



**WINGGEN | 羿弓氢能**

## Hydraulic-Driven Diaphragm Compressors

Front runner in hydrogen compressors industry



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Shanghai Winggen Hydrogen Technology Co. Ltd.

# More Pressure makes a More Powerful World



## About Winggen

Shanghai Winggen Hydrogen Technology Co. Ltd. is a high-tech enterprise specializing in the research and development, design, production and sales of hydrogen compressors, the company's products can be used in hydrogen preparation, storage and transportation, refueling, recycling and so on. The company is an innovative front runner in the field of hydrogen compressors, having passed the ISO9001, ISO14001, ISO45001 system certification and the European Union CE certification.

The company is committed to independent research and development. The company has made a comprehensive breakthrough in the mastery of the core technology, created the world's first liquid-driven diaphragm hydrogen compressor, has provided the market with the compressor(45MPa,90MPa) for hydrogen refueling station, compressors(22MPa,32MPa) for filling gas tanks and other products. The company can provide a complete set of gas compression solutions, some of which have been widely used in hydrogen refueling stations, energy and chemical industry, green power hydrogen production, hydrogen filling, iron and steel industry and many other fields.

The company's products have the significant advantages of safety, reliability, flexibility, security and economy, and the performance of the products has reached the international advanced level as appraised by the industry experts. All core components are independently developed by the company, corresponding to 49 independent intellectual property rights. The compressor can replace the components to complete the upgrade, and the after-sales team 7X24 hours around the clock to ensure the safe and stable operation of the equipment.

| SCIENCE AND TECHNOLOGY INNOVATION MAKES GREEN FUTURE |



## Enterprise Team

### WuJian

Company founder, General manager

Professor level researcher, pioneer of "in-orbit fuel refueling" technology, one of the four key technologies of China's space station, inventor of "space compressor" for space station, drafter of GJB10111-2021 "Specification for Spacecraft Propellant Refueling Gas Compressor", owns more than 20 international and domestic leading scientific and technological achievements and patents.

He has been awarded more than ten national and provincial honors, including "Xianzi Zeng Manned Spaceflight Fund Award", "National Defense Science and Technology Progress Award", "Shanghai Outstanding Invention Award", "Top Ten Outstanding Youths of China Aerospace Science and Technology Corporation", etc.



The company's R&D team has an average of more than 10 years of experience in product development, a complete range of disciplines, solid theory, rich experience, most of them have a master's degree, graduated from Tsinghua University, Zhejiang University, Shanghai Jiaotong University and other first-class colleges and universities. There are technical experts from key scientific research institutes, as well as key personnel from leading enterprises in aerospace, nuclear industry, heavy machinery and other industries. The core technical team members have participated in the major projects of the National 12th Five-Year Plan and 13th Five-Year Plan, and have won a number of provincial and ministerial honors. They have the ability to integrate multi-disciplinary knowledge and are good at innovation.

# 03

## Core Technology



### Digital Twin Technology

Based on the large-capacity data acquisition of the industrial Internet and the 5G real-time transmission cloud platform application, predict and determine product status to provide more reliable O&M assurance.



### High Pressure Plunger Pump Technology

The product runs reliably for more than 5000h, filling the blank of domestic high-pressure piston pump field.



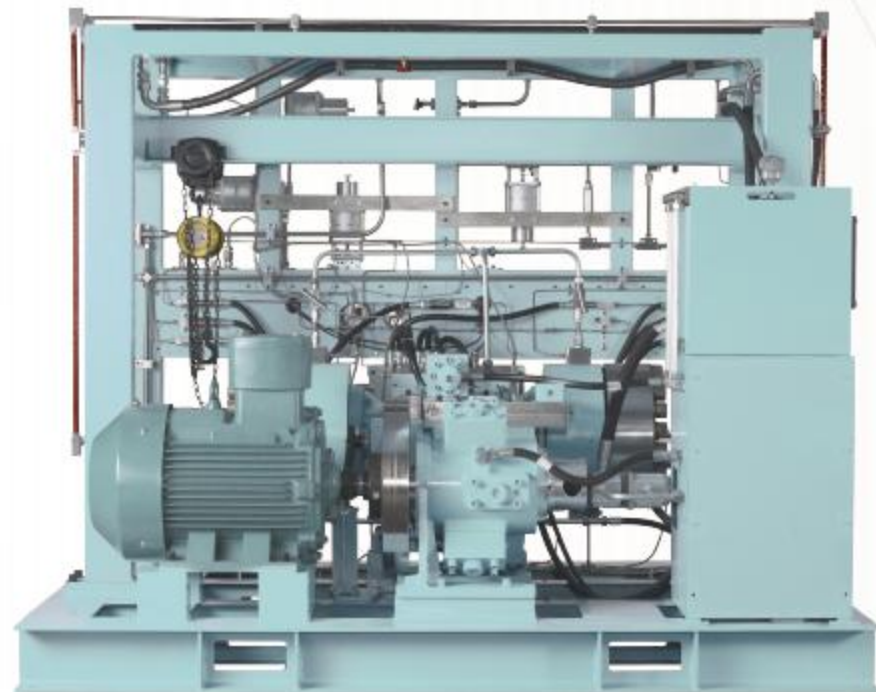
### High Reliability Hydrogen Valve Technology

Derived from long-life, high-reliability valve technology in the nuclear industry. Innovative design methods, proper material selection, advanced mechanical manufacturing process.



### Space Compressor Technology

15 years long service life, integrated cooling of the whole machine, 125 times larger compression ratio, ultimate compactness and lightweight.



# 04

## Qualification Honor

### Enterprise Certification

The company passed the high-tech enterprise certification



### Trade Appraisal

The products passed the appraisal of China Machinery Industry Association



### Intellectual Property

The company has 49 patents



# 05

## Production delivery capacity

The company has formed two series of hydrogen compressors for hydrogen refueling station and for filling gas tanks, with the production capacity of more than ten types of products. With 1500 square meters of processing workshop and 3500 square meters of assembly and testing workshop, the production and delivery capacity of the company can reach 200 units/year.



High precision production equipment



### Production management system

Standardized operation management, structured management of production data, site management based on MES system, material management based on ERP system.



### Delivery assurance system

Stable supply chain, complete spare parts system, first-class staff team, perfect after-sales service system.

# 06

## Intellectual Property



### ISO9001、ISO14001、ISO45001 system certification and EU CE certification

The company has always adhered to the "quality certification as an opportunity, the pursuit of excellence as a starting point", committed to building a comprehensive, reliable process quality management system, and systematically promote the implementation of quality certification in all aspects of research and development, manufacturing, to provide customers with zero-defect, highly reliable products.



### Perfect quality management system

It has a series of inspection equipments including hardness tester, ammonia leakage detector, image measuring instrument, round runout detector, which can meet the inspection and control requirements of incoming materials, process and finished products. It has perfect quality management process and standardized inspection documents, as well as a professional and efficient quality management team.

## Product Introduction

Shanghai Winggen Hydrogen Technology Co. Ltd. is committed to independent research and development. The company has made a comprehensive breakthrough in the mastery of the core technology , created the world's first liquid-driven diaphragm hydrogen compressor. During the compression process, it can effectively ensure the absolute cleanliness of the gas, and the single-stage compression can realize a compression ratio of more than 10, which can adapt to the harsh working conditions of "frequent start and stop, cold driving, and start and stop with load". It can be connected in series and parallel by driving and pressurizing unit to realize the demand of large filling flow; it can be pressurized by multi-stage to realize the demand of large pressure ratio; it is modularized, so the size is compact and the components are fewer; the core parts and components are all designed independently, which is controllable and convenient for maintenance. We have already provided the market with a full range of products such as 22MPa, 32MPa compressors for filling tanks, 45MPa, 90MPa compressors for hydrogen refueling stations, etc. Compared with similar products at home and abroad, they have unique advantages in terms of safety, reliability, flexibility and economy.



