Varelen

Smart energy for better life!

WITH OUR WISDOM, WE PROVIDE YOU WITH A BETTER VOLTAGE CONVERSION SOLUTION

New Energy | Power Utilities | Rail Transportion | Data Center | Mining

COMPANY BRIEF

Varelen Electric Co., Ltd. is located in Changsha, Hunan Province, We specializes in the research, development, and manufacturing of transformers, reactors, and integrated substations. Originating from the technical team and manufacturing background of Changsha Transformer Factory, founded in 1956(with nearly 70 years of production history) and continuously explores the latest technologies and applications in voltage and energy conversion.

Varelen is committed to product development and innovation, providing professional intelligent power distribution, energy-saving control, and drive solutions and products for power utilities, mining, tunnel engineering, railways, and public facilities etc. We are also offers specialized electromagnetic solutions and products, including transformers and reactors, for new energy, marine&offshore, BESS, oil&gas, rail transit, and energy-saving and environmental protection power electronics.

"Integrating art into products and making technology serve life" is the product philosophy of Varelen. "taking responsibility, continuous innovation, value creation, and the pursuit of excellence" are the core values of the company.
Varelen is committed to becoming a specialized, high-quality, and innovative enterprise in the field of electromagnetic components and intelligent integrated power distribution and drive systems. The company strives to build a professional, high-quality electrical brand — "Varelen".

CONTENTS

DEVELOPMENT HISTORY （1956-2025）

Over **30** years professional technical team, originated from **70** years history transformer factory.

1956

Changsha transformer factory was established

2013

Rebuilt the new company Varelen Electric Co.,ltd

2014

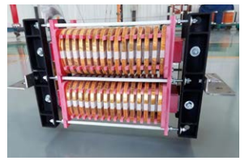
Exported mining explosion dry type transformer to Europe.

2015

Exported cast resin dry type transformer to Europe

2016

Exported electric rail reactor to Germany



2017

Exported phase shift transformer to Europe

2018

Exported oil immersed transformer to Australia

2019

Successfully developed 10.4MVA dry type rectifier transformer

2020

Successfully developed single-phase 6-winding rectifier transformer for railway traction

2021

Exported cast resin transformer(E4 C3 F1) to Russian speaking countries

2022

Production of 132kV oil immersed transformer

2023

15MVA oil transformer adopt anti-corrosion design, C5-M painting, used for offshore

2024

Varelen's dry transformers approved by marine standards --Bureau Veritas

Marine & Offshore
Bureau Veritas
CERTIFICATION

Design KNAN 5000kvar shunt reactors Natural ester fluid used for outdoor，25MVA dry type transformer winding at -60℃ (classes C5 E4 F1)

2025

OIL IMMERSED TRANSFORMER

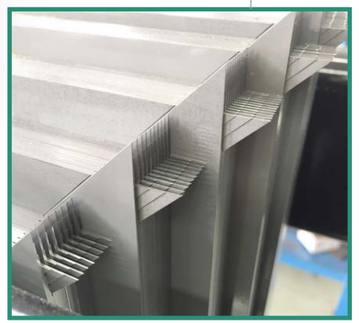
BENEFITS OF OIL IMMERSED TRANSFORMER

- Moisture-proof , salt spray-proof and anti-corrosion design, C5-M Marine paintings, specific coating treatment and use of surface can be hot dip zinc coating to withstand the most extreme environmental conditions.
- Strong resistance to sudden short circuits.
- 7-step stepping lap iron core structure.
- High-Temperature Resistant Insulation System.
- Oil conservator: hermetically sealed or conservator/free breathing.
- Cooler corrugated wall or with radiators.
- Fluid options available，Mineral Oil - Natural Ester Fluid (FR3 fluid)- Silicone etc.
- Special anti-loose structure, no internal looseness during transportation.
- The Tank withstanding pressure up to 115kPA comply with FM3990 requirements.
- All transformers can be designed, customized, and supplied with a wide variety of accessories, as required.
- Adopted isolation valve, the transformer is easy to maintenance and convenient in transportation.
- Below 10MVA transformer, we can meet various small-volume requirements and container transport.

