



# **Tianjin Mainland**

## **Hydrogen Equipment Co., Ltd. (THE)**

### **Characteristics of Products**

#### **Advanced flow process**

We invented the unique flow process of separate circulation which is in process of patent which differs from the traditional process which H<sub>2</sub> separator and O<sub>2</sub> separator are connected at bottom through pipeline, the alkaline solution being poured into the electrolyser then is mixed with the gas. In THE generator, the alkaline solutions with O<sub>2</sub> and H<sub>2</sub> are completely separated than higher purity of H<sub>2</sub> and O<sub>2</sub> are available.

#### **Series of products**

The generators are categorized according to H<sub>2</sub> output from 2-400Nm<sup>3</sup>H<sub>2</sub>/h with fine steps. The specifications can also be tailored by the customer.

#### **Operation at high pressure**

The aim of hydrogen generator manufacturers and it is an important sign of technical level to operate under higher pressure. THE generator can reach high reasure: 1.6MPa, 3.2MPa and 5.0MPa. This makes THE the leader in the world. Additionally, THE can also design and manufacture higher operation pressure generator according to the customer's requirement. Thus, the hydrogen compressor and gas tank can be omitted to save investment and increase reliability. Because power and cooling water for hydrogen compressor are no longer used than the operation cost is lowered.

#### **High purity**

Because THE uses unique separate circulation process, hydrogen electrolyte and oxygen electrolyte circulates separately in separate ways, which reduces the mixing possibility of H<sub>2</sub> and O<sub>2</sub>, solved the technical problem of low gas purity of H<sub>2</sub> purity99.7-99.8% O<sub>2</sub> 99.2% respectively. THE generator can reach 99.9% and 99.5% respectively. According to the Gas Bottle Safety Supervision Regulation issued by National Labor be compressed into bottle directly. Then the oxygen from traditional hydrogen equipment purity is the important sign of the quality and technical level of hydrogen generator, in China standard JB/TQ584-87Quality Classification of Water Electrolysis Hydrogen Generator, the hydrogen purity is the basis of the classification.99.7% is qualified, 99.75% is the first class products, 99.8% is top class products. The quality of hydrogen produced through water electrolysis is mainly influenced by the content of oxygen, which is more serious than that of produced through ammonia dissociation, methanol dissociation and pressure swing absorption. Especially to the process of using catalytic agent, Although high purity hydrogen can be produced by other methods, the hydrogen may have complex impurity, such as S and CO, which would cause catalytic agent poisoning, thus enlarges the operation cost.

#### **Low Gas Moisture**



Gas moisture is in reverse proportion to its pressure. To THE FDQ series generator, due to the high operating pressure, its hydrogen moisture is lower than  $4\text{g}/\text{Nm}^3\text{H}_2$ , which is 3 to 4 times less than that from traditional hydrogen generators.

### **Low Power Consumption**

Since the main consumption of water electrolysis equipment is electric power, the technology for decreasing power consumption has been searched for a long time by the manufacturer. Separate circulation process applied on FDQ series equipment increases temperature and flow rate of electrolyte, (to mixed circulation process, the electrolyte flow rate cannot be too large, or the gas purity will decrease because the electrolyte entrains too much gas, the electrolyte flow rate cannot be also too small, otherwise the electrolysis may be dry, causing the electrode plates burned out and poor gas purity, thus increases the operation danger and difficulty), So, saves the electric power cost and improves cooling efficiency, uses less cooling water. Electric power consumption is an important parameter, standing for the technical level of hydrogen equipment.

### **Multiple control mode**

Any one of following control modes can be chosen by use: Direct control, Pneumatic instrument control, Electric instrument control and Microprocessor control.

### **High Automatic Level and Flexible Operation**

Technical parameters such as pressure, pressure difference, temperature and feed water compensation are automatically controlled. When one of the following problems occurs, the whole system will alarm or interlock.

Maximum limit of electrolysis pressure and temperature

Low limit of electrolyte flow rate

High/low liquid level in hydrogen and oxygen separator

Low limit of air supply pressure

High limit of pressure after hydrogen valve

The FDQ series equipment can be operated at the pressure between 0.5MPa and rated pressure, and at 50-110% of rated gas production. THE generator is operation.

### **Excellent sealing materials and long overhaul duration**

THE generator is possible to have a long overhaul duration and higher operating pressure because of the hi-tech sealing and its materials. Sealing materials of others are generally asbestos, rubber plate, F plastics or F plastics with additives, which all have the problems of low compressive strength and poor creeping resistance. Using these kinds of sealing materials, firstly the electrolysis cannot be operated at high pressure, secondly, since the temperature of electrolysis is 80-90 degree centigrade at normal condition and drops to ambient temperature after the equipment is shut down, these kinds of gasket gradually get thinner, so electrolysis leakage will occur, furthermore, the gaskets also insulate electrode plates and it is very dangerous to use thin gasket, which can easily cause electric arc between two electrodes, burning out electrolysis and causing features good creeping resistance, no cold flow, its compressive strength is 50% higher than materials mentioned above. Its coefficient of line expansion approaches to that of steel, so the sealing effect is good and the gaskets do not get thinner under expansion pressure. FDQ series



electrolysis is tightened with special tools and further tightening is not necessary in performance.

With high quality sealing materials, the FDQ series electrolysis can be operated under high pressure and have 10 years overhaul duration. For other kinds of electrolysis, this is only 3-5 years. THE guarantees: any overhaul of the electrolysis within 10 years caused by poor quality will be at the cost of THE.

**Integration, easy installation and small space occupation.**

Complete set of generator will be provided to user and facility inputs are only water, electricity and air, pre-assembly and skid-mounted system make installation simple. There is no electricity insulation requirement for electrolysis, construction and no elevation requirement for installing auxiliary equipment frame. Operated under high pressure, FDQ series has small space requirement and lightweight.

**Good appearance, easy operation and other advantages**

FDQ series electrolysis have good appearance and reasonable structure. End plates are directly made by processing thick steel plate; problems such as sand holes on castings and installing flanges on end plates made by welding are solved. The total length of electrolysis is 200-400mm smaller than that of the others'.

To improve cooling effect and decrease leaking possibility, three-dimension rib pipes are used in electrolyte and gas coolers.

THE generator have references in electronics industry, electrical power plants, air separation plants, and a wide range of other industries.

THE's policy:

**Excellent quality    Good service    Timely supply    Reasonable price**