VS



Hydraulic-driven diaphragm compressor

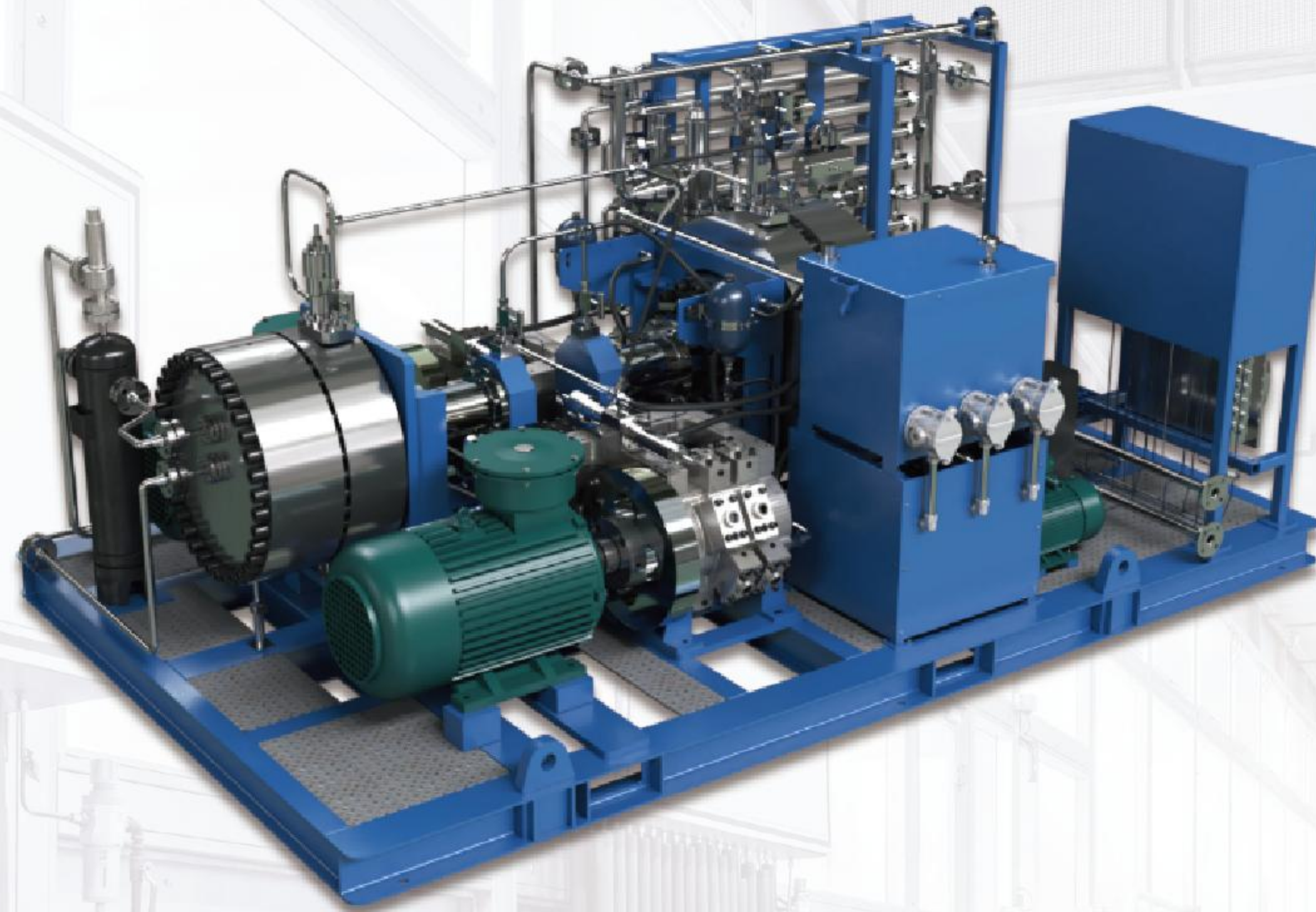


Conventional Diaphragm Compressor



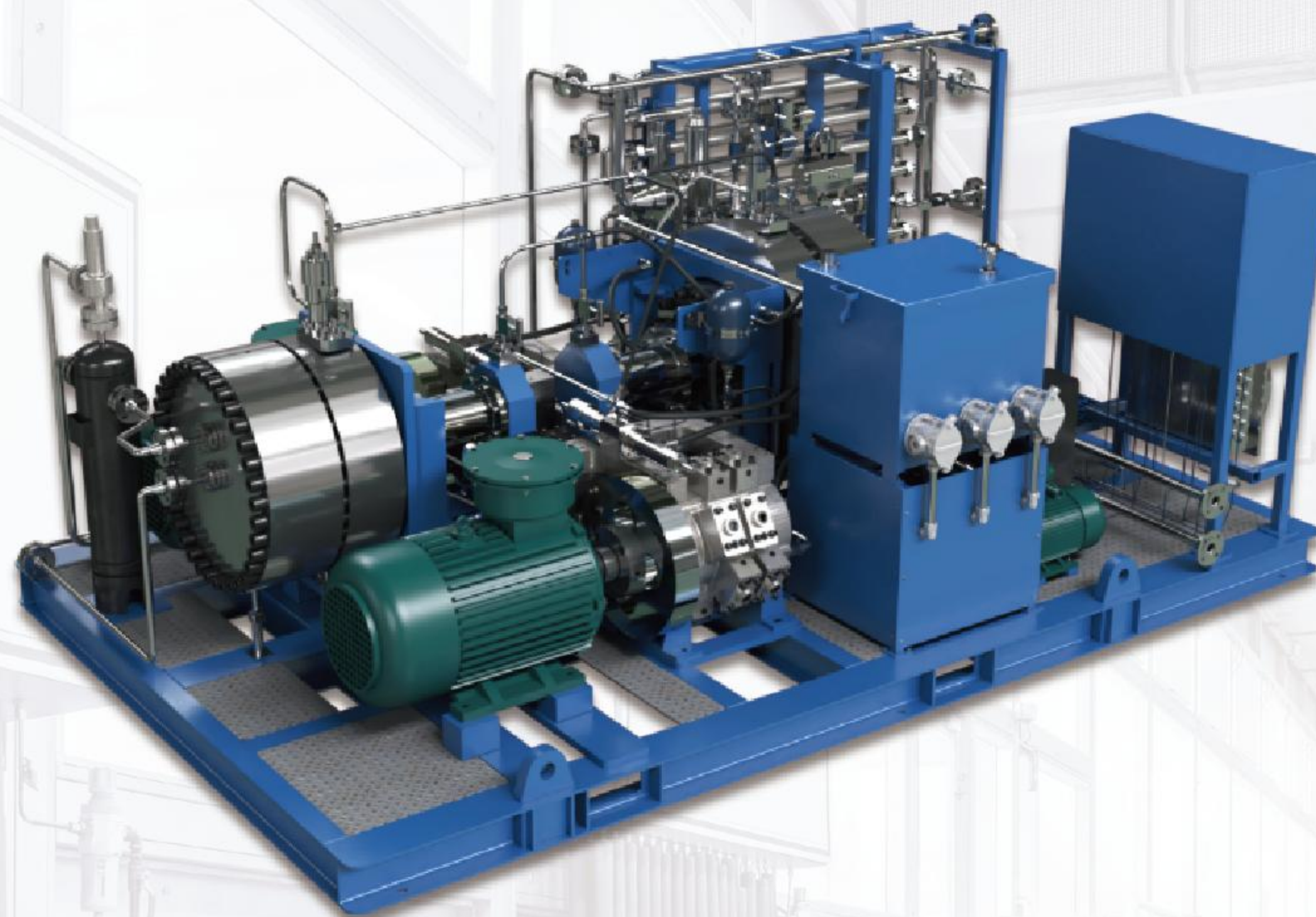
Hydraulic-driven piston compressor

Footprint	Small	Big	Larger
Driving Form	Simple, high transmission efficiency	Complexity	Complex, easy to wear
Structural Form	Module design and layout are flexible	Complexity	Module design
Sealing Performance	Good	Good	Poor
Gas purity	High cleanliness	High cleanliness	Low cleanliness
Compression Ratio	Big	Big	Small
Maintenance	Good	Poor	Preferably
Cooling System Performance	Good	Good	Poor
Load start and stop	Adapt to	Inadaptation	Adapt to
Foundation requirement	There is no	There are	There are
Maintenance cost	Low	High	Higher



