

Operating Instructions

Wind Turbine

Item No.: 3348509 (FN500W 48V)

Item No.: 3348510 (FN500W)



CE

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1. PRODUCT OVERVIEW

This wind turbine provides an energy solution for both on and off-grid applications for locations with medium to high wind speeds.

This product can be added to any existing system (e.g., solar power system) to supplement charging and energy production.

Applications include, but are not limited to:

- Off-grid and hybrid household power systems
- Power for remote locations
- Telecommunications and power station equipment
- Power for industrial sites
- Lighting, farming etc.

This product has been specifically engineered to maximise power generation whilst adhering to the highest standards of safety. In addition to the standard braking and safety features, this wind turbine also includes an innovative *aerodynamic breaking tail mechanism*, which forces the turbine to move away from the wind direction at high winds to reduce the speed of rotation and prevent damage to the turbine.

2. DESCRIPTION OF SYMBOLS



The symbol warns of hazards that can lead to personal injury.



The symbol warns of dangerous voltage that can lead to personal injury by electric shock.

3. SAFETY INFORMATION

Read the operating instructions carefully and especially observe the safety information. If you do not follow the safety instructions and information on proper handling, we assume no liability for any resulting personal injury or damage to property. Such cases will invalidate the warranty/guarantee.

3.1 Electrical installation

WARNING! Safety Hazard!

The product should only be installed by people with relevant electrical knowledge and experience! *)

If it is not installed properly, you risk:

- your own life
- the life of user of the electrical device
- severe damage to property, e.g., by fire
- personal liability for personal injury and material damage

Always consult an electrician!

*) Technical knowledge required to perform the installation:

For the installation, the following specialist knowledge is required in particular:

- The “Five safety rules”: Disconnect from the mains; protect against accidental switch-on; ensure there is no voltage; earth and short-circuit; cover or protect adjacent live parts
- Use of suitable tools, measuring devices and personal protective equipment, where necessary
- Analysis of measurement results
- Use of electrical installation materials to meet the requirements for disconnection
- IP protection ratings
- Installation of electrical installation materials
- Type of power supply (TN system, IT system, TT system) and the corresponding connection criteria (classic earthing, protective earthing, necessary additional measures etc.)

If you are not a professional, do not do it yourself, have it performed by a specialist.

3.2 Battery installation



Risk of electric shock. The current when charging the batteries can reach more than 30A. Never short-circuit the battery.

- Always provide enough ventilation for batteries.
- To minimize installation risk and reduce power loss, keep wire lengths as short as possible by mounting all system components close to the batteries.

3.3 Mechanical risk



Rotating blades can cause severe injury in high wind conditions.

- Always keep clear of the turning blades in all circumstances.
- Never try to touch the turning rotor system.
- Never try to stop the turning rotor system manually.
- Blades can break due to ropes or other objects touching them in very strong winds.



If one of the blades is damaged, activate the brake function on the controller! Refer to the controller operating instructions for information about how to do this.

3.4 Installation



(Where applicable) to stop the blades from spinning, use the brake function on the charge controller or fix the blades to the mounting rod (e.g., using a rope).

- Avoid installing the wind turbine on a windy day.
- Wear appropriate gloves and other protective wear.
- Never open the turbine enclosure or disassemble the turbine.
- Follow all precautions and requirements for works at height.
- The wind turbine tower pole must be installed with a separate grounding conductor.

3.5 Operation



WARNING

Risk of electric shock!

Never work on the system when turbine blades are spinning and charging is in progress!

Always disconnect the product from the power source before performing any installation, maintenance, or repair work.

(Where applicable) secure the blades with rope before connecting any wires.

If in doubt, consult a qualified professional. Incorrect installation can permanently damage the charge controller, rechargeable batteries, and the wind turbine.



Do not disconnect the turbine from the controller/inverter during high winds or severe weather. Disconnecting disables the brake mechanism causing the wind turbine to start rotating abnormally fast. This can lead to overheating and damage.

- Before severe weather, lower the tower or remove the turbine/blades to prevent damage. Do not rely solely on tail furling in extreme conditions.
- Stay at least 7 m away from the wind turbine while it operates (e.g., for a 6 m pole).
- Before severe weather (e.g., storms or hurricanes), lower the tower or remove the turbine/blades to prevent damage. Do not rely solely on tail furling in extreme conditions.

