



LDC Power Supply System And Service

Rectifier Power Supply Partners of Fortune 500 Enterprises

Application scenario:

Hydrogen production from electrolyzed water powered by power grid, photovoltaic and wind power.

Both alkaline and PEM processes can be used to produce hydrogen by electrolyzing water.

Technical scheme:

AC/DC, DC/DC power supply solution.

Product path:

SCR rectifier /GBT rectifier /GBT-PWM rectifier

LDC Technology Group

Qingdao LDC Technology Corp.

LDC Hydrogen Energy Technology (Qingdao) Co., Ltd.

FAX: +86 532 87882666

WEB: WWW.LDCUPS.COM

MAIL: LDCUPS@LDC.COM.CN

ADD.: Jiangshan Precision Machinery Manufacturing Industrial Park, Laixi, Qingdao, China.

V1.1

10-4000Nm³/h

hydrogen production rectification system by electrolysis of water



Enterprise profile

The business segments of LDC Technology Group are primarily composed of three parts:

1. Qingdao LDC Technology Corp. was established in 1998 as a Sino-foreign joint venture, supported by the state-owned capital of Shandong Province and Qingdao City. The company is engaged in the research and development, production, sales, and service of high-power power electronics conversion and control technologies and related products. As a national-level technology enterprise, LDC Technology is committed to providing high-reliability power supply solutions and energy conversion solutions for traditional energy sectors such as the power industry, petroleum, chemical, and coal chemical industries, as well as emerging strategic industries such as nuclear power generation, solar thermal power generation, hydrogen energy, new materials, and semiconductors, and large-scale intelligent manufacturing enterprises.

Main Products:

- Industrial-grade power supplies
- Industrial-grade uninterruptible power supply (UPS)
- Industrial-grade emergency power supply (EPS)
- Industrial-grade direct current (DC) power supply (RPS)

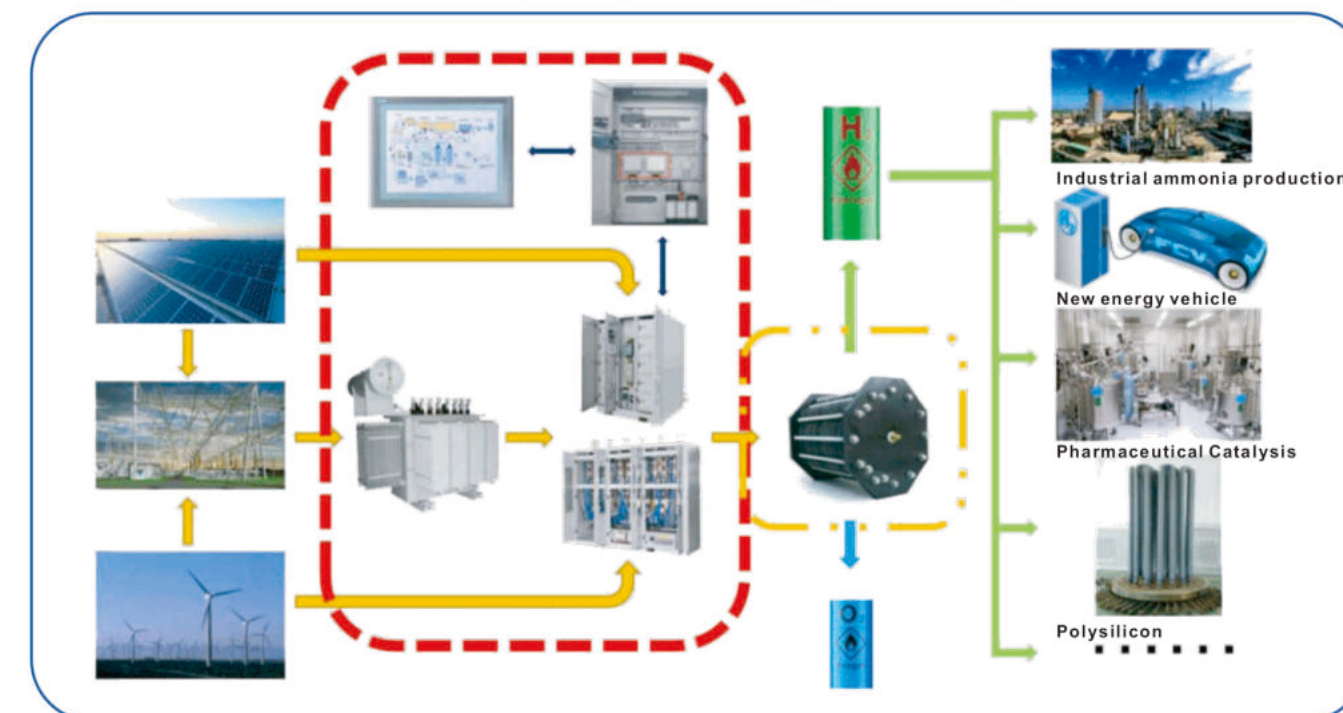
After more than two decades of effort, the company's industrial-grade UPS products have achieved a leading position in domestic traditional energy markets such as power, petrochemical, and coal chemical industries. The products have been exported to over thirty-nine countries and regions across five continents. Since its establishment, LDC Technology has adhered to a customer-centric business strategy, guided by the corporate spirit of "cooperation, win-win, and innovation," and the business philosophy of "meeting customer requirements and exceeding customer expectations." The company has continuously strived for excellence and innovation, maintaining a craftsman-like dedication to quality. In the fierce market competition, LDC Technology has grown into a well-known brand in the "high-end industrial market" and the "industrial-grade uninterruptible power supply" industry. LDC has successfully participated in the formulation of the Chinese power industry's group standard "Management Specification for Power Industrial Internet Identity."

