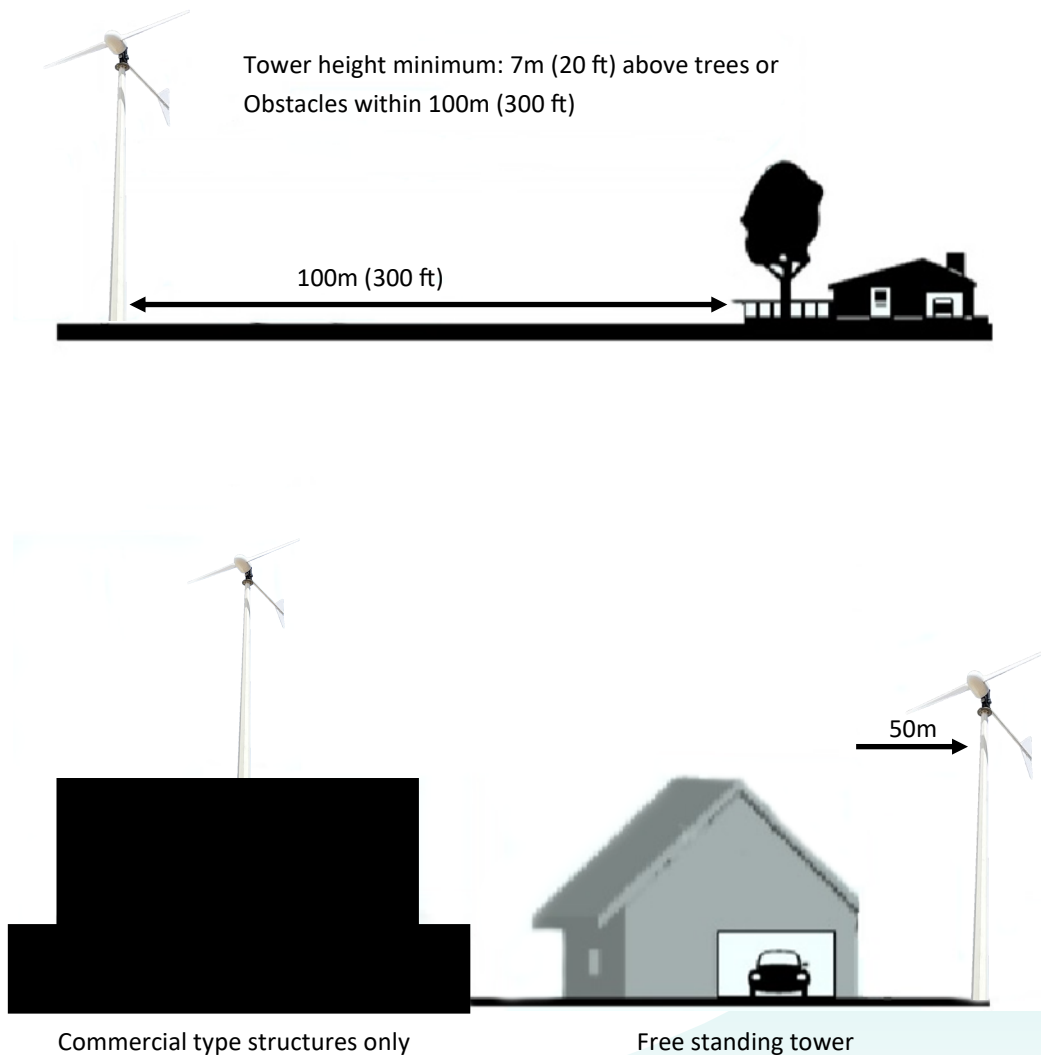
## TOWER LOCATION/TYPE AND HEIGHT.

### INSTALL TOWER

*(Install tower following manufacturer's instructions.)*

The tower height minimum is 7 meters above trees or obstacles within 100m (300ft). The highest point on your property is generally best, but wind generator distance to the battery and the battery voltage must be considered for correct wire sizing (Refer to wire size table). A self supporting tower occupies less ground area than a guyed tower. A fold over design such as the SOMA towers are recommended.

It is recommended to fit the wind generator to the matching SOMA tower, available in 9, 12, 15 and 18 metres (9 and 12 metre tower are wireless).



#### 4. CHOOSE BATTERY LOCATION

##### BATTERY (off grid or grid storage)

Locate batteries in cool, dry area of the building. Run AC power from inverter to house or load. If the batteries are in an occupied building an enclosure with ventilation to outside is required. Check out local regulations. See the following diagrams for package system series/parallel arrangement (examples only).

Follow the attached DC WIRE SIZING tables or inverter instructions for wire sizing. Fuse both — and + as close as practical to the battery supply.

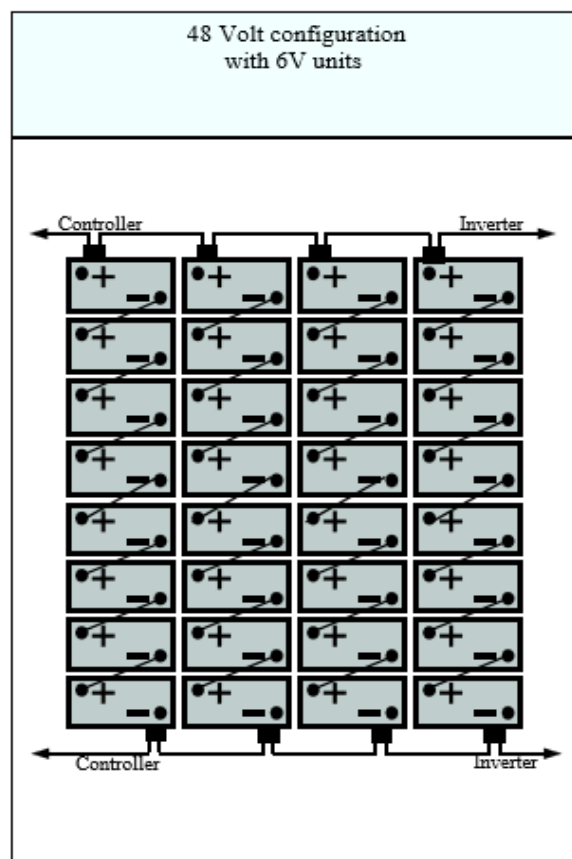
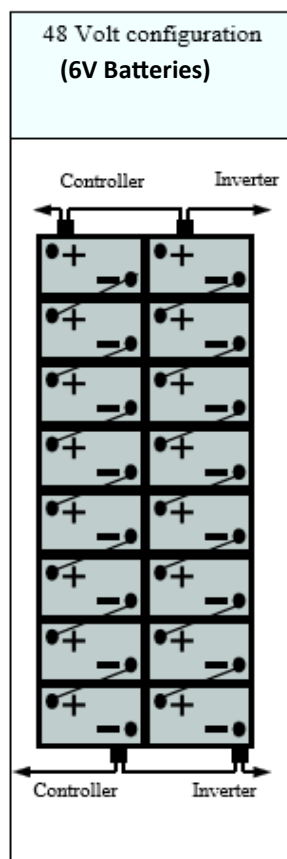
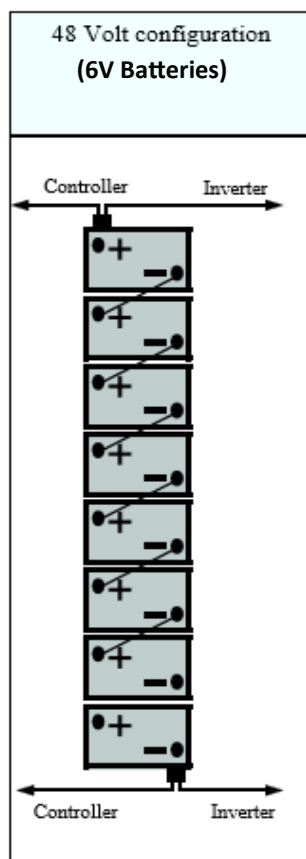
Use the table below for determining required battery capacity.

