



# 卧龙氢能解决方案

Wolong Hydrogen Energy Solutions

**WOLONG**  
*Power your future*

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## 卧龙集团 - 概况

## Wolong Group - Profile

卧龙创建于 1984 年，总部位于浙江绍兴，是一家致力于向全球用户提供安全、高效、智能、绿色的电驱动力系统解决方案和全生命周期服务解决方案的全球领先工业企业。

十四五以来，围绕源网荷储氢进行重点布局和发展，拥有电力变压器、光伏、铅酸和锂电池、储能 PCS、制氢电源、光储集成项目等方面的产品和技术。

Wolong, founded in 1984 and headquartered in Shaoxing, Zhejiang Province, is a global leading industrial enterprise committed to providing safe, efficient, smart and green power drive system solutions with life-long supporting services to global users.

Since the 14th Five-Year Plan, the company has focused on the layout and development of hydrogen storage by source network, and has products and technologies in power transformer, photovoltaic, lead-acid and lithium batteries, energy storage PCS, hydrogen power supply, and light storage projects.

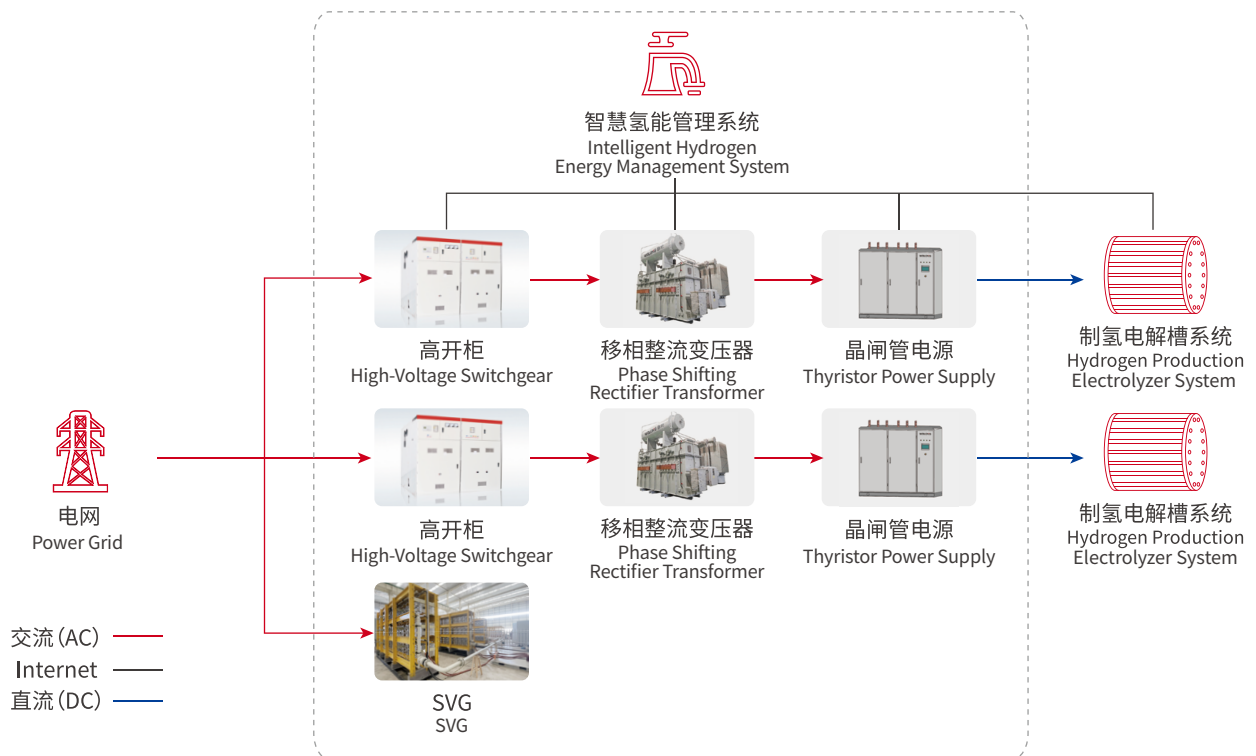
三大产业 THREE MAJOR INDUSTRIES	公司规模 COMPANY SIZE	公司规模 COMPANY SIZE
 <b>制造业</b> Manufacturing 卧龙电气驱动集团股份有限公司 Wolong Electric Group Co. LTD	 <b>430 亿</b> 6,25 BUSD 集团销售额 Group revenue	 <b>358 亿</b> 5,2 BUSD 集团总资产 Group total assets
 <b>金融&amp;投资</b> Finance & Investment 卧龙资本 Wolong Capital	 <b>39 个</b> 全球制造基地 Global manufacturing bases	<b>卧龙电驱</b> Wolong Electric Group SH600580
 <b>房地产</b> Real estate 卧龙地产集团 Wolong Real Estate Group	 <b>16000 名</b> 员工 Employees	<b>卧龙地产</b> Wolong REAL ESTATE SH600173
		<b>Brook Crompton Holdings Ltd.</b> 新加坡 Singapore