2. In response to China's national strategy for "carbon peak" and "carbon neutrality," LDC Technology Group established LDC Oxygen Energy Technology (Qingdao) Co., Ltd., marking an extension and expansion of the company's product line from industrial-grade power supplies to new energy products.

Main Products:

- 1) Industrial-grade hydrogen production power supplies and inverters
 - Wind and solar hydrogen production power systems
 - Fuel cell grid-connected and off-grid inverters
- 2) New energy converters
 - Energy storage grid-connected and off-grid charging converters (PCS)

LDC's position in the hydrogen energy industry chain



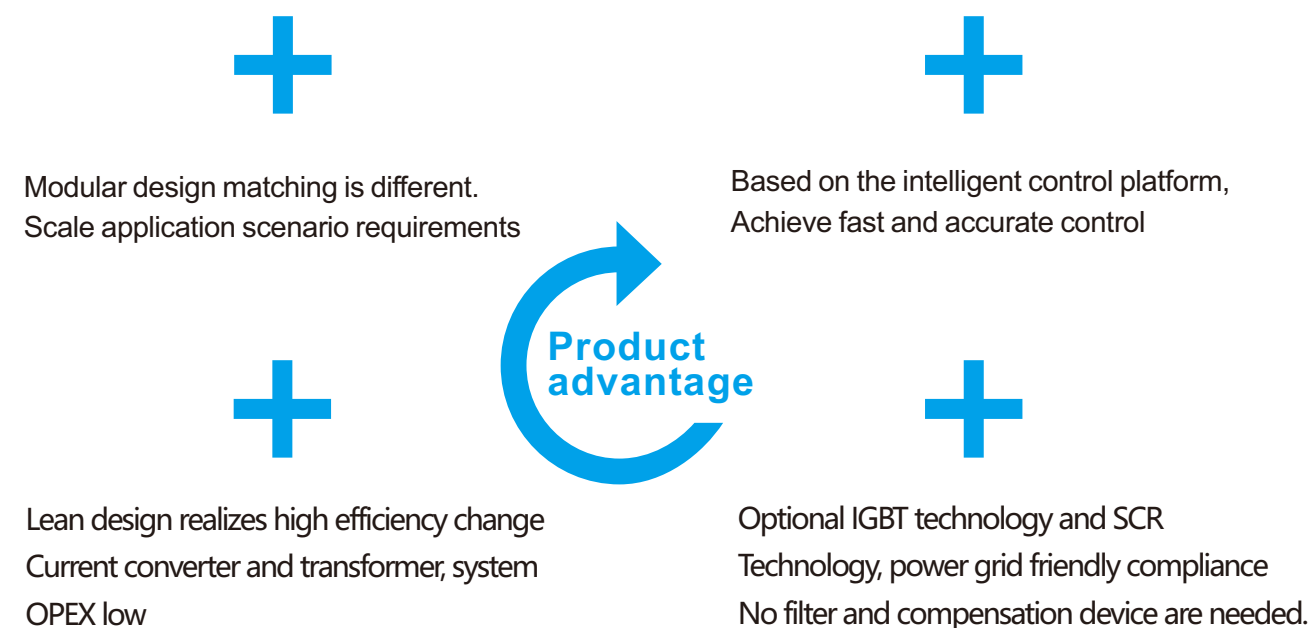
Solution

LDC hydrogen production power supply system

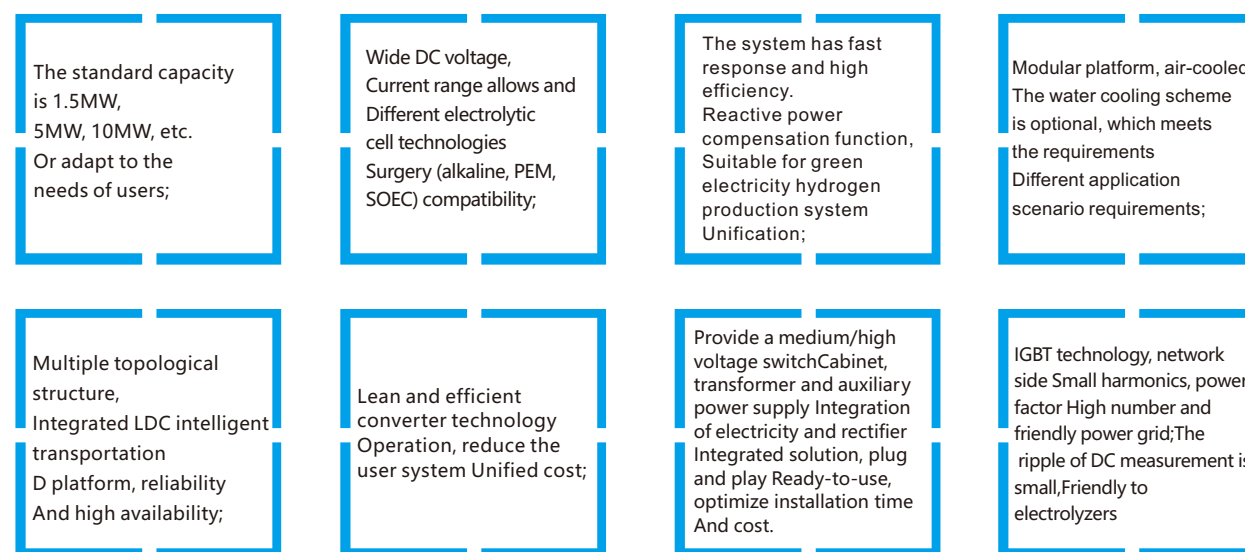
LDC hydrogen production power supply converts alternating current of wind and solar power generation and power grid into direct current conforming to electrolyzer standards. IGBT technology and SCR technology are adopted to minimize the impact on the power grid without any additional filter or compensation device; Small DC ripple, friendly to electrolyzer: the system has fast response and is suitable for coupling with new energy grid.



Product advantage



Product features



Four solutions of power supply

01:IGBT high frequency rectifier power supply

Suitable for small and medium-sized electrolytic equipment

Modularization, small size, high power factor, module can exit without disturbance, eliminating rectifier transformer, Suitable for 380V, 480V and other local power access conditions.

Completely independent development, using DSP technology as the core of the controller, supplemented by high-precision external Surround the hardware circuit to ensure high reliability, high precision, high performance and fast response of the system.



