

Wind and Solar Hybrid System

GES-500



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 to create a teaching platform which can fulfill the wind power and solar power experiment together, and reach to the purpose of education. It can help the student understand the theory of solar on-grid and off-grid, the wind power generation system and further to study the engineering practical application technology.

► Features

- The software can display and store the data.
- Using the digital meter, the user can easily realize the current operation status of the system.
- All the input and output terminals are adopting the safety plugs, use the connection wire to fulfill the experiment is more convenient and freely operation.
- Equipped with the Polarity reverse protection to avoid the modules being damaged caused by the users plug-in the inverse power.
- Adjustable light source, thereby simulating the sunlight intensity
- Adjustable solar panel, thereby simulating the situation of the sunlight irradiation from different angles.

► Specifications

► Wind Generator Set (GES-58001)

1. Blade Diameter : 600mm
2. Frequency : 20-60Hz
3. Voltage : 1Φ 220V
4. Output : 2HP
5. Airflow max. : 340 m³/min



► Horizontal Axis Wind Turbine (GES-58002)

1. Rated Power Output : 200W(AC 0~20V Output)
2. Diameter : 0.68m
3. Number of Blades : 5
4. Start-up wind speed : 3 m/s
5. Rated wind speed : 12m/s
6. Cut off wind speed : 20m/s
7. Yaw : Shroud wind force automatic adjustment



► Anemometer (GES-58003)

1. Power Supply : DC 12V
2. Output Signal : TTL



► PV Set (GES-58005)

1. Halogen : AC 110/60Hz or 220/50Hz, 1000W
2. Dimmer : AC 110 or 220, 1200W
3. PV Module
 - a. Maximum Power : 50W
 - b. Voltage : 17.5V
 - c. Current : 2.86A
 - d. Open Circuit Voltage : 21.5V
 - e. Short Circuit Current : 3.23A
4. Have temperature sensor
5. Have solar power sensor



► Wind Energy Monitor (GES-53001)

1. Anemometer : 0~15m/s
2. ACV Meter : 0-50VAC
3. Communication interface : RS-485



► Three-phase rectifier (GES-53002)

1. DCV Meter : DC 0-50V
2. DCA Meter : DC 0-10A
3. Input Voltage Rated : 3Φ 0~100VAC
4. Output Voltage Rated : DC 0~50V
5. Fuse : 10A
6. For wind powered generator use



► Wind and Solar Hybrid controller (GES-53003)

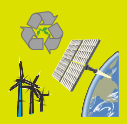
1. PV input Rated : 130Wp
2. Wind Power input Rated : 200W
3. Output Power Rated : 20W
4. Battery Charge Voltage : DC 12V
5. Wind generator dump load voltage : 15V±1
6. Wind generator un-dump load voltage : 13V±1
7. PV stop charge : >15V
8. PV recharge : <14V
9. Disconnect load : 10.5V±1
(PV Voltage higher than 4.5V/10 Sec)
10. Reconnect load : 13V±1
(PV Voltage lower than 4.5V/10 Sec)
11. Wind generator fuse rated : 30A
12. Fuse : 10A
13. Light Mode Switch



► Solar Energy/Temperature Meter (GES-53004)

1. PV Box : Connected PV module for Measuring the temperature and solar power
2. °C/°F Switch: Select Celsius or Fahrenheit
3. Communication interface : RS-485





▶ MPPT Solar Charging Controller (GES-53005)

1. Input Voltage : 16~55V
2. Battery Voltage : 12V
3. Load Voltage : 13.5V
4. Power output : 150W
5. Load Mode Switch: DDS(Dawn to Dusk Switch) and LVD (Low Voltage Disconnect)



▶ Grid-tie Inverter (GES-53006)

1. Power Output : 400W
2. DC Input Voltage: DC 12~28V
3. Output Voltage : AC 120V 60Hz, AC 220V 50Hz
4. Polarity Indicator: Reverse supply protection, The indicator lights up
5. Over Heat : Over heating, The Indicator lights up and shut down
6. MPPT : This is maximum power point tracking, At the maximum power point, The Indicator lights up.
7. Power Indicator : Power ON



▶ DC-AC Inverter (GES-53007)

1. Output Power : 300W
2. Output Waveform : Pure Sine Wave
3. Output Voltage : AC 110V 50/60Hz, AC 220V 50/60Hz
4. Input Voltage : DC 10~15V
5. Polarity Indicator : Reverse supply protection, The indicator lights up
6. Abnormal Voltage Indicator : Indicator lights up, If DC input <10V.