<b>MODEL</b>	<b>SOMA 1000</b>
<b>BATT VOLTS</b>	48
<b>MIN. AH</b>	300

Never use Automotive batteries they are not meant for stationary applications, they have a very short cyclic life, stationary "deep cycle" types are always recommended though they are expensive initially they last longer, properly maintained Deep cycle stationary batteries could last for 7 to 8 years or more.

Never leave batteries in a discharged state for very long, this shortens the life of the batteries.

Always keep batteries dry and clean, ensure terminals are not corroded, apply battery GEL to prevent terminals from corroding, replace the terminals if found badly corroded.



## DC WIRE SIZE TABLES

The following tables are used to determine the wire size based on the distance (one way) required to connect DC components.

### Maximum distance in FEET for COPPER wire size.

**NOTE : Never join Copper and Aluminum wires together !!!**

BAT VOLTS	12	12	12	12	24-36	24-36	24-36	48-72	48-72	120	120	240	240
AMPS	400	200	100	50	200	100	50	100	50	50	25	25	10
WIRE SIZE	FEET												
*AWG 10	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	300	600	1500
8	xx	xx	xx	18	xx	xx	36	xx	75	200	400	750	2000
6	xx	xx	12	23	xx	23	50	50	100	250	500	950	2500
4	xx	xx	15	30	xx	30	60	60	120	300	600	1200	3000
3	xx	xx	18	36	xx	36	75	75	150	400	750	1500	4000
2	xx	12	23	50	23	50	100	100	200	500	950	2000	5000
1	xx	15	30	60	30	60	120	120	250	600	1200	2500	6000
0	xx	18	36	75	36	75	150	150	300	750	1500	3000	7500
2/0	xx	23	50	100	50	100	200	200	400	950	2000	4000	10000
3/0	xx	30	60	120	60	120	250	250	500	1200	2500	5000	12000
4/0	18	36	75	150	75	150	300	300	600	1500	3000	6000	15000

### Maximum distance in METERS for COPPER wire size.

BAT VOLTS	12	12	12	12	24-36	24-36	24-36	48-72	48-72	120	120	240	240
AMPS	400	200	100	50	200	100	50	100	50	50	25	25	10
WIRE SIZE	METERS												
*AWG 10	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	90	180	450
8	xx	xx	xx	6	xx	xx	11	xx	22	60	120	230	600
6	xx	xx	3.5	7	xx	7	14	14	30	75	150	290	750
4	xx	xx	4.5	9	xx	9	18	18	36	90	180	360	900
3	xx	xx	6	11	xx	11	22	22	45	120	230	450	1200
2	xx	3.5	7	14	7	14	30	30	60	150	290	600	1500
1	xx	4.5	9	18	9	18	36	36	75	180	360	750	1800
0	xx	6	11	22	11	22	45	45	90	230	450	900	2300
2/0	xx	7	14	30	14	30	60	60	120	290	600	1200	3000
3/0	xx	9	18	36	18	36	75	75	150	360	750	1500	3600
4/0	6	11	22	45	22	45	90	90	180	450	900	2000	4500

### \*CONVERSION FROM AMERICAN WIRE SIZE, AWG TO METRIC note: AWG=B&S

AWG SIZE	14	12	10	8	6	4	3	2	1	0	2/0	3/0	4/0
Diam inches	0.0641	0.081	0.102	0.129	0.162	0.204	0.229	0.258	0.289	0.325	0.365	0.41	0.46
Square mm	1.628	2.057	2.591	3.277	4.115	5.182	5.817	6.553	7.341	8.255	9.271	10.414	11.684

# SOMA 1000



**Tail fin reinforcements**

**Name plate shows  
voltage configured**

## NOTES:

- 1) All required stainless steel hardware is packed in pouches with identification labels
- 2) Check for any play in assembly
- 3) Ensure you have ready the required nut drivers, spanners, wrenches, etc
- 4) Preferably choose a reasonably calm day for installation
- 5) Follow all safety precautions



**INTERCONNECTIONS & MANUAL BRAKE  
ARRANGEMENT FOR**

**SOMA 1000 WIND GENERATORS**

**AWS WIND CONTROLLER**



**SOMA 1000  
WIND GENERATORS**

THREE WIRES FROM WIND GEN SHALL BE CONNECTED TO IDENTIFIED TERMINALS INSIDE THE CONTROLLER

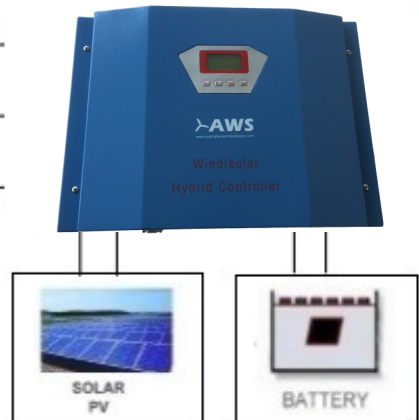
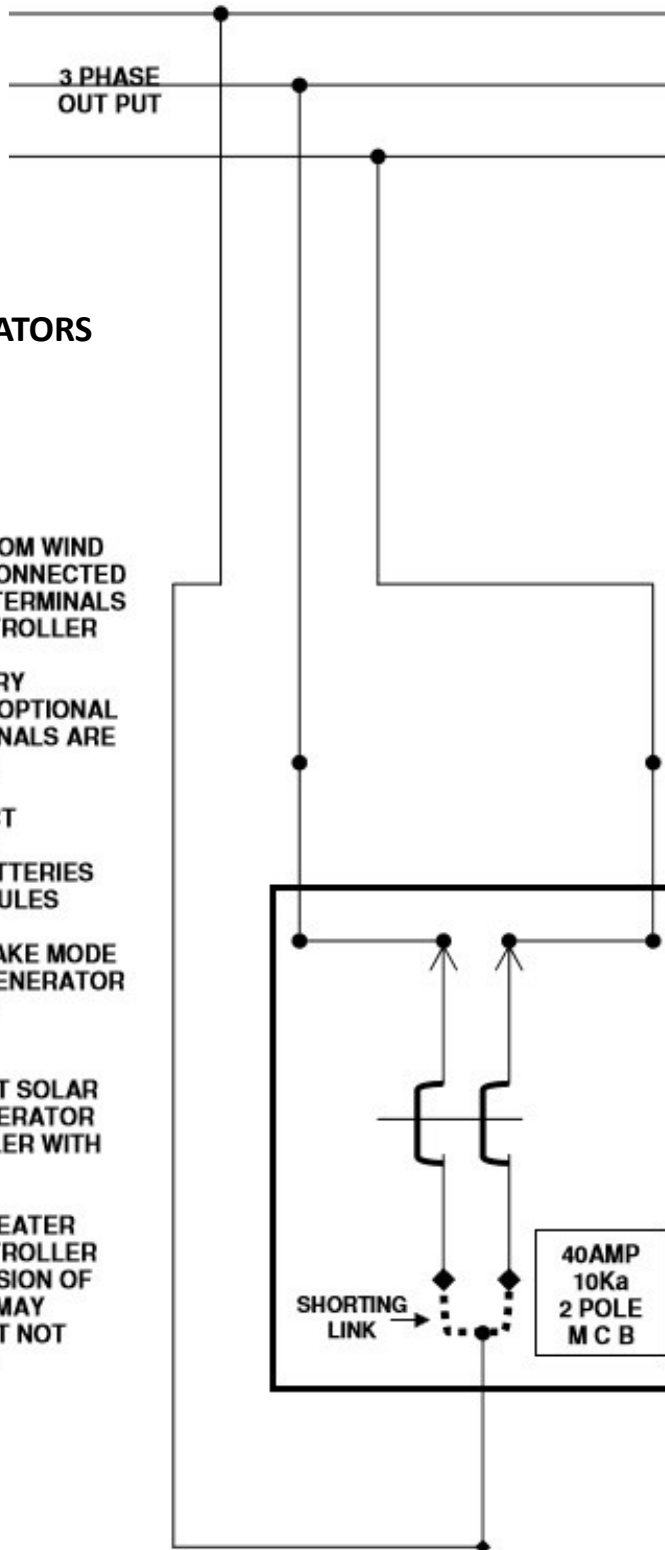
SIMILARY BATTERY TERMINALS AND OPTIONAL SOLAR PV TERMINALS ARE ALSO PROVIDED

ENSURE CORRECT POLARITY WHEN CONNECTING BATTERIES AND SOLAR MODULES

KEEP MCB IN BRAKE MODE TILL THE WIND GENERATOR INSTALLATION IS COMPLETE

DO NOT CONNECT SOLAR PV OR WIND GENERATOR TO THE CONTROLLER WITH OUT BATTERIES

THE RESISTIVE HEATER INSIDE THE CONTROLLER USED FOR DIVERSION OF EXCESS POWER MAY BECOME HOT BUT NOT UNDER NORMAL CONDITIONS



OPTIONAL

**NORMALLY MCB SHALL BE IN "OFF" POSITION**

TO STOP THE TURBINE SHIFT THE LEVER TO "ON" IF THE CURRENT IS IN THE LIMIT OF MCB RATING THE TURBINE WILL COME TO STANDSTILL OR SLOW SPIN

IF THE CURRENT EXCEEDS MCB LIMIT THE MCB TRIPS ,REPEAT THIS PROCESS TILL TURBINE SLOWS DOWN .