## 22MPa Filling compressor

	WDCT2220-235	WDCT2220-500	WDCT2220-800	WDCT2220-1000
Inlet Pressure	1.0MPa-3.0MPa	1.0MPa-3.0MPa	1.5MPa-2.3MPa	1.0MPa-3.0MPa
Inlet Temperature	≤40°C	≤40°C	≤40°C	≤40°C
Discharge Pressure	22MPa	22MPa	22MPa	22MPa
Discharge Temperature	≤45°C	≤45°C	≤45°C	≤45°C
Flow Capacity	235Nm <sup>3</sup> /h	500Nm <sup>3</sup> /h	800Nm <sup>3</sup> /h	1000Nm <sup>3</sup> /h
Motor Power	55KW	110kW	132kW	180kW
Overall Dimension	3.2m×2.3m×3.0m	3.6m×2.4m×3.2m	3.6m×2.4m×3.2m	4.4m×2.8m×3.1m
Weight	≤8500kg	≤11000kg	≤11000kg	≤18000kg
Explosion-Proof Class	Ex d IIC T4 Gb	Ex d IIC T4 Gb	Ex d IIC T4 Gb	Ex d IIC T4 Gb



### 32MPa Filling compressor

- Inlet Pressure
- Inlet Temperature
- Discharge Pressure
- Discharge Temperature
- Flow Capacity
- Motor Power
- Overall Dimension
- Weight
- Explosion-Proof Class

#### WDCT2320-235

1.0MPa-3.0MPa  
 $\leq 40^{\circ}\text{C}$   
 32MPa  
 $\leq 45^{\circ}\text{C}$   
 235Nm<sup>3</sup>/h  
 75KW  
 3.2m×2.0m×2.4m  
 $\leq 7000\text{kg}$   
 Ex d IIC T4 Gb

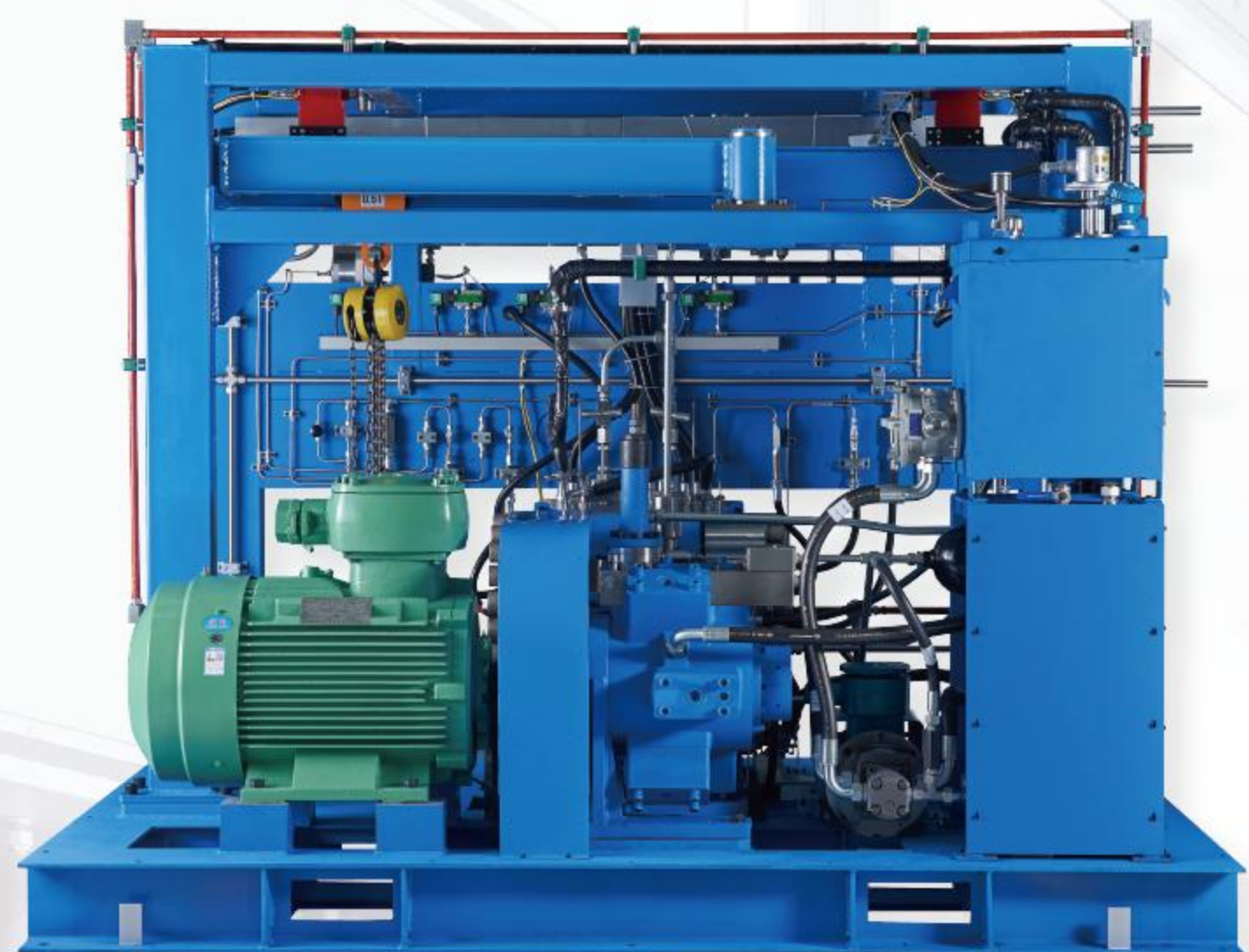
#### WDCT2320-500

1.0MPa-3.0MPa  
 $\leq 40^{\circ}\text{C}$   
 32MPa  
 $\leq 45^{\circ}\text{C}$   
 500Nm<sup>3</sup>/h  
 132kW  
 3.6m×2.4m×2.4m  
 $\leq 12000\text{kg}$   
 Ex d IIC T4 Gb

