HYGEN POWER
合耕电源

DC power
For Hydrogen Production

Product manual

Headquarter : Yueqing Industrial Zone, Yueqing City, Zhejiang Province
R&D : Huangpu District, Guangzhou City, Guangdong Province
Production : Yueqing, Dongguan

>> Profile

GuangDong Hygen Power Solutions Technology(Hygen power), as a leading enterprise in **DHP** (DC power for Hydrogen Production), hydrogen fuel cell power supply, and intelligent management system, focuses on providing one-stop power system solutions for global customers' hydrogen front-end hydrogen production side and back-end application side.

New energy hydrogen production has become increasingly mainstream in hydrogen production lines. The physical characteristics of thyristor-based DHP cannot cope with the fluctuations and weak gird characteristics of new energy. Due to the fast response, high power factor, and low harmonic distortion rate of IGBT-based DHP, our company focuses on the research and development of IGBT-based DHP when establishing our own DHP technology line.

The company's IGBT-DHP includes two series: Two-stage IGBT-based DHP and one-stage DC-DC IGBT-based DHP.

Two-stage IGBT-based DHP is applied in AC coupling scenarios, such as pure grid hydrogen production and wind and solar new energy hydrogen production supported by the grid;

The DC-DC IGBT-based DHP is applied in DC coupling scenarios, such as photovoltaic direct hydrogen production scenarios.

The company has currently obtained IATF 16949 qualification and holds dozens of patents.

Headquarter : Yueqing Industrial Zone, Yueqing City, Zhejiang Province
R&D : Grand Tech Park, Huangpu District, Guangzhou City, Guangdong Province
Production : Yueqing, Dongguan

>> Overview

Product overview

IGBT-based DHP adopts a fully controlled IGBT topology scheme for the main power, with modular redundancy design and good parallel characteristics. The system is easy to expand in parallel according to the requirements of the electrolytic. It has significant "three highs and one low" characteristics (high efficiency, high reliability, high power factor, and low harmonics), and the power supply design is easy to parallel, reliable and stable, easy to maintain, and has good adaptability.

Naming rules

HG - 6K4 - 600 - T / F

Product name:
HG: Hygen power IGBT-based DHP

Output current rating:
6400A

Output voltage rating:
600Vdc

Topology:
T: AC/DC+DC/DC Two-stage; R: AC/DC One-stage; D: DC/DC One-stage

Cooling:
F: Fan; L: Liquid

Typical product appearance

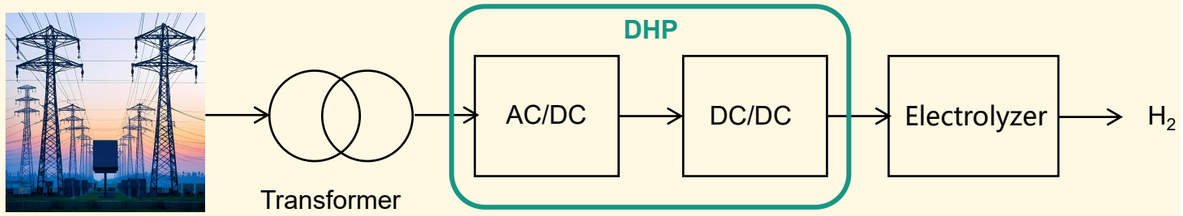
>> DHP solutions

■ Grid connected solutions

The grid connected hydrogen production system achieves efficient collaborative energy supply through intelligent allocation of grid base load and wind solar new energy power. The DHP is based on advanced SVPWM control technology and multi-phase staggered parallel control technology, through dynamic reactive power compensation and millisecond level fault ride through response, it ensures extremely low harmonic pollution in the power grid and excellent operational stability. This system supports parallel expansion of multiple units.