▶ Digital DCV/DCA Meter (GES-53008)

1. Measuring Voltage Range : DC 0~100V
2. Measuring Current Range : DC 0~20A
3. Communication interface : RS-485



▶ Battery Bank (GES-53009)

1. Battery Type : NiCd
2. Battery Pack : Parallel
3. Nominal Voltage : 12V
4. Nominal Capacity : 14.4Ah
5. Charge Voltage : 14V
6. Fuse : 10A
7. Polarity Indicator : Reverse supply protection, The indicator lights up.



▶ Multifunction Power Meter (GES-53010)

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. Selectable input/output socket style
8. Communication interface : RS-485



▶ DC Generator Load Resistor(GES-53011)

1. Adjustable wire-wound Resistor : 100 Ohm
2. Power Rated : 200W
3. Fuse : 10A



▶ DC Load (GES-53012)

1. 12 VDC 7W LED Bulb
2. 12VDC Fan
3. Polarity Indicator : Reverse supply protection, The indicator lights up.



▶ AC Load (GES-53013)

1. Light Bulb 20W AC 110V or 220V
2. Light Bulb 40W AC 110V or 220V
3. AC Fan AC 110V or 220V
4. Fuse : 2A



▶ List of Experiments

▶ Solar power generation system manual

- Ex1 Power system of Solar cells
- Ex2 Introduction of Solar cells system
- Ex3 Conversion test of solar photovoltaic energy
- Ex4 Solar cell characteristic curve test
- Ex5 The influence of temperature on solar cell
- Ex6 Solar cells affected by different light angles curves
- Ex7 The efficiency and maximum power of solar cell
- Ex8 Solar cells generation-Off-grid system
- Ex9 Solar cells generation-Streetlight system
- Ex10 Solar cells generation-Grid-tie system

▶ Wind Power System Manual

- Ex1 Power system of Wind turbine
- Ex2 Introduction of Wind turbine generator system
- Ex3 Wind speed and Wind Turbine
- Ex4 Loading and unloading with Wind Turbine
- Ex5 Wind energy coefficient of Wind turbine
- Ex6 Power curve of Wind turbine
- Ex7 Wind power generation-Off-grid system
- Ex8 Wind power generation-Grid-tie system

▶ Scenery complementary laboratory manual

- Ex1 Introduce of Wind and Solar Hybrid system
- Ex2 The efficiency of DC-AC Inverter
- Ex3 The efficiency and Islanding Effect of Grid-tie inverter
- Ex4 Wind and Solar Hybrid system-Off-grid
- Ex5 Wind and Solar Hybrid system-Streetlight
- Ex6 Wind and Solar Hybrid system - Grid-tied

▶ Accessories

1. Experiments manual
2. Connection leads and plugs : 1set
3. CD : software
4. USB to RS-485 Converter
5. 12 VDC 7W LED Bulb
6. Light Bulb 20W AC 110V or 220V
7. Light Bulb 40W AC 110V or 220V

▶ Requirements

Personal computer

▶ Optional

▶ Vertical Axis Wind Turbine (GES-58004)

1. Rated Power Output : 70W(AC 0~20V Output)
2. Dimension : Rotor Diameter 0.8m / Rotor High 0.7m
3. Number of Blades : 8
4. Start-up wind speed : 3 m/s
5. Rated wind speed : 12m/s
6. Cut off wind speed : 20m/s



▶ DC Electronic Load (GES-53021)

1. With GES-500 software operating using
2. Measuring Voltage Range : DC 2V~30V
3. Measuring Current Range : 0~20A
4. Measuring Power Range : 200W
5. Communication interface : USB
6. Power supply : DC 12V from adapter
7. Fuse : 20A



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