#### WDCT2320-1000

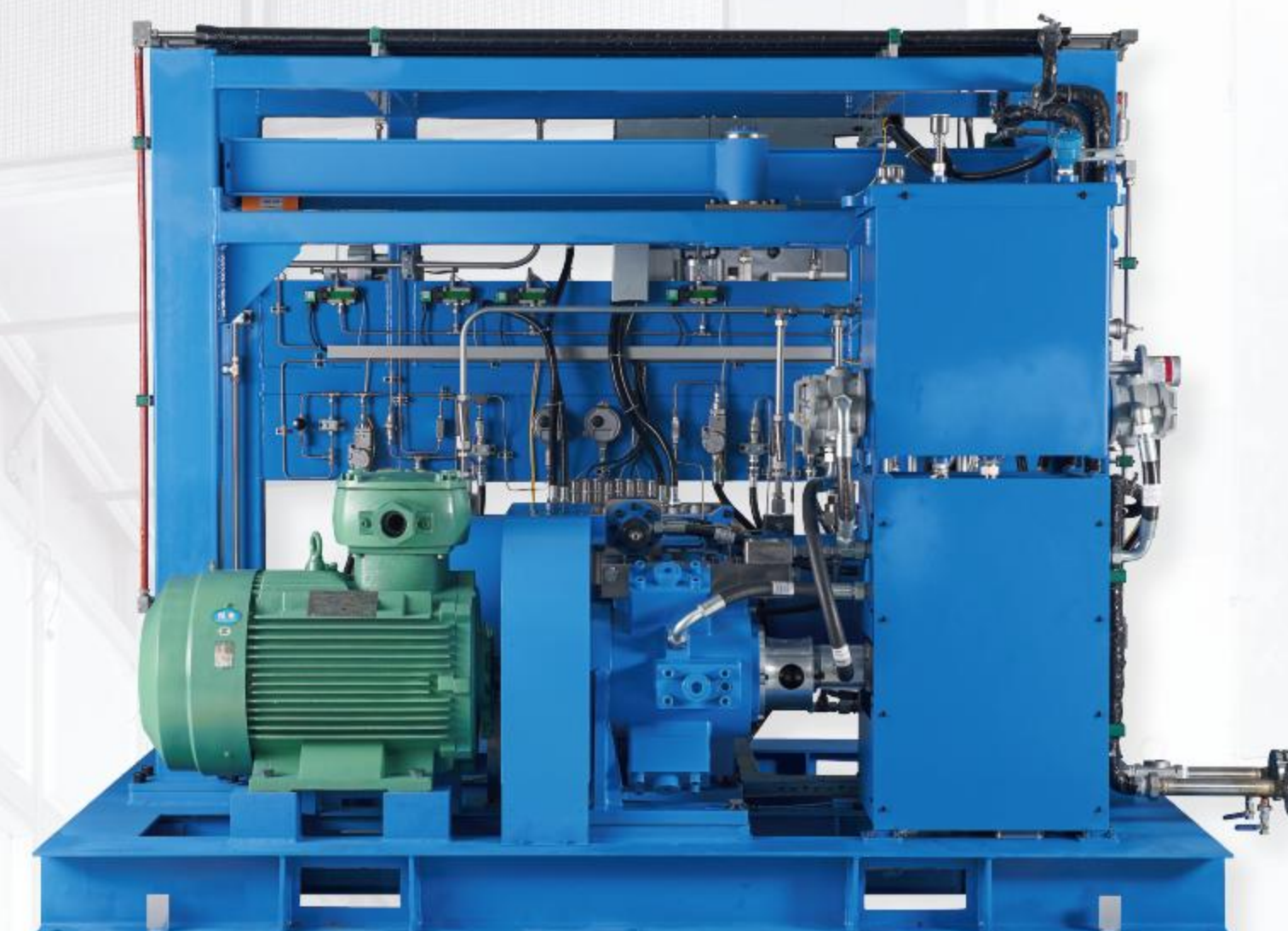
1.0MPa-3.0MPa  
 $\leq 40^{\circ}\text{C}$   
 32MPa  
 $\leq 45^{\circ}\text{C}$   
 1000Nm<sup>3</sup>/h  
 220kW  
 4.4m×2.8m×2.4m  
 $\leq 19000\text{kg}$   
 Ex d IIC T4 Gb





### 45MPa Station compressor

	WDCS2450-500	WDCS2450-1000
Inlet Pressure	5MPa-20MPa	5MPa-20MPa
Inlet Temperature	≤40°C	≤40°C
Discharge Pressure	45MPa	45MPa
Discharge Temperature	≤45°C	≤45°C
Flow Capacity	500Nm <sup>3</sup> /h	1000Nm <sup>3</sup> /h
Motor Power	55KW	110KW
Overall Dimension	2.8mX1.8mX2.3m	3.0mX1.8mX2.3m
Weight	≤4500kg	≤7000kg
Explosion-Proof Class	Ex d IIC T4 Gb	Ex d IIC T4 Gb



### 90MPa Station compressor

	WDCT2900-200	WDCS2900-500
Inlet Pressure	10MPa-20MPa	30MPa-45MPa
Inlet Temperature	≤40°C	≤40°C
Discharge Pressure	90MPa	90MPa
Discharge Temperature	≤45°C	≤45°C
Flow Capacity	200Nm <sup>3</sup> /h	500Nm <sup>3</sup> /h
Motor Power	55KW	55KW
Overall Dimension	2.8mX1.8mX2.3m	2.8mX1.8mX2.3m
Weight	≤4500kg	≤5000kg
Explosion-Proof Class	Ex d IIC T4 Gb	Ex d IIC T4 Gb



## Product Advantage

## High Security



# 01

## Explosion-proof certification

All electrical components meet the explosion-proof level of Zone 1 hydrogen environment (GB 3836 and GB 50058), realizing the explosion-proof certification of the whole machine to meet the requirements of higher-level applications.

# 02

## Safety Protection Device

Multiple safety devices are installed in the hydrogen inlet and filling lines and hydraulic lines to ensure that the equipment is not overpressurized.

## Anti-Stupid System Design

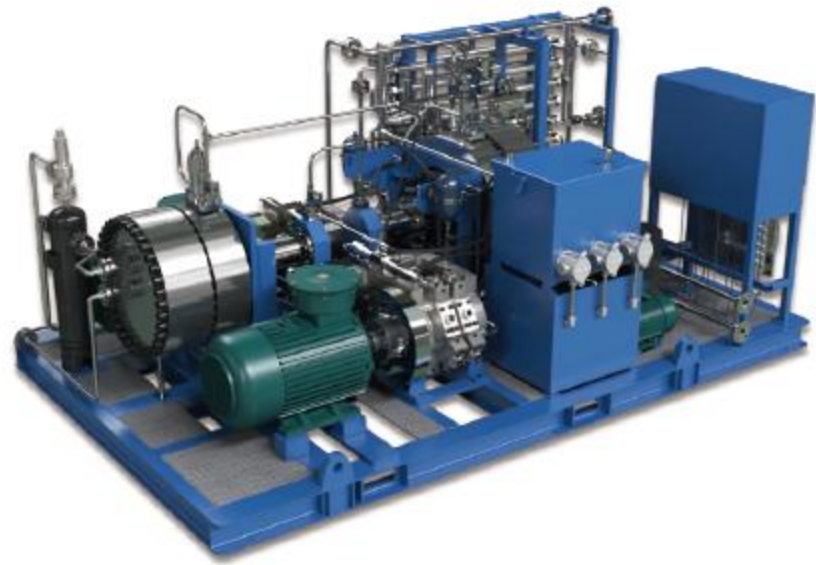
At the design stage, a "fail-safe" program is put in place in response to abnormal equipment conditions. Effective early warning of diaphragm rupture, high discharge gas temperature, high oil temperature, low tank level, increased vibration, fire point monitoring, etc.

## Component Security Testing

Pressurized components have been subjected to full production cycle quality control and performance testing. Core components such as safety valves and pressure gauges are subjected to rigorous third-party calibration before assembly.

# High Reliability

## 01. The whole machine passed 5000h life assessment



The industry's only 5000h uninterrupted life assessment of the entire machine, without replacement of wearing parts on the premise of trouble-free operation, far exceeding the energy industry's assessment of equipment requirements.

## 02. Key components passed 10000h life assessment



Developed accelerated life test device with independent intellectual property rights, taking into account the requirements of hydrogen compatibility assessment. The self-developed diaphragms and valves have been tested for more than 10,000h on a stand-alone basis.

