

**Application**

Electronics	Semiconductor, Capacitor, LED, Optical fiber, Photovoltaics
Metallurgical industry	Bright annealing, Sintering, Brazing
Chemical	Pharmaceutical products, Food(Hydrogenation), Ceramics
Industrial gas	Gas purification, Hydrogen gas production, Oxygen gas production
Power plant	Coolant gas for generator, Inhibitor for stress corrosion cracking of cooling water piping
Energy industry	Fuel cell, Hydrogen turbine, Power to gas, biogas purification
Infrastructure	BCP, Emergency power system, Absorption of renewable energy fluctuation
Vehicle	Hydrogen Station for FCV or FCFL, Plane, Ship
Communication	Aerospace use(Airship), Radiosonde balloon
Others	Disposal of PCB (Polychlorinated Biphenyl), Recovery of radioactive material, R&D

**Photos**



HB1-II(1,000×500×1,700H)



CL/CH-5D(900×1,700×2,000H)



CL/CH-10D(1,500×2,600×1,950H)



SH-20D, Special specification  
[simplified explosion-proof type, both H<sub>2</sub> and O<sub>2</sub> use]  
(6,500×2,000×2,500H)



SH-20D(5,700×2,000×2,500H)



SL-50D(8,500×2,200×2,500H)



SH-20D, Special specification  
[simplified explosion-proof type, for outdoor use]  
(4,400×2,000×2,200H,  
except for Control panel & Power supply unit)

**KOBELCO ECO-SOLUTIONS CO.,LTD.**

New Businesses Promotion Department  
Hydrogen Business Promotion Section

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**HHOG**

High-purity Hydrogen Oxygen Generator

The HHOG (High-purity Hydrogen Oxygen Generator) is on-site gas generator which produces high-purity hydrogen and oxygen gases by electrolysis of deionized water using proton exchange membranes.

High-purity Hydrogen Oxygen Generator

# HHOG

## Features

### Simple operation and maintenance

- HHOG is a full automatic operation, and it quickly starts and stops by only pressing the switch button.
- No idle operation is required since gases are generated as soon as the switch is turned on unlike methanol reforming and natural gas reforming. The hydrogen gas production is controlled automatically in the range 0 to 100% according to demand.
- The simple construction and no use of dangerous chemicals which are necessary for alkaline electrolysis lead to simple maintenance. Only annual inspection is required.

### High-purity hydrogen gas

- HHOG can generate high-purity hydrogen gas since HHOG directly electrolyzes deionized water, which avoids contamination of the produced gases.

### High level of safety and reliability

- Since HHOG quickly generates the necessary amount of gas on demand, it can eliminate gas storage facilities.
- HHOG is designed to ensure safety and shuts down in the event of equipment malfunction.

