Flexible Green Hydrogen Production System Solutions

Sungrow Hydrogen provides“efficient, intelligent, safe”flexible green hydrogen production system solutions, which include ALK electrolyzer, PEM electrolyzer, PWM hydrogen production power supply, gas-liquid separation equipment, hydrogen purification equipment and intelligent hydrogen management system. They perfectly match the rapid and volatile nature of renewable energy, and are suitable for electric power, industry, transportation and other fields.

Safe & Reliable

Reliability Design

Status Analysis

Multi-layer Security Prevention

Flexible & Efficient

Rapid Response

Wide-Range Operatihgm

High Efficiency

Smart & Friendly

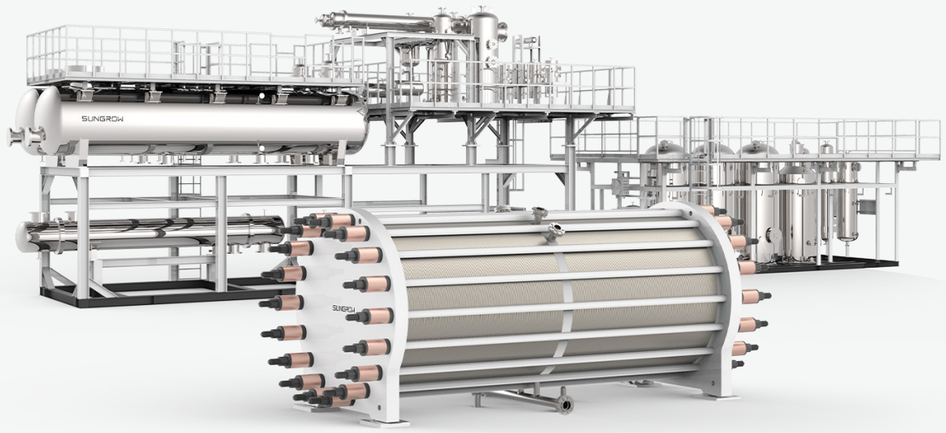
Intelligent Start/Stop

Grid-Friendly

User-Friendly

ALK Water Electrolysis Equipment

Alkaline solution is electrolyzed into hydrogen and oxygen with direct current. High-purity hydrogen is obtained through gas-liquid separation and purification equitment. It consists of ALK electrolyzer(s), gas-liquid separation and hydrogen purification equipment.



Flexible

25%-110% operating range

5%/s ramp up/down

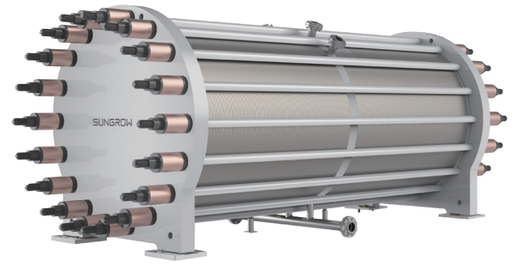
Efficient

Adopts high performance electrode, late-model structure and optimized fluid channel design, DC power consumption can be lower than 4.5kWh/Nm³ H_2

