DC bus power supply method



Overview

In a standard servo architecture, incoming AC power enters the drive and is immediately converted into direct current (DC) by a rectifier stage.

Key Takeaways

DC bus power can be supplied using rectifiers, pre-charge circuits, common bus systems, or isolated bootstrap techniques depending on the application and protection requirements. AC-to-DC RectificationThe most common method of supplying a DC bus is through AC-to-DC rectifiers, which convert single-phase or three-phase AC input into a stable DC voltage. Single-phase rectifiers can power three-phase drives, while three-phase rectifiers are typically used for larger systems.

D

C bus capacitors are added to reduce voltage ripple and improve immunity to sags, and filters can limit spikes and ringing in the bus voltage. Some rectifiers include pre-charge functionality to safely ramp up the DC bus voltage before full operation.

Pre-

Charge CircuitsPre-charging is essential in Voltage Source Converters (VSCs) to prevent high inrush currents when connecting the DC bus to the AC mains. A typical pre-charge circuit uses resistors and relays to gradually charge the DC bus capacitors. Once the bus reaches the required voltage, the resistors are bypassed, allowing normal operation.

This method protects power semiconductors and ensures safe startup.

© 2026 KENHARDT OPTICAL NETWORKS - All rights reserved

Common Bus Systems

In multi-drive systems, a common DC bus can supply multiple drives from a single rectifier, reducing cost and component count. Sharing or isolation diodes allow multiple drives to utilize a single braking transistor or regenerative unit. This approach also reduces the need for excess braking or power supply components, as not all drives operate simultaneously.

Isolated DC+ Power SupplyFor applications requiring isolated control circuits, such as overcurrent protection on the DC+ side, a bootstrap charge pump or a small transformer can generate a stable isolated supply. This method is cost-effective and suitable for high-voltage industrial and automotive systems, providing fast response and accurate threshold detection for protection circuits. SummaryDC bus power supply methods are chosen based on system size, safety, and operational requirements.

Rectifiers with DC bus capacitors are standard for general power conversion, pre-charge circuits prevent inrush currents, common bus systems optimize multi-drive setups, and isolated bootstrap or transformer-based supplies support sensitive control and protection electronics. Each method ensures stable DC bus operation while protecting components and improving system efficiency.

Article Content

DC Bus in Servo Drive Solutions Explained

In a standard servo architecture, incoming AC power enters the drive and is immediately converted into direct current (DC) by a rectifier stage. This newly created DC power sits on the DC bus a low

Design of DC bus voltage high dynamic performance control

This paper presents an enhanced DC bus voltage extraction algorithm that estimates the second harmonic component in the DC bus voltage using system parameters and variables, without

Common DC Bus

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

DC bus pre-charge from the AC mains

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.

© 2026 KENHARDT OPTICAL NETWORKS - All rights reserved

DC+ Bus Power-Supply Solution Using Bootstrap Charge Pump

The power supply on DC+ for overcurrent protection can be generating by either adding a transformer or adding an additional secondary winding to an existing transformer.

Bus Bar Design for High-Power Inverters

Based on different application requirements, packages of power modules and DC-link capacitors, five bus bar layouts are designed. The current density, current distribution, and par-asitic parameters of

Isolated Bidirectional DCDC in PCS

PCS can convert the energy stored in the bus into AC power and supply the power to the grid or the user''s device. PCS is mainly composed of bidirectional AC/DC, bidirectional DC/DC, and so forth.

Design of a PV fed Hybrid DC Bus Power Supply with the High

In view of today''s state of art and future requirement, this paper proposes the design and development of high power quality DC bus supply system which provides a regulated bus voltage,

A DC-DC Converter Reuse-Based Double-Line Frequency Ripple

However, startup inrush current and backflow ripple voltage significantly impact the stability of DC power supply equipment. This paper proposes a DC-DC circuit-reuse method with double-line

DC-bus voltage balancing control for 3-level DC/DC converters in ...

Furthermore, some researchers focus on how to reduce negative effects of the dc-bus voltage balancing, such as efficiency. Generally, current research is mainly for 3-level DC/AC

DC Bus Stability Improvement Using Dynamic Voltage Feedback

This paper proposes a dynamic voltage feedback model predictive control (MPC) method for a motor-driven system with a Supercapacitor (SC). This method is suitable for improving the

Common DC Bus

A common bus power supply can also allow the use of single phase AC power with 3-phase motors without having to oversize the drive. The M3712 can create a common DC bus from single phase

An Overview of Direct Current Distribution System Architectures

© 2026 KENHARDT OPTICAL NETWORKS - All rights reserved

A DC distribution system can be considered a DC bus connected to various sources (AC grid, renewables, and energy storage systems) and loads (electronics, lighting, variable speed

Bonitron | Common Bus & Power Supply Solutions for AC Drives

Common DC bus configurations create advantages including cost savings, greater efficiency, and a more versatile system design. There are multiple methods of creating common bus systems. One

what is DC bus?

A DC bus is a common term used in electrical engineering to refer to a power distribution system that uses direct current (DC) voltage. It is a central power supply that distributes electrical energy to

DC+ Bus Power-Supply Solution Using Bootstrap Charge Pump

ABSTRACT DC+ (DC bus positive side) overcurrent protection is widely used in industrial systems. Compared with the traditional discrete solution, the isolated comparator (AMC23C11) can achieve

A Centralized DC Bus Voltage Control Scheme for Isolated DC-DC ...

To ensure uninterrupted power supply for critical equipment and to maintain the DC system stability, multiple isolated DC-DC converters combined with renewable sources are

Common DC Bus

In a common DC bus drive system, the regenerative energy sent back can be utilized to power other motoring axis through the shared DC bus design. This can eliminate the wasting of energy and

Related Video Reference

This video was associated with the source search result. Verify technical details against current product documentation and project requirements.

© 2026 KENHARDT OPTICAL NETWORKS - All rights reserved

Contact Us

Continue your research online:

Website: https://kenhardtprimary.co.za
Technical inquiry: https://kenhardtprimary.co.za/project-desk.html
African project coordination: Century City, Cape Town, Western Cape, South Africa

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

© 2026 KENHARDT OPTICAL NETWORKS - All rights reserved