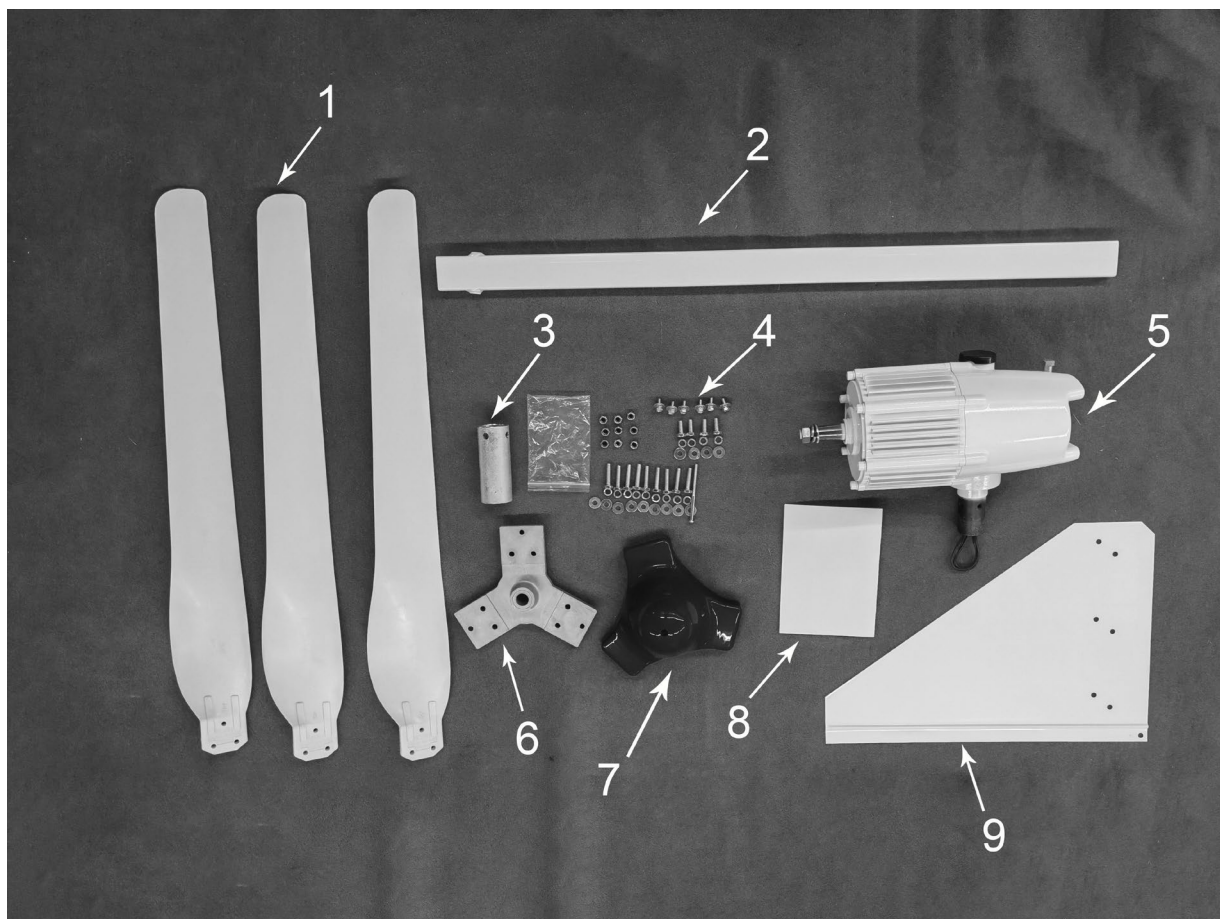
3.6 Disassembly

1. Activate the brake function on the controller and prevent the blades from spinning using a rope or similar.
2. Disconnect the wires.
3. (If applicable) Cover the solar panels and disconnect them from the charge controller.
4. Disconnect the rechargeable battery.

4. PACKAGE CONTENTS

Important: Upon receipt of the item package, confirm that all items are present and in good condition.