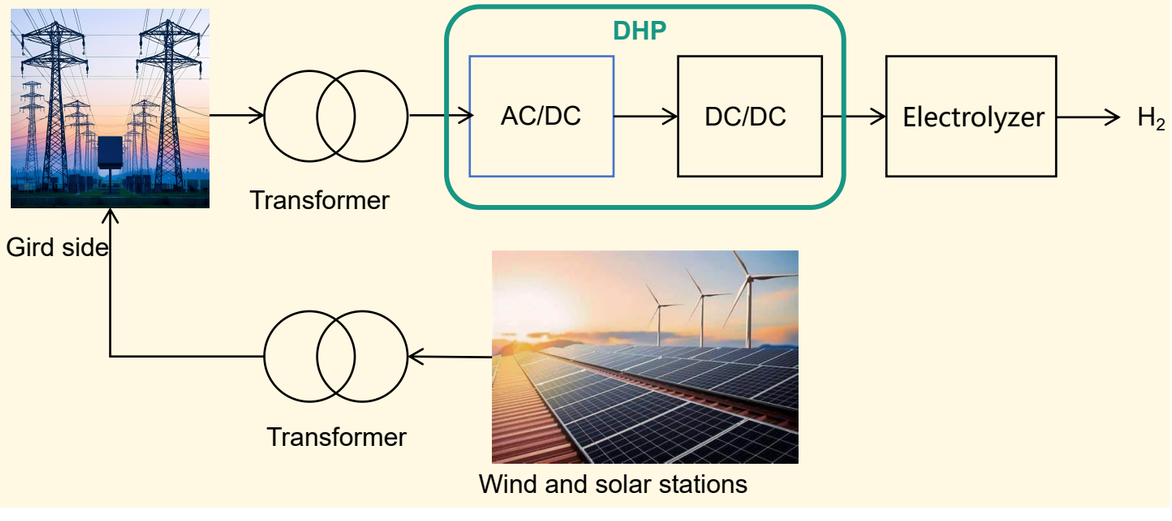
Grid-based hydrogen production plan

Hydrogen production electricity comes from the power grid. After being stepped down by a medium voltage transformer, it is rectified and transformed by the DPH to output stable DC electricity for hydrogen production in the electrolyzer.



Wind, solar and grid power hydrogen production plan

Hydrogen production electricity comes from wind and solar, but they have certain fluctuations. The use of the large power grid only serves as support, and the hydrogen production power provided by the power grid accounts for about 10% to 20%, while the hydrogen production power provided by wind and solar sources is more than 80%.After being stepped down by a medium voltage transformer, it is rectified and transformed by the DPH to output stable DC electricity for hydrogen production in the electrolyzer.

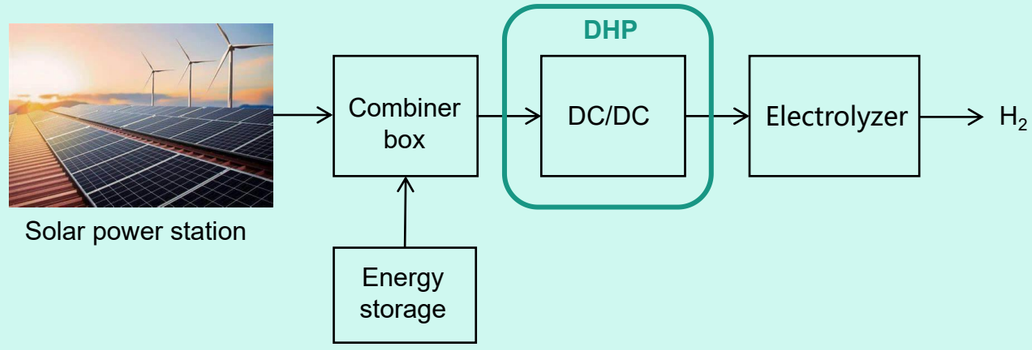


■ Off-grid solutions

In off-grid hydrogen production scenarios, hydrogen production electricity comes from wind, solar or energy storage systems, etc. In this scenario, due to the lack of support from the large power grid, the microgrid fluctuates greatly, and the DHP needs to operate within a wider range of voltage and frequency fluctuations, usually requiring an energy management system for flexible control of hydrogen production.

