

Technical Requirements for Intelligent Integrated Distribution Boxes



Overview

Technical Details and Application Scheme of Industrial Intelligent. It can be flexibly configured according to the power consumption requirements of diff.

Key Takeaways

Intelligent integrated distribution boxes must meet modular design, safety protection, real-time monitoring, and standardized compliance requirements to ensure reliable, efficient, and intelligent power distribution. System Architecture and Design

Intelligent integrated distribution boxes are designed with a modular architecture, integrating main circuit protection, secondary control, and signal monitoring. Each module can be flexibly configured according to the power consumption and application scenario, supporting industrial production, commercial buildings, and public facilities . The system typically includes a common power supply module, main and branch intelligent circuit breakers, a central processing unit (CPU), and PCB-based parallel wiring for data and power communication between devices .

Functional Requirements

Key technical functions include:

- Protection: Overload, short circuit, leakage, overvoltage, undervoltage, and phase imbalance protection .

- **Monitoring and Control:** Real-time measurement of voltage, current, temperature, and power quality; remote control of switches and capacitors; three-phase imbalance adjustment; and fault detection with automated reporting .
- **Energy Management:** Data collection for energy consumption analysis, reactive power compensation, harmonic control, and integration with smart grid systems via GPRS or optical fiber .

- **Safety Features:** Rainproof, dustproof, anti-theft, anti-leakage, anti-lightning, and electromagnetic interference protection .

Component and Installation Standards

- **Standardized Components:** Use of standard guide rails, elastic contact pieces, and PCB circuit boards to ensure reliable electrical connections and independent feedback to the CPU .

- **Enclosure Protection:** Compliance with IP44 or higher for outdoor installations, ensuring safe operation under environmental stress .

- **Installation Requirements:** Typically installed at low-voltage ends of transformers (≤ 500 kVA) or in urban/rural power grids, with altitude limits not exceeding 2,000 meters above sea level .

Compliance and Testing

The State Grid Corporation's corporate standard Q/GDW 11221-2023 specifies technical requirements for low-voltage integrated distribution boxes, including:

- Product design principles, component selection, and sample processing.
- Test items, methods, and inspection requirements for safety, reliability, and performance.
- Specifications for intelligent fusion terminals, modular capacitors, and SVG rails/connectors .
- Guidelines for on-site inspection and standardized selection tables for customized solutions .

Communication and Integration

Intelligent distribution boxes must support data communication with control centers, enabling remote monitoring, parameter adjustment, and fault management. Integration with smart grid systems allows for active management, moving beyond passive protection to optimize energy efficiency and operational reliability .

Summary

In summary, the technical requirements for intelligent integrated distribution boxes encompass:

- Modular and flexible design for diverse applications.

- Comprehensive protection and monitoring for electrical safety.
- Energy management and smart grid integration.
- Compliance with national standards (e.g., Q/GDW 11221-2023) and environmental protection requirements.
- Reliable communication interfaces for remote control and data collection. These requirements ensure that intelligent integrated distribution boxes provide safe, efficient, and intelligent power distribution suitable for modern industrial, commercial, and public infrastructure applications.

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