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QING NENG ELECTRIC

# Reactor

## Qingneng Electric







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# 1 Introduction

01：Background　02：Function　03：Category

# Background

Reactor is a core power device based on the principle of electromagnetic induction, used to prevent changes in current. Its core functions are current limiting, reactive power compensation, and smoothing current. It is a key basic component of power systems and power equipment.

## Original Application

In the late 19th century, with the development of AC power systems, reactors were used to limit short-circuit current and stabilize voltage.

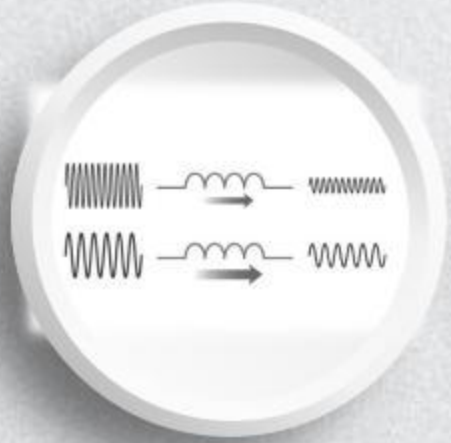
## Maturity and Scaling

With the development of higher voltage, larger capacity, and higher precision, parallel/series reactors are widely used in 500kV power grids.

## Technology Iteration

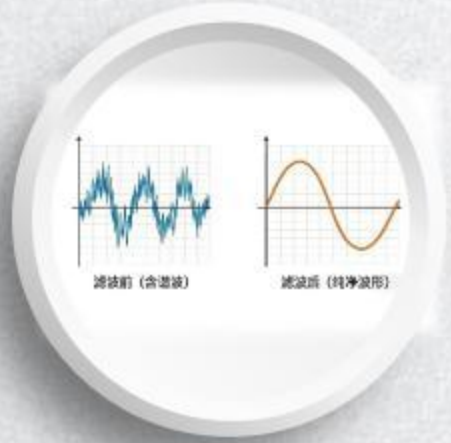
Material updates, process upgrades, and intelligent integration have greatly improved the efficiency and reliability of reactors.

# Function



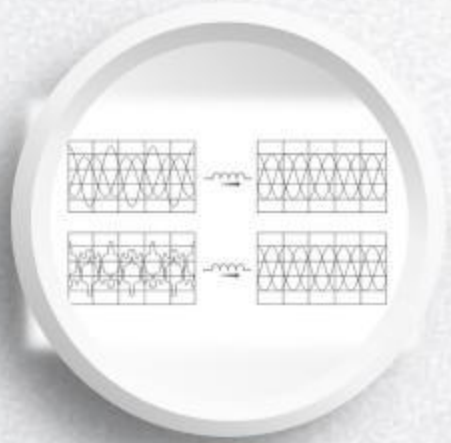
## Current Restriction

Protect generators,circuit breakers, and transformers from overload impacts.



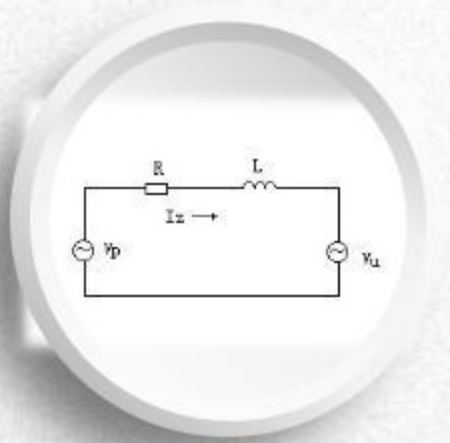

## Harmonics Filtering

Suppress harmonics generated by power electronic equipment to ensure power quality.



## Power Compensation

Absorb reactive power, suppresses power over voltage.




## Voltage Stabling

Remove harmonics and voltage fluctuations generated by the converter to ensure connection stability of grid.

# Category


- Core Type
- Cooling System
- Insulation Material
- Production Craft
- Connection Method
- Main Function
- Working Frequency

# Core Type

## Air Core

The magnetic flux forms a loop through the air, without iron core, and is usually formed directly by winding.