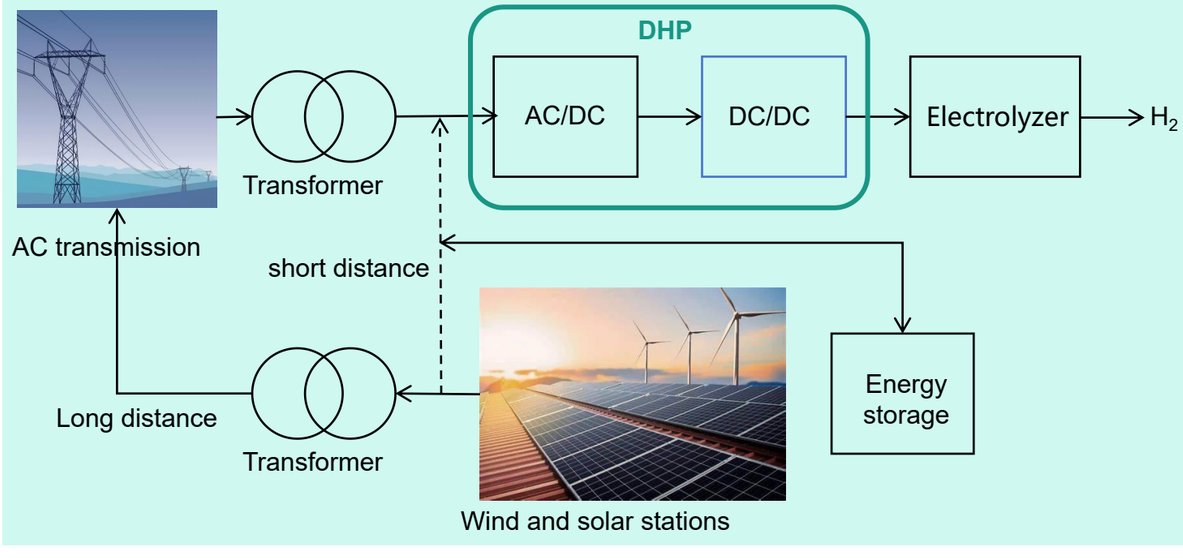
DC coupled hydrogen production plan

DC coupled off-grid system is one of the typical application scenarios for green electricity hydrogen production. The solar system provides power to the DHP through the combiner box, and the function of smoothing fluctuations is achieved by the energy storage system. The DC coupling system reduces the number of AC conversion steps and has relatively high theoretical efficiency.



AC coupled hydrogen production plan

In the AC coupling off-grid system, the maximum power generation of the solar system is predicted in real time through an energy management system to improve hydrogen production efficiency. By configuring an energy storage system, fluctuations in wind and solar power generation can be smoothed out, ensuring hydrogen production efficiency.

