



Create more value for you!

# Cast coil dry-type transformers

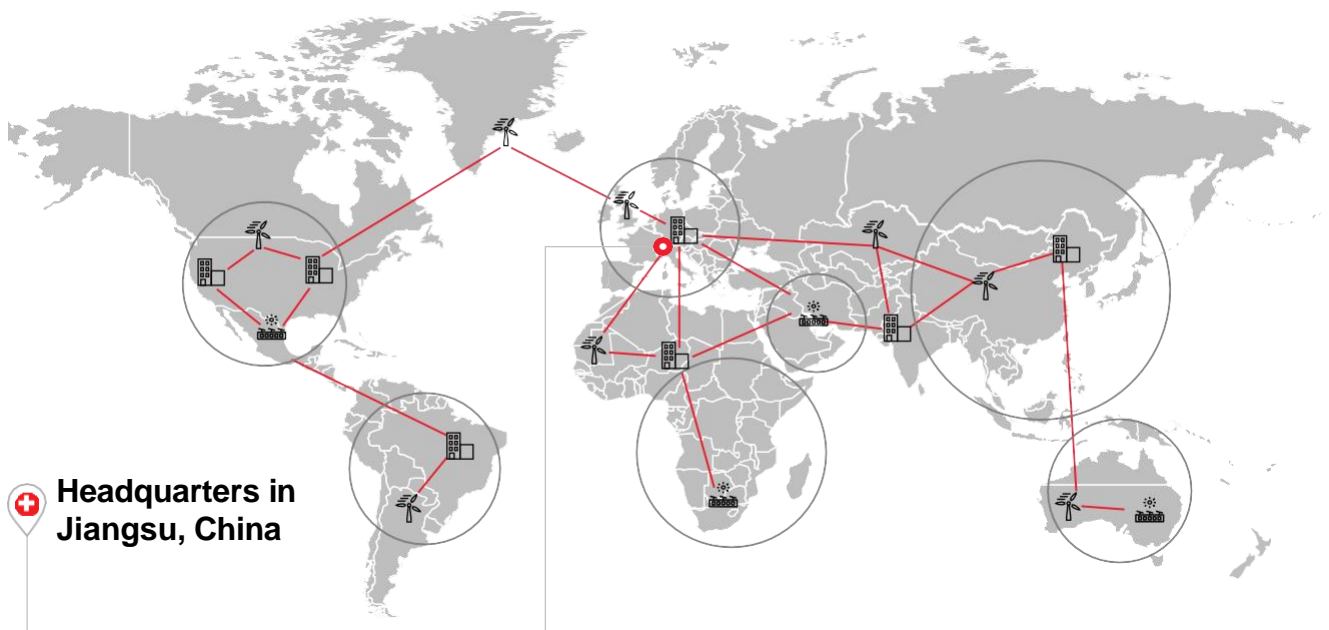


Putuo Electric vacuum cast coil transformers use the most technologically advanced design to support the extreme conditions present in chemical processing, extra heavy traction, and heavy industrial applications.



**PUTUO ELCTRIC**

# Putuo Electric worldwide



In almost every place where people live and work, you will find at least one transformer. But as long as it keeps working and supplying power to the escalator in the department store, the hotel lift, the office computer, the oven in the local bakery, or the petrochemical plant, no one gives it a second thought. Putuo Electric is a global leader in power technologies, enabling utility and industry customers from around the world to improve performance while lowering environmental impact. As one of the world's leading engineering companies, Putuo Electric helps its customers to use electrical power effectively and to increase industrial productivity in a sustainable way.

## Why choose dry-type: Safe and environmental friendly transformers

- Reduced environmental contamination
- 0-risk of leakage of flammable or contaminating substances
- Environmentally-friendly production
- Well-suited to dump and contaminated areas
- Non-flammable and self-extinguishing
- High resistance to short circuits
- High capacity to support overloads
- High performance in dealing with seismic phenomenon
- Capable of withstanding the most severe rolling and vibrating conditions

## Latest developments: Expanding the portfolio

Putuo Electric introduces **FreeCombination™ Technology** that combines various types of transformer production into one united mechanism to improve production efficiency, stabilize product quality, and enhance product performance.

All these transformers can be designed, customized, and supplied with a wide variety of accessories, as required.

**Putuo Dry-type Transformers** are able to reach 20 MVA and operating voltages of up to 40.5 kV. This product offers savings on civil works, fire systems, insurance fees, site installation, shorter cables, and maintenance.



# Reliable solutions for all applications

A large variety of applications demand technologies which contribute to high safety performance, cost savings, and environmental respect.

Putuo Electric has expertise in producing transformers for optimum space utilization, special requirements, and the most demanding conditions.

Putuo Electric is one of the global leaders in power technologies, providing the broadest experience in all applications, ranges, and customized projects:

- wind
- solar
- marine
- railways
- drives
- power plants
- utilities
- buildings
- chemical and pharmaceutical
- mobility
- metal and mining
- pulp and paper
- oil and gas
- cement
- water
- industry
- infrastructure
- nuclear
- data center
- semiconductors





# Our technology: What makes us different?

Putuo Electric uses the most advanced production technologies and the most demanding control systems to guarantee the highest product quality and total product reliability.

