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Mobile Trailer Substation

TGOOD GLOBAL
-ENERGY,FAST!-

www.qdtgood.com

Company Profile

- Founded in 2004,TGOOD (Stock Code: 300001) was the first company listed on the Growth Enterprise Board of the Shenzhen Stock Exchange in 2009.
- The mission of TGOOD is to create the world's top brand of prefabricated power equipment.
- TGOOD's intelligent modular prefabricated substations has occupied a 60% share of power grid and new energy markets.
- TGOOD has delivered product solutions to 6300+ customers, and provided 11,000+ prefabricated substations.
- TGOOD's prefabricated and integrated solutions have been implemented in 50+ countries and regions worldwide.

No.1
The world's No.1 brand of prefabricated substation equipment

The largest in World
One of the largest supplier for prefabricated substation

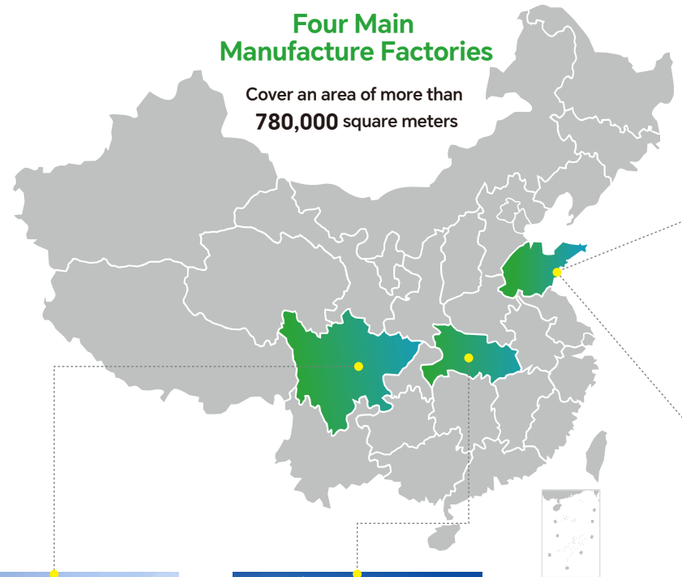
The largest in China
TGOOD is the largest R&D and production base for prefabricated substations in China

Only in China
The only manufacturer in China achieving digital, technological,specialized, and large-scale production of prefabricated substation

Champion
MIT manufacturing industry single item champion enterprise

Four Main Manufacture Factories

Cover an area of more than **780,000** square meters



Qingdao West Coast Manufacturing Factory

Qingdao Free Trade Zone (China)

Sichuan Chengdu Manufacturing Factory

Hubei Yichang Manufacturing Factory

Product Overview

The mobile trailer substation is a power distribution and transformation equipment prefabricated onto a mobile system, which integrates two or more modules, such as the high-voltage module, transformer module, medium (low)-voltage module, control and protection modules, along with auxiliary equipment, and features the functions of fast movement and rapid deployment.

Applicable Standard

- IEC 62271 High-voltage Switchgear and Controlgear
- DL/T2283 General Technical Requirements for Mobile Substation
- DL/T2284 Regulation of Operation and Maintenance of Mobile Substations

Product Features

- Module Design High Integration
- Flexible Transfer Efficient Connection
- No Foundation Construction Rapid Substation Construction
- Corrosion and Coldness Resistance Environmental Adaptability

Table of Contents

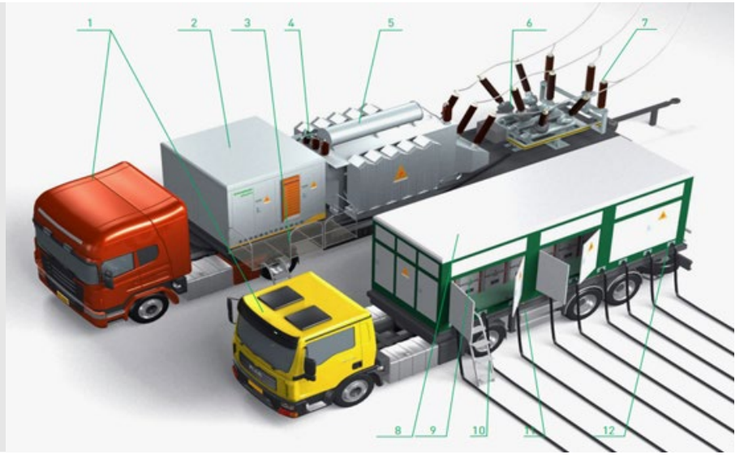
2 Products

2.1 Product Features

The mobile trailer substation consists of several modules, including high-voltage modules, main transformer modules, medium- voltage distribution modules, integrated automation substation modules, and equipment transport modules. With an overall prefabricated structure, each module realizes modular manufacturing of various functional units in the factory. During the prefabrication process, the internal connections and debugging of each module are completed. The mobile trailer substation features compact structure, high mobility, rapid operation in a short time, flexible operation, simple assembly, and reliable power supply. Each component can also operate and be transported independently. The semitrailer remains in a standby state and can be dispatched upon receiving the departure command, and it can contribute to the operation of the power grid within hours after reaching the designated destinations. The mobile trailer substation can specially meet the power supply needs of the high-voltage power grid in scenarios such as substation technological transformation, equipment maintenance, temporary site power supply, emergency repairs, and natural disasters.