02:SCR silicon controlled rectifier

Suitable for MW-class large and medium-sized electrolytic equipment

Low harmonics can be achieved by multiple pulses (such as 24 pulses, 48 pulses, 60 pulses, 96 pulses, etc.);

The power factor is guaranteed by on-load voltage regulating switch and accurate SCR trigger angle control; Through full digital control

Tracking technology meets the characteristics of photovoltaic power supply and wind power supply. For the power supplier of large electrolytic equipment

The project has the advantages of high reliability, high efficiency, low investment, less floor space and less maintenance.

A widely used power supply scheme for large-scale hydrogen production by electrolysis of water.

03:IGBT DC/DC power supply

It is suitable for photovoltaic direct supply and realizes DC/DC power supply scene.

It can be directly connected to photovoltaic power generation to realize DC/DC conversion, with high efficiency, and is suitable for photovoltaic direct supply.

Scenes of hydrogen production.



04:PWM rectifier

Can match that characteristic of electrolyzer for electrolyze water to produce hydrogen.

Using power transformer +PWM rectifier can not only meet the direct current of electrolyzer

IGBT high frequency rectifier power supply

Application area

- Hydrogen production by electrolysis
- power station
- Photothermal power station
- New energy storage project
- oil production
- Gas power station
- Seawater desalination
- Pharmaceutical industry
- DCS system

Operating principle

Three-phase (single-phase) AC input is composed of insulated gate bipolar transistor (IGBT) or MOSFET after AC-DC rectification and filtering.