Reliable

Stack management system integrated

Repeated on/off cycles and continuous accelerated aging tests, longer lifespan



ALK Electrolyzer

Product parameters

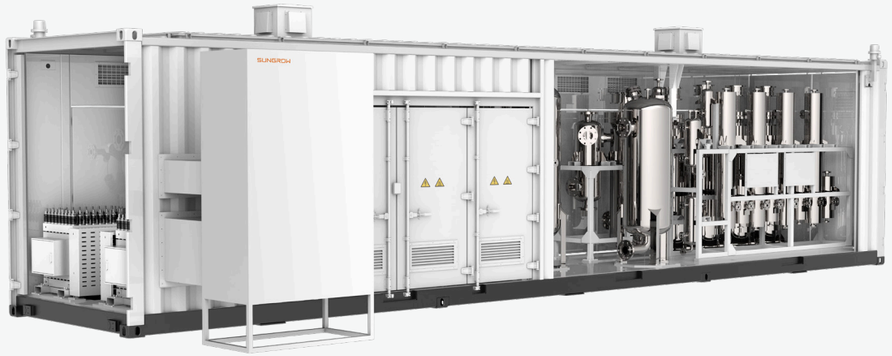
H_2 nominal flow rate	1000Nm³/h	500Nm³/h
H_2 delivery pressure	16barg	16barg
H_2 purity	99.8%(@outlet separation)	99.8%(@outlet separation)
	99.999%(@oulet purification)	99.999%(@oulet purification)
H_2 outlet temperature	≤45℃	≤45℃
H_2 dew point	-70℃	-70℃
O_2 nominal flow rate	500Nm³/h	250Nm³/h
Stack DC consumption, BOL	4.50kWh/Nm³@nominal load	4.50kWh/Nm³@nominal load
System AC consumption[1], BOL	4.60kWh/Nm³@nominal load	4.65kWh/Nm3@nominal load
Operating range[2]	25%-110%	25%-110%
Ramp up/down	5%/s	5%/s
Electrolyte	30% KOH	30% KOH
Demineralized water consumption	0.90L/Nm³ H_2	0.90L/Nm³ H_2
Demineralized water quality	Conductivity < 5μs/cm Chloridion < 0.5mg/L	Conductivity < 5μs/cm Chloridion < 0.5mg/L
Cooling water requirement	140m³/h	90m³/h
Ambient operating temperature	5-45℃	5-45℃
Dimensions (W×D×H)	Separiton:5400×3200×5850mm	Separiton:4500×3000×5350mm
	Purification:5200×2760×3630mm	Purification:4300×2700×3580mm
Compliance	CE-PED/ATEX/MD/LVD/EMC, ISO22734	CE-PED/ATEX/MD/LVD/EMC, ISO22734

[1]PWM hydrogen production power supply, gas-liquid separation and hydrogen purification equipment included

[2]Based on the nominal hydrogen production rate

PEM Water Electrolysis Equipment

Pure water is electrolyzed into hydrogen and oxygen with direct current. High-purity hydrogen is obtained through gas-liquid separation and purification equitment. It consists of PEM electrolyzer(s), gas-liquid separation and hydrogen purification equipment.



Flexible

5%-110% operating range

10%/s ramp up/down

Efficient

Adopts high performance electrode, late-model structure and optimized fluid channel design, DC power consumption can be lower than 4.3kWh/Nm³ H_2

Reliable

Stack management system integrated

Repeated on/off cycles and continuous accelerated aging tests, longer lifespan

PEM Electrolyzer

Product parameters

H_2 nominal flow rate	500 Nm³/h	200Nm³/h
H_2 delivery pressure	30barg	30barg
H_2 purity	99.9%(@outlet separation)	99.9%(@outlet separation)
	99.999%(@oulet purification)	99.999%(@oulet purification)
H_2 outlet temperature	≤45℃	≤45℃
H_2 dew point	-70℃	-70℃
O_2 nominal flow rate	250Nm³/h	100Nm³/h
Stack DC consumption, BOL	4.30kWh/Nm³@nominal load	4.30kWh/Nm³@nominal load
System AC consumption[1], BOL	4.50kWh/Nm³@nominal load	4.50kWh/Nm³@nominal load
Operating range[2]	5%-110%	5%-110%
Ramp up/down	10%/s	10%/s
Electrolyte	PEM	PEM
Demineralized water consumption	0.90L/Nm³ H_2	0.90L/Nm³ H_2
Demineralized water quality	Conductivity＜1μs/cm Chloridion＜0.1mg/L Soluble silicon＜0.02mg/L	Conductivity＜1μs/cm Chloridion＜0.1mg/L Soluble silicon＜0.02mg/L
Cooling water requirement	90m³/h	35m³/h
Ambient operating temperature	5-45℃	5-45℃
Dimensions (W×D×H)	12192×2438×5792mm	12192×2438×2896mm
Compliance	CE-PED/ATEX/MD/LVD/EMC, ISO22734	CE-PED/ATEX/MD/LVD/EMC, ISO22734

[1]PWM hydrogen production power supply, gas-liquid separation and hydrogen purification equipment included

[2]Based on the nominal hydrogen production rate

PWM Hydrogen Production Power Supply

AC/DC rectifier

IGBT rectifier power supply utilizes PWM fully controlled type power device and PWM control technology to convert power from AC to DC for the electrolyzer, which is suitable for the scenario of large-scale grid coupling hydrogen production.