### • 卧龙电驱组织架构 Wolong Electric Group Organization Structure



# 水电解制氢系统解决方案 Water Electrolysis Hydrogen Production System Solutions

## 晶闸管制氢电源解决方案 Thyristor Hydrogen Production Power Supply Solution



### ● 应用场景 Application Scene

主要用于交流电网条件较好的制氢场景，可以配套卧龙的 SVG 电网治理设备进行使用。

It is mainly applicable to hydrogen production scenarios with good AC power grid conditions. It can be used with Wolong SVG power grid governance equipment.

### ● 主要特点 Technical Features

技术成熟。  
Mature technology.

晶闸管电源功率因数较低，需要配套 SVG 使用。  
The power factor of thyristor power supply is low, and it needs to be used with SVG.

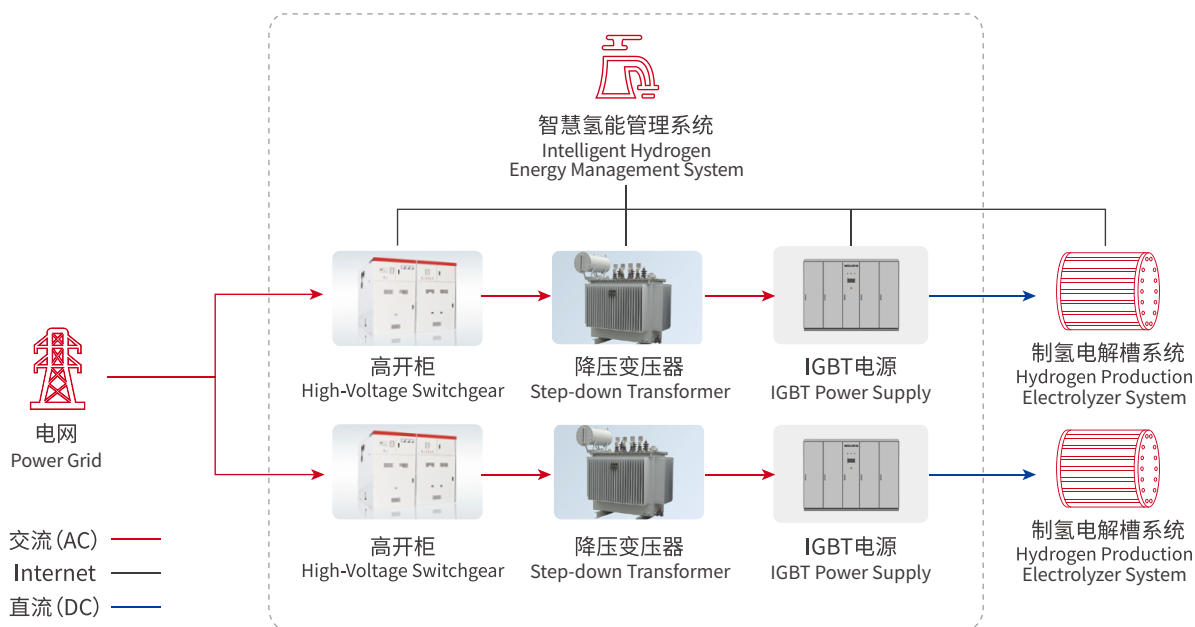
在轻载或功率波动时，网侧谐波较大。  
In case of light load or power fluctuation, the grid side harmonics are large.

动态响应速度慢，不能很好的跟随新能源功率波动。  
The dynamic response speed is slow and cannot follow the new energy power fluctuations well.



## IGBT 制氢电源解决方案

### IGBT Power Supply For Hydrogen Production Solution



#### ● 应用场景 Application Scene

主要适用于新能源制氢，能很好的跟随新能源电网的功率波动，对电网谐波污染小。输出纹波电流小，电解槽运行效率高。  
Mainly applicable to new energy hydrogen production, can well follow the power fluctuations of the new energy grid, the harmonic pollution of the grid is small. The output ripple current is small, the electrolyzer operation efficiency is high.

#### ● 主要特点 Technical Features

功率动态调节响应速度快，适用于新能源制氢。

Power dynamic regulation has fast response speed and is applicable to hydrogen production from new energy.