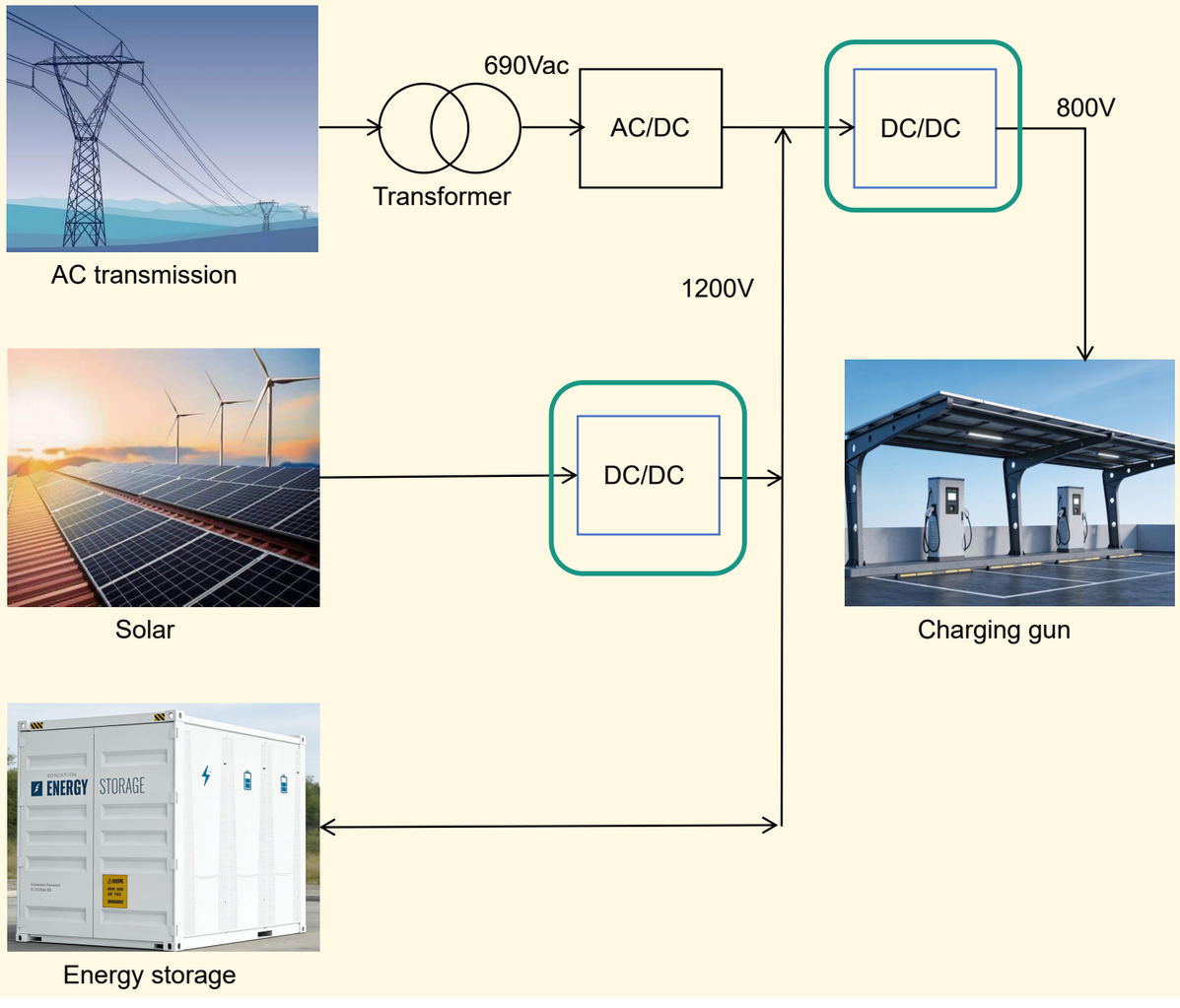


>> MW supercharging station solution

Features

- ✓ For MW level supercharging stations
- ✓ Support power grid and solar input
- ✓ Charging platform 800V
- ✓ Widely used for charging heavy trucks and other vehicles
- ✓ Standardized container design
- ✓ Modular design, good parallel characteristics, and easy parallel expansion of the system, for meetting the power required