Notes to Configuration:

1. Tractor
2. Automated Prefabricated Substation
3. Semitrailer
4. Incoming Cable
5. Transformer
6. High-Voltage GIS or HIS
7. High-Voltage Surge Arrester
8. Switchgear Prefabricated Substation
9. Medium (Low) -Voltage Switchgear
10. Climbing Ladder
11. O&M Passage
12. Feeder Cable



High Flexibility:
The reliable integration between the mobile trailer substation and the vehicle allows for quick access to the site

Quick Operation:
The mobile trailer substation features quick response, rapid deployment and fast energization

Strong Adaptability:
The high structural strength and complete shock absorption measures offer adaptability to various working conditions

Compact Structure:
The highly integrated design meets road transport requirements

2.2 Application Scenarios

Petrochemical Engineering

State Grid

国家电网

Rail Transport

Urban Power Distribution

Emergency Rescue

Renovation of Old Substation

New-Build

Technical Transformation
110 kV Outdoor Switchgear Renovation
35 kV Old Switchgear Renovation
10 kV Old Switchgear Renovation
...

Renewable
Power Distribution
Architecture Improvement Energy Transformation
...

Load Transition
Rapid Power Supply Restoration Point
Load Peak in Summer/Winter
Substation Renovation and Load Transfer
Emergency Power Supply
...

Power Distribution for Newly Migrated Industries
Rapid Power Supply Restoration Point
Load Peak in Summer/Winter
Substation Renovation and Load Transfer
Emergency Power Supply
...

3 Product Range

3.1 Manufacturing Capability

3.2 High-Voltage Switchgear

HGIS: features simple and clear wiring, compact structure, multiple functions, modular design, flexible combination, convenient installation and maintenance, and reliable operation.

Key Parameters	Photo
Rated voltage: 40.5 to 145 kV Rated current: 2,000 to 2,500 A Rated frequency: 50/60 Hz Rated short-time withstand current: 31.5/40 kA Rated short-circuit duration: 4s	

GIS: features compact structure, small footprint, high reliability, low maintenance workload, as well as easy and flexible maintenance.

Key Parameters	Photo
Rated voltage: 40.5 to 220 kV Rated current (main circuit/busbar): 2,000 to 4,000 A Rated frequency: 50/60Hz Rated short-time withstand current: 31.5/40 kA Rated short-circuit duration: 4s	

AIS: features simple structure, small size, high reliability, easy installation, convenient installation and maintenance, and low in noise.

Key Parameters	Photo
Rated voltage: 6 to 252 kV Rated current: 2,000 to 4,000 A Rated frequency: 50/60 Hz Rated short-time withstand current: 40 kA Rated short-circuit duration: 3s/4s	

3.3 Transformer

Oil-Filled Transformer

Key Parameters	Photo
Rated capacity: 8 to 50 MVA Rated voltage: HV: 110 kV/132 kV/138 kV (69 kV)/225 kV (150 kV)/230 kV (150 kV) LV: 11 kV/13.8 kV/22 kV/33 kV Rated frequency: 50/60 Hz Short-circuit impedance: 10.5% to 17% Connection group: YNd11/YNyn0+d11 Cooling method: ONAF/ONAN/ODAF/OFAF	

Dry-Type Transformer

Key Parameters	Photo
Rated capacity: 2 to 16 MVA Rated voltage: 6 to 35 kV Rated frequency: 50/60 Hz Short-circuit impedance: 6% to 9% Connection group: Yd11 Cooling method: AN/AF	

Technical Features of Mobile Transformer

- **Low Noise**: The iron-core material is made from high-quality cold-rolled grain-oriented silicon steel sheets, and a multi-stage stepped full-angled seam structure is adopted to control the core burrs below 0.01 mm with excellent shearing equipment.
- **Strong Resistance to Sudden Short Circuit:** Multiple measures are adopted in the manufacturing process of components such as coils and transformer body to ensure structural self-support while also handling external sudden short circuits, making the transformer outperform the standard level by 20%.
- **Reliable Structure:** The winding and the transformer body adopt cutting-edge insulation technologies to enhance electrical performance, reduce no-load and load losses, and improve product conversion efficiency.
- **Application Scenarios:** Efforts are made to optimize compact design, reinforce iron core to meet seismic conditions, and provide a 3D collision recorder.

