

Power Transmission and Distribution

**Shunt reactors for medium and high-voltage networks:**  
From development to use



**SIEMENS**

# From the beginning up to today – more quality and reliability for your network

A safe power supply requires a well-developed supply network. We at Siemens make a decisive contribution to this worldwide. With the most modern technology, the highest quality and reliability. Our program includes transformers for power plants, transformer substations and HVDC plants, special transformers for industry and traffic, shunt reactors and accessories.

## More stability and efficiency for your network

Shunt reactors for medium and high-voltage networks improve the stability and efficiency of the power transmission. Siemens ranks among the leading suppliers worldwide of these reactors – with a reference program of sold units with voltages up to 735 kV and ratings up to 250 MVar. Our company can not only look back on more than a century of experience gained in constructing shunt reactors. We can also offer our customers the most constructive solutions to meet their requirements.

## Present worldwide

With locations on three continents, as well as a worldwide sales and service network, we are right there where you need us. This is also what we mean by reliability.

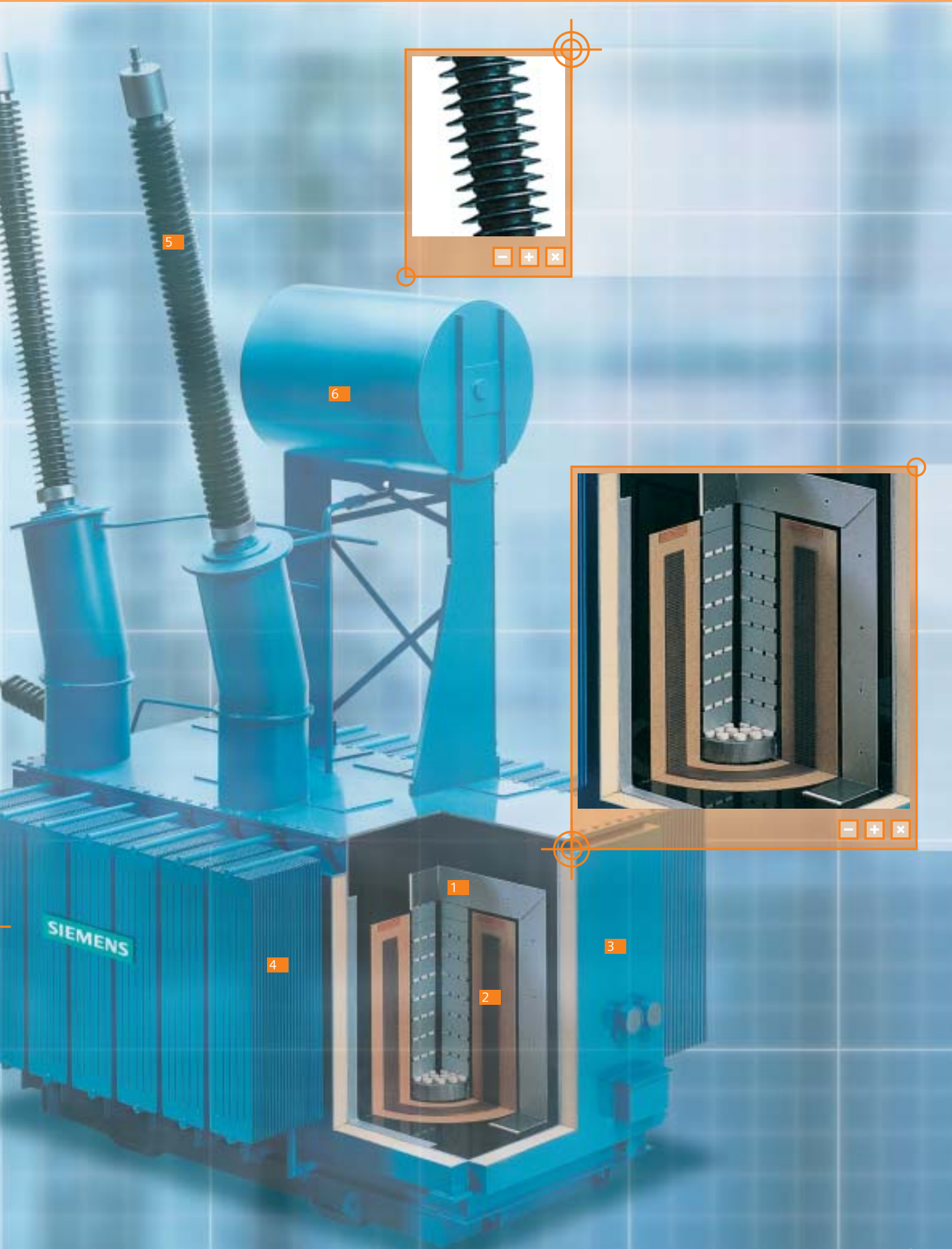
**Designed to transform. Made to perform.**

### Components:

- 1 Five-limb core  
(the wound limbs consist of radially laminated packages. Air gaps have been added between the packages)
- 2 Winding
- 3 Tank
- 4 Radiators
- 5 Bushings
- 6 Conservator

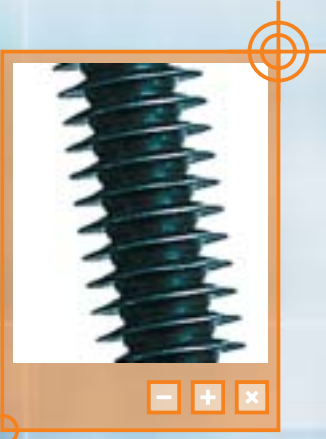


**View into a 60-MVar three-phase shunt reactor:**  
420 kV, ONAN cooling  
(section model M1 : 20).



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# Shunt reactors:

## An all-round view of fields of application, construction and production

### Shunt reactors carry out different types of tasks:

- They compensate the capacitive reactive power of the transmission cables, in particular in networks with only light loads or no load.
- They reduce system-frequency overvoltages when a sudden load drop occurs or there is no load.
- They improve the stability and efficiency of the energy transmission.