TECHNICAL CHARACTERISTICS

Main Specification

Transformer Type	Oil immersed
Rated capacity	Up to 40MVA
Rated voltage	Up to 132kV
Frequency	50 or 60Hz
Phase	Single phase and three phase
Winding material	Copper or Aluminum
Tap changer	Off-load or on-load
Vector group	Dyn11, YNd1d1, Yyn0, YNd11 etc.
Cooling	ONAN , ONAF, KNAN, KNAF etc.
Ambient temperature	-45° C +60° C
Insulation class	A, E, B
Dielectric fluids	Mineral oil , Silicone, FR3 oil , MIDEL 7131
Standard	IEC, AS, EN, IEEE/ANSI, GOST



PRODUCT FEATURES

Iron Core
Superior silicon lamination for steel core, the lamination joint is processed by oblique cut angle and the latest new technology “seven-step”, which ensures small no-load loss and current.

Winding
The winding as the centerpiece of the transformer must be especially protected - both against high electrical stress due to external over voltages and against mechanical overloads by short circuits. Varelen transformers are systematically designed to meet these requirements.

PROJECTS

Country: Australia

2500KVA Mining transformer for mining industry

Oil-filled transformer type has side mounted cooling radiators, which are removable using radiator isolation valves. makes them easy to transport, with low operation and maintenance costs over their life span.

Country： Bosnia and Herzegovina

15MVA transformer for offshore solutions

15 MVA 33/11KV transformer adopt anti-corrosion design, Marine painting C5-M，Tank with hot dip galvanized the transformer are designed withstand from extreme weather conditions to corrosive conditions.
Liquid-filled transformers are ideal solutions，Made for durability in salt mist environments.
Environmentally friendly and fire-safe ester insulation liquid.
High-temperature insulation material.

Their reliable, energy-efficient, and compact construction is well suited for installation in wind projects.

Country： Vietnam

Earthing transformers

An earthing transformer (neutral coupler) is a three-phase transformer connected to the power system to provide a neutral connection for earthing, either directly or via impedance. The earthing transformers may in addition supply a local auxiliary load.

Oil immersed earthing transformer, the design have Variable shape,terminal box can design from top also can from side.the Neutral bushing can be also in the same terminal with HV.

Zigzag earthing transformer short circuit current : 25A-2000A/10s. 30s .60s As Optional.

Country： Chile

Pad mounted transformer

We are able to achieve compact design with 3D Modeling and high efficiency Substation Power Transformers with Hib grade silicon steel and special type design that is to be easy transportation and installation.
Pad-mounted transformers are widely used in applications ranging from commercial buildings to residential developments. These highly compact and flexible transformers can be installed almost anywhere, even in harsh weather conditions.

DRY TYPE TRANSFORMER

BENEFITS DRY-TYPE: SAFE AND ENVIRONMENTAL FRIENDLY TRANSFORMERS

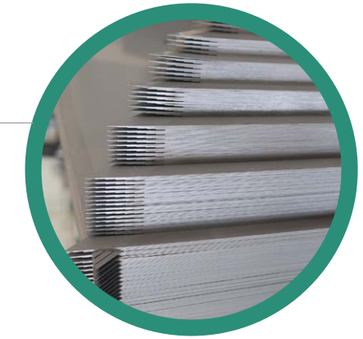
- High resistance to short circuits.
- Climatic areas with extremely low ambient temperatures (down to -50° C).
- Special and tailored design, installed altitude ⩾ 5000M.
- Hot-dip galvanized screws.
- Low and High-temperature-resistant insulation.
- Thin insulation structure, cold and thermal shock for crack resistance.
- customized transformers can meet a variety of high altitude requirements.
- Maintenance-free fastening body structure, keep reliable in the long-distance transport and operation.
- Environmentally friendly thanks to non-flammable and self-extinguishing materials. Free from the emission of toxic gases, low noise and with low electromagnetic pollution.
- Partial discharge is < 10pC， Low partial discharge ensures long service life.
- Excellent heat dissipation for enhanced cooling efficiency.
- Dry-type transformers are specially designed for use in high humidity and harsh environmental conditions.
- Superior reliability reduced thermal and mechanical stress.

