



# OPERATION MANUAL

FOR SHC-300/500 SERIES MODEL

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**Dear Clients: Please read carefully the Operation Manual prior to operation. Juveniles and those who do not understand the requirements of the manual cannot operate the generators .**

## Operation Manual for SHC Series Hydrogen Generators

### 1 General Description

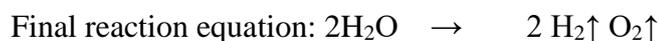
The data and operating requirements stipulated in this Operation Manual are applicable to all the SHC series hydrogen generators.

SHC series hydrogen generator is to electrolysis KOH liquid to produce hydrogen. There are many intelligent control equipments inside of equipment, easy and safety. The equipment could meet requirement of many kinds of gas chromatograph at home and abroad.

### 2 Operational Principles and Technological Process

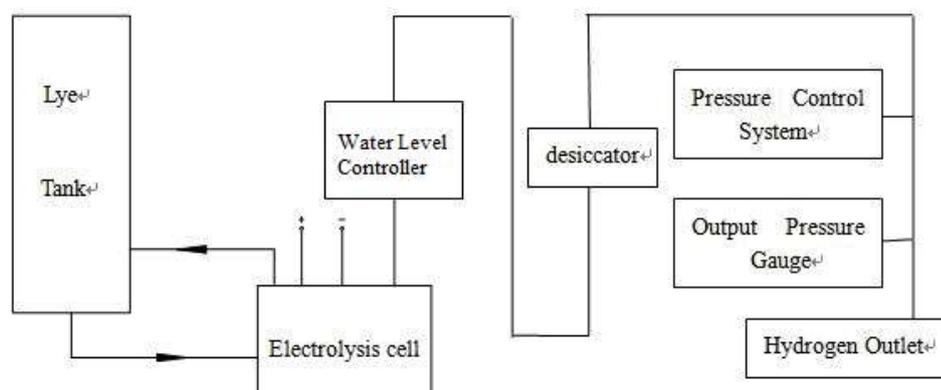
2.1 The operational principle of this instrument is traditional electrolyzing lye. The conducting medium in the cell is water solution of KOH. The membrane between the two electrode chambers is for the navigation electrolysis equipment. After electrifying direct current, the electrochemical reaction of water molecule occurs. It produces oxygen on the anode, and hydrogen on the cathode.

The reaction equation is as follows:



The pressure control, protective pressure, flow display and flow tracking are all automatic control. The hydrogen output is self-regulation according to the using hydrogen flow under stable pressure (in the range of output flow).