SOMETIMES YOU MAY HAVE TO WAIT FOR AN OPPORTUNITY TILL WIND SPEED DROPS AND TURBINE SLOWS TO STOP THE TURBINE

SLOW SPIN UNDER VERY HIGH WIND SPEED EVEN WHEN STOPPED IS NORMAL





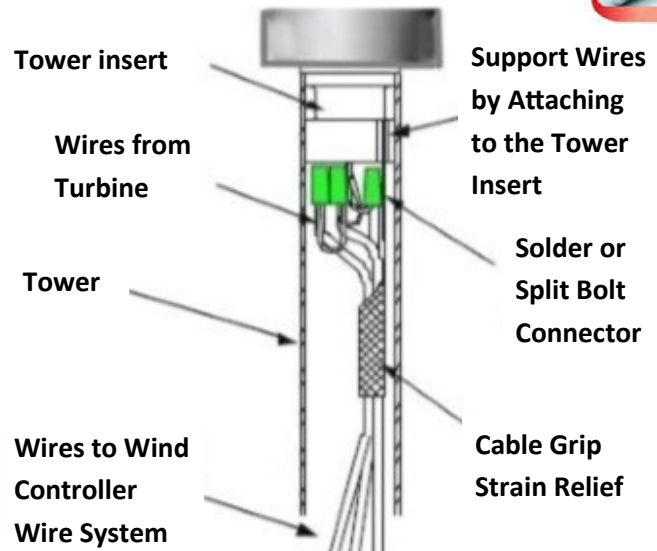
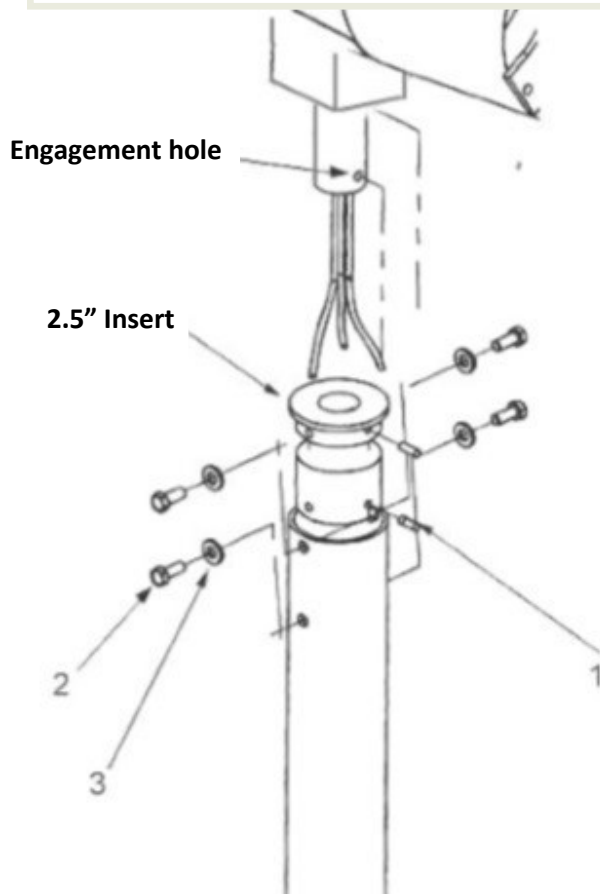
## Tower Insert Kit

For 2.5 Schedule 40 Pipe (2.875 O.D. x .20 Wall)

# SOMA 1000 Wind Generator



Please note: Loctite (such as Holdite T62 or Holdtite T62) must be used on both ends of screws and all threads



Item	Description	2.5" QTY
1	Set Screw (M6 x 20)	2
2	Bolt M8 x 35	4
3	M8 SS Nylock Nut	4

**The tower insert & mounting hardware is supplied by SOMA**

- 1) Ensure that "tower insert is properly engaged on to YAW SHAFT before installation
- 2) At least three skilled people are needed while installing, two people for holding the generator assembly and one person to locate and fix all the hardware, for tilt-up type masts
- 3) Use the recommended SOMA tower

# Blade Assembly

**1** The two blades and three blade stiffeners are now ready to mount to the hub. Fix the first blade and two stiffeners, then move on to the other blades. Fix blades and stiffeners with the hardware provided marked “Blade Hardware”. Tighten the six blades fixings to 30Nm and then to 50Nm. Tighten in a criss-cross formation.

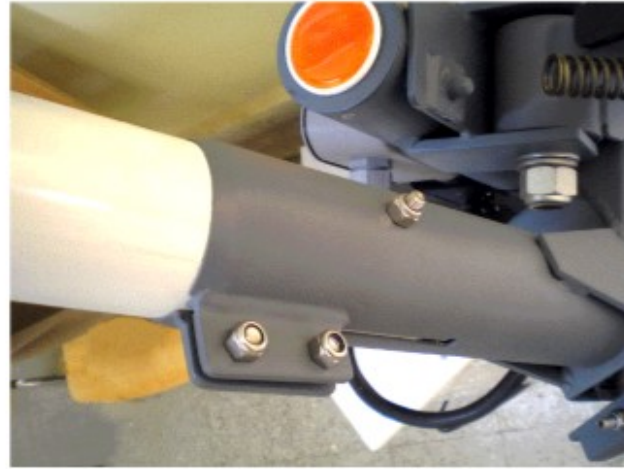
**2** Take note of the blade direction as shown in picture 2. The leading edge (being the thicker edge with foil protection) is on the right when the blade is at the 12 o'clock position.



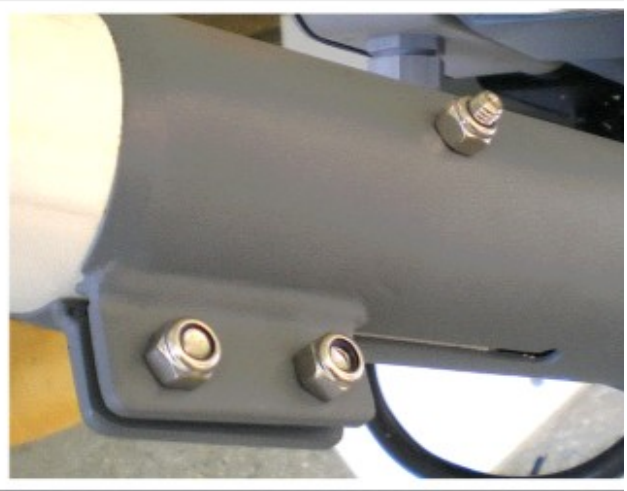
**3** Fix the nose cone into position using the three fixings marked “Nose Cone”, ensuring to use Loctite on the thread. Do not over-tighten.

## Installing the Tail

Insert the tail pipe into the rear of the turbine body, ensuring the hole in the tail pipe is aligned with the hole in the housing.



Install the long through-bolt with stainless steel washers and a nylock nut and tighten with a socket and wrench.



Install the two compression bolts to the lower weldment and tighten with a socket and wrench.

The tail boom should now be securely attached to the lower weldment.

Alternate tightening between the three fixings.