TECHNICAL CHARACTERISTICS

Main Specification

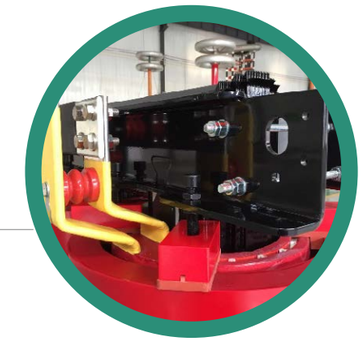
Transformer Type	Cast resin
Rated capacity	Up to 25MVA
Rated voltage	Up to 66kV
Frequency	50 or 60Hz
Phase	Single phase or three phase
Winding material	Copper, Aluminum
Insulation class	F, H
Vector group	Dyn11, Dyn5, YNd1d1 etc.
Cooling	AN, AF, ANAN, ANAF, AFWF
Protection Enclosure	IP00 to IP54
Climate	C3, C4, C5
Environmental	E2, E3, E4
Fire behaviour	F1
Standard	IEC, AS, EN, IEEE/ANSI, GOST
Altitude	Max 5000m

PRODUCT FEATURES



Iron Core:

The three-limb iron core is made of oblique cut Grain-oriented, seven-step silicon steel laminations insulated on both sides, guaranteeing low losses and low noise. These values are even improved by laser treatment. It is protected on the surface with a flash-proof varnish in order to prevent the sheet from corrosion and to reduce the noise.



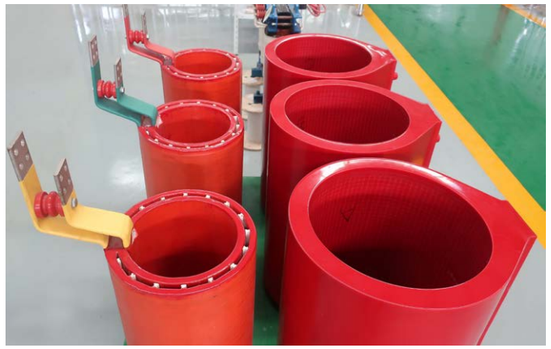
Clamping frame:

It is processed by CNC cutting, bending and then one-time punch forming, the hole's size is accurate and the appearance looks delicate.

Dry Type Transformer Winding

The winding coil is made of oxygen-free copper, class H for main insulation materials and coil is insulated by NOMEX paper of DUPONT brand, LV winding is isolated by copper foils. All these make the heat-resistant up to 220 C, with excellent overload capacity and low loss, but high efficiency.

Resin guarantees the best dielectric performance, short-circuit resistance, and long-term reliability, customized up to 25mva transformer winding Designed with HV/LV foil winding and round wire winding.



High voltage coil

This is vacuum-cast with epoxy resin with excellent mechanical and electrical performances using conductors with excellent conductivity to be outstanding in short circuit strength and insulation performance.

Low voltage foil coil

The standard low-voltage winding twine by copper foil (or aluminum foil) with interleaved DMD which bear less dielectric stress. The assembled coils are then oven-cured to form uniformly bonded solid cylinders that are anti-moisture. Such winding has excellent dynamic stability under shortcircuit condition.

