



SOLAR ENERGY TRAINER KIT

Model: SE-550/8-HYBRID



INTRODUCTION

- Empower students and professionals with cutting-edge solar energy training.
- The SE-550/8-HYBRID Solar Energy Trainer Kit is a complete, hands-on learning solution for understanding photovoltaic systems, battery storage, and hybrid inverter technology.
- Designed with real-world components, it's ideal for classroom, laboratory, and outdoor field demonstrations.

SYSTEM TYPE

- Off-Grid Hybrid System – Perfect for simulating both off-grid and grid-support solar power solutions.
- Suitable both education and real world application

SYSTEM COMPONENTS

The system consists of:

- Off-Grid Inverter:

- Type: Hybrid Inverter (Off-grid only)
- Rated Power: 5 kW
- System Voltage: 48V DC
- Max Charging Current: 100A
- Supports solar-battery-load operation independent of grid

-Solar PV Modules:

- Quantity: 8 modules
- Rating: 550W each (Total: 4.4 kW)
- Type: Mono-facial
- Mounting: Movable frame with adjustable tilt
- Realistic clamping and orientation mechanism
- Hands-on exposure to solar irradiance, panel alignment, and wiring

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- Battery Storage System:

- Chemistry: LiFePO₄
- Voltage: 51.2V
- Capacity: 100Ah
- Safe, efficient, and long lifecycle

- External MPPT Charge Controller:

- Independent MPPT unit
- Used for comparison with inverter's internal charging method
- Enables flexible PV-battery system studies

- Load and Output System:

- AC Load Bank with output socket
- DC Load Terminals
- Load switches, indicators, and safety protections
- Simulates real appliance usage and effect on system

- Power Monitoring System:

- Bidirectional Power Cum Energy Meter
- Measures: Voltage, Current, Active Power, Energy (kWh), Power Factor
- Enables tracking of real-time system behavior
- Wifi Monitoring Module + Tablet

- Safety and Wiring:

- 4mm Banana Shrouded Connectors
- Fuse and Circuit Breakers for all critical paths

KEY FEATURES

- Fully operational with or without sunlight (battery simulation mode)
- Real-time monitoring of power generation and flow
- User-friendly layout for easy component tracing and wiring
- Built-in protection: Overvoltage, short circuit, and reverse polarity
- Designed for durability and mobility
- Suitable for schools, universities, training centers, and government demos

EDUCATIONAL OBJECTIVES

- Learn photovoltaic (PV) generation and battery storage principles
- Understand MPPT functionality and performance optimization
- Analyze grid-tied vs. off-grid system behavior
- Experiment with real-time load behavior and inverter operations
- Observe solar system efficiency under varying sunlight conditions
- Understanding Solar Energy Basics
- System Design and Integration
- Operating an Off-Grid Solar Energy System
- Fault Diagnosis and Troubleshooting
- System Monitoring and Maintenance

EXPERIMENTAL MODULES

- PV Panel Output Analysis (V-I-P Curve)
- Charging and Discharging Battery Cycles
- Load Efficiency at Different Inverter Outputs
- Solar-to-Battery vs. Direct Solar Load Supply
- Hybrid Simulation: Grid + Solar + Battery Integration

MAINTENANCE & SAFETY

- Always wear PPE when operating live systems
- Regularly clean solar panels for peak performance
- Check inverter firmware for updates
- Ensure power is disconnected before servicing
- Replace fuses and inspect terminals routinely

Operation Principle