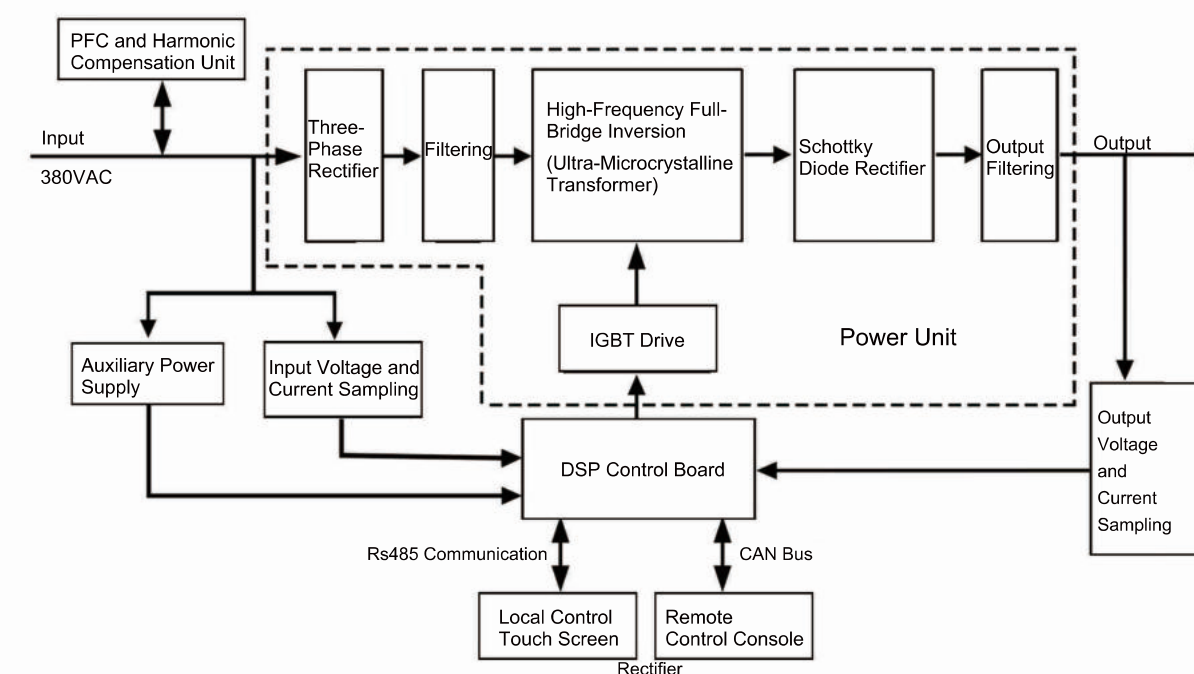
High-frequency DC-DC conversion circuit or other forms of circuits, after high-frequency (about 10-40kHz) conversion and adjustment, and then high efficiency.

Rectification and filtering are converted into DC power supply suitable for users.

The control system adopts fully digital DSP control, and integrates auxiliary power supply circuit, input and output sampling circuit and PWM.

Generation, communication interface circuit, protection circuit and other functions, with high control accuracy and stability, fast response, anti-interference.

Good interference performance, perfect protection system and rich communication interfaces.