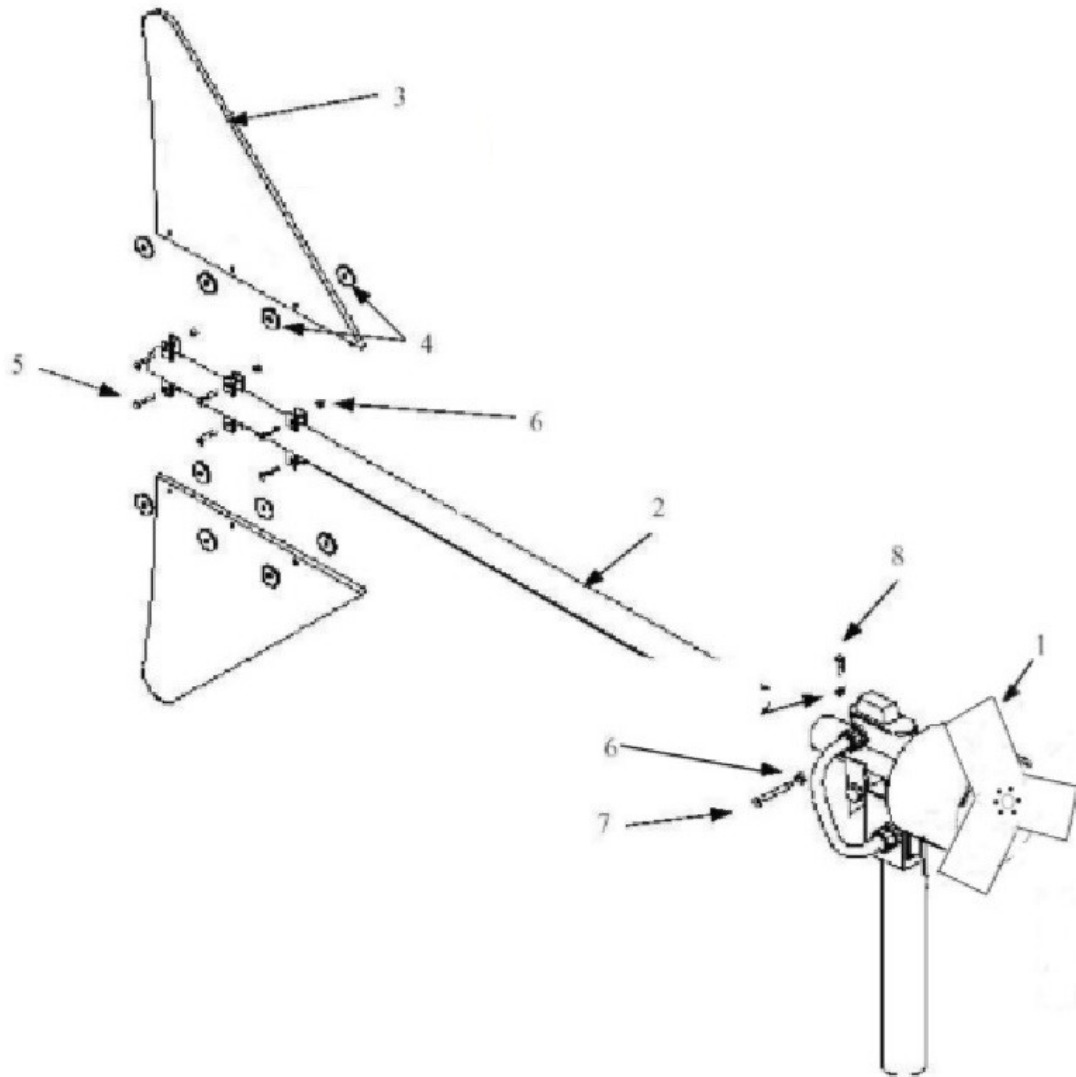
## Tail Assembly

- A) Use the nylon washer between the tail strap and the tail fin. Finger tighten the nylock nut.
- B) Use a 13mm socket and a wrench to tighten all three bolts connecting the tail strap to the tail fin.
- C) The tail fin should now be securely fastened to the tail boom and should look like the picture below.



