

TIANJIN ELECTRICAL ENERGY EQUIPMENT

Quality Guaranteed, High Efficiency and
Cost-effectiveness, Shorter Lead Times

COMMITTED TO BEING THE WORLD'S LEADING
DRY-TYPE AIR-CORE REACTOR

MANUFACTURER



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Tianjin
Electrical
Energy
Equipment



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HIGHLIGHTS

- Successfully designed and developed the world's first $\pm 1100\text{kV}$ Dry-Type Air-Core Smoothing Reactors. The reactors were specially manufactured and delivered to SGCC in 2018 for the Changji-Guquan UHV DC transmission project, and has been running perfectly since 2018.
- Developed the first 500kV high voltage Dry-Type Air-Core Shunt Reactors in the world, and these reactors have been delivered to the Sylvania Project in Brazil in 2023.
- Successfully designed and developed the world's first $\pm 800\text{kV}$ UHV Dry-Type Air-Core Converter Reactor, demonstrating our world-class technical capabilities and providing the springboard for advancement in this area.
- The world's first 500kV-class high-voltage Dry-Type Air-Core converter reactor has been utilized in the $\pm 800\text{kV}$ Baihetan-Jiangsu UHV DC transmission project.
- Developed the highly reliable online fault monitoring system for Dry-Type Air-Core Reactors.

ENTERPRISE PROFILE

Tianjin Jingwei Zhengneng Electrical Energy Equipment Co., Ltd. (TEEE) was founded in 2014. With its headquarters in Tianjin, China, TEEE develops and manufactures small, medium, large and extra-large Dry-type Air-core reactors and line traps. Our products are reliable and of high quality, covering the complete range of voltages up to 1100kV and applications, like SVG, SVC, VSC, HVDC and HVAC.

TEEE has a total of 200 employees, with a strong technical team of 32 engineers. TEEE has three R&D centers in China, located in Tianjin, Beijing and Changsha, and 16 overseas offices worldwide.

Adopt a dual-brand strategy: "TEEE" for Overseas Market and "JWZN" for Domestic Market.

3

Established 3 R&D centers, located in Tianjin, Beijing and Changsha.

40⁺

Involved in more than 37 HVDC & HVAC transmission lines around the world until 2025.

16000⁺

Supplied over 16,000 reactors for HVDC & HVAC transmission lines, VSC transmission lines, SVC, SVG, FACTS, capacitor banks globally until 2023.

35⁺

Exported to over 35 countries worldwide, including Brazil, USA, Canada, Mexico, Spain, Poland, Chile, South Africa, Egypt, India, Japan, South Korea, Vietnam and others.

HISTORY



2014

- Establishment of Tianjin Jingwei Zhengneng Electrical Energy Equipment Co., Ltd. (TEEE), specializing in the manufacture of various types of air-core dry reactors.

2015

- Roger Alberton, former General Manager of Trench Canada, joined TEEE.
- ± 800 kV Smoothing Reactor and 110 kV Shunt Reactor qualified by CMIF (China Machinery Industry Federation).

2016

- Awarded multiple ± 800 kV UHVDC transmission projects in China.
- World's first ± 1100 kV UHV Smoothing Reactor supplied for the Changji-Guquan UHVDC Project.

2017

- ± 1100 kV UHV Smoothing Reactor internationally recognized as leading-edge technology by CMIF.
- TEEE recognized as a National High-Tech Enterprise by Tianjin Science and Technology Bureau.

2018

- Awarded the ± 500 kV Zhangbei Flexible HVDC VSC Project and Wudongde UHV Multi-terminal DC Project.
- Established two new R&D Centers and started the development of the 500 kV Current Limiting Reactor and ± 800 kV Converter Reactor.

2019

- Awarded the Northern Shaanxi-Wuhan ± 800 kV UHVDC Project.

2020

- Finished development of the ± 800 kV Converter Reactor and 500 kV Current Limiting Reactor, both qualified by CMIF.
- Awarded major UHV AC and international power transmission projects.

2021

- Lightweight dry-type air-core converter reactor for offshore wind power successfully developed and qualified by CMIF.
- Awarded multiple UHV AC and DC transmission projects in China.
- CEO Mr. Wu received China's highest honor for industry experts from the State Council.

2022

- Development and qualification of TEEE's unique 500 kV Dry-type Air-core Shunt Reactor design. First units awarded and delivered to Brazil.
- TEEE recognized as a technology "Little Giant" enterprise by the Ministry of Industry and Information Technology.

2023

- Awarded more than 7 HVDC and HVAC projects and delivered over 16,000 reactors worldwide.
- First 500 kV Dry-type Air-core Shunt Reactor single tower put into operation in Brazil.

2024

- TEEE was #1 reactor supplier in China.
- Awarded the largest overseas projects totaling more than 160 units of 500 kV Single Tower Shunt Reactors.
- Replacement of the ± 600 kV HVDC Smoothing Reactor in Brazil for the Ibiúna-Foz do Iguaçu Converter Station.

2025

- Energization of the first overseas HVDC Smoothing Reactors in Brazil (Itaipu) and Congo.
- Delivered more than 30 units of 500 kV Shunt Reactors in a record lead time of 7 months from contract signature.
- Created its first direct overseas subsidiary in Brazil.
- Doubled manufacturing capacity with Workshop 2 inaugurated in September 2025.

GLOBAL BUSINESS NETWORK

3

R&D Centers

4

Subsidiaries

15

Overseas Offices



As a leading manufacturer of Dry-type Air-core Reactor in China, TEEE has established its strong production base in Tianjin, and also set up its knowledgeable and dedicated R&D center in Tianjin, Beijing and Changsha. International market is our next most important step, as which TEEE has opened its overseas branch offices in Korea, Toronto and Rio de Janeiro, and construct a reliable and capable agents network worldwide. All people are customer-focused, dedicated, efficient and with integrity. We are committed to making TEEE the foremost manufacturer of high quality reactors in the world.

CORPORATE CULTURE



GLOBAL VANGUARD

Pioneers in various applications such as 1100 kV HVDC smoothing reactors and 500 kV HVAC shunt reactors.



ABSOLUTE SPECIALIZATION

We do just one thing: reactors and we're the best in the world at it!



TOTAL CONTROL OF THE PRODUCTION CHAIN

We oversee the entire production chain from raw materials to asset management.



PROUD TO BE CHINESE

We show the world the best of China: empathy, professionalism, and a partnership-minded vision.

CERTIFICATION

Since 2015, TEEE has been certified to ISO9001, ISO14001, ISO45001 and ISO50001. After years of strong efforts, TEEE is recognized as one of the top leaders worldwide, focusing on Dry-Type Air-Core reactor for all utility and industrial application.