Application schematic



Technical specifications

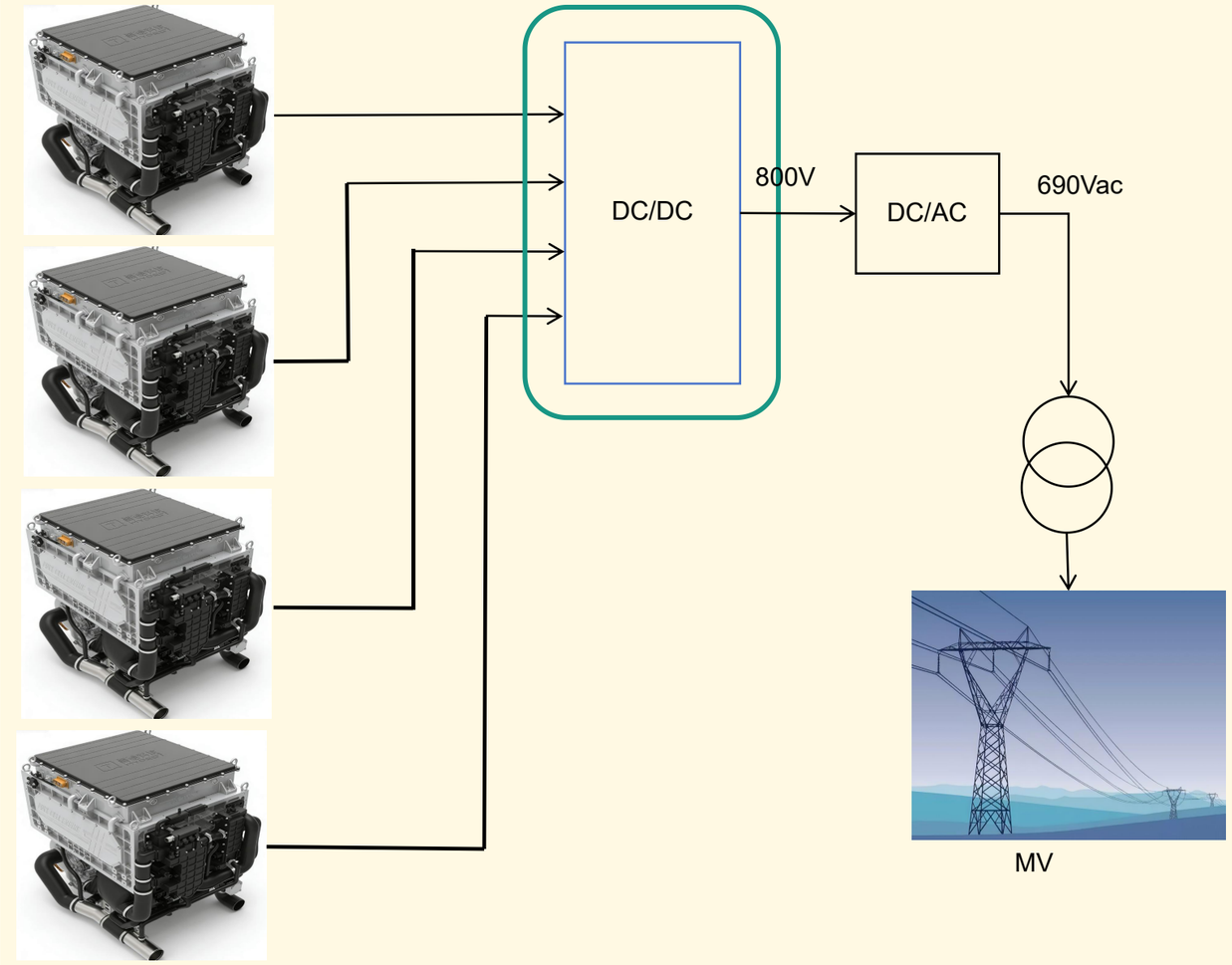
Term		Value
DC output	Voltage range	0-800V
	Current range	0-4000A
	Power range	1-2MW
	Voltage ripple	≤3%
	Current-controlled precision	≤±1% (Steady state)
	Voltage-controlled precision	≤±1% (Steady state)
	Load response time	≤100ms (0% to 100% load)
DC input	Voltage range	0-1200V
	Voltage fluctuation range	≤±10%
System	Efficiency	≥97.5% (Half load above)
	Cable configuration	Bottom for input and output
	Control mode	CC, CV, CP
	Size (W×D×H)	1.2m × 1.1m × 2m
Environmet	Cooling	Liquid cooling
	Ambient temperature	-40℃ ~ +45℃
	Relative humidity	0%～95%（No condensation）
	IP	IP54
	Maximum altitude	4000m
Communication	Interface	RS485, TCP, AI and AO
	Protocol	Modbus RTU, Modbus TCP
Display	HMI	Touch Screen