网侧谐波低、功率因数高，对电网的污染小。

The grid side has low harmonics, high power factor and low pollution to the grid.

具备无功补偿能力。

Have reactive power compensation capability.

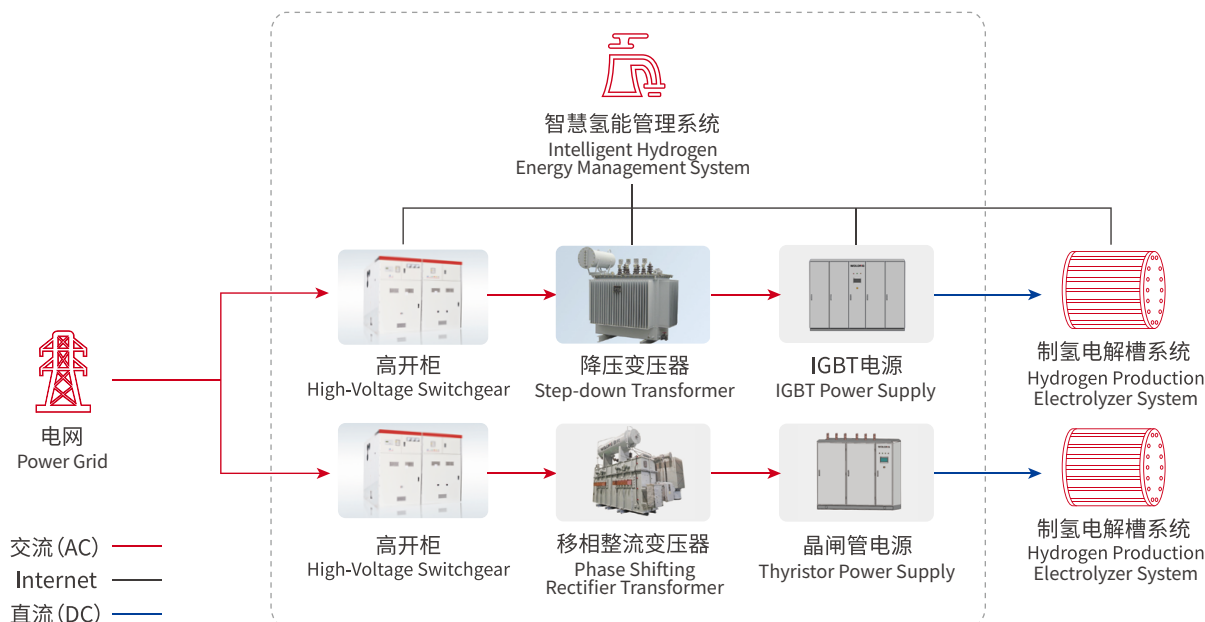
网侧变压器不需要移相，不需要有载调压开关，可靠性高，效率高。

The grid side transformer does not need phase shift and on-load voltage regulating switch, which is high in reliability and efficiency.

输出纹波电流小，电解槽运行效率高。

Low output ripple current and high operation efficiency of electrolyzer.

## ▼ IGBT 制氢电源 + 晶闸管制氢电源混用方案 IGBT Power Supply For Hydrogen Production+Thyristor Power Supply For Hydrogen Production Solution



### ● 应用场景 Application Scene

在大规模的新能源制氢场站，通过 IGBT 制氢电源和晶闸管制氢电源的混用实现性价比最优。

In large-scale new energy hydrogen production stations, the best cost performance can be achieved through the mixing of IGBT power supply for hydrogen production and Thyristor power supply for hydrogen production.

### ● 主要特点 Technical Features

混用方案为成熟产品的系统集成。

The mixed solution is the system integration of mature products.

充分利用 IGBT 制氢电源动态响应好的特点，跟随新能源电网的波动。

Make full use of IGBT hydrogen power supply with good dynamic response to follow the fluctuations of new energy grid.

晶闸管制氢电源长期工作在满功率状态且波动小，效率高，网侧谐波小。

Thyristor power supply for hydrogen production works at full power for a long time with small fluctuation, high efficiency and low harmonic at grid side.