## 03. Safe and reliable operation in -35°C environment



1. Hydrogen refueling station site

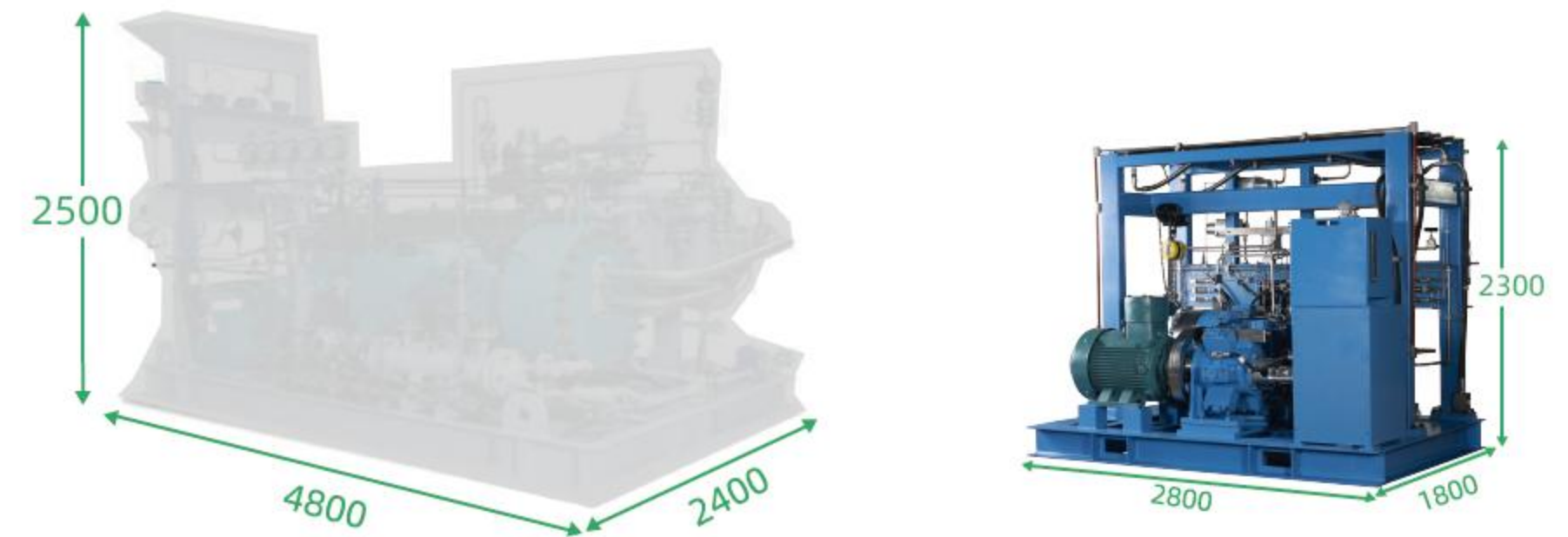
2. Hydrogenation scene

3. Cloud platform monitoring

4. Cloud platform interface

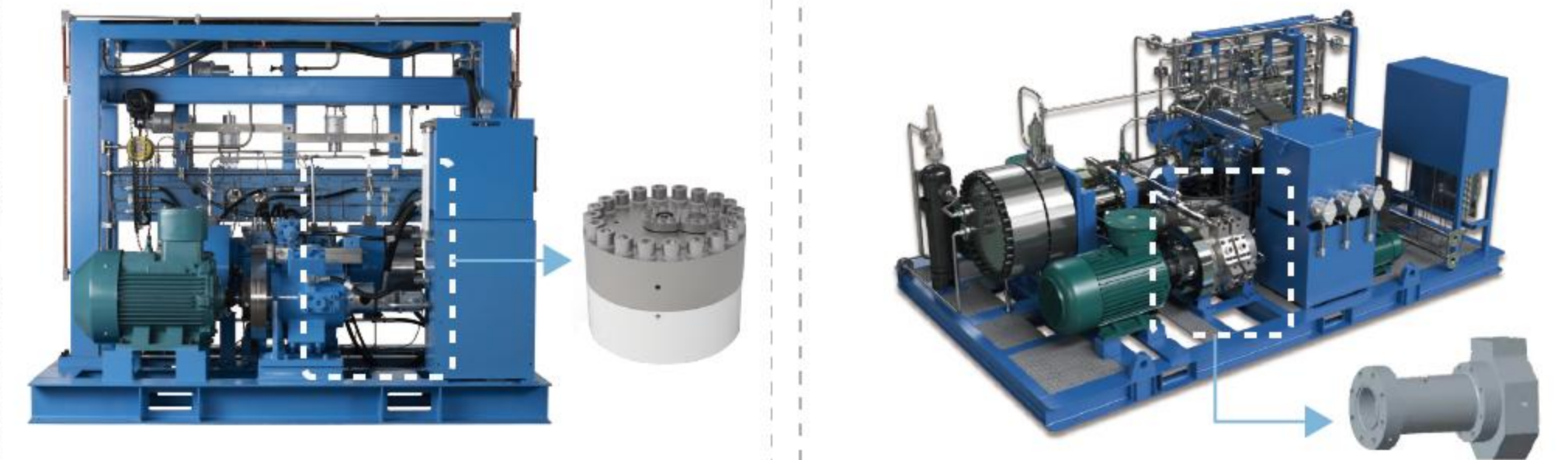
# High flexibility

## 01. Compact size and easy maintenance



Modular and expandable design with extremely compact dimensions. Its footprint, machine volume and weight are only about 50% of traditional diaphragm compressors, which is very favorable to the flexible layout of hydrogen refueling stations, integrated hydrogen production and refueling stations, and integrated energy stations. The weight of a single module is less than 0.3 tons, and only 0.6 meters are needed for maintenance space. The product is cleverly designed with lifting tools, so there is no need for additional lifting equipment for maintenance, and only one person is needed to operate it, which makes operation and maintenance extremely convenient.

## 02. One machine for two purposes, the industry only



Up to 90% of the components in the compressor range for hydrogen refueling stations are common, allowing upgrading from 45 MPa to 90 MPa or vice versa with the replacement of only one component. The ability to switch between the two product states greatly enhances the flexibility of the hydrogen refueling station.

Flexible upgrades are also available for the filling series. The 22 MPa product can be easily upgraded to 32 MPa by replacing only one component, making it easy to cope with the trend toward higher pressure levels in the transportation industry.

