

Wind turbines presentation

Supplier: Etneo Italia

Contact:

**Project name: VERTICAL AXIS WIND
TURBINES FOR HYBRID SOLUTIONS
WITH BATTERY OR GRID CONNECTION**

Presented to:



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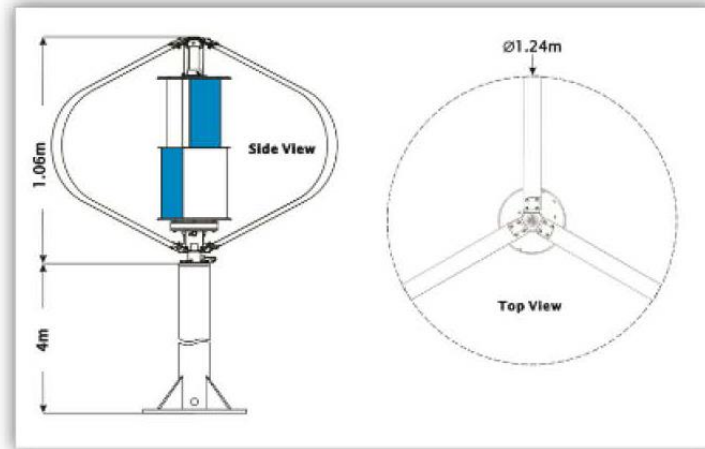




PORTION OF WIND PLANT

MICRO WIND 300W/500W

General Specifications			
Rated Power	300W	Wind Speed max. power	15 m/s
Maximum Power	500W	Cut in Wind Speed	<3 m/s
Cut out Wind Speed	15.5 m/s	Survival Wind Speed	60 m/s
Dimensions/Weight			
Rotor Diameter	1.24 m		
Rotor Height	1.06 m		
Tower Height	4.00 m (minimum)		
Total Height	5.06 m (minimum)		
Turbine Weight	25.5 kg w/o tower		
Rotor Specifications			
External Darrieus	3 blades		
Internal Savonius	2 layers		
Blades Material	Anodized aluminum		
Axis Material	Galvanized steel SS400		



The DS300 turbine is a vertical micro-wind generator with dimensions 1,24m in diameter and 1.06 in height, it weighs 25kg and is usually mounted on poles from 2 to 6m maximum in height.

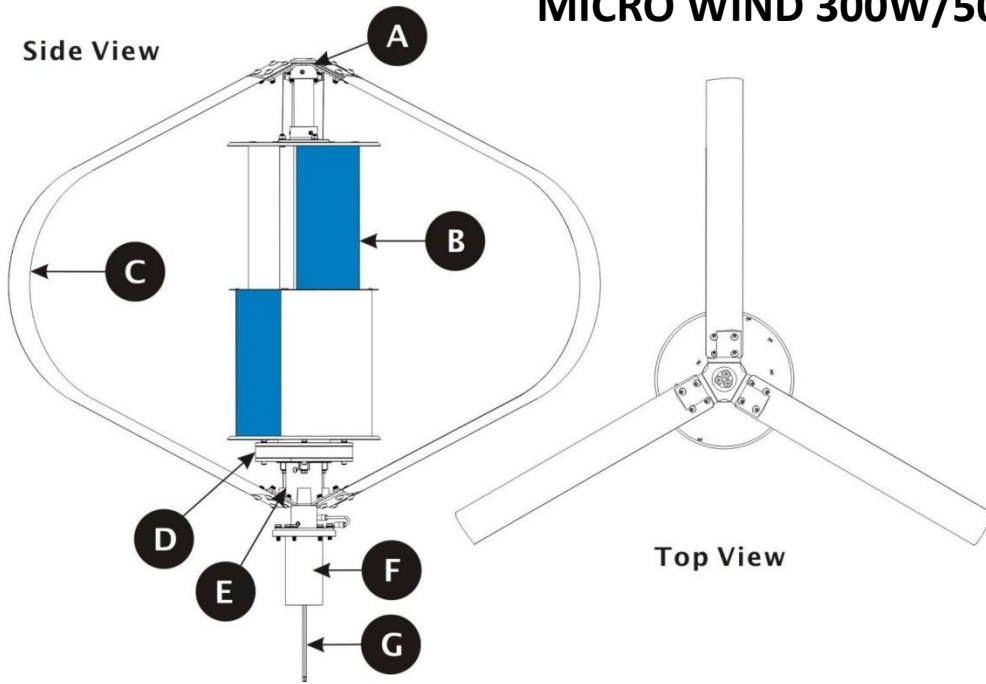
Components



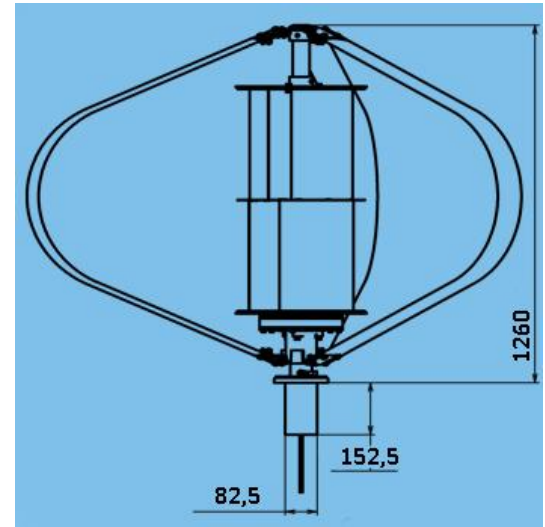
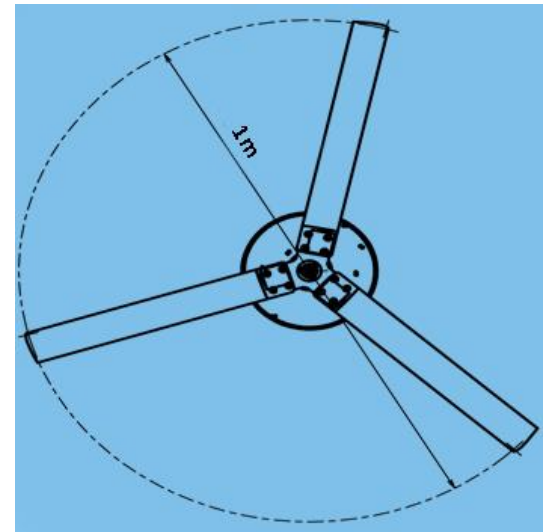
Vertical axis wind turbine

MICRO WIND 300W/500W

Side View



Top View



Parts	Description
A	Upper Darrieus Blades Connector.
B	S-Type Savonius.
C	3 Darrieus blades with built-in airfoil.
D	3-Phase, Direct Drive, Weather Sealed, Mechanically Integrated Permanent Magnet Generator.
E	Lower Darrieus Blades Connector.
F	Damper.
G	3-Phase R-S-T Generator Wires.

Components



Vertical axis wind turbine



The hybrid controller is able to manage the wind source and its accumulation in the battery pack 24V in total autonomy. The advanced technology allows accurate control over all generated values, turbine speed, output power, stored energy capacity. The product is also water resistant and equipped with all the protections for short circuit, overcurrent or voltage. It is also equipped with an RS232-USB output that allows convenient parameter management via dedicated software to be installed on a computer.



