

DCS System UPS Power Supply Configuration Requirements



Overview

Introduction The CENTUM VP is a distributed control system (abbreviated as DCS) for small to large plants.

Key Takeaways

A DCS requires a reliable UPS system with sufficient capacity, redundancy, and isolation to ensure continuous operation, data integrity, and safety during power disturbances. Key UPS Requirements for DCS

1. UPS Architecture and Components A typical UPS for a DCS includes a rectifier module, charging module, battery bank, inverter module, automatic bypass switch, and manual maintenance bypass switch. The rectifier converts AC to DC, charges the batteries, and the inverter converts DC back to high-quality AC for the DCS load. Automatic and manual bypass switches allow uninterrupted power during maintenance or component failures . 2. Redundancy and Dual AC Inputs

- Dual AC Incoming Lines with Single UPS: The UPS can switch automatically between two AC inputs if one fails, ensuring continuous power to the DCS .
- Dual AC Inlet with Parallel UPS: Two UPS units of equal capacity can operate in parallel, sharing the load. If one UPS fails, the other can carry the full load, though load reduction may be necessary .
- Redundant UPS configurations (N+1 or 2N) are recommended for critical DCS installations to enhance reliability . 3. Capacity and Load Considerations

- UPS sizing should account for the full DCS load plus a margin for unexpected spikes.
 - Battery autonomy should match operational requirements, e.g., 30 minutes for DCS systems, allowing safe shutdown or generator startup .
 - Calculate UPS rating based on VA or Watt ratings of all critical components, including controllers, I/O modules, HMIs, and auxiliary devices .
- #### 4. Isolation and Safety

- DCS UPS should ideally be independent from SIS (Safety Instrumented Systems) to prevent cascading failures and ensure safety-critical functions remain operational .
- Electrical isolation reduces the risk of power anomalies affecting multiple systems.

5. Environmental and Operational Considerations

- UPS systems must be robust for industrial environments, including temperature extremes, humidity, and potential explosive atmospheres .
 - Signal conditioning, I/O module specifications, and remote I/O drops should be considered to maintain reliable operation under UPS power .
- #### 6. Best Practices
- Use high-quality sine wave output from the inverter to protect sensitive electronics.
 - Implement automatic and manual bypass switches for maintenance without interrupting DCS operation.
 - Conduct a risk assessment to determine whether DCS can share a UPS with other systems like GDS, considering system criticality and operational impact .
 - Ensure battery maintenance and monitoring to prevent unexpected failures.

Summary

A DCS UPS system must provide continuous, high-quality power with redundancy, proper sizing, and isolation from other critical systems. Dual AC inputs, parallel UPS configurations, and battery autonomy are essential to maintain process stability, data integrity, and operator safety in industrial environments .

Article Content

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Research on UPS Power Supply Configuration of DCS System

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UPS DESIGN CONFIGURATIONS

Each UPS is capable of carrying the entire critical load and supports its own independent distribution system with no power

The Importance of Independent UPS for SIS, DCS, and GDS in

While DCS and GDS may share a UPS in low-risk scenarios, SIS should always have a fully independent power source. Following

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The different parts of DCS system layout are processors, marshalling & system cabinets,

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Eaton UPS fundamentals handbook

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The UPS system design configuration chosen for the application directly impacts the availability of the critical equipment it supports.

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DCS system redundancy usually includes power supply redundancy, controller redundancy, communication

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