>> MW fuel cell power generation solution

Features

- ✓ For MW fuel cell power generation using
- ✓ Supports up to four inputs, with a maximum current of 1000A and a maximum power of 500KW per input
- ✓ 800V DC output platform
- ✓ Standardized container design
- ✓ Modular design, good parallel characteristics, and easy parallel expansion of the system, for meetting the power required

Application schematic



Technical specifications

Term		Value
AC output	Voltage range	3-phase 3-wire 690Vac
	Power range	1MW-2MW
DC output	Voltage range	800V
DC input	Voltage range	200-600V
	Current range	0-4000A
	Current-controlled precision	≤±1% (Steady state)
	Max. input port	4
System	Efficiency	≥97.5% (Half load above)
	Work mode	Non-isolated
	Control mode	CC, CV, CP
	Size (W×D×H)	2.5m × 1.1m × 2.2m
Environmet	Cooling	Liquid cooling/Fan
	Ambient temperature	-40℃ ~ +45℃
	Relative humidity	0% ~ 95% (No condensation)
	IP	IP54/IP21
	Maximum altitude	4000m
Communication	Interface	RS485, TCP, AI and AO
	Protocol	Modbus RTU, Modbus TCP
Display	HMI	Touch Screen

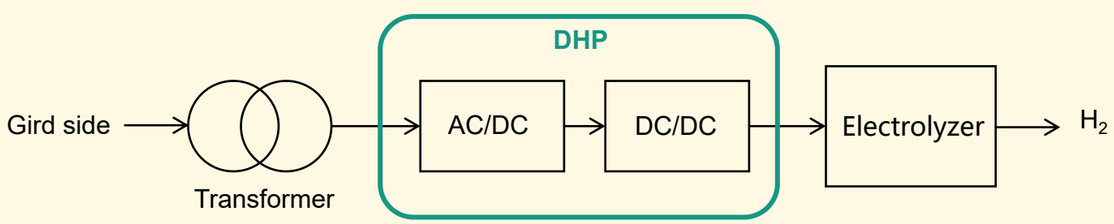
>> AC coupled 5MW DHP

Typical product appearance

Features

- ✓ Two-stage IGBT-based DHP: AC/DC+DC/DC
- ✓ Suitable for electrolyzer applications within the voltage range of 0~700V, such as PEM and ALK
- ✓ Supports a wide power range of 10~120%
- ✓ Modular design, good parallel characteristics, and easy parallel expansion of the system, for meetting the power required
- ✓ Good Gird related characteristics, Thdi ≤ 3%
- ✓ High efficiency, with over 98%
- ✓ Strong adaptability to grid measurement, wide voltage and frequency adaptability, supporting low short circuit ratio and weak current grid operation
- ✓ Fast response speed, current response time ≤ 100ms, easy to cope with rapid fluctuations in new energy