Flexible

THDi < 3%, PF>0.99, Q>40%, more friendy to grid

Dynamic response time < 100ms, more friendy to RE

Efficient

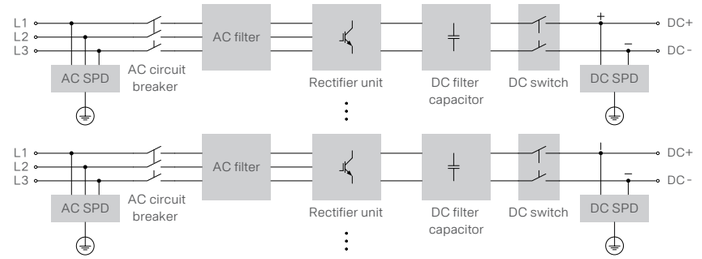
Conversion efficiency > 97.5%

Reliable

Intelligent air/liquid cooling, IP65

Modular design

Topological Block Diagram



Product parameters

Product model	SHR5700	SHR5540
Input （AC）		
Rated grid voltage	530V	500V
Grid voltage range	477~583V	450~550V
Maximum input current	4*1765A	2*3640A
Rated grid frequency	50Hz	
Grid frequency range	45 Hz ~55Hz	
Total current distortion rate	<3%（at maximum power）	
Power factor	>0.99	
Output （DC）		
Maximum output power	5700kW	5540kW
Maximum output voltage	820V	780V
Maximum output current	4*2200A	2*6000A
Operating voltage range	0~820V	0~780V
Output current accuracy	≤0.50% maximum output current	
Dynamic response time	<0.1s	
Output control mode	Voltage control, current control, power control	
Protection		
Fault interlock protection	Yes	
AC insulation test	Yes	
Other functions		
Reactive power compensation function	Yes	
Automatic recognition of AC phase sequence	Yes	
General parameters		
Protection grade	IP65	IP54
Cooling	Temperature controlled forced air cooling	Liquid cooling
Operating temperature range	-30℃~+60℃（>45℃ derating）	-30℃~+45℃
Compliance	IEC 62477-1:2012+A1:2016/EN, IEC 61000-6-2:2019/EN, IEC 61000-6-4:2019, IEC 61000-6-2:2018, IEC 61000-6-4:2018	

PWM Hydrogen Production Power Supply

DC/DC converter

IGBT DC conversion power supply utilizes PWM fully controlled type power device and PWM control technology to convert the unstable wind and PV energy to DC required by the electrolyzer, which is suitable for wind and PV off-grid direct hydrogen production scenario.

