Grid-Connected Renewable Energy System (Microgrid)

This versatile microgrid system, complete with an energy management controller, allows homes or small businesses to utilize renewable energy sources such as solar and wind power. During optimal conditions, the system powers your property with renewable energy, feeding any excess electricity back into the grid. When renewable sources are unavailable, the system seamlessly switches to grid electricity, eliminating the need for costly storage solutions like batteries.

Wind Power Generator

- **Blades:** Three carbon fiber blades.
- **Rotor Diameter:** 1.15 m.
- **Rated Wind Speed:** 14.5 m/s (52 km/h).
- **Start-Up Wind Speed:** 2.2 m/s (8 km/h).
- **Start-Up Charging Speed:** 2.5 m/s (9 km/h).
- **Generator:** Three-phase permanent magnet.
  - **Rated Voltage:** 12 VDC.
  - **Rated Power Output:** 420 W.
  - **Charging Indicator:** LED (blue).
- **Stackable Mast:**
  - **Material:** Polished stainless steel.
  - **Tube Length:** 3 x 1 m.
  - **Total Height:** 2.8 m or better.
  - **External Diameter:** 48.1 mm.
- **Mounting Kit:** Included for installation.
- **Indoor Operation Device:** Included for indoor wind generator operation.

Note: Specifications are subject to change, Photos shown above are Indicative, Actual Product can Vary.

Mobile Photovoltaic Solar Array

- **Frame:** Wheeled stainless steel for easy mobility.
- **Photovoltaic Panels:**
  - ➤ Two modules with a peak power of 120 W each.
- **Solar Tracker:**
  - ➤ **Tracking:** Automatic/manual dual-axis tracking (right/left and up/down) for maximum insolation.
  - ➤ **Sensors:** Solar sensors assembly.
  - ➤ **Actuators:** DC motor-driven actuators.
- **Indoor Lighting Device:** Included for indoor operation.

Mobile Control Panel

- **Structure:** Wheeled steel frame.
- **Front Side:** Features a comprehensive, colored system diagram.
- **Back Side:** Equipped with an AC loading system consisting of five switchable lamps, each equivalent to 30 W.

Buffer Battery

- **Voltage:** 12 VDC.
- **Capacity:** 260 Ah.
- **Shelf:** Dedicated shelf for the buffer battery (12 VDC, 260 Ah).

Hybrid Charge Controller

- **Max Power Input (Wind Generator):** 600 W.
- **Max Current Input (Wind Generator):** 40 A.
- **Max Power Input (Solar Panel):** 550 Wp.
- **Max Current Input (Solar Panel):** 40 A.
- **Max Total Charge Current:** 80 A.
- **Max Switch Off Current at Load Output:** 15 A.
- **Display:** LCD for visualizing all operating parameters.
- **Control Interface:** 5 touch keys with 2 signaling LEDs.
- **Thermal Management:** Thermally switched vent to maintain optimal operating temperature.
- **Battery Compatibility:** Supports charging for all types of lead batteries (Gel, AGM, and acid).

Sine Wave Inverter

- **Input Voltage Range:** 9.5-17 VDC.
- **Output Voltage:** 220 VAC ±2%, 50 Hz ±0.1%.
- **Continuous Output Power at 25°C:**
  - ➤ 800 VA.
  - ➤ 700 W.
- **Peak Power:** 1600 W.

Note: Specifications are subject to change, Photos shown above are Indicative, Actual Product can Vary.

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- **Charger:**
  - ➢ **Input:** 187 - 265 VAC, 45 - 55 Hz.
  - ➢ **Power Factor:** 1.
  - ➢ **Battery Charge Current:** 35 A.

Instrumentation

- **DC Parameters:** Four microprocessor-based instruments.
- **AC Parameters:** Two microprocessor-based instruments.
- **Sensors:**
  - ➢ **Anemometer Probe:** Measures and transmits wind speed to the control panel.
  - ➢ **Temperature Sensors:**
    - • One for measuring ambient air temperature.
    - • One for measuring photovoltaic panel temperature.
  - ➢ **Pyranometer Probe:** Measures and transmits solar radiation incident on the photovoltaic panel to the control panel.

Portable Rheostat

- **Control:** Slider-based control.
- **Winding:** Double winding with four sections each.
- **Ohmic Value:** 2 x 20 ohms.
- **Power:** 1200 W.

PC Data Acquisition

- **Software:** Specific software for data monitoring, recording, and analysis.
- **Connection:** RS485/USB adapter for PC connection.
- **Network:** All instruments and sensors are connected via a Modbus network.

Connection Lead Set

- **Specifications:** All leads are appropriately rated to ensure safe and effective connections within the hybrid system.

Manuals

- **Teacher and Student Manual:** Comprehensive guide for educational purposes.
- **Troubleshooting Manual:** Detailed instructions for identifying and resolving system issues.

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