Components

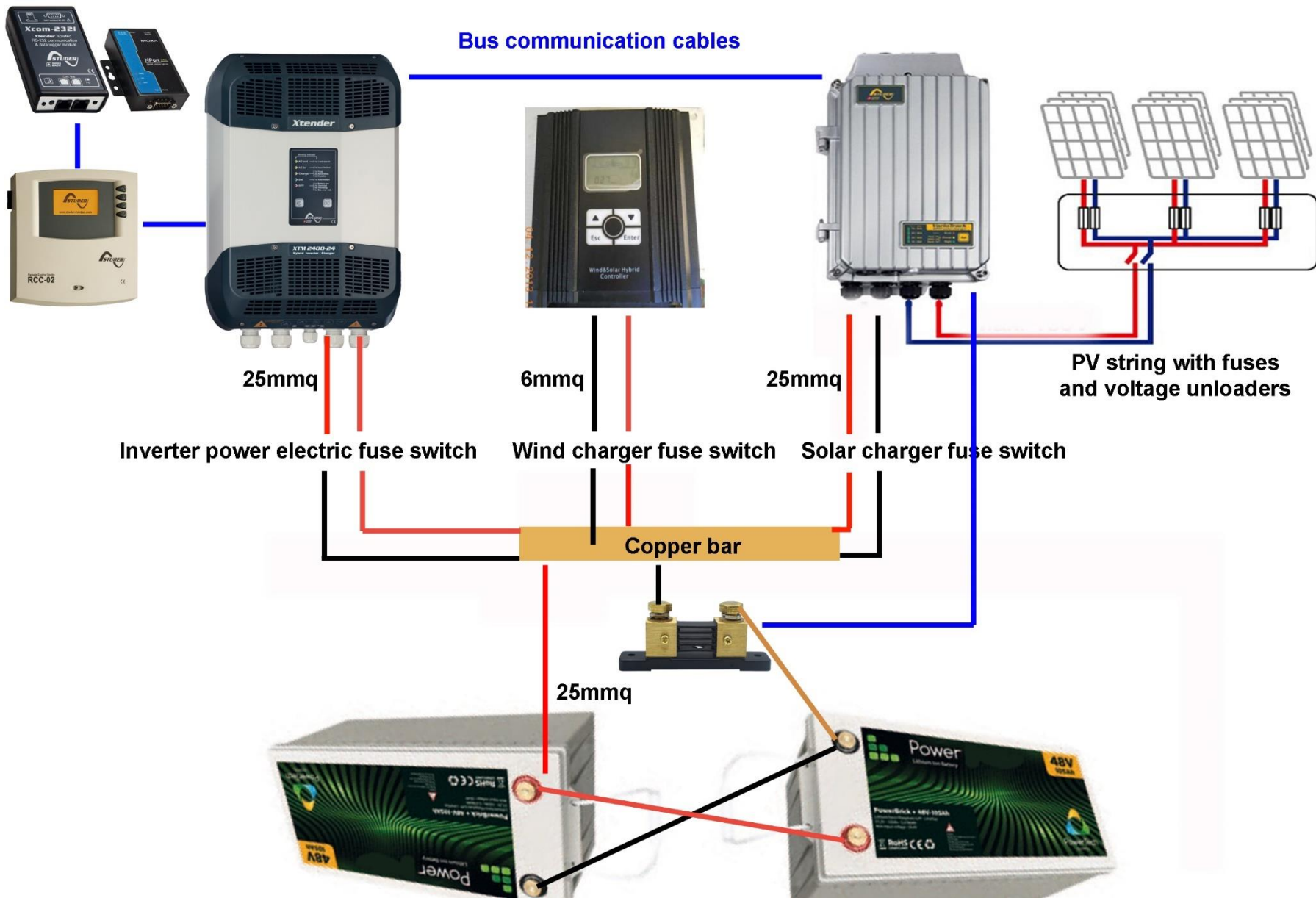


Wind controller

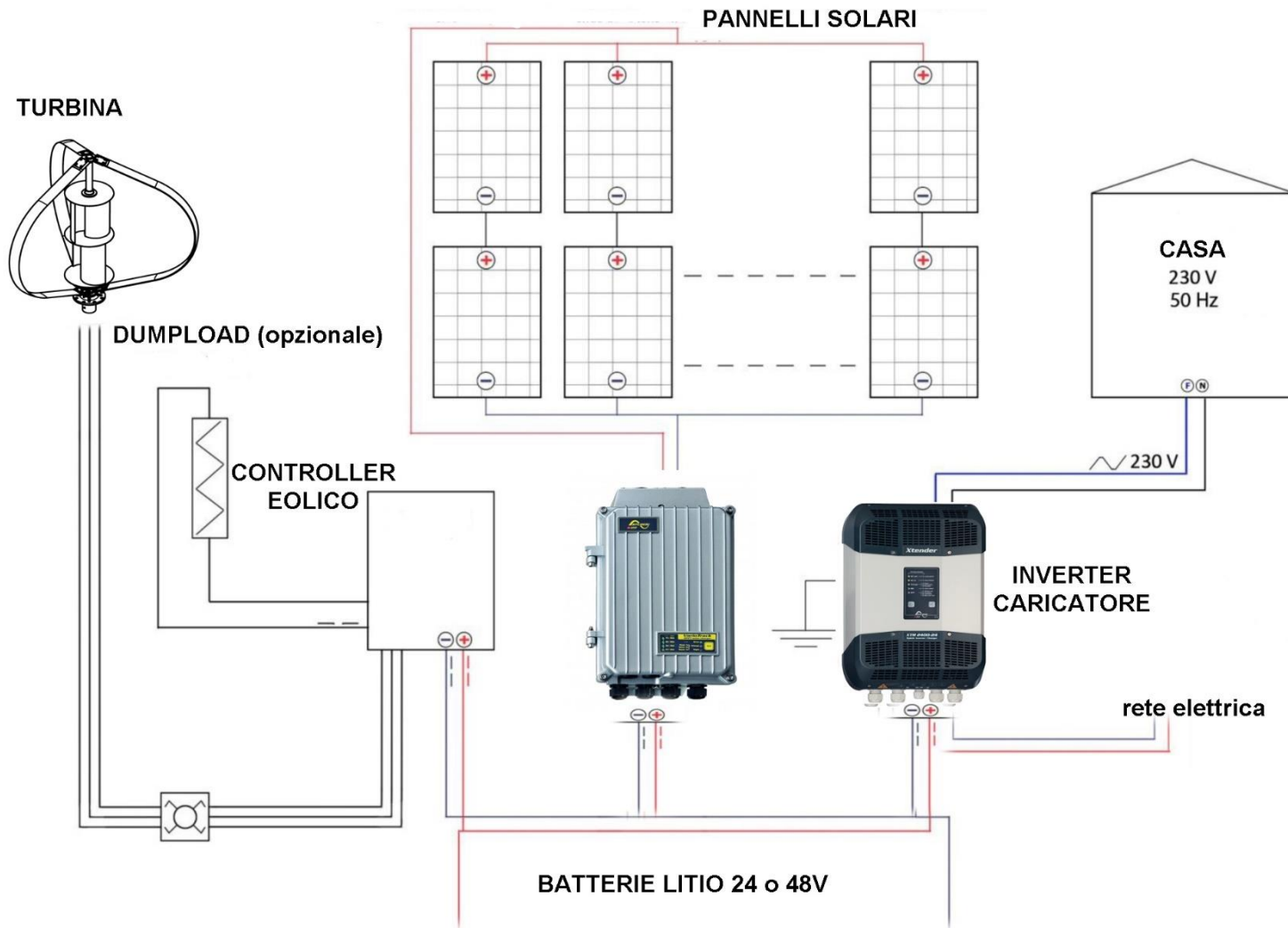


Applications for DS300 hybrid turbine with vertical axis

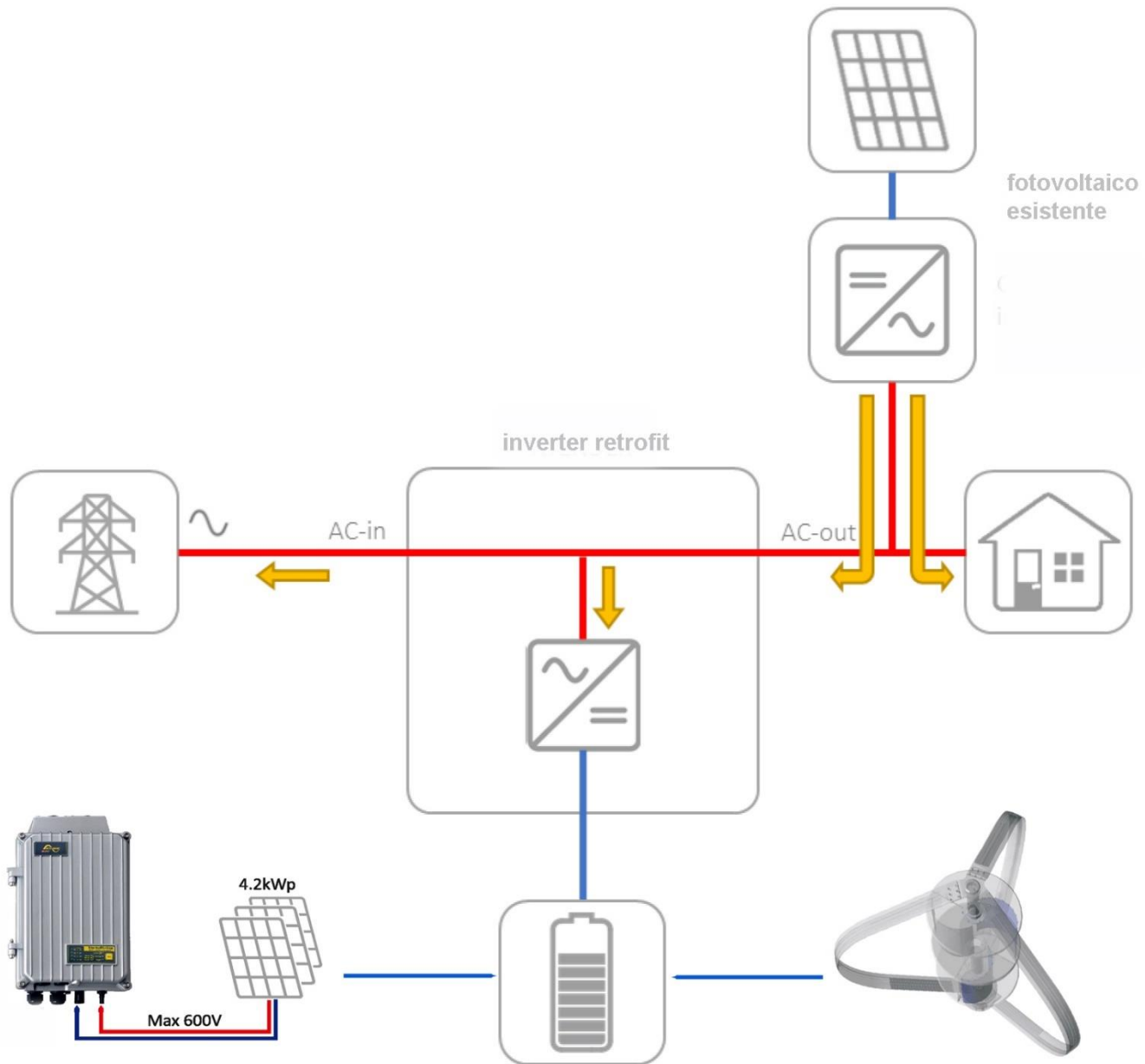
- **Solutions with energy storage in 24V batteries**
- **Ongrid or offgrid hybrid systems up to 4-5kW of solar power with energy storage in 24V batteries**
- **Lighting on poles with 1-2 photovoltaic panels and energy storage in 24V batteries**
- **Special poles with video surveillance, sensors, sos emergency and similar applications**
- **Offgrid applications to power both low voltage and high voltage 220V devices with suitable inverters**
- **Installations on the coastal area, in open sea, in the high mountains safe and guaranteed as the turbine is robust and resistant, tested over 4000mt altitude and in the open sea on platforms.**
- **It is mounted on poles from 2 to 4-6m in height, generally 140mm diameter and 5-6mm thickness, the poles can be for installation on the ground or flat roof.**



SAMPLE FOR OFF-GRID SOLAR INSTALLATION WITH WIND TURBINE AND BATTERY PACK 24V



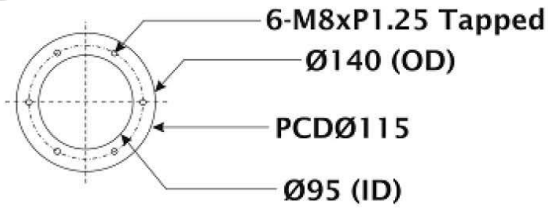
SAMPLE FOR SOLAR INSTALLATION WITH WIND TURBINE AND BATTERY PACK 24V



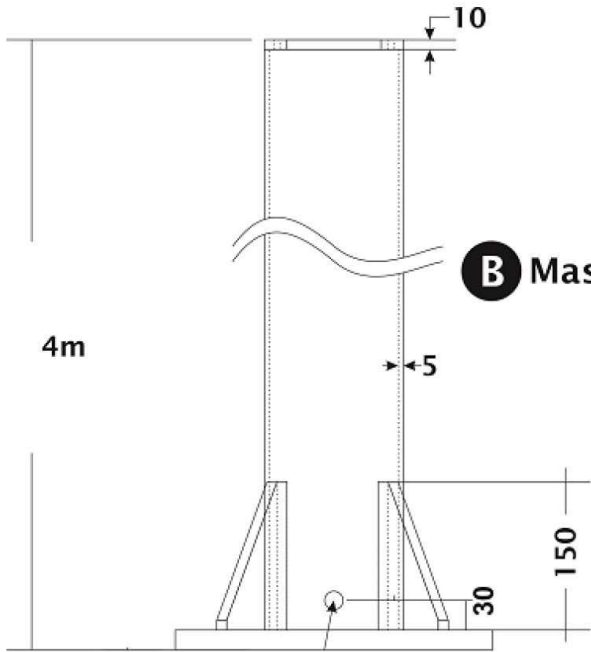
SAMPLE OF RETROFIT ON EXISTING SOLAR INSTALLATION AND ADD OF WIND TURBINE FOR 24V BATTERY PACK

A Mounting Flange

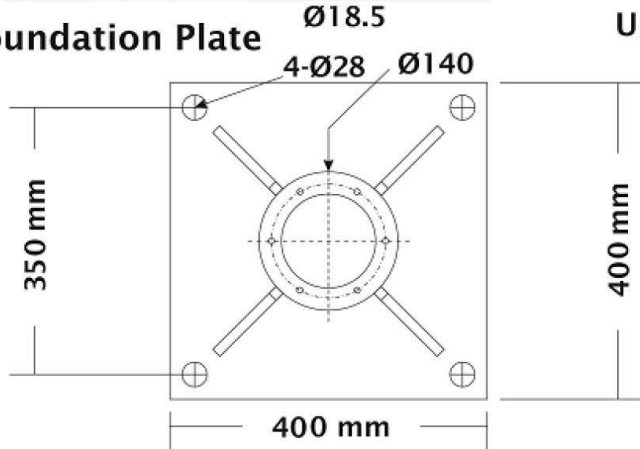
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B Mast Dimension