Flexible

Dynamic response time < 100ms, more friendly to RE

Efficient

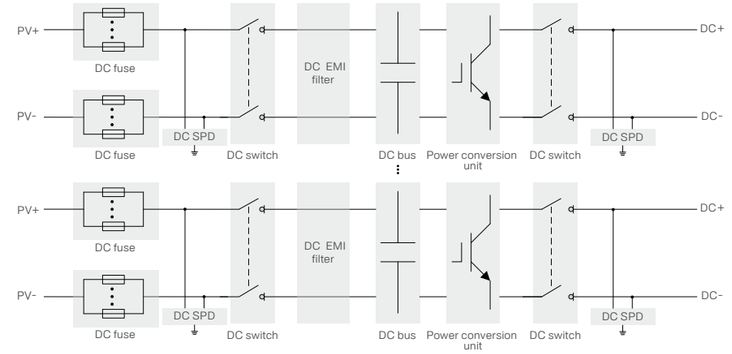
Patent topology & MPPT function

Reliable

Intelligent air/liquid cooling, IP65

Modular design

Topological Block Diagram



Product parameters

Product model	SHD1755	SHD5265
Input（DC）		
Maximum input voltage	1500V	1500V
Minimum input voltage	850V	850V
Full load MPPT voltage range	850~1300V	850~1300V
MPPT number	1	3
Maximum input current	2117A	3*2117A
Output（DC）		
Maximum output power	1755kW	5265kW
Maximum output voltage	820V	820V
Maximum output current	2700A	3×2700A
Operating voltage range	0~820V	0~820V
Output current accuracy	≤0.50% maximum output current	
Dynamic response time	<0.1s	
Output control mode	Voltage control, current control, power control	
Protection		
Fault interlock protection	Yes	
Input/output overcurrent protection	Yes	
General parameters		
Protection grade	IP20	
Cooling	Liquid cooling	
Operating temperature range	-30℃~+45℃	
Compliance	IEC 62477-1:2012+A1:2016/EN, IEC 61000-6-2:2019/EN, IEC 61000-6-4:2019, IEC 61000-6-2:2018, IEC 61000-6-4:2018	

Intelligent Hydrogen Management System —— HyBrain

The intelligent hydrogen management system is the “brain” of the flexible green hydrogen production platform which consists of multiple hydrogen production systems to achieve the coordination of hydrogen production from multiple power sources. Based on four key functions of monitoring, diagnosis, coordination and operation, the intelligent hydrogen management system achieves efficiency, intelligence and safety through three cores of System Integration, Energy Management and Cluster Control.

System Integration

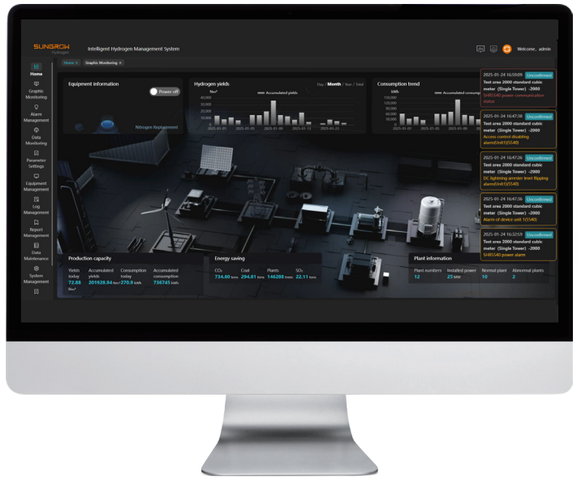
Integrated system management, achieving inter-system linkage
Increases operation efficiency and safety

Energy Management

Achieves the ENERGY & YIELD DISPATCH of wind, PV, ESS and grid according to PV/wind input, on/off grid and hydrogen consumption demand

Cluster Control

Reduces startup time and improves energy efficiency and operational lifespan of hydrogen production stations through online model analysis, intelligent switching, and power allocation strategies



DESIGN AWARD 2023

Product parameters

Product model	HMS1000
System	
Configuration	Server, Controller, Switch, Firewall
Ports	
RS485 interface	6
Ports	16/4
Fiber port	4×1000 Mbps
Ethernet port	16×10/100 Mbps
AI	4
CAN	1
Power supply	
Power supply	100 - 240Vac, 50/60 Hz, 3200W
Ambient parameters	
Operating temperature	10℃-35℃
Operating humidity	10% RH~80% RH
Elevation	≤3000m
Protection class	IP20
Communication	
Communication medium	Optical fiber, Ethernet
Networking method	Bus / Star / Ring Network
Communication protocol	Modbus RTU, Modbus TCP, CAN2.0, IEC60870-5-104, DLT645
Compliance	
Compliance	CE
Cabinet	
Dimensions (W×H×D)	800×2200×1000mm
Operating humidity	10% RH~80% RH