制氢电源

Power Supply For Hydrogen Production



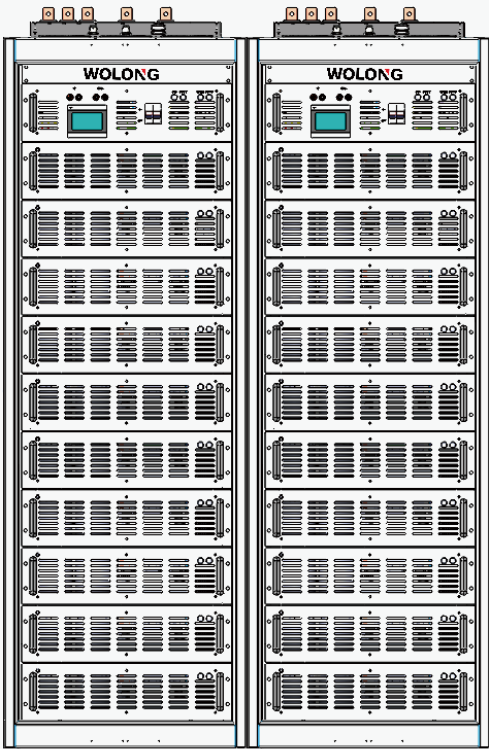
IGBT 制氢电源

IGBT Power Supply For Hydrogen Production

特点 Features	
采用 IGBT，使用 PWM 整流和多重化 DC-DC 等技术。具备无功补偿功能。	Adopt IGBT, PWM rectification and multiple DC-DC technologies. It has the function of reactive compensation.
具备以太网、CAN、RS485、模拟量、数字量接口。	Equipped with Ethernet, CAN, RS485, analog, digital volume interface.
具备设备健康管理系统。	A health management system with equipment.
采用水冷设计，高 IP 等级，可靠性高。	Adopt water-cooled design, with high IP level and high reliability.
模块化设计、可并联扩展功率。	Modular design, parallel expansion power.
高功率因数（0.99），电网侧的低谐波（<3%），快速动态响应（< 60ms）。	High power factor (0.99) , low harmonic on the grid side (< 3%) , fast dynamic response (< 60ms) .
较小输出电压和电流纹波（≤ 0.5%）。电解槽运行效率高。	Small output voltage and current ripple (≤ 0.5%) .The electrolyzers operation efficiency is high.
网侧变压器不需要移相，不需要有载调压开关。	The grid side transformer does not need phase shift and on-load voltage regulating switch.
选项 Options	
可选电源范围：1250-11400kW	Optional power range:1250-11400kW
额定输入电压 / 频率：35kV/10kV；50Hz/60Hz（可配置）	Rated input voltage/frequency:35kV/10kV;50Hz/60Hz (Configurable)
额定输出电压：0V-820V（可设置）	Rated output voltage: 0V-820V (Settable)
额定直流电流：0-20000A	Rated DC current: 0-20000A



型号 Model	WDHI1250~11400
交流输入 AC input	
输入电压范围 Input voltage range	306~583V
电网频率 Grid frequency	50 /60Hz
总电流畸变率 Total current distortion rate	<3%（最大功率下）(At maximum power)
功率因数 Power factor	>0.99
直流输出 DC output	
最大输出功率 Maximum output power	1250~11400kW
最大输出电压 Maximum output voltage	820V
最大输出电流 Maximum output current	2200A~20000A
工作电压范围 Operating voltage range	0~820V
输出电流精度 Output current accuracy	≤ 0.5%（最大输出电流）(Maximum output current)
输出电流纹波 Output Current Ripple	≤ 0.5%
动态响应时间 Dynamic response time	<60ms
输出控制方式 Output control mode	电压控制 / 电流控制 / 功率控制 Voltage /current /power control
保护 Protect	
无功补偿功能 Reactive compensation function	具备 possess
交流相序自动识别 identify AC phase sequence	具备 possess
联动故障保护 Linkage fault protection	具备 possess
交流绝缘检测 AC insulation test	具备 possess
通用参数 General parameters	
通讯接口 Communication interface	CAN,RS85,Ethernet
冷却方式 Cooling Method	水冷 water cooling
防护等级 Protection grade	IP54
工作温度范围 Operating temperature range	-30°C ~+60°C