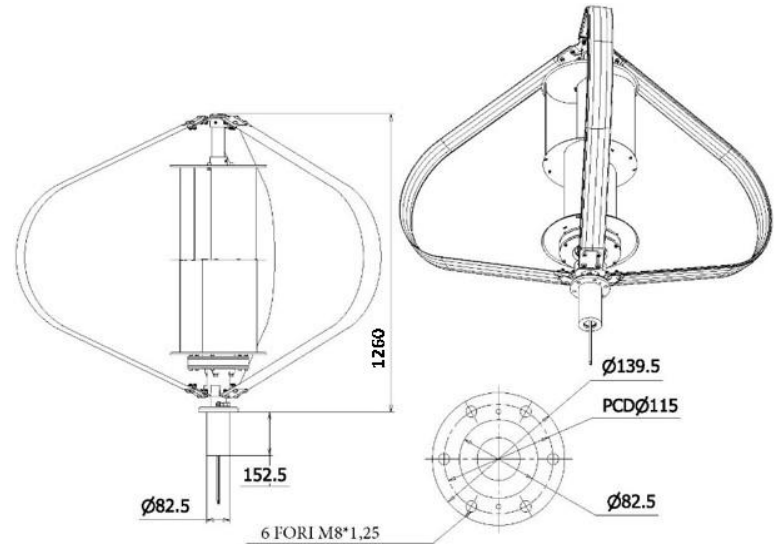


B Foundation Plate



Unit: mm

The pole of the wind generator with vertical axis must mainly respect the design of the generator connection flange itself, it is possible to use poles of lower diameter but respecting the size of the flange in the head of the pole that must be connected to the equal footing on the turbine.



Components



Ground pole 4-6m (not included)



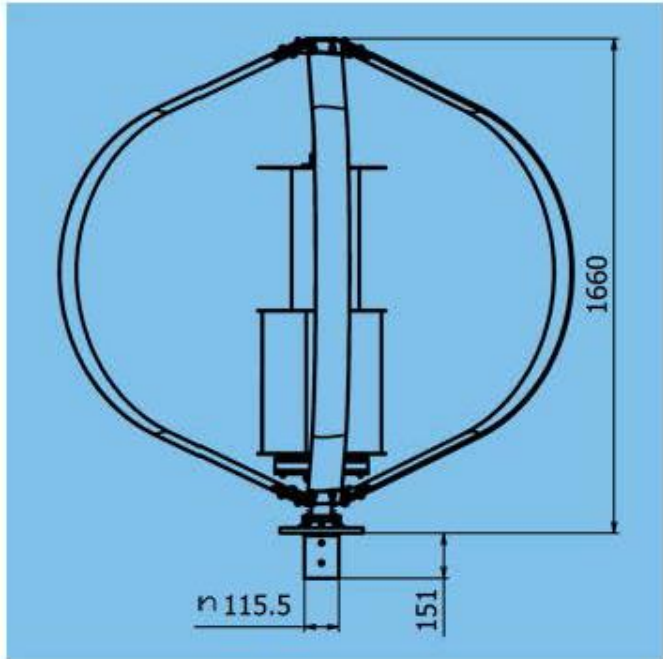
DS300 with 3,6kW of solar and 7,7kWh of battery storage

Components



INSTALLATIONS

MICRO WIND 700W/1kW

General Specifications			
Rated Power	700W	Wind Speed max. power	15 m/s
Maximum Power	1000W	Cut in Wind Speed	<3 m/s
Cut out Wind Speed	15.5 m/s	Survival Wind Speed	60 m/s
Dimensions/Weight			
Rotor Diameter	1.93 m		
Rotor Height	1.66 m		
Tower Height	4.00 m (minimum)		
Total Height	5.66 m (minimum)		
Turbine Weight	60kg w/o tower		
Rotor Specifications			
External Darrieus	3 blades		
Internal Savonius	2 layers		
Blades Material	Anodized aluminum		
Axis Material	Galvanized steel SS400		

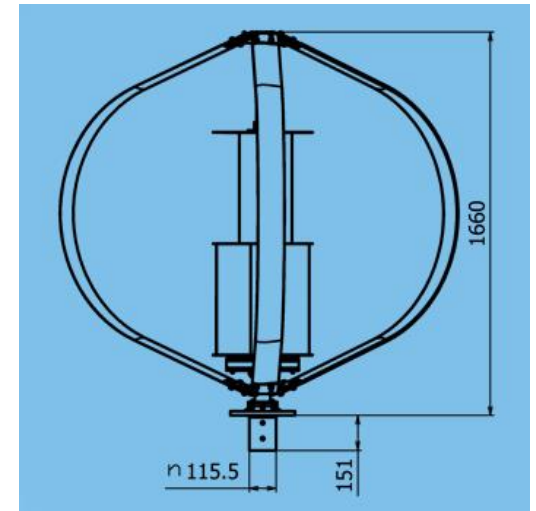
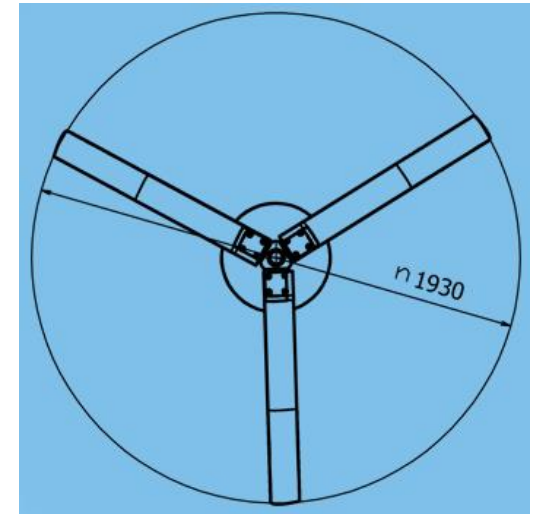
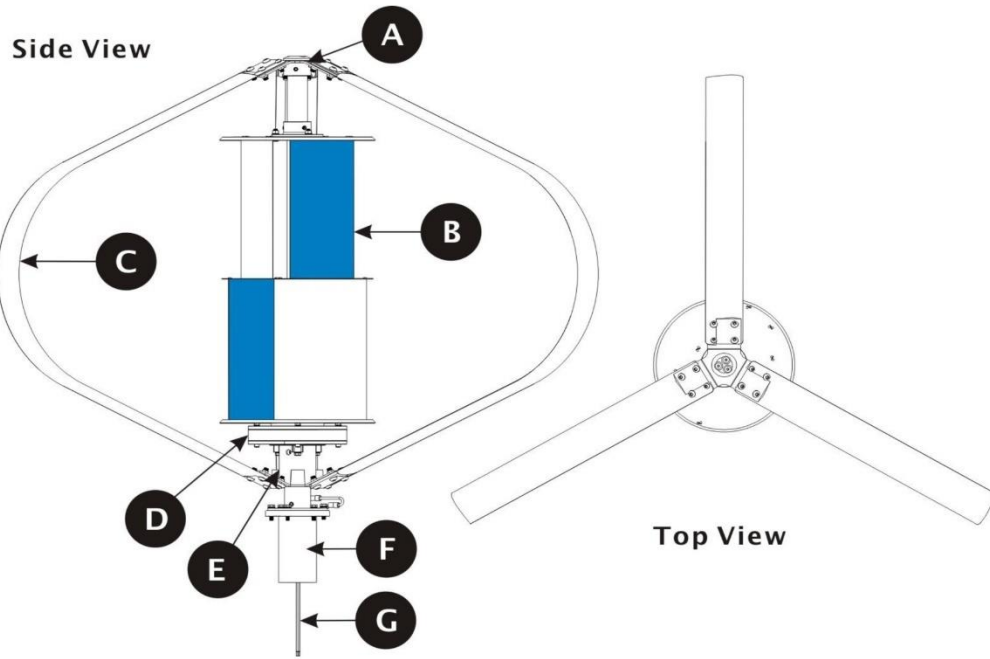
The DS700 turbine is a vertical micro-wind generator with a size of 1.93m in diameter and 1.66 in height, it weighs 60kg and is usually mounted on poles from 2 to 6m maximum in height.

Components



Vertical axis wind turbine

MICRO WIND 700W/1kW



Parts	Description
A	Upper Darrieus Blades Connector.
B	S-Type Savonius.
C	3 Darrieus blades with built-in airfoil.
D	3-Phase, Direct Drive, Weather Sealed, Mechanically Integrated Permanent Magnet Generator.
E	Lower Darrieus Blades Connector.
F	Damper.
G	3-Phase R-S-T Generator Wires.

Components

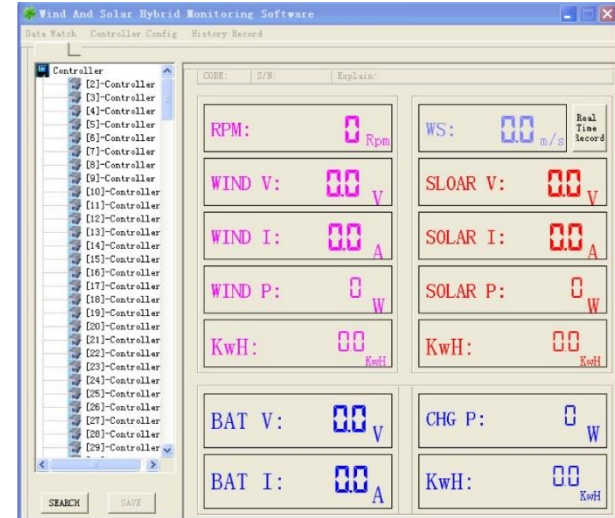
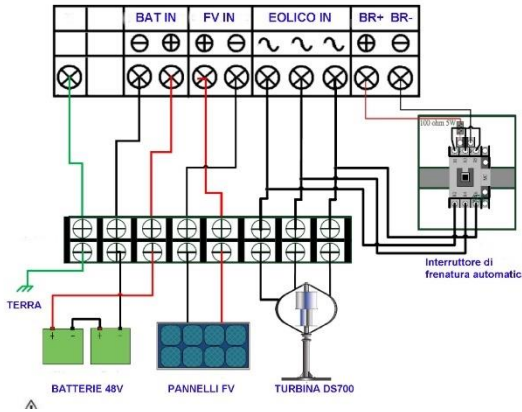


Vertical axis wind turbine

700W/1kW Vertical wind turbine



MAX1500 WIND CONTROLLER



The hybrid controller for 48V vattery charging can manage the wind source in complete autonomy through the MPPT curve management function of the turbine. Advanced technology allows precise control over all generated values, turbine speed, output power, stored energy capacity. The product is also equipped with all short-circuit, over-current or voltage protections, which can be managed by proprietary software on a computer via RS485-USB. A GPRS cellular web monitoring system can be added with extra price of 350 euro.