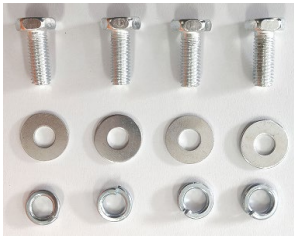
Part	Quantity
Turbine (lead wire length is 15cm)	1
Wind blades	3
Flange	1
Front cover	1
Rod	1
Tail plate	1
Fastener	1
Metal sleeve	1
Manual	1



- | | | |
|-----------------|--------------------------|----------------|
| 1. Fan blades | 4. Fasteners (see below) | 7. Front cover |
| 2. Rod | 5. Turbine | 8. Manual |
| 3. Metal sleeve | 6. Flange | 9. Tail plate |

Fasteners:

Item/Specification	Quantity	Photos
M6x85 cross screws Ø6 spring washer	1 Set	
M8x16 Hexagonal cross combination screws	6 Sets	

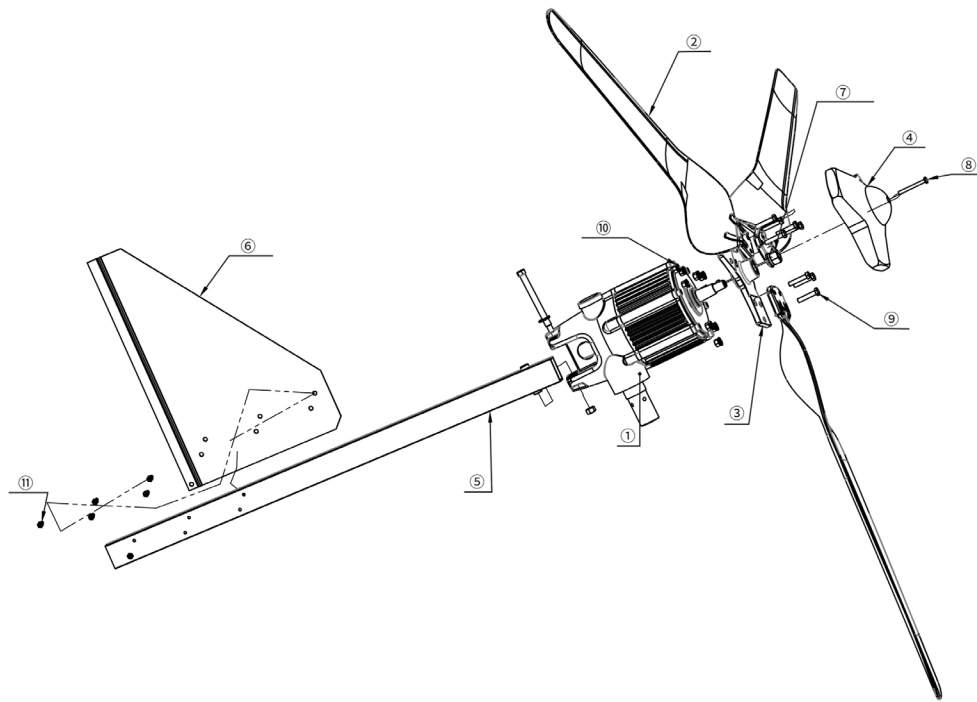
M8x20 Hexagonal screws Ø8 Flat washers Ø8 spring washer	4 Sets	
M8x35 Hexagonal screws Ø8 Flat washers Ø8 spring washer M8 nylock nuts	9 Sets	

5. OVERVIEW

5.1 Wind turbine



5.2 Exploded parts



- | | | |
|----------------|---|---|
| 1. Turbine | 6. Tail plate | 9. Wind blades fixing screw |
| 2. Wind blades | 7. Flange fixing nut, flat washers, spring washer | 10. Wind blades fixing nut, flat washers, spring washer |
| 3. Flange | 8. Front cover fixing screw | 11. Tail plate fixing screw |
| 4. Front cover | | |
| 5. Rod | | |

6. TECHNICAL DATA

Specification	Unit	Data
Rated output power	W	500
Start wind speed	m/s	2.5
Rated wind speed	m/s	11
Rotor diameter	m	1.9
Number of blades	pieces	3
Net weight	Kg	21.8
Machine length	mm	1400
Matched system DC voltage	V	DC48
Noise	dB(A)	65
Blade material		high strength composite
Hub		die-cast aluminum
Turbine style		permanent magnet AC turbine
Brake protection		magnet brake, tail tilted speed limitation
Drive type		Direct drive
Body material		die-casting aluminum/aluminum
Mounting option		Metal pole (not included)
Paint		Weather-resistant (multi-layered application)

7. INSTALLATION



WARNING

Risk of electric shock!

