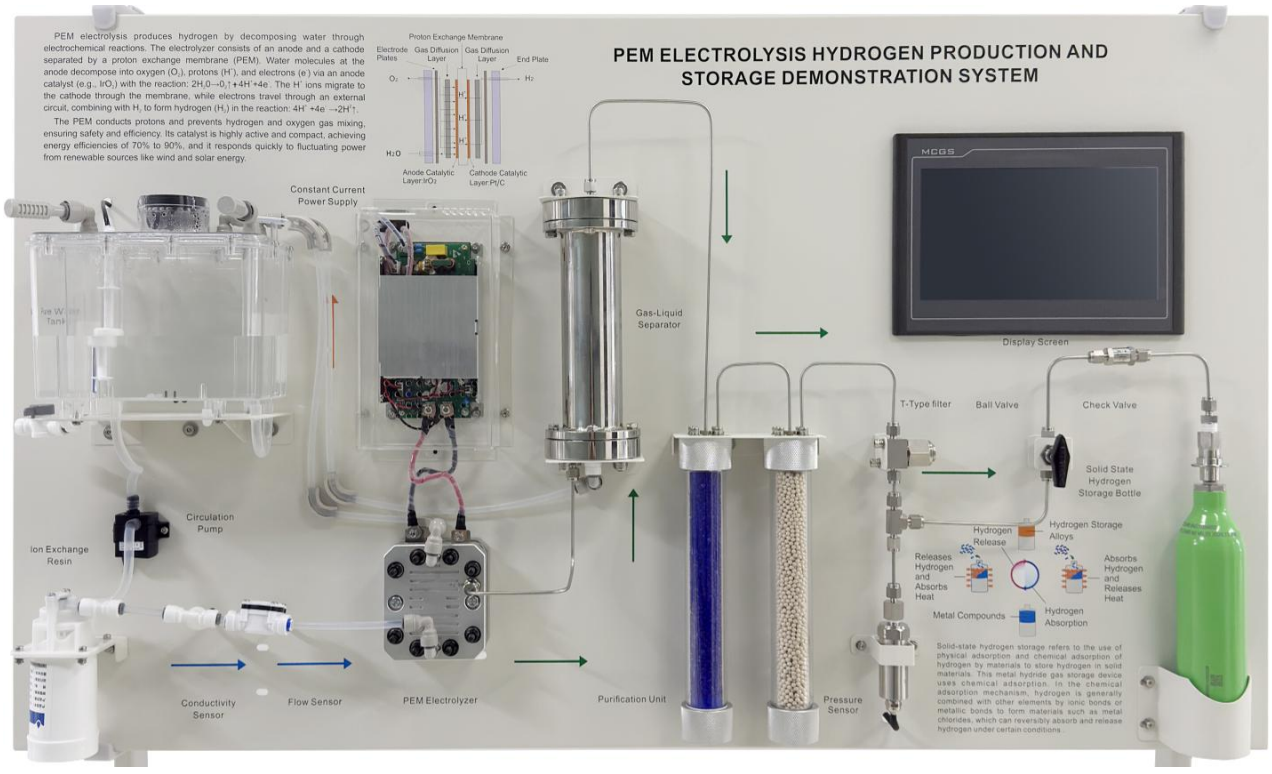
PEM Electrolysis Hydrogen Production and Storage Demonstration System

1. PRODUCT OVERVIEW

This system is an integrated teaching demonstration device for hydrogen production and storage using PEM (proton exchange membrane) water electrolysis, designed for schools and scientific research institutions. It integrates the entire process of hydrogen production, purification, and storage, and intuitively demonstrates the core technology of converting renewable energy into green hydrogen. The system is based on the principle of PEM water electrolysis technology, uses pure water electrolysis, has no risk of alkaline liquid pollution, is safe and reliable, and is suitable for laboratory environments. Through modular panel design, visual operation interface, and real-time data monitoring, it helps students deeply understand the process of hydrogen energy preparation and storage, and helps the teaching and scientific research of new energy, chemistry, engineering and other disciplines.



2. DESCRIPTION OF MAIN COMPONENTS

2.1 Pure water circulation unit

Pure water tank: stores deionized water to ensure the purity of electrolysis raw materials.

Water pump: provides sufficient raw water to the electrolytic cell and takes away the heat of electrolysis reaction.

Resin filter: absorbs metal ions and impurities in water.

Conductivity sensor + flow sensor: real-time monitoring of water purity and flow, data synchronization to the MCGS touch screen.

2.2 PEM electrolyzer and power supply

PEM electrolyzer: uses proton exchange membrane technology to directly separate hydrogen and oxygen by electrolysis of pure water, without alkaline mist pollution, and the hydrogen flow rate is >500ml.

Constant current switching power supply: AC input voltage 110V/220V adjustable, DC output 12V×25A.

2.3 Gas-liquid separation and purification unit

Gas-water separator: Separates hydrogen generated by electrolysis from liquid water, circulates the water back to the water tank, and the hydrogen enters the purification process.

Hydrogen purifier:

The first column (color-changing silica gel): absorbs residual moisture in hydrogen, and the silica gel changes color to intuitively display the adsorption status.

The second column (molecular sieve): deeply removes moisture and other trace impurities to ensure that the purity of hydrogen at least meets the standards for use in fuel cells.

T-type filter: filter particulate matter, intercept dust and other solid particles.

Pressure sensor: monitors gas pressure in real time to ensure system safety.

2.4 Hydrogen storage and safety control

Metal hydride tank: low-pressure safe hydrogen storage, with ball valve and one-way valve to prevent gas backflow, hydrogen storage pressure <1.6Mpa, hydrogen storage capacity >20g, supports hydrogen collection and subsequent experimental applications (such as fuel cell power generation demonstration).

2.5. Intelligent control and monitoring unit

Siemens S7-200 SMART PLC: realizes automatic control of system start and stop, fault alarm, etc.

MCGS touch screen: real-time display of conductivity, flow, pressure and other data, support for experimental data export and analysis.

Board integration design: All components are integrated into the anti-corrosion board, with process arrows and text descriptions marked to clearly display the entire chain of hydrogen production → purification → storage.

3. TECHNICAL SPECIFICATIONS

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Category	Parameter Name	Unit	Parameter
Pem Electrolyzer Stack	Hydrogen Flow	ml/min	500
	Oxygen Flow	ml/min	250
	Supply Voltage	V	9
	Supply Current	A	25
	Dimension	mm	109×58×106
Metal Hydride Hydrogen Storage Tank	Diameter	mm	60
	Height	Mm	258
	Weight	Kg	1.5
	Storage Capacity	g	>20
	Filling Pressure	Mpa	1.6