- Large & heavy
- Without Magnetic saturation
- Electronic interference
- High loss with low noise

VS

## Iron Core

Magnetic flux forms a circuit through iron core (made of magnetically conductive materials such as silicon steel sheets), comprising the iron core and winding.

- Small & light
- With Magnetic saturation
- High electromagnetic compatibility
- Low loss with noise

# Cooling System

Air Cooling

Oil Immersion

Water Circulation

# Insulation Material

## Organic Insulation

PE、PVC、VMQ、EP

## Inorganic Insulation

Ceramic、Glass、Mica

## Composite insulation

Fiber Glass with EP、Ceramic with VMQ、PMP、DMD、SMC

# Production Craft

Dry

Casting

Encapsulation

# Connection Method

## Series Reactor

Connected in series in the main circuit or branch circuit, its main functions are to limit short-circuit current and inrush current, suppress high-order harmonics, and absorb inductive reactive power.

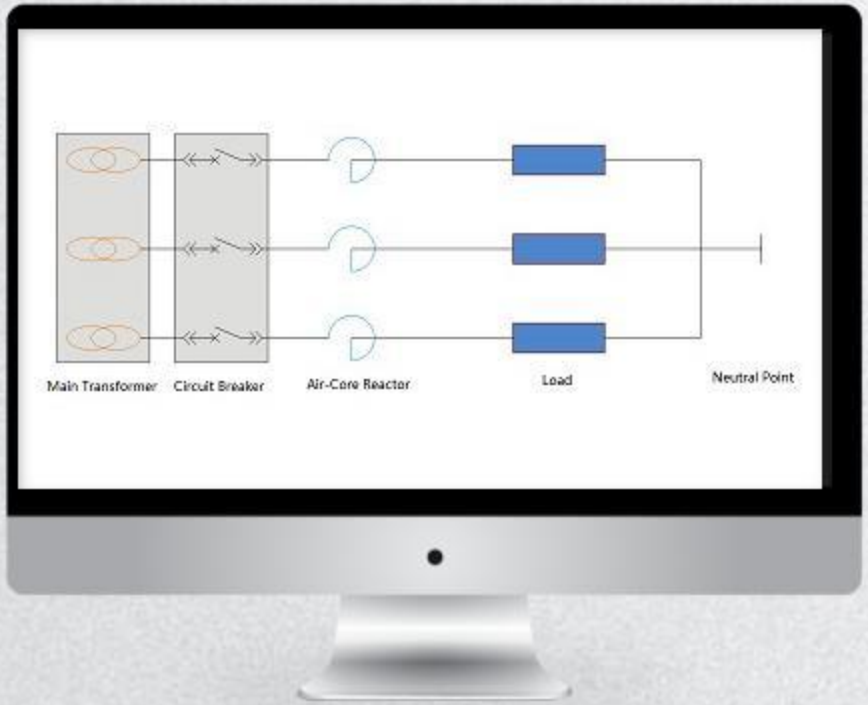
It is commonly used in power distribution lines, frequency converter systems, and reactive power compensation devices.

## Shunt Reactor

Connected in parallel at the termination of transmission lines, busbars, or load sides, it is mainly used for reactive power compensation and voltage stabilization, improving power factor and absorbing capacitive reactive power.

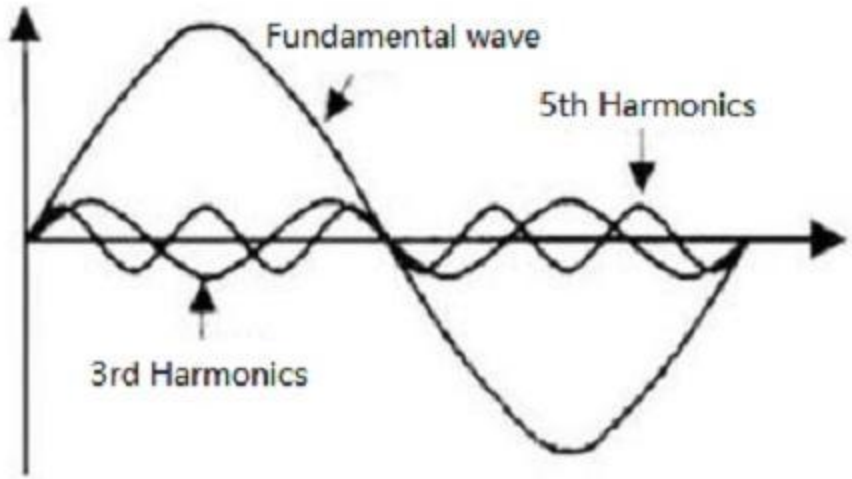
It is commonly used in ultra-high voltage transmission systems and static compensators.

