



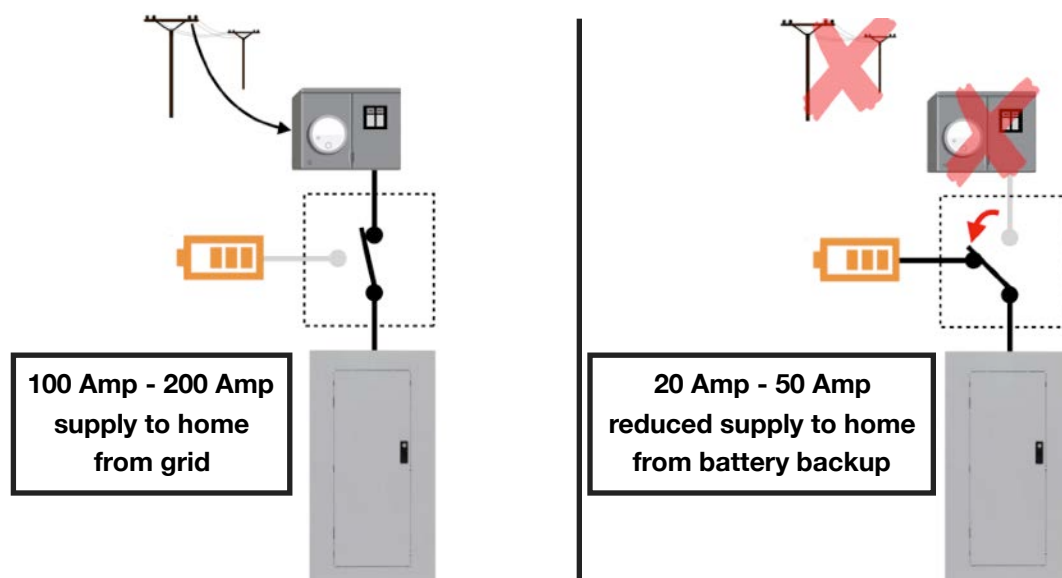
Home Battery Backup Education Series PART 3: Load Control Modules

NOTE: This document assumes that you have an operational understanding of an Automatic Transfer Switch (ATS) and the