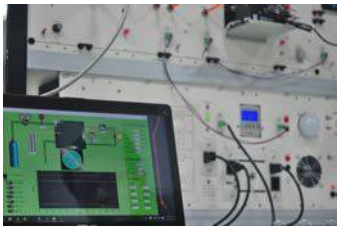
GFC-3100

PEM tüzelőanyagcella hibrid gyakorló rendszer

A PEM hidrogén üzemanyagcella működési elve az, hogy egy proton-cserélő membrán segítségével a hidrogén és oxigén elektrokémiai reakciójából elektromosságot állít elő. A működéhez a hidrogén a tüzelőanyag.
A hidrogén PEM tüzelőanyagcella használatának előnye a nagy hatásfok. Továbbá csak ez a tüzelőanyagcella az, melynél a folyamat eredménye - az elektromosságon kívül - hő és víz, amely nem szennyezi a környezetet, kielégítve a szigorú környezet szennyezésre vonatkozói követelményeket is.
A PEM tüzelőanyagcella hibrid gyakorló rendszer (GFC-3100) egy moduláris felépítésű oktatási rendszer biztonságos működési feltételekkel, amelynél a felhasználó könnyen csatlakoztathatja a tüzelőanyagcellát egy nagynyomású hidrogén hengerhez.
A főbb témák magukba foglalják a működés optimalizálást, a PEM tüzelőnanyagcella energiatárolásának hatékonyságát, valamint a PEm tüzelőanyagcella alkalmazási lehetőségeit.
AGFC-3100 PEM tüzelőanyagcella hibrid gyakorló rendszert a GES-500 szél és napenergia hibrid rendszerrel (opcionális)együtt használva egy megújuló energia szolgáltató rendszer építhető fel, áthidalva a nem folyamatosan rendelkezésre álló szél és napsugárzás okozta problémát.

Features

- An open system architecture & a flexible panel designed for easy replacement of parts
- A specific fuel-cell database provided for learning and R&D application
- Data can be displayed and stored in the software
- Real-time operation status of the system can be observed using a digital meter
- Safety plugs are equipped with all the input and output terminals for the purpose of easy and safe connection during
- experiments.
- Polarity reversal protection is provided to prevent damage from reverse polarity of the supply voltage.
- An effective and efficient solutions are provided for the fundamental learning of hydrogen PEM fuel cells, the method for storing hydrogen, and related safety norms.



Specification

GFC-35001 DC Power Supply

1. AC Input voltage: AC 90~240VAC
2. DC Output: Adjustable, 10.5~13.5 VDC
3. Power rated: 75W
4. Output short protection
5. With digital DC voltage meter: 4½ bits

GFC-35002 Hydrogen Regulator

1. Inlet pressure gauge : 0~400 psi
2. Outlet pressure gauge : 0~30 psi
3. Adjustable outlet pressure
4. Relief valve switch

GFC-35003 Hydrogen Flow Meter

1. Flow meter: 0~2 L/min
2. Precision : ±1.5%
3. Max.pressure : 72.5 psi
4. Communication interface : RS-485
5. With digital flow meter : 4 ½ bits

GFC-35004 100W Fuel Cell Stack

1. Quantity of cell : 20 cells
2. Voltage output : 12V~18V (Operating voltage range)
3. Rated power : 100W
4. Rated performance : 12V at 8.3A
5. Max stack temperature : 60°C
6. Hydrogen purity : 99.999% dry H2
7. Humidification : Self-humidified
8. With temperature sensor : PT-100

GFC-35005 Fuel Cell Controller

1. DC Input voltage : 12V
2. Overheat protection
3. Low voltage protection
4. Overcurrent protection
5. Fan tachometer control
6. Short Control Unit(SCU) switch
7. Purging valve
8. Start switch

GFC-3100

PEM tüzelőanyagcella hibrid gyakorló rendszer

GFC-35006 Fuel Cell DCV/DCA Meter

1. Measuring voltage range : DC 0~100V, 4 ½ bits
2. Measuring current range : DC 0~20A , 4 ½ bits
3. Communication interface : RS-485

GFC-35007 Temperature Meter

1. Digital temperature meter : 0~100°C, 4 ½ bits
2. Communication interface : RS-485

GFC-35008 DC Generator Load Resistor

1. Adjustable wire-wound resistor : 1~21 Ω
2. Power rated : 200W
3. Fuse: 10A

GFC-35009 Digital DCV/DCA Meter & DC-DC Converter

1. Measuring voltage range : DC 0~100V, 4 ½ bits
2. Measuring current range : DC 0~20A, 4 ½ bits
3. DC-to-DC converter :
   Input voltage : DC 9~36V
   Output voltage : DC 12V/10A
   Output with Fuse protection : 10A
4. Communication interface : RS-485