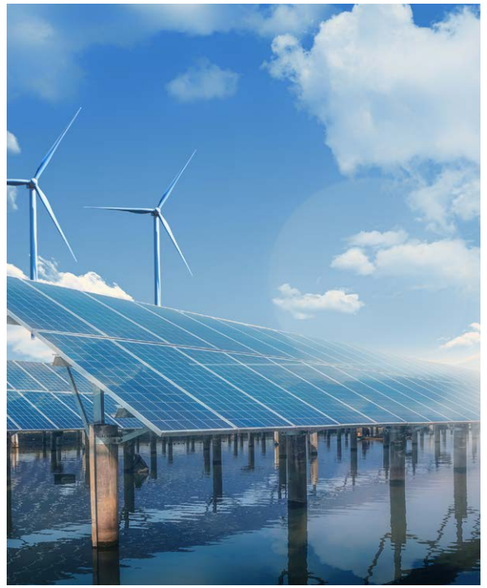
PROJECTS

Country: Australia

Double split dry type transformer for solar farm

High efficiency and energy saving: The structure of the double-split transformer can reduce losses during power transmission and improve power transmission efficiency.

Limit short-circuit current: When one branch of the split winding is short-circuited, the short-circuit current will pass through the semi-through impedance, which helps protect system equipment from the impact of short-circuit current.



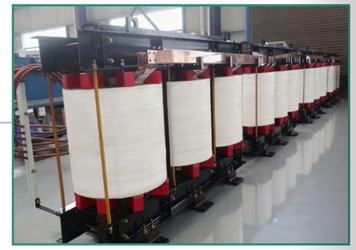
Country: Spain

Country: Russia

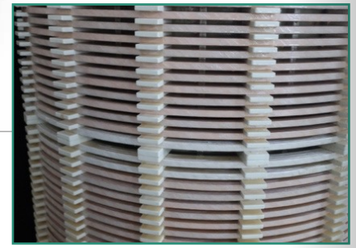
Dry type transformer for University

Safety, environmental protection, high efficiency and energy saving, easy maintenance, low noise, compact structure, moisture-proof and dustproof, strong overload capacity, dry design without insulation oil, completely eliminate oil leakage, fire risk, in line with campus fire safety standards.

VPI DRY TYPE TRANSFORMER



layer winding



disc winding

VACUUM PRESSED IMPREGNATION TECHNOLOGY

- Integrated HV and LV winding increase mechanical strength and short circuit resistance by vacuum pressed impregnation technology.
- Adopted Insulation material C-class Dupont Nomex paper,plus oxygen-copper winding, ensure lower partial discharge , no-load and load loss, and low temperature rise.

BENEFIT OF VPI TRANSFORMER

- High-tech VPI (vacuum pressure impregnation) processing for coil, then high temperature curing, highly insulated, dust-proof & moisture-proof.
- Better moisture proof , dust proof, lightning shock resistance.
- Low noise, Low Loss, strong short-circuit resistance.
- Low temperature rise, long life.
- Disc winding with excellent Short-Circuit Strength and Improved Cooling Efficiency.
- Core is made of superior silicone steel, outstanding performance of magnetic conduction. Joint is processed by 45° oblique angled technique and new technology seven step core, with low loss and low noise.

TECHNICAL CHARACTERISTICS

Main Specification

Transformer type	Three phase, VPI dry type
Frequency	50 or 60Hz
Rated capacity	Up to 10000kVA
Rated voltage	Up to 33kV
Insulation class	H,C
Winding material	Copper , Aluminum
Cooling mode	ANAN，ANAF
Vector group	Dyn11, Yyn0 etc.
Protection Class	IP00 - IP56
Standard	IEC, AS, EN, IEEE/ANSI, GOST

VPI DRY TYPE TRANSFORMER FOR MARINE&OFFSHORE

- Varelen transformers for marine application are designed, manufactured, and approved by marine standards --Bureau Veritas, Anti-corrosion and anti-salt spray,Protection from the harsh marine environments.
- Marine VPI Dry type transformer adopts special anti-vibration measures.
- Ship transformer meeting the severe environment of ships that requires high reliability such as vibration resistance, salt resistance, etc.
- An AFWF(forced water cooling type transformer technology is used considering the fact that the temperature in transformer stations is high due to the characteristics of ships.
- We have secured ship class certification BV.