Components

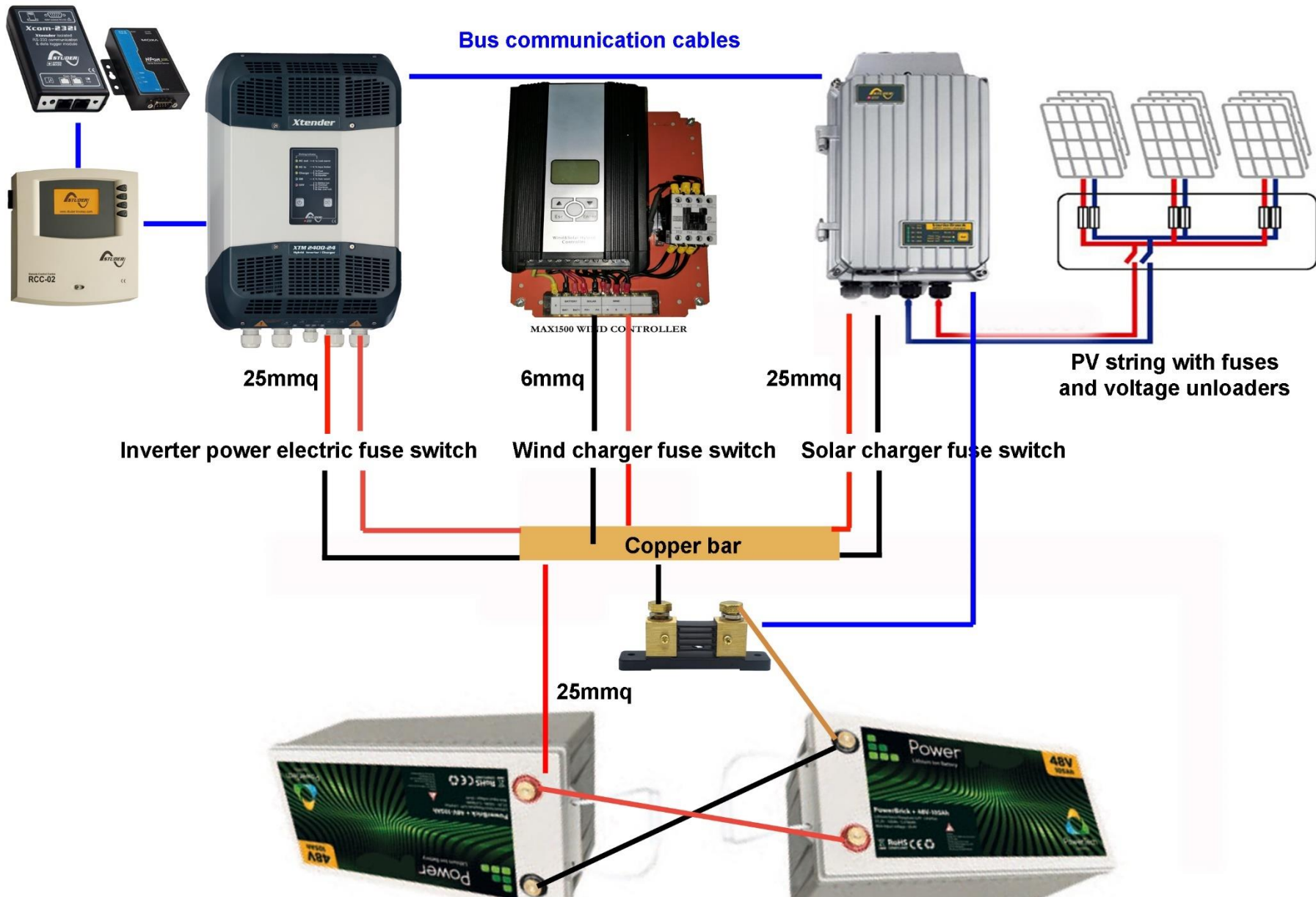


Wind controller

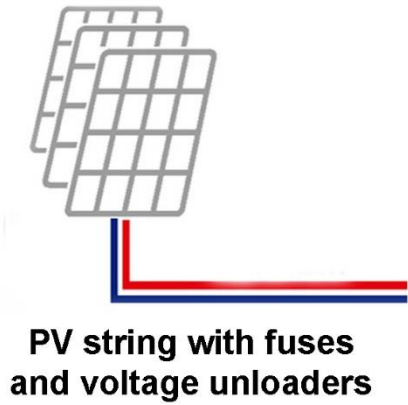


Applications for DS700 hybrid turbine with vertical axis

- **Solutions with energy storage in 48V batteries**
- **Offgrid hybrid systems up to 7-9kW, in single phase installations, or 30kW for three phases installations, of solar power with energy storage in 48V batteries**
- **Ongrid hybrid systems up to 9kW in single phase installations together with solar inverter and battery storage in 48V**
- **Offgrid applications to power both low voltage and high voltage 220V devices with suitable inverters**
- **Installations on the coastal area, in open sea, in the high mountains safe and guaranteed as the turbine is robust and resistant, tested over 4000mt altitude and in the open sea on platforms.**
- **It is mounted on poles from 2 to 4-6m in height, generally 165mm diameter and 5-6mm thickness, the poles can be for installation on the ground or flat roof.**