GFC-35010 DC-AC Inverter

1. Power output : 200W
2. Output waveform : Pure sine wave
3. Output voltage : AC 110V 50/60Hz, or
   AC 220V 50/60Hz
4. Input voltage : DC 10~15V, 10A
5. Polarity indicator : Reverse supply protection
6. Abnormal voltage indicator :
   Indicator lights up, if DC input <10V

GFC-35011 AC Load

1. LED Bulb 13W AC 110V or 220V
2. AC Fan AC 110V or 220V
3. Fuse : 1A

GES-53010 Multifunction Power Meter

1. Measuring and display
   ACV/ACA/Watt/Frequency/Power factor/KWH/KWH time
2. Measuring voltage range : AC 80~260V
3. Measuring current range : AC 0~15A
4. Measuring watt/VA range : 0~3900W
5. Measuring KWH range : 0~9999KWH
6. Measuring frequency range : 45~60Hz
7. Equipped with a universal socket
8. Communication interface : RS-485

GES-53012 DC Load

1. 12 VDC 7W LED Bulb
2. 12 VDC Fan
3. Polarity Indicator : Reverse supply protection

List of Experiments

1. GFC-3100 Module Introduction and Software Installation
2. The Operating Principle of Fuel Cell Stack
3. Hydrogen Storage - Theory and Operation
4. Activation Experiment
5. I-V curve
6. Fuel Cell Efficiency Calculation
7. Power Densities of Single Cell and Stack Discussion
8. DC-to-DC Converter
9. Inverter Efficiency
10. Fuel Cell and Solar Power System (With optional GES-500A)
11. Fuel Cells and Wind Power System (With optional GES-500B)
12. Fuel Cells, Wind Power and Solar Power Systems (With optional GES-500)

Accessories

1. Experiment manual
2. Connection leads and plugs : 1set
3. CD : Software
4. USB Cable
5. H2 Regulator
   It is a pressure regulator between high-pressure hydrogen cylinder and GFC-35002.
   (1) Inlet connector : The cylinder connections has 4 types for selection. Confirmation for required type is needed before purchasing.

Gas Connection Assignment Table				
CGA DISS	CGA	JIS	DIN	
Hydrogen	724	350	22-L	DIN1

   (2) Inlet pressure gauge : 0~400 bar
   (3) Outlet pressure gauge : 0~16 bar

6. Rack frame (KL-89003)

Optional
Hydrogen Storage (GFC-35021)

a. Fan x 2
   - Input voltage : 12VDC

b. Metal hydride canister:
   - Hydrogen capacity : 200 L ± 5%
   - Raw hydrogen purity : 99.99 %
   - Charging pressure : 9.9 Bar
   - Discharging pressure : 0... 9.9 Bar
   - Hydrogen purity during discharging : 99.999 %

c. Split Type 3-way ball valve
d. Teflon flexible tube

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DC Electronic Load (GFC-39105)

1. Voltage control range : 0V~60V
2. Current control range : 0A~30A
3. Output power: 150W
4. 5 digital V/A/W meter
5. Power ON status value can be set
6. High-speed measurement and communication transmission
7. Flexible CC, CR, CV, CP, dynamic and short operation modes
8. V/A/W values can be displayed simultaneously
9. SHORT time setting and SHORT_VH, SHORT_VL setting function(s)
10. LCD big display
11. Protection against V, I, W, and °C
12. Setting values can be adjusted by rotary knob or push button (Setting values are adjustable via the rotary knob or the push button)
13. Voltage meter displays the positive (”+”) or negative polarity which (”-”) is selectable.
14. OCP, OPP test function
15. Flexible Load Module configuration
16. Include 150 states store / Recall memory
17. External recall key

GES-500 Wind and Solar Hybrid System

GES-500 (Wind and Solar Hybrid System) is composed of Solar Panel, Battery Bank Module, MPPT Solar Charging Controller Module, DC-AC Inverter Module, Grid-tie Inverter Module, Wind Generator Set, Wind Energy Monitor Module, Three-phase Rectifier Module, Wind and Solar Hybrid Controller Module, Load Module and Meters. By means of combining all these control systems, a teaching platform for implementation of the wind power, solar power and hybrid experiments is presented. It can help students understand the theory of on-grid and off-grid solar power, wind power generation system, hybrid system and further create practical applications.