High-Frequency Rectifier Power Supply Schematic

IGBT high frequency rectifier power supply

01:IGBT high frequency rectifier power supply

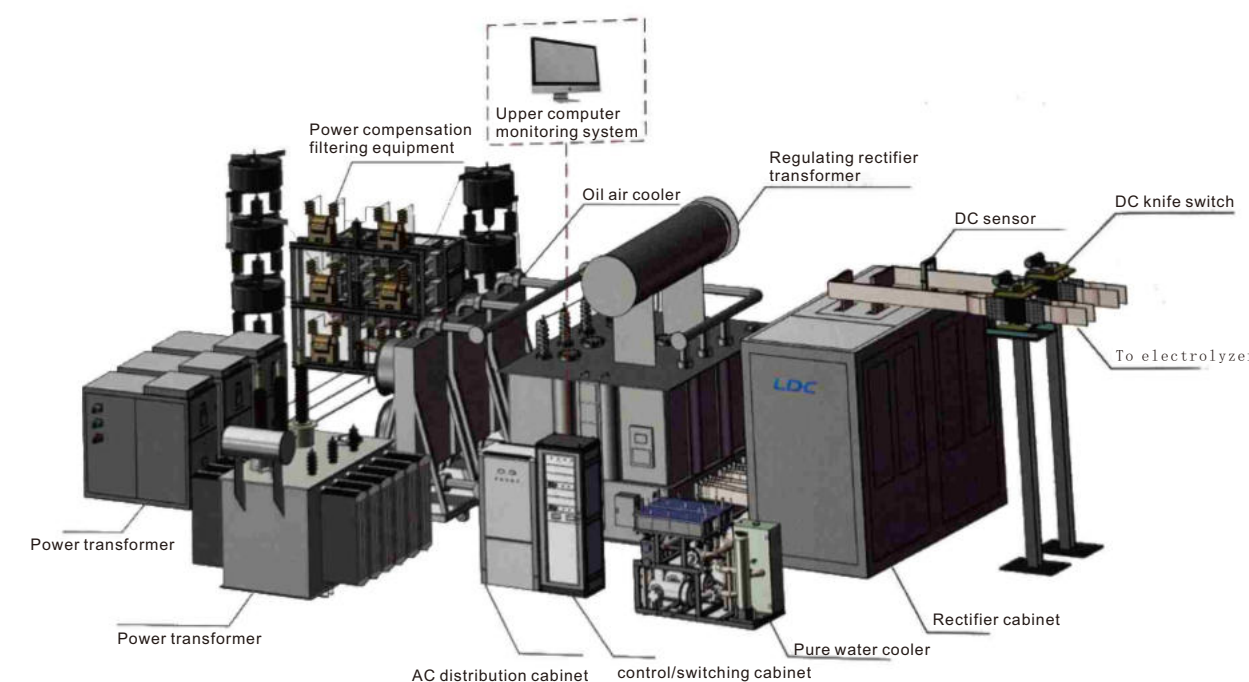
Input voltage	AC 3-phase 380V/AC, 3-phase 415V/220V, can be customized according to user input voltage.
Output current	Rated current 10
Output voltage	Rated voltage 6V-1500V, or customized design.
Output regulation range	0-100% of rated value
Control accuracy	1%, 0.5%, 0.1%, 0.01%, user can choose.
Operation mode	Constant voltage/current/power
Ripple	< 10%, < 5%, < 3%, ≤ 1%, which can be selected by users.
Efficiency	> 90% (at 12v rated output, the higher the output voltage, the higher the efficiency).
Protect grade	IP30, IP42, IP44, IP54, user can choose.
Power factor	≥0.94 (at rated output)
Insulation grade	B
working hours	24 hours continuous operation
Alarm type	Acousto-optic alarm
Appearance size	Customizable
PLC remote control interface	Analog signal 0-10V/4-20mA Digital signal RS485 (Modbus)/RS232/PROFIBUS-DP/PROFINET/CAN.
Cooling mode	Air cooling and water cooling
Defensive function	Short circuit protection Input overvoltage and undervoltage protection Drive protection overheating protection Output overvoltage protection Output overcurrent protection Water pressure undervoltage protection (water cooling) Water temperature over-temperature protection (water cooling)
Man-machine interface	Touch screen digital control historical data storage, export, automatic fault identification and alarm.
Other functional features	output waveform query Save history settings Protective shielding function ampere-hour meter Timing function Low twist wave Remote control console
Matching function	Soft start Power failure recovery self-starting function Output auto-commutated programmable process curve with multiple customized output waveforms. Cloud platform support