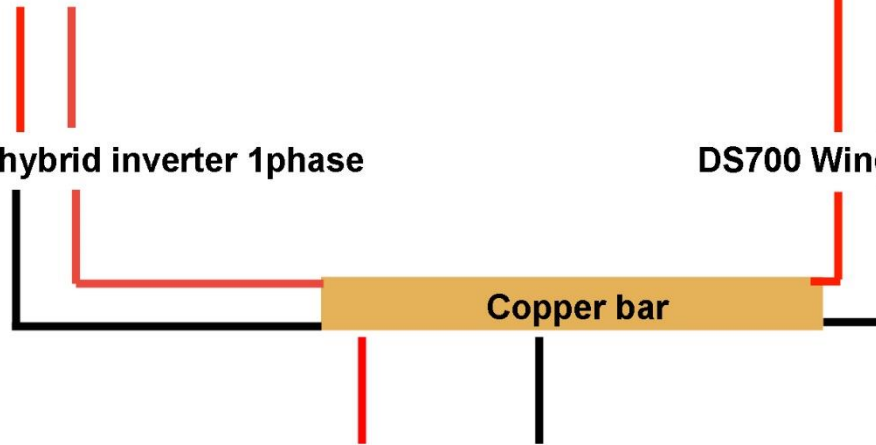


SAMPLE FOR OFF-GRID SOLAR INSTALLATION WITH WIND TURBINE AND BATTERY PACK 48V



Solar hybrid inverter 1phase

DS700 Wind controller

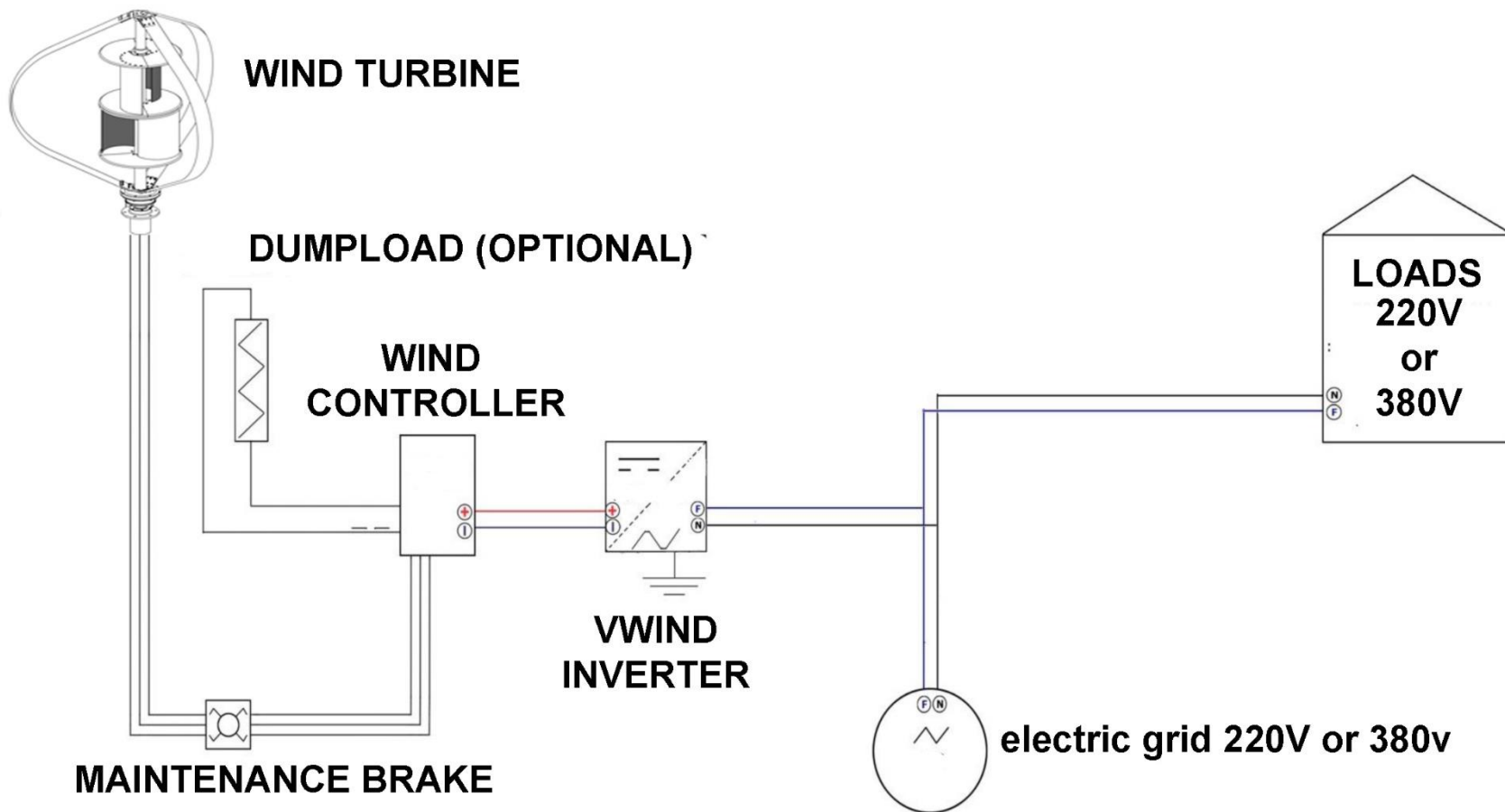


48V Pylontech
LiFePO4 batteries

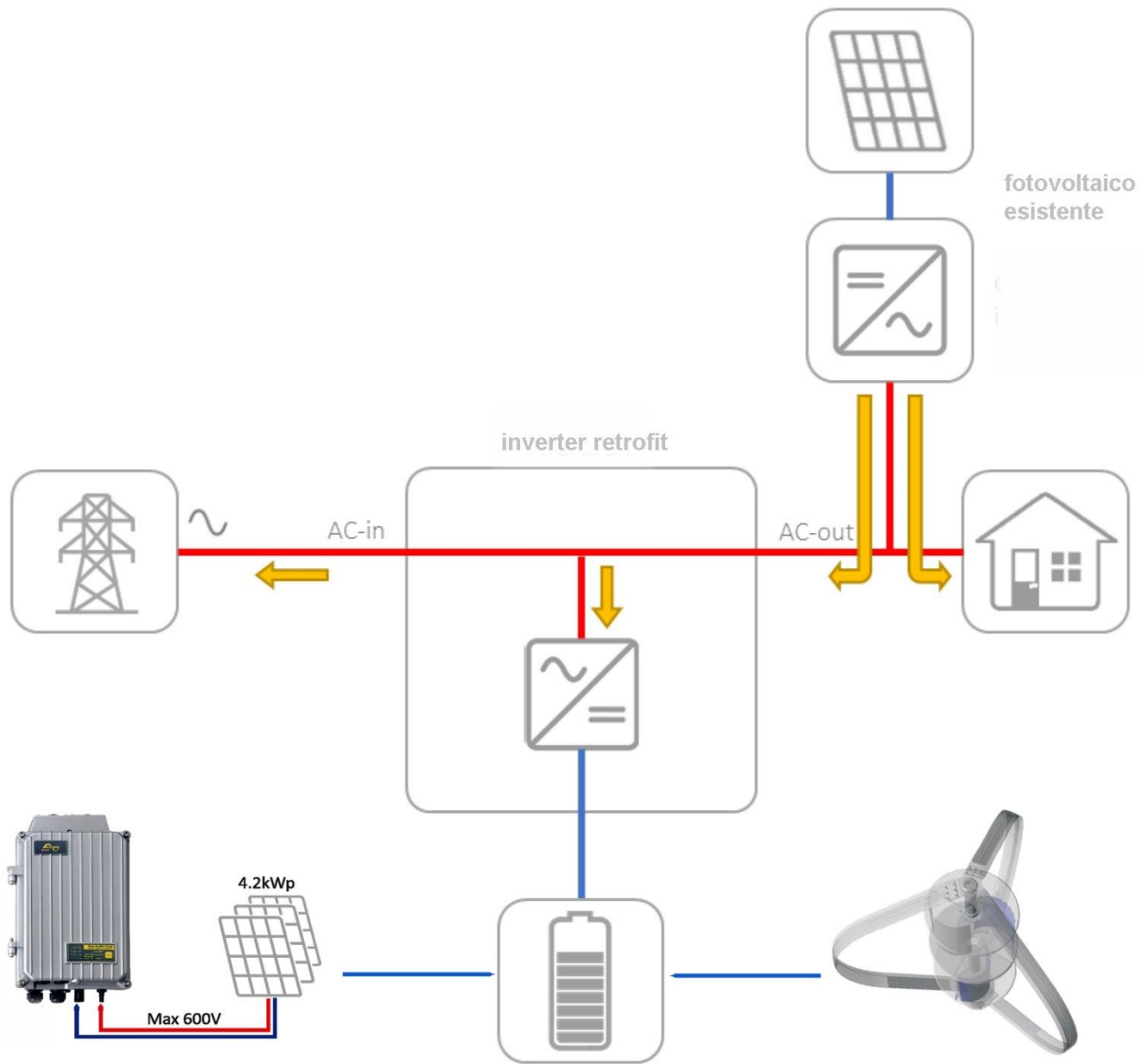


SAMPLE FOR ON-GRID SOLAR INSTALLATION WITH WIND TURBINE AND BATTERY PACK 48V

**Single -phase installation example,
For three -phase consider multiples of 3 turbines and inverters**

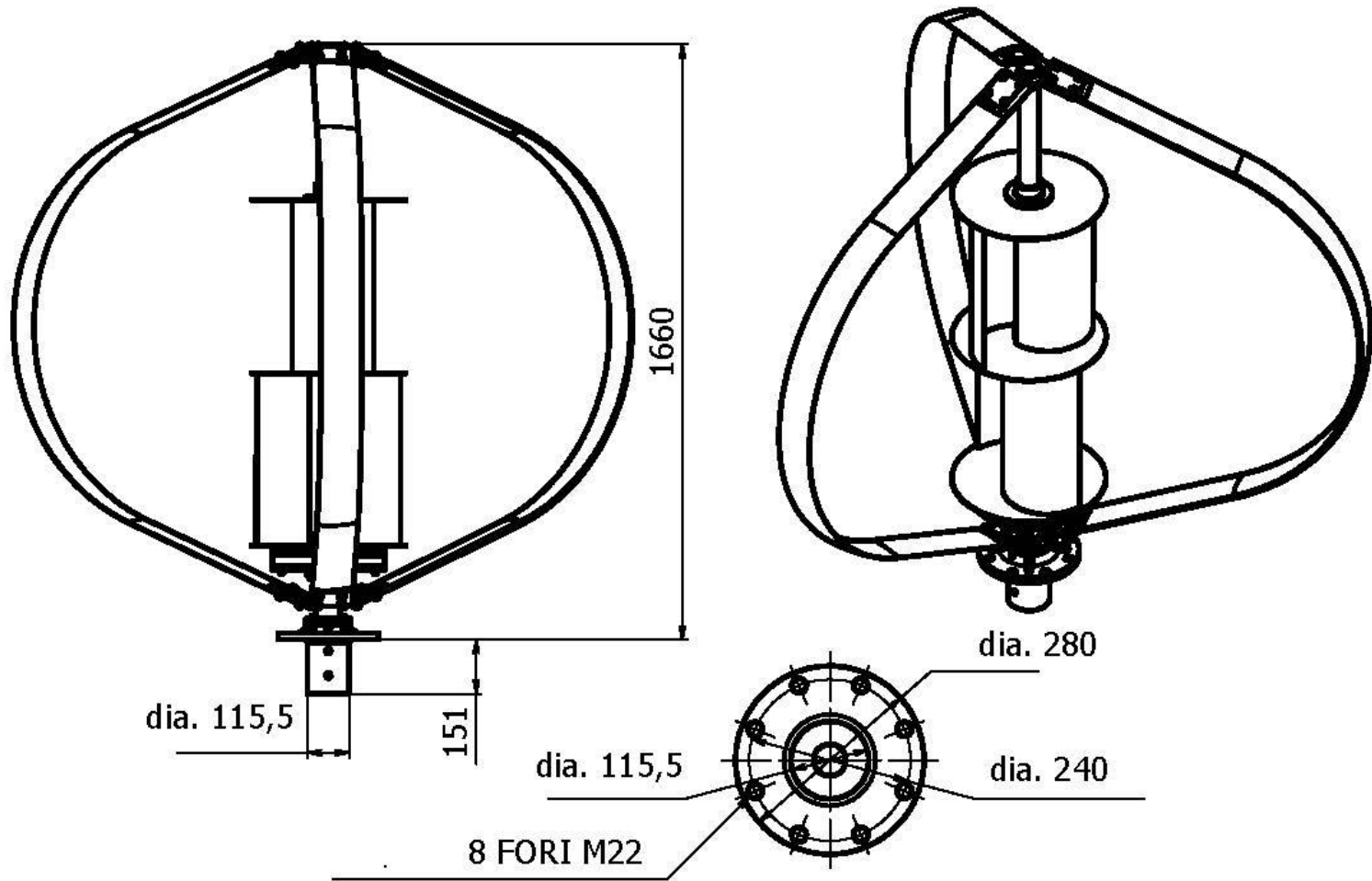


SAMPLE FOR ONLY WIND INSTALLATION WITH GRID INVERTER, 1 INVERTER + 1 TURBINE FOR SINGLE PHASE OR 3 INVERTER + 3 TURBINES (AND MULTIPLES OF 3 SETS) FOR 3 PHASES INSTALLATION. NO STORAGE AVAILABLE FOR THIS CONFIGURATION



SAMPLE OF RETROFIT ON EXISTING SOLAR INSTALLATION AND ADD OF WIND TURBINE FOR 48V BATTERY PACK

MICRO WIND 700W/1kW

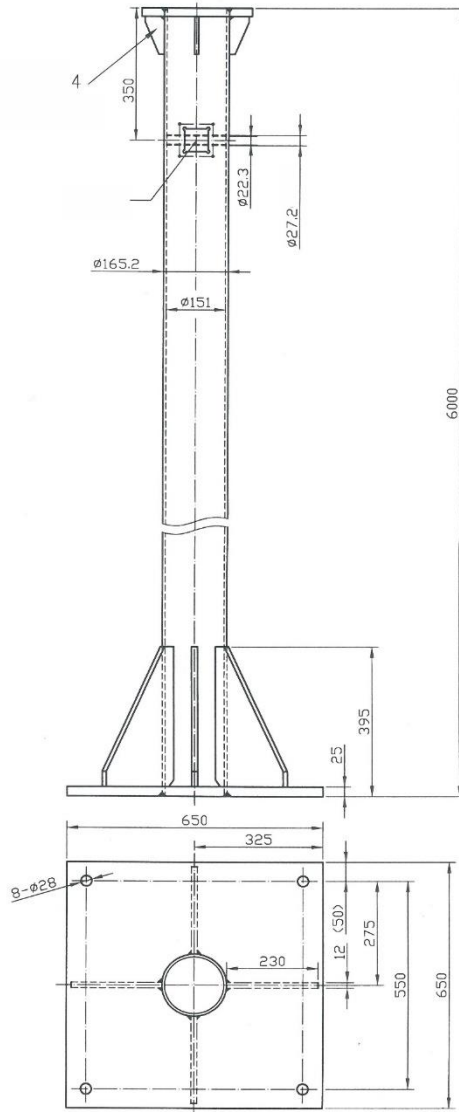
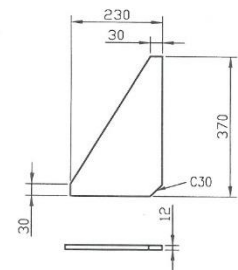
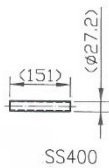
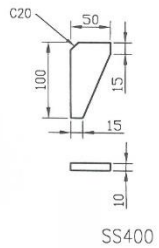
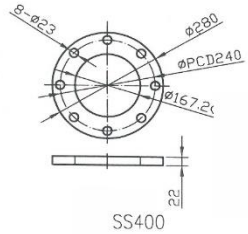
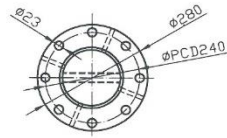
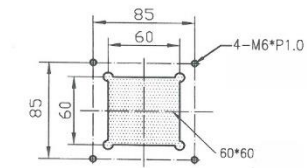


The design above shows the turbine and the flange already connected to the turbine with the vibrations and the relative dimensions underneath.

Components



DS700 wind turbine



The drawing on the side shows an example of pole on the ground in variable height between 4 and 6m with the design of the flange welded at the head of the pole that mates with that of the turbine.

