



GES-300 oxy-hydrogen fuel cell trainer makes trainees understand how to produce the fuel via electrolysis and use the produced fuel to generate electricity. The modularized design of the experiment can be implemented easily. In addition, the users can design their own training courses according to their demands. GES-300 is designed as a toolbox. All the required equipment for making experiments is included, and easy for setting and storage.

• Features

- GES-300 is a basic trainer of the Proton Exchange Membrane Fuel Cell (PEMFC).
- Open system configuration with modularized-design elements.
- Understand the combination of water by electrolysis.
- The voltage and current can be measured.
- A complete fuel cell database can be constructed for study, research, and development.
- The brightness of the simulated sunlight is adjustable.

• Specifications

H₂/O₂ Fuel Cell Trainer (GES-31001)

- Electrolyser**
 - (1) Size : 54(L)x54(W)x15(H)mm±5%
 - (2) Input voltage: DC 1.8~3V
 - (3) Input current: 0.7A at 2V
 - (4) H₂ production rate: 7ml/min
- Water storage capacity x 2: 80ml**
- H₂ storage capacity: 50ml**
- O₂ storage capacity: 50ml**
- H₂/O₂ Fuel Cell**
 - (1) Size: 54(L)x54(W)x15(H)mm±5%
 - (2) Output voltage: 0.6V
 - (3) Output current: 2.4A
 - (4) Output power: 1W
- Keyp timer**
- Digital Multimeter x2**
 - DC Voltage : 400mV, 4V, 40V, auto range
Input resistance ≥10MΩ
 - AC Voltage : 400mV, 4V, 40V, auto range
Input resistance ≥10MΩ
 - DC Current : 400μA, 400mA, 10A, push button selector switch
10A Range: 10A / 250V fuse protected
mA/μA Ranges: 0.5A / 250V fuse protected
 - AC Current : 400μA, 400mA, 10A, push button selector switch
10A Range : 10A / 250V fuse protected
mA/μA Range : 0.5A/250V fuse protected
 - Resistance : 400Ω, 4KΩ, 40KΩ, 4MΩ, 40MΩ, auto range
 - Diode test: 0~1.5V
 - Continuity: Buzzer for the measured resistance < 30Ω
 - Display: 3 ¾ digit LCD, max. indication 3999
- Load**
 - DC motor : 0.5~6V, 10mA
 - Light bulb : 1.1V, 300mA
 - Potentiometer : 100Ω, 10-turn



Solar Module (GES-33001)

- **Solar Cell**
 - ☐ 6 pcs of monocrystalline silicon solar cell 26*156 mm
 - ☐ Each unit solar cells
 - ✓ Open circuit voltage (Voc): 0.63V
 - ✓ Short circuit current (Isc): 1.45A
 - ✓ Maximum load voltage (Vmp) : 0.52V
 - ✓ Maximum load current (Imp) 1.35A
 - ✓ Maximum power (Pmp): 0.7W
 - ✓ Efficiency (Eff): 15%
- **Dimmer**
 - ☐ Adjust the brightness of halogen lamp
- **Light Source**
 - ☐ Halogen lamp 250W

Power Supply

- Input voltage 110/220VAC
- Output voltage 9VDC for DMM use only



List of Experiments

1. Safety Information
2. GES-300 H2 / O2 Fuel Cell Trainer
3. Hardware Installation
4. Energy Conversion of Solar Cell
5. I-V Curve of Solar Cell
6. H 2-to-O 2 Ratio in Water Electrolysis
7. Production Rate of Gas Volume in Water Electrolysis
8. Efficiencies of Electrolyser
9. I-V Curve of Electrolyser
10. H 2/O2 Fuel Cell
11. I-V Curve of H 2/O2 Fuel Cell

Consumables

1. Proton exchange membrane fuel cell
2. Electrolyser
3. Silicone tube

System Requirements

- Deionized water resistance : $\geq 13\text{M}\Omega\text{-cm}@25\text{oC}$

Accessories (GES-39001)

1. AC Power cord
2. Test lead0: 1set
3. Silicone tube: 1set
4. Experiment manual: 1pce
5. Syringe: 1 pce
6. Scissor: 1 pce
7. Measuring glass: 1 pce

Optional

DAQ with Software (GES-13003)

1. Channel 1 and 2 : max. input voltage $\pm 5\text{V}$
2. Channel 3 and 4 : max. input current 1A
3. DAQ type: GES-13003 for Windows 8/ 7/Vista/XP
4. PC Requirements
 - INTEL CPU P4 or better
 - USB port equipped
 - 1GB of hard disk space
 - CD-ROM drive
 - Operating system : Windows 8/Windows 7/Vista/XP



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