Wind Turbine and Solar Trainer

Category: New & Renewable Energy · Model reference: MZM-5007



SPECIFICATIONS

DESCRIPTION
Designed to enable the user to use easily as system diagram is attached with voltmeter and ammeter on every measurement area. The experiments and its objective to achieve the particular objective are as follows:
- Practice of the configuration of Solar Generating System
- Practice of Characteristic Curve of the Solar Module
- Photocurrent as a Function of Distance and Angle of Incidence of the Light Source
- Practice of Inverter and DL Loading Characteristics

TECHNICAL SPECIFICATION:
The trainer should consist of the following :
1. Halogen Lamps
for generating solar battery Composed of 300W halogen lamps (4ea)
Each lamp has it's to turn ON and OFF for the light source output with various conditions.
2. Solar Panel and Install kit Components
A multi-crystalline silicon solar cell (Solar 12v 125W PV Module) has Cross Arm bracket and angle control brackets. PV Panel is designed to tilt by angles and the Module generates DC 12V with 125W maximum power when being lighted and delivers power to the Power Monitor Rack. The features of PV Panel are as follows: Standard Test Condition = 1kW/m2 radiant illumination intensity, Am1.5 spectrum, cell temperature 25C
FEATURES:
Open circuit Voltage (Voc) = 21.8V
Optimum operating voltage (Vmp) = 17.4V
Short circuit current (Isc) = 7.64A
Optimum operating current (Imp) = 7.18A
Maximum power at STC (Pmax) = 125W
Nominal circuit voltage (Vnc) = 12V
No. of cell and connection = 36 (4x9)
Operating temperature = -40 to +85C
3. Power Monitor Rack
Power monitor rack is used to do characteristic test and battery charging DC loading test using solar output voltage Designed to do current load test through the inverter.
• When installed, ensure that the Power Monitor case is not in contact with any earthed metalwork since this may result in inaccurate readings.
• Connect polarity when making electrical connections as follows Red = positive+, black (blue) = Negative-
A. Display Unit
Display device panel shows voltage, current, power, and frequency that measure AC load from solar panel.
· Solar cell DC Voltmeter
This DC Voltmeter indicates real voltage indicates real voltage generated from the photovoltaic module.
· Solar cell DC Ammeter
This DC Ammeter indicates real current that is generated from the photovoltaic module and flows to the battery through battery charger or indicates current when measuring power current property of Solar Cell using by Solar Output terminal. (But this time connect horizontally with each battery & Charger +, - terminal)
· Solar output terminal
This terminal uses generated output from solar cell, it uses when conduct property experiment. (But this time connect horizontally with each Battery & Charger+, - terminal)
· Battery & Charger Terminal
This terminal is conversion terminal for performing property experiment or recharging the battery by generated output from Solar Cell.
· +,- Horizontal connection: Does not connect to battery. Connecting method when measure property using generated output Solar Cell.
· +,- Vertical connection: connect to battery. Connecting method of generated output from Solar Cell to Battery.
· Battery DC Voltmeter
This DC voltmeter indicates actual battery voltage.
• Battery DC Ammeter
This DC voltmeter indicates actual current that flows to inverter through the battery.
• Battery Output Terminal
This terminal is output terminal recharged voltage to battery through recharging circuits. This is used for DC load experiment by battery output voltage. (When each battery & charger +,- terminal is vertically connected.
• Inverter AC Voltmeter
This AC Voltmeter indicates AC voltage that flows to a load device from the inverter.
• Inverter AC Ammeter
This AC Ammeter indicates AC current that flows to a load device from the inverter. The maximum toleration current value that flows from the inverter through the power monitor is 5A. Please check the rated power of any load devices.
• Inverter AC frequency indicator
This AC frequency indicator indicates AC current frequency that flows to load devices from the inverter.

B. DC Load Panel
This panel consists of digital voltmeter and ammeter and variable load resistance (100 ohm 50W) for load experiment using generated voltage from solar cell by direct output. Also there is DC load for load experiment which using solar cell generated voltage and charged voltage of storage voltage. Dc load consists of resistance load selected by 5 step switches, DC 12V Lamp load, and buzzer.
• Digital Voltmeter
This digital Dc voltmeter measures generated voltage from photovoltaic module and battery output voltage.
• Digital Ammeter
This digital DC ammeter indicates actual current through load resistance generated from photovoltaic module and battery output voltage when performing load experiment.
• Load
This resister is variable load resistor used when conduct property experiment by solar cell generation voltage. (Variable range: 2Ω - 100Ω)
• Resistor
This resistor is for load experiment by battery voltage select 12 Ω (1A), 6Ω (2A), 4 Ω (3A), 3 Ω (4A), 2.4 Ω (5A), and OFF, perform experiment. (current: 12v supply)
• Lamp
This lamp is used for load by DC 12V
• Buzzer
This buzzer is used for load by DC 12V
C. AC 200V Load Panel
This panel is for the loading test using AC 220V produced from the inverter. Please take care of short circuit or electric shock and keep the rated power to protect the power monitor rack and damage of load
• Lamp
Lamp is used as a load by connecting to the inverter output insulation terminal. The user can measure and record the change value of AC voltmeter , AC ammeter, AC Ammeter, and AC frequency indicator.
• Motor
Motor is used as a load by connecting to the inverter output insulation terminal. The user can measure and record the change value of AC voltmeter, AC ammeter, AC ammeter and AC frequency indicator.
• AC220V Load Outlet
Plug socket is used for a load by connecting with electric or electronic equipment. The maximum rated power of the equipment for the test is 1000W.
• Inverter Output S/W
This is the switch to connect AC voltage produced from the inverter. Neon lamp is ON by this Switch.
• Main Power S/W
Main power switch is used for ON/OFF for the power supply of display panel and halogen lamp. Neon lamp is ON by this switch.
• Halogen lamp Outlet
Plug socket is used for supplying power to halogen lamps for radiating light to solar panel. When turn on the switch, the same power with power monitor rack is supplied to plug socket. And Neon lamp is ON by this switch.
D. Battery & inverter panel
• Solar cell panel
This is solar input terminal. Please take care of connecting polarity correctly to avoid damaging of solar cell, battery, and circuits. The same input terminal is provided on the left side of power monitor rack.
• Battery check
This is the terminal to check battery voltage. A digital multi-meter is generally used to measure battery voltage. In case of the main power switch is OFF, the battery voltage can also be measured by this terminal.
• Inverter Check Input
This terminal is used for checking DC 12V supplied to supply the inverter by digital multi-meter.
• Inverter Check Output
This is the terminal to check AC output of inverter by using a digital multi-meter.
• Inverter status
Inverter status shows input voltage and load rate (%) by level meter and has inverter operating switch.
• BNC measuring terminal
This is the terminal to measure the voltage of solar cell input, battery check, and inverter check output using an oscilloscope. BNC probe of oscilloscope is connected.
E. Slim lamp panel
This is panel to turn on fluorescent light by inverter output by connecting AC 220V input terminal.
F. Experiment
· Hands-on skills & troubleshooting ability across the types of PV systems commonly used such as AC/DC & grid-tie
· Computerized fault insertion for both electrical & fluid systems
· It consists of mobile workstation, PV systems, component panels with breakers, combiner box, remote programmer unit, MPPT charge controller, lamps, batteries, meters, grid-tie inverter, fault insertion system
· Topics include module operation, PV module performance, PV array connection, solar batteries, DC solar PV systems, charge controllers, AC solar PV systems, PV inverters, grid-tie systems, energy demand & conservation, solar PV system & component sizing, solar PV system performance, troubleshooting
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