

Wind Turbines



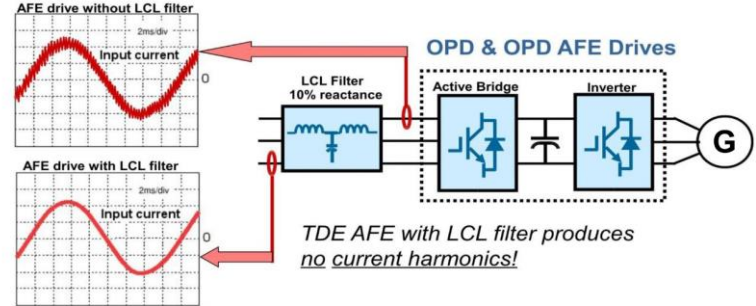
AFE & Inverter

OPDE

Energy Conversion System

Double fed AFE and inverter system allows to control the generator in the best way.

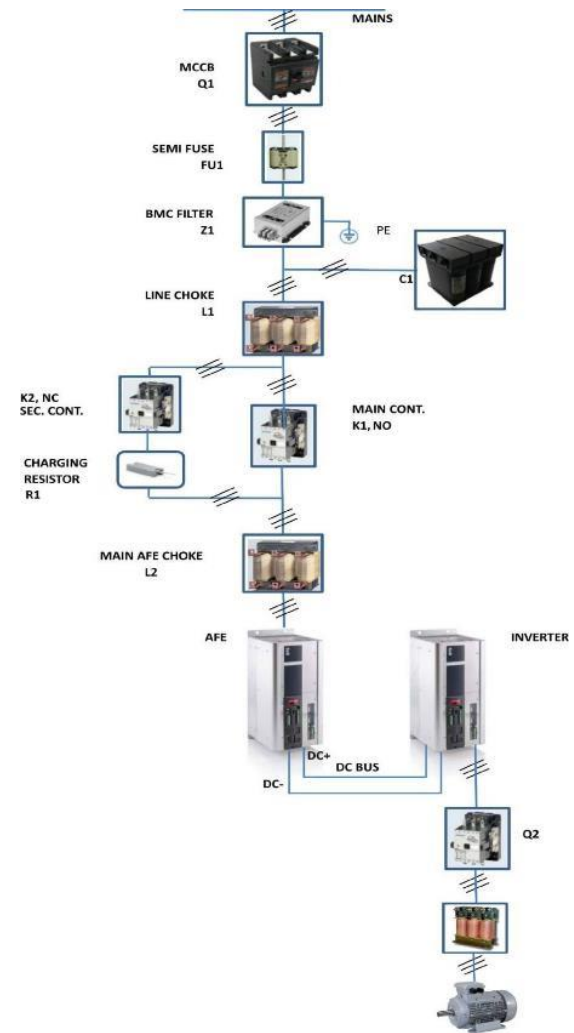
In this electronic system the DC bus created by the AFE recovers the rotoric power of the generator directly to the grid and the regulation of the inverter allows to control the wind turbine at any speed, in every working phase.



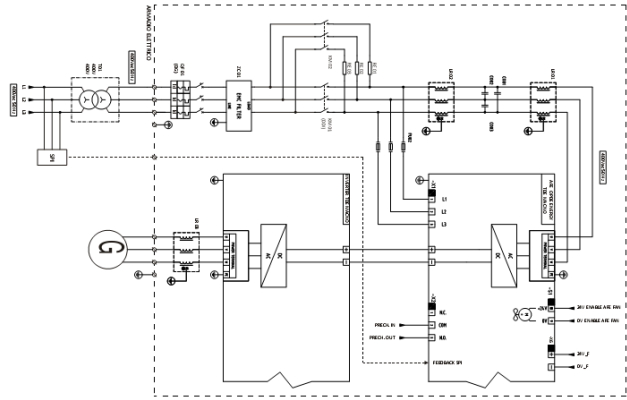
Components of the System

BDF Digital offers the power components:

- ▶ AFE (Active Front End drive)
- ▶ Soft start resistors
- ▶ EMC filters
- ▶ LCL clean power filters for THD < 3%
- ▶ INVERTER
- ▶ Inductance (generator side)



Electric Cabinet



Generators

Control of Rotating Generators

Thanks to BDF Digital's know how and expertise in the control of electric motors in industrial applications, we can control any type of generators with or without speed sensor:

- ▶ “Direct drive” permanent magnet synchronous generators up to 160 poles
- ▶ Traditional or vector controlled asynchronous generators
- ▶ Hybrid reluctance generators



Generators

Control of Rotating Generators

To increase the performances we developed a new application software: STARTER/BY PASS.