高频隔离 IGBT 制氢电源

High-frequency Isolated IGBT Power Supply For Hydrogen Production

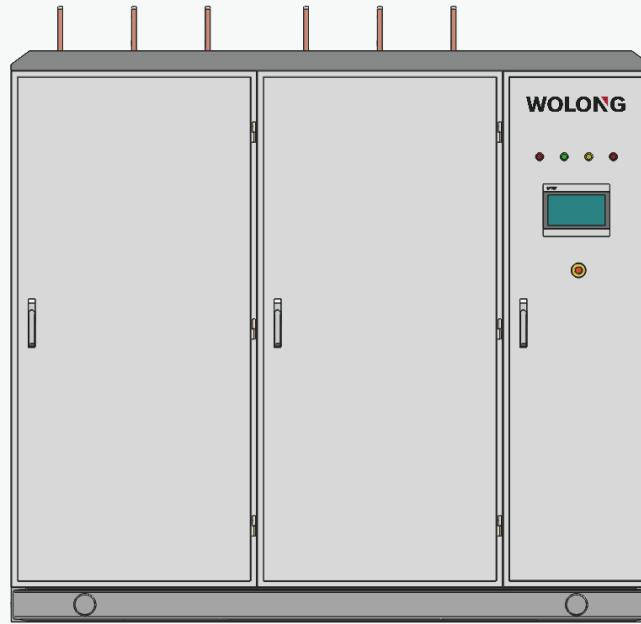
特点 Features

标准模块化设计，便于生产和维护。	Standard modular design is convenient for production and maintenance.
内置高频隔离，可直接接入配电网，体积小，功率密度高。	Built in high-frequency isolation, it can be directly connected to the grid, with small size and high power density.
电压适应范围广，适用多种电压等级。	Wide voltage adaptation range, applicable to various voltage levels.

选项 Options

可选电源范围：60-1200kW	Optional power range: 60-1200kW
额定输入电压 / 频率：380V/220V； 50Hz/60Hz（可设置）	Rated input voltage/frequency: 380V/220V; 50Hz/60Hz (Settable)
额定输出电压：0V-300V（可设置）	Rated output voltage: 0V-300V (Settable)
额定直流电流：0-5000A	Rated DC current: 0-5000A

型号 Model	WDHI60~600
交流输入 AC input	
输入电压范围 Input voltage range	198~418V
电网频率 Grid frequency	50/60Hz
总电流畸变率 Total current distortion rate	<3% (最大功率下) (At maximum power)
功率因数 Power factor	>0.99
直流输出 DC output	
最大输出功率 Maximum output power	600kW( 可并联扩展至 1200kW) (Parallel power extension to 1200kW)
最大输出电压 Maximum output voltage	300V
最大输出电流 Maximum output current	5000A( 可并联扩展至 10000A) (Parallel power extension to 10000A)
工作电压范围 Operating voltage range	0~300V
输出电流精度 Output current accuracy	≤ 0.5% (最大输出电流) (Maximum output current)
输出电流纹波 Output Current Ripple	≤ 0.5%
动态响应时间 Dynamic response time	<20ms
输出控制方式 Output control mode	电压控制 / 电流控制 / 功率控制 Voltage /current /power control
保护 Protect	
无功补偿功能 Reactive compensation function	具备 possess
交流相序自动识别 identify AC phase sequence	具备 possess
联动故障保护 Linkage fault protection	具备 possess
交流绝缘检测 AC insulation test	具备 possess
通用参数 General parameters	
通讯接口 Communication interface	CAN,RS85,Ethernet
冷却方式 Cooling Method	风冷 Wind cooling
防护等级 Protection grade	IP21
工作温度范围 Operating temperature range	-30°C ~+60°C (>45°C 降额) (>45°C Derating)



## 晶闸管制氢电源 Thyristor Power Supply For Hydrogen Production

### 特点 Features

水冷设计，高 IP 等级，可靠性高，效率高。	Water cooling design, high IP level, high reliability and efficiency.
元件压装采用均衡固定受力的典型设计，双重绝缘。	The component press mounting adopts the typical design of balanced fixed stress, double insulation.
关键结构部件采用低磁导率材料，有效防止涡电流引起的柜体局部过热。	Key structural components are made of low permeability materials to effectively prevent local overheating of the cabinet caused by eddy current.
完备的保护措施，实时监测柜内空气温度、湿度、水温、水压、水流量、水泄漏、元件温度等。	Complete protection measures, real-time monitoring of air temperature, humidity, water temperature, water pressure, water flow, water leakage, element temperature, etc. in the cabinet.
可通过 12 脉波 -96 脉波实现多脉波整流，降低谐波。	Multi-pulse rectification can be realized through 12-96 pulse wave to reduce harmonics.
占地面积小，设备投资低。	Small size and low equipment investment.