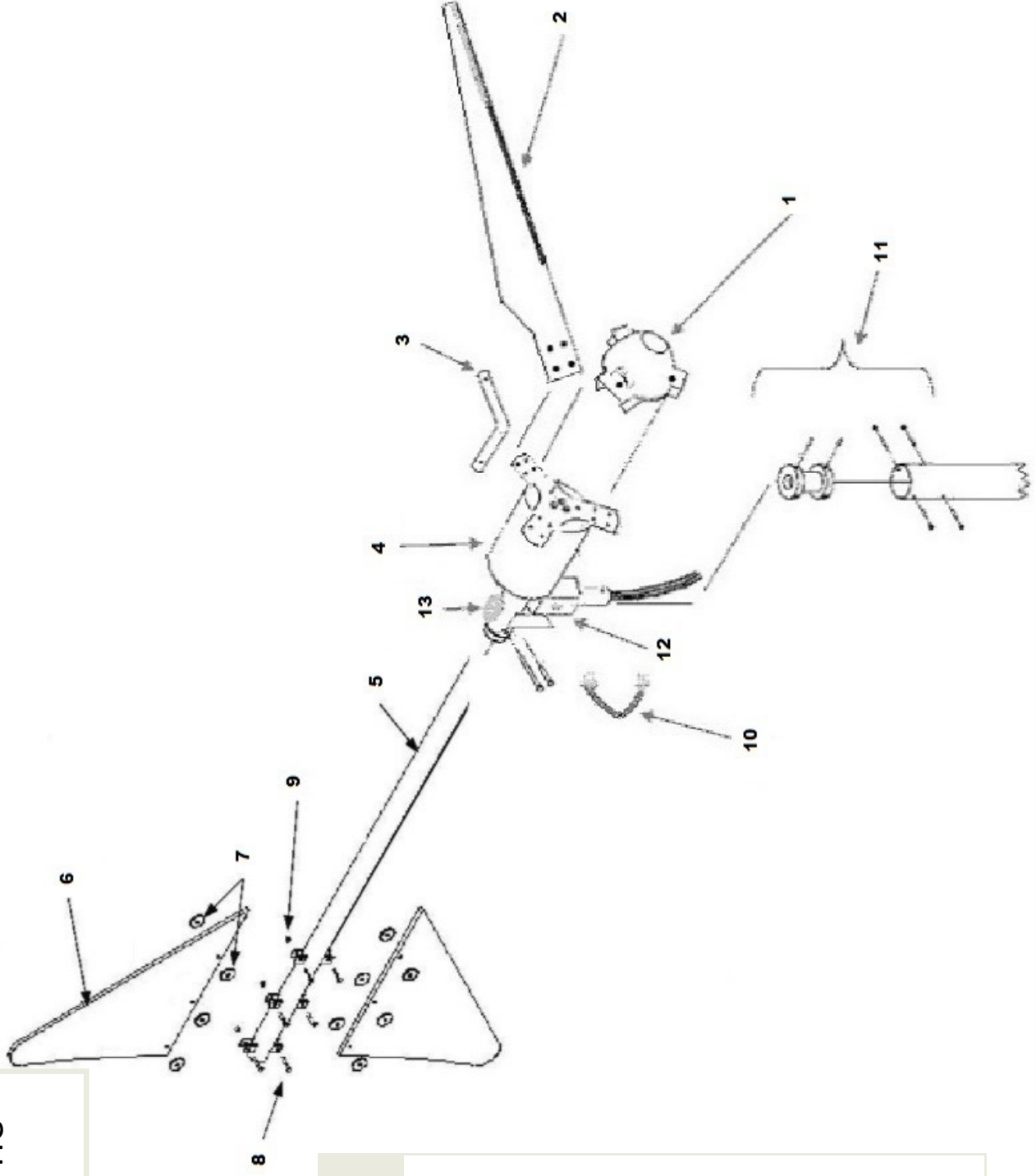
## INSTALL TAIL

### Tail Assembly SOMA 1000 Wind Generator



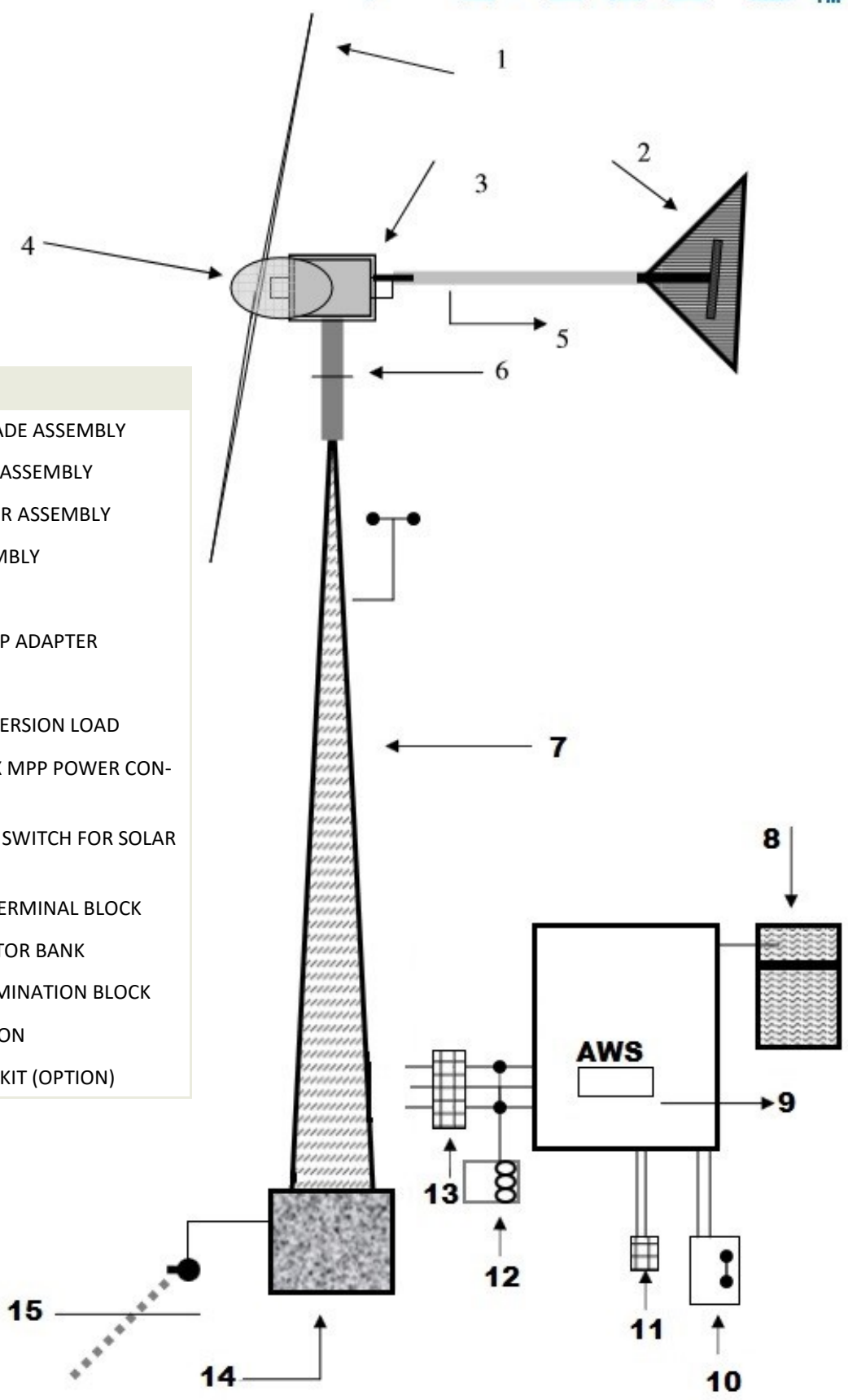
Item No	Description	Quantity
1	Assembled Unit	1
2	Tail Stalk	1
3	Tail Fin	2
4	Nylon Washer	12
5	Tail Fin Mounting Bolt	6
6	Mounting Nut	9
7	Tail Stalk Mounting Bolt	1
8	Talk Stalk Clamp Bolt	2

Typical main assembly view  
 SOMA—HC 650W, SOMA—HC  
 1.5kW,



Item	Description
1	Hub Cap
2	Rotor Blades x3
3	Blade Stiffeners
4	Alternator Assy.
5	Tail Stalk
6	Tail Fin
7	Nylon Washer
8	Tail Fin Mounting Bolt
9	Mounting Nut
10	Cable Link
11	Tower Insert Kit
12	Yaw Box
13	Wire Combination Box

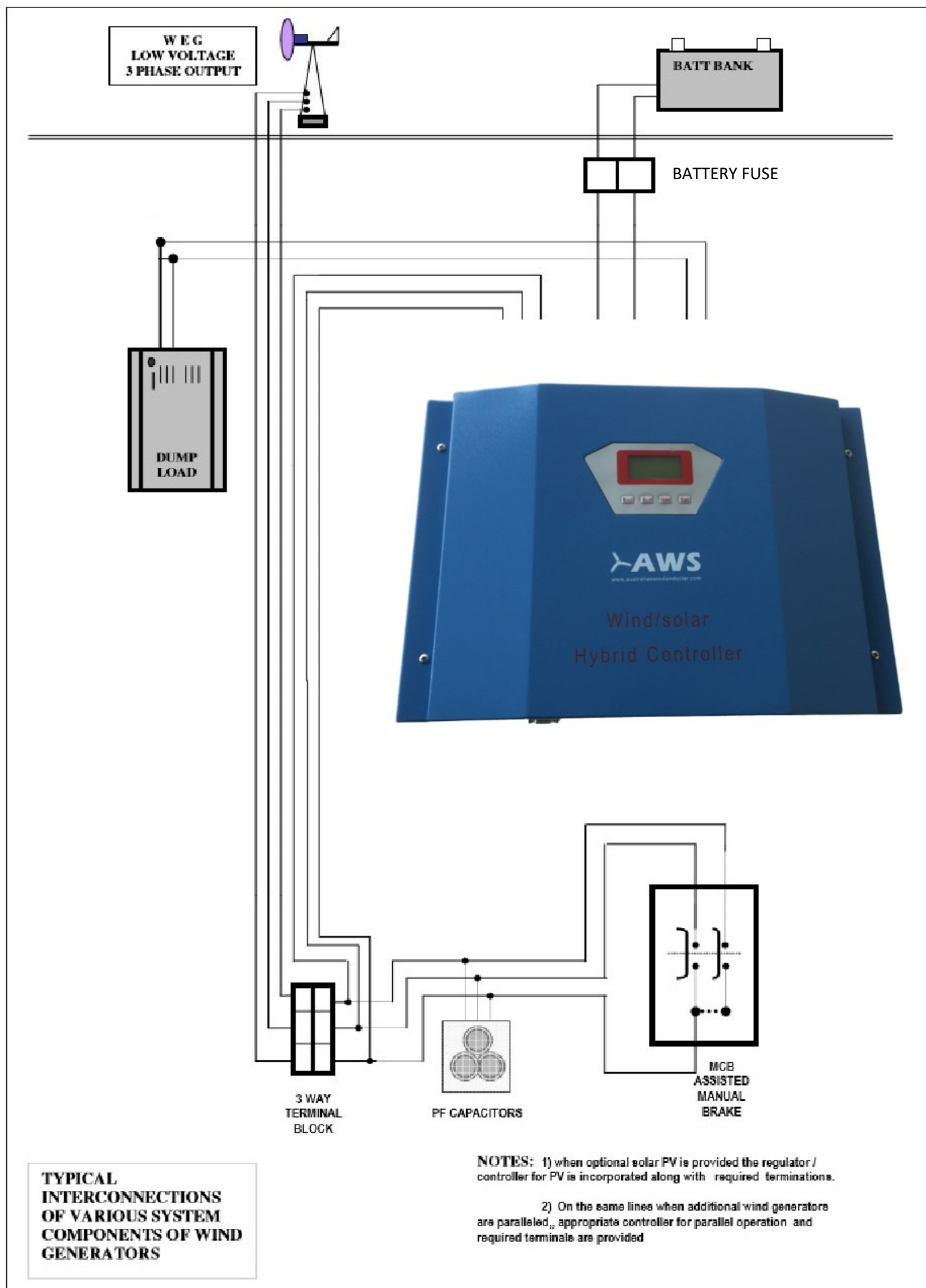
# MAIN PARTS OF WIND GENERATOR AND INTER-CONNECTIONS



SR. NO	DETAILS
1	ROTOR BLADE ASSEMBLY
2	TAIL VANE ASSEMBLY
3	GENERATOR ASSEMBLY
4	HUB ASSEMBLY
5	TAIL STALK
6	TOWER TOP ADAPTER
7	TOWER
8	DUMP/DIVERSION LOAD
9	WIND MAX MPP POWER CON-
10	TWO POLE SWITCH FOR SOLAR
11	BATTERY TERMINAL BLOCK
12	PF CAPACITOR BANK
13	WIND TERMINATION BLOCK
14	FOUNDATION
15	EARTHING KIT (OPTION)