High power SCR silicon controlled rectifier

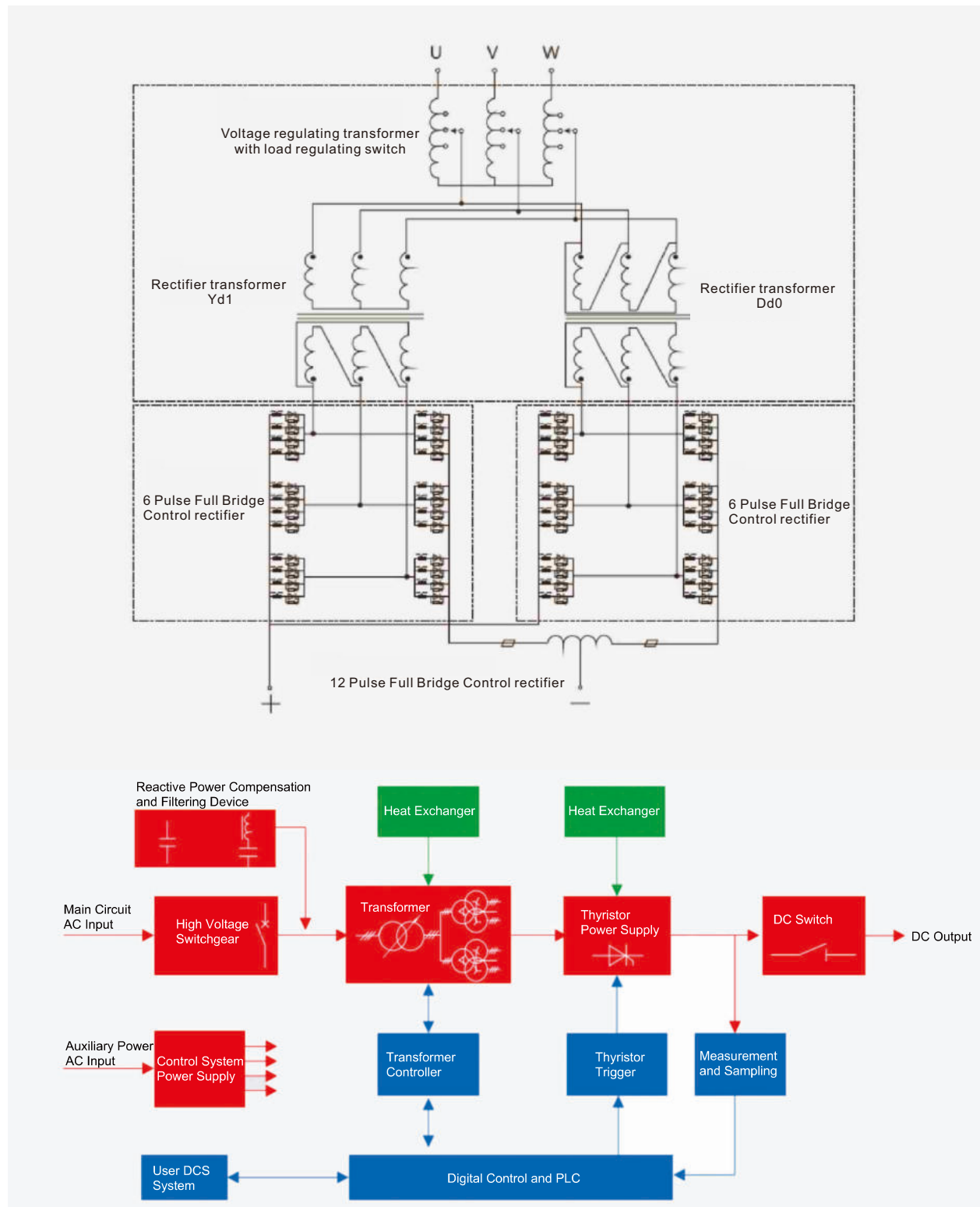
Application area

- Hydrogen production by electrolysis
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- DCS system

System Composition



High-Power SCR Thyristor Rectifier



High-Power SCR Thyristor Rectifier

Technical superiority

High performance:

High reliability, various measures to ensure the reliability of the system, non-magnetic box, SCR N-1 redundancy design, heat exchanger redundancy design.

Energy-saving and electricity-saving: Improve the efficiency of rectifier system through optimization design High control accuracy Low ripple High power factor.

Friendly man-machine interface

Minimize the total investment cost and operation cost;