It allows to disconnect the generators from the electronic part during the working mode at normal speed 50Hz.

The software also connects the generator directly in parallel to the grid, reducing in this way the losses at 50Hz and minimizing the peak current in the start up phase.



Main Features

Control of Rotating Machines

- ▶ Speed and torque control of the generator
- ▶ Flying restart of the rotating machine
- ▶ Function STARTER/BY PASS both in the asynchronous and in the synchronous as well and viceversa: back to the inverter control
- ▶ Automatic Cosphi rephasing with the AFE in run mode without the use of capacitor banks
- ▶ Management of the exceeding energy and of the plant out of control, thanks to electronic circuits and dissipative braking resistors
- ▶ Control of rotating machines in sensorless FOC and defluxing modality



Security System

In case of Power Failure

In case of power failure BDF Digital solution allows to switch from the main power supply line to dissipative resistors, when foreseen by the customers.

It brakes the generator and the wind turbine through a mechanic brake mounted on the fly-wheel; in this way you can avoid the not controlled overspeed of the turbine and possible mechanical and electrical failures.

If there are no resistors, the AFE detects the power failure and through some alarm signals grants the opening of the contactor between the generator and the inverter.

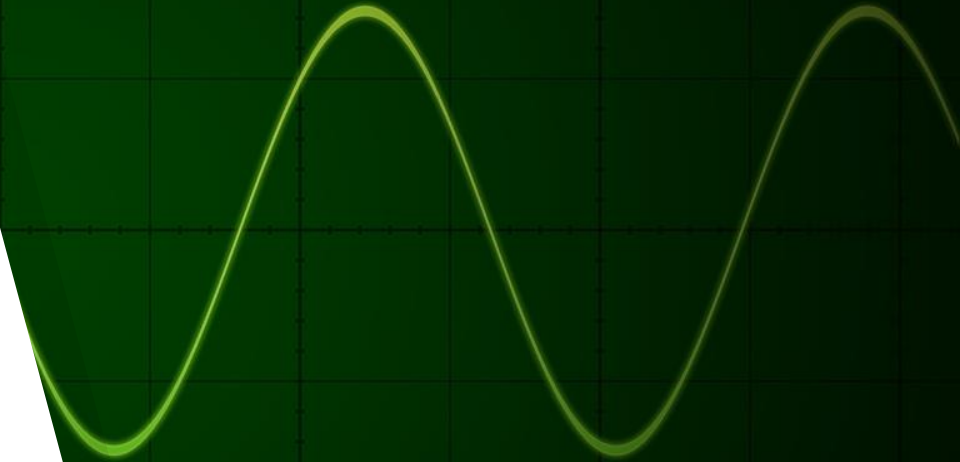
Monitoring

Easy and Fast

The info exchange between the PLC, the installation control and the inverter can be sent via Profibus, EtherNET or Modbus RTU.

Diagnosis and PC configuration connections are also possible through the local or remote keypad (optional).

Thanks to OPDexplorer, the monitor and supervision software of the drives, all the parameters and electric values are always controlled. Via teamviewer (internet connection) it is also possible to do remote control.

