



Energy Switch Operating Manual

Introduction

This document covers the operation and use for the Energy Switch micro-grid system. The system has been designed to abstract the operation of a multiple energy source micro-grid so that as a homeowner you have no need to interact regularly with the Energy Switch. It is a set and forget system which will maximize self consumption and minimize grid impacts due to intermittent solar generation.

Installation

The Energy Switch is designed to be installed by qualified and trained personal. During installation the homeowner will designate critical/non-critical loads that can be shed during power outages to maximize battery life.

The Energy Switch will be installed with a battery charge of less than 25%, to ensure safety during system transport. The system will require 1-2 hours of charging before beginning full operation.

Display

The Energy Switch has a LCD touch screen display. The screen can be used to operate the system, switching between modes. The connections to the energy switch can be thought of as a energy source, a load, or a combination.

Energy sources are grid-tie solar arrays and generators. These devices need to be protected from reverse energy flows which can be damaging. Loads are devices that absorb power, such as a house or battery. In some cases the device can be a source or a load, like batteries and the grid. The batteries can provide power to the house or grid or accept power from sources.

Source	Load	Source and Load
Solar	House	Battery
Generator		Grid

The display shows the direction of power flow and the amount of power being generated from all of the sources, and the power being used by all of the loads.

Operation

Modes 1 and 2

Once the system has reached a minimum operational battery charge level it can be moved from Mode 5 (it's default power on state) to Mode 1 or 2. The system will decide the best option between the two so it is possible that setting the system into Mode 1 will result in the system moving to Mode 2 operation.



Figure 1 Mode 1 Screen

Mode 1 means the system is not allowing reverse power flow to the grid. It is possible to keep all energy production local. In some cases it is not possible to keep all production local and some of the energy must be sold back to the grid.

The example screen shot (Figure 1) shows the home using 2000W and the solar producing 100W the solar power is directly being used in the home.

Mode 2 makes an effort to maximize stored energy locally minimizing power sold back to the grid. In the example Mode 2 screen (Figure 2) the batteries are full and the system is allowing the solar production to be sold onto the grid since it cannot be kept local.



Figure 2 Mode 2 Screen

Modes 3 and 4

Modes 3 and 4 are off-grid modes, for use in the event of a grid outage or demand response event from the local utility. The system will automatically switch to mode 3 in the event of a grid outage. If

there is a local secondary source of generation, such as a gas or diesel generator the system will move to Mode 4 once the secondary generation is brought online.



Figure 3 Mode 3 Screen



Figure 4 Mode 4 Screen

Mode 5

If the system ever needs to be taken offline to fully recharge batteries or to shut it down and perform maintenance requiring the unit to be opened up Mode 5 can be used to bypass the energy switch and place the house back on grid in a standard mode. The homeowner does not endure a service interruption for mode 5.

There are no local solar production or grid benefits to Mode 5, so it's continuous use should be avoided.



System Maintenance

The Energy Switch has been designed to minimize maintenance.

Battery

There is no user serviceable parts for the battery modules. The Lithium Ion batteries do not require maintenance.

Filters



Input air filters need to be cleaned once a month. They are easily removed and vacuumed with a residential vacuum cleaner brush attachment.

Inspection

The unit should be inspected every 24 months by a qualified professional or your installer. Battery connections, relays and contacts should be inspected.

Troubleshooting

1. No residential power present: Press the bypass switch to place the system in the Mode 5 mechanical bypass. Contact installer or qualified individual.
2. Portions of residence not powered: Check to see if system in Mode 3 or 4. Also check if non-Energy Switch houses have power, grid outage may have occurred.
3. No display: Press the bypass switch to place the system in the Mode 5 mechanical bypass. Contact installer or qualified individual.
4. All other issues: Press the bypass switch to place the system in the Mode 5 mechanical bypass. Contact installer or qualified individual.