ISO 9001:2015 Quality System Certificate



ISO 14001:2015 Environment System Certificate



ISO 45001:2018 Occupation Health and Safety System Certificate



ISO 50001:2018 Energy System Certificate

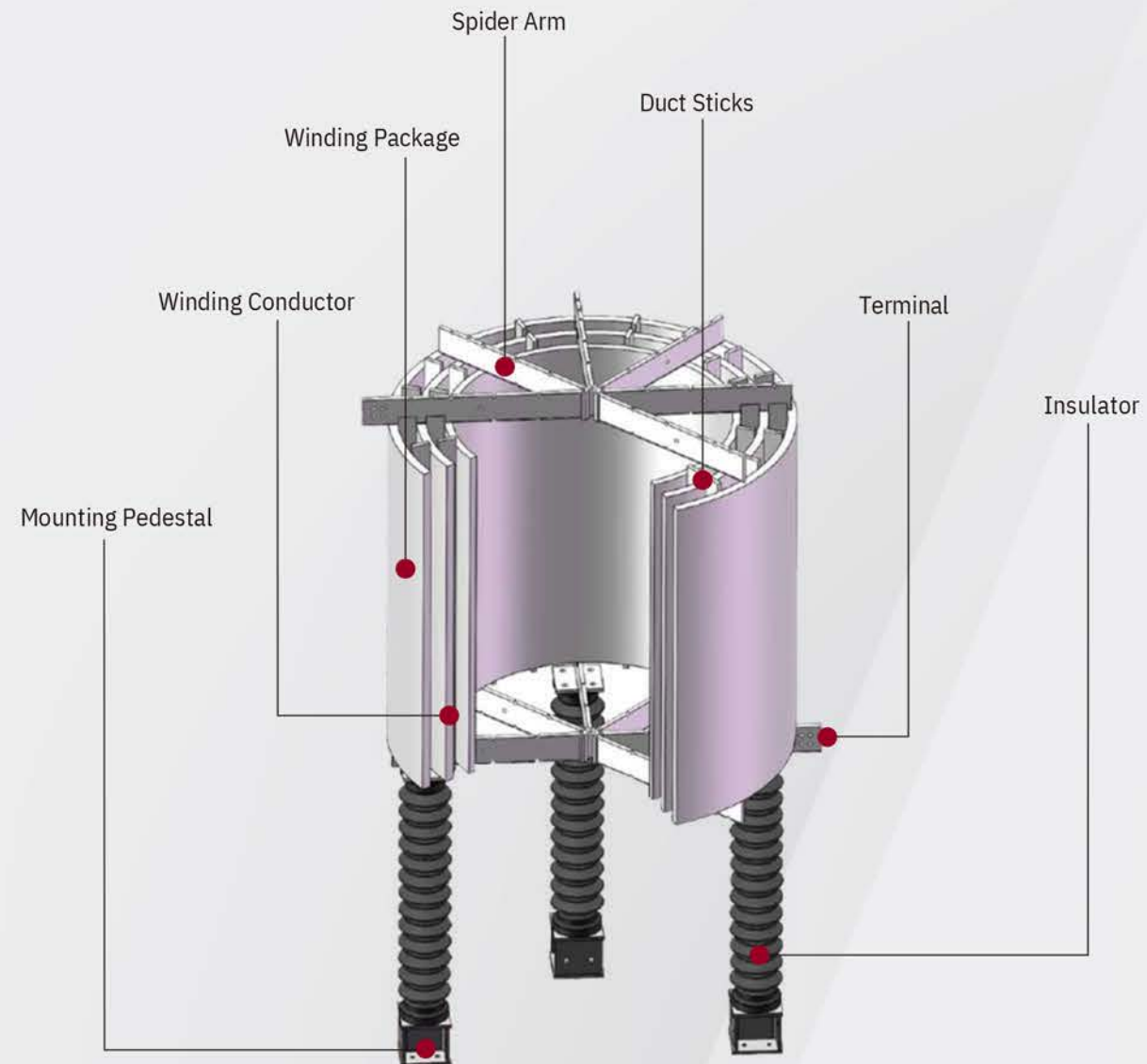


PRODUCT INTRODUCTION

TEEE has the capability to design and manufacture Dry-Type Air-Core Reactors, which can meet the requirements of domestic and international standards such as GB, IEC, IEEE and ANSI. The voltage level covers the full range from 6kV to 1100kV. TEEE is the world's leading reactor manufacturer and its quality control capabilities are excellent, especially in the field of large reactors for ultra-high voltage, large capacity and AC and DC power transmission and transformation projects. At the same time, TEEE enjoys high ranking market brand recognition.



BASIC REACTOR CONSTRUCTION



The horizontally and vertically structured epoxy-impregnated fiberglass encapsulation provides superior mechanical strength, minimizing both reactor vibration and sound level.

All conductor terminals are welded to the aluminum bus bars, forming the top and bottom spider arms of the reactor.

The support structure consists of insulators and pedestals. We can provide steel or fiberglass support structures, ensuring proper magnetic clearance between the ground and the reactor and it also provides safe personnel clearance at ground level while energized.



ADVANTAGES OF TEE DRY-TYPE AIR-CORE REACTORS

- Light weight and small size;
- Large temperature rise margin and service life in excess of 35 years;
- No insulating oil, more environmentally-friendly;
- Explosion-proof design, environment-resistant, maintenance-free;
- No iron core, low noise;
- Epoxy resin-impregnated fiberglass encapsulation, high fiberglass transition temperature, strong short-circuits resistance;
- In-house manufactured low-loss conductors, a fixed length with zero defects.

MAIN PRODUCTS

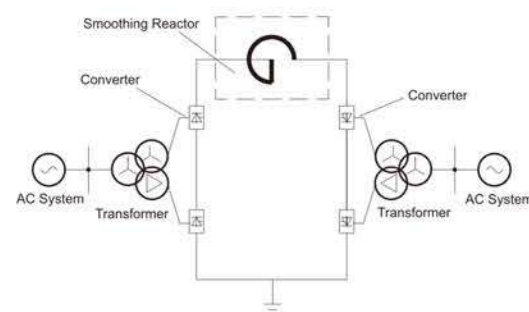
TEEE specializes in the design, production, and selling of small, medium and large Dry-Type Air-Core Reactors, and line traps.

Our products are reliable and of high-quality, covering the complete range of voltages and applications.

Smoothing Reactor

Upto1100kV

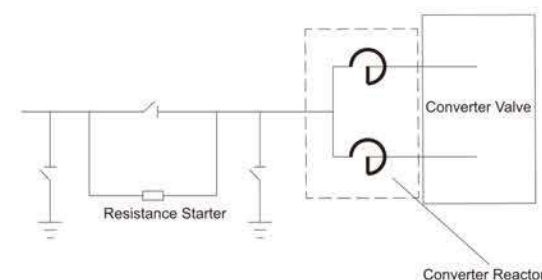
The smoothing reactor is connected in series in high-voltage DC converter stations or installed in the middle of back-to-back DC lines to reduce harmonic currents in DC lines, limit inrush currents when a fault occurs, limit the rise rate of DC reverse-phase currents and improve the stability of the transmissionsystem.



Converter Reactor

Upto800kV

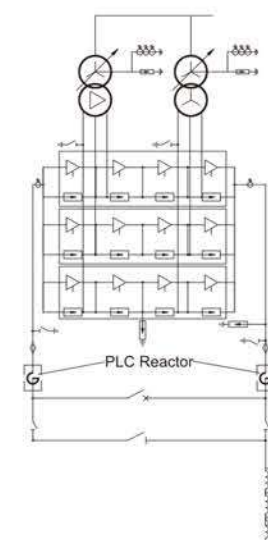
The converter reactor is located between the flexible DC converter valve and the connecting transformer. It can be installed on either the DC or the AC side of the converter valve. The converter reactor and the leakage reactance of the connecting transformer together constitute the commutation reactance of the converter station, which mainly plays the role of controlling power transmission, filtering and suppressing current fluctuations on the AC side. In addition, it can restrain the fault current of the bridge arm when the bridge arm commutation and short circuit current rise too fast.



PLC Reactor

Upto800kV

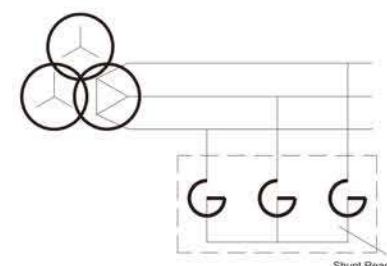
The PLC reactor is the main component of the noise filtration and is usually installed on the AC or DC side of the converter station. It can effectively filter out high-frequency harmonics to prevent interference with PLC signals in the power system, prevent damage to PLC modules caused by high-order harmonic impacts and prevent high-frequency noise from affecting the power carrier communication (PLC) system on the AC and DC input and output lines of the converter station or other PLC communication systems used in power transmission projects.



Shunt Reactor

Upto500kV

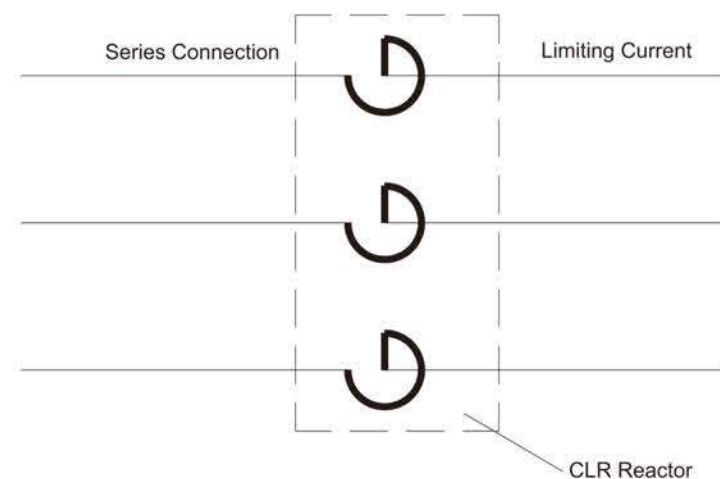
The shunt reactor is connected between the phase and the ground, between the phase and the neutral point, between phases in the power system to play the role of reactive power compensation. It is used to compensate the capacitive charging power of ultra-high voltage lines, which is helpful to limit the increase of power frequency voltage and operating over-voltage in the system, reduce the insulation level of ultrahigh voltage system, improve the voltage distribution along the line and increase the stability and power transmission capacity of the system.