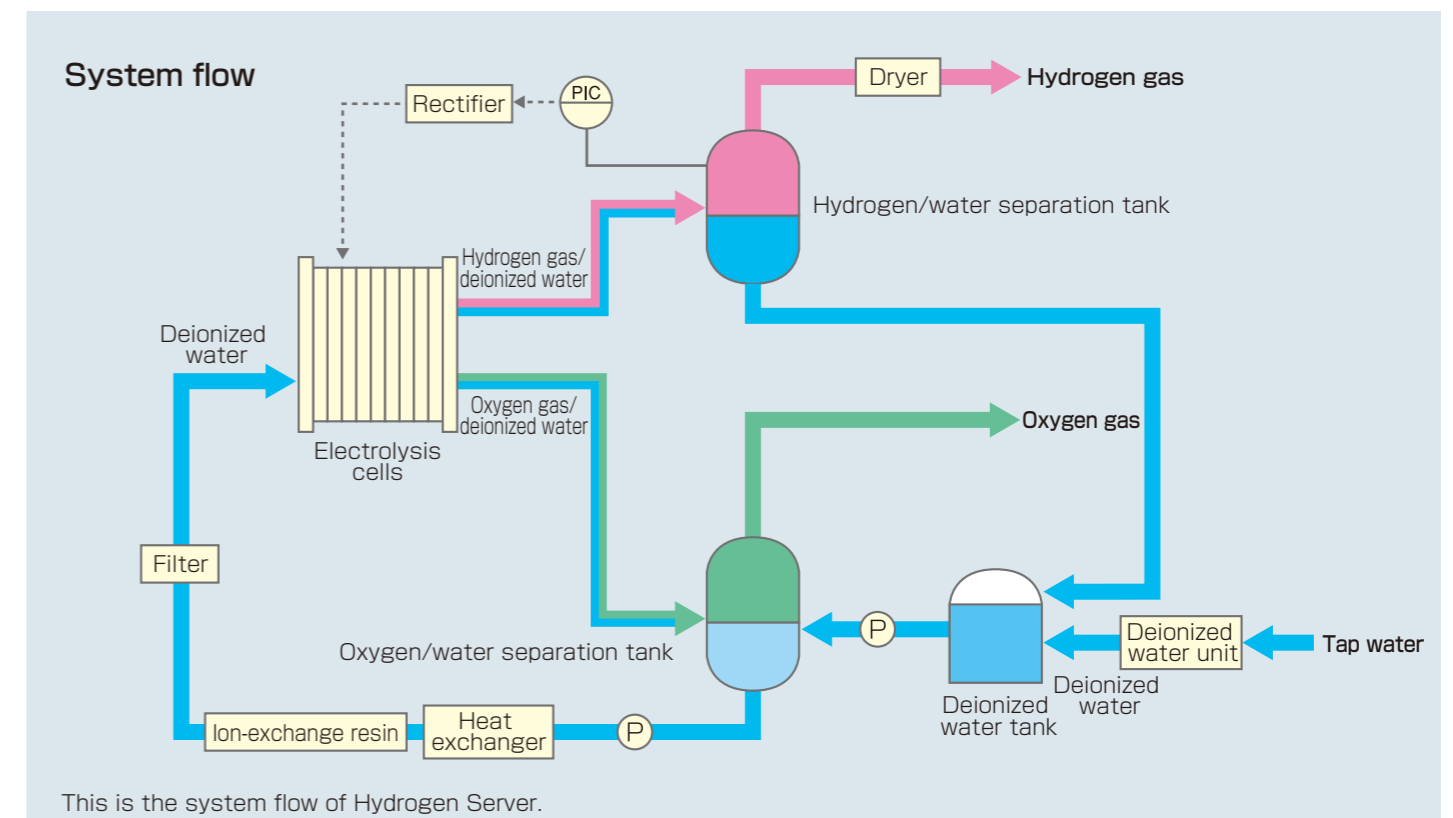
### Environment-friendly

- HHOG needs only water and electricity as materials, unlike methanol reforming and natural gas reforming in which dangerous raw materials and poisonous substances are used.
- No chemical and waste water treatment facilities enable you to minimize the required space. HHOG frees you from transportation work for gas cylinders by truck or trailer.

## Standard specifications

Type	Hydrogen Box	Hydrogen Server		Skid mounted type				
		CL-5D	CL-10D	SL-20D	SL-30D	SL-40D	SL-50D	SL-60D
Low pressure type (0.37MPa(Gauge),H <sub>2</sub> )	—	CL-5D	CL-10D	SL-20D	SL-30D	SL-40D	SL-50D	SL-60D
High pressure type (0.82MPa(Gauge),H <sub>2</sub> )	HB1	CH-5D	CH-10D	SH-20D	SH-30D	SH-40D	SH-50D	SH-60D
Output capacity (m <sup>3</sup> /hr(Normal),H <sub>2</sub> )	1	5	10	20	30	40	50	60

The equipment except above specifications can be manufactured.



## Example of hydrogen gas analysis

Analyzed impurities	CO	CO <sub>2</sub>	CnHm	Ar	N <sub>2</sub>	O <sub>2</sub>	Dew point at atmospheric pressure
Concentration(ppm)	≤0.01	≤0.01	≤0.01	≤0.01	0.03	≤0.01	≤-70 degree C

The data is based on the analysis of hydrogen gas generated by standard model CH-5D.

## Utilities

- ①Electricity(three phases, 200V or 400V)
- ②Tap water
- ③Instrument Air
- ④Cooling Water
- ⑤Nitrogen Gas

## Power consumption

6.5kWh/Nm<sup>3</sup>·H<sub>2</sub>

The value includes that of all equipment in above system flow at rated operation by standard model CH-5D.

## Principle of deionized water electrolysis

A proton exchange membrane functions as both an electrolyte and a gas separator. Electrocatalysts are bonded on both surfaces of the membrane. Deionized water fed into the anode chamber is decomposed into oxygen and proton(H<sup>+</sup>).

The proton passes through the membrane to the cathode by force of electrical field, and then is converted to hydrogen gas by accepting the electron(e<sup>-</sup>).

