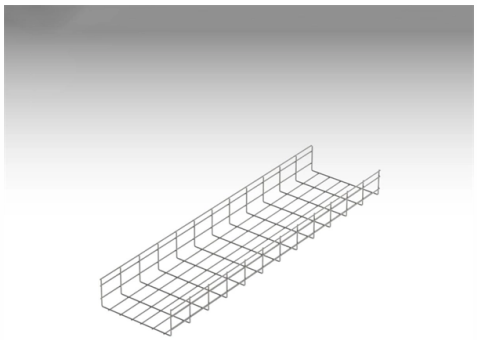
Integrated bidirectional power supply



Grid Cable for marine and offshore applications

Overview

A bidirectional power supply can both source power to a device and sink/absorb power from it, enabling charge/discharge workflows without switching between separate instruments.

Key Takeaways

Integrated bidirectional power supplies can both deliver and recover energy, enabling high-efficiency, flexible, and regenerative power management for modern energy systems.

Overview

An integrated bidirectional power supply is a programmable device capable of sourcing (delivering) and sinking (absorbing) electrical energy within a single unit. Unlike traditional unidirectional power supplies that only provide power, bidirectional systems can recover unused energy and feed it back into the grid or internal energy bus, achieving regenerative efficiencies of up to 96%. This dual functionality reduces energy waste, heat generation, and operational costs while supporting environmentally friendly energy management.

Key Components and Operation

Bidirectional Converters: Core AC/DC and DC/AC converters allow seamless energy transfer between AC and DC systems, enabling both grid interaction and device charging/discharging. Digital Control Systems: High-level controllers manage power references, while low-level subsystems regulate voltage and current for precise, stable operation. Energy Recovery Circuits: Absorbed energy is converted back to AC or DC and returned to the grid or facility, minimizing losses.

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Protection Mechanisms: Overvoltage, overcurrent, and thermal protections ensure safe and reliable operation.

Advantages

High Efficiency: Regenerative operation can exceed 90–96%, significantly reducing energy losses. Flexibility: Auto-ranging voltage and current outputs allow operation across a wide range of devices and applications. Compact Integration: Combines power supply and electronic load in a single chassis, reducing equipment footprint and complexity.

Adaptability: Supports multiple operating modes such as grid-following, droop, and isochronous for diverse system requirements.

Applications

Electric Vehicle (EV) Charging: Enables Vehicle-to-Grid (V2G) and Vehicle-to-Home (V2H) energy exchange, allowing EVs to discharge energy during peak demand and recharge during off-peak hours. Renewable Energy Systems: Facilitates energy storage integration and efficient power flow management in solar, wind, and hybrid systems. Battery Testing and Simulation: Provides precise source and sink capabilities for R&D, quality assurance, and battery emulation.

Smart Grids and Energy Storage: Supports bidirectional energy flow, stabilizing voltage and current while enabling regenerative energy recovery.

Conclusion

Integrated bidirectional power supply technology represents a critical advancement in energy management, combining high efficiency, regenerative capabilities, and flexible operation. Its ability to source and sink power within a single unit makes it indispensable for modern applications in EV infrastructure, renewable energy, and advanced testing environments, while reducing energy waste and operational costs.

Article Content

Bidirectional Power Supply

The EA-PSB Series bidirectional DC programmable power supply has an integrated, regenerative electronic load and therefor can sink (absorb) current and recover up to 96% of current, returning it to

EA-PSB Bidirectional Power Supplies

EA supplies can parallel easily up to 3.84MW in output power, at up to 2000VDC. They come standard with a built-in function generator capable of creating

Understanding Bidirectional Power Supply

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With features like regenerative energy recovery, auto-ranging output, and easy integration with PLCs and PCs, GTAKE''s bidirectional power supplies

Chroma 62000D Series Bidirectional DC Power Supply

The Chroma 62000D boasts a bidirectional switch-mode power supply design that offers two-quadrant operation with positive current/positive voltage as well as negative current/positive voltage, enabling

What Is an EA Bidirectional Power Supply and How

By combining a DC power supply and an electronic load into a single unit, these devices can both source power to a device under test (DUT) and sink

Bidirectional and Regenerative Systems

A bidirectional power supply can both source power to a device and sink/absorb power from it, enabling charge/discharge workflows without switching between separate instruments.

Bidirectional DC power supplies | Stand-alone devices or cabinet

Our bidirectional power supplies provide precise control and flexibility to simulate different battery conditions, resulting in improved designs and higher efficiency. Our modular, bidirectional power

Bidirectional DC power supply (source/load)

The N35500 series is a bidirectional programmable DC power supply with dual-quadrant functionality, integrating a bidirectional power source and regenerative load to deliver and absorb power.

The Rise of GaN Bidirectional Switches

GaN switches, with their high-frequency, low-loss operation, are enabling new power supply topologies. In 2026, we will likely see GaN-based power factor correction (PFC) stages and

Press Release | The smarter E AWARD 2026: Clever, Bold, Visionary

The bidirectional EV charger edsn is a V2G-capable DC charging device. It uses OCPP and Modbus to form an important interface between the household power supply, electric vehicle and

Balcony Solar System with Storage | Flexible. Safe.

With the Indevolt BK1600, you are bringing more than just a balcony solar power system into your home – you are experiencing independence, sustainability and

DC-to-DC converter

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Before the development of power semiconductors, one way to convert the voltage of a DC supply to a higher voltage, for low-power applications, was to convert it to AC by using a vibrator, then by a step

DC test power supply, Bidirectional DC test power

DC test power supply, Bidirectional DC test power supply, Battery simulator, AC variable frequency power supply,Wocen Power has been focusing on the field of

The size of the Bidirectional DC Power Supply Market ...

The global "Bidirectional DC Power Supply Market" is expected to witness a compound annual growth rate (CAGR) of 4.5% between 2026 and 2033.

Spain Home V2H Power Supply System Market: Industry Dynamics

Which growth opportunities are emerging in Spain Home V2H Power Supply System Market? The integration of Home V2H systems with residential solar installations represents a significant frontier

Sungrow Presents PowerMatrix™ at Intersolar Europe 2026, Enabling ...

It enables key capabilities for next-generation power systems, including multi-source integration, bidirectional power flow, flexible dispatch, and high system reliability.

Infypower – Power Electronics & Smart Energy Solutions

The V2H/V2G technology enables smart bidirectional energy flow between EVs, buildings, and the grid-turning EVs into mobile energy storage. With local or remote EMS integration, it helps reduce your

Winners of The Smarter E Award 2026 revealed in Munich

Exeron CheckMate Exeron CheckMate is a bidirectional inverter designed for supply-scale battery energy storage systems (BESS). It''s available in two variants, both boasting a power

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