Application schematic



Technical specifications

Term		Value
DC output	Voltage range	0-700V
	Current range	0-12000A **(Be customized)**
	MAX. power	5.4MW
	Voltage ripple	≤3%
	Current-controlled precision	≤±1% (Steady state)
	Voltage-controlled precision	≤±1% (Steady state)
	Load response time	≤100ms (0% to 100% load)
AC input	Voltage range	450Vac~550Vac (500Vac)
	Working frequency rating	50Hz / 60Hz
	PF	≥0.98 (30% load above)
	Grid frequency deviation	≤±10%
	Grid voltage deviation	≤±10%
	THDi	≤3% (30% load above)
	Cables for input	3-phase 3-wire+PE
System	Efficiency	≥98% (Half load above)
	Cable configuration	Bottom for input and output
	Control mode	CC, CV, CP
	Size (W×D×H)	8.6m × 1.2m × 2m
Environmet	Cooling	Liquid cooling
	Ambient temperature	-40℃ ~ +45℃
	Relative humidity	0%~95% (No condensation)
	IP	IP54
	Maximum altitude	4000m
Communication	Interface	RS485, TCP, AI and AO
	Protocol	Modbus RTU, Modbus TCP
Display	HMI	Touch Screen

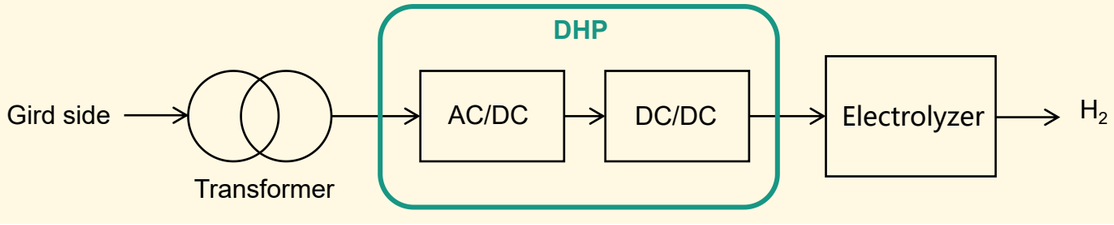
>> AC coupled 1.5MW DHP

Typical product appearance

Features

- ✓ Two-stage IGBT-based DHP: AC/DC+DC/DC
- ✓ Suitable for electrolyzer applications within the voltage range of 0~700V, such as PEM and ALK
- ✓ Supports a wide power range of 10~120%
- ✓ Modular design, good parallel characteristics, and easy parallel expansion of the system, for meetting the power required
- ✓ Good Gird related characteristics, Thdi ≤ 3%
- ✓ High efficiency, with over 98%
- ✓ Strong adaptability to grid measurement, wide voltage and frequency adaptability, supporting low short circuit ratio and weak current grid operation
- ✓ Fast response speed, current response time ≤ 100ms, easy to cope with rapid fluctuations in new energy

Application schematic



Technical specifications

Term		Value
DC output	Voltage range	0-700V
	Current range	0-8000A **(Be customized)**
	MAX. power	1.7MW
	Voltage ripple	≤3%
	Current-controlled precision	≤±1% (Steady state)
	Voltage-controlled precision	≤±1% (Steady state)
	Load response time	≤100ms (0% to 100% load)
AC input	Voltage range	450Vac~550Vac (500Vac)
	Working frequency rating	50Hz / 60Hz
	PF	≥0.98 (30% load above)
	Grid frequency deviation	≤±10%
	Grid voltage deviation	≤±10%
	THDi	≤3% (30% load above)
	Cables for input	3-phase 3-wire+PE
System	Efficiency	≥98% (Half load above)
	Cable configuration	Bottom for input and output
	Control mode	CC, CV, CP
	Size (W×D×H)	3.7m × 1.2m × 2m
Environmet	Cooling	Liquid cooling
	Ambient temperature	-40℃ ~ +45℃
	Relative humidity	0% ~ 95% (No condensation)
	IP	IP54
	Maximum altitude	4000m
Communication	Interface	RS485, TCP, AI and AO
	Protocol	Modbus RTU, Modbus TCP
Display	HMI	Touch Screen