The capacity, energy efficiency level, and other parameters of transformers can be customized according to user plans, scene requirements, etc.

3.4 Medium-voltage Switchgear

TGP: Gas-insulated Switchgear

Features	Key Parameters	Photo
Compact structure, small size, flexible operation, maintenance-free, high safety, reliable interlock, etc.	Rated current: 1,250 to 2,500 A Rated frequency: 50/60 Hz Rated short-time withstand current:25/31.5 kA Rated short-circuit duration: 4s	

XGN: Gas-insulated Switchgear

Features	Key Parameters	Photo
Modular design, high adaptability, compact structure, small size, high protection degree, and wide application range.	Rated voltage: 7.2 to 24 kV Rated current: 630 to 2,500 A Rated frequency: 50/60 Hz Rated short-time withstand current:31.5 kA Rated short-circuit duration: 3s	

TAP: Switching Device

Features	Key Parameters	Photo
Flexible operation, high space utilization, convenient maintenance, pressure relief channel designed inside the switchgear to enhance safety, standardized design, and high interchangeability.	Rated voltage: 17.5 kV Rated current: 630 to 4,000 A Rated frequency: 50/60 Hz Rated short-time withstand current: 25/31.5 kA Rated short-circuit duration: 3s	

KGN: Fixed Cabinet

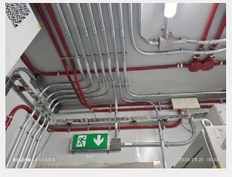
Features	Key Parameters	Photo
Simple structure, high mechanical reliability, fewer failure points, low maintenance needs, low maintenance costs, capability to accommodate bottom or side cable exit, and flexible wiring.	Rated voltage: 12 kV Rated current: 1250 to 4,000 A Rated frequency: 50 Hz Rated short-time withstand current: 25/31.5/40 kA Rated short-circuit duration: 3s/4s	

3.5 Prefabricated Substation

Corrugated-Plate Prefabricated Substation

Interior Design:
> Rock wool board walls and ceiling + exposed pipelines

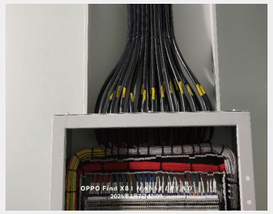
> Loop Control Wiring for Distribution Cabinet



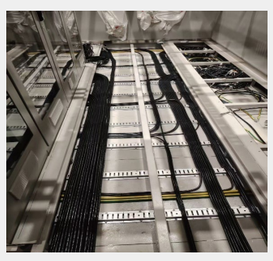
> Secondary Wiring on Indoor Top

Assembled-Frame Prefabricated Substation

Interior Design:
> Rock wool board walls + aluminum alloy grille ceiling



> Loop Control Wiring for Distribution Cabinet



> Secondary Wiring on Indoor Floor

Fire Resistance / Seismic Resistance Report

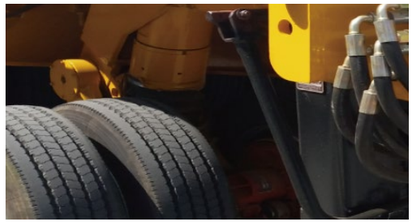
GB / EN / ASIC Standard Report

First Prize for Technological Progress of Prefabricated Substation in China

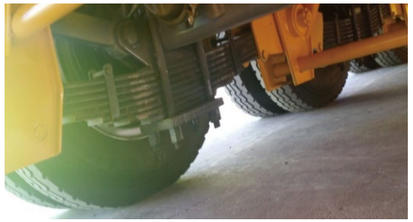
Regional Electrical & Construction Test Reports

