

ContainerPower Energy Solutions

Three-level conversion wind power generation system



Overview

What are the different types of wind turbine generation systems?

Two typical configurations of power electronic converter-based wind turbine generation systems have been widely adopted in modern wind power applications: type 3 wind generation systems with doubly fed induction generators (DFIGs) (Fig. 2a); and type 4 wind generation systems with permanent magnet synchronous generators (PMSGs) (Fig. 2b).

What are the components of a wind generation system?

In wind generation systems, the wind turbine, the electrical generator and the grid-interfaced converters are three key components that have been developed in the past 30 years 32, 33. The turbine converts wind energy into mechanical energy.

Do power electronics converters work on wind turbines?

As power electronics develop, power electronics converters are increasingly being equipped on wind generation systems 35, 36; for example, back-to-back converters are equipped on both type 3 and type 4 wind turbine generators.

Why do wind power converters need a parallel connection?

As the power rating of wind energy conversion system increases, high-voltage or large-current is required for the power converters. Considering the limited power rating of power switch devices, the parallel or series connection of several converters would be the solutions.

Should converter-interfaced wind power generators be regulated?

Expanding the role of converter-interfaced wind power generators in future power systems from passively following the power system to actively participating in its regulation offers frequency support functionality, which is beneficial for enhancing the frequency stability of power systems with high penetration of wind and low inertia.

How can a wind generation system be regulated?

One approach involves operating the wind generation system with power reserve, achieved by shifting the MPPT reference. In this approach, the pitch angle can be regulated based on frequency deviations, enabling power reserves to participate in primary frequency control 156.

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