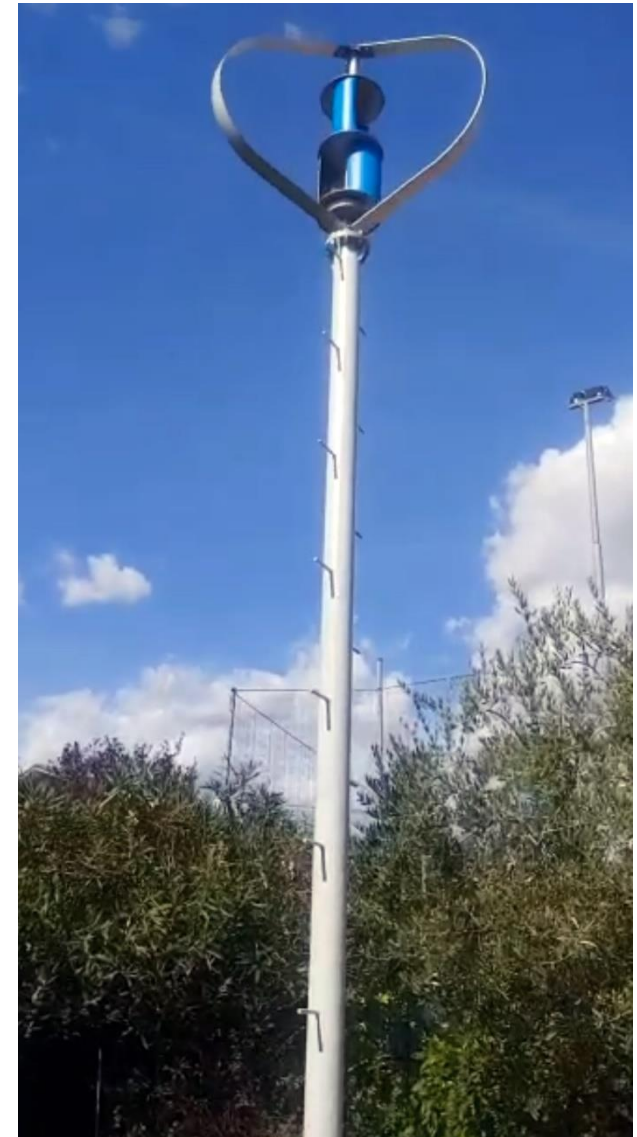
Components



Ground pole 4-6m (not included)



**DS700 with solar installation 4,2kW and
10kWh of battery storage**



Components



INSTALLATIONS



DS700 with solar installation 2,4kW and 12kWh of battery storage with lead acid

Components



INSTALLATIONS

MICRO WIND 700W/1kW



The wind controller comes with a small wall cabinet including terminal block and automatic brake, to be connected to the main solar cabinet.

Components



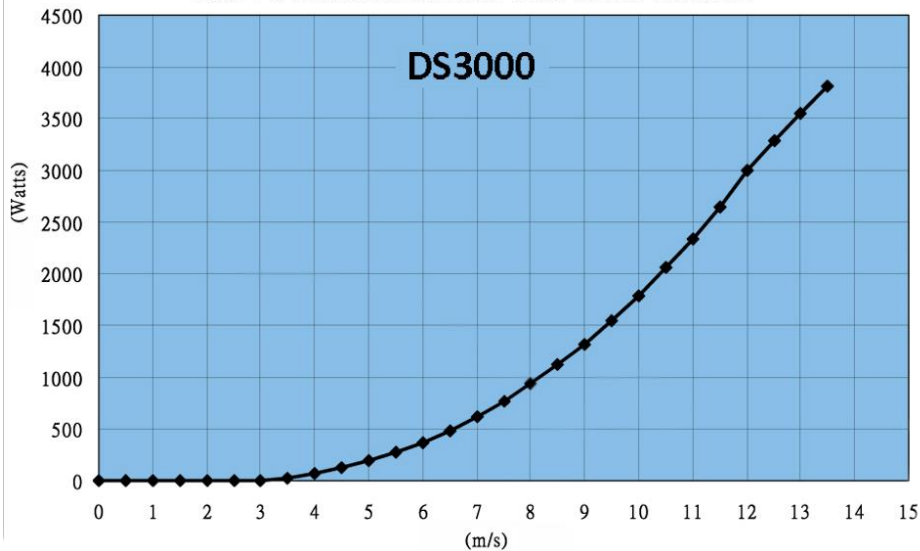
Wind controller cabinet

MICRO WIND 3kW

The DS3000 turbine is a 3kW **vertical axis micro wind turbine**, which combines in its structure a dual system consisting of Darrieus blades that guarantee high efficiency and Savonius blades that allow the system to be activated in very low winds. This mix of technologies makes this VAWT product highly innovative: equipped with a controller capable of managing maximum power based on the wind speed, **direct drive generator with permanent magnets**.

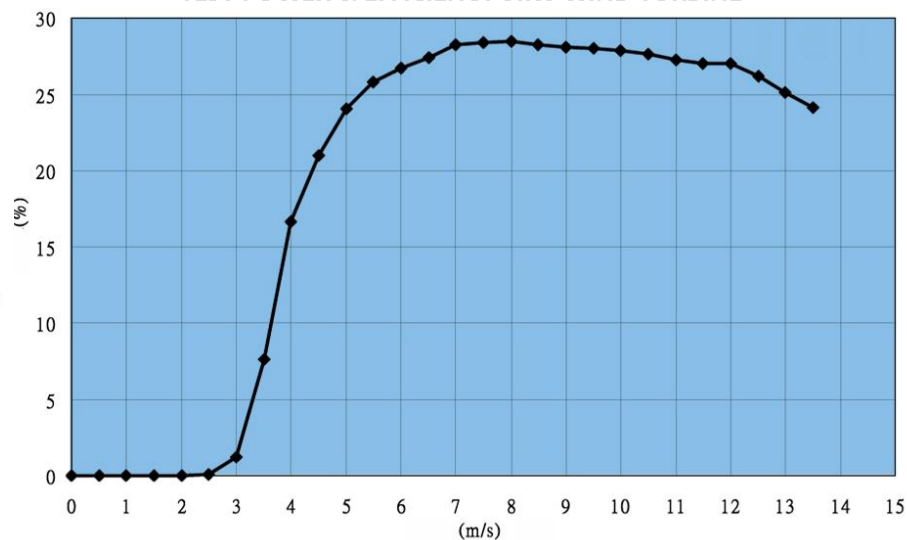
The turbine with double rotor that facilitates starting with the wind breeze and increases exponentially with medium strong winds up to 18m/s. IEC 61400-2 certified in South Korea and Japan, BWEA compliance test completed at TUV NEL laboratories (UK), JWSTA certified in Japan for power sales as well as in US and UK

TEST POWER & EFFICIENCY 3kW WIND TURBINE



WATT POWER CURVE

TEST POWER & EFFICIENCY 3kW WIND TURBINE



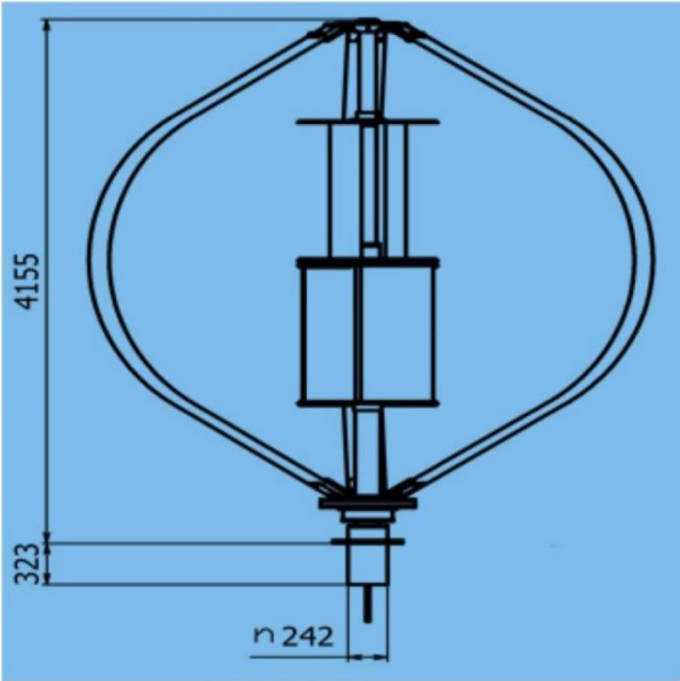
EFFICIENCY CURVE %

Components



Wind turbine

MICRO WIND 3kW

General Specifications			
Rated Power	3000W	Wind Speed max. power	15 m/s
Nominal RPM	230rpm	Cut in Wind Speed	<3 m/s
Cut out Wind Speed	20 m/s	Survival Wind Speed	60 m/s
Dimensions/Weight			
Rotor Diameter	4 m		
Rotor Height	4,2 m		
Tower Height	4. m (minimum)		
Total Height	8.2 m (minimum)		
Turbine Weight	680kg w/o tower		
Rotor Specifications			
External Darrieus	3 blades		
Internal Savonius	2 layers		
Blades Material	Anodized aluminum		
Axis Material	Galvanized steel SS400		

The DS3000 turbine is a vertical micro-wind generator with dimensions 4m in diameter and 4.2 in height, it weighs 680kg and is usually mounted on poles from 4 to 8m maximum in height.

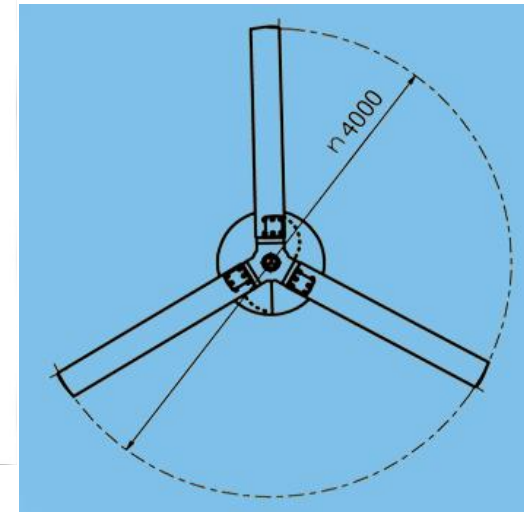
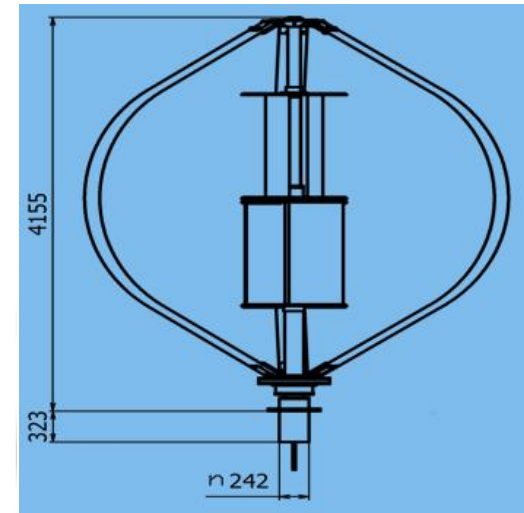
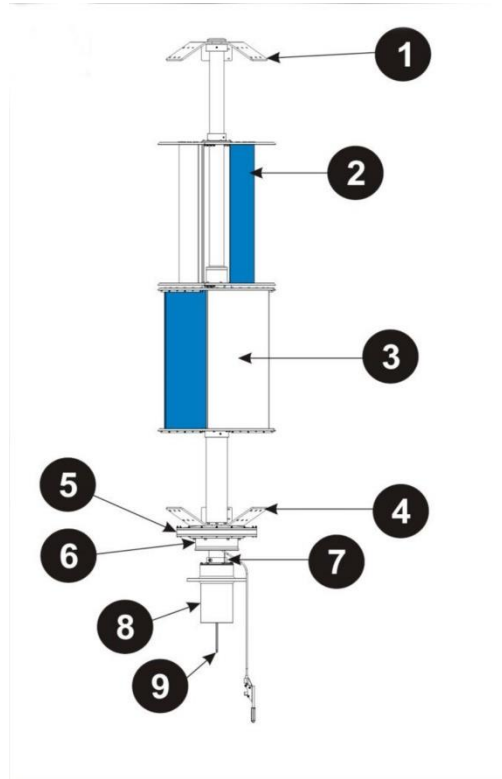
Components



Vertical axis wind turbine

MICRO WIND 3kW

- 1: upper fixing plate of the Darrieus blades, the blade connection has been designed to eliminate possible breakages with very strong winds and reduce the possibility of damaging the generator in case of blade breakage.
- 2: Savonius blades, perfect as they are oriented on the four cardinal points to capture the wind from any direction, without the need for rotor orientation.
- 3: vertical axis of the turbine, made of ASTM A283 grade D steel (better known as SS400) suitable for working with temperatures of $-20 \sim +40^{\circ}\text{C}$.
- 4: bottom fixing plate of the Darrieus blades.
- 5: permanent magnet generator of direct drive type, bearings with high resistance to high temperatures, a fundamental characteristic for working with constant strong winds, where mechanical stress is very strong.
- 6: Manual mechanical brake, this protection system acts on rotation and is mainly used for maintenance and machine downtime.
- 7: overvoltage wire for the manual brake to be welded to the pole with relative “C” support.
- 8: dumper, a fundamental component to minimize vibrations and therefore the noise of the turbine.
- 9: R/S/T three-phase generator cables prepared for connection to battery charger controller or network inverter.