### 选项 Options

可选电源范围：1250-11400kW	Optional power range: 1250-11400kW
额定输入电压 / 频率：35kV/10kV；50Hz/60Hz（可配置）	Rated input voltage/frequency: 35kV/10kV; 50Hz/60Hz (Configurable)
额定输出电压：0V-820V（可设置）	Rated output voltage: 0V-820V (Settable)
额定直流电流：0-20000A	Rated DC current: 0-20000A

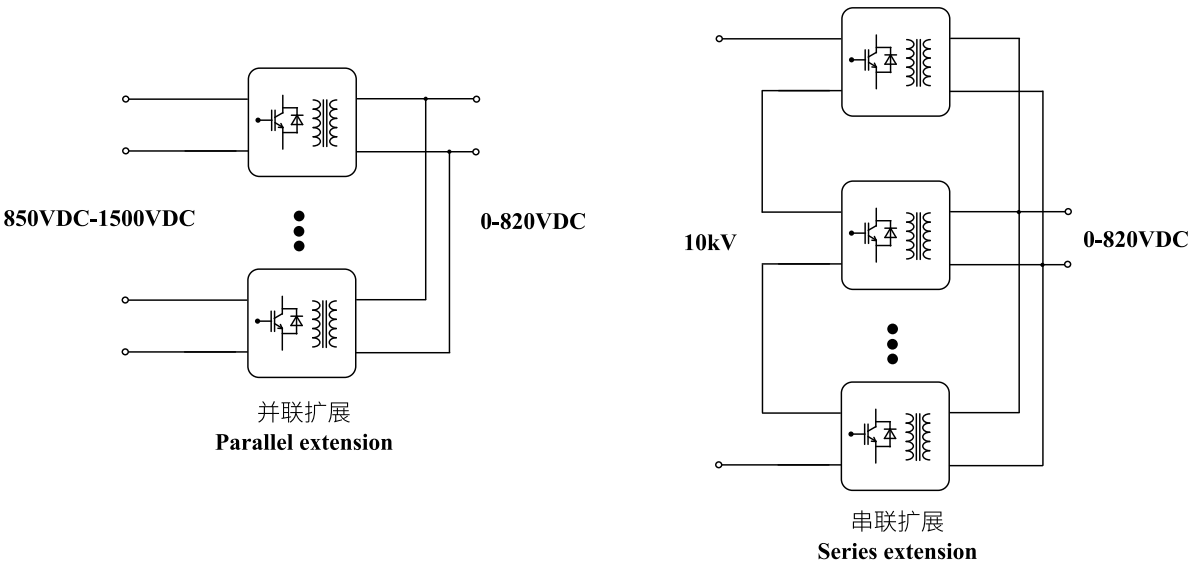
型号 Model	WDHS1250~11400
交流输入 AC input	
电网频率 Grid frequency	50/60Hz
总电流畸变率 Total current distortion rate	<5% (最大功率下) (At maximum power)
功率因数 Power factor	≥ 0.9
直流输出 DC output	
最大输出电压 Maximum output voltage	820V
最大输出电流 Maximum output current	20000A
工作电压范围 Operating voltage range	0~820V
输出电流精度 Output current accuracy	≤ 0.50% (最大输出电流) (Maximum output current)
输出电流纹波 Output Current Ripple	≤ 5%
输出控制方式 Output control mode	电压控制 / 电流控制 / 功率控制 Voltage /current /power control
保护 Protect	
交流相序自动识别 identify AC phase sequence	具备 possess
联动故障保护 Linkage fault protection	具备 possess
通用参数 General parameters	
通讯接口 Communication interface	CAN,RS85,Ethernet
冷却方式 Cooling Method	水冷 Water cooling
防护等级 Protection grade	IP54
工作温度范围 Operating temperature range	-30°C ~+60°C

# DC-DC 制氢电源

## DC-DC Power Supply For Hydrogen Production

特点 Features	
可再生能源离网直接制氢，降低系统投资成本。	Direct hydrogen production from renewable energy off the grid to reduce the system investment cost.
采用 IGBT 全控型功率型器件和 PWM 控制技术。	Adopt IGBT full-control power type device and PWM control technology.
功率调节响应时间 < 60ms，快速匹配可再生能源波动性。	Power regulation response time < 60ms, fast matching renewable energy volatility.
MPPT 功能，快速高效跟踪光伏组件最大功率点。	MPPT function, fast and efficient tracking of maximum power point of PV module.
微秒级故障保护，高频隔离，保障设备和系统安全。	Microsecond level fault protection, high-frequency isolation, ensuring equipment and system safety.
调试运维更方便，具备设备健康管理系統。	More convenient for commissioning, operation and maintenance, and equipment health management system.
具备丰富的通讯接口，以太网、CAN、RS485、模拟量、数字量接口。	It has rich communication interfaces such as Ethernet, CAN, RS485, analog quantity and digital quantity interfaces.
模块化设计，可并联扩展功率，串联扩展电压和功率。	Modular design, parallel extension power, series extension voltage and power.
较小输出电压和电流纹波 (≤ 0.5%)，电解槽运行效率高。	Smaller output voltage and current ripple ( ≤ 0.5%), high operation efficiency of electrolytic cell.