Current-Limiting Reactor

Upto500kV

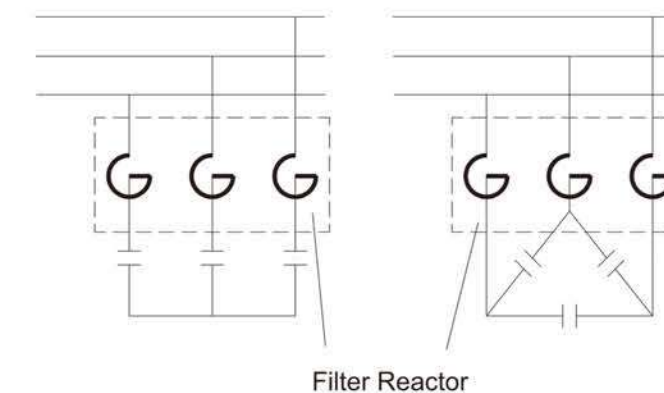
The current-limiting reactor is connected in series in the system line to limit the short-circuit current or fault current of the system to a specified value when a system fault occurs.



Filter Reactor

Upto1100kV

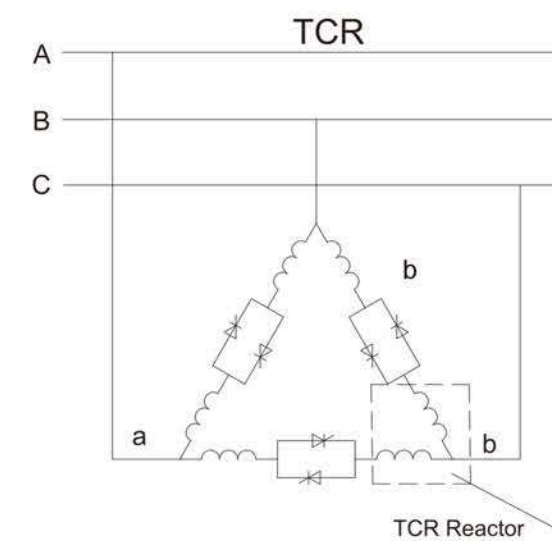
Filter reactors and filter capacitor banks are used in series or parallel to form a tuned filter circuit, which is used to filter out harmonics of specified frequencies and reduce the harmonic content on the line.



Thyristor-Controlled Reactor (TCR)

Upto66kV/300MvarperPhase

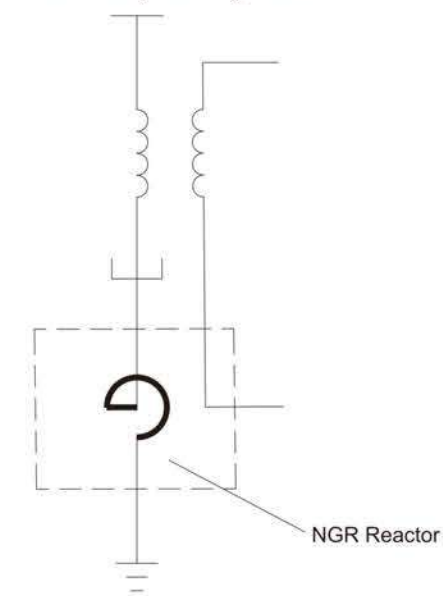
Thyristor-Controlled Reactor (TCR), is a static reactive power compensation device that is connected in parallel with the system and absorbs reactive power from the system. By controlling the conduction angle of the thyristor valve, its equivalent inductance changes continuously.



Neutral Grounding Reactor

Upto66kV

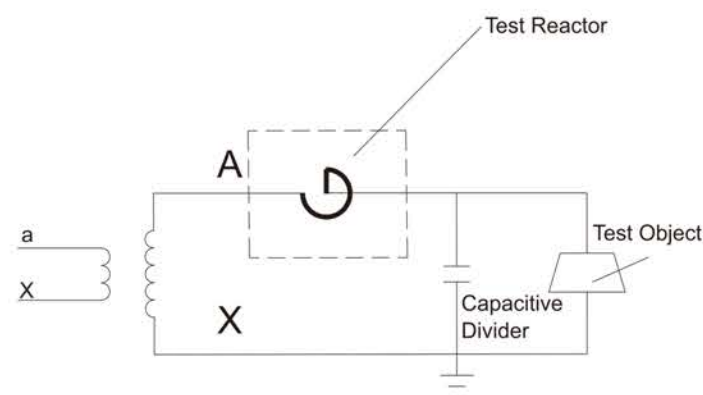
The neutral grounding reactor is installed between the high impedance or the three-phase neutral point of the transformer and the ground. It is a single-phase reactor used to limit the ground current to a specified value when the system is grounded.



Test Reactor

Acustom-madesolution

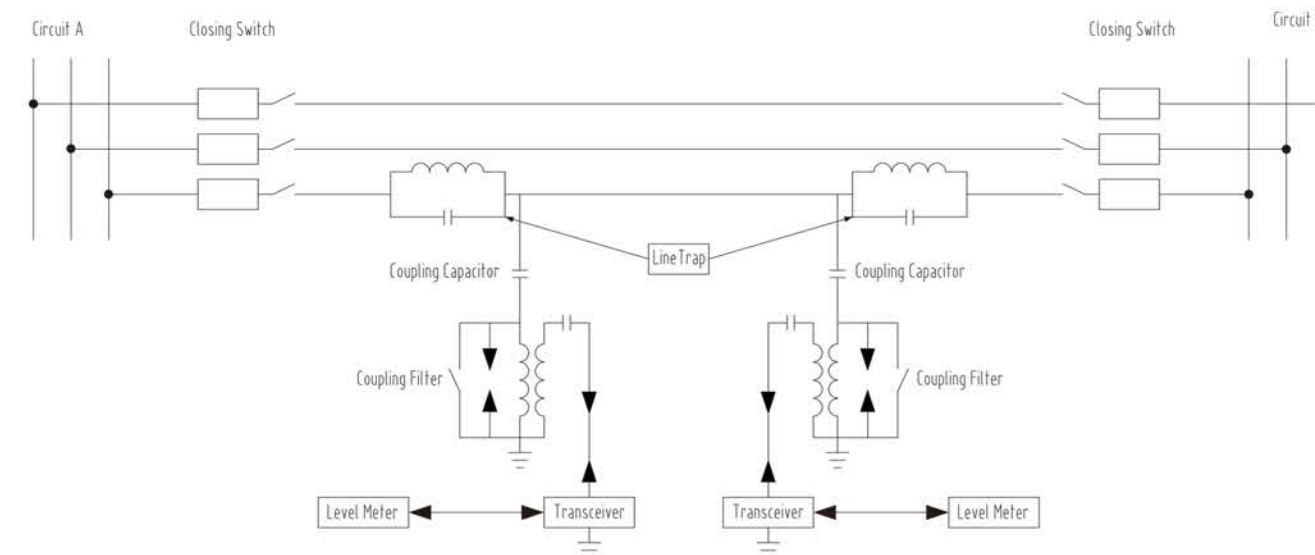
The test reactor is installed in the test circuits of high-voltage and highpower test chambers to adjust the test current. Typical application test circuits include current limiting, circuit breaker synthesis testing, inductive energy storage and simulated circuits, etc.



Line Traps

Upto750kV,500KHz

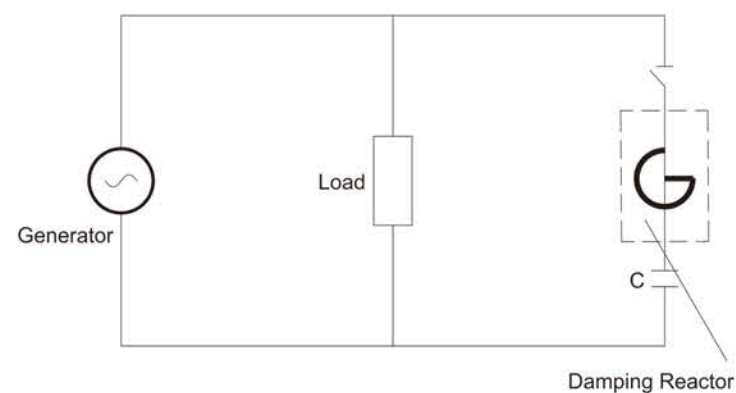
Line Traps are connected in series in high-voltage and ultra-high-voltage AC power lines to prevent excessive loss of carrier signals with frequencies generally in the 40-500KHz range under various conditions in the power system and to minimize interference from adjacent carriers.



Damping Reactor

Upto1100kV

The damping reactor is connected in series with the capacitor bank or dense capacitor to limit the closing inrush current of the capacitor, limit the external inrush current generated when a fault occurs or an adjacent capacitor is switched or detuning of the power supply container group to avoid resonance with the power system.