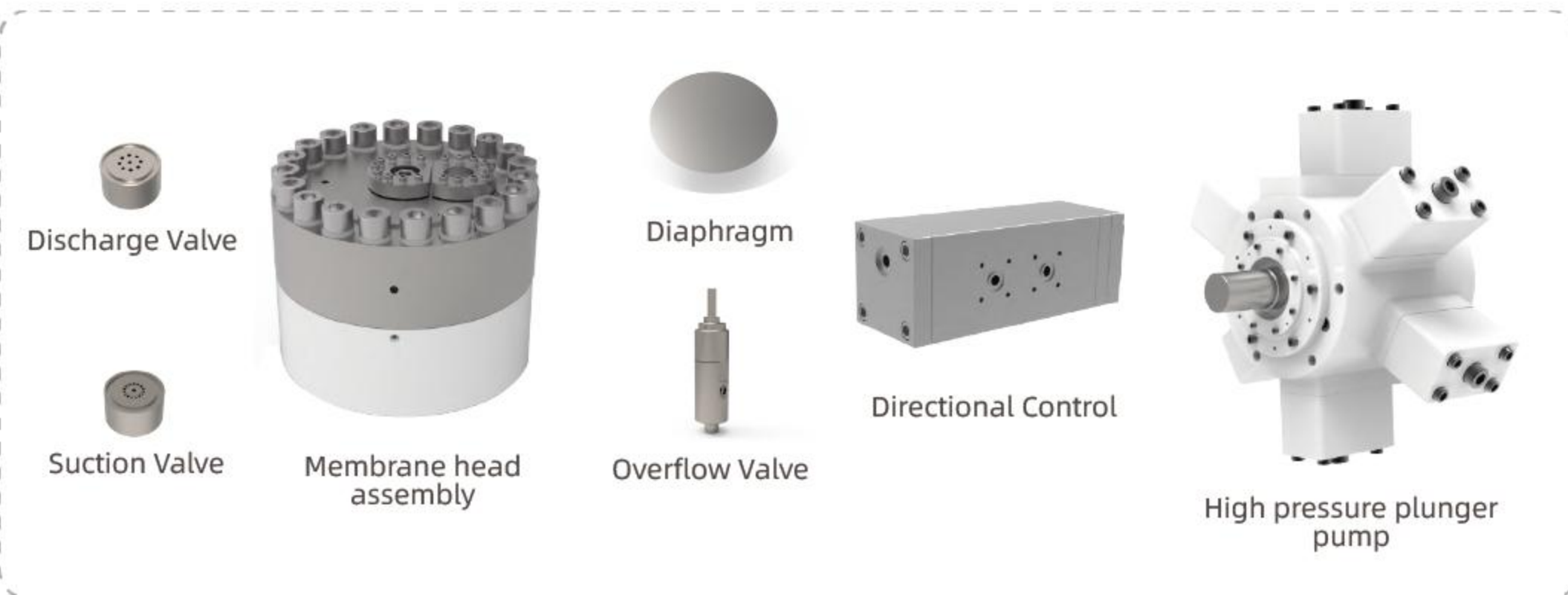
# High guarantee

## 01. Digital twin operation and maintenance platform



Based on the compressor digital model and the Internet of Things technology to develop the application of digital twin technology, combined with the compressor failure mode for online diagnosis and early warning, to realize the failure warning and remote operation and maintenance, greatly ensuring the safety of the compressor.

## 02. The core components are autonomous and controllable



All core components are independently developed by the company and authorized intellectual property rights, while replacing imported parts. More economical in terms of consumption and maintenance. Parts supply delivery and component replacement are more controllable.

## 03. Delivery time, after-sales service is guaranteed

The delivery time of each standard series of Winggen hydrogen compressors is within 90 days, and the compressors for common hydrogen refueling stations can meet the customer's demand for expedited delivery. 7\*24 hours to provide a full range of after-sales service, promising to respond to after-sales demand within 24 hours, and to come to your door within 48 hours.



# High economy

### Provides an upgrade value-added solution



We provide components and services for upgrading products from 45MPa to 90MPa and from 22MPa to 32MPa, saving hundreds of thousands of dollars compared to purchasing new products.



The core components of the products are independently developed and produced, and the supply chain is independently controllable. The products are so well designed that no additional lifting equipment is required for maintenance, which saves labor. The operating cost of the product over its entire life cycle is particularly economical.

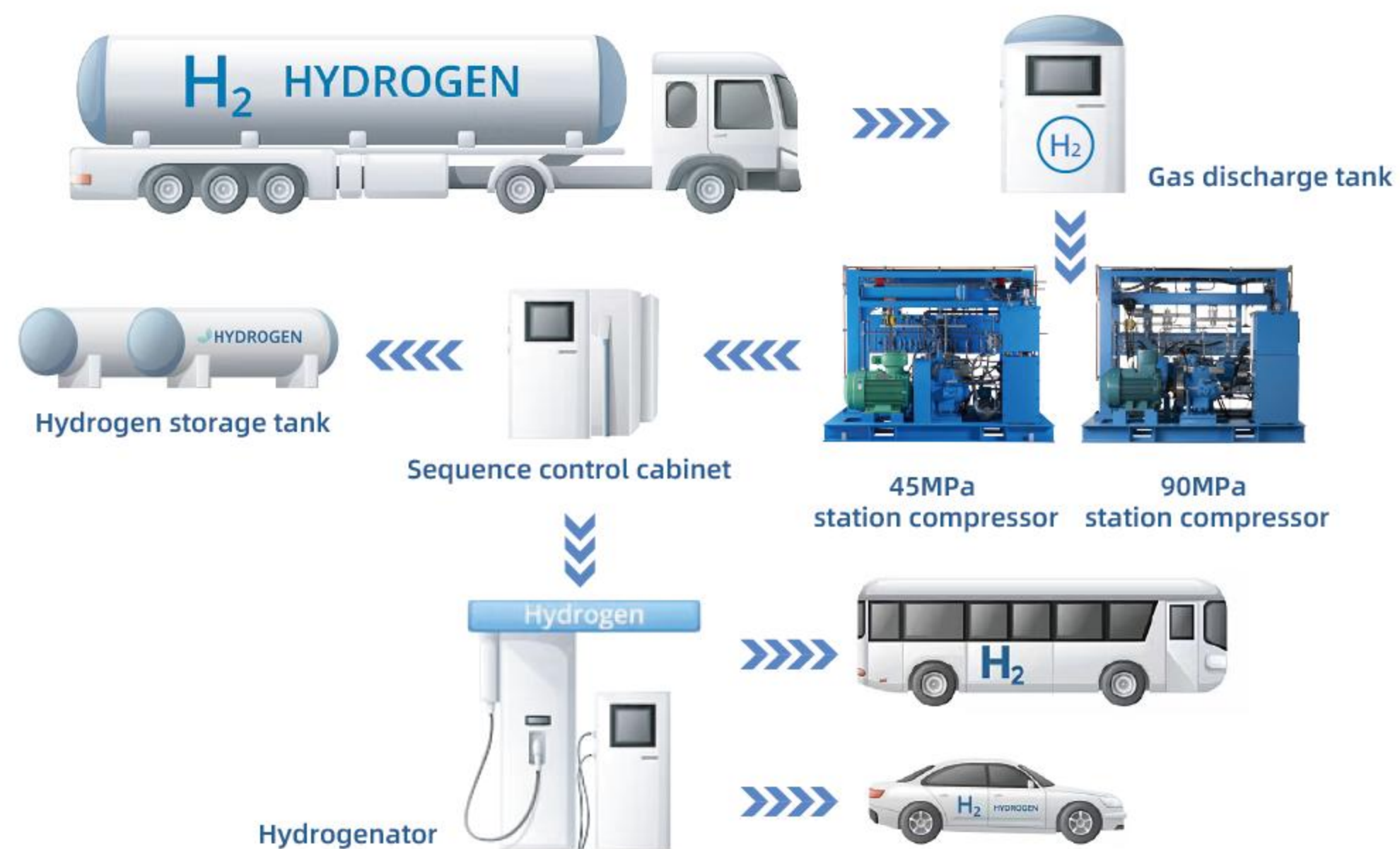


The product is adapted to the "cold start-up, start-stop with load" working condition of hydrogen refueling station. It supports direct charging without buffer tanks, which saves equipment costs.