# Main Function




## Current Restriction

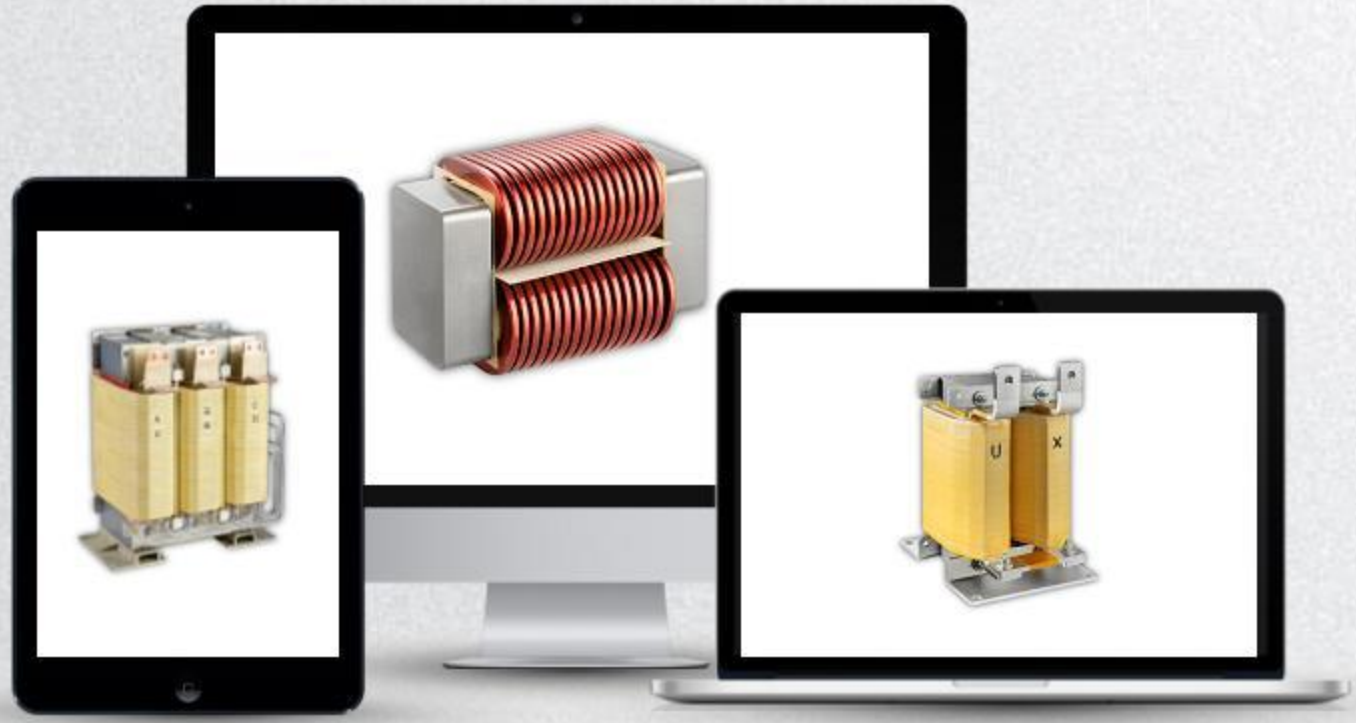
Current-limiting reactors are generally used in power distribution lines. Branch feeders drawn from the same busbar are often connected in series with current-limiting reactors to limit the short-circuit current of the feeder and maintain the busbar voltage not dropping too low due to a short circuit in the feeder.




## Harmonics Filtering

When paired with capacitors according to specific parameters, they form an "LC filter circuit" that can accurately identify and absorb the main harmonic components such as the 3rd, 5th, and 7th harmonics, allowing only pure 50Hz sine wave current to flow to electrical appliances.

