

Product Overview

Prefabricated cabins are outdoor intelligent substations based on the core concept of "standard distribution". The adoption of prefabricated cabin structures has become an important measure for the construction of secondary equipment carriers in intelligent substations. With the acceleration of the construction of smart grids, the speed of substation construction is relatively lagging behind. In order to accelerate the construction cycle of smart substations, State Grid Corporation of China has proposed a standard distribution type substation construction model, which achieves rapid promotion and practical application of smart substations (prefabricated cabins) through the scheme of "standardized design, factory processing, and prefabricated construction"

Prefabricated cabins are an important manifestation of new technologies, materials, and equipment applied in intelligent substations. They are composed of prefabricated cabins, secondary equipment cabinets (or racks), cabin auxiliary facilities, etc. They are manufactured, assembled, wired, debugged, and transported as a whole to the construction site, located on the installation foundation. The prefabricated cabin and its internal secondary equipment are integrated by the manufacturer to achieve factory processing, reduce on-site secondary wiring, decrease design, construction, commissioning, workload, simplify maintenance work, shorten construction period, and effectively support the rapid construction of the power grid

Prefabricated cabins have the technical characteristics of standardization, modularization, and prefabrication. Manufacturers can customize specific sizes according to the actual needs of the equipment cabinet to adapt to the normal operation of the equipment

Standardization refers to the reference of the size of prefabricated cabins to the size of standard containers and appropriate improvements, in order to make them as perfect and standardized as possible, in accordance with the adoption of equipment, and to achieve corresponding standardization in order to facilitate the normal operation of equipment more effectively

Modularization refers to the division of prefabricated compartments into modules such as public equipment prefabricated compartments, interval equipment prefabricated compartments, AC/DC power prefabricated compartments, and battery prefabricated compartments based on the different functions of internal equipment. Different modular prefabricated cabins can be divided into several sub modules based on the voltage level

Prefabrication refers to the factory prefabrication of the cabin structure, internal equipment installation, wiring between internal equipment, and cables and optical cables between internal equipment. And complete the installation, wiring, and debugging of all equipment in the factory, transport the prefabricated cabin and its internal equipment as a whole to the substation site, complete the positioning and power on, thereby improving on-site construction efficiency and achieving the goal of reducing the construction cycle of smart substations

Product Features

220kV and below modular intelligent prefabricated cabin substations are a new generation of intelligent substations promoted by State Grid Corporation of China. They have the advantages of safety and reliability, small footprint, short construction period, small and exquisite appearance, long service life, no radiation, low noise, and flexible layout. The main transformer adopts high-quality products that are safe, reliable, low-noise, leak free, and free of hanging cores; The entire station has no exposed conductors or electrical equipment, and with good enclosure protection, it eliminates the risk of accidental electric shock; The compact layout of the entire station reduces the land area and height by more than 30% compared to civil substations, thereby reducing the urban space occupancy rate; All equipment in the substation adopts the modular design concept of building blocks, and each module realizes factory production and assembly construction. The on-site civil engineering workload is reduced by more than 70% compared to conventional civil engineering substations, and the equipment installation workload is reduced by more than 80%; Equipment entering the site does not require road closure, and there is no dust or noise pollution during the construction process. The shell can achieve full site painting, integrate urban theme culture, improve the harmony of urban planning, and blend in with the surrounding environment; The transformer is placed in a prefabricated compartment, and the substation noise is reduced to below 40 decibels through firewall technology, sound barrier technology, and electromagnetic shielding technology, meeting the requirements of urban environmental impact assessment and eliminating noise pollution from surrounding residential areas. Due to the modularization of the substation, it can be flexibly arranged according to the site terrain, fully solving the difficulties of land acquisition, construction, and landing of substations in urban centers. It is a new model for substation construction

Fast -3 months factory production cycle, 1 month on-site construction cycle

Small - occupies a small area, reducing the land occupation by 30% -70% compared to conventional substation construction

Precision - The shell adopts internationally advanced six anti-corrosion processes, with 30 years of non rusting and a service life of 60 years. The main electrical equipment adopts maintenance free equipment, which is safe and reliable. Exquisite exterior design

Province - Standardized design, factory processing, and prefabricated construction, resulting in a comprehensive investment savings of 5% -10% for the entire station. The compact layout of the substation adopts advanced complete sets of land resources to save 30% -70%

Activity - modular structure of building blocks, which can adopt flexible building block construction mode according to different geographical locations of the station site, and can also be constructed in stages according to the long-term planning of this phase; Relocate to another location in the shortest possible time

Application scope

The product can not only be applied in urban central areas to solve the problem of difficult landing of conventional substations, but also widely used in traditional energy industries such as coal and oil, as well as new energy industries such as photovoltaics and wind power. Meanwhile, with its modular design, production, and transportation assembly mode, it is particularly suitable for places where road transportation is inconvenient, such as suburban and remote mountainous areas

Environmental conditions for use

All equipment inside the cabinet should be moisture-proof, and the prefabricated compartment should have dehumidification function