TEEE NEW 500 KV SHUNT REACTOR

Introduction

Shunt reactors are connected in a parallel configuration to the power system to compensate for capacitive reactive power of transmission and distribution systems. This ensures that operating voltages are maintained within acceptable operating levels.

Shunt reactors are constructed as either “Oil-Immersed ” or “Dry-Type”.

Dry-Type reactors consist only of encapsulated windings, supported by the appropriate insulators.

TEEE Dry-Type Reactor VS. Oil-Type Reactor

(Example: 500kV/20M)

ITEM	Oil-Type	TEEE Dry-Type
Footprint(LXWXH)	3m X 8.1m	3m X 8m
Weight (T)	80T	16T
Loss (% loss/capacitor)	≤0.3%	≤0.3%
Self voltage-sharing capacity	None	Yes
Iron Core	Yes	None
Oil Need	Yes	None
Fire Protection	Yes	None
Field Installation	Hard	Easy
Delivery	Hard	Easy

Advantage of TEEE New Developed Shunt Reactors

RECAP ON TEEE INNOVATION POINTS

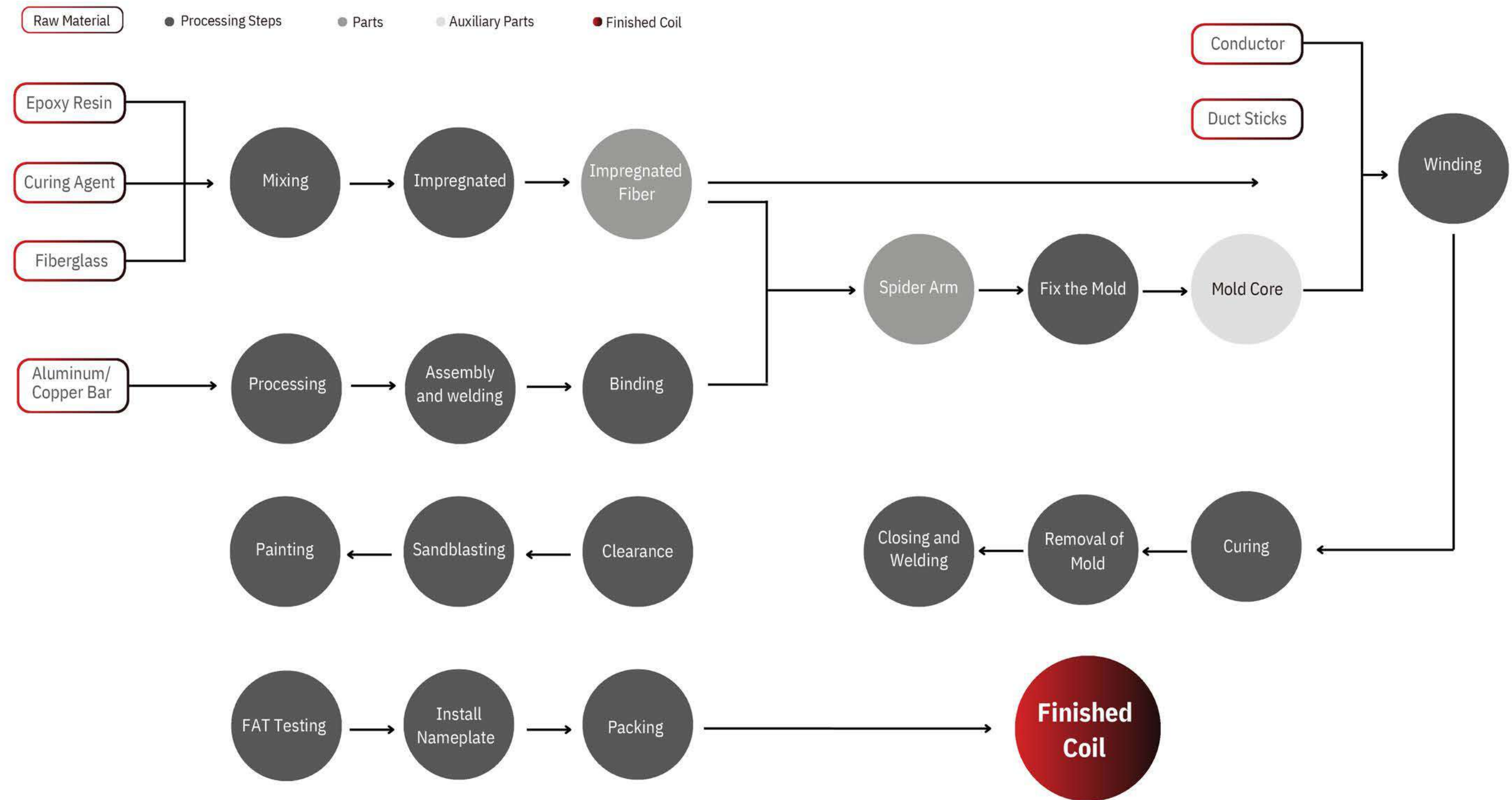
- Special "Modular" Design makes Developed New Shunt Reactors more compact.
- Good voltage equalizing performance, excellent tolerance to transient overvoltage.
- No iron core, low vibration, low noise.
- Only 20% of the weight of oil reactor, less occupation of land, completely replace the oil reactor, maintenance-free.
- Low heat generation, rain proof, bird proof, strong weather resistance and more reliable.
- Easy assembly and disassembly, fast and convenient transportation, great anti-seismic structure.
- Replaces Oil-Type shunt reactors and traditional Dry-Type Shunt Reactors.



FACTORY VIEWS



PROCESS FLOW CHART



QUALITY CONTROL

Incoming Inspection

- **Conductor:** size, overlap rate, insulation resistance, DC resistance, withstand voltage test
- **Epoxy Resin/Cure Agent/Imidazole:** compressive strength and glass transition temperature test
- **Fiberglass products:** dimensions, material verification reports, extended manufacturing supervision
- **Duct sticks:** dimensions, compressive strength and lightning impact test
- **Aluminum bar:** size, material report checking
- **Insulators:** dimensions, reports checking, tests witnessing
- **Stainless steel products:** dimensions, magnetic inspection, material report checking and extended manufacturing supervision
- **Fiberglass products:** dimensions, material reports checking and extended manufacturing supervision

In-Process Inspection

- Glue content test of fiberglass
- AC Hi-pot Testing of small wire for winding
- AC Hi-pot Testing of cables for winding
- Insulation resistance and DC resistance tests before and after curing
- Record curing curve
- Dimensional inspection - conductors and windings

Routine Tests

- DC Resistance
- Inductance
- Power Losses
- Turn to Turn Test
- High Frequency Impedance

Type Tests

- Temperature Rise Test
- Lightning Impulse Test
- Chopped Wave Test
- Switching Impulse Test
- Sound Level Measurement

Special Tests

- Radio Influence Voltage (RIV)
- Short Circuit Test

Note: Specific tests are carried out according to customer requirements and different standards.

TESTING BAY



1000kV Hi-Pot Transformer



1000kV Impulse Generator



DC Temperature Rise Test on 800kV SMR at 6250A



Capacitor Banks (up to 60kV) for AC Temperature Rise Testing

SALES ACHIEVEMENT & APPLICATION FIELD

TEEE reactors have been installed on over 31 HV lines throughout China. TEEE also exported the new 500kV shunt reactors to Brazil, 220kV series reactors to Pakistan and a complete range of applications worldwide. In total, we have supplied over 15,000 reactors for SVC, HVDC, HVAC, FACTS, VSC, capacitor banks, etc. globally.

- 1 line@1100kV
• 7 lines @ 800kV
- 6 lines @ 1000kV
• 9 lines @ 500kV
- 8 lines@220kV~330kV
.....to be increasing more

Fully compliant with technical specifications and full customer satisfaction.



Changji-Guquan ±1100kV UHVDC
1100kV Smoothing Reactor -HV



Wudongde ±800 UHVDC
Multi-terminal Project
800kV Smoothing Reactor-HV



Baihetan - Jiangsu ±800 kV
UHVDC project
500kV Converter Reactor-HV



Jingmen 1000kV UHVAC
110kV Shunt Reactor



Zhangbei 500kV VSC
66kV Shunt Reactor



Zhangbei-Shengli 1000kV HVAC
110kV Series Reactor



Changji-Guquan ±1100kV UHVDC
1100kV Smoothing Reactor-LV



Wudongde ±800 UHVDC
Multi-terminal Project
800kV Smoothing Reactor-LV



Baihetan - Jiangsu ±800 kV
UHVDC project
500kV Converter Reactor-LV



Zhebei ±800kV HVDC
110kV Filter Reactor



Jinzhong 1000kV Substation Project
110kV Series Reactor



Changtai Substation
110kV Shunt Reactor



900MW Combined Cycle Power Station in Pakistan
220kV Current Limiting Reactor



CATL Xiapu Project
Converter Reactor, 1220A



NPPD Project in the U.S.
6667kVA Shunt Reactor



SILVÂNIA Substation Project in Brazil
500kV Shunt reactor



Knoxville Utilities Board Project in U.S
875A Neutral Grounding Reactor



TMC Project in Spain
1850A Current Limiting Reactor



Job No. 229306 KEPCO PJT in South Korea
170kV Current Limiting Reactor



Malaysia Project
300A Current Limiting Reactor

COOPERATIVE PARTNER

AFTER-SALES SERVICE

“Service first, customer supreme” is TEEE’s principle of service. We serve customers from different application both across China and abroad.