1. The magnetic core has a miter step joint to ensure optimum performance and minimum sound levels by using step lap technology. The magnetic steel is cut to length sequentially and automatically stacked. This ensure dimensional accuracy and single sheet interlacing within the full stack
2. The high voltage winding commonly has foil disc or round wire (aluminum or copper). Windings are cast under vacuum with epoxy resin. Transient analysis tests have been performed to verify the electrical stress distribution through the windings confirming the highest strength in our design.
3. The low voltage windings are made of conductor foil, alternatively round or rectangular wire, when needed, (aluminum or copper) and insulating foil pre-impregnated with epoxy resin. After the winding process, the coil is cured into an oven resulting in an extremely compact winding, which can withstand the dynamic stresses produced by a short-circuit

The encapsulation process is a key stage within the manufacturing process. Encapsulation is carried out under the most rigorous conditions in order to ensure optimum insulating and mechanical characteristics. The resin mix is prepared in a continuously monitored mixing plant where all the components are mixed together just before the encapsulation process.

Inside the vacuum casting chamber, the resin is introduced into the mold. The components are mixed together which ensures that the viscosity of the resin when poured in the molds is very low, filling interstices, and allowing the finished winding to reach the lowest level of partial discharge. Once the casting is finished, the coils are placed into the curing oven for the resin gel to cure and acquire the optimal final electrical and mechanical properties.

In Putuo Electric factories, the whole tendering, design, and production process is controlled and planned with sophisticated software. This ensures the highest productivity and reduced production time while maintaining the highest quality standards.



# Our values

All this process is certified under the strictest quality standards.



## Design

- Guarantee of accurate temperature rise in windings; in case of enclosure IP/20/21/23/30/31/40/41, there is no de-rating
- Low working temperatures down to -40°C
- Possibility to include any kind of accessories such as rollers, fans, temperature controllers and etc.
- Insulation class F, H (optional)
- C3, E3, F1 certification (optional)

## Technology

1. Aluminum, copper foil disk, or other materials in high voltage winding
2. Aluminum, copper foil, or other materials full width in low voltage winding
3. Casting under vacuum
4. Low partial discharge values <10 pc
5. Smooth surface
6. Self-extinguishing
7. Dust resistance due to sealed coils (optional)
8. Silicon free (optional)
9. Low induction level and step lap configuration, granting lower noise level
10. High impulse voltage withstand
11. High short circuit withstand (radial and axial)
12. Reduced footprint

# Customized solutions

## Design options

- Reduced loss transformers
- Copper/ Aluminum windings
- Low voltage transformers
- Class H transformers
- Reduced temperature rise
- Multiple primary voltage
- Multiple secondary windings
- Multi winding transformers (2, 3, 4, or 5 on the same core)
- Encapsulated low voltage windings
- Sealed or casted low voltage winding
- Impregnated high voltage windings
- Different location of high and low voltage connection terminals: top and bottom, both on the same side
- Special connection groups
- Variable speed drives (VSD), rectifiers, and excitation transformers for 6, 12, 18, and 24 pulses
- Different coupling factors from 0.15 up to 0.9
- Earthing transformers
- Seismic and vibration reinforcement system
- Outdoor operation
- Offshore applications
- Reduced footprint

## Accessories

- Enclosure IP20/21/2/23/30/31/40/41 (optional)
- Temperature monitor
- Antivibration pads
- Space heaters
- Electrostatic screen
- Current transformers on primary and secondary windings
- Plug in bushings
- High voltage earthing switch
- Surge arrestors (for high and low voltage)
- Cooling fans with up to 40% power increase
- On load tap-changers (OLTC)
- Flexible terminals
- Connection box
- Bidirectional wheels
- Different IP/NEMA enclosures with cable or bus-duct connection
- Earthing bullets
- Lifting and pulling lugs
- Voltage detectors
- Voltage automatic regulator (VAR)
- Special packings
- Hydrocoolers
- Cable boxes
- Containerized solutions





# Testing and logistics

All transformers are manufactured to the most stringent quality control standards in order to guarantee the full reliability of the product.

## Routine test

All transformers are 100% routine tested:

- Voltage ratio measurement and check of phase displacement
- Induced over-voltage withstand test
- Partial discharge measurements
- No load loss and current measurement
- Measurements of windings resistances
- Load loss and short circuit impedance measurements

## Type tests

Performed according to customer requirements:

- Temperature rise test
- Lightning impulse test

## Special tests

Performed according to customer requirements:

- Measuring zero-sequence impedance
- Noise level test
- Measuring insulation resistance
- Measuring of harmonics of the no-load current
- Measuring of the parallel capacity of windings and tag  $\delta$
- Anti-corrosion protection checking
- Short circuit test
- Vibration test

Our transformers have the following certificates:

- The class F1 "Fire behavior" certificate
- The class C1, C2, and C3 "Climatic" certificate
- The class E2 and E3 "Condensation and humidity" certificate
- "Qualified to perform in the most severe environmental conditions"

## Logistics and services

Once the transformer is successfully tested, the product is ready for shipping, either by truck or sea freight.

As a manufacturer, Putuo Electric understands the relevance of what logistics represents to the customers. This is one of the reasons why Putuo Electric has developed a large and qualified network of suppliers with the same values and targets.

Putuo Electric takes care of all official documentation, depending on the final destination and delivery terms.

## Different packaging for special applications or conditions

- Standard packaging
- Crate packaging
- Sea-worthy packaging

Putuo Electric has a long experience in arranging special transport, as and when it is required.

In addition, Putuo Electric's global presence ensures the best, local, and after-sales service.

Working with Putuo Electric, you have access to a worldwide service with a full range of products and solutions, access to production facilities using the most up to date technologies that provides the highest quality for standard and specially made products and solutions. Our warranty provides "Life-long & 7/24" quality and service.



**Putuo Electric**  
Customer Connect Center

**[putuo-electric.com](http://putuo-electric.com)**

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