Altitude:<1000m

Annual average temperature: 23 °C

Annual average rainfall: 1300

Annual average evaporation:/

Extreme maximum temperature: 39.9 °C

Extreme minimum temperature: -8.6 °C

Annual maximum snow thickness:/

Annual average relative humidity (%): ≤ 75

Annual maximum frozen soil depth: ≤ 0.5 meters

Annual sunshine hours:/

Annual average thunderstorm days (d): 37.6

Annual average number of strong wind days (d):/

Pollution level: IV

Maximum wind speed: 25.3m/s

Basic seismic intensity: VI degree

Installation location: Outdoor

Structure of Prefabricated Cabin

1. The internal space and structure of the prefabricated cabin are composed of secondary equipment, air conditioning, lighting, fire protection, security, imaging and other equipment. At the same time, it is necessary to meet the work requirements of equipment operation and maintenance personnel. The interior of the cabin needs to be maintained, and fireproof and waterproof materials should be selected for decoration. Thermal insulation materials can be added between the decoration materials and the cabin walls to block sunlight and ensure the insulation function of the box. The lighting and air conditioning in the cabin can be implemented in different ways according to the needs. In order to effectively save costs, industrial air conditioning and exhaust systems are installed in the cabin, which can adjust the operating environment in real time; Due to the current unmanned mode, security, imaging, image monitoring, and fire alarm systems must also be installed inside the cabin; The wiring layout can be appropriately arranged according to the normal operation of the equipment

2. Prefabricated cabin GIS composite electrical appliances and prefabricated cabin substations. Prefabricated cabin GIS composite electrical appliances include prefabricated boxes, incoming and outgoing line intervals, and segmented measurement and protection intervals. The incoming and outgoing line intervals include incoming line intervals and main transformer intervals; The incoming interval includes the terminal of the incoming cable, isolation switch 1, and isolation switch

3. Transformer one and circuit breaker one, the main transformer interval includes the outgoing cable terminal and isolation switch three; The segmented measurement and protection interval includes one busbar segmented interval and two measurement and protection intervals. The busbar segmented interval includes circuit breaker two, transformer two, and two isolation switches four. The measurement and protection interval includes transformer three and isolation switch five connected together; There is a segmented measurement and protection interval set between adjacent groups of incoming and outgoing lines. The incoming and outgoing line intervals, segmented measurement and protection intervals, and busbars form a linear structure. The incoming and outgoing line intervals, segmented measurement and protection intervals, and busbars are located in prefabricated boxes. The prefabricated secondary combination equipment cabin consists of cabin body, secondary equipment, air conditioning, lighting, fire protection, security, imaging and other equipment. All equipment in the cabin has completed relevant wiring and debugging work in the factory and is transported to the site as a whole or 2-3 individual units

Solution

Using the world's most reliable electrical equipment, combined with the system integration technology of outdoor box type substation cabinets and the original prefabricated cabin manufacturing technology, the substation is divided into modules according to functions, and standardized design, factory production, and modular construction are carried out. Different modules are selected according to the different configurations of various substations to achieve a modular combination, which has the characteristics of small footprint, short construction period, high safety and reliability, and beautiful appearance. It completely overturns the traditional construction mode of substations and fully solves the problem of difficult landing of central substations in large and medium-sized cities. Modular design, the entire station is divided into six types of delivery modules:

Compact substation layout:

110kV prefabricated cabin GIS composite electrical module

10kV prefabricated cabin switch station module

Prefabricated cabin type secondary combination equipment module

Prefabricated cabin transformer module

10kV prefabricated cabin grounding transformer arc suppression coil

10kV prefabricated cabin reactive power compensation system Greatly reduce the footprint

Original prefabricated cabin three-dimensional layout method

110kV prefabricated cabin GIS composite electrical appliances are placed on the top to save space Prefabricated 10kV switchgear and secondary combination equipment prefabricated cabins are arranged in the shape of finished products below Prefabricated cabin transformer symmetrically arranged

The fire escape is arranged between the three-dimensional substation and the transformer Flexible modular construction can be carried out according to the terrain of the site The 10kV wiring method can be flexibly designed according to user needs, and a horizontal GIS combination electrical device has been jointly developed with Siemens, which is completely maintenance free

The 10kV system is segmented into single busbars and uses high-end and high-end fixed switchgear such as Siemens and ABB, which is completely maintenance free

◆ Adopting a fixed compensation system, configure the grounding transformer arc suppression coil module according to the needs of station construction

◆ Maintenance free, unmanned, intelligent management and control substation

◆ Artistic appearance and harmonious coordination with urban environment

The prefabricated cabin adopts world advanced technologies such as double-layer steel plate foaming technology, six layer anti-corrosion technology, and bridge insulation, fully meeting the 60 year service life requirements of the main building of the substation

The patented micro positive pressure dust prevention technology, box insulation technology, and intelligent environmental control technology create a constant temperature, humidity, and dust-free operating environment for electrical equipment, surpassing traditional indoor substations

The external dimensions of each prefabricated cabin module adopt standardized modules to meet transportation requirements without exceeding the limit