Stick on the principle of responding to customers within 120 hours: the feedback information from the customers will be responded within 24 hours. Once there needs service on site, we will arrive within 72 hours (for domestic customers), and solve the problems within 24 hours after arrival(24+72+24=120).

Service Hotline

+86-22-28571040

+86-22-28572588-8022

info@teee.com.cn



DATA REQUIRED FOR QUOTATION

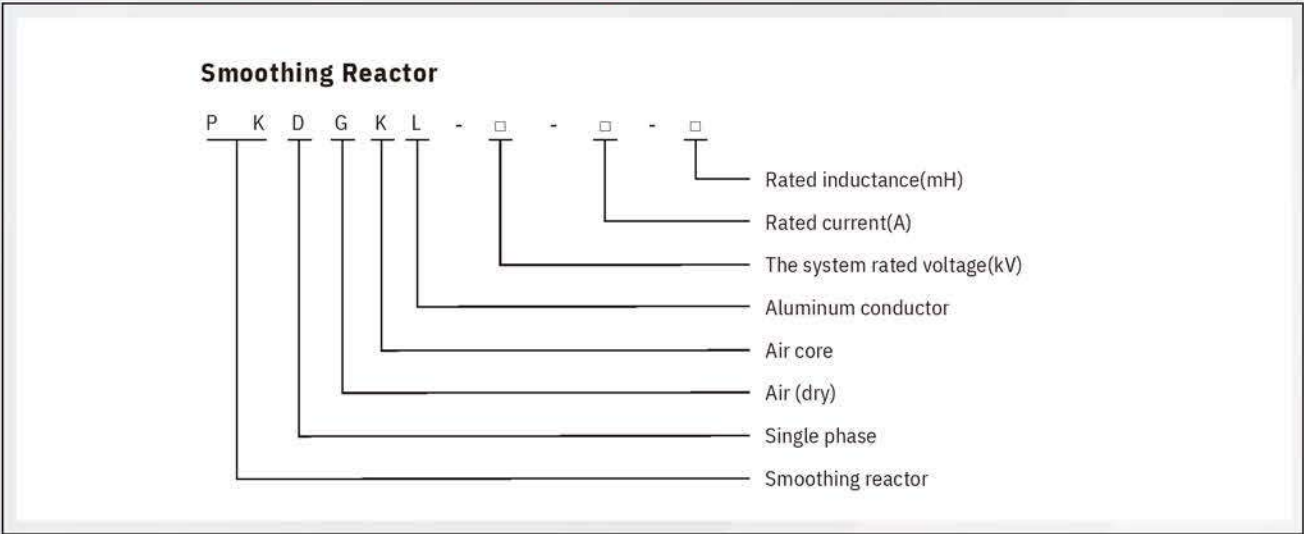
Note: Mandatory information is marked by a red asterisk (*).

Reactors	Line Traps
Customer Name*	Customer Name*
Shipping Address c/w Zip Code*	Shipping Address c/w Zip Code*
Quantity*	Quantity*
Rated Continuous Current (A) *	Rated Continuous Current (A)*
System Voltage (kV) *	System Voltage (kV)*
Rated Thermal Short-Time Current (kA/s) *	Rated Thermal Short-Time Current (kA/s)*
Rated Impedance or Inductance (ohms or mH) *	Rated Main Coil Inductance (mH)*
Power Frequency (Hz) *	Power Frequency (Hz)*
Applicable Standard *	Applicable Standard*
Application: Series or Shunt	Type of Tuning – Single or Double or
Harmonic Currents (A/Hz)	Wideband* Fixed or Adjustable Tuning
Maximum Continuous Overload Current (A)	Capability*
Mechanical Short-Time Current (kA/peak)	Bandwidth Frequencies (Hz)*
Average Ambient Temperature (°F or °C)	Minimum Blocking Impedance/Resistance
Maximum Ambient Temperature (°F or °C)	(ohms)* Mounting – Vertical or Horizontal*
Site Altitude (ft or m)	Average Ambient Temperature (°F or °C)
Seismic Level (G)	Maximum Ambient Temperature (°F or °C)
BIL Across Reactor (kV)	Site Altitude (ft or m)
BIL Reactor to Ground (kV)	Seismic Level (G)
Maximum Noise Level (dBA)	Special Environmental Considerations (if any)
Special Environmental Considerations (if any)	Special Technical Requirements (if any)
Special Technical Requirements (if any)	

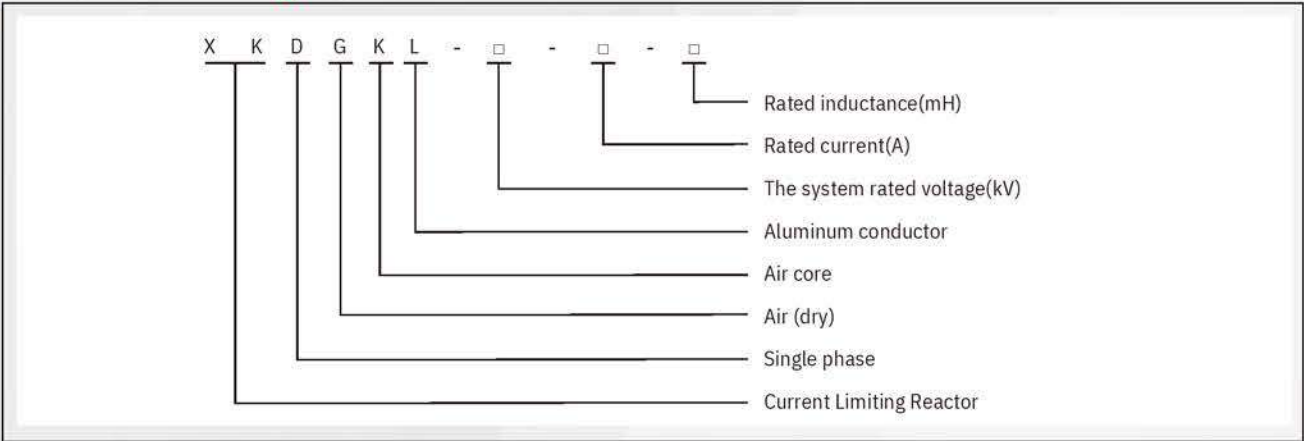
REACTOR CODE

- **Current Limiting Reactor:** XKDGKL-system rated voltage - rated current - rated inductance
- **Smoothing Reactor:** PKDGKL - system rated voltage - rated current - rated inductance
- **Shunt Reactor:** BKDGKL - rated kVA_r / system rated voltage
- **Filter Reactor:** LKDGKL - system rated voltage - rated current - rated inductance
- **Series Reactor:** CKDGKL - rated kAV_r / system rated voltage - reactive rate %
- **Test Reactor:** SKDGKL - system rated voltage - working current - rated inductance
- **Neutral Ground Reactor:** JKDGKL - system rated voltage - rated current - rated inductance
- **Line Trap:** XZF/XZK-rated current -rated inductance-short-time withstand current