选项 Options	
可选电源范围：750-11400kW	Optional power range: 750-11400kW
额定输入电压：DC1500V/DC10kV	Rated input voltage: DC1500V/DC10kV
额定输出电压：0V-820V（可设置）	Rated output voltage: 0V-820V (Settable)
额定直流电流：0-20000A	Rated DC current: 0-20000A

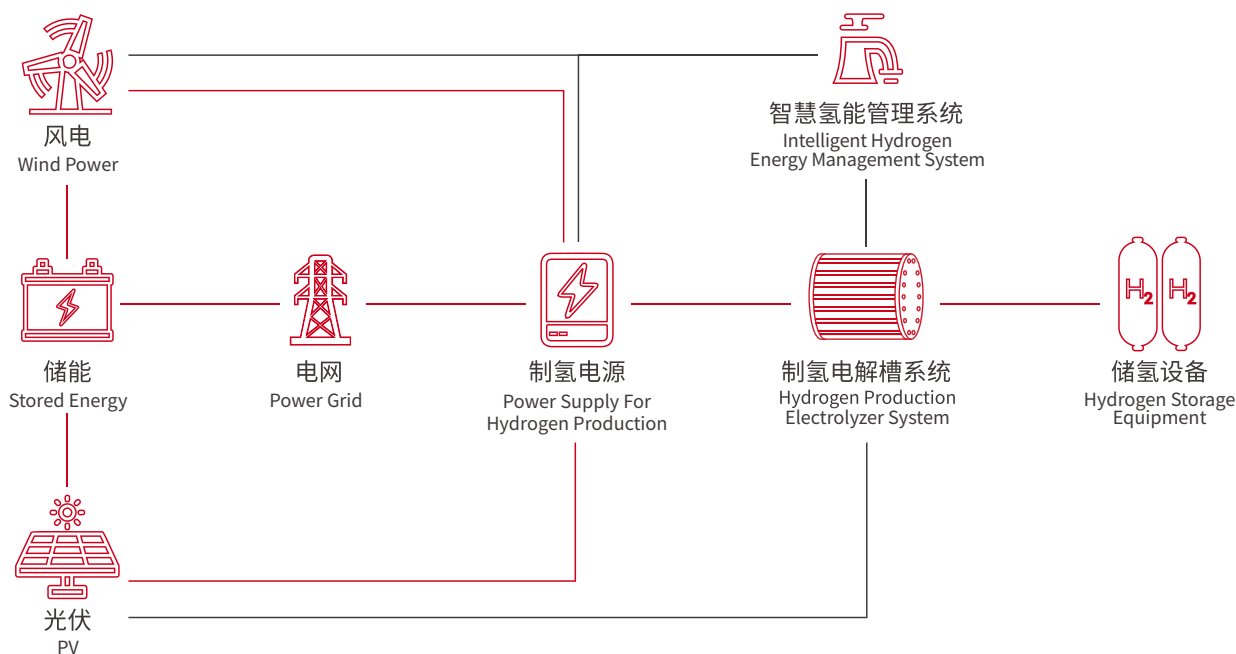




型号 Model	WDHD750~11400
交流输入 AC input	
输入电压范围 Input voltage range	850~1500V(1300V 满功率 MPPT)/10kV±10%
MPPT 数量 MPPT quantity	1 路
最大输入电流 Maximum input current	980A (750kW 单机)
直流输出 DC output	
最大输出功率 Maximum output power	750~11400kW
最大输出电压 Maximum output voltage	820V
最大输出电流 Maximum output current	20000A
工作电压范围 Operating voltage range	0~820V
输出电流精度 Output current accuracy	≤ 0.5% (最大输出电流) (Maximum output current)
输出电流纹波 Output Current Ripple	≤ 0.5%
动态响应时间 Dynamic response time	<60ms
输出控制方式 Output control mode	电压控制 / 电流控制 / 功率控制 Voltage /current /power control
保护 Protect	
联动故障保护 Linkage fault protection	具备 possess
输入输出绝缘检测 Input/output insulation detection	具备 possess
通用参数 General parameters	
通讯接口 Communication interface	CAN,RS85,Ethernet
冷却方式 Cooling Method	水冷 Water cooling
防护等级 Protection grade	IP54
工作温度范围 Operating temperature range	-30°C ~+60°C

## 智慧氢能管理系统

## Intelligent Hydrogen Energy Management System



## 产品介绍 Product Introduction

实现制氢系统多种能量来源之间的协调控制，比如风电，光伏以及电网之间的协调。

The coordination and control among various energy sources of the practical hydrogen production system, such as wind power, photovoltaic and grid coordination.

