



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.

● Features

1. The software can display and store the data.
2. Using the digital meter, the user can observe the current operation status of the system.
3. All the input and output terminals are adopting the safety plugs. Users can implement the experiments with the connecting wires easily and safely.
4. Equipped with the Polarity reverse protection to avoid the modules being damaged due to the wrong input of inverse power.
5. Adjustable light source for the sunlight intensity
6. Adjustable solar panel, simulating the situation of the sunlight irradiation from different angles.

● Specifications

Wind Generator Set (GES-58001)

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



Horizontal Axis Wind Turbine (GES-58002)

1. Power Output : 400W (3Ø 0~20V AC output)
2. Number of Blades : 3
3. Start-up Wind Speed : 3m/s
4. Rated Wind Speed : 12m/s
5. Cut off Wind Speed : 20m/s
6. FRP Safety Nets



Anemometer (GES-58003)

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



PV Set (GES-58005)

1. Halogen : 110V AC or 220V AC, 1000W
2. Dimmer : 110V AC or 220V AC, 1200W
3. PV Module
 - (1) Maximum power : 50W
 - (2) Voltage : 17.5V
 - (3) Current : 2.86A
 - (4) Open circuit voltage: 21.5V
 - (5) Short circuit current : 3.23A
4. Temperature Sensor
5. Solar Power Sensor



Wind Energy Monitor (GES-53001)

1. Anemometer : 0~15m/s
2. ACV Meter : 0~50V AC
3. Communication Interface : RS-485



Three-phase Rectifier (GES-53002)

1. DCV Meter : 0~50V DC
2. DCA Meter : 0~10A DC
3. Input Voltage Rated : 3Ø 0~100V AC
4. Output Voltage Rated : 0~50V DC
5. Fuse : 10A
6. For Wind Powered Generator Use



Wind / Solar Hybrid System Controller (GES-53003)

1. Controller Rated Voltage : 10V
2. Wind Rated Power : 200W
3. PV Rated Power : 100W
4. Max. PV OCV : 30V
5. Rated Output Current : 10A
6. Wind Generator Dump Load Voltage : 16.5V ±1
7. Battery Low Voltage Cutoff (LVC) : 10.8V adjustable
8. LCD Display : display output voltage and battery capacity
9. LED Indicator : indicate states of wind generator, solar, battery, and system fault





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 : 16V~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 : 12V~28V DC
3. Output Voltage : 110V AC, 50Hz/60Hz
220V AC, 50Hz/60Hz
4. Polarity Indicator: reverse supply protection
5. Overheat : over heating protection
6. MPPT : for Max. power point tracking
7. Output Indicator : power ON



DC-AC Inverter (GES-53007)

1. Power Output : 150W
2. Output Waveform : pure sine wave
3. Output Voltage : 110V AC, 50Hz/60Hz,
220V AC, 50Hz/60Hz
4. Input Voltage : 10V~15V DC
5. Polarity Indicator : reverse supply protection
6. Abnormal Voltage Indicator : indicator lights up, if DC input < 10V



Digital DCV/DCA Meter (GES-53008)

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



Battery Bank (GES-53009)

1. Battery Type : Lead-Acid
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



Multifunction Power Meter (GES-53010)

1. Measuring and Display ACV/ACA/Watt/Freqz/Power Factor/KWH/KWH Time
2. Measuring Voltage Range : 80V~260V AC
3. Measuring Current Range : 0~15A AC
4. Measuring Watt/VA Range : 0~3900W
5. Measuring KWH Range : 0~9999KWH
6. Measuring Frequency Range: 45Hz~60Hz
7. Use Universal Socket
8. Communication Interface : RS-485



DC Generator Load Resistor (GES-53011)

1. Adjustable Wire-Wound Resistor : 100Ω
2. Power Rated : 200W
3. Fuse : 10A



DC Load (GES-53012)

1. LED Bulb : 12V DC, 7W
2. DC Fan : 12V DC
3. Polarity Indicator : reverse supply protection



AC Load (GES-53013)

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



List of Experiments

Solar Power Generation System Manual

- Ex 1 Power system of Solar cells
- Ex 2 Introduction of Solar cells system
- Ex 3 Conversion test of solar photovoltaic energy
- Ex 4 Solar cell characteristic curve test
- Ex 5 The influence of temperature on solar cell
- Ex 6 Solar cells affected by different light angles curves
- Ex 7 The efficiency and maximum power of solar cell
- Ex 8 Solar cells generation-off-grid
- Ex 9 Solar cells generation-streetlight
- Ex10 Solar cells generation-grid-tie

Wind Power System Manual

- Ex 1 The principle of wind power
- Ex 2 Introduction of wind system
- Ex 3 Wind speed experiment of a wind turbine
- Ex 4 Open circuit and loading experiment of wind turbine
- Ex 5 Wind energy utilization factor of wind turbine
- Ex 6 Power curve experiment of wind turbine
- Ex 7 Wind power generation-off-grid
- Ex 8 Wind power generation-grid-tie

Scenery Complementary Laboratory Manual

- Ex 1 Wind and solar hybrid system
- Ex 2 The efficiency of DC-AC inverter
- Ex 3 The efficiency and Islanding effect of grid-tie inverter
- Ex 4 Wind and solar hybrid system-off-grid
- Ex 5 Wind and solar hybrid system-streetlight
- Ex 6 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. LED Bulb : 12V DC, 7W
6. Light Bulb : 110V AC or 220V AC, 20W
7. Light Bulb : 110V AC or 220V AC, 40W
8. Rack Frame (KL-89003)

System Requirement

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

Optional but Necessary

Digital Multimeter

DC Power Supply (output voltage : 0~±30V, output current : 6A)



GES-500A	
Module	Device Name
GES-53004	Solar Energy /Temperature Meter
GES-53005	MPPT Solar Charging Controller
GES-53006	Grid-tie Inverter
GES-53007	DC-AC Inverter
GES-53008	Digital DCV/DCA Meter
GES-53009	Battery Bank
GES-53010	Multifunction Power Meter
GES-53011	DC Generator Load Resistor
GES-53012	DC Load
GES-53013	AC Load
GES-58005	PV Set

GES-500B	
Module	Device Name
GES-53001	Wind Energy Monitor
GES-53002	Three-phase Rectifier
GES-53003	Wind / Solar Hybrid System Controller
GES-53006	Grid-tie Inverter
GES-53007	DC-AC Inverter
GES-53008	Digital DCV/DCA Meter
GES-53009	Battery Bank
GES-53010	Multifunction Power Meter
GES-53011	DC Generator Load Resistor
GES-53012	DC Load
GES-53013	AC Load
GES-58001	Wind Generator Set
GES-58002	Horizontal Axis Wind Turbine
GES-58003	Anemometer