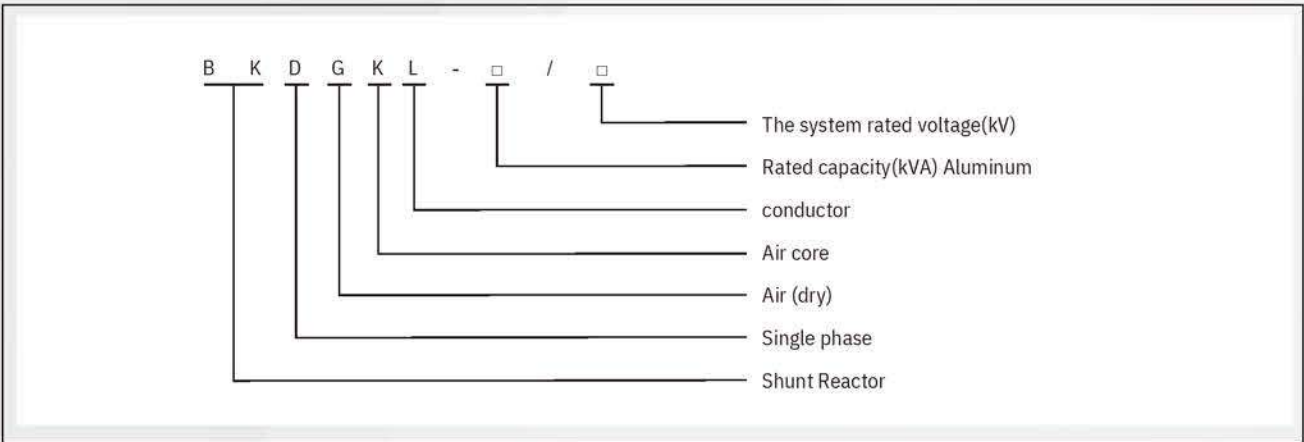
PK Series Dry-Type Air-Core Smoothing Reactor