Never work on the system during charging!

Always disconnect the product from the power source before performing any installation, maintenance, or repair work.

(Where applicable) secure the blades with rope before connecting any wires.

If in doubt, consult a qualified professional. Incorrect installation can permanently damage the charge controller, rechargeable batteries, and the wind turbine.

7.1 Installation location

The selection of a wind turbine installation location affects the performance. Ideal positioning involves maximising the tower height, wind speed and distance from obstacles, whilst minimising the distance from the controller, inverter or battery bank.

- Installation is affected by the following factors:
 - Pole /tower height
 - Distance from the controller, inverter or battery bank
 - Obstacles such as buildings and trees
- Wind speed increases with height; install turbines at elevated locations for maximum efficiency.
- Install the turbine in an unobstructed area where the wind wheel center is at least 6 meters above ground level.
- For roof installations, ensure the wind wheel center is at least 2 meters above any barrier to avoid wind blockage.
- Turbulence caused by obstacles (e.g., buildings, trees) reduces efficiency and poses risks to turbine operation.
- Select flat, open terrain with unimpeded airflow. Around the tower:
 - No obstacles taller than 8 meters within a 100-meter radius.
 - No obstacles taller than 3 meters within 30 meters.
 - If close to obstacles, ensure the tower height is at least twice the height of the obstacle.
- Position the tower so that the turbine blades face windward, to maximize efficiency.
- Install the turbine on solid ground to ensure stability. If the foundation is weak, reinforce it appropriately.
- Install turbines away from transmission and communication lines. Follow local regulations and safety requirements.
- Choose a location that allows for easy observation and maintenance access.

7.2 Installation steps

- Recommended mounting height: 6 m
- Recommended wall thickness for mounting iron Rod: $\geq 4\text{mm}$
- Recommended diameter of mounting irons: $\geq 140\text{ mm}$

Mounting and installation

1. Use a suitable iron rod to weld the accessory sleeve onto (dimensions of the accessory sleeve can be seen in the Figure1).
2. Tube is 120 mm length, weld this tube at 40 mm height of tower, set aside height of 80 mm.
3. Install the turbine head into the tower tube (see Figure 2)

