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Technical Specification

Definition of technical specification of ELY50 aerogenerator, designed and built by Ergycon di Conigliaro s.r.l., the aerogenerator is composed by:

- Nacelle
- HUB with three-blades and related mechanism
- Inverter and electric generator
- Yaw control system and active pitch device
- Remote control
- Tower

DESCRIPTION OF AEROGENERATOR

The wind turbine is designed and realized in the factory of Ergycon di Conigliaro s.r.l. and represents the excellence in small wind power technology, it has a three blades rotor of 20.7 m of diameter and a swept area of 336 mq, also it has a synchronous electric generator with multipolar permanent magnets that reaches the rated power of 50 kW with just 45 rpm.
The bearing of nacelle take place thanks to a yaw system controlled by an ultrasounds anemometer that come from aeronautical design.

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The control of the speed of rotation, and consequentially of the power is possible thanks to the active pitch of blades, where the angle of incidence is determinated from an electromechanical system driven by PLC and Inverter.

In case of fault, the turbine includes an automatic internal security system that allows the blades to reach the wind direction and consequentially, stop the rotation of the rotor in less than one second.

The cables between the nacelle and the bottom of the tower are internal and there is an automatic system that doesn't allow the wrapping of the cables (allows until 3 consecutive clockwise and counterclockwise rotations) caused by the changement of the yaw.

Ely 50 is realized with high reliability components that guarantee the best perfomance, thanks to the possibility of customization and optimization of innovative solutions for eolic systems, totally ***made in Italy***.

The features of wingspan, with rotor's diameter of 20.7 m, guarantee the start of production with just 2,5 m/s of windspeed, reaching the rated power of 50 kW, with just 8,5 m/s of windspeed.

Those performances are allowed also by the active pitch system of Ely 50, which modifying the degree of the blades in function of the intensity of the wind, allows to adequate the quantity of swept area to optimize the production.

In addition to the pitch, also the yaw system is active, controlled by a PLC that manage the datas from ultrasound anemometer and from electronical devices in the nacelle.

The most innovative solution of Ely50 is the configuration of direct drive generator with permanent magnet, which means that the turbine doesn't need a rotation multiplier, but is directly linked to rotor.

Another feature of the generator, is represented by the low number of rotations required to reach the rated power: just 45rpm.Every technical and technological choice guarantees the less usury of mechanical parts, and make Ely50 the less noisy turbine of her range.

The converted energy in Three-phases for the connection to the national grid happen through an electronical device with back to back configuration, designed to satisfy the needs of eolic production.

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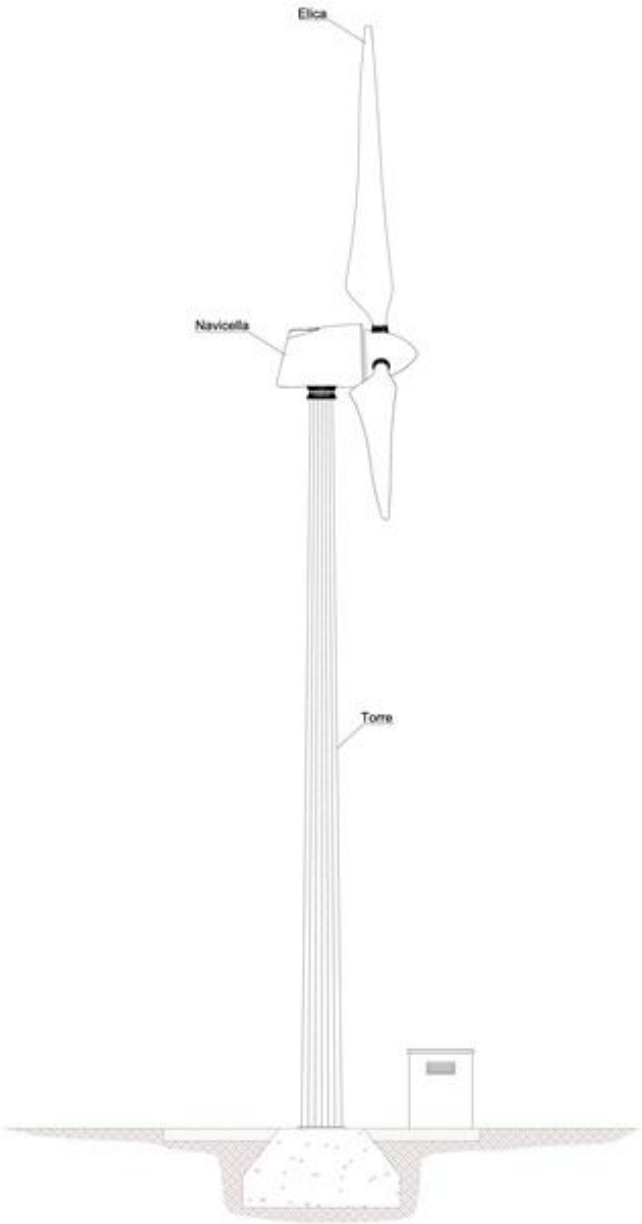
ELY 50 WIND TURBINE