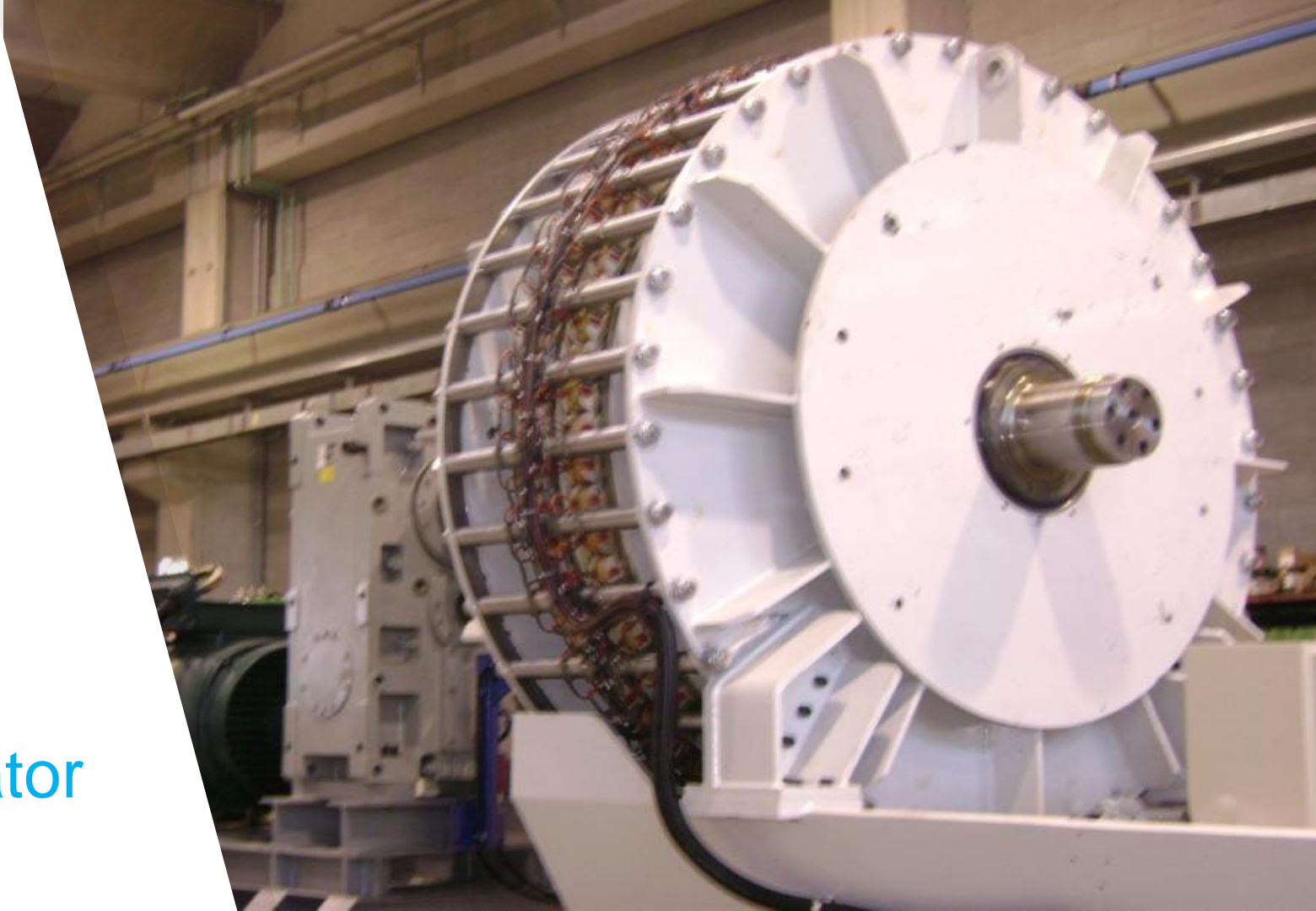


Main References

- ▶ **53,5kW Plant** with synchronous generator
- ▶ **N° 5 100 kW plant** with synchronous generator
- ▶ **N° 3 30kW plant** with synchronous generator
- ▶ **250kW Plant** with synchronous generator
- ▶ **N° 2 4kW plant** with synchronous generator
- ▶ **N° 16 10kW plant** mono-phase with synchronous generator
- ▶ **2 MW plant** with synchronous 200kW generators



Generator



Turbine



Cabinet



Plant





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