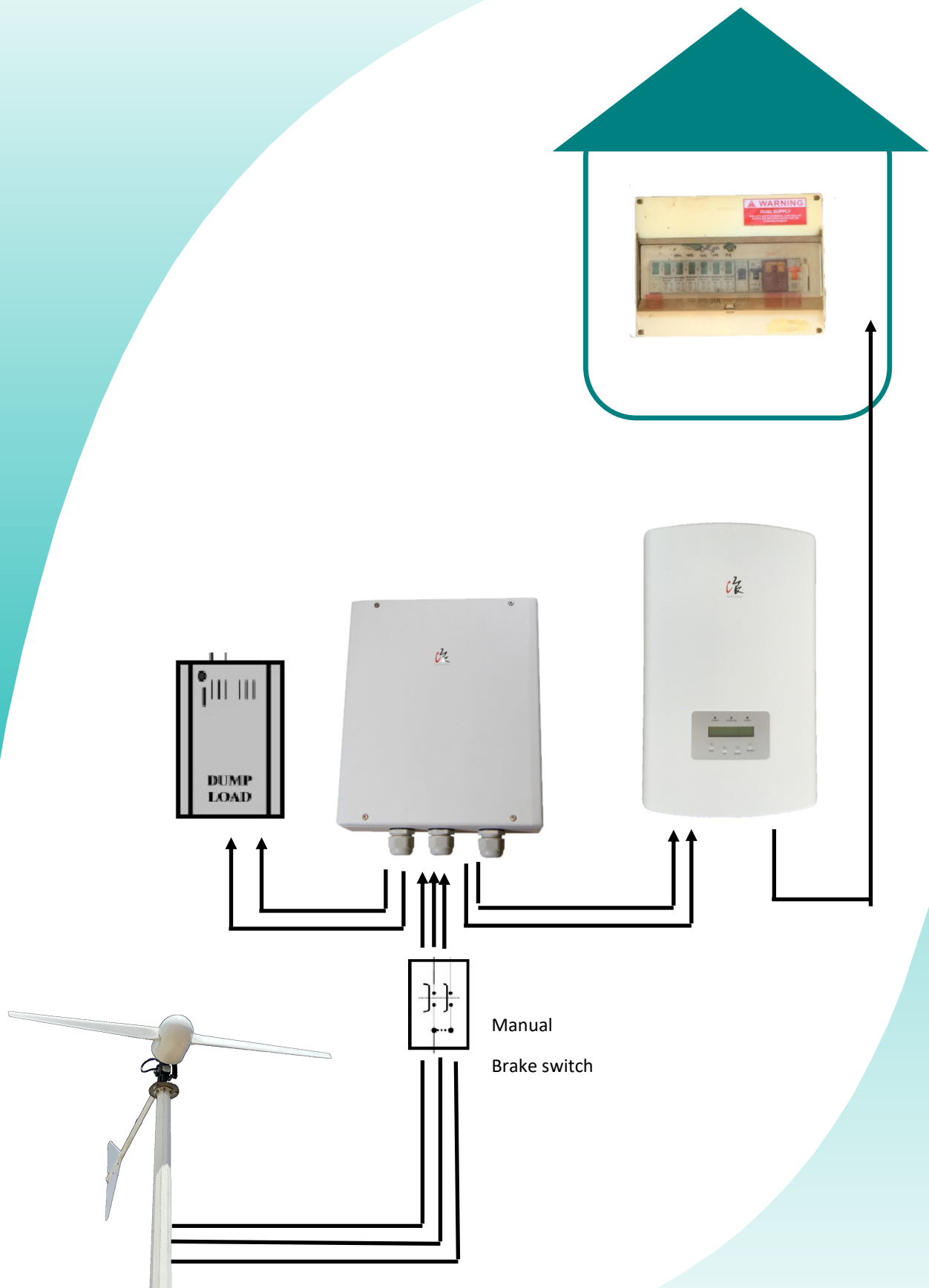
Off grid 48V system shown

# Typical Arrangement of 48V off grid system





# Typical Arrangement for Grid Connected system



# Pre-commissioning Checks

- DO NOT STAND THE TURBINE UNTIL THE FOLLOWING CHECKS ARE COMPLETE:-

1. Check all tower bolts and connections and tighten all tower bolt double nuts and spring washers
2. Check all turbine bolts and connections for correct tightness
3. Check for correct assembly
4. Check and test all electrical connections for continuity and polarity
5. Check and carefully tighten (do not overtighten) stator connection cover on turbine
6. Check and carefully press into shape stator terminal moulding, in case it has been knocked during assembly
7. Ensure Loctite has been applied to all threads
8. Inspect tower surfaces and cold gal spray any surfaces that may have been scratched during transport or assembly
9. Spin the blades by hand and apply the brake at the control room. Ensure the turbine is hard to rotate with the brake applied
10. For ON Grid systems ensure all electrical connections are completed and the Inverter has the correct power curve entered
11. For OFF Grid systems ensure all electrical connections are completed and the control system is energised and batteries are connected
12. **APPLY THE BRAKE SWITCH!**

## DOS AND DON'TS AT THE SYSTEMS CENTRE

1. Do not keep or store any inflammable materials in the control room
2. In case of OFF GRID system final output is meant for dedicated loads as far as possible don't connect any other power polluting loads which may interfere with power quality going to critical loads
3. All open circuit voltages in a high voltage system of Wind / Solar will exceed 300V AC / DC (in case of HV systems). Do not attempt to work inside control panel without proper precautions
4. In case of BATTERY CHARGING system never disconnect battery bank from the control panel. If needed, the sources have to be isolated i.e., all wind generators shall be put on brake and solar isolator in OFF position
5. To stop the wind generator with an SOMA OFF grid controller do not as a first attempt use MCB stop switch, initiate diversion loads first by depressing Esc/Enter buttons on the front panel, you may then use MCB switches to stop the turbines For ON Grid systems you must use the brake switch as detailed in instruction 7
6. If the wind speeds are not very high wind generator will come to a standstill within 20 seconds
7. If the wind generator does slow down or STOP (especially during high winds) do not leave MCB "on" for more than 20-25 seconds, release MCB and wait for wind speed to drop, or re-attempt after a gap of 20-25 seconds, follow this cycle till the turbine comes to halt or slow spin, sometimes RPM drops during furling, wait for this opportunity
8. It is a good practice to have additional MCB at the base of the tower itself, this will enable to STOP wind generator in case there is a cable fault between tower base and Controller
9. In case of any major problem inside the control panel
  - A) Follow instruction 5
  - B) Isolate solar Power in case of Hybrid system
  - C) Disconnect Battery or input of Grid tie inverter, preferably +ve terminal and call for Service assistance
10. Keep control panel door key within access to all authorized personnel
11. Keep flooring of control room dry and clean

## START UP PROCEDURE

**START up operation:** When the wind turbine is new, in wind speeds below 3 – 3.5 m/s the propeller will not start from a *dead stop*. For wind speeds above 3.5 m/s the propeller will begin slowly and after 1- 10 minutes, depending on wind speeds, it will reach an RPM where blades are nearly invisible otherwise known as “operating as Aerofoil” - about 100 RPM. Once started the propeller continue to operating in winds as low as 2 m/s, with usage start up performance drastically improves, it takes about 900 to 2000 hours of continuous operation for the bearings of the generator shaft “broken in “. After this the propeller will start from as low as 2.5 – 2.7 m/s.