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Below, the technical specifications of the turbine:

Rotor's Diameter	*20,7 m*
Blades	*3 pcs*
Direction	*Whatever*
Blade's material	*Fibreglass and epoxy resin*
Electronic conversion system	*Back to back cofiguration*
Rated power	*50kW*
Voltage	*400 V threephase*
Operating Windspeed	*2,2 – 25 m/s*
Start-up Speed	*2,5 m/s*
Rotation	*45 r/min*
Rated Windspeed	*8,5 m/s*
Generator	*Threephase alternator*
Range of temperatures	*From -20°C to +60°C*
Brake system	*Pitch control, hydraulic brake, electomagnetical brake*
Yaw system	*Active with electronical control system*
Speed adjustment	*Active pitch and electronical control systems*
Mutiplier of rotation	*Missing, start in Direct Drive*
Tower model	*24 m polygonal tower*

Yaw system

The yaw control is managed by PLC depending from datas which arrive from nacelle's sensors. Through a gear and a pinion, the turbine keeps the direction of the wind.

GENERATOR and INVERTER

Inverter and generator are built by the same Company, and are arranged in back to back mode, to optimize the interaction between devices avoiding dispersions and maximizing the production.

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Generator

Threephase synchronous generator with permanent magnets with 110 terminals, operating voltage 50 V – 530 V, max operatingvoltage 600 V, rated RPM 45, max. RPM 60, same manufacturer of inverter.

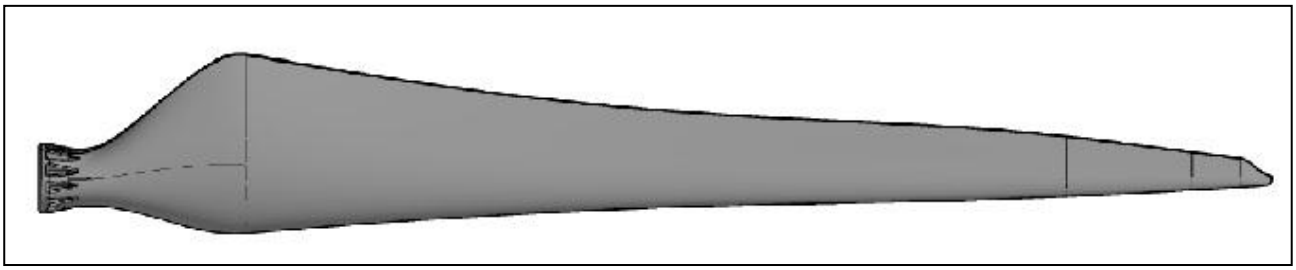
Inverter

Inverter in back to back mode, only one power curve during the process of conversion, synchronization to the grid with low rotations, speed control of generator through IGBT technology and PWM control, CEI 0-21 certified to direct connection to the grid.

Blades

The geometrical parameters of exclusive design offered by Ely50, has been chosen depending from determinate features:

- Low start-up windspeed (2,5 m/s);
- Resistence in extreme conditions;
- Noise reduction.



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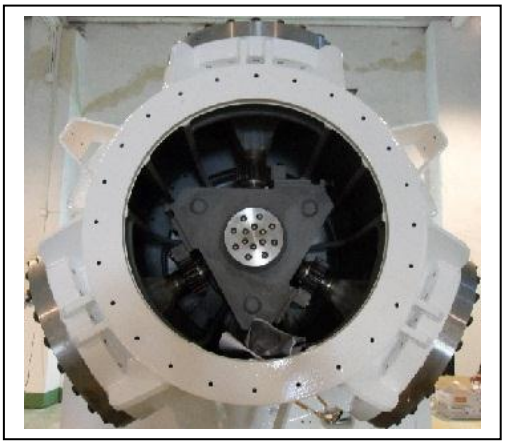
The structure, composed by fibreglass and epoxy resines and realized with infusion in vacuum-sealed molds, guarantees beyond the stability, the maximum precision in terms of balance.

Furthermore, in compliance with IEC61400 standard, the aerodynamic design guarantees a low noise level.

Bearing system of blades



The orientation control system (pitch), allows to reach, always the best angle of incidence of wind.