PROJECTS

Country: Canada

Medium voltage VPI dry type Transformer

Standard: ANSI
Efficiency: 99.41%

VPI Dry type transformer adopts Vacuum Pressure Impregnation (VPI) insulation system that ensures excellent dielectric strength, moisture resistance, and long-term thermal stability — ideal for indoor and heavy industrial environments.

With Qualitrol monitoring equipment to ensure reliable power. Gain real-time oversight of your operations with actionable insights into compliance, equipment performance, and risks.

Country: Denmark

Dry type phase shifting transformer for wind power projects

Dry type transformer,variable frequency 16.5-28.6Hz， The variable frequency rectifier phase shift transformer is specifically designed to provide multiphase rectified power for medium and high-voltage frequency converters. Supported by DuPont Nomex insulation, the rectifier is suitable for a wide range of medium to high voltage inverters, effectively filtering harmonics, protecting motors, dissipating heat, and preventing flames.

Country: Italy

36 pulse output for 13.8KV variable frequency converter systems

Dry Type Phase shift transformer, 36 pulse output for 13.8KV variable frequency converter systems.
Multi-phase units available, 6,12, 18, 24, 36, 48 pulse Bridge

VPI Dry Type transformer With electromagnetic and structural optimization design, small size and lower noise. Good solution to harmonic influence: Reaching up to maximum 27 phase for secondary winding in result a great reduction of the harmonics influence on the power grid and other equipment.

Multi pulse rectifier transformer, Multi-phase power supply for Variable Frequency Drives. Frequency Inverter. High Voltage Rectifier, and installed in Power Plant. Boiler Fan. Coal. Mining. Petroleum. Steelworks and Water-supply System etc.

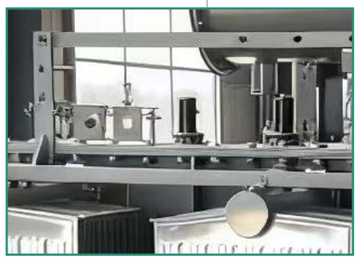
Country: Russia

24 pulse VPI dry type phase shift transformer for MV Drives

Our dry type transformer are very safe compact, energy-efficient and sustainable.
VPI dry type transformer Made of Class C insulation materials with big running temperature rise margin, strong overload capacity, high fire resistance, good thermal stability and long service life.

Made of high-performance silicon steel sheet material and lower magnetic flux density design so as to withstand over-voltage and harmonic influence unsaturated.
phase shift rectifier transformer Maintenance-free fastening body structure, keep reliable in the long-distance transport and operation.
Multi-Pulse transformers are designed specifically for inherent harmonics, voltage distortion and other unique characteristics associated with drive systems. They provide required supply voltage with the desired phase angle between secondary voltages for VFD systems/ converters.

SHUNT REACTOR



Oil immersed shunt reactors Used in parallel with the power transmission system to minimize the reactive/ capacitive effects inherent to the transmission lines due to their long lengths.

DESIGN FEATURES

- Shunt reactors control voltage and compensate reactive power, while series reactors change load flow and limit short-circuit currents.
- Largely reduce non-load losses by adopting high quality silicon steel core.
- Optimized tank designs , reducing the overall shipping dimensions and weight. easier installation.
- Low noise levels.
- Compact, robust design; stable performance over service life.
- Surface treatment C3, C4 , C5.
- Fluid options available， Mineral Oil - Natural Ester Fluid (FR3 fluid)- Silicone etc.
- All transformers can be designed, customized, and supplied with a wide variety of accessories, as required.

