Gas-insulated medium-voltage switchgear

For marine and offshore applications

Answers for energy.
Full power on the high seas

This much is certain: whatever happens on the surface and on the floors of the oceans and seas has a decisive influence on our economy. Maritime navigation is the backbone of international trade flows. Global economy and intercontinental exchange of goods on a large scale would be unthinkable without modern maritime navigation. Offshore technologies are equally significant for our economy, as they enable the extraction of mineral resources on the high seas.

Working conditions at sea are often harsh and inhospitable. Therefore, it is absolutely necessary for the technology used to be safe and reliable in the tropics, as well as in the Arctic and the Antarctic. Safe operation is secured by a reliable and consistent energy supply. This is where the gas-insulated medium-voltage switchgear from Siemens plays an integral role. Our switchgear is designed to perform reliably even under extreme conditions. This makes it well-suited for offshore and marine applications, where high availability and maximum performance in minimum space are essential.
The challenge: reliable operation despite extreme environmental conditions

Ships and platforms are in operation all over the world, in the tropics as well as in the polar sea – mostly under extremely rough conditions. This means that operating conditions for the switchgear are often very tough: high humidity levels at sea and saline air cause exceedingly fast corrosion, and extreme temperatures put the materials to severe tests. Medium-voltage switchgear for marine and offshore applications must withstand such stresses for many years and without difficulty.

The Siemens solution: protection from 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 insulation consisting of inert sulfur hexafluoride (SF₆) gas. This makes the switchgear resistant to environmental effects such as humidity, saline air and dust and 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

Energy supply onboard ships and platforms must operate with high reliability around the clock, as every outage has dramatic consequences. A blackout on a dynamically-positioned platform, for example, would force the platform to disconnect from the drill pipe. This would lead to enormous material damage and a great loss of precious time. This is why reliability is the first and foremost requirement for medium-voltage switchgear on ships and platforms.

The Siemens solution: reliable, proven technology

With Siemens you benefit from over 25 years of experience with gas-insulated medium-voltage switchgear and a degree of expertise only the market leader can provide. Siemens’ gas-insulated switchgear is designed for high reliability and availability.

Robust

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**Stout construction**

The challenge: maximum operational safety, even under vibration and impact

Switchgear on ships and platforms is constantly subjected to oscillations and vibrations caused by operating machinery and propellers. At rough sea, the equipment is also affected by considerable horizontal and vertical accelerations – a real test for the dielectric strength of the switchgear, the solidity of the SF₆ enclosure and for all mechanical components. Even so, the switchgear must be able to operate 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. Fixed installation of all components eliminates the need for moving contacts, as they would be exposed to exceptional stress by vibration. A computer-controlled three-dimensional copper bending technique minimizes the number of connections. The use of three-position switches as busbar disconnectors, and as feeder earthing switches, additionally contributes to the reduction of moving parts.

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**Compact**

The challenge: individual adjustment to all space requirements

On ships and platforms, the available space is very limited and must be used as efficiently as possible. This is why switchgear is often installed in corners and nooks, and it must adjust flexibly to given conditions. Space-saving installations provide compact construction and minimum dimensions, without compromising on the safety of the switchgear.

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 compromises are made in regards to safety. The protection against accidental contact and high resistance to internal faults offer a high degree of personal safety.

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**Integration compatible**

The challenge: integration of control and automation systems

Medium-voltage switchgear units on board ships and platforms are decisive network nodes and must meet the highest safety requirements in every respect, both for processes and personnel. Theoretical and practical knowledge in this industry differs from operator to operator, so it is extremely important that the switchgear can be fully integrated in the control and automation environment of the complete system, including in the power management system.

The Siemens solution: remote control and central monitoring

Siemens medium-voltage switchgear with Siemens protective relays can be fully controlled remotely – from the control room, as well as by the 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 from different manufacturers.
The challenge: particularly high switching rates

The power supply for ships and offshore platforms is extremely demanding, as the operating conditions at sea are considerably different from those on shore. For example, the daily switching rate for generators or drives is common. Medium-voltage switchgear used at sea must be capable of a high number of operating cycles to ensure trouble-free and cost-efficient continuous 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 (contactors) or up to 30,000 (circuit breakers) making and breaking operations. The operating mechanisms of the switching devices are located outside the high-voltage part of the equipment. They are accessible from outside without reaching into the high-voltage enclosure, and they can be inspected without interfering with operation.