After the **running in** period as described above, charging will begin at as low as 2.7 – 3.0 m/s and increase rapidly with increasing wind speeds.

**Shut down Operation:** There are no mechanical brakes in small turbines. Complete furling as described earlier will reduce the RPM, the PWM Shunt also activates diversion loads complimenting mechanical furling, if the wind speeds are not very high the rotor may cease to operate as Aerofoil and come to a slow spin. The wind generator can be stopped by MCB assist STOP/BRAKE switch. This action over excites the alternator windings in turn offer very high counter resistance for propeller to remain in “Aerofoil Mode“. Under normal winds the propeller rapidly comes to a halt. Once stopped the propeller will not spin even under very strong cyclonic winds. At the most it may run very slowly say 5 to 6 RPM, however under strong winds propeller will not come to a halt easily. The MCB can be kept on for about 30 – 40 seconds max without any damage, several 30 – 40 second cycles may be needed to stop the turbine. In the case of the rotor do not stop wait for the rotor furl as this will bring down the RPM. Seeing the right opportunity the MCB may be operated to bring the turbine to slow spin, monitoring the RPM / Hz display will be useful while operating MCB stop switch.

- To stop the wind generator with an SOMA OFF grid controller do not as a first attempt use MCB stop switch, initiate diversion loads first by depressing Esc/Enter buttons on the front panel, you may then use MCB switches to stop the turbines For ON Grid systems you must use the brake switch as detailed in instruction 7 of DOS AND DON'TS AT THE SYSTEMS CENTRE.
- If the wind speeds are not very high wind generator will come to a standstill within 20 seconds
- If the turbine stops within 30-40 seconds it may be left on otherwise release immediately and re-attempt after a gap of 15- 20 seconds, follow this cycle till the turbine comes to halt or slow spin

# Energising

1. Ensure you have completed the Pre-commissioning Checks
2. Ensure the brake switch is ON
3. Stand the turbine and insert and tighten ALL remaining tower fixings
4. Ensure the tower is plumb
5. Remove any winches or equipment no longer required
6. Energise the grid controller/inverter or off grid controller
7. Wait until system is ready and controllers are ready
8. DO NOT release the brake until you have confirmed the off grid or on grid system is energised and ready to receive power
9. DO NOT operate the system without the dump load connected or tested
10. Read the Dos and Don'ts procedure
11. Read the Start Up and Shut Down procedure
12. When ready, release the brake
13. In the event of any unexpected operation, apply the Shut Down procedure

## **RAISE TOWER AND BEGIN GENERATING ELECTRICITY FROM THE WIND**

Raise the tower with the brake switch engaged. Follow the tower manufacturer's instructions. After the tower is securely raised and all system connections are double checked, turn off the brake switch and begin generating electricity from the wind.

**IMPORTANT:** Do not turn on the wind generator if the batteries are not connected to the controller.

**IMPORTANT:** The battery bank must have some charge on it for the wind generator to begin charging (ie do not connect a dead battery to the wind generator).

Refer to the **Controller Section** to become familiarised with the operation of the controller.

**Operation of the wind generator propeller (when the machine is new):** In winds below ~3.5m/s (6-8mph) the propeller will not start from a dead stop. In wind above 3-4m/s (7-9mph) the propeller will begin to turn slowly and after 1-10 minutes depending on the wind, it will reach an RPM where the blades are nearly invisible. Once started the propeller will continue operating in winds as low as 2m/s (4mph). With usage the start-up performance drastically improves.

In normal winds the charging current will begin in winds as low as 3m/s (7-8mph) and increase rapidly.

## MAINTENANCE checks- Bi-Monthly

### 1a) TEST BRAKE

*(This checks electrical wiring)*

STOP THE WIND GENERATOR IN A MODERATE WIND  
(CHARGING BUT NOT FURLING)

No unusual difficulty or noise should be experienced in stopping the propeller. A noise during braking can indicate a disconnected wire or problem inside the controller such as open circuited diode or loose contact of one of the wires from the wind generator

### b) BATTERIES

Inspect electrolyte levels, check Specific Gravity, check voltages of each battery, preferably number each battery and maintain a record for future use, it helps to identify deteriorating battery easily, take the battery readings under lightly loaded conditions

### 2. INSPECT THE TOWER

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. check for any sway in the towers, inspect for loosened tower hardware, in case of guys check for sags, all guys must be adjusted to nearly same tension, under marine climatic conditions it essential to look for corrosion and pitting of surfaces, immediately treat with anti rust protectors, PU coats, Marine grease etc., many times scratches during transportation / installation will not come to light immediately

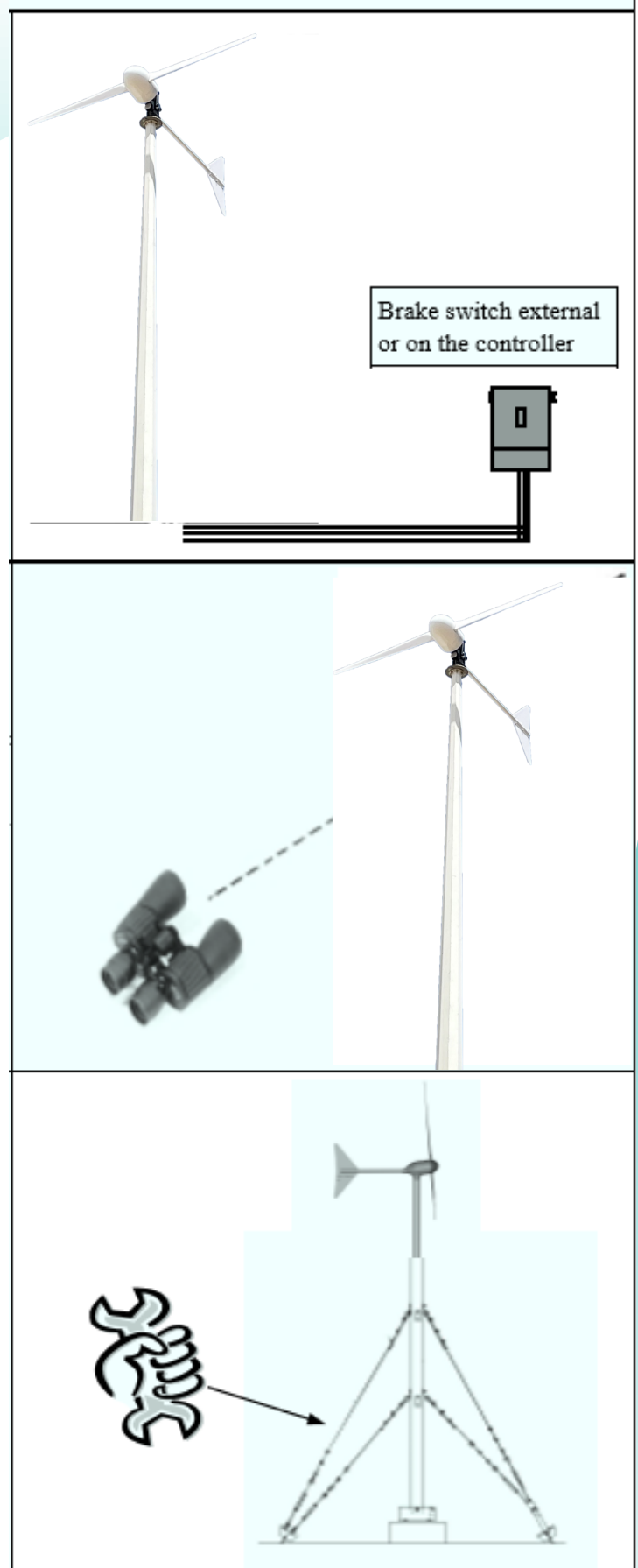
### 3. CHECK MECHANICAL CONDITION WATCH AND LISTEN FROM THE TOWER BASE

Use binoculars. Under normal operating conditions i.e., wind direction reasonably steady there should be no undue mechanical noise, rattle or vibration. The propeller and tail must not wobble must not wobble excessively. Lower or climb the tower for inspection, (after stopping the wind generator!!) if indicated. There should be no buzzing either heard or felt with your hand on the tower mast. Go to Electrical Problems if everything checks out.