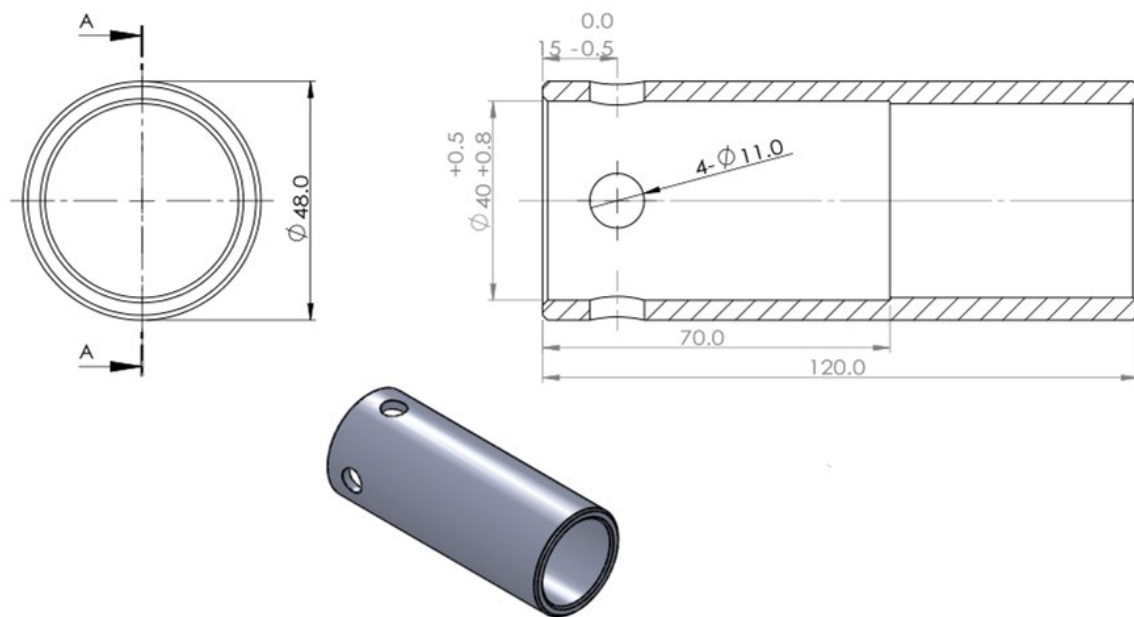


Figure1

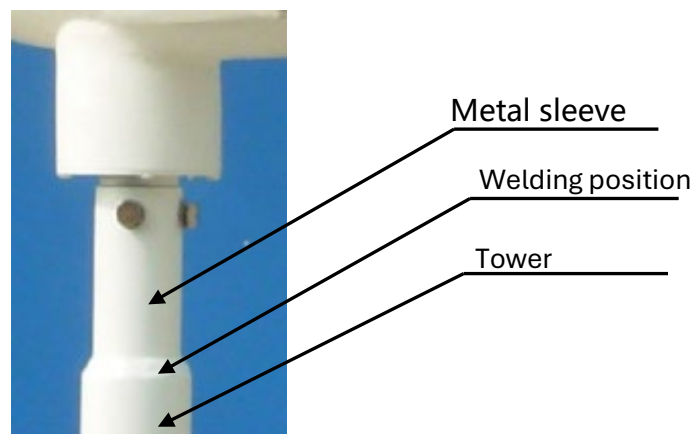


Figure2

1. A reinforcing side brace should be installed (e.g., to provide additional structural stability, support wind load resistance, and dampen vibrations). (see Figure 3).

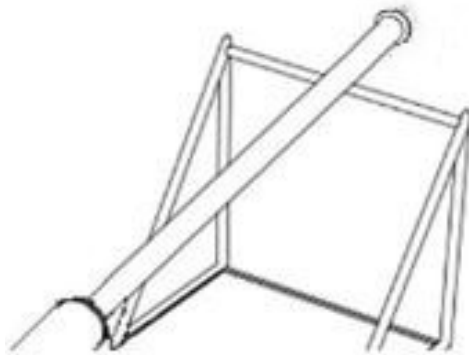


Figure 3

Wiring

1. The wiring should be routed through the main tower pole.

NOTE: For further information: See section “7.3 Connection > Wire routing.”



The wind turbine tower pole should be installed with a separate grounding conductor.

The three-phase wires must be short circuited during installation to prevent the turbine from turning.

2. Connect three wires of wind turbine and tower poles, wrap with insulating tape, and route the cable through the inside of the tower tube (see Figure 4)
3. Connect the turbine to the tower pole with M8x20 hex screws and spring washers (see Figure 5).

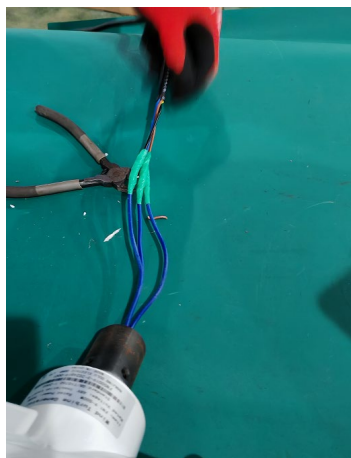


Figure 4



Figure 5

Attach the turbine blades

Make sure the blades are installed in the correct orientation and pre-lock with M8x35 hex screw and nylock nuts (blades and screw direction as shown in Figure 6).

NOTE The blades must be balanced when installing. For example, the distance between the blades tips should be equal ($L1=L2=L3$) $\pm 5\text{mm}$, and then tighten the bolts (see Figure 7).