The challenge: safe control of high currents

On more and more ships and positioned platforms, energy is increasingly generated on-board. This means that, given a certain number of electrical traction motors and thrusters, power ratings can quickly reach tens of megawatt figures for propulsion alone. An appropriate number of diesel or gas turbine generators are therefore needed on board. The medium-voltage switchgear must reliably switch and distribute the total generated amount of energy - at voltage ratings up to 13.8 kV and current ratings up to 2,000 A.

The Siemens solution: a wide product range

Siemens offers a comprehensive range of gas-insulated medium-voltage switchgear. Whatever the requirements, there is almost certainly a suitable type of Siemens switchgear to meet them:

- **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
  - circuit breakers up to 2,500 A
  - contactors up to 450 A

- **8DA10**
  - up to 40.5 kV, up to 40 kA, up to 5,000 A
  - circuit breakers up to 2,500 A.

The challenge: maximum availability, minimum operating costs

For ships, laytime is not only unproductive, it also produces costs. Offshore platforms must extract mineral resources with as few interruptions as possible in order to operate efficiently. Each standstill costs money. This is why maximum availability and a minimum need for maintenance are decisive quality criteria for medium-voltage switchgear used in marine applications.

The Siemens solution: high reliability and availability

Medium-voltage switchgear from Siemens features a sealed pressure system that minimizes the maintenance needed, even under the toughest possible operating conditions. This allows for reduced operating costs and a higher return on investment.

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Durable

Efficient

High performance
Highly available, low-maintenance, compact, robust: gas-insulated medium-voltage switchgear type NXPlus C from Siemens provides a reliable solution, even under extreme conditions. A unique, hermetically-welded stainless steel switch enclosure, vacuum switching technology and a digital protection system makes it independent from environmental conditions, and result in low maintenance and long life. On top of that, the SF₆ insulation enables an extremely compact construction.

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

**Approvals:**
- Lloyds Register of Shipping (LRS)
- Det Norske Veritas (DNV)
- Germanischer Lloyd (GL).

**Reliability:**
- Type and routine tests in accordance with IEC 62271-200
- Standardized, numerically-controlled production processes
- Experience from more than 100,000 installed panels of all types
- Quality assurance in accordance with DIN EN ISO 9001.

**Operational safety:**
- Hermetically-welded switch enclosures
- Low-maintenance 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 between switching device, cable termination area and main bus area
- Logical mechanical interlocks and capacitive voltage detecting system
- IP65 degree of protection for the high-voltage element.
Type 8DA10 switchgear up to 40.5 kV, up to 40 kA, up to 5,000 A

Type 8DA10 - Superior technology for demanding tasks

Highly available, low-maintenance, compact, robust: gas-insulated medium-voltage switchgear type 8DA10 from Siemens provides a reliable solution, even under extreme conditions. A unique, hermetically-sealed pressure system in a corrosion-resistant aluminum alloy vessel, vacuum switching technology and a digital protection system make the high-voltage elements independent from environmental conditions and provide low maintenance operation for life. On top of that, the SF₆ insulation enables an extremely compact construction.

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

Reliability:
- Type and routine tests in accordance with IEC 62271-200
- Standardized, CNC production processes
- Experience from more than 55,000 installed panels globally
- Quality assurance in accordance with DIN EN ISO 9001.

Operational safety:
- Hermetically-sealed switchgear housings
- Permanently low-maintenance operating mechanisms
- Optimum accessibility of current and voltage transformers
- Complete logical mechanical interlocks
- Minimum fire load.

Personal safety:
- Safe-to-touch and hermetically-sealed primary enclosure
- Design tested for resistance to internal faults
- Single-phase (isolated-phase) construction eliminates phase-to-phase faults inside switchgear
- Logical mechanical interlocks and capacitive voltage detecting system
- IP65 degree of protection for the primary part.

Approvals
- Shell Dep
- UL or C-UL.