3.6 Semitrailer

Hydraulic suspension



Leaf spring suspension



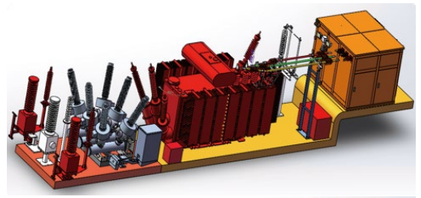
Air suspension

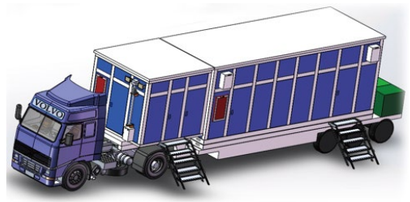
Mechanical support legs

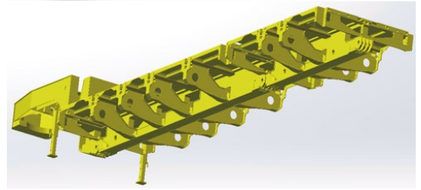
Electric leg

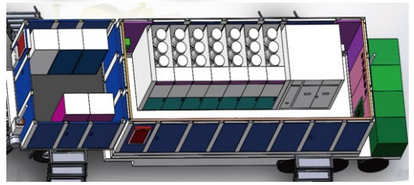
4 Quality and Process

4.1 Simulation Design

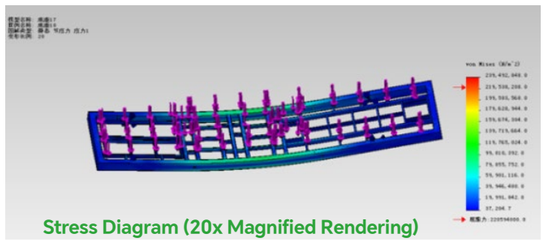




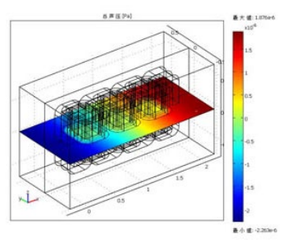


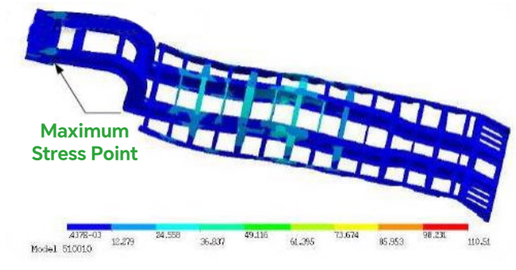


With the finite element analysis technology, seismic and settlement resistance of the E-house is simulated and validated, and weak structural areas are improved and reinforced to enhance the product's environmental adaptability.



Stress Diagram (20x Magnified Rendering)

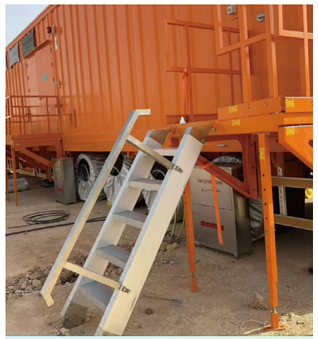




Through finite element analysis and actual measurement verification, the center of gravity distribution is reasonably adjusted to meet the requirements of different scenarios such as transport and lifting and improve the product's safety factor.

4.2 Display of Details

Adjustable Lighting Lamp



Folding Stairs

Quick-Connect Cable Box

Mobile Surge Arrester

Electric Cable Winch

Wall-mounted Integrated Fan

Collision Recorder

Onboard Leveling Instrument

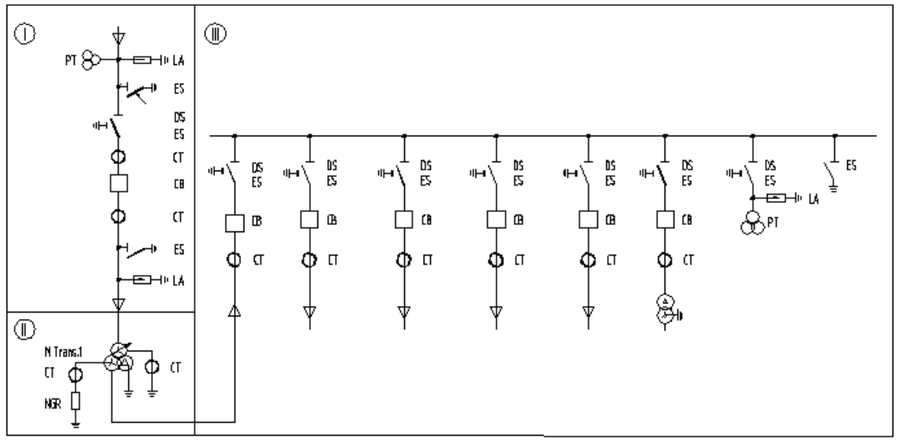
Cable Sealing Module

5 Typical Scheme

5.1 Primary System

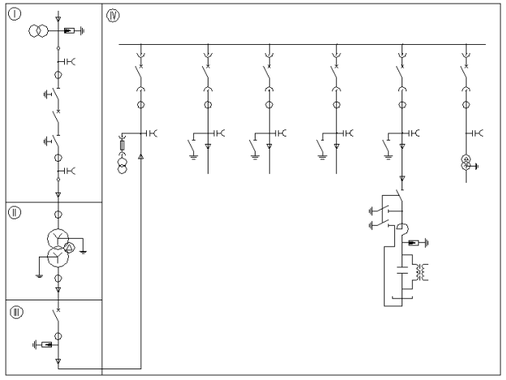
Main Typical Electrical Wiring Scheme 1 for Mobile Trailer Substation:

- **High-voltage Module:** Select GIS and line transformer connection form, selectively configure external PT, SA, and other equipment;
- **Transformer Module:** select a three-winding or two-winding transformer, and selectively configure the neutral point earthing system, CT, NGR, and other equipment;
- **Medium- (Low-) Voltage Module:** Select TGP cabinet type, configure one incoming cabinet, multiple outgoing cabinets, PT cabinet, substation transformer cabinet, etc.