Components



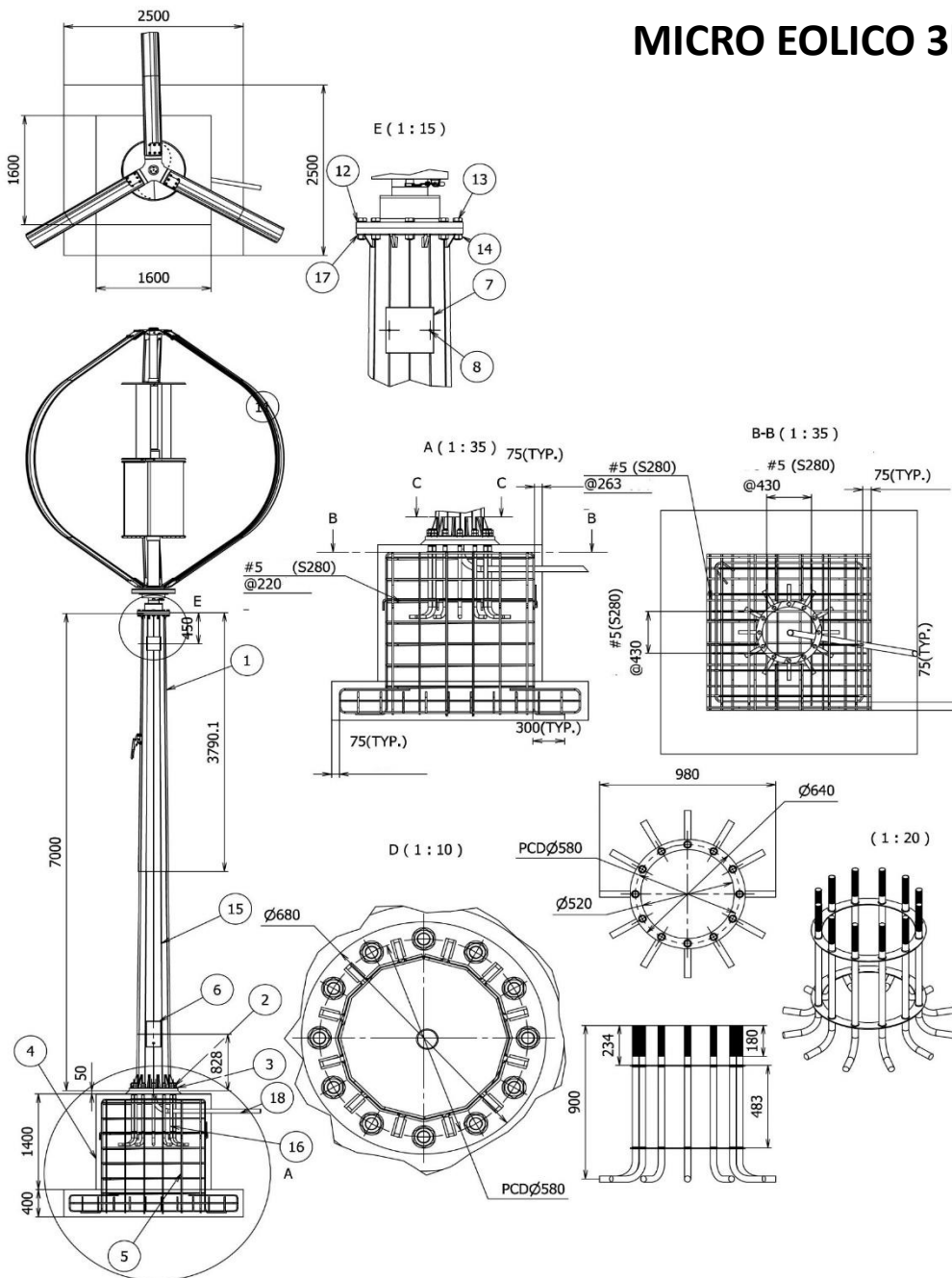
Wind turbine



Applications for DS3000 hybrid turbine with vertical axis

- Solutions both for grid connection and for energy storage in 48v batteries
- Three -phase ongrid systems with Huawei 4.6kW solar inverters, minimum three turbines for 9kW of total power and 9kW multiples for mini wind farms installations
- Single-phase or three-phase hybrid systems without limits with solar power and battery storage in 48V
- Installations on the coastal area, in open sea, in the high mountains safe and guaranteed as the turbine is robust and resistant, tested over 4000mt altitude and in the open sea on platforms.
- It is mounted on 4-8m high-end poles, generally 300mm diameter and 16mm thickness, the poles can be for installation on the ground or flat roof.

MICRO EOLICO 3kW



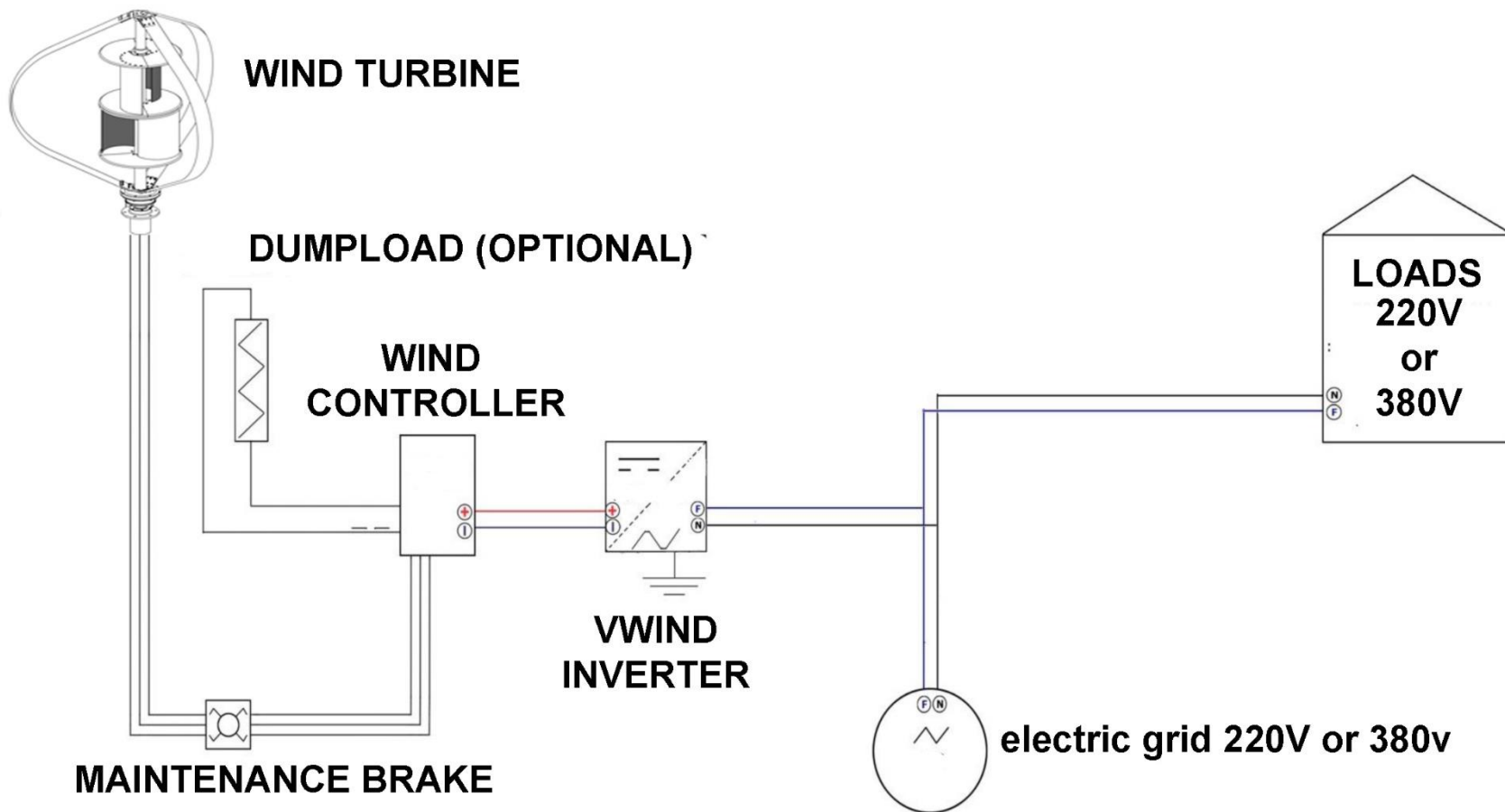
The pole of the wind generator with vertical axis must comply with the design of the generator connection flange itself, must then be sized on the basis of structural calculation based on the installation site to be guaranteed earthquake and max wind. However, this drawing is an excellent reference for sites with maximum ventiness greater than 45m/s.