Better conversion efficiency Less maintenance

Maximize and ensure personnel safety Longer service life

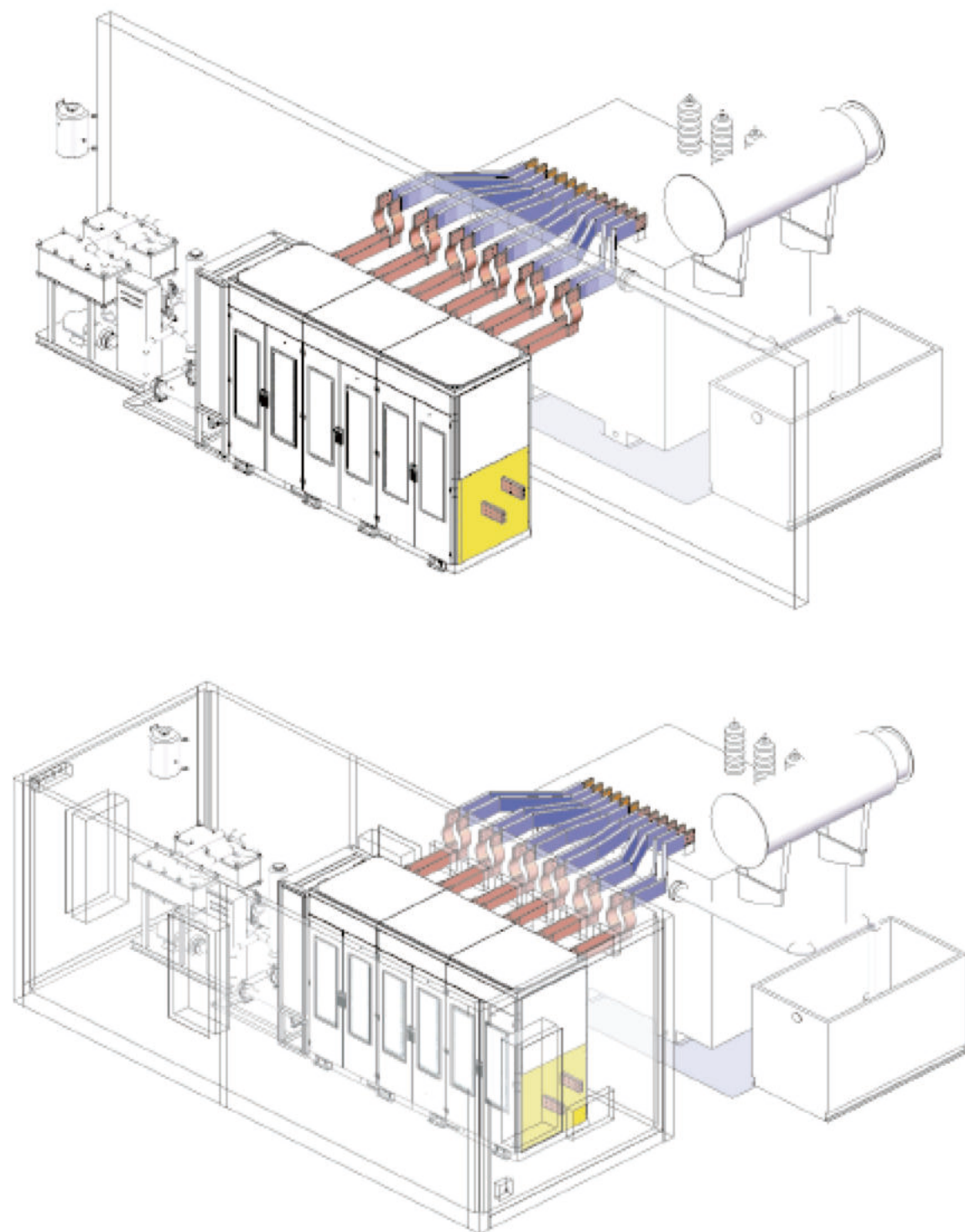
Short-time installation and debugging

Intelligent digital control, strong anti-interference and good automatic control function.

Main technical parameters

Input voltage	Three-phase AC 380V or kV class, 50Hz/60Hz
Rated output current	DC output rated current of 200A-100kA, customized according to customer requirements.
Rated output voltage	The rated voltage of DC output is 12V-21kV, customized according to customer's requirements.
Output rating	The DC output power is 50kW-150MW, which can be customized according to customers' requirements.
Design standards	IEC-60146 semiconductor converter IEC-60076 Power Transformer National standard GB/T3859 CE, UL, CSA standards (optional)
Input power factor (at rated load)	The on-load voltage regulating switch can be =0.90, and the power factor can be above 0.97 through the reactive power compensation
Efficiency (at rated load)	Related to the output voltage
Control accuracy	Within 0.5%
Control type	digital control
IP grade	Up to IP54
Ambient temperature	Up to 50°C
Output pulse number	6, 12, 24, 36, 48, 96.
Control model	Constant current/constant voltage
Overload capacity	150% 1 minute, 110% 5 minutes, 100% long-term operation.
Cooling mode	Water cooling (the cooling water is deionized water)/air cooling
Transformer cooling mode	AN/AF, OFWF, OFAF, ONAN
Installation position	Indoor or outdoor
Man-machine interface	Color touch screen
Remote control interface	4-20mA/0-10V signal and dry contact, Modbus, Profibus, Profinet.
SCR N+1 redundancy	Yes
Heat exchanger	Deionized water/tap water with redundancy
Protec	Grounding detection and grounding fault alarm, SCR RC absorption Overheating protection, output overvoltage protection, output overcurrent protection and water pressure protection. Water temperature protection, others can be designed according to customer requirements.

Layout of 1000Nm³/h SCR rectifier power supply system



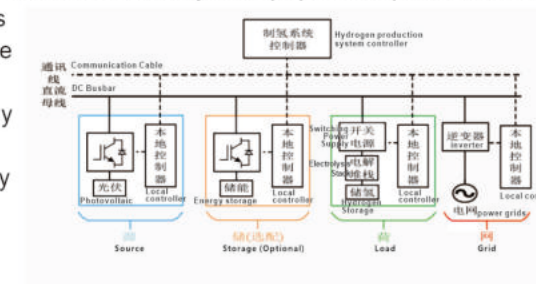
Photovoltaic direct supply IGBT DC/DC hydrogen production power supply

Technical parameters of IGBT DC/DC power supply

Type	IGBT DC/DC power supply
Structure	Modular design
Working performance	100% 24-hour continuous operation customized design
Input voltage	Customized design
Rated output voltage	Customized design
Rated output current	Customized design
Output range	0-100%
Control accuracy	0.20%
Power factor	20.94 (rated output)
Efficiency	≥93-98%
Control model	Constant current/constant voltage
Cooling mode	Air cooling or water cooling
Protect grade	Air-cooled IP30, water-cooled IP44, or customized by customers.
Man-machine interface	Touch screen
Remote control interface	MODBUS, Profibus, Profinet, Ethernet, 0-10V/4-20mA optional.
Alarm type	Acousto-optic alarm
Protect	Output overcurrent protection
	Output overheating protection
	Drive protection
	Overheating protection
	Short circuit protection
Characteristic	Other customized designs
	DSP digital control
	Historical data recording function
Ambient temperature	Output waveform tracking function
	Protection self-diagnosis function
Humidity	Up to 40°C, degradation operation up to 50°C
	The maximum relative humidity is 90%, without condensation.

