ASTROL

High-performance protection for next-generation AI datacenter architectures

Modern data centers are transitioning toward DC-based power distribution to improve efficiency, scalability, and integration of renewable energy and battery storage systems. Astrol solid-state DC breakers are specifically designed to protect these advanced power systems with ultra-fast interruption, high reliability, and seamless integration.

Astrol solid-state DC breakers are engineered for:
- 400V, 800V and 1500V DC architectures
- Nominal currents up to 7.5 kA
- Battery energy storage system (BESS) integration
- Data center DC distribution systems
- Bus-tie protection between SSTs
- Battery energy storage protection
- Feeder and branch circuit protection
- High-power rectifier and inverter interfaces

Key benefits

- Ultra-fast fault interruption within microseconds
- Enhanced system selectivity
- Maximum uptime and operational continuity
- Modular and scalable platform

Reliable protection for critical applications

Fast switching and precise fault isolation ensure that only the affected section of the network is disconnected, maximizing data center uptime and operational reliability.
Astrol solid-state DC breakers provide a future-ready protection solution for next-generation high-performance data center infrastructures.

Advanced protection for modern railway traction systems

As railway systems adopt increasingly advanced semiconductor technologies such as IGBTs and SiC MOSFETs, conventional protection devices struggle to keep pace with modern DC traction requirements.
Our DC breakers provide the speed, selectivity,and reliability required for next-generation railway infrastructures.

Key challenges in modern traction networks
- High-frequency transients
- DC arc persistence
- Bidirectional regenerative currents
- Complex multi-converter architectures
- EMI and harmonics

Why solid-state protection matters
- Ultra-fast fault isolation
- Real selectivity
- Bidirectional current capability
- Improved system stability
- Reduced maintenance
- Enhanced operational reliability

Applications examples
- Traction substations
- Onboard converter protection
- Feeder protection
- DC bus protection

Astrol Electronic AG

Ahornweg 14
CH-5504, Othmarsingen
Switzerland

+41(0)564856020
info@astrol.com
www.astrol.com

Astrol solid-state DC breakers

Ultra-fast protection for the next generation of DC power systems

From maritime electrification to railway traction systems,renewable energy microgrids, and high-power data centers, modern DC infrastructures demand a new level of protection.

Astrol develops and produces ultra-fast solid-state DC breakers that interrupt faults within microseconds, before dangerous current levels can develop.

With decades of expertise in advanced power electronics based solutions, such as solid-state breakers, switches and pulsed power solutions up to 100 kV, Astrol has become leading specialist in reliable, ultra-fast DC protection technology for various applications;

- Maritime DC grids
- Railway traction systems
- Data center DC architectures
- Renewable energy and microgrids
- Battery energy storage systems (BESS)
- Industrial DC distribution systems

About Astrol

Technology leader in pulsed power switches and solid-state circuit breakers

Astrol is a Switzerland based innovator and manufacturer of state-of-the-art power control and switching solutions. We design and produce electronic parts for technical high demanding industries such as medical, energy distribution and pulsed power applications since 1996. In our 30-year history we have developed from a designer of custom-built electronics to a technology leader in pulsed power switches and solid-state circuit breakers. Astrol offers a wide range of products and has a world-wide customer base consisting of system integrators, operating companies and research institutes.
Our main focus lies on power switching in the medium voltage range, from optimized gate drive units to fully integrated solutions up to 100kV. Our products are designed, manufactured and tested in our production location and high voltage test laboratory in Othmarsingen and therefore can withstand harsh environments, extended temperatures and have a long lifetime.

赛晶集团微信公众号

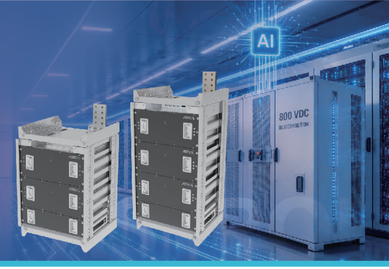
赛晶科技集团有限公司

地址 北京市顺义区空港工业园B区裕华路空港融慧园9-A
电话 010-56301111
传真 010-56301112

邮箱 info@sunking-tech.com
网址 www.sunking-tech.com

ASTROL

固态直流断路器专家



针对船舶应用的固态直流断路器

随着海事行业向电气化、混合动力推进、电池集成和先进直流配电系统发展，可靠的直流保护已变得至关重要。Astrol固态直流断路器专为保护现代船舶直流电网而设计，可在微秒内防止短路和功率过载。

与传统机械断路器不同，Astrol基于半导体的技术能够在危险能量水平形成之前检测并切断故障电流，从而保护变流器、推进驱动装置、电池、保险丝和其它关键船载系统。

可靠，面向未来

Astrol直流断路器的设计运行寿命超过15年，几乎无需维护，可为下一代船舶电力系统提供最高的系统可靠性

专为严苛的海事环境而设计

针对现代船舶直流电网的超快速保护。
- 在2 µs内检测到短路
- 在10-21 µs内完全清除故障
- 额定电流范围从350A至5kA
- 额定电压高达1.5 kV DC
- 免维护运行
- 模块化和可扩展设计
- 双向电流能力
- 所有船舶应用的断路器均已获得DNV、Lloyd's Register、RINA和CCS型式认可

