

Completely Integrated Solutions
for the Navy

SINAVY^{CIS} HTS FCL

More operational reliability in
electrical networks through high
temperature superconductors

Your Success is Our Goal

SIEMENS

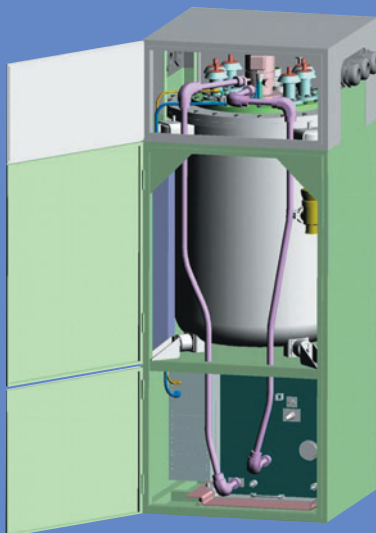
Industrial Solutions and Services

Through the use of high temperature superconductors for fault current limiting in SINAVY^{CIS} HTS FCL, Siemens is able to make switchgear on board submarines and surface vessels less susceptible to malfunction, and to further increase their performance. SINAVY^{CIS} HTS FCL is suitable for use with DC, AC and three-phase current systems.

SINAVY^{CIS} HTS FCL – enormously increased demands for switchgears

Not only on board All Electric Ships (AES), electrical switchgear must fulfil ever-increasing demands due to the presence of electrical currents on board. If a short circuit should nonetheless occur, the individual power circuit breakers usually quickly reach their limits.

In the worst case, total network failures can occur on board. New fault current limiters based on high temperature superconductors (HTS) offer a solution.



Three good reasons for SINAVY^{CIS} HTS FCL

- Increased operational reliability and availability of the switchgear, networks, and thus of the ships
- Lower strain on conductive components leads to less wear and tear in the event of a short circuit
- Higher level of availability and more flexibility for system design through the possibility of interconnecting several subnetworks which, due to excessive short-circuit currents, had to be performed separately until now

SINAVY^{CIS} HTS FCL – Our solution in detail

With SINAVY^{CIS} HTS FCL (High Temperature Superconducting Fault Current Limiter), Siemens has developed a highly efficient, innovative protective system to guard against the consequences of short circuits. The system utilizes high temperature superconductors that normally show no measurable resistance. Should the current, however, exceed a predetermined level, SINAVY^{CIS} HTS FCL immediately changes over to normal conductive mode. Short circuit currents are thereby limited to levels that are easily handled by the switchgear.

Compared to earlier high temperature superconductors that were helium-cooled to $-269\text{ }^{\circ}\text{C}$, new HTS systems achieve the superconductive state at temperatures below $-196\text{ }^{\circ}\text{C}$. In these systems, liquid nitrogen is used as a coolant.

This makes the use of HTS equipment technically feasible and economically interesting.

SINAVY^{CIS} – Completely Integrated Solutions for the Navy

As a comprehensive industry-specific solution for naval vessels, our SINAVY^{CIS} product family integrates all the products and services you need for sustained maximization of your ship's performance.

For each particular task, a solution has been defined that

- **horizontally** improves all of your ship's operations
- **vertically** integrates the ship's information and security management end-to-end, helping to make better-founded decisions
- and, at the same time, is designed for optimal vessel-specific maintenance and comes with assured further development **over the whole life cycle**.

Due to this unique combination of horizontal, vertical and life cycle dimensions, our solutions all carry the genes of an exhaustive and sustained plant productivity in their very core.

For More Efficiency. More Performance. More Power.

Completely Integrated Solutions from Siemens.

Switch-off diagram
 $U_0: 925\text{ V}_{\text{rms}}, I_k: 150\text{ kA}, dI/dt: 12\text{ kA/ms}$



Relieving network components

Through the modernization of existing systems with SINAVY^{CIS} HTS FCL, it is not only possible to achieve a higher level of switchgear availability, but also to significantly increase safety on board.

SINAVY^{CIS} HTS FCL is, among other things, particularly suited for utilization on board vessels whose electrical networks have already reached their limits, or which are being newly designed. The fault current limiter reduces the strain that network components are subjected to, thereby increasing their life span. At the junction points of subnetworks, SINAVY^{CIS} HTS FCL even ensures that, in the event of a short circuit, fault-free subnetworks can continue to operate with virtually no disruption – an important contribution to the availability and operational reliability of the entire vessel.

www.siemens.com/marine

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CIS = Completely Integrated Solutions

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