

RIVO MULTITRADE OPTICAL SYSTEMS

Installation of three-level power distribution box on construction site



Overview

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Key Takeaways

A three-level power distribution system at a construction site uses a main distribution box, sub-distribution boxes, and switch boxes to safely and efficiently deliver electricity to all equipment and facilities. Overview of the Three-Level System

A typical construction site power distribution system is structured in three tiers:

- **Main Distribution Box (Primary Level):** Receives three-phase power, neutral, and grounding from the transformer or main supply. It acts as the central hub for power aggregation, featuring internal metering, protection devices, and copper busbar connections suitable for outdoor use .
- **Sub-Distribution Boxes (Secondary Level):** Branch out power from the main box to specific construction areas. These boxes often have double-door designs, powder-coated casings, and rainproof tops. They redistribute power to multiple switch boxes and equipment, maintaining three-phase load balance .



- **Switch Boxes (Tertiary Level):** Located close to the end-use equipment, these boxes contain circuit breakers and residual current devices for independent control and protection of individual machines or tools .

Installation Guidelines

- **Positioning:** Place the main distribution box near the transformer or external power supply. Sub-distribution boxes should be centrally located within areas of concentrated equipment, and switch boxes should be installed within 3 meters of the equipment they control .
- **Load Management:** Ensure three-phase load balance. Separate circuits for power and lighting are recommended, with dedicated switch boxes for each piece of equipment .
- **Distance Limits:** The distance between sub-distribution and switch boxes should not exceed 30 meters to prevent voltage drop and ensure safety .
- **Environmental Considerations:** Install boxes in ventilated, dry areas away from harmful gases, liquids, heat sources, or vibration. Provide sufficient clearance for operation and maintenance .
- **Construction and Materials:** Use iron or high-quality insulating materials with a minimum thickness of 1.5 mm. Internal mounting boards should be metal or non-wood insulation .
- **Safety Measures:** All boxes should be numbered, labeled, and equipped with locks. Fixed boxes should have rainproof and anti-smash protection. Power should be cut off when not in use .

Electrical Planning

- **Load Calculation:** Determine rated power, inrush currents, duty cycles, and diversity factors for all equipment .
- **Voltage and Network Type:** Typically, three-phase 400 V for heavy machinery and 230 V for small consumers .
- **Cable Sizing:** Use adequate conductor cross-sections and limit cable lengths to reduce voltage drop .
- **Reserves:** Plan for additional capacity to accommodate peak loads or extra equipment .

Summary

A properly designed three-level power distribution system ensures safe, reliable, and efficient electricity delivery across a construction site. By following tiered distribution, correct positioning, load balancing, environmental protection, and safety regulations, construction teams can minimize downtime, prevent accidents, and maintain compliance with electrical standards .

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