OPERATING MANUAL

LABSTAC



AUTOMATIC HYDROGEN GENERATOR

GEN21-0200



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1. Introduction

GEN21-0200 High Purity Hydrogen Generator employs the latest technology to satisfy various models of gas chromatographs, which are manufactured by domestic and aboard manufactures. In the present market, its volume is smallest, the weight is lightest in the same specification generator, and easy to operate.
Its pressure Control adopts a highly sensitive fuzzy control and automatic tracking system to make the precision range of the pressure stability less 0.001MPa.
Its electrolytic cell utilizes transient metal element catalytic technology and processes multi-stage purification. The hydrogen purity can be reached up to: oxygen content : less 3PPM, water content dew point temperature :-56℃.

2. Descriptions for each part of Instrument

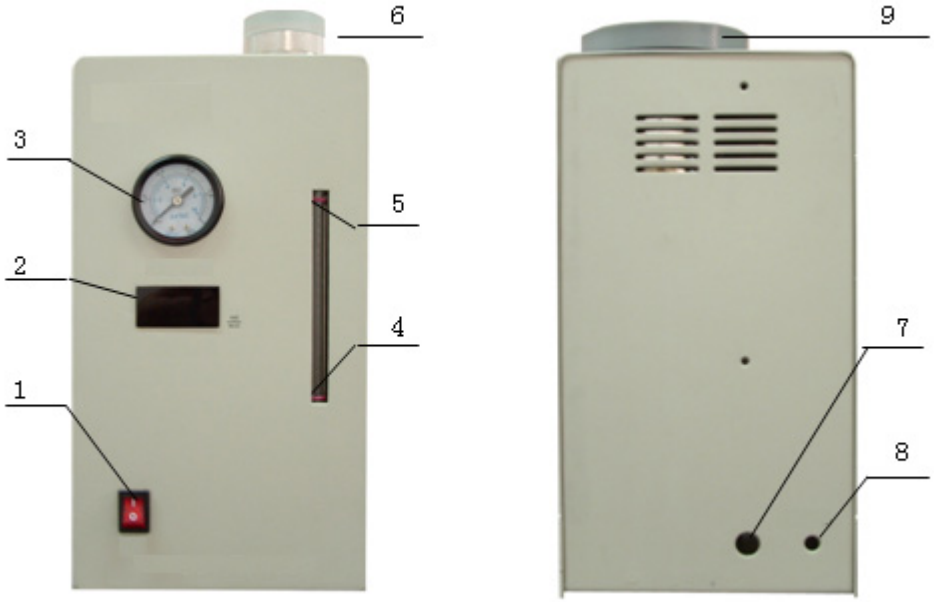


Figure 1 (Front panel) (Rear panel)

1. Switch of power supply
2. Hydrogen digital flow indicator
3. Indicator of working pressure
4. Low limit indication of electrolytic solution
5. Upper limit indication of electrolytic solution
6. Purified tube
7. Cable of power supply
8. Outlet port of hydrogen
9. Liquid bucket of electrolytic solution

3. Installation and Operation

3.1 Preparation before the operation

3.1.1 Take the instrument out from the packing box. Check if there is any damage on the instrument during the transportation and verify that all of the spare parts are provided with the main unit according to the packing list.

3.1.2 Adding the electrolytic solution
1) Take out the potassium hydroxide (60g) from the spare parts and put them all into a container, then add secondary distilled water or de-ionized water of 500ml as the master solution and fully mix it. Use it after the electrolytic solution cools down.

2) Open the outer cover of the liquid bucket of the instrument, take out the cotton from it.
NOTE: The cotton is mainly used to avoid the liquid leakage during the transportation. It must be taken out during running.

Put the electrolytic solution (master solution) after cooling down into the liquid bucket, continuously again add the secondary distilled water or de-ionized water, but it can neither exceed the upper limit water level line nor be lower than the low limit water level line. Screw the outer cover tightly and use it after ten minutes.

3.2 Self checking of instrument

(Never connect with gas chromatograph)
3.2.1 Connect with the power supply.

3.2.2 Switch on the power supply. The moment the pressure meter goes up. Verify that the electrolytic indicating lamp (green lamp) on the instrumental panel is lit, digital flow indication (Digital meter) should be more than 200 and less than 250. The pressure indication (Pressure meter) in five minutes should reach up to 3Kg/cm2 (about 0.3Mpa) and digital flow indication drops to “000”. That shows the instrument working in a normal case and the self-checking is qualified.

3.3 Operation of instrument

(Connect with the gas chromatograph)
3.3.1 Take off the sealing nut located at the outlet port of the rear of the hydrogen generator. (Please keep it well for the next usage after taking it off).
The outlet port of the hydrogen generator qualified after the self-checking is connected to the inlet port of the hydrogen of the gas chromatograph using a gas tube with the outer diameter of 3mm. Screw up the nut to be sure of a good seal. Switch on the power supply and instrument enters into working status.

3.3.2 Great attention should be taken that the flow display should be in accord with the flow display used by the gas chromatograph. When the flow displayed exceeds more than the actual flow used, promptly stop the instrument running and verify the gas leakage carefully. Please refer to the sections of

troubleshooting in this manual. After that, the self-checking is done again. It can be operated until the self-checking of the instrument is qualified.

3.3.3 Observe through the viewed window if the color of the silica gel in the filter has been changed. If it is so, please immediately make the replacement or regeneration. Its method shows as follows: Rotate off the filter and lose the top cover of the filter. Again screw it tightly after replacing the silica. Mount the filter to the chassis and rotate it tightly. After so, check if the gas leakage exists.