* Excluding GES-53010 and GES-53012 (as they are already included in GFC-3100)

Consumables

1. Proton exchange membrane fuel cell (20 cells)
2. Metal hydride canister
3. Silicon tube

Requirements

1. Hydrogen purity : 99.99%
2. Personal computer
3. Monkey spanner x 2

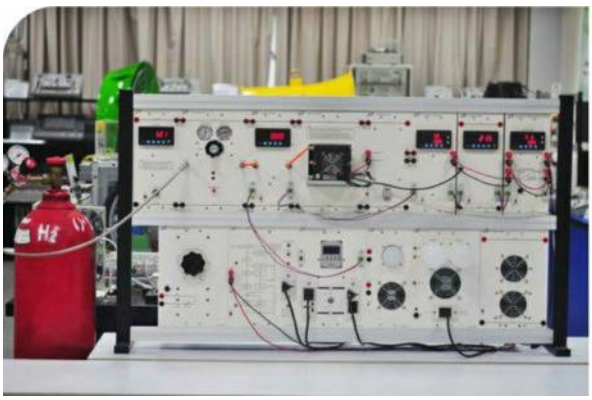
System Requirement

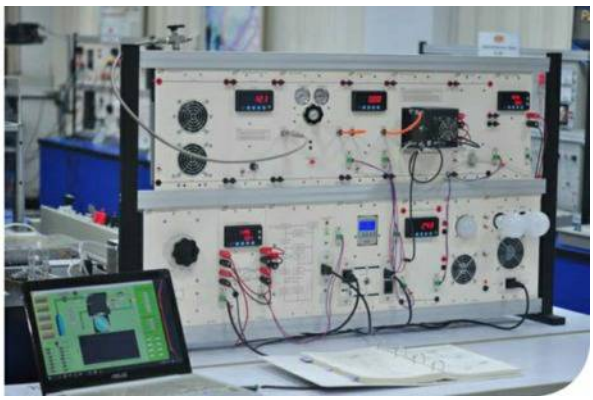
1. PC : 1GHz or faster 32-bit (x86) or 64-bit (x64) processor, 1 GB RAM, 1GB more free disk space
2. OS : Windows XP / Vista / 7 / 8 / 10

GFC-3100 with GES-500	
Module	**Device name**
GFC-35002	Hydrogen Regulator
GFC-35003	Hydrogen Flow Meter
GFC-35004	100W Fuel Cell Stack
GFC-35005	Fuel Cell Controller
GFC-35006	Fuel Cell DCV/DCA Meter
GFC-35007	Temperature Meter
GFC-35009	Digital DCV/DCA Meter & DC-to-DC Converter
GFC-35010	DC-AC Inverter
GFC-35011	AC Load
GES-53010	Multifunction Power Meter
Optional	
GFC-35021	Hydrogen Storage
GES-53001	Wind Energy Monitor
GES-53003	Wind/Solar Hybrid System Controller
GES-53004	Solar Energy/Temperature Meter
GES-53005	MPPT Solar Charging Controller
GES-53009	Battery Bank
GES-58001	Wind Generator Set
GES-58002	Horizontal Axis Wind Turbine
GES-58003	Anemometer
GES-58005	PV Set

GFC-3100 with GES-500A	
Module	Device Name
GFC-35002	Hydrogen Regulator
GFC-35003	Hydrogen Flow Meter
GFC-35004	100W Fuel Cell Stack
GFC-35005	Fuel Cell Controller
GFC-35006	Fuel Cell DCV/DCA Meter
GFC-35007	Temperature Meter
GFC-35009	Digital DCV/DCA Meter & DC-to-DC Converter
GFC-35010	DC-AC Inverter
GFC-35011	AC Load
GES-53010	Multifunction Power Meter
Optional	
GFC-35021	Hydrogen Storage
GES-53004	Solar Energy/Temperature Mete
GES-53005	MPPT Solar Charging Controller
GES-53009	Battery Bank
GES-58005	PV Set

GFC-3100 with GES-500B	
Module	Device Name
GFC-35002	Hydrogen Regulator
GFC-35003	Hydrogen Flow Meter
GFC-35004	100W Fuel Cell Stack
GFC-35005	Fuel Cell Controller
GFC-35006	Fuel Cell DCV/DCA Meter
GFC-35007	Temperature Meter
GFC-35009	Digital DCV/DCA Meter & DC-to-DC Converter
GFC-35010	DC-AC Inverter
GFC-35011	AC Load
GES-53010	Multifunction Power Meter
Optional	
GFC-35021	Hydrogen Storage
GES-53001	Wind Energy Monitor
GES-53003	Wind/Solar Hybrid System Controller
GES-53009	Battery Bank
GES-58001	Wind Generator Set
GES-58002	Horizontal Axis Wind Turbine
GES-58003	Anemometer





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