Components



Ground pole 7m (not included)

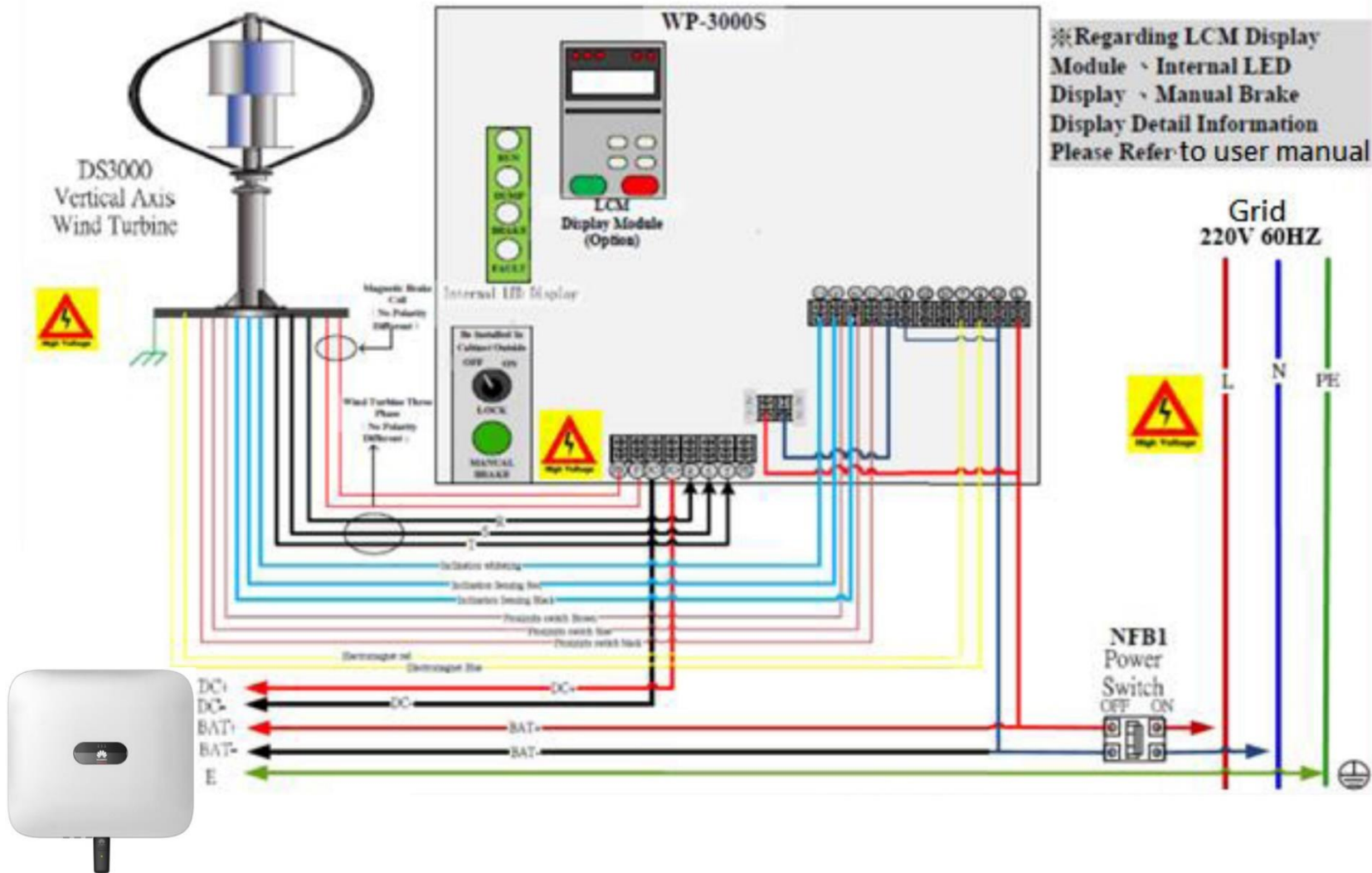
**Single -phase installation example,
For three -phase consider multiples of 3 turbines and inverters**



SAMPLE FOR ONLY WIND INSTALLATION WITH GRID INVERTER, 1 INVERTER + 1 TURBINE FOR SINGLE PHASE OR 3 INVERTER + 3 TURBINES (AND MULTIPLES OF 3 SETS) FOR 3 PHASES INSTALLATION. NO STORAGE AVAILABLE FOR THIS CONFIGURATION

DS3000

SYSTEM DIAGRAM

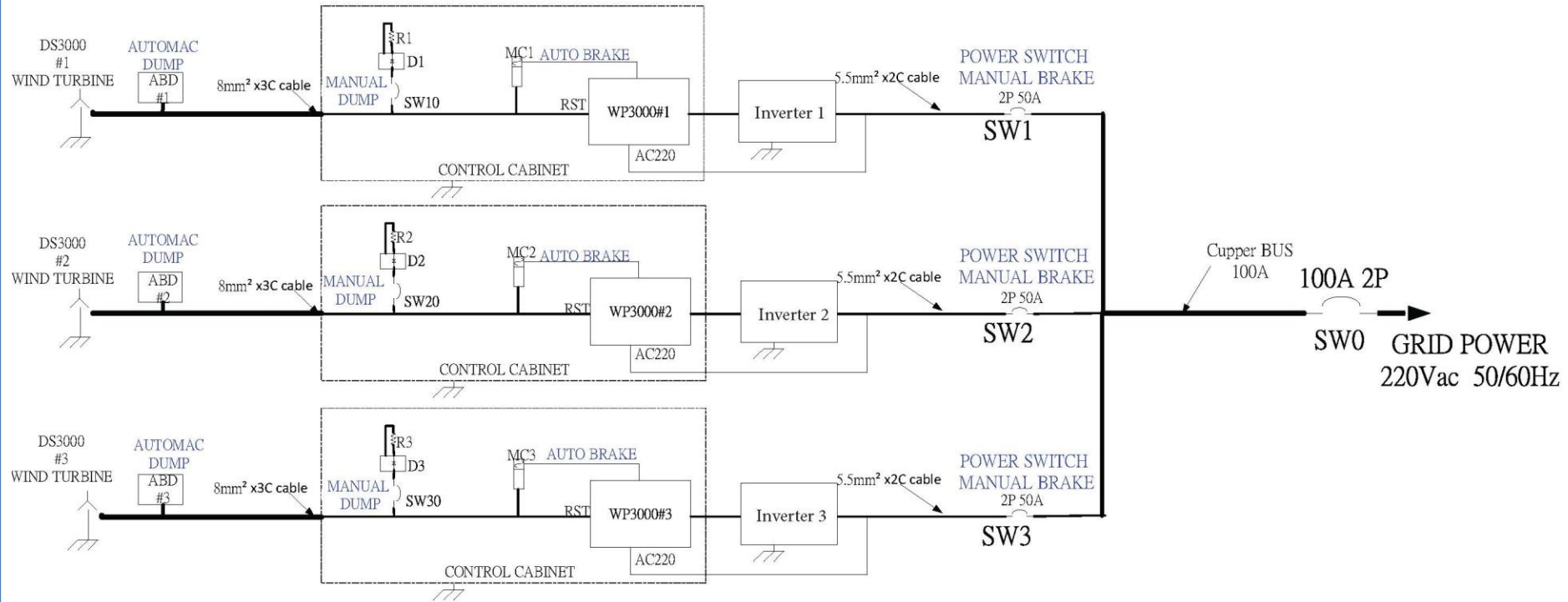


※Regarding LCM Display Module · Internal LED Display · Manual Brake Display Detail Information Please Refer to user manual

Components



ON-GRID 380V



The image above shows the connection scheme of 3 turbines for a three -phase system, to be considered with single turbine in the case of a single -phase system.

Components



ON-GRID 220-380V



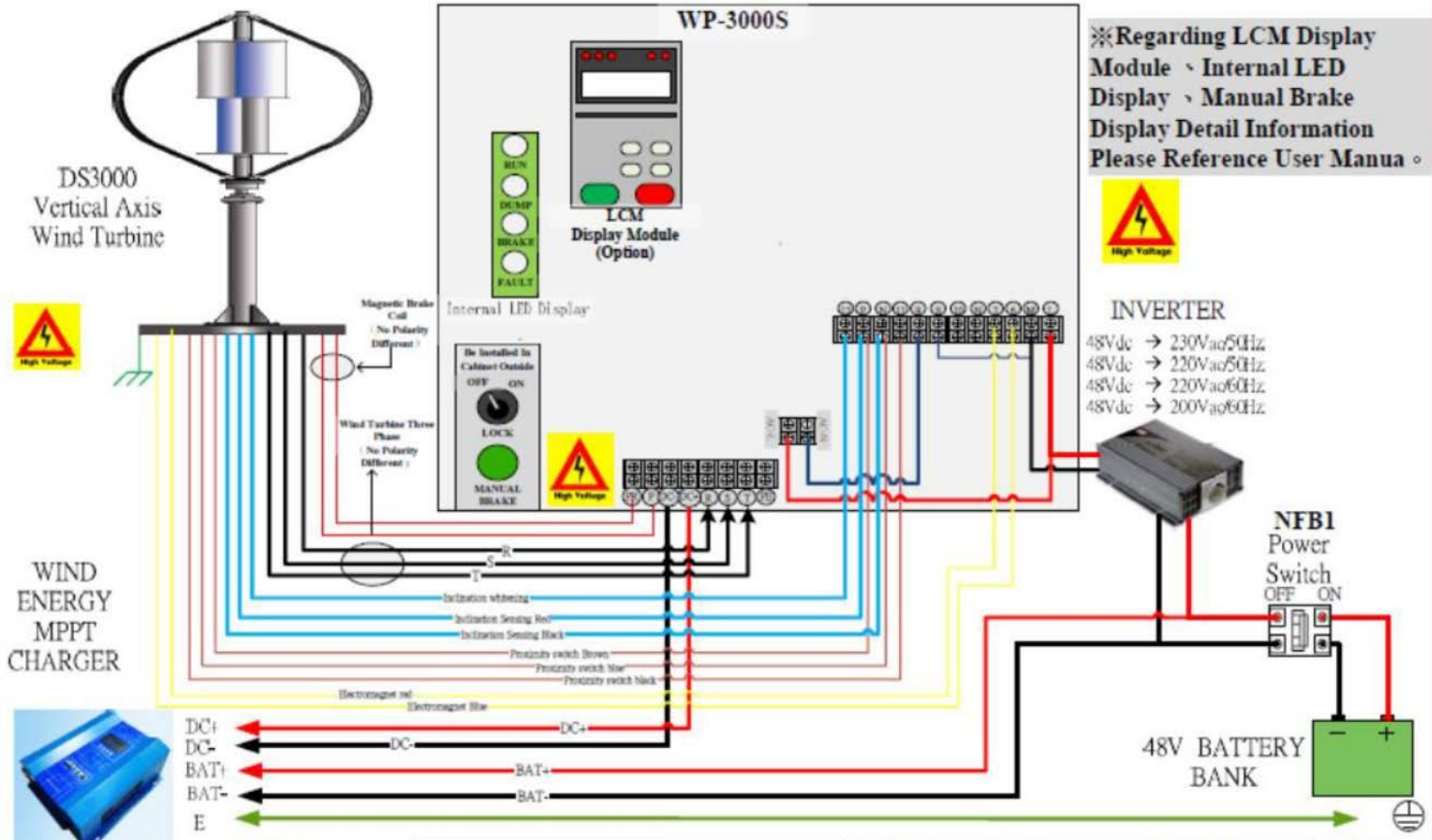
**DS3000 mini wind farm grid
connected**

Components



INSTALLATIONS

DS3000 OFF GRID SYSTEM DIAGRAM



※Regarding LCM Display Module ∙ Internal LED Display ∙ Manual Brake Display Detail Information Please Reference User Manual ∙



INVERTER
 48Vdc → 230Vac/50Hz
 48Vdc → 220Vac/50Hz
 48Vdc → 220Vac/60Hz
 48Vdc → 200Vac/60Hz

NFB1 Power Switch
 OFF ON

48V BATTERY BANK



DC+
 DC-
 BAT+
 BAT-
 E

HiVAWT



Hi-VAWT Technology Corp.

DRAWING No.	B-107-00001	VER.	2.0
SUBJECT	DS3000 WIRING DRAWING (202Vac)		
DRAWER	Eddy	DATE	MAR.18 2018

Components



OFF-GRID 48V



**Hybrid installation for TLC customer in
Trollstingen with battery storage 48V**

Components



INSTALLATIONS

THANKS FOR THE ATTENTION



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