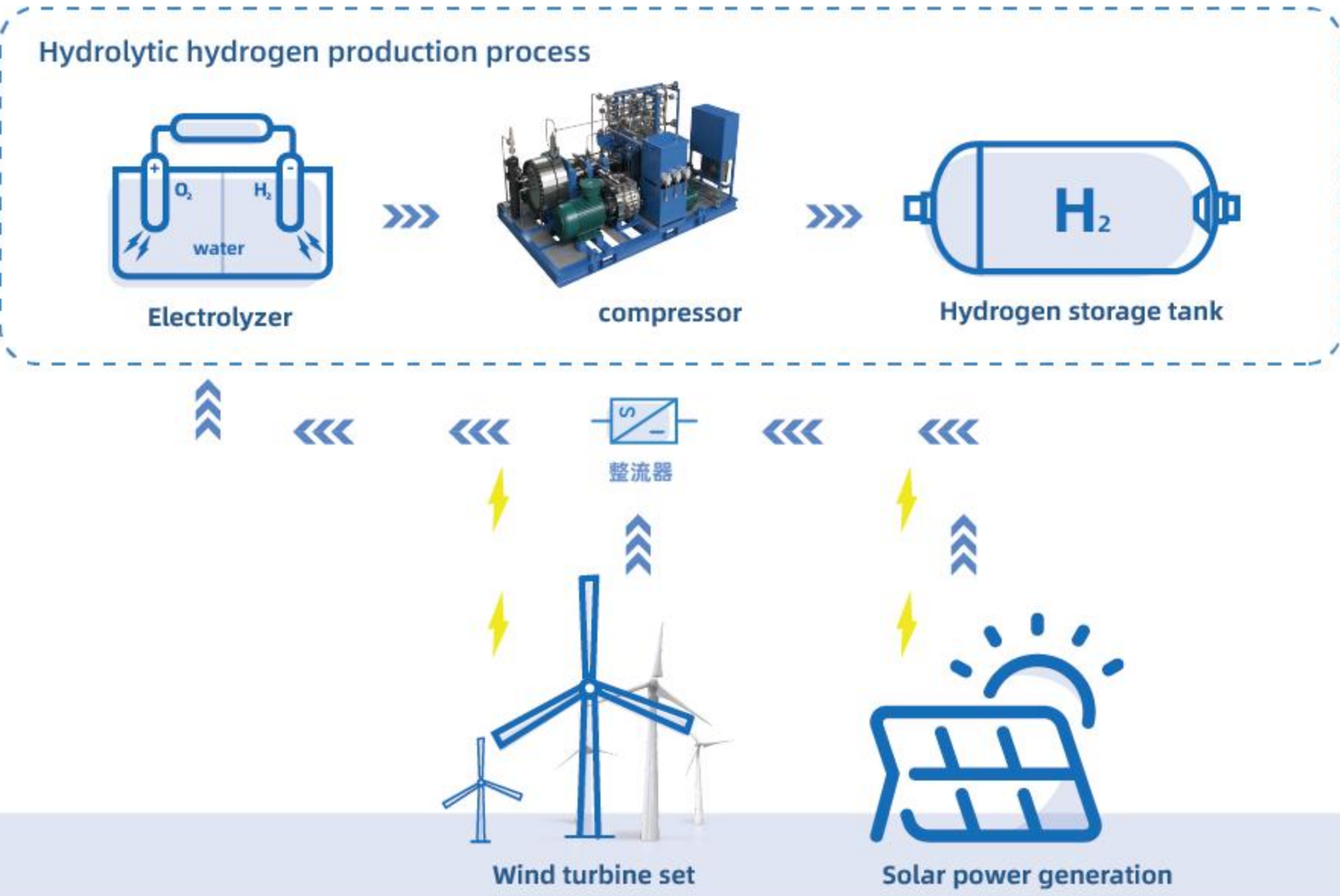


The product is designed to be extremely compact and lightweight, weighing only 50% of conventional products. The product has a balanced design and does not require foundation construction, saving the cost of building hydrogen refueling stations.

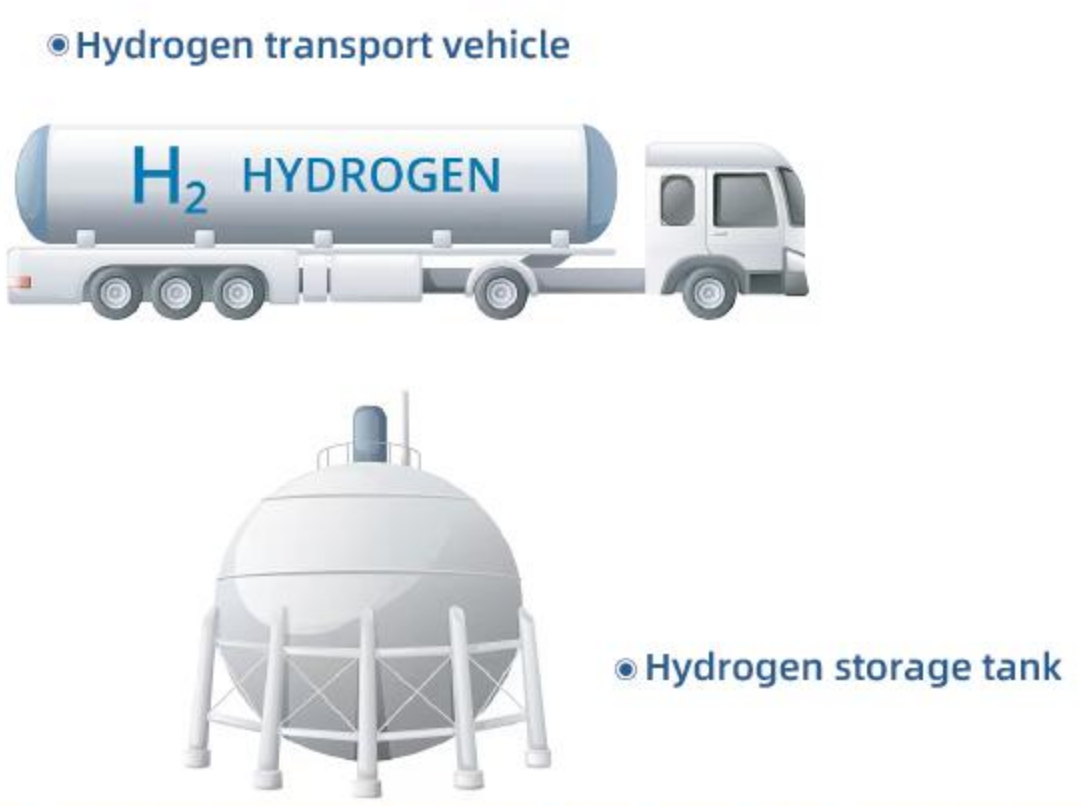
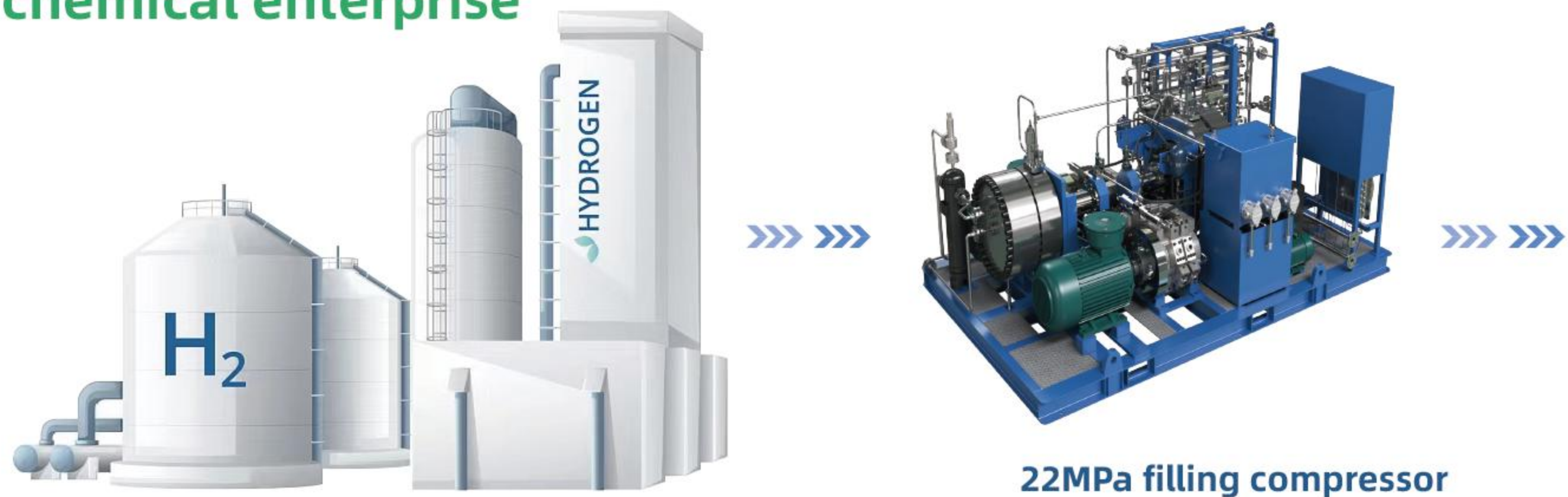
## Hydrogen Refueling Station