TECHNICAL CHARACTERISTICS

Main Specification

Transformer Type	Oil immersed
Rated capacity	Up to 20MVAr
Rated voltage	Up to 36kV
Frequency	50 or 60Hz
Phase	Single phase and three phase
Winding material	Copper or Aluminum
Tap changer	Off-load or on-load
Vector group	Dyn11, YNd1d1, Yyn0, YNd11 etc.
Cooling	ONAN , ONAF, KNAN, KNAF etc.
Ambient temperature	-45° C + 60° C
Insulation class	A, E, B
Dielectric fluids	Mineral oil , Silicone, FR3 oil , MIDEL 7131
Standard	IEC, AS, EN, IEEE/ANSI, GOST

LINE CHOKE(VPI REACTORS)

- Line chokes provide input impedance which helps reduce harmonic distortion and increase VFD component lifetimes. reactors help reduce dV/dT switching peaks and increase motor life.
- By use of liquid cooling, the temperatures in the components can be reduced greatly-ie less stress for the insulation materials and longer life.
- Reduced increase of the coolant temperature and lower required flow rates.
- Water cooled reactor for wind frequency converter.
- Three phase line choke is used for converter in wind application. On the one hand the choke has to smooth the current and on the other hand the choke is part of the line side filter to meet the power quality.
- Maintenance-free (non-hygroscopic).

PHASE SHIFT TRANSFORMER

BENEFIT OF PHASE SHIFT TRANSFORMER

Excellent structure, small size and high reliability:

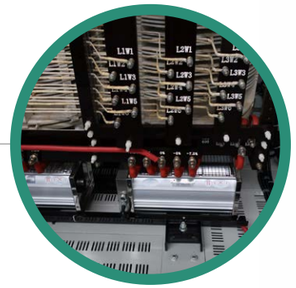
- With electromagnetic and structural optimization design, small size and lower noise.
- Same mold winding, the special support structure for coil end surface, high strength mechanical, high ability to withstand short-circuit, safe and reliable.
- Maintenance-free fastening body structure, keep reliable in the long-distance transport and operation.
- Lead lays out neatly, reasonable and nice.

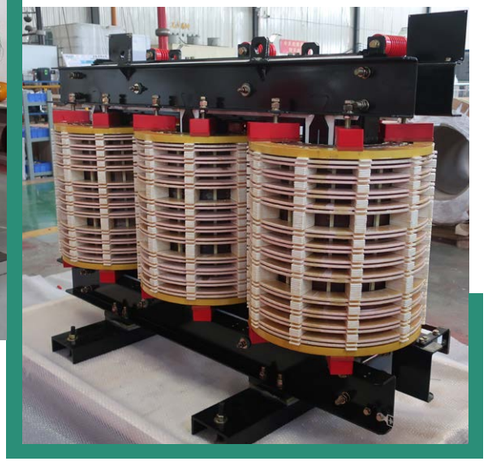
Vacuum Pressure Impregnated, High-quality material and good performance:

- Made of Class C Dupont insulation materials with big running temperature rise margin, strong overload capacity, high fire resistance, good thermal stability, and long service life.
- Adopted vacuum pressure impregnation Class C with UL insulating paint to ensure moisture proof, dust-proof, anti-contamination and low partial discharge.
- High-quality core made of silicon steel sheet and high-quality oxygen-free copper wire to reduce the effective operation loss and improve efficiency.

Good solution to harmonic influence:

- Made of high-performance silicon steel sheet material and lower magnetic flux density design so as to withstand over-voltage and harmonic influence unsaturated.
- Lower current density design and sufficient margin to make winding withstand additional temperature rise caused by harmonic.
- Advanced insulation structure that can withstand a variety of over-load insulation impact.





24 pulse phase shift rectifier transformer

TECHNICAL CHARACTERISTICS

Main Specification

Type	VPI dry type
Phase	Three phase
Frequency	50 or 60Hz
Rated Capacity	250 to 10000kVA
Rated HV	3kV to 13.8kV
Rated LV	3kV to 10kV
Temperature Rise	125K
Cooling Mode	AN , AF
Insulation Class	H
Winding Connection Code	Y/E/yn
Impedance	6- 9%
Secondary Winding Available	6, 9, 12, 15, 18, 21, 24, 27, 36 winding
Maximum temperature	+50°C
Minimum temperature	-50°C
Altitude	1000M
Standard	IEC, AS, EN, IEEE/ANSI, GOST

