



SOLAR ACADEMY COURSE AGENDA: SUNNY BOY 1

This course offers a basic understanding of Sunny Boy inverters and their interaction with the utility grid. Topics include Sunny Boy product knowledge, U.S. utility transformer integration, SMA DC disconnect, components of grid-tied PV systems, residential grid-tied battery backup basics using Sunny Boy inverters, inverter safeguards per UL1741. Also covered are installation requirements based on the National Electrical Code (NEC) and safe installation practices for working with high voltages. Hands-on training provides reinforcement of training concepts.

Components of Residential Grid Tie Photovoltaic Systems

Function and overview of the 4 basic parts of a grid tie PV system, module mounting methods and their uses, inverter topologies and IGBT operation, operating parameters of Sunny Boy inverters, UL1741 and its role in grid tie PV systems, electrical safety when installing PV.

SMA Sunny Boy Inverters

SMA residential inverter product line, Sunny Boy configuration for residential applications, inverter grounding methods as per NEC, SMA DC disconnect technical description, use and wiring practices, Sunny Boy MPP tracking and importance of proper array design, array design using Sunny Design software, conductor and overcurrent protection sizing per NEC, inverter installation and preventative maintenance.

» See reverse for detailed course topics.

Training Day Schedule

Continental breakfast: 8:30 AM

Morning break: 10:00 AM

Lunch: 12:00 PM to 1:00 PM

Afternoon break: 2:30 PM

All participants will receive training materials on the day of the training. As in any professional presentation environment, please silence or turn off cell phones, laptops, PDAs, photo and video cameras, audio recorders or any other electronic equipment.

COURSE: SUNNY BOY 1 (SB1)

CLASS DURATION: 6 HOURS

NABCEP CREDITS: 5 HOURS

1. Components and operation of a Grid Tied Photovoltaic System

Functionality of components: Wiring, PV Array, Combiner, DC disconnect, Inverter, AC Disconnect, Breaker, AC Distribution Panel, Meter.

Balance of System components required by the National Electrical Code.

Principle of operation of a Grid Tied Photovoltaic System.

Inverter Topologies. Transformer and transformer-less Grid Tied Inverters. Single and Multiple MPP channel inverters.

Modules in Series, Strings in parallel. Strings vs. Terminals.

Grid protective functions of a grid interactive inverter required by UL 1741. Anti Islanding. ANSI Voltage Ranges.

Current Source and Voltage Source. Effect of increased impedance on the AC wiring.

Ground Fault Detection Interrupt (GFDI) as required by NEC Article 690.5.

Testing the PV array. Open Circuit Voltage, Short Circuit Current, Ground Fault.

Components of a Grid Tied Photovoltaic System with battery backup.

> Observation of live inverter start up sequence, response to Insufficient DC input voltage and grid over voltage.

2. Safety Basics

Safety hazards of operational and non-operational PV systems. Lethal DC and AC Voltages in a PV system.

Safety hazards, practices and protective equipment during PV system installation and maintenance.

3. SMA Inverters

How to find the UL listing of SMA inverters on the file E210376 of the UL web site.

Current lineup of SMA Grid Tied Inverters.

Inverters Sunny Boy by AC voltage.

Inverter interaction with single phase residential systems.

Inverter Grid voltage selection and neutral configuration.

Inverter configuration for positive to ground or negative to ground PV arrays.

Description and functionality of the inverter terminal blocks: DC, AC, Equipment Ground, Grounding Electrode Conductor.

Inverter grounding for single and multiple units.

SMA DC disconnect: features and wiring.

> Hands on Activity: Wiring of a DC Disconnect and Inverter for single phase residential applications.

4. System Design for a residential application

Inverter Sizing.

PV array sizing using the software Sunny Design.

AC and DC wiring sizing using Sunny Design and AC voltage drop calculator.

Minimum and Maximum Series Fuse Size.

Sizing the over current protection device (AC Breaker).

Main Panel Breaker. Ampere Rating of the Bus Bar

NEC requirements for the Load Side Connection (Article 690.64)

5. Installation, commissioning and troubleshooting

Selection of inverter mounting location.

Impact of air flow, temperature, exposure to direct sunlight.

Wiring

Commissioning

Display and LED code messages

Basic Troubleshooting

Maintenance

Introduction to Data Logging and Monitoring

> Observation of live PV plant data using the Flash Application.