Main Typical Electrical Wiring Scheme 2 for Mobile Trailer Substation:

- **High-voltage Module:** Select HGIS and line transformer connection form, and selectively configure external PT, SA and other equipment;
- **Transformer Module:** Select a three-winding or two-winding transformer, and selectively configure the neutral point earthing system, CT, NGR, and other equipment;
- **Medium- (Low-) Voltage Module:** Select AIS, and selectively configure external circuit breakers, CT, SA and other equipment;
- **Medium- (Low-) Voltage Module:** Select TAP, and configure one incoming cabinet, multiple outgoing cabinet, PT cabinet, capacitor, etc.

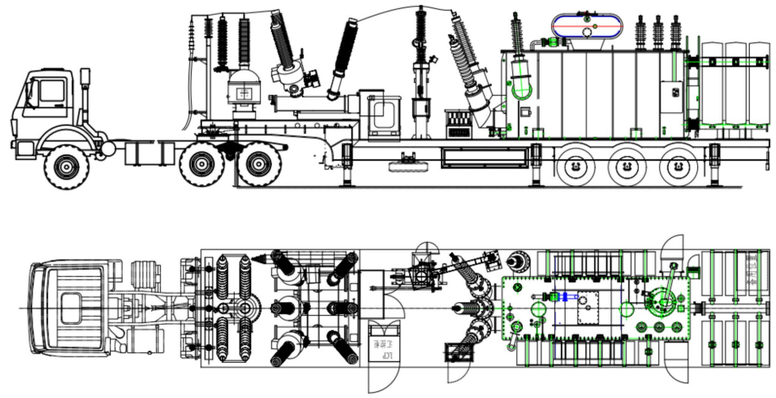


5.2 Typical Arrangement

132 kV Mobile Trailer Substation

with a Layout of High-voltage Equipment + Transformer

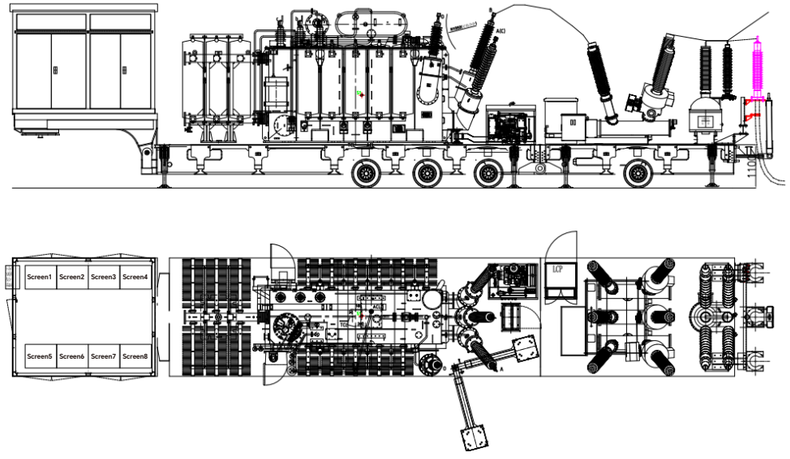
The vehicle chassis is of rigid suspension, hydraulic support, and high and low deck vehicle model. This scheme is suitable for large capacity substations of 66 kV and above, with a main transformer capacity of up to 50,000 kVA.



132 kV Mobile Trailer Substation

with a Layout of High-voltage Equipment + Transformer + Secondary Prefabricated Substation

The vehicle chassis is of hydraulic suspension, mechanical support, and high and low deck vehicle model. This scheme is suitable for large capacity substations of 66 kV and above, with a main transformer capacity up to 40,000 kVA.

