

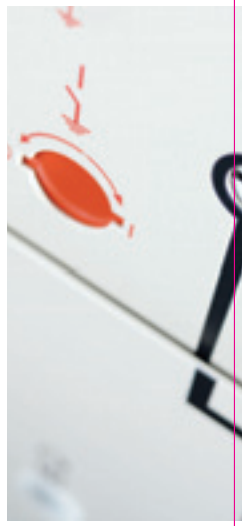


Gas-insulated medium-voltage switchgear

for wind parks

Answers for energy.

SIEMENS



Switchgear for wind turbines:
8DH10
up to 24 kV, up to 20 kA, up to 1,250 A
up to 17.5 kV, up to 25 kA, up to 1,250 A

Best performance for eco-friendly power generation

Wind energy plays a decisive role for carbon-neutral power generation in order to reduce greenhouse gases. Wind power is intended to reach a share of twenty percent in the total electrical energy produced in the European Union until the year 2020. To achieve this goal, more than 100 gigawatt of additional wind power capacity must be installed until 2020 in the European Union alone, which means further continuous growth. The newly installed capacity worldwide has increased by up to 30 per cent per year during the last years.

In other regions of the world, in the USA, China, or India, for example, the growth rates are even higher. More and more countries rely on wind energy to reduce carbon emissions.

Medium-voltage switchgear is used to couple the individual wind turbines with the wind park power system, to connect the wind park to the high-voltage system, and for compensation systems within larger wind parks.

SF₆-insulated switchgear from Siemens has been in operation in the first offshore wind parks for almost ten years, in the Middelgrunden, Horns Rev, Rødsand, and Arklow Bay wind parks, for example. Meanwhile, Siemens has delivered more than 5,000 switchgear panels for wind park applications.



Switchgear for wind turbines: NXPLUS C Wind
36 kV, up to 25 kA,
up to 1,000 A

Switchgear for collector substations:
NXPLUS C
up to 24 kV, up to 25 kA, up to 2,500 A
up to 15 kV, up to 31.5 kA, up to 2,500 A

Switchgear for collector substations: 8DA10
up to 40.5 kV, up to 40 kA, up to 5,000 A

Superior technology for demanding tasks

Highly available, maintenance-free, compact, robust: Gas-insulated medium-voltage switchgear from Siemens provides a convincing solution, even under the most extreme conditions. A worldwide unique, hermetically welded pressure system in a stainless-steel vessel, vacuum switching technology, and a digital protection system make it independent from environmental conditions, and provide maintenance-free operation for life. On top of that, the SF₆ insulation enables an extremely compact construction.

The result: minimum operating costs, maximum performance, and highest safety in every respect.

Approvals,

for example, NXPLUS C:

- Lloyds Register of Shipping (LRS)
- Det Norske Veritas (DNV)
- Germanischer Lloyd (GL)

Reliability

- Type and routine tests in accordance with IEC 62271-200
- Standardized NC production processes
- Experience from more than 100,000 installed panels
- Quality assurance in accordance with DIN EN ISO 9001

Operational safety

- Hermetically welded switchgear vessels
- Permanently maintenance-free operating mechanisms
- Optimum accessibility of current and voltage transformers
- Complete logical mechanical interlocks
- Minimum fire load

Personal safety

- Safe-to-touch and hermetically welded primary enclosure
- Design tested for resistance to internal faults, metallic partitions, logical mechanical interlocks, and capacitive voltage detecting system
- IP65 degree of protection for the primary part





Robust

The challenge: reliable operation despite extreme environmental conditions

Wind parks are being installed in many regions of the world today. They are in operation in Canada as well as in North Africa. Moreover, large offshore wind parks are increasingly being installed to capitalize on the higher energy yield at sea. The components used in the wind turbine must therefore operate reliably even under extreme environmental conditions. The switchgear must withstand the permanent stress caused by sand, dust, extreme temperatures, high humidity levels, and saline air for a long time and without difficulty.

The Siemens solution: consistent exclusion of damaging environmental influences

Reliable protection of the high-voltage part of our gas-insulated medium-voltage switchgear is provided by a hermetically sealed primary enclosure and by an insulation consisting of inert sulfur hexafluoride. This makes the switchgear resistant to environmental effects such as humidity, saline air, and dust, but also prevents ingress of small animals. Live parts of the primary circuit – busbar, three-position switch, vacuum circuit-breaker, connecting bars, bushings, and cable connection – fulfill the IP65 degree of protection.

Reliable

The challenge: maximum performance around the clock

The failure of an individual wind turbine will immediately reduce the earnings of the wind park. In case of bad weather conditions or rough sea, it may take several days until a fault on a wind turbine can be fixed in an offshore wind park. That's why a maximum degree of availability is a must for medium-voltage switchgear in wind parks.

The Siemens solution: extremely reliable technology

With every gas-insulated medium-voltage switchgear from Siemens you benefit from 25 years of experience and a degree of expertise only the market leader can provide. The probability of an outage is reduced to the absolute minimum, which means maximum reliability and availability.



Stress-resistant

The challenge: maximum operational safety, even under oscillations and impacts

Wind turbines are continuously subjected to oscillations and jolts by the rotor movements. This means that the mechanical operating mechanisms and bolted joints of the medium-voltage switchgear are subject to particularly high stress. In addition, the permanent vibrations put the dielectric strength of the SF₆ enclosure to severe tests. The switchgear must be able to cope with such challenges in order to function reliably at all times.