### 4. CLEAN AND REALIGN (if needed)

#### SOLAR PANELS

Dust, bird droppings can affect the performance, a thorough and frequent wash helps to restore performance



## ANNUAL MAINTENANCE

### 1. CHECK THE BATTERY

Add only distilled water if low. Tighten battery connections. Remove corrosion and protect terminals. Wipe tops with baking soda solution, a good coat of battery terminal protector is recommended, preferably GEL or conformal coats give long lasting results

### 2. BATTERY EQUALIZING CHARGE (IF NECESSARY)

An equalizing charge may not be necessary if the float voltage / lightly loaded batteries show nearly same reading. If batteries are discharged for long periods or cell hydrometer readings differ by more than 20 points (e.g., 1205 verses 1230) or one cell is weak, give the battery an equalizing charge. Hydrometer available at auto parts store.

Equalize the battery cells by placing the FLOAT VOLTAGE SETTING TO 2.7-2.8V\* and permit the battery to become full and gassing freely (disconnect load and/or run generator, if necessary). Let battery charge for at least 24 hours and take hydrometer readings. Equalization is complete when hydrometer readings are within 20 points. Monitor water level and reduce charging to prevent battery from becoming more warm see boxed instructions.

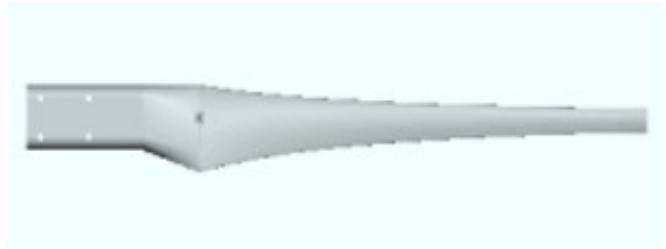
### 3. BLADES AND GENERATOR

Lower tower and give wind generator complete mechanical check, fix or replace loose or worn parts

- a) Check tightness of all tower mounting nuts and bolts and propeller mounting bolts.
- b) Check all bearings. Just perceptible play is acceptable.
- c) Clean the propeller with mild scrubbing agent to remove all insect deposits. Replace missing leading edge tape. Fill small surface cracks on fiberglass blades with white silicone sealant. If found beyond repair replace with new set of blades.
- d) Keep blades for at least 24 hours for curing, refinish with '0" paper meant for wooden surfaces and give a fresh coat of epoxy paint if possible
- e) Instructions "c" and "d" are for minor defects only if the damage is perceptibly more, it is better to replace with new set of blades, please get in touch with your dealer.



Clean blade and replace missing blade tape on the leading edge



## BRUSHES AND BRUSH HOLDERS

### SOMA-HC 650W, SOMA-HC 1.5kW and SOMA-HC 1.8kW:

Disconnect the wiring harness in the wiring box, disconnect cord grip nuts and remove the lower frame cord grip body. Remove the four screws retaining the brush card and pull the card and attached wiring harness away from its opening.

Check slip rings which should be a dark colour and not pitted. Check for continuity and shorts to ground. Clean with mineral spirits and sand lightly to remove pitting or fretting. Yaw bearings should be smooth with just perceptible play.

Brushes on **SOMA-HC 650W, SOMA-HC 1.5kW and SOMA-HC 1.8kW** are copper/graphite pads soldered to a beryllium spring and should show 50% or more surface contact. Pads should have a minimum thickness of 1.5mm (1/16in) at the thinnest point and not be pitted or badly scored. Polish pads with fine sandpaper and clean all parts. Mounting screws carry electric power and mating surfaces must be clean and screws tight. Align brushes as shown.

Reassemble in reverse order.





**Table: Symptoms and Trouble Shooting**

Symptom	Possible Cause	Correction
1. Propeller is stationary, even in high winds	<ul style="list-style-type: none"> <li>a. Ice in generator, or uneven ice on propeller</li> <li>b. Debris between rotor and stator</li> <li>c. Loose or high magnet</li> <li>d. Bad bearing</li> </ul>	<ul style="list-style-type: none"> <li>i. Wait for warm weather</li> <li>i. Turn propeller gently by hand and blow or use piece of paper to dislodge debris</li> <li>i. Remove rotor and re-glue magnet (order glue kit from World Power)</li> <li>i. Replace bearing</li> </ul>
2. Propeller will not turn at all except in high wind, scraping or rubbing sound at low rpm, always stops at same propeller position	<ul style="list-style-type: none"> <li>a. Same as above, except more likely to be high magnet or bad bearing.</li> <li>b. Swelled wire keepers due to high moisture</li> </ul>	<ul style="list-style-type: none"> <li>i. Same as above</li> <li>i. Contact factory. Stator needs re-varnishing.</li> </ul>
3. Propeller is harder starting, out put is lower & there is more propeller noise than usual. Seems out of balance.	<ul style="list-style-type: none"> <li>a. Ice on propeller</li> <li>b. Dirty propeller</li> <li>c. Eroded leading edge or damaged leading edge tape</li> <li>d. Split, warped or damaged prop</li> <li>e. one or more blades on backwards</li> </ul>	<ul style="list-style-type: none"> <li>i. Prop will eventually shed ice, leave running unless excess vibration</li> <li>i. Clean with soap or bug cleaner</li> <li>i. Refinish prop and replace tape</li> <li>i. Replace or repair propeller</li> </ul>
4. Propeller turns a little, never starts	<ul style="list-style-type: none"> <li>a. Blades on backwards. (See blade installation)</li> </ul>	<ul style="list-style-type: none"> <li>i. Turn blades over. Leading edge advances clockwise from upwind view.</li> </ul>
5. Tail, generator and tower vibrate or shake at all or some wind speeds	<ul style="list-style-type: none"> <li>a. Propeller out of balance</li> <li>b. Propeller not tracking</li> <li>c. Rotor (magnet can) out of balance</li> <li>d. blade plate out of balance</li> </ul>	<ul style="list-style-type: none"> <li>i. Balance or replace propeller</li> <li>i. Replace mounting plate</li> <li>ii. Shim at mounting bolts</li> <li>iii. Replace propeller</li> <li>i. Send to factory or balancing shop</li> <li>i. Send to factory or balancing shop</li> </ul>
6. Rattle or clunking from generator	<ul style="list-style-type: none"> <li>a. Generator loose in tower</li> <li>b. Loose rotor (magnet can) on shaft loose tail, missing rubber bumper, wires slapping inside of mast, governor pivot bolt loose</li> <li>c. Worn bearings</li> <li>d. Shaft (spindle) broken</li> </ul>	<ul style="list-style-type: none"> <li>i. Retighten mounting hardware, use lock tight or equivalent</li> <li>i. Repair as required</li> <li>i. Replace bearings</li> <li>i. Replace shaft (spindle)</li> </ul>



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## Australian Wind and Solar Congratulate you on your purchase!

Thank you for your purchase of SOMA Wind Turbine. You have purchased one of the most advanced wind turbines in the world! We believe you will find it easy to install. We are confident you will experience years of dependable service from it.

Before going any further please complete the **Warranty Registration Card** or **Warranty Service Card** and return it by email to [admin@australianwindandsolar.com](mailto:admin@australianwindandsolar.com). (Note: Australian Wind and Solar does not sell or distribute your personal information to any third party. We understand and respect your privacy.)

If you have any questions or comments we would like to hear from you. Please call 1300 736 458 or email us.

Welcome to our SOMA family and thank you for investing in the future of wind energy with Australian Wind and Solar.

Warranty Register Card	
Client Name	
Model Number	
Installation Date	
Installation Location	
Other Requirements	<i>Send at least three photos of the working wind turbine</i>

Warranty Service Card	
Client Name	
Model Number	
Installation Date	
Application Procedure	Phone Number:
	Email:
Problem Description	
Total Work Period	
Other Requirements	<i>Send at least three photos of the wind turbine's current state</i>