>> DC coupled 2MW DHP

Typical product appearance

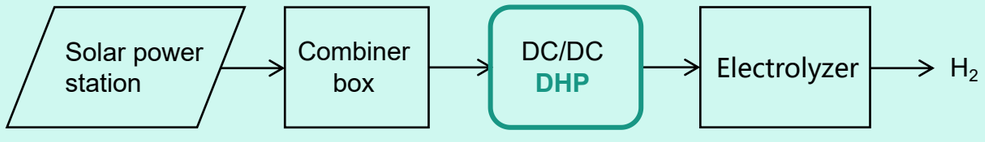
Features

- ✓ One-stage IGBT-based DHP: DC/DC
- ✓ Suitable for electrolyzer applications within the voltage range of 0~700V, such as PEM and ALK
- ✓ Supports a wide power range of 10~120%
- ✓ Modular design, good parallel characteristics, and easy parallel expansion of the system, for meetting the power required
- ✓ Good Gird related characteristics, Thdi ≤ 3%
- ✓ High efficiency, with over 98%
- ✓ Strong adaptability to grid measurement, wide voltage and frequency adaptability, supporting low short circuit ratio and weak current grid operation
- ✓ Fast response speed, current response time ≤ 100ms, easy to cope with rapid fluctuations in new energy

Technical specifications

Term		Value
DC output	Voltage range	0-700V
	Current range	0-4000A **(Be customized)**
	MAX. power	2MW
	Voltage ripple	≤3%
	Current-controlled precision	≤±1% (Steady state)
	Voltage-controlled precision	≤±1% (Steady state)
	Load response time	≤100ms (0% to 100% load)
DC input	Voltage range	0-800V
	Voltage fluctuation range	≤±10%
System	Efficiency	≥99% (Half load above)
	Cable configuration	Bottom for input and output
	Control mode	CC, CV, CP
	Size (W×D×H)	1.2m × 1.1m × 2m
Environmet	Cooling	Liquid cooling
	Ambient temperature	-40℃ ~ +45℃
	Relative humidity	0% ~ 95% (No condensation)
	IP	IP54
	Maximum altitude	4000m
Communication	Interface	RS485, TCP, AI and AO
	Protocol	Modbus RTU, Modbus TCP
Display	HMI	Touch Screen

Application schematic



>> 1.5MW DHP with MV transformer

Features

- ✓ Integrated design with standard 40' GP container, integrated 35KV/10KV medium voltage transformer, DHP and cooling system
- ✓ A wider operating temperature environment
- ✓ Two-stage IGBT-based DHP: AC/DC+DC/DC
- ✓ Suitable for electrolyzer applications within the voltage range of 0~700V, such as PEM and ALK
- ✓ Modular design, good parallel characteristics, and easy parallel expansion of the system, for meetting the power required
- ✓ Good Gird related characteristics, Thdi ≤ 3%
- ✓ High efficiency, with over 98%
- ✓ Strong adaptability to grid measurement, wide voltage and frequency adaptability, supporting low short circuit ratio and weak current grid operation
- ✓ Fast response speed, current response time ≤ 100ms, easy to cope with rapid fluctuations in new energy

Technical specifications

Term		Value
DC output	Voltage range	0-700V
	Current range	0-6400A
	MAX. power	1.7MW
AC input	Voltage range	35KV/10KV
	THDi	≤3% (30% load above)
System	Control mode	CC, CV, CP
	Size	40' GP
Environmet	Ambient temperature	-40℃ ~ +60℃
	IP	IP54
	Maximum altitude	4000m
Communication	Interface	RS485, TCP, AI and AO
	Protocol	Modbus RTU, Modbus TCP

>> Application

eg1: 1000 Nm³ ALK application case

Part No.	HG-12K0-600-T/L
AC input voltage	3-phase 500±10%，50/60Hz
Power rating	5.2MW
Output voltage range	0-600V
Output current range	0-12000A
Cooling	Liquid

eg2: 200 Nm³ PEM application case

Part No.	HG-6K4-600-T/L
AC input voltage	3-phase 500±10%，50/60Hz
Power rating	1.2MW
Output voltage range	0-600V
Output current range	0-6400A
Cooling	Liquid