The Siemens solution: intelligent engineering and consistent testing

We use only hermetically welded stainless-steel vessels or single-pole enclosed cast light alloy housings for our medium-voltage switchgear. A computer-controlled three-dimensional copper bending technique minimizes the number of screwed connections. The use of three-position switches as busbar disconnectors, as well as of feeder earthing switches, additionally contributes to the reduction of moving parts. To provide the highest degree of safety, all our switchgear is thoroughly and comprehensively tested before delivery.

Compact

The challenge: individual adjustment to all space requirements

In most cases, the medium-voltage switchgear is installed in the tower base, where space is extremely limited. Therefore, the space available must be used as efficiently as possible. Even the narrow doorway of the tower is a big challenge, as the switchgear needs to fit through it. Despite the compact construction, the safety of the switchgear must not be compromised upon.

The Siemens solution: modular and compact construction

Medium-voltage switchgear from Siemens provides the ideal solution for installations in confined spaces. Thanks to its modular design and small dimensions, our switchgear can be flexibly adapted to situations where space is limited. It goes without saying that no compromise is made on safety. The protection against accidental contact and a maximum resistance to internal faults offer a high degree of personal safety.



Integratable

The challenge: perfect integration in control and automation systems

The medium-voltage switchgear connects the individual wind turbine with the wind park network. This means that the switchgear units are decisive network nodes. Depending on the location of the wind turbine, the switchgear is operated either locally or exclusively from remote. In offshore wind parks, remote control of the switchgear is particularly important. The switchgear must, therefore, be fully integratable in the control and automation environment of the complete system, for example, a power management system (PMS).

The Siemens solution: remote control and central monitoring

Siemens medium-voltage switchgear can be fully controlled from remote – from the control room as well as by a power management system. In connection with the combined protection and control devices, the switchgear panels can be integrated into power management systems and process control systems of different makes and from different manufacturers.

Durable

The challenge: particularly high switching rates

Depending on the design of the wind turbine, power is generated on the low-voltage or on the medium-voltage level. Wind turbines with low-voltage generators are usually switched on the low-voltage level as well. Medium-voltage generators, on the other hand, are also switched on the medium-voltage level. This means the medium-voltage switchgear must operate reliably despite a high switching rate. The switching devices used must therefore feature a high number of operating cycles to ensure trouble-free and cost-efficient long-term operation.

The Siemens solution: vacuum switching technology

Circuit-breakers and contactors from Siemens are exclusively equipped with vacuum interrupters. These extremely durable devices allow for up to 500,000 failure-free making and breaking operations. The operating mechanisms of the switching devices are located outside the high-voltage part. They can be accessed from outside without having to reach into the enclosure, and thus be inspected without interfering with operation.

Efficient

The challenge: maximum availability, minimum operating costs

Each standstill of a wind turbine implies financial losses due to the complex repair procedures that often take days. That is why a minimum need for maintenance is a decisive quality criterion for medium-voltage switchgear used in wind turbines.

The Siemens solution: highest reliability and availability

Medium-voltage switchgear from Siemens features a sealed pressure system, which makes the equipment maintenance-free, even under the hardest possible operating conditions. This allows for reduced operating costs and a higher return on investment.



Environmentally compatible

The challenge: minimum environmental impact throughout the entire life cycle

The environmental friendliness of electrical equipment gains increasing importance with consumers. High efficiency and emission-free operation, but also the comprehensive recyclability of the equipment at the end of its lifespan, are decisive factors that influence buying decisions.

The Siemens solution: intelligent technology and sustainable concepts

Medium-voltage switchgear from Siemens with its sealed pressure system does not release any insulating gas into the atmosphere, even under the toughest possible operating conditions. Its compact construction and short conductive paths inside the switchgear minimize electric heat losses, thus providing maximum power efficiency. Above that, Siemens is committed to environmental protection. That's why all plastics used within the switchgear are clearly labeled for recycling at the end of the service life, and a comprehensive recycling concept makes it possible to recover the materials and substances used.

Highly performant

The challenge: safe control of high currents

The technical demands placed on the medium-voltage switchgear grow with the size of the wind parks and the wind turbines. In small wind parks, coupling with the high-voltage system is often implemented using 24 kV switchgear with busbar currents of up to 1250 A and short-circuit currents of 16 kA. Larger wind parks require 36 kV switchgear with busbar currents of up to 2500 A and short-circuit currents of 25 kA for coupling.

The Siemens solution: a wide product range

Siemens offers a comprehensive range of gas-insulated medium-voltage switchgear. There is always a suitable type of Siemens switchgear to meet your requirements, both for coupling with the high-voltage system and for application in the wind turbine.

Switchgear for high-voltage system coupling:

- **NXPLUS C**
up to 15 kV, up to 31.5 kA, up to 2,500 A
up to 24 kV, up to 25 kA, up to 2,500 A
- **8DA10**
up to 40.5 kV, up to 40 kA, up to 5,000 A
- **NXPLUS**
up to 40.5 kV, up to 31.5 kA,
up to 2,500 A

Switchgear for application in wind turbines:

- **8DH10**
up to 17.5 kV, up to 25 kA, up to 1,250 A
up to 24 kV, up to 20 kA, up to 1,250 A
- **8DJ20**
up to 17.5 kV, up to 25 kA, up to 630 A
up to 24 kV, up to 20 kA, up to 630 A
- **NXPLUS C Wind**
36 kV, up to 25 kA, up to 1,000 A
- **8DJH**
up to 17.5 kV, up to 25 kA, up to 630 A
up to 24 kV, up to 20 kA, up to 630 A

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