#### 2.2 Technological Process

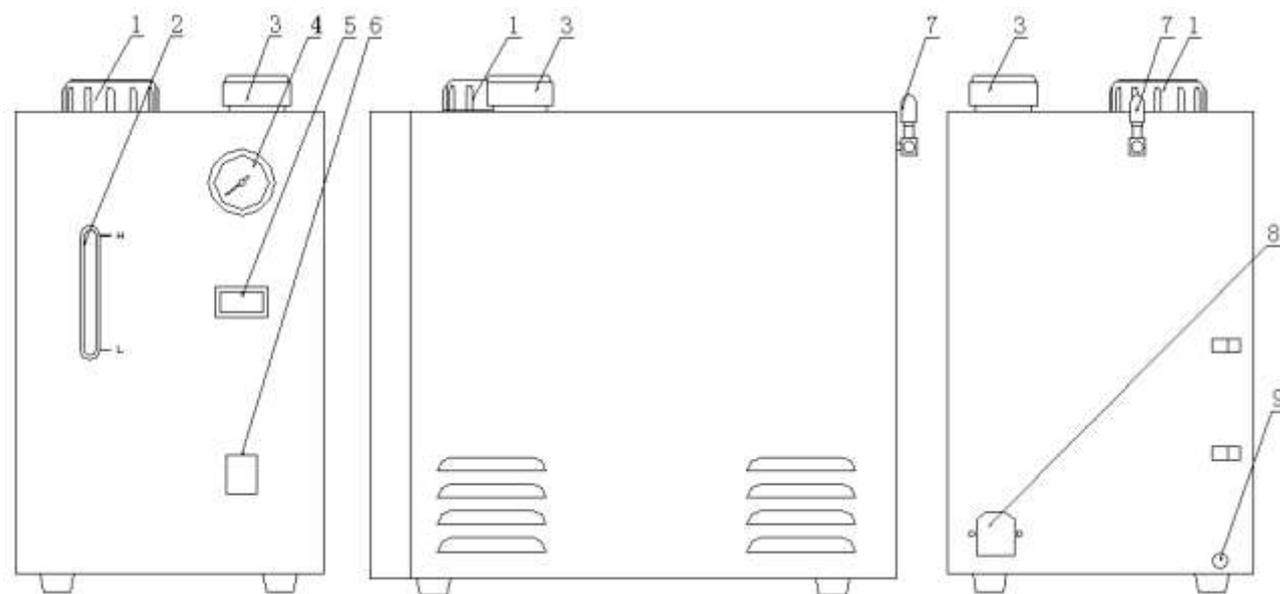


### 3 Technical Parameters

Type	SHC-300 <input type="checkbox"/>	SHC-500 <input type="checkbox"/>
Output Volume (ml/min)	0~310	0~510
Output Pressure (MPa)	0.4	
Hydrogen Purity (%)	99.999	
Overpressure Protective Value (MPa)	0.46	
Power Pressure (V)	110±15% 50~60Hz / 220±15% 50~60Hz	
Input Power (W)	<150	<250
Weight (kg)	<15	<16

Notice:  mark √ is equipment model

### 4 Structure of the Generators



Front View

Right Side View

Rear View

#### Contours and Dimensions Of Hydrogen Generators

- |   |                       |                 |
|---|-----------------------|-----------------|
| 1. Lye Tank                             | 2. Water Level        | 3. Desiccator   |
| 4. H <sub>2</sub> Output Pressure Gauge | 5. Output Flow Screen | 6. Power Switch |
| 7. Hydrogen Outlet                      | 8. Power              | 9. Water Outlet |

## 5 Acceptance Check

### 5.1 Unpacking for the acceptance check

Open the package, check equipment is in good condition, the attached accessories and technical documents should be checked according to the packing list. Otherwise claims should be filed against carriers and supplier in accordance with the actual conditions.

### 5.2 Operation for the acceptance check

#### 5.2.1 Make Lye Liquid

Take out corresponding Qty KOH as below required, put all in a clean bottle (anti-corrosion, polythene bottle is enough). Add 1000ml distilled water, then stir the liquid to make KOH fully melt. The KOH should be analysis purity, and purity is 85%. When the lye liquid cooled, put it into the tank.

Weight of KOH in fitting bag is as follows:

Model	SHC-300	SHC-500
KOH Weight(g)	320	375

5.2.2 Open the cover of Lye tank, pull out the nut. (Nut is used in case of lye leaking during transport). **Nut should be taken away when instrument is used.** Please keep the nut well for further use when transport again.

5.2.3 Put cooling lye into the tank, and then add distilled water. Water level should be in the range of up&bottom water level.

**Notice: Please don't let lye liquid onto the skin and other products !**

5.2.4 After pouring into electrolysis water, please raise the front of equipment, let the equipment lean about 40° to exhaust air in the electrolysis cell, and which could make cell full of electrolysis water.

### 5.3 Starting Equipment (Don't link with Gas Chromatograph )

Connect power supply ( should have ground connection wire). After connecting the power cord, turn on the switch of power supply on the front panel, will immediately start working, H<sub>2</sub>

output flow reaches to max gas flow. When the nut for hydrogen outlet of the generator is sealed securely, output pressure will rise, and when the pressure reaches 0.4MPa, the number indicating output flow rate will show falling to zero. This indicates the generator is in normal operation. After the acceptance check is completed, the generator can be operated in accordance to the Operational Manual.

#### **5.4 Equipment Installation**

Take off sealing nut of H<sub>2</sub> output port at rear of the equipment. (Please keep it well for checking instrument in future). Connect H<sub>2</sub> output port and hydrogen-applied equipment with copper pipe in fitting bag; don't screw the nut too tightly. Turn on the switch of power supply, equipment starts to produce gas, after several minutes, screw the nut tightly, at this time, equipment is in normal working condition.

## **6 Operational Requirements**

### **6.1 Requirements for operational environments and conditions of the generators :**

6.1.1 The hydrogen generators are forbidden to be operated in a sealed room.

6.1.2 The generators should be put horizontally near hydrogen-applied instruments

6.1.3 Temperature : 0℃–45℃

Humidity : <85%

6.1.4 Nut on the lye tank is to prevent lye liquid spreading out when delivery. Customer should not put on again when normal use. Otherwise, oxygen could not be vented out. Users should keep the nut well in order for future use.