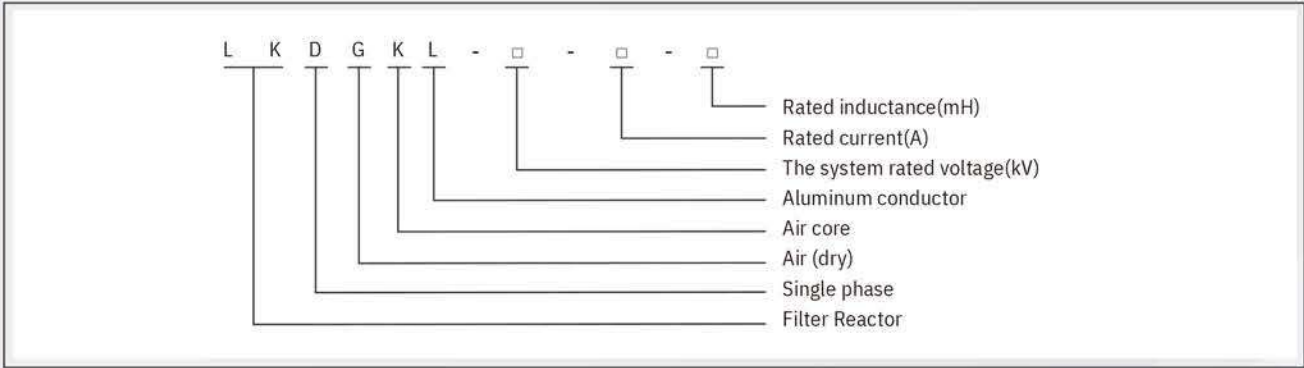
XK Current Limiting Reactor



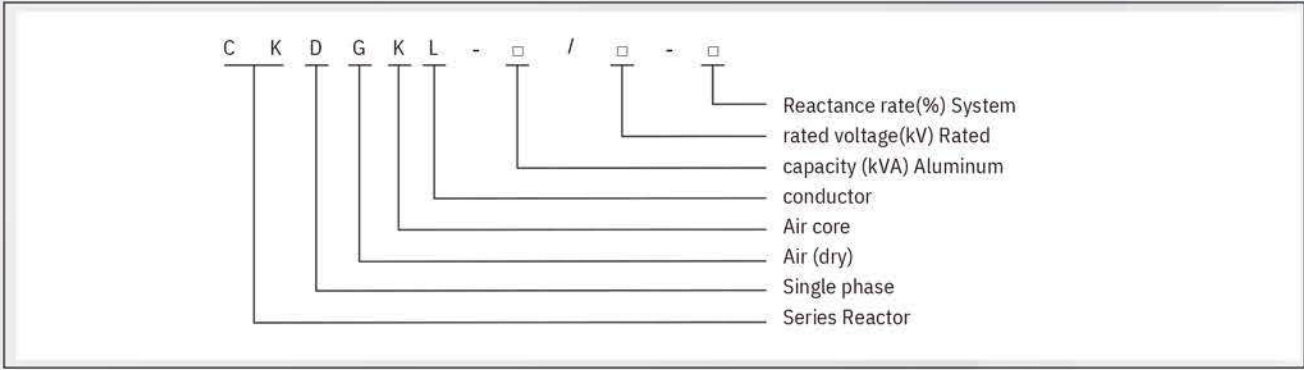
BK Shunt Reactor



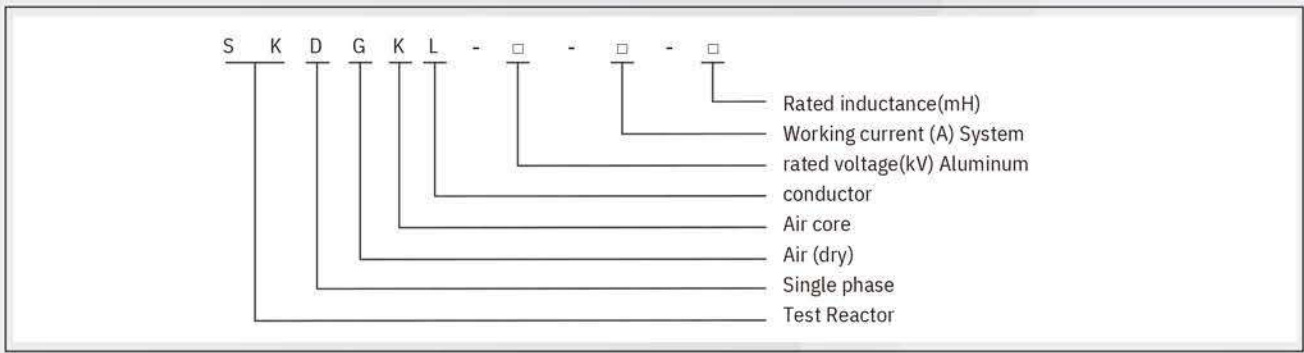
LK Filter Reactor



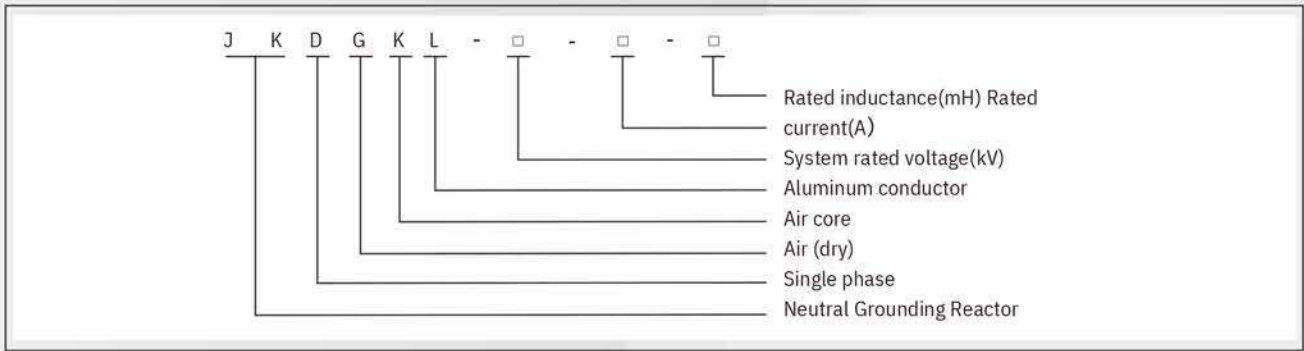
CK Series Reactor



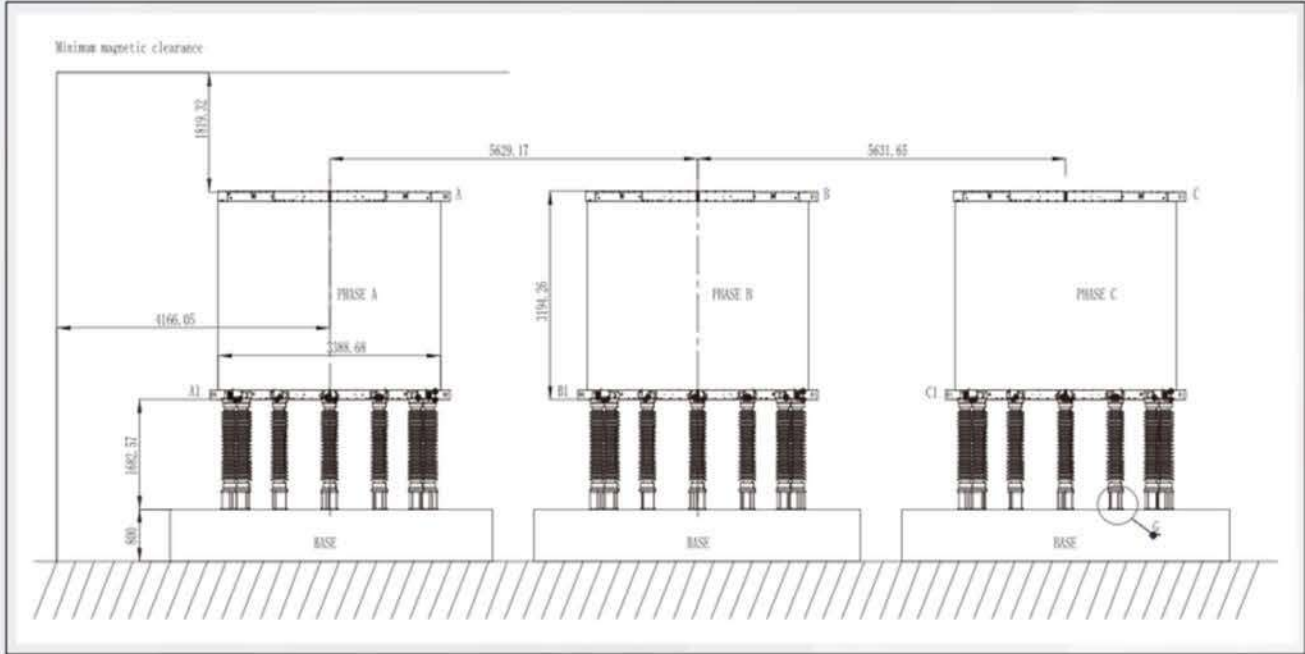
SK Test Reactor



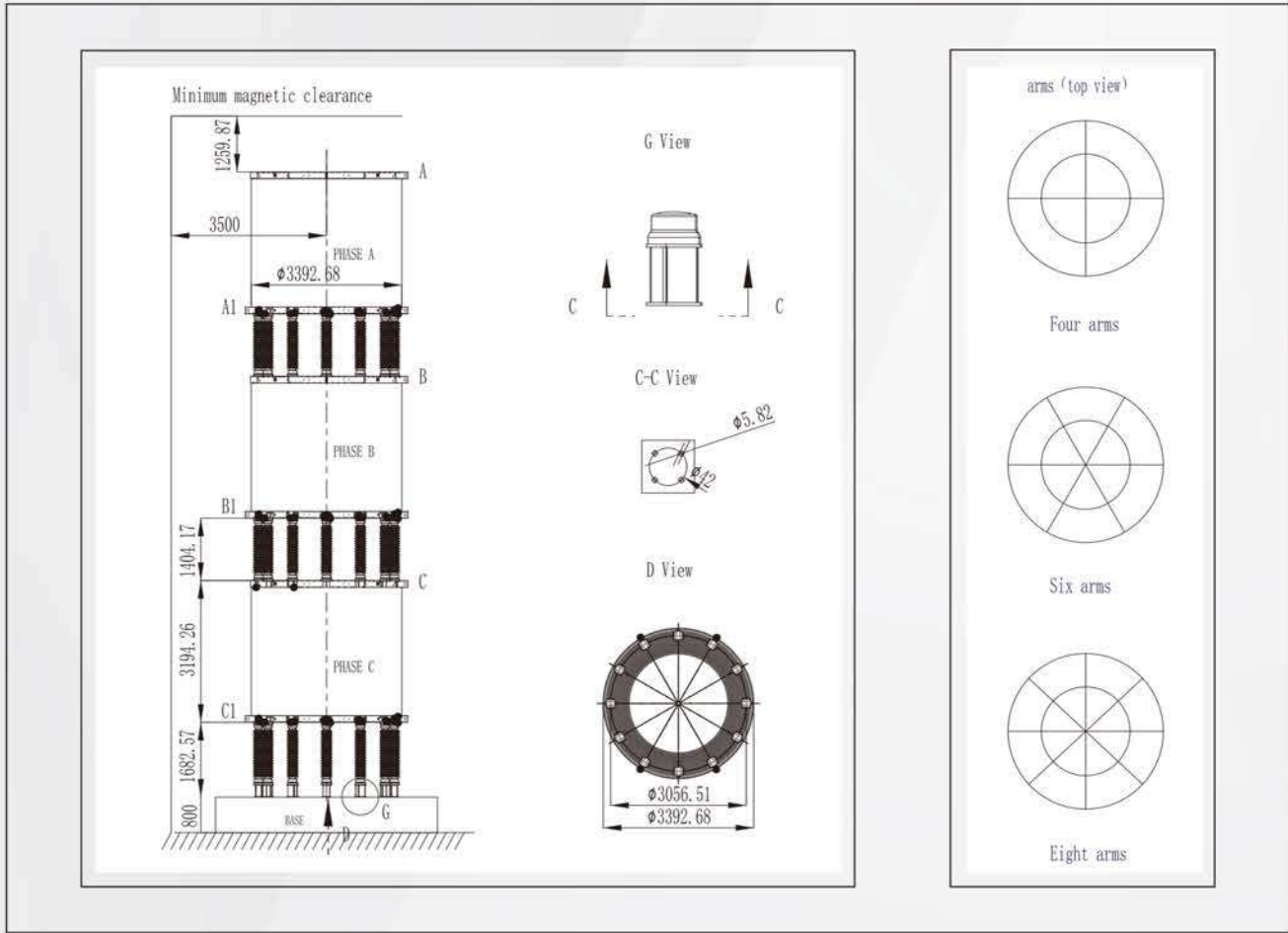
JK Neutral Grounding Reactor



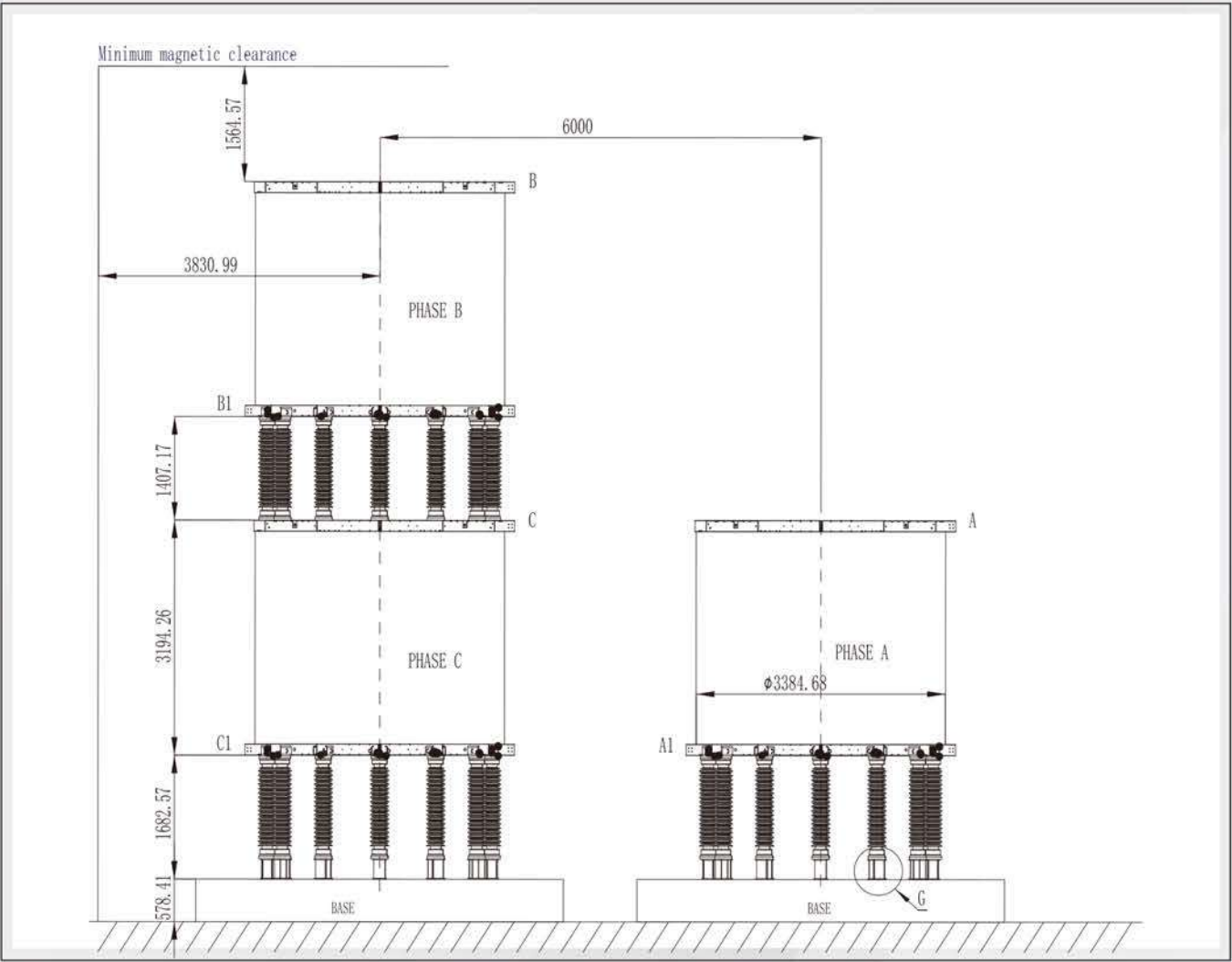
Three-Phase Side-by-Side Layout



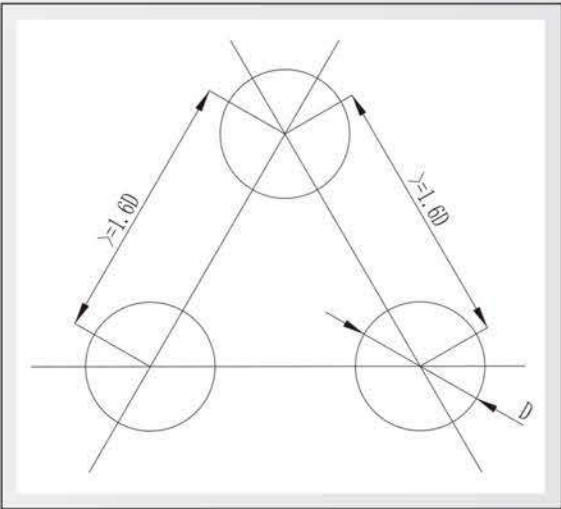
Three-Phase Stacked



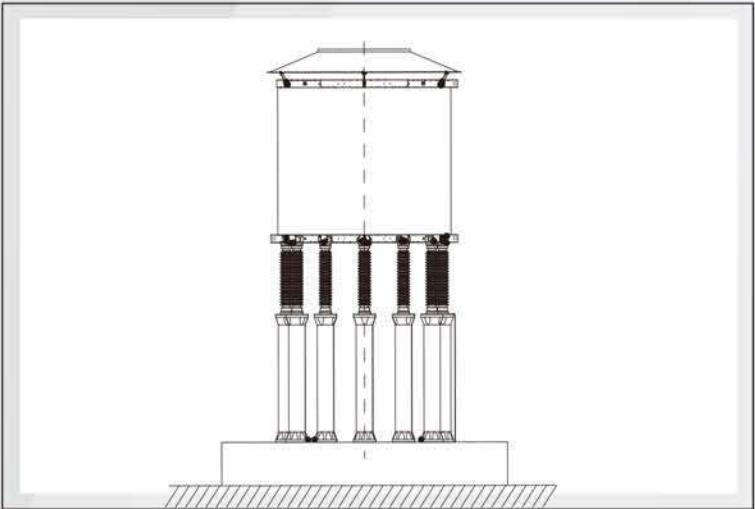