Figure 6

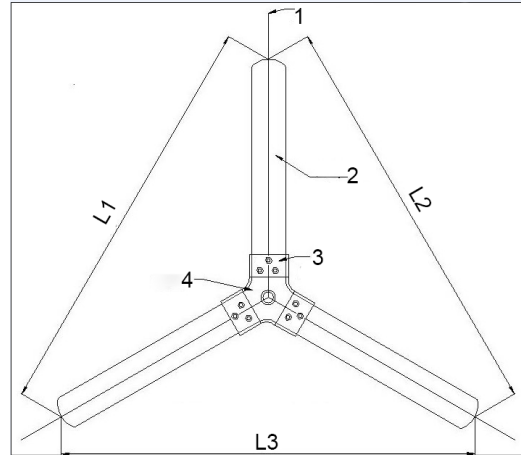


Figure 7

1. Center line

3. Bolt and nuts

2. Wind blade

4. Flange

Mount flange to rotor shaft

1. Attach the flange with the M16x1.5 nut, flat washers and spring washer (see Figure 8).



Figure 8



Figure 9

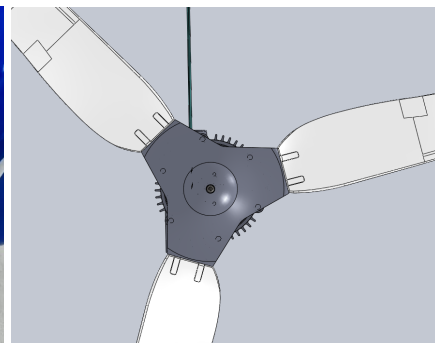


Figure 10

2. Attach the front cover to the rotor shaft with M6x85 cross screws and spring washer (see Figure 9 and 10)

Attach tail

1. Assemble the tail plate and rod direction as shown Figure 11, with M8x16 Hexagonal cross combination screws, flat washer, and spring washer.

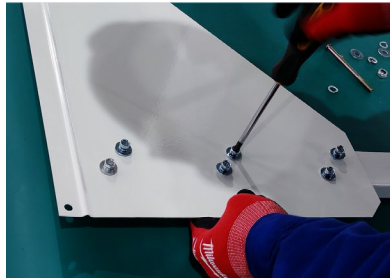


Figure 11

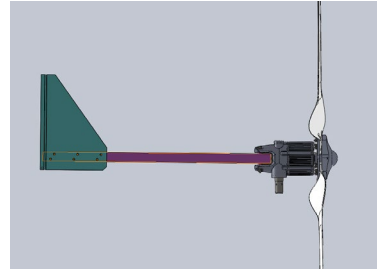


Figure 12

2. Take apart the tail rod pre-lock screw and install the tail rod, the direction as shown in Figure 12, the screw is assembled from the top and down and lock tightly with nuts.



The three-phase wires must be short circuited during installation to prevent the turbine from turning.

8. CONNECTION



The wind turbine tower pole should be installed with a separate grounding conductor.

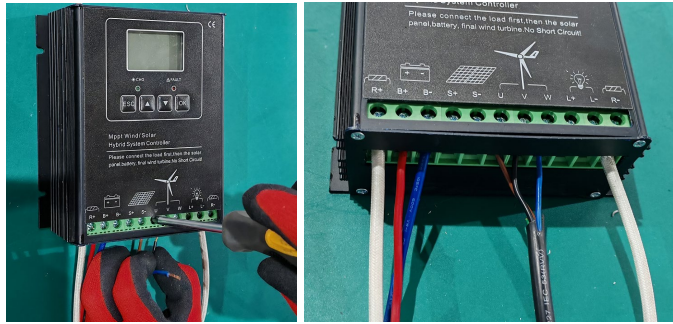
8.1 Charge controller

- When connecting the wind turbine to a charge controller, refer to the charge controller operating instructions.

NOTE: A general recommendation is that the charge controller should be connected to the battery first, before the wind turbine is connected to the controller.

- Connect the three output wires of the wind turbine to the controller wind terminals.

NOTE: The output of the wind turbine is 3 - phase AC, with no specific polarity, so the order of connection of these three wires is not important.



8.2 Inverter

- Always follow the inverter manual and technical documentation.
- Extend the wires from the wind turbine to the controller /inverter. To attach the extension cable to the wind turbine wires, recommended connection methods (soldering, butt connectors or a screw terminal block) . Ensure three wire joints are appropriately insulated.

8.3 Wire routing

- Normally wind turbine cables run inside the wind turbine pole / tower. If there is a risk that the joints between the extension cable and the wind turbine wires would be exposed to water, humidity or condensation, use a connection method which provides a good environmental seal (e.g. adhesive lined heat shrink over soldering, butt connectors with heat shrink, non- crimp solder sleeves with heat shrink, waterproof cable joint covers etc.).
- Avoid using plugs and sockets for connection, unless they are waterproof and can be securely fixed when joined together.
- Make sure the extension cables do not hang down on the connection point with all their weight. Fix the extension cables to the wind turbine pole mechanically in multiple locations.
- It is recommended that any cables or wires at risk from outdoor exposure damage are sheathed with conduit for protection.