The mechanism researched and tuned by Ergycon, permits to obtain even minimum variations of the angle so is possible capitalise every wind capacity.

In addition, in case of black out or another fault, the same electromechanical control system, thanks to an internal security device, allows the emergency closing of the blades in "flag" mode, so the rotations can be stopped in just 0.8 seconds.

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Power Curve

All the above listed peculiarities, bestow to Ely50 the following power curve that expresses the power developed by the turbine in reasons to wind changements.

The power curve is under certification IEC 61400 procedure at ICIM institute. This curve is represented in graphical and table terms.

Velocity	Power
[m/s]	[kW]
0	0
1	0,104
2	0,700
3	2,200
4	4,900
5	9,400
6	15,900
7	32,700
7,5	40,800
8	48,800
8,5	50,500
9	50,500
	50,500
11	50,500
	50,500
13	50,500
	50,500
15	50,500
	50,500
17	50,500
	50,500
19	50,500
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21	50,500
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23	50,500
	50,500
25	50,500

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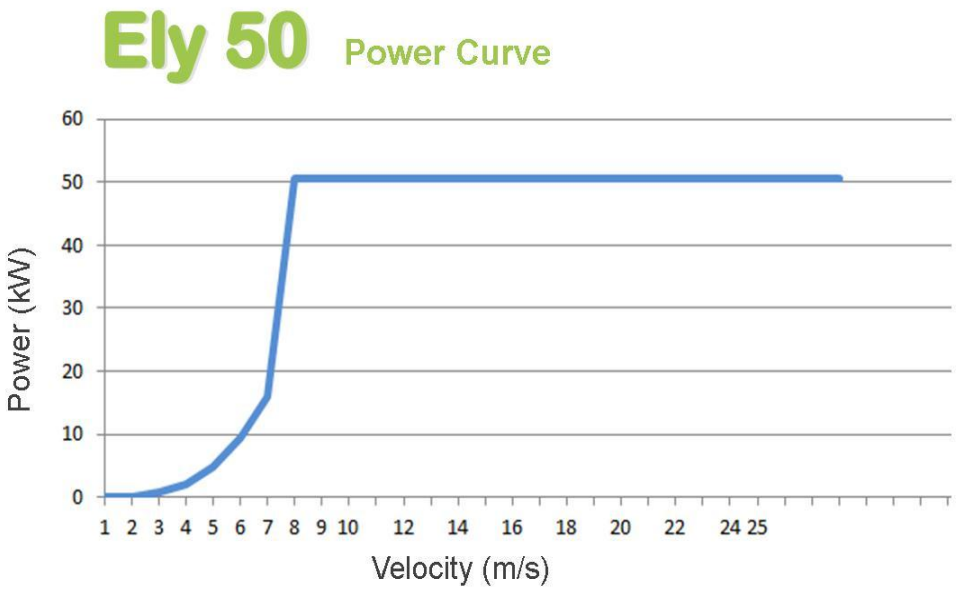

IEC 61400-12
Certification in progress, at ICIM Institute

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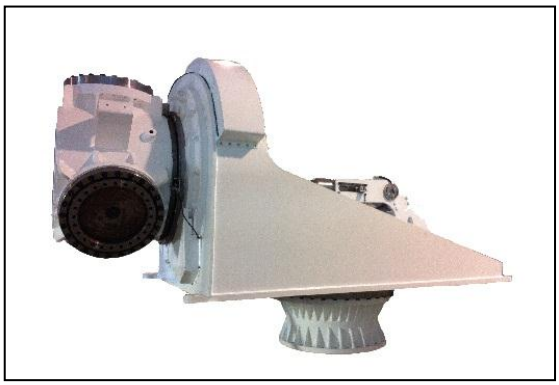
Frame



The frame of nacelle is totally realized in galvanized and varnished S235 JR steel.
All weldings and manufacturing devices, are done by specialized laboratories in compliance with ISO 4063 e DIN 18800-7 standards.

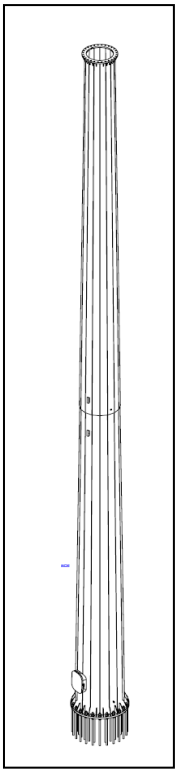
Cover and housing

The cover of Ely50 is composed by an ogive and a case both realized in fibreglass.

The ogive protect all the shifting parts of the rotor.

The structure and all internal components are covered by the case. The opening system, based on pneumatical supports, allows the entry of an operator for maintenance intervention.