Lloyd's Register RINA DNV·GL CCS 中国船级社

针对现代直流架构的先进保护

现代船舶直流电网当前使用闭式母线和环形系统拓扑结构，其中故障电流可能双向流动。

Astrol多台固态直流断路器之间使用先进的基于通信的协作和光通信链接，以确保选择性故障保护，仅断开故障区域，同时保持其他区域正常运行。

针对下一代AI数据中心架构的高性能保护

现代数据中心正在向直流配电转型，以提高效率、可扩展性以及可再生能源和电池储能系统的集成。Astrol固态直流断路器专为保护这些先进的电力系统而设计，具有超快速中断、高可靠性和无缝集成的特点。

Astrol固态直流断路器专为以下应用而设计：

- 400V、800V和1500V直流架构
- 标称电流高达7.5 kA
- 电池储能系统(BESS)集成
- 数据中心直流配电系统
- SST之间的母线联络保护
- 电池储能保护
- 馈线和分支电路保护
- 大功率整流器和逆变器接口

主要优势

- 微秒级超快速故障中断
- 增强系统可选择性
- 最大限度地提高正常运行时间以及运行连续性
- 模块化和可扩展平台

为关键应用领域提供可靠保护

快速开关和精确的故障隔离确保发生故障时仅断开故障回路，从而最大限度地提高数据中心的正常运行时间和运行可靠性。

Astrol固态直流断路器为下一代高性能数据中心基础设施提供面向未来的保护解决方案。

针对现代铁路牵引系统的先进保护

随着铁路系统越来越多地采用IGBT和SIC MOSFET等先进的半导体技术，传统的保护设备已难以满足现代直流牵引系统的要求。

我们的直流断路器可为下一代铁路基础设施提供所需的速度、选择性和可靠性。

现代牵引网络的主要挑战

- 高频瞬变
- 直流电弧持续性
- 双向再生电流
- 复杂的多变流器架构
- EMI和谐波

固态保护为何重要

- 超快速故障隔离
- 真正的选择性
- 双向电流能力
- 提高系统稳定性
- 减少维护
- 增强运行可靠性

应用示例

- 牵引变电站
- 车载变流器保护
- 馈线保护
- 直流母线保护

Astrol固态直流断路器

为下一代直流电力系统提供超快速保护

从船舶电气化到铁路牵引系统、可再生能源微电网和高功率数据中心，现代直流基础设施需要更高水平的保护。

Astrol开发和生产超快速固态直流断路器，可在数微秒内中断故障，防止危险电流的形成。

凭借在先进电力电子解决方案领域（例如固态断路器、开关和高达100kV的脉冲功率解决方案）数十年的专业知识，Astrol已成为可靠、超快速直流保护技术领域的领先专家，产品广泛应用于：

- 船舶直流电网
- 铁路牵引系统
- 数据中心直流架构
- 可再生能源和微电网
- 电池储能系统（BESS）
- 工业直流配电系统

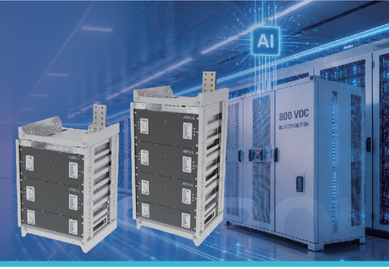
关于Astrol

脉冲功率开关和固态断路器的技术领导者

Astrol是一家总部位于瑞士的先进电源控制和开关解决方案的创新企业和制造商。自1996年以来，我们一直为医疗、配电和脉冲功率应用等高技术要求行业设计和生产电子部件。在我们30年的发展历程中，我们已从一家定制电子产品设计商发展成为脉冲功率开关和固态断路器领域的技术领导者。Astrol提供广泛的产品，客户遍布全球，包括系统集成商、运营公司和研究机构。

我们的主要重点是中压范围内的功率开关，从优化的栅极驱动单元到高达100kV的完全集成解决方案。我们的产品在位于奥特马尔辛根的生产基地和高压测试实验室进行设计、制造和测试，因此能够承受恶劣环境和极端温度，并具有较长的使用寿命。

Experts in solid-state DC breakers



Solid-state DC breakers for maritime applications

As the maritime industry moves toward electrification, hybrid propulsion, battery integration, and advanced DC power distribution systems, reliable DC protection has become essential. Astrol solid-state DC breakers are specifically designed to protect modern maritime DC grids against short circuits and power overloads within micro-seconds.

Unlike conventional mechanical breakers, Astrol's semiconductor-based technology detects and interrupts fault currents before dangerous energy levels can develop, protecting converters, propulsion drives, batteries, fuses, and other critical onboard systems.

Reliable and future-ready

Designed for operational lifetimes exceeding 15 years, Astrol DC breakers require virtually no maintenance and provide maximum system reliability for next-generation maritime power systems.

Designed for demanding marine environments

Ultra-fast protection for modern maritime DC grids.

- Short-circuit detection within 2 µs
- Total fault clearance within 10 – 21 µs
- Nominal current ratings from 350 A up to 5 kA
- Nominal voltages up to 1.5 kV DC
- Maintenance-free operation
- Modular and scalable design
- Bidirectional current capability
- All breakers are marine type approved by DNV, Lloyd's Register, RINA, and CCS for marine applications.

Advanced protection for modern DC architectures

Modern maritime DC grids now use closed-bus and ring-based system topologies where fault currents can flow bidirectionally.
Astrol solid-state DC breakers use advanced communication-based coordination and optical communication links to ensure selective fault isolation, disconnecting only the affected section while keeping healthy zones operational.