DC bus microgrid power supply system

The mode shown in the figure is recommended for hydrogen production by electrolysis of water in DC bus microgrid. If there is no energy storage equipment, the system can run smoothly by adjusting the operating point of electrolytic equipment and photovoltaic power generation. When the photovoltaic power generation is greater than the power required by the electrolysis equipment, the electrolysis equipment operates at the maximum power; when the photovoltaic power generation is insufficient to meet the maximum hydrogen production of the electrolysis equipment, the hydrogen production will be reduced to match the photovoltaic power generation. Energy storage equipment can be selected to make up for the fluctuation of photovoltaic power generation, and the energy storage equipment can supplement the insufficient part of photovoltaic power generation to meet the power demand of hydrogen production equipment.



Engineering Case Studies

South Africa Redstone 100MW Tower Solar Thermal Project

The South Africa Redstone 100MW Tower Solar Thermal Power Station is located in the Northern Cape Province. It is the first tower molten salt solar thermal power generation project in Africa and the largest renewable energy investment project in South Africa to date. Owner: ACWA POWER, a company specializing in clean energy power generation, desalination, and supply. EPC Contractor: China Power Construction Corporation's SEPCO III ELECTRIC POWER CONSTRUCTION CO.LTD Qingdao LDC Technology Corp. provided the uninterruptible power supply (UPS) and direct current (DC) power system for this project. Key system parameters: Output 8000A/125VDC, providing power support for critical facilities and equipment of the project.



South Africa Redstone 100MW Tower Solar Thermal Project - Site Photos

Engineering Case Studies

South Africa Redstone 100MW Tower Solar Thermal Project

The Syrdarya 1500MW gas-fired combined cycle power plant project is the first large-scale gas power project developed in Uzbekistan through foreign investment. It covers a total area of approximately 75 hectares and is currently the largest gas combined cycle power plant in Central Asia. The project is contracted by China Energy Construction Group. The power plant uses the world's highest combustion temperature, largest single-unit power, and most efficient gas turbines. Owner: ACWA POWER. Project Design Firm: IDOM from Spain. Power System Parameters Provided by LDC: Output 4000A/220VDC.



Uzbekistan Syrdarya 1500MW Gas Combined Cycle Independent Power Plant Project - Site Photos

DC Power Product Certification Qualifications

产品型号注册证书

PRODUCT TYPE CERTIFICATION

No. 20212332

申请单位: 青岛艾迪森科技股份有限公司
 产品型号: HRE31-120-380/220
 产品名称: HRE 直流电源
 检验报告编号: JW212332
 检验单位: 许昌开普检测研究院股份有限公司
 国家继电保护及自动化设备质量检验检测中心

(本产品型号注册证书与 JW212332 检验报告同时有效)

发证单位: 中电协继电保护及自动化设备质量检验检测中心
 2021年09月

电磁兼容检验证书

EMC TEST CERTIFICATION

No. 202111228

委托单位: 青岛艾迪森科技股份有限公司
 产品型号: HRE31-120-380/220
 产品名称: HRE 直流电源
 检验报告编号: JW212332-EMC
 检验类别: 型式检验

检验项目:

序号	标准	结论
1	阻尼振荡波抗扰度检验 DL/T 459-2017、GB/T 17626.18-2016	合格
2	静电放电抗扰度检验 DL/T 459-2017	合格
3	电快速瞬变脉冲群抗扰度检验 DL/T 459-2017	合格
4	浪涌抗扰度检验 DL/T 459-2017	合格

发证单位: 许昌开普检测研究院股份有限公司
 国家继电保护及自动化设备质量检验检测中心

DC Power Product Certification Qualifications

报告编号 Report No.: 03401-22-10063F-S

检验报告

TEST REPORT

样品名称: SRE 系列直流电源
 Sample Name: SRE series DC power supply

型号: SRE31-2000-400/220-A
 Model No.: SRE31-2000-400/220-A

受检单位: 青岛艾迪森科技股份有限公司
 Inspected unit: Qingdao LDC Techn

检验类别: 委托型式试验
 Inspection type: Commissioned Typ

湖南电科院检测集团有限公司
 Hunan Electric Research Institute Testing Grou

检验报告

No: JW212332

样品名称: HRE 直流电源

样品型号: HRE31-120-380/220

委托单位: 青岛艾迪森科技股份有限公司

制造商: 青岛艾迪森科技股份有限公司

签发日期: 2021年09月24日

许昌开普检测研究院股份有限公司
 国家继电保护及自动化设备质量检验检测中心