3.3.4 The electrolytic solution is gradually reduced when the instrument is used for a certain period. Therefore add the secondary distilled water or de-ionized water promptly when the electrolytic solution is nearly too low. Don’t exceed the water level line of the upper limit when the water is added. The electrolytic solution should be replaced after a half year. (The concentration of the potassium hydroxide used for the hydrogen generator is 10% more or less).

3.3.5 Don’t detach and open the electrolytic cell by user so as to avoid the instrument running in abnormal cases. It can’t be repaired by the user himself.

3.3.6 Don’t take the black rubber ring around the liquid bucket away, to avoid the instrument running in abnormal cases.

3.3.7 Clean up the electrolytic solution in the liquid bucket using an ear ball if transportation is required.

4. Working Principle and Features of Instrument

4.1 Working principle

The electrolytic method is utilized to produce the hydrogen. The water solution of potassium hydroxide acts as the electrolytic solution. The noble metal acts as the electrode. The latest filter separation technology is used to wholly separate the hydrogen and oxygen. The transient metal catalytic technology is adopted in the electrolytic cell to make the purity of the hydrogen production contenting oxygen less 3ppm.

The program control used in the instrument adopts a high sensitivity, fuzzy control automatic tracking system without using the stable valve and realizes auto-constant voltage and current. The pressure stable precision range will be less than 0.001MPa. The amount of the hydrogen required by the gas chromatograph can be automatically adjusted in the range of 0-200ml/min. The hydrogen production will automatically stop when stopping using the hydrogen.

4.2 Features of instrument

4.2.1 Small, light, high purity, the pressure is steady.

4.2.2 Automatic to avoid reverse liquid.

4.2.3 Program control: The specialized chip is used in the control system of the instrument. All working processes of the instrument will be completed by the program control. The automatic constant voltage, constant current and hydrogen flow can be automatically adjusted in the range of 0-200ml/min according to the requirements.

4.2.4 Low humidity of hydrogen production: The film separating technique and effective de-humidity device are used in the system, so the original humidity is more reduced. The multi-polar absorption is adopted to make the hydrogen humidity reach up to -56℃ of dew point temperature..

4.2.5 Easy operation: Only switch on the power supply if the hydrogen is required. It can be used continuously or at intervals, the hydrogen production is very stable without the attenuation.

4.2.6 Safe and reliable: The safe device is equipped with the system, sensitive and reliable.

5. Trouble Shooting

5.1	Problem	There is no work in the system.
	Possible causes	1. No connection to the circuit 2. The switch of the power supply may be damaged.
	Checking area	1.Test the circuit 2. Measure the voltage of the electrolytic cell to confirm if it is about 2.3V using an universal meter.
	Solution	1. Repair the power supply. 2. Replace the damaged switch of the power supply.
5.2	Problem	1. Hydrogen production can not reach presetting pressure. 2. Hydrogen digital display shows over 200. 3. The amount of hydrogen displayed exceeds the amount of practice used.
	Possible causes	1. Gas leakage exists in gas piping systems. 2. No screw tightly between the filter and the top cover of the filter. 3. Reverse leakage of electrolytic cells.
	Checking area	Verify gas leakage on each joint using test leakage liquid.
	Solution	1. Replace gas leakage part. 2. Screw the leakage point tightly. 3. Electrolytic cells can never be repaired by users themselves.
5.3	Problem	Hydrogen production exceeds the resetting pressure of 0.1Mpa.

	Possible causes	1. Dowsers of automatic tracking devices may be dislocation or drop off. 2. The photo thermal couple is damaged.
	Solution	1. When the pressure on the front panel reaches to 4Kg/cm 2 (About0.4Mpa), promptly mount the dowser in a proper position, then repeatedly increase the pressure for several times to determine if it is mounted properly. Afterwards slightly knock in the dowser. 2. Replace the photo thermal couple.
	Location	1.Open the cover of instrument, it is located above the pressure plate Mounted on the front panel. 2. It is located beside the control pressure meter.
5.4	Problem	The instrument can start, but the hydrogen digital display shows “0” or black screen.
	Possible causes	The digital indicator is damaged.
	Solution	Replace the indicator

Table 1

6. Main Technical Parameters

Sr. No.	Parameter	Specification
1	Hydrogen Purity	99.999%
2	Oxygen Content	< 3 ppm
3	Water Content (Dew Point)	-56°C
4	Hydrogen Flow Rate	0–200 mL/min
5	Output Pressure	0–3 kg/cm² (Approx. 0.3 MPa)
6	Pressure Stability	< 0.001 MPa
7	Power Supply	220 V ±10%, 50 Hz
8	Power Consumption	100 W
9	Ambient Temperature	1–40°C
10	Relative Humidity	< 85%
11	External Dimensions (W × D × H)	200 × 140 × 290 mm
12	Net Weight	Approx. 6 kg

Table 2

7. Packing list

Sr. No.	Description	Specification / Size	Quantity
1	Fully Automatic Hydrogen Generator	GEN21-0200	1 Set
2	Ear Ball	with ϕ4 stainless steel tube	1 Kit
3	Potassium Hydroxide (Analytical Purity)	60 g/bottle	
4	Sealing Washer of Filter	Ø14 × 2.4	1 Pc.
5	Sealing Washer of Filter	Ø26 × 2.4	1 Pc.
6	Sealing Washer of Filter	Ø32 × 2.4	1 Pc.
7	Sealing Washer of Gas Piping	Ø6 × 5 mm	5 Pcs.
8	Screw Nut	M8 × 1	1 Pc.
9	Operating Manual	Standard	1 Copy

Table 3

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