MINING FLAME-PROOF MOBILE SUBSTATION

BENEFIT OF MINING TRANSFORMERS

- Excellent explosion-proof performance and mechanical strength.
- Adopted cylinder- type HV winding to strengthen resistance to over- voltage.
- Robust designs to withstand the harsh operating environments.
- Integrated HV and LV winding increase mechanical strength and short circuit resistance by vacuum pressed dipped technology.
- Excellent overload resistance and insulation performance by Dupont Nomex paper.
- Special anti-loose structure with vertical lifting ability, no internal looseness during transportation, easy to use and maintain.
- Equipped with rail wheels, strong impact resistance ability, detachable and adjustable rail gauge.
- Multiple protective functions of overload, short circuit, leakage, leakage lockout, over-voltage, under-voltage and over temperature.
- With RS485 interface for computer communication.

TECHNICAL CHARACTERISTICS

Main Specification

Transformer type	Three phases, dry type
Frequency	50 or 60Hz
Rated capacity	Up to 8000kVA
Rated voltage	Up to 11kV
Insulation class	H,C
Cooling mode	ANAN，GNAN
Explosion-proof type	ExdIMb
Connection code	Yd, Dyn, Yyn etc.
Standard	IEC60079
Protection Class	IP56
Tank Temperature	110°C
Altitude	Max. 2300 m

HV AND LV SWITCHES HAVE THREE CONFIGURATION OPTIONS:

Country: Spain

A) Mining Flameproof HV vacuum switch + Mining Flameproof LV protection box

Country: Colombia

B) Mining Flameproof HV vacuum switch + Mining Flameproof LV feed switch

Country: Mexico

C) Mining Flameproof HV vacuum switch + Mining Flameproof LV multi-loop combined switch(LMCC)

CONTAINERIZED SUBSTATIONS

Containerized mobile substations are sheltered and address applications in challenging environmental conditions including areas with high pollution, high humidity, extreme temperatures or sand storms.Containers are easy to transport and fast to install, by reducing foundation works as well as installation and commissioning effort on site.

- Compact structure and small footprint.
- The internal dry-type transformer is stable and maintenance-free, fire-retardant, and meets higher fire protection requirements.
- The container adopts a special process, with anti-corrosion and anti-exposure capabilities, and can effectively resist the erosion of wind and sand.
- Easy To Transport, compact 20ft/40ft, the container loads on most flatbeds.
- Super Harmonic withstand capability.
- Container substation safety and reliability: fully sealed and insulated for enhanced safety.
- High overload capacity.
- High resistance to short circuits.
- Fan forced ventilated options available.
- Designed and Customized according to customer requirements.

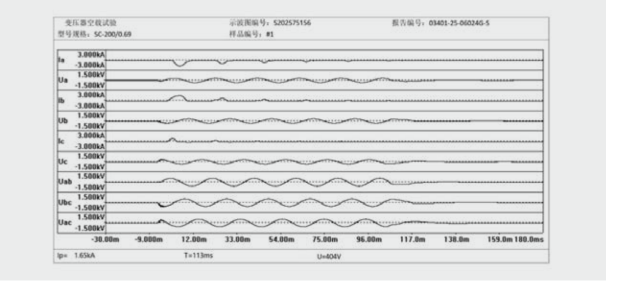
TECHNICAL CHARACTERISTICS

Main Specification

Transformer Type	Cast resin
Rated capacity	315kVA - 10MVA
Rated voltage	Up to 33KV
Frequency	50 or 60Hz
Phase	Single phase or three phase
Winding material	Copper, Aluminum
Insulation class	F, H
Vector group	Dyn11, Dyn5, YNd1d1 etc.
Cooling	AN, AF, ANAN, ANAF, AFWF etc.
Protection Enclosure	IP00 to IP54
Sound level	⩽ 55dB
Climate	C3, C4, C5
Environmental	E2, E3, E4
Fire behaviour	F1
Standard	IEC, AS, EN, IEEE/ANSI, GOST
Altitude	Max 5000m

CERTIFICATION

Salt spray test



Inrush current

Varelen

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