

500 kVA Compact Substation



| | |
|------------------------------|--|
| Model: | |
| OEM and ODM Services: | Available |
| Enclosure: | PINEELE standard |
| Brand: | PINEELE, a Brand Under ZHENGXI |
| Form: | All- packaged Type |
| Scope of Application: | Suitable for industrial power distribution, voltage stabilization, and transformer protection. Widely used in commercial buildings, manufacturing plants, and utility substations. |
| Reviewed By: | Zheng Ji, Senior Electrical Engineer at PINEELE 18+ years of experience in HV switchgear design & testing. |
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Introduction

As urban infrastructure expands and industries demand more compact, reliable power systems, the **500 kVA Compact Substation** has emerged as a preferred solution for medium-to-low voltage transformation. Compact in design but comprehensive in functionality, it serves as an all-in-one power node, combining a **distribution transformer**, **medium voltage switchgear**, and **low voltage panel** into a single, factory-built unit.



What Makes a 500 kVA Compact Substation Unique?

Unlike traditional substations that require separate civil infrastructure and extended installation timelines, the 500 kVA compact variant is fully **prefabricated**, tested in factory conditions, and delivered ready for deployment. Its modular nature reduces installation complexity and ensures consistent performance across different environmental conditions.

Whether deployed in an urban residential area or a remote solar field, this unit is engineered to deliver dependable service with minimal maintenance.

Technical Specifications

| SPECIFICATION | VALUE |
|----------------------|--|
| Rated Power | 500 kVA |
| Primary Voltage | 11 kV / 22 kV / 33 kV |
| Secondary Voltage | 400 V / 230 V |
| Frequency | 50 Hz / 60 Hz |
| Transformer Type | Oil-immersed (ONAN) or Cast Resin (Dry-type) |
| Cooling Method | Natural air (ONAN) |
| Vector Group | Dyn11 (Standard), customizable |
| Protection Level | IP54 or higher (for outdoor use) |
| Switchgear Type | RMU / LBS / VCB (SF6 or Vacuum Insulated) |
| Low Voltage Panel | ACB/MCCB with metering & feeder breakers |
| Compliance Standards | IEC 60076, IEC 62271-202, ISO 9001 |

Structural Configuration

A standard 500 kVA compact substation is divided into three isolated compartments for safety and functionality:

1. Medium Voltage Section

Equipped with SF6-insulated RMUs or load break switches, this compartment handles incoming MV power (typically 11 kV or 22 kV). Safety features include surge arresters, current transformers (CTs), and interlocks.

2. Transformer Chamber

This compartment houses the 500 kVA transformer, built with high-grade CRGO silicon steel core or cast resin technology. Thermal indicators, oil level gauges, and pressure release valves ensure safe operation.

3. Low Voltage Section

Outgoing feeders, typically via molded case circuit breakers (MCCBs) or air circuit breakers (ACBs), distribute power to the connected loads. The panel includes voltmeters, ammeters, energy meters, and optional IoT-based smart monitoring.

Typical Applications

- **Residential Developments**
Ideal for apartment blocks, townships, and gated communities where footprint is limited.
- **Industrial Units**
Suited for light manufacturing facilities and small-scale factories.
- **Solar Power Projects**
Converts and distributes power from solar inverters to the main grid.
- **Commercial Zones**
Used in malls, office parks, and schools for secure, efficient energy delivery.
- **Public Infrastructure**
Deployed in metro stations, hospitals, and data hubs for uninterrupted service.

Design and Build Quality

- **Enclosure:** Made from galvanized steel, powder-coated for corrosion resistance
- **Access:** Separate, lockable doors for MV, transformer, and LV sections
- **Ventilation:** Natural louvered airflow or forced ventilation if required
- **Cable Management:** Bottom or side-entry cable trenches, with gland plates
- **Mounting:** Skid-based, concrete pad mountable, or underground vault compatible

Key Features and Advantages

Factory-Assembled & Tested – Reduces site testing time

Compact Footprint – Fits tight urban spaces

Safe & Tamper-Proof – Meets arc fault containment standards

Rapid Commissioning – Ready-to-install design saves up to 50% of project time

Customizable Design – Options available for solar integration, remote monitoring, and special climate zones

Frequently Asked Questions

Q1: How long does installation take for a 500 kVA compact substation?

Typically, installation and commissioning can be completed within 1–2 days after delivery.

Q2: Can this kVA Compact Substation be integrated with solar PV systems?

Yes, it can be customized for hybrid energy systems including solar and battery storage.

Q3: Is this substation suitable for high-humidity or coastal regions?

Absolutely. Stainless-steel enclosures with IP65 protection are available on request.

Q4: Can we request a specific transformer manufacturer or vector group?

Yes, the design is flexible to accommodate client-preferred brands and configurations.

Q5: What are the maintenance requirements?

Annual visual inspection, oil analysis (for oil-type transformers), and functional testing of switchgear are recommended.

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