### **6.2 Requirement for Lye Liquid**

6.2.1 Electrolysis liquid is made according to 5.2.1--5.2.3.

6.2.2 Electrolysis liquid purity controlling

After working for a while, electrolysis liquid will be less, when the liquid nearly reaches to bottom of water level, customers should add distilled water in time, which should guarantee water level is in the range of up&bottom level.

6.2.3 Electrolysis liquid replacement period and method

Electrolysis liquid should be replaced every three months. When replacing, first, open the

outlet in back of instrument to discharge electrolysis liquid. Clean the system 2 or 3 times with distilled water according to electrolysis cell and tank pollution conditions. Electrolysis liquid is made according to 5.2.1--5.2.3

Drain pipe is at the back panel of instrument. It could be taken down or put into freely.

Hole on cover of lye tank is oxygen outlet. Don't clog it. Don't replace cover of water tank at will!

**Notice: Please don't let lye liquid onto the skin and other products !**

**6.3** When hydrogen generator working, if there is no gas output suddenly, and flow display becomes zero, please take off the equipment side plate, to check whether there is accumulated water in water level controller. After discharging the accumulated water, it could recover to work. Method to discharge accumulated water: screw off the bottom cover on the water level controller, and water could flow out. Make sure there is some container under the controller to contain the accumulated water.

#### **6.4 Requirements for replacing desiccant**

6.4.1 The desiccant (discolored silica gel) will lose effectiveness after water uptake to saturation, and should thus be replaced on time.

6.4.2 Users should notice whether silica gel becomes pink. If it becomes pink, please replace it immediately. If there is no color changes, users could continue to use it till it changes to pink. Users could also decide the replacement period according to usage condition.

6.4.3 The silica gel should be baked under the temperature between 120 and 140 °C until its color changes into blue completely. It should be packed for future use when it is dried and its temperature decreases to below 50° C

6.4.4 After replacing new desiccant, when turn on the equipment for using, should vent gas without using for several minutes. When air in the desiccant pipes empty, hydrogen purity reaches standard, customer could only use hydrogen.

#### **6.5 Pressure and Output Flow Requirement**

6.5.1 This equipment utmost output pressure is 0.4MPa, maximum output flow should less than max gas production, pressure and flow should not exceed requirement.

6.5.2 This equipment should not be used under normal pressure! As long as turn on the

equipment, pressure should be more than 0.1MPa.

**6.6** When operating instrument, please notice outflow is accord with that of Gas Chromatography.

If exceed, turn off instrument and check leakage.

**6.7** Users are forbidden to disassemble electrolysis cell.

**6.8 Equipment Delivery Requirement:** when delivery, should empty lye liquid in the tank, and seal it with internal nut and external cover.

## 7 Troubleshooting

Breakdown	Causes	Guide for maintenance
1. When the power switch is turned on, the generator will not be in operation.	1. The power plug is in poor connection. 2. Blown fuse. 3. Power switch is damaged. 4. Electrolysis power is damaged.	1. Recheck the plug and make it in good connection. 2. Replace the fuse. Do not change type of safety wire at will. 3. Repair or make replacement. 4. Repair or make replacement.
2. When the electrolysis indicator light is on with the maximum output generated, the pressure does not rise.	1. Leak in the pipe system of hydrogen. 2. Over output flow. 3. Hydrogen produced too little	1. Use leak-hunting liquid to check sealing of all nuts, screw securely the fittings at the leaks. 2 Lower using output flow. 3 Replace electrolysis lye liquid or electrolysis cell. Forbidden to disassemble!
3. Instrument stops electrolyzing.	1. Overpressure. Pressure gauge indicates above 0.46Mpa. 2. Accumulated liquid in water level controller is excessive, floater reaches to upper limit of accumulated liquid.	9. Replace flow controller.  10. Discharge accumulated liquid.

## 8 After-sales Service

The warranty period of the generators is one year, and the maintenance will be lifelong. Maintenance and replacement of parts within the warranty period will be done free of charge, and beyond the warranty period, they will be done with only cost of the raw materials charged.

**If the following occurs, the maintenance will not be done free of charge:**

- a. users do not operate the generators according to the operational manual ;**
- b. users disassemble parts by themselves , which are forbidden by the manufacturer to be disassembled .**