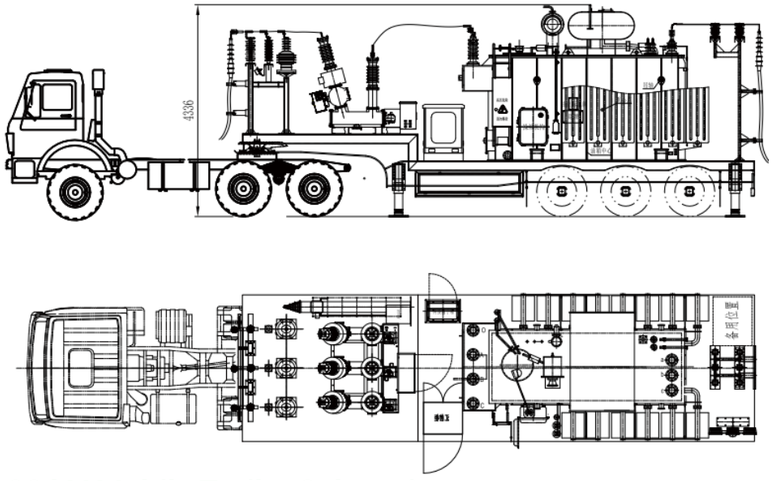


5.2 Typical Arrangement

33 kV Mobile Trailer Substation

> with a Layout of High-voltage Equipment + Transformer

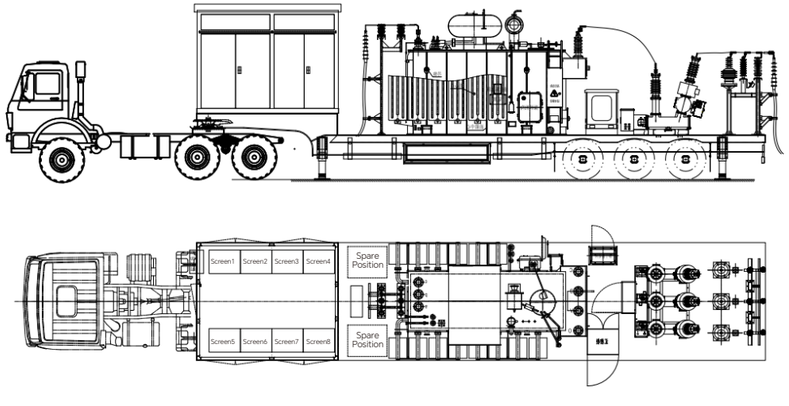
The vehicle chassis is of rigid suspension, mechanical support, and high and low deck vehicle model. This scheme is suitable for substations of 35 kV and below.



33 kV Mobile Trailer Substation

> with a High-voltage Equipment + Transformer + Secondary Prefabricated Substation Layout

The vehicle chassis is of rigid suspension, mechanical support, and high and low deck vehicle model. This scheme is suitable for substations of 35 kV and below, with a main transformer capacity not exceeding 10,000 kVA.

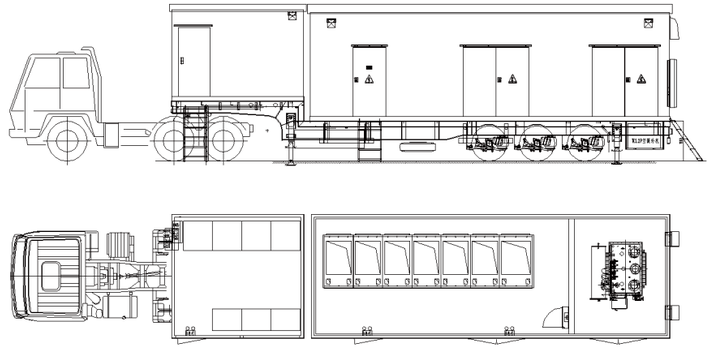


5.2 Typical Arrangement

13.8 kV Medium-voltage Distribution Vehicle

> with a Layout of Medium-voltage Switchgear + Station Transformer + Secondary Equipment Combined Prefabricated Substation

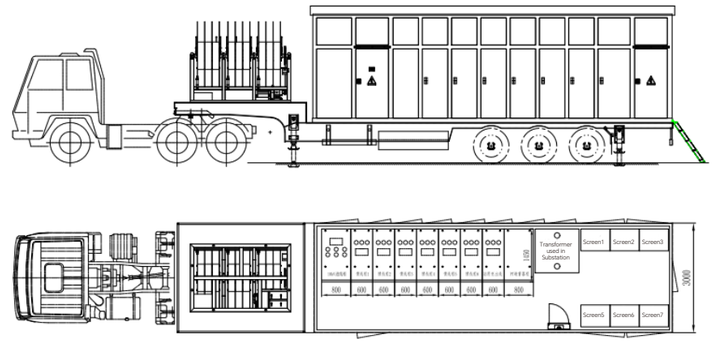
The vehicle chassis is of leaf spring suspension, mechanical support, high and low deck vehicle model. This scheme is suitable for most onboard substation usage scenarios. The vehicle chassis width is between 3,000-3,450mm, with the goose-neck location as the control room, and the rear vehicle face contains the medium-voltage switchgear equipment.



33 kV Medium-voltage Distribution Vehicle

> with a Layout of Cable Winch + Gas-insulated Switchgear + Secondary Equipment Combined Prefabricated Substation

The vehicle chassis is of leaf spring suspension, mechanical support, high and low deck vehicle model. This scheme is suitable for onboard substations where gas-insulated switchgear is used as the medium-voltage switching equipment, commonly used for users in higher altitude areas. The vehicle chassis width is between 3,000-3,450 mm, with the goose-neck position for the cable winch, and the rear main vehicle face containing the medium-voltage gas-insulated switchgear (GIS) equipment. The secondary cabinet equipment can be placed in the medium-voltage room or another supporting vehicle body according to specific project needs.

