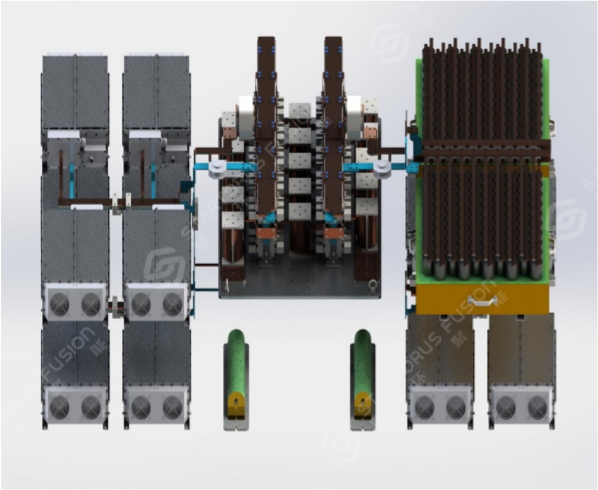
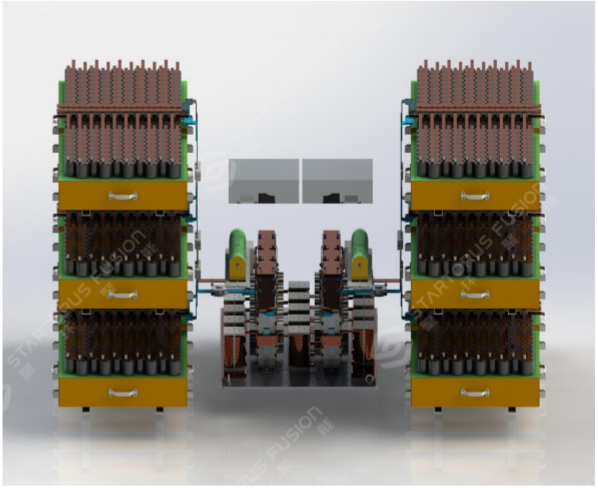
PF/CS Pulse Magnet Drive Power Supplies

Introduction



PF pulse magnet drive power supplies



CS pulse magnet drive power supplies

This advanced pulsed power supply serves as a core driver for PF and CS magnets in tokamak fusion devices. Designed with a fully modular architecture, it integrates three key subsystems: a high-density Energy Storage Unit, a high-efficiency Power Conversion Unit, and an intelligent Digital Control Unit.

- Through adjustable power switch topologies and hybrid energy storage—combining aluminum electrolytic capacitors with supercapacitor modules—the system can be rapidly reconfigured between PF pulse magnet drive power supplies and CS pulse magnet drive power supplies, offering exceptional operational adaptability.
- Delivers output currents up to ± 10 kA (PF) and ± 20 kA (CS), with a current rise rate of 1 kA/ms. The current fall rate is configurable via external series resistors, extending up to 2 kA/ms for CS operation.
- Supports both voltage-controlled and current-controlled discharge regimes. Operators can select either mode prior to operation or switch between them in real time during discharge for unmatched waveform flexibility.
- Equipped with multi-protocol communication interfaces (RS485, Ethernet, EtherCAT), the system enables seamless remote monitoring, control, and automation via integrated power supply control software.

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●Its modular construction allows for tailored adjustments to output voltage, current, pulse waveform, and timing parameters, ensuring optimal performance for specific experimental or operational requirements.

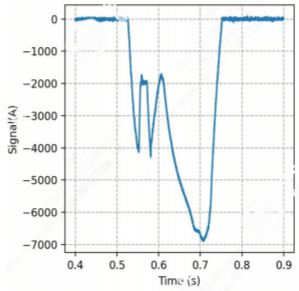
Applications

This pulsed tokamak magnet power supply employs a modular architecture, delivering high-current output, exceptional current slew rate (di/dt), and advanced waveform programming capabilities. It enables real-time, closed-loop waveform control based on both acquired data and user-defined profiles, making it an ideal solution for driving diverse magnet systems in fusion research.

Proven in rigorous operation on the SUNIST-2 tokamak, the system has successfully executed tens of thousands of continuous discharge cycles with outstanding stability and repeatability.Beyond tokamak applications, its core technological strengths extend to the following fields:

- Controlled Nuclear Fusion Research: Provides high-performance driving solutio -ns for magnet systems in alternative fusion concepts, such as stellarators and Z-pinch devices.
- Large-Scale Scientific Facilities: Serves as a critical power source for large super conducting magnet testing systems and particle accelerator complexes.
- Specialized Industrial & Research Applications: Offers tailored pulsed power sol -utions for demanding processes including special material treatment, extreme condition simulation, and next-generation medical equipment.

Parameters

Item		Specification Description
Input	Input Voltage	220VAC± 15%
	Input Power	9kW
	Stored Energy	5.58MJ
Output	Output Voltage	-520V~520V（PF），-400V~400V（CS）
	Voltage Accuracy	± 5%FS
	Output Current	-10kA~10kA（PF），-20kA~20kA（CS）
	Current Accuracy	± 1%FS
	Current Rise Rate	≤ 1kA/ms
	Current Fall Rate	≤ 1kA/ms（PF），≤ 2kA/ms（CS）
	Output Pulsa Duration	≤ 500ms
	Discharge Interval	≥ 10min
Control	Regulation Control Cycle	200us
	Communication Interface	RS485、EtherCAT、Ethernet
	Control Mode	Voltage Control Mode, Current Control Mode
Energy Storage	Type	Electrolytic Capacitor Module, Supercapacitor Module
	Discharge	Wire-wound Resistor, Water-cooled Resistor
Safety	Insulation Withstand Voltage	2500VDC
Structure	Dimensions	3200mm× 2000mm× 1600mm
Environ-mental Conditi-ons	Ambient Temperature	0~45℃
	Humidity	≤ 95%，Non-condensing
	Altitude	0~2000m
	Cooling Method	Natural Cooling, Water Cooling
Discharge Current Waveform Examples	PF Discharge Waveform	
	CS Discharge Waveform