System Management and Monitoring

System configuration is imperative if it's going to do exactly what you want it to do—whether that's properly charging your batteries, getting your hybrid system prepped for load shaving or setting your battery monitor to accurate setpoints. Most inverter manufacturers have external devices capable of setting up whole-system management, as long as all major components—like the charge controller, battery monitor and inverter—are from that same manufacturer. However, a few other manufacturers offer standalone items that are capable of setting up remote system monitoring all on their own—some even without a Wi-Fi signal present. This is especially useful in the following circumstances:

- **Areas without Wi-Fi access.**
- **Antiquated systems with equipment that does not have this option from the manufacturer (whether because they're no longer in business or otherwise).**
- **Systems that have major components from multiple manufacturers (inverter and charge controller are different brands for example).**

If your equipment comes from one manufacturer, getting set up is easy—just go with their system. If that's not the case, then you'll need to go with a manufacturer that provides remote battery monitoring.

Microgrid Interconnect Devices (MID)

MID equipment is used to satisfy grid anti-islanding requirements. Microgrid Interconnect Devices (MID) are control equipment used for Islanding (Backup Systems). These devices enable microgrid systems to disconnect from and reconnect to the grid based on grid suitability. Microgrid controllers (a component of the MID) will measure and evaluate grid parameters like voltage and frequency; and provide control of a disconnecting contactor to allow isolation from the grid. The National Electric Code requires all MID to be listed for use.

Essentially, this device monitors grid stability and provides isolation for multimode inverters from the grid when there's failure or instability of the grid. Most microgrid systems consists of Energy Storage Equipment (Batteries), Inverters (PV interactive and/or Multimode Inverters), and dependent loads (back-up loads or critical loads). The MID prevents back feeding power during an outage and satisfies grid anti-islanding requirements. The MID can be incorporated directly in Multimode Inverters (Energy Storage Systems) or can be a separate component that is installed in conjunction with ESS systems.

Power Control Systems (PCS)

With the increasing number of electrical loads found in homes the potential to overload conductors and bus bars/panel boards is becoming much more prevalent, especially with the addition of EV chargers. One can use a Power Control System (PCS) to control loads, optimize renewable resources, and prevent overloading of the electrical distribution system. The National Electric Code book states: "A power control system shall be listed and evaluated to control the output of one or more power production sources, energy storage systems (ESS), and other equipment. The PCS shall limit current on the busbars and conductors to prevent overload." (NEC 2020 705.13).

A PCS is often used in conjunction with ESS and interactive solar systems to allow for full optimization of renewable resources as well as load shed capabilities during power outages. A PCS is comprised of system power monitoring equipment, communication equipment, and contractors that can turn off/on various loads using automation or human input. PCS often have their own app that can be used to control loads, and these can also be configured to turn off/on loads depending on solar production, battery health, peak rates, or to protect against overload. One can control large power-hungry loads when renewable resources are weak, peak rates are active, or during a power outage to conserve battery energy.