8.4 Battery



Install a fuse between the controller and the battery positive pole, as close as possible to the battery.

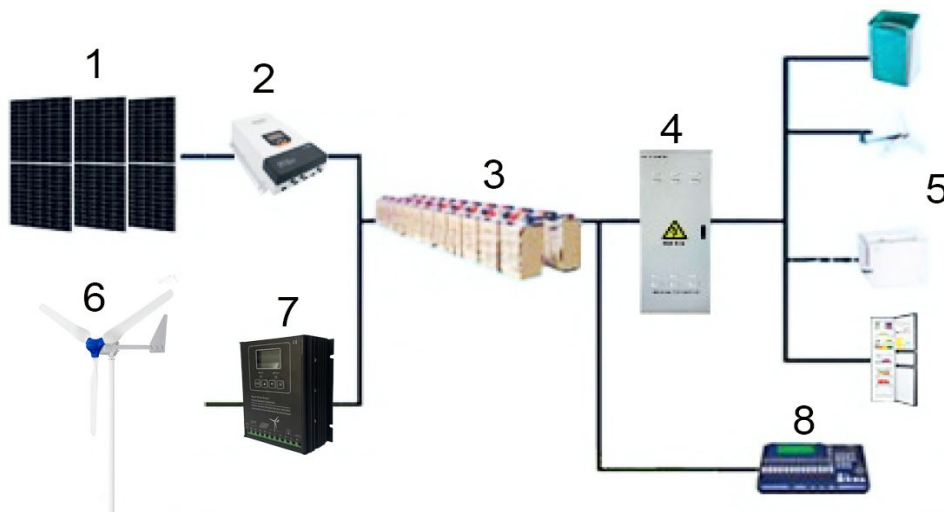
- Connect the controller to the battery with correct polarity (red = positive, black = negative). Reversed polarity will damage the controller.

9. CABLE SPECIFICATIONS

- Appropriately rated wires must be used to minimize power losses caused by cable resistance.
- Cable thickness relates to wind turbine size and distance to the controller or inverter.
- Insulation quality, flexibility, and resistance to environmental factors should be considered. Corrosion can be reduced by using tinned copper cables, and cable conduits are recommended to prevent damage or movement.
- The table below lists the minimum copper wire diameter based on current levels. The actual cable size must be equal to or greater than these values:

Installation distance	0-30 m	30-60 m	60-90 m
Cable specifications	3x2.5 mm ²	3x4 mm ²	3x6 mm ²

10. CONNECTION DIAGRAM



- | | |
|---------------------------|----------------------------|
| 1. Solar panel(s) | 5. AC unloader |
| 2. Solar controller | 6. Wind turbine |
| 3. Rechargeable batteries | 7. Wind turbine controller |
| 4. Inverter | 8. DC unloader |

11. TROUBLESHOOTING

Problem	Possible cause(s)	Solutions
Wind turbine vibration	1.Nuts on fixed blades loose 2. Damaged blade 3.Debris attached to blades causing imbalance	1.Tighten loose parts 2.Replace blades 3.Clear attachment
Abnormal noise	1. Loose parts 2. Damaged turbine bearings 3. Friction between parts	1. Tighten loose parts 2.Replace bearings 3. Check all connections
Slow rotor rotation	1.Stator and rotor friction 2.Stator winding short circuit or output short circuit 3.Controller switch in the stop position	1.replace bearings 2.Insulate short circuit 3.Controller switch set at power on location
Turbine output voltage low	1.Low rpm 2.Stator winding three phase has short circuit 3.Controller short circuit 4.Low-voltage output wire is too long or too short	1.Check reason and restore normal rpm 2.Insulate short circuit 3.Replace controller 4.Shorten wire, bold wire diameter
Turbine AC circuit no output	1.Output wire short circuit	1.Check the reasons and connected circuit
Turbine output normal, but no DC output	1. Output short circuited 2.Controller's rectifier broken	1.Check the reasons and connected circuit
Less battery output capacity	1.Lower turbine output voltage 2.Poor battery terminal conductivity 3.Battery invalid	1.Check the above solutions 2. Maintain battery