Two Phases Stacked and One Phase on the Ground



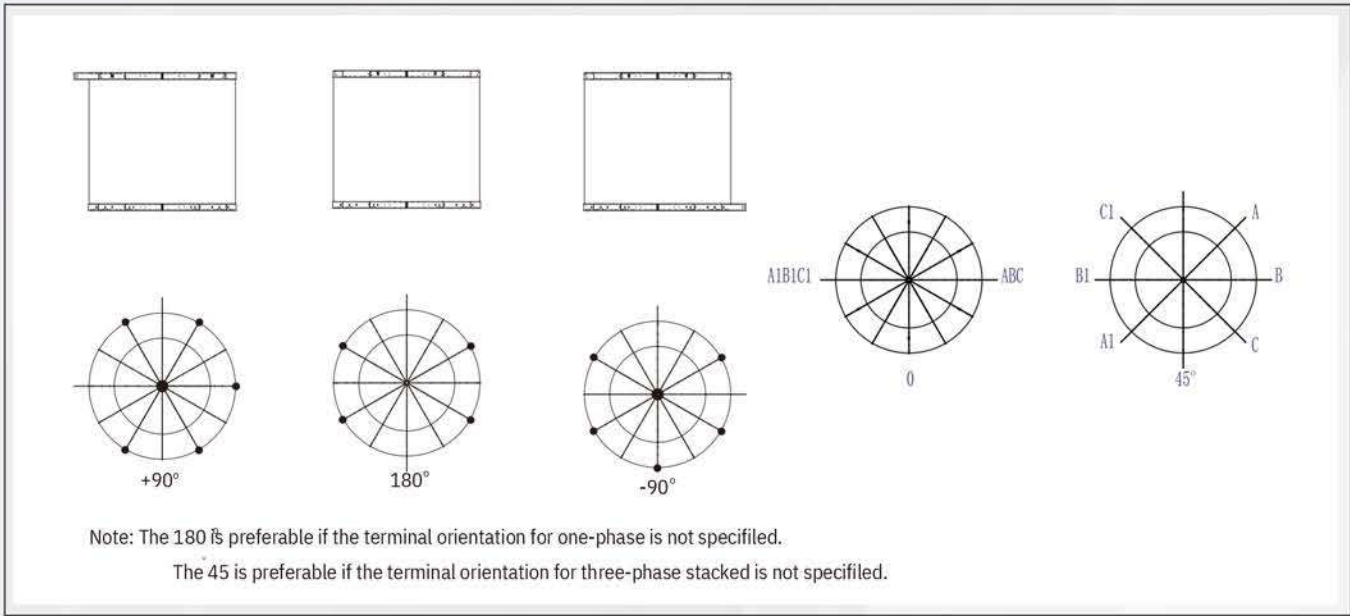
Three-Phase Δ Layout



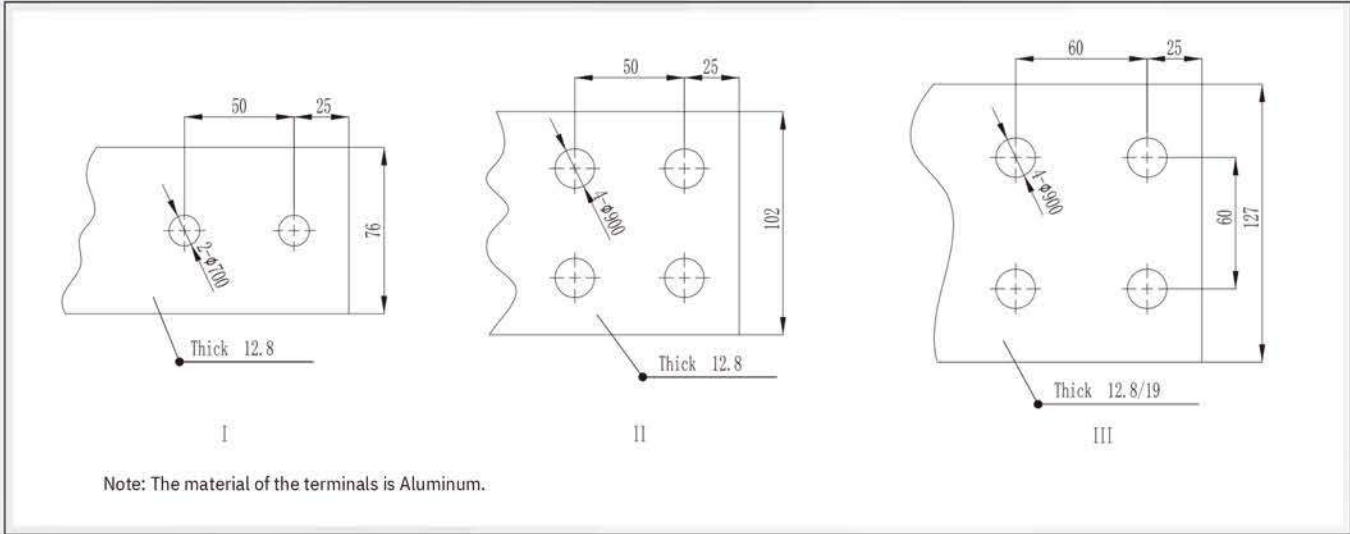
Outdoor Shunt Reactor Installation Drawing



Line Angle of Terminals



Terminal Shape and Size



At TEEE, we believe innovation only matters when it delivers real value to our customers.

Every project, every reactor, and every challenge motivates us to push technology further while maintaining reliability, transparency, and long-term commitment.

Our journey is just beginning.



Mr. Wu
CEO, TEEE