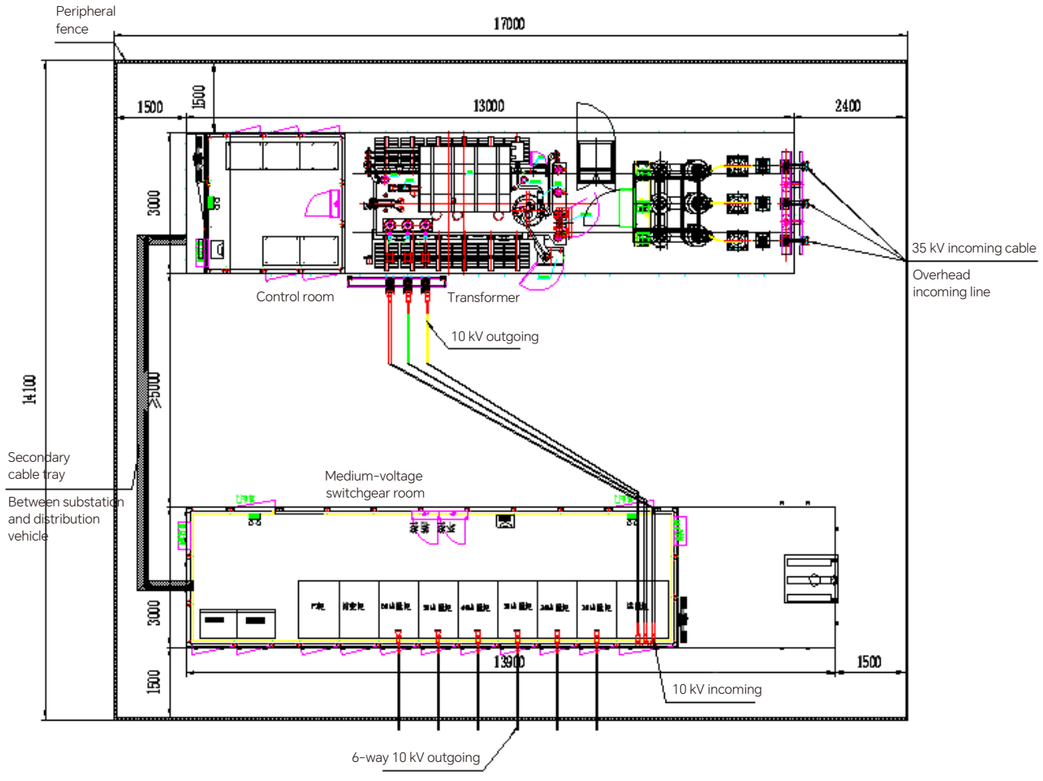


5.2 Typical Arrangement

33 kV Mobile Trailer Substation

with an Overall Layout Scheme

This layout places the substation vehicle and the distribution vehicle side by side, suitable for scenarios where the substation space is relatively rectangular. The primary cable between the two vehicles is laid along the ground from the low-voltage side of the main transformer to the medium-voltage switchgear incoming cabinet. The secondary cable between the two vehicles is laid using a metal flexible conduit, with aviation plugs at both ends as quick-connect fittings.

