Power DC Bus Connection Method

Overview

This whitepaper will look at the main advantages with use of common DC bus configuration for AC drive systems and why they are increasingly the choice for implementation to meet today''s needs.

Key Takeaways

DC bus connection methods include common DC bus configurations, isolated bidirectional DC/DC converters, and dual active bridge (DAB) topologies, enabling efficient power transfer, bidirectional flow, and energy recovery.

Common DC Bus Configuration

A common DC bus connects multiple AC drives or inverters to a single DC link, allowing energy sharing between drives and reducing the need for individual rectifiers for each drive. This configuration is widely used in industrial machinery and motion control systems. Key advantages include: Energy efficiency: Regenerative energy from one drive can be reused by others, reducing energy loss.

Cost savings: Fewer rectifiers and reduced component count lower system costs. Design flexibility: Multiple inverters can be connected to a single DC bus for coordinated control. Dynamic braking or energy recovery units are often integrated to handle regenerative energy during rapid stopping or torque reversal.

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Isolated Bidirectional DC/DC ConvertersFor battery energy storage systems (ESS) or high-voltage DC buses, isolated bidirectional DC/DC converters are used to safely charge and discharge batteries while maintaining electrical isolation. The dual active bridge (DAB) is a common topology: Bidirectional power flow: Power can flow from the DC bus to the battery or vice versa. Phase-shift control: The power transfer is controlled by adjusting the phase angle between primary and secondary switches.

Soft start algorithms: Reduce inrush current during initial connection to prevent overcurrent and device stress.

DA

B converters are particularly suitable for microgrids and distributed energy systems, allowing efficient integration of renewable energy sources.

DC Bus Connection in Microgrids and Marine Systems

In D

C microgrids, DC buses connect distributed energy sources, storage, and loads. Key considerations include: Bidirectional energy transfer: Ensures power can flow in both directions between storage and loads. Voltage regulation: Phase-shift modulation or feedback control maintains stable DC bus voltage.

Transient protection: Soft start and inrush current suppression prevent damage to converters and capacitors. For marine and offshore applications, DC distribution systems offer flexible equipment arrangement, improved fuel efficiency, and reduced equipment size and weight. Safety and reliability are critical, and standards recommend careful design, installation, and testing of DC bus connections.

Summary

Power D

C bus connection methods vary depending on the application: Common DC bus: Ideal for multiple AC drives in industrial systems, enabling energy sharing and cost savings. Isolated bidirectional DC/DC (DAB): Used in ESS and microgrids for safe, bidirectional power flow with soft start control.

Marine/offshore D

C systems: Focus on flexible, efficient, and safe DC distribution for propulsion and onboard loads. Selecting the appropriate DC bus connection method requires considering power flow direction, voltage levels, energy storage integration, and transient protection to ensure efficiency, safety, and reliability.

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Article Content

PowerFlex 755 High Power drive DC Bus Connection

Further to the wiring data in chapter 4 of the PowerFlex 750-Series AC Drives Installation Instructions, Publication 750-IN001, the attached document shows the locations of the bus bar

Drives in Common Bus Configurations with PowerFlex 755TM Bus ...

PDF file

Common DC Bus - New Technologies for multi-axis servo ... - Siemens

This whitepaper will look at the main advantages with use of common DC bus configuration for AC drive systems and why they are increasingly the choice for implementation to meet today''s needs. The

Bus Bar Design for High-Power Inverters

Type C consists of a flat bus bar connecting the input and output with the DC-link capacitor, while type E is shaped around the capacitors. In most cases, the ability to share the heat sink between the power

Common DC Bus

An increasing number of drive systems in a wide range of industrial applications and power ranges are being configured today in a common DC bus configuration. This drive system configuration provides

Common Bus and Line Regeneration

Sometimes called a shared bus, a common bus is established by simply interlinking the DC bus between VFDs via a fused connection (Figure 1). The key benefit of a common bus is the sharing and

Two DC busses for one AC application, how to balance/share

Using two synchronized inverters is the safer and more reliable approach. By having each DC bus feed its own inverter and synchronizing the outputs, you can combine the AC outputs to

ATV31 DC Bus Connection Guidelines

This document provides recommendations for connecting ATV31 variable speed drives to a common DC bus voltage source. The key points are: - Each drive must be fused to isolate faults and prevent

DC bus pre-charge from the AC mains

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This note explains how to execute the DC bus pre-charge for an inverter connected to the AC mains as to avoid destructive inrush currents.

Maximum power extraction and DC-Bus voltage regulation in grid

The DC-Bus voltage will reduce the substantially if the output power is raised in steps, for example, since the energy stored in the capacitor is inadequate to maintain the DC-Bus voltage.

Design of DC bus voltage high dynamic performance control

The DC bus voltage in single-phase converters inherently exhibits a second harmonic ripple. To accurately track the current reference value, notch filters are typically incorporated into the

Architecture of the dc power bus communication system.

A new type of power line carrier communication (PLC) technique is developed to reduce cable requirements for robotic and vehicular systems. An electrical line connecting a dc power supply to

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Technical inquiry: https://cgweb.co.za/project-enquiry.html

This document is for preliminary research. Verify specifications against current standards, product documentation and project requirements.

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