## Green electricity to produce hydrogen

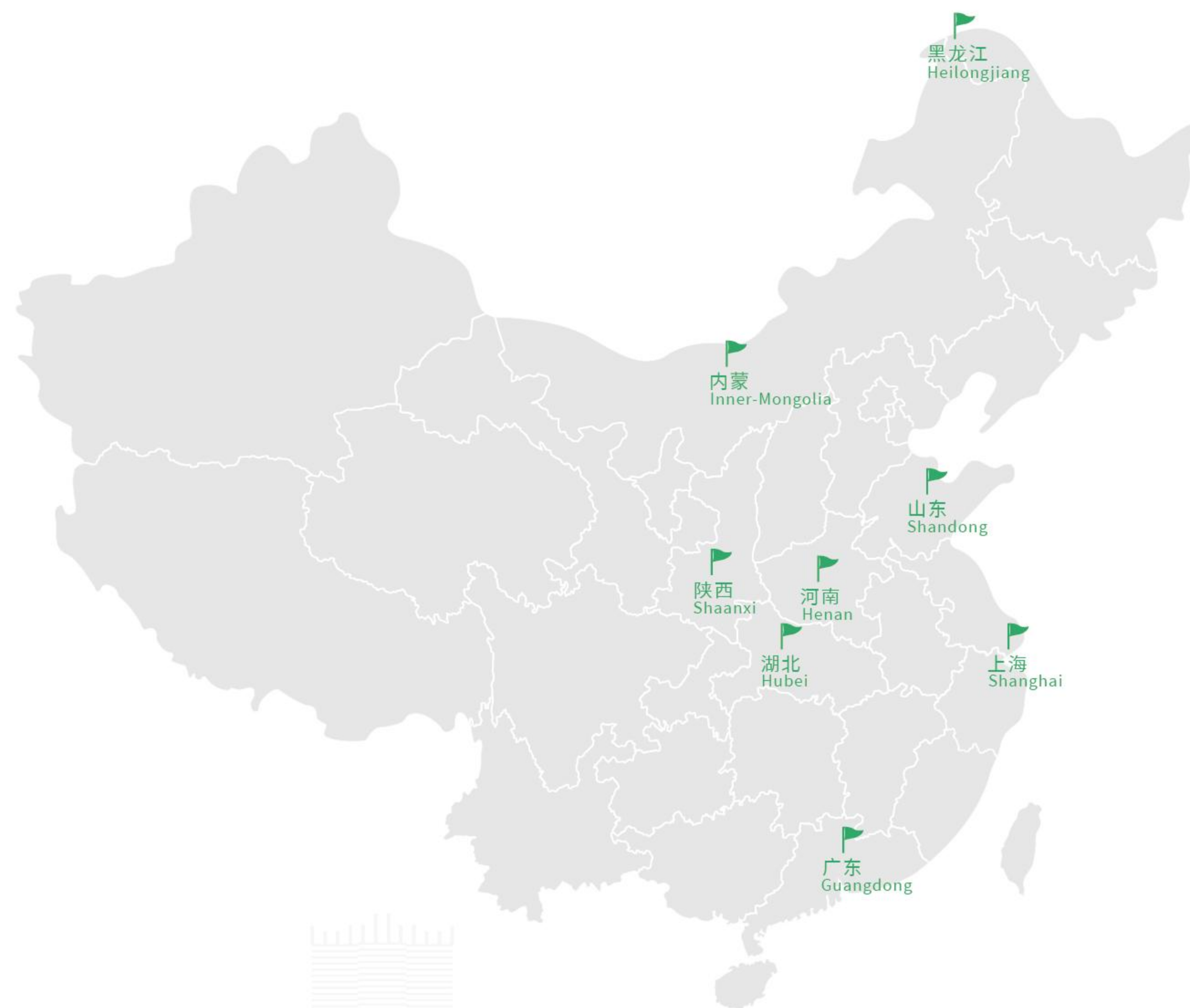


## Gas chemical enterprise





## Application Cases



### Heilongjiang

Yilan Heihe hydrogen refueling station.

### Shanghai

Jiading hydrogen port hydrogenation station.  
Guangtai hydrogen refueling station.  
Pujiang gas hydrogenation station.

### Guangdong

Guangzhou Hengyun Hydrogen Park hydrogenation integrated skid loading station.  
Foshan Zijin hydrogenation integrated station.

### Hubei

Yangtze River electric power hydrogenation integrated station.

### Henan

Anyang Jinghui hydrogen hydrogen refueling station.

### Inner-Mongolia

Ordos Shengyuan energy skid loading hydrogenation station.

### Shandong

Zibo hydrogen gas filling station.

### Shaanxi

Shaanxi Xinyuan natural gas helium extraction station.

## Yilan Heihe hydrogen refueling station

### Project Situation:

Under the extreme low temperature condition of  $-35^{\circ}\text{C}$ , the compressor runs direct charging hydrogenation, serving the commercial fuel cell vehicles participating in the field road test, and undertaking all hydrogenation tasks for SAIC Yuejin, SAIC Hongyan heavy truck and other models. Verification of 5 mpa low-pressure air intake condition, frequent start-stop condition, start-stop condition with load and other conditions, the cumulative work of more than 300 hours, all hydrogenation process smoothly, the entire hydrogenation service did not appear any fault. Highly recognized by the owner.



Application: 45Mpa/500kg diaphragm compressor

## Zhengxing Erdos skid loading hydrogenation station

### Project Situation:

The compressor operates in a direct-charging hydrogen refueling mode, providing hydrogen refueling service for 10-20 heavy trucks per day, with the compressor starting and stopping once for each vehicle refueling. The compressor has been working round-the-clock in the second half of 2022, and has accumulated more than 1,500 hours of trouble-free work by the end of 2022. It has proven the stability of Winggen liquid-driven diaphragm compressor under variable working conditions and frequent start/stop conditions, and has been highly recognized by the owner.



Application: 45Mpa/500kg diaphragm compressor

## Changjiang Electric Power green electric green hydrogen demonstration project

### Project Situation:

This project is the first hydrogen energy demonstration project of Three Gorges Group, which is used to produce hydrogen from electrolyzed water for hydrogen refueling of ships at the dock. The design requirements are stringent, to meet the frequent starting and stopping conditions, and at the same time the equipment needs to meet the shallow foundation and low load-bearing characteristics of the dock. The permissible vibration amplitude is much lower than traditional diaphragm machine. Winggen liquid-driven diaphragm compressor is the only diaphragm machine that can meet the requirements of dock foundation by virtue of its ultimate compact and lightweight design.



Application products: 45Mpa/500kg, 20Mpa/235 diaphragm compressor

## Shanghai Jiading hydrogen port hydrogenation station

### Project Situation:

Shanghai Motor Vehicle Testing and Certification Technology Research Center Co., Ltd, Hydrogen Port project is mainly used for fuel cell vehicle testing. It is mainly for refueling 70Mpa level passenger vehicles that are not yet on the market and need to be tested, as well as providing hydrogen refueling services for a wide range of vehicle models for test drives.



Application products: 45Mpa/500kg, 90Mpa/200kg diaphragm compressor



**Business Partner**