### Made for every requirement

Our oil-filled shunt reactors are manufactured in two versions:

- With an iron core divided by air gaps
- Without an iron core, with a magnetic return circuit.

Shunt reactors offer individual solutions: They satisfy all the specified requirements regarding voltage, rating, type of operation, low-noise and low-loss levels, connection method and type of cooling, as well as transportation and installation.



# Precision manufactured in all designs

The windings, insulation, tank, monitoring devices and connection method are practically the same as those found in the construction of transformers. However, shunt reactors have some special features with regard to their design and their mastery of certain physical properties.

Oil-filled shunt reactors are generally made with ONAN cooling systems and, for high ratings also with ONAF cooling systems.

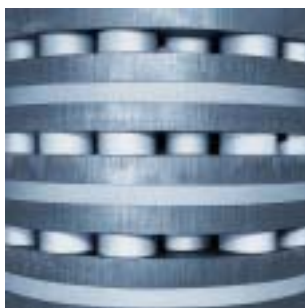


### Accurate production processes are the basis:

The manufacture of low-vibration cores from radially laminated iron packages with particularly hard air-gap material.

### Detailed view of an iron core divided by air gaps:

Production has to satisfy very stringent standards to meet the specified tolerances.



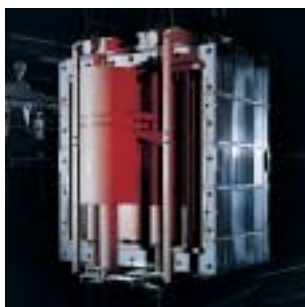
### Assembly of the iron core components:

Insertion of the radially laminated limb column.



### Active part:

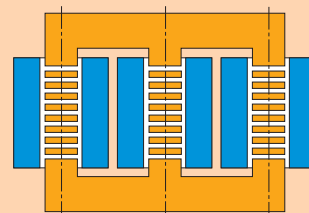
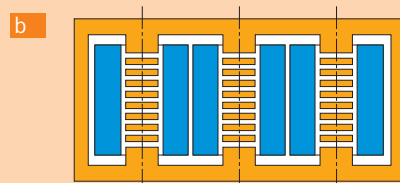
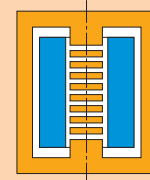
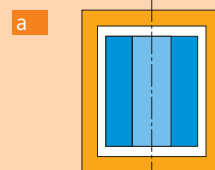
33.3-MVar single-phase shunt reactor, 500 /  $\sqrt{3}$  kV.



### Types of shunt reactors:

a) One-phase design with and without iron core and magnetic return circuit.

b) Three-phase design with iron core, with and without magnetic return circuit.



# Siemens shunt reactors – In use around the world

Whether for low noise emissions and compact dimensions or for very high voltages, whether for a 400-kV cable network in Saudi-Arabia or for a 275-kV network in Kuwait – we have a wide range of different technical versions of shunt reactors. This is proved on the one hand by the large number of units sold with voltages up to 735 kV and ratings up to 250 MVar. And on the other hand, by the very different types of applications and locations around the world.



**Up to very high voltages:**  
110-MVar single-phase shunt reactor, 735 /  $\sqrt{3}$  kV for Canada.



**Designed for very low noise emissions and compact dimensions:**

150-MVar shunt reactor, 345 kV.

**Figure 1** with sound-damping hood, sound pressure level of 59 dB (A), measured at a distance of 0.3 m.

**Figure 2** without hood, with a separate radiator bank.





**In the high-voltage test bay in Nuremberg:**

135-MVar three-phase shunt reactor, 525 kV, after successful testing according to all required standards.



**For the 400-kV Jeddah cable network in Saudi-Arabia:**

Two of the four 250-MVar shunt reactors supplied by Siemens, 60 Hz, ONAF cooling.



**For operation in the Danish high-voltage network:**

60-MVar shunt reactor, 420 kV, ONAN cooling.

**For direct connection to the transmission cable:**

40-MVar three-phase shunt reactor, 110 kV.



**Version with reduced overall losses:**

110-MVar shunt reactor, 400 kV, with attached radiators, ONAN cooling.



**For the 275-kV network in Kuwait:**

250-MVar three-phase shunt reactor, frequency 50 Hz, ONAF cooling with cable connection box. For testing, the boxes are turned and bushings inserted.





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If you have any questions about  
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The information in this document contains  
general descriptions of the technical options  
available, which do not always have to be  
present in individual cases.  
The required features should therefore be  
specified in each individual case at the time  
of closing the contract.

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