



SOLAR ACADEMY COURSE AGENDA: SUNNY BOY 2

Upon completion of Sunny Boy 2, participants will have a solid understanding of the grid-tied components and functionality of Sunny Boy inverters and Sunny Tower in 3-phase commercial applications. This course also covers commercial applications and commercial-scale string sizing, installation code compliance, best practices and commissioning. Sunny Boy 2 is highly recommended for PV installers, solar designers and PV sale engineers.

Overview Grid Tied Photovoltaic Systems in 3-Phase Applications

Principles of 3-phase power generation and distribution, inverter operation on 3-phase transformers. AC and DC components including combiner boxes and disconnects. Hands on activity includes AC and DC wiring of Sunny Boy inverters and Sunny Tower.

System Design and Installation

String sizing using Sunny Design, installation best practices, grounding. Troubleshooting common AC and DC error messages, PV ground fault detection. Commissioning and code compliance. Theory to practice exercise: live Sunny Design system sizing.

» See reverse for detailed course topics.

Training Day Schedule

Continental Breakfast: 8:30 AM

Lunch: 12:00 PM to 1:00 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 2 (SB2)

CLASS DURATION: 6 HOURS

NABCEP CREDITS: 5 HOURS

1. Three Phase Systems

Single phase vs. three phase systems. Three phase utility power systems.

Three Phase utility step down transformers with and without a neutral.

Single phase and three phase inverters in three phase systems.

Phase imbalance. Utility requirements.

Inverter response to Line to Line voltages and Line to Neutral voltages outside UL1741 ranges.

Consequence of installing Grid Tied inverters in parallel to single or three phase generators.

> Observation of live inverter response to voltages outside UL1741 ranges in 208 Delta 120 Wye and 240:120 Split Phase.

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. Sunny Boy inverters in three phase applications

Review of features of SB 5000US, SB 6000US and SB 7000US.

Connection of inverters to three phase utility grid transformers 208, 240 and 277 VAC.

Grid voltage selection. Xformer Error. Neutral selection and Grid Time Out Error.

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

Neutral, L1, L2, Equipment Ground and GEC. Differences of Neutral Terminal in 277 respect to 240/208 VAC.

Inverter grounding for single and multiple units.

SMA DC disconnect: features and wiring. Wiring inverters without using SMA disconnect.

Wiring between combiner box output and the combined input of SMA DC disconnect.

> Hands on Activity: Wiring of a DC Disconnect and Inverter for a three phase application.

4. Sunny Tower

Features of ST 36 kW and ST 42 kW.

Mechanical installation. Cement Slab. Side and bottom conduit access. Mounting inverters to Sunny Tower.

Wiring DC, AC from inverters to ST. Wiring of Sunny Tower to three phase utility 208,240 and 277 VAC.

RS 485 wiring and Sunny Web Box installation.

5. System Design for a three phase application

Inverter model selection, Number of Inverters, Number of full rings and Number of odd out inverters.

PV array sizing using the software Sunny Design and the String Sizing program.

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

Over current protection device on DC per NEC. Minimum and Maximum Series Fuse Size.

Sizing the over current protection device.AC Breaker.

Panel and Breaker sizing. Phase current in single pole vs. two pole breakers. Full ring, one odd out and two odd out rings.

NEC requirements for the Load Side Connection (Article 690.64) .Ampere Rating of the Bus Bar.

6. Installation, commissioning and troubleshooting of inverters in three phase.

Selection of inverter mounting location respect to sub panel or main panel.

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

Wiring of three phase systems.

Commissioning of multiple inverters in three phase systems

Display and LED code messages.

Troubleshooting and Maintenance.

Introduction to Data Logging and Monitoring. Web Box and Sunny Portal

> Observation of live PV plant data on Sunny Portal.