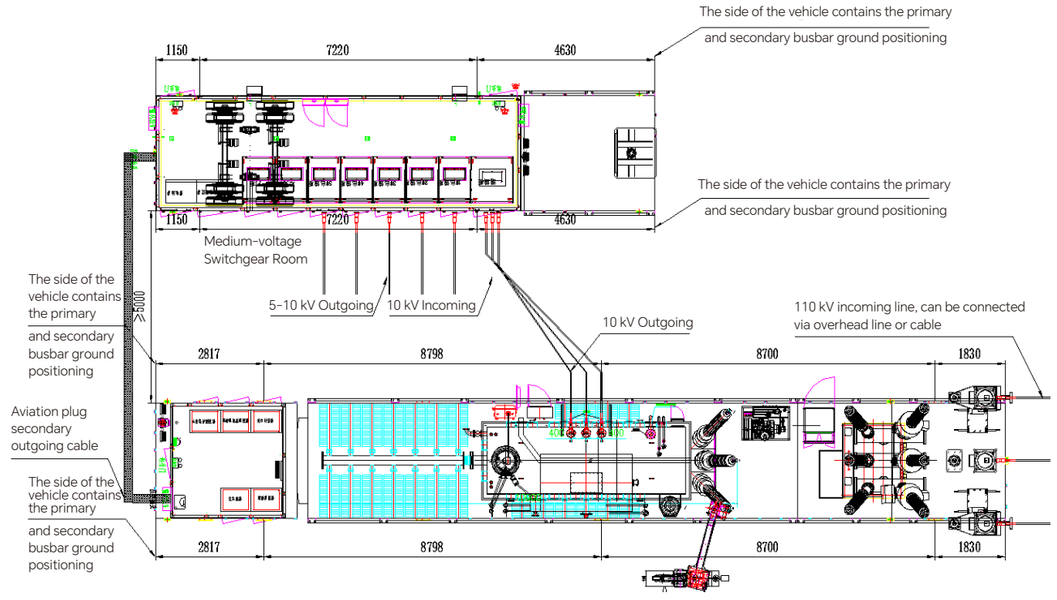


5.2 Typical Arrangement

132 kV Mobile Trailer Substation

with an Overall Layout Scheme

This layout places the substation vehicle and the distribution vehicle side by side, suitable for scenarios where the substation space is relatively rectangular. When the substation space is limited in some projects, a front-back layout of the two vehicles can also be used. The primary cable between the two vehicles is laid along the ground from the low-voltage side of the main transformer to the medium-voltage switchgear incoming cabinet. The secondary cable between the two vehicles is laid using a metal flexible conduit, with aviation plugs at both ends as quick-connect fittings.



6 Transport and Storage

6.1 Transport Requirements

- Before transport, the route, check road height, weight, speed restrictions, and turning radii should be inspected to verify that the carrying capacity of roads and bridges along the way is not less than the maximum weight of the vehicle.
- **Pre-transport vehicle inspection:** The jack device must be fully retracted and suitable for transport transfer; the connection between the towing vehicle and the carrier vehicle should be in good condition, with reliable connections for electrical connectors, air connectors, and other components; the lighting circuit system and the brake system should be functioning normally; the tire surface should be crack-free, and tire pressure should be normal; the support legs, tires, axles, and other connections must be tightly fastened; the 3D collision recorder must be in normal working condition.
- **Pre-transport onboard electrical inspection:** The appearance of all electrical equipment should be intact, and free from oil leakage or cracks, and all valves should be in the closed position.
- Throughout the process, pay attention to controlling the starting and braking process, start and brake smoothly, and avoid emergency braking or sharp movements.
- Avoid large potholes, reduce speed when passing speed bumps or uneven ground, and reduce speed when turning or going around curves to avoid high-speed sharp turns.
- **GIS equipment transport requirements:** Longitudinal acceleration should not exceed 0.5 g, and lateral acceleration should not exceed 0.3 g. If shock acceleration exceeds 1.5 g during transport, airtightness testing, circuit resistance measurement, mechanical characteristics tests, and even opening the GIS to check the components for integrity are required.
- **Transformer transport requirements:** Longitudinal acceleration should not exceed 3 g, and lateral acceleration should not exceed 3 g, vertical acceleration should not exceed 2 g, and the tilt angle should not exceed 5 degrees, to ensure the stability of the transformer.
- **Other conventional mobile trailer substations:** During transport, the shock acceleration in all three directions should not exceed 3 g. The mobile trailer substation's tilt angle during movement should not exceed 15° .
- On regular highways, the driving speed should be ≤40 km/h; on rural roads, the driving speed should be ≤20 km/h; on uneven mountain roads, the driving speed should be ≤10 km/h. During steady driving, sudden acceleration or emergency braking should be avoided.

6.2 Storage Requirements

- The altitude of the storage location should not exceed 2,000 m generally.
- The surrounding air temperature should not be higher than +55 °C or lower than -25 °C.
- Outdoor wind speed should not exceed 20 m/s.
- Relative humidity: The daily average value should not exceed 80%, monthly average value should not exceed 70%.
- Ground slope should not exceed 3° .
- The maximum seismic horizontal acceleration should not exceed 0.4 m/s^2 .
- The maximum seismic vertical acceleration should not exceed 0.2 m/s^2 .
- Installation location: The installation location should be free from fire, explosion hazards, severe pollution, chemical corrosion, and intense vibrations.
- The accessories should be properly installed on site and protected from fire, rain, moisture, and frost.
- Periodic inspection of electrical equipment: should be conducted on appearance integrity, desiccator, pressure relief valve, control box, mechanism box, relay, transformer oil level and other items to ensure they are in stable and reliable status.
- Periodic inspection of vehicle: should be conducted on tire pressure, hydraulic system sealing, support device stability, bearing lubrication clearance, brake air circuit, electrical circuits, and indicators, to ensure that all functions are normal and usable.

7 Project Cases

Saudi Arabia 132/115 kV Mobile Trailer Substation

Saudi Arabia 132/115 kV Mobile Trailer Substation

Côte d'Ivoire 220 kV Mobile Trailer Substation

Colombia 115 kV Mobile Trailer Substation

7 Project Cases

State Grid Henan 110 kV Mobile Trailer Substation

State Grid Xi'an 110 kV Mobile Trailer Substation

State Grid Shandong
110 kV Mobile Trailer Substation

Shandong Qingdao
35 kV Mobile Trailer Substation

Guangxi Hezhou
110 kV Mobile Trailer Substation