Tower and foundations



The tower is conical with polygonal section (16 sides) and is obtained by S 355 JO steel in compliance with Uni En 10025 standard; the welding process guarantees the compliance with Iso 4063 e DIN 18800-7 standards; the structure is composed by two sections that must be combined with slip on joint method. In the lower section there is a little breach with an hold door, in the higher section there is a flange that will have diameter and holes that will perfectly match with the turbine.
The tower, with a diameter at the bottom 1.450 mm and on the top of 920 mm, is supplied in hot dip galvanized steel, in compliance with Uni En 1416/99 standard.

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Anchor is inserted in plinth and bottom flange, and welded with the lower section of the tower.

The plinth is structured basing on loads of the turbine and also, depends from the geological features that will be examinated in executive step of the project, and in compliance with applicable regulations.

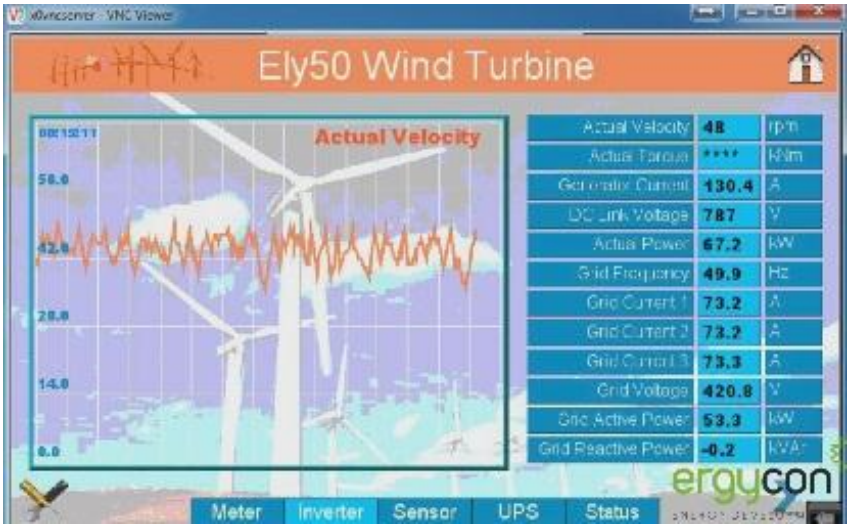
Remote control system

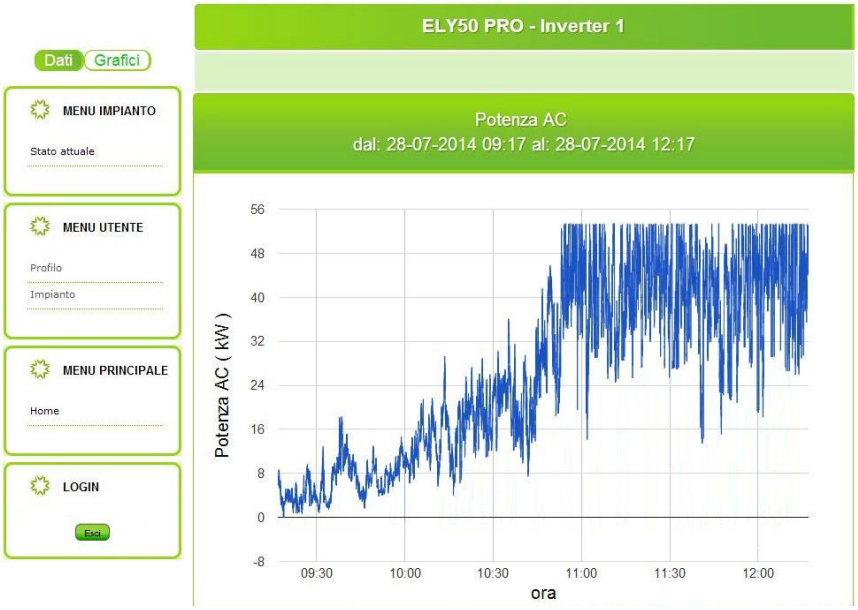
An advanced tele control system is included with Ely 50 , that permits the management and an optimization of the wind turbine through a web-browser. There is no need to install a client software on user's personal computer.

This system allows:

- Datas of production capture and storage and informations about the status of generator and inverter;
- Control of electromechanical components operation;
- Remote control of installations.
- Report and analysis of datas;
- Alarms management and security control.
- Remote control via pc, web-browser ,smart-phone, tablet;
- Technical assistance and help-desk.

In control cabinet there is an ADSL internet connection. In case of ADSL connection missing, there is an hsdpa Router with sim card and external antenna that allows internet connection.





"The company can modify at whatever, technical and aesthetical features."

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