实现多台制氢电源之间的协调控制，保障制氢系统高效，安全运行。

Realize the coordinated control of multiple hydrogen generation power supplies to ensure the efficient and safe operation of the hydrogen generation system.

具备运行监测功能，可以实时监测制氢系统的运行数据。

With operation monitoring function, it can monitor the operation data of hydrogen production system in real time.

具备分析诊断功能，通过对制氢系统的运行数据进行分析，提供诊断报告。

It has the analysis and diagnosis function, and provides the diagnosis report by analyzing the operation data of the hydrogen generation system.

具备运营管理功能，挖掘能量调度潜能，降低用能成本，创造利润增长，提升企业竞争力。

It has the operation management function to tap the potential of energy dispatching, reduce the cost of energy use, create profit growth, and improve the competitiveness of enterprises.

## 能量管理 Energy Management

智慧氢能管理系统根据设置的电能调度策略，实现整个制氢系统的协调控制。可跟随电网波动，100% 绿电制氢。  
The intelligent hydrogen energy management system realizes the coordinated control of the entire hydrogen generation system according to the set electric energy scheduling strategy. It can follow the fluctuation of the power grid and produce hydrogen from 100% green electricity.

## 安全管理 Security Management

智慧氢能管理系统具备多级安全机制，对告警事件统一通知提醒和消缺管理，缩短响应时间，提高运维效率。  
The intelligent hydrogen energy management system has multi-level security mechanism, unified notification and defect elimination management for alarm events, shorten response time and improve operation and maintenance efficiency.

## 运行管理 Operation Management

根据新能源的发电功率、电解槽的工作曲线和氢气压力，自动优化制氢系统至最佳运行状态。  
According to the generation power of the new energy , the working curve of the electrolyzer and the hydrogen pressure, the hydrogen production system is automatically optimized to the optimal operation state.

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减少设备启停次数，降低系统能耗，实现高效制氢。  
Reduce the number of equipment startup and shutdown, reduce system energy consumption, and achieve efficient hydrogen production.

## 数据中心 Data Center

全面数据采集、检测和分析。  
Comprehensive data collection, detection and analysis.

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实时、全面地掌握用能情况，辅助制氢系统精准决策和控制。  
Grasp the energy consumption situation in real time and comprehensively, and assist the accurate decision-making and control of the hydrogen production system.

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通过计算和分析产氢效率，建立高效制氢策略。  
Establish efficient hydrogen production strategy by calculating and analyzing hydrogen production efficiency.

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## 氢压机系统解决方案

## Hydrogen Compressor System Solution

氢气压缩机是加氢站的三大核心部件之一，相较于活塞式压缩，隔膜压缩机具备压缩过程中不受污染、压缩过程无泄漏、压缩比大、排气压力高等特点，因此，常用的氢气压缩设备为隔膜式压缩机。

当前氢气压缩机国产化比例正在逐步提高，卧龙集团与国内多家压缩机厂家达成合作，提供氢气压缩机所用的电机、变频等驱控产品，也可以提供全套氢气压缩机系统。

The hydrogen compressor is one of the three core components of the hydrogen refueling station. Compared with piston compression, the diaphragm compressor has the characteristics of no pollution in the compression process, no leakage in the compression process, high compression ratio and high exhaust pressure. Therefore, the commonly used hydrogen compression equipment is the diaphragm compressor.

At present, the localization proportion of hydrogen compressor is gradually increasing. Wolong Group has reached cooperation with several domestic compressor manufacturers to provide drive and control products such as motors and inverter for hydrogen compressor, and also can provide a complete set of gas compressor systems.



配电柜  
Power Distribution Cabinet



变频器  
Inverter



电机  
Motor



氢压机  
Hydrogen Compressor

## 项目案例 Project Case

- 中国石化集团新星石油有限责任公司绿电 IGBT 制氢电源 “揭榜挂帅” 项目  
Green Power IGBT Power Supply For Hydrogen Production Project of SINOPEC STAR Petroleum Co., Ltd.



### 项目配置 Project Configuration

4 台 6MW-IGBT 制氢电源  
Four 6MW-IGBT hydrogen  
generation power supplies

2 台 12MVA 变压器  
Two 12MVA transformers

- 中国石化集团新星石油有限责任公司新疆库车绿氢示范项目  
Xinjiang Kuqa Green Hydrogen Demonstration Project Of SINOPEC STAR Petroleum Co., Ltd.



### 项目配置 Project Configuration

26 台 12500kVA 移相整流变压器  
26 phase shifted rectifier  
transformers of 12500kVA



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