# Working Frequency



**High Frequency**

400Hz~150kHz

**Power Frequency**

50Hz~400Hz

**Direct Current**

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# 2 Showcase

# Showcase

New Energy Reactor

Power Storage Reactor

Input Reactor

Output Reactor

# Showcase

PF Reactor

HF Reactor

DC Reactor

Series Reactor

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# 3 Parameter

01：Input Reactor　　02：Output Reactor

03：DC Reactor　　04：Series Reactor

# Input Reactor

| | |
|---|---|
| Rated Voltage | 380/660/1140/3300VAC |
| Rated Current | 5～1600A |
| Dielectric Strength | 60s without Arc Penetration (4200VAC/50Hz) |
| Insulation Resistance | >100MΩ (1000VDC) |
| Operating Noise | <65dB |
| Overload Capacity | 1min (1.5 R.C.) |
| Saturation Characteristics | Attenuation below 10% (1.5 R.C.) |
| Protection Class | IP00 (Cabinet Optional) |
| Insulation Class | H |
| Standards | GB1094.6/GB10229 |

# Output Reactor

| | |
|---|---|
| Rated Voltage | 380/660/1140/3300VAC |
| Rated Current | 5～1600A |
| Dielectric Strength | 60s without Arc Penetration (4200VAC/50Hz) |
| Insulation Resistance | >100MΩ (1000VDC) |
| Operating Noise | <65dB |
| Switching Frequency | 2～10kHz |
| Overload Capacity | 1min (1.5 R.C.) |
| Saturation Characteristics | Attenuation below 10% (1.5 R.C.) |
| Protection Class | IP00 (Cabinet Optional) |
| Insulation Class | H |
| Standards | GB1094.6/GB10229 |

# DC Reactor

| | |
|---|---|
| Rated Voltage | 500/1000VDC |
| Rated Current | 5～1600A |
| Dielectric Strength | 60s without Arc Penetration (3000VAC/50Hz) |
| Insulation Resistance | >100MΩ (1000VDC) |
| Operating Noise | <65dB |
| Protection Class | IP00 (Cabinet Optional) |
| Insulation Class | H |
| Standards | GB1094.6/GB10229 |

# Series Reactor

| | |
|---|---|
| Rated Voltage | 480/525VAC |
| Rated Current | 6～120A |
| Power Compensation | 5～100kVar |
| Reactance | 7%/14% |
| Dielectric Strength | 60s without Arc Penetration (3500VAC/50Hz) |
| Insulation Resistance | >100MΩ (1000VDC) |
| Operating Noise | <65dB |
| Overload Capacity | 1min (1.5 R.C.) |
| Saturation Characteristics | Attenuation below 10% (1.5 R.C.) |
| Insulation Class | H |
| Standards | GB1094.6/GB10229 |

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# 4 Application

01：Power System　02：Industry　03：Power Quality

# Power System

## High Volt Reactor

It primarily works by altering the phase relationship between current and voltage to achieve reactive power compensation and harmonic suppression, thereby improving the power factor of the power grid, reducing line losses, and ensuring stable operation of the power system. In high-voltage power grids, it not only effectively reduces energy losses caused by reactive power but also reduces grid pollution caused by harmonics.

### Power Plant

Adjust the generator's reactive power to ensure stable operation.

### Substation

Improve voltage distribution, reduce harmonic interference, and enhance power quality.

### Distribution

Compensate reactive power, improve power transmission efficiency, reduce line losses.

# Industry

01

## Input Protection

By input reactors, grid surges, dv/dt can be suppressed, harmonic pollution can be reduced (THD reduced by 30%–50%), and the adjustment filter can be protected.

02

## DC Smoothing

DC reactors are used on the DC side of frequency converters or rectifiers to reduce current ripple and improve the power factor to above 0.9.

# Power Quality

## NEW ENERGY

Suppress harmonics generated by the inverter and stabilize the grid connection voltage.

## AUTOMATION

Multi-frequency inverters connected in parallel and decoupled to prevent mutual interference and balance the three-phase voltage.

## HIGH PRECISION

Input reactors must be installed to suppress grid interference where high power quality is required.

## RAILWAY

Suppressing harmonics in traction inverters to improve power supply quality; used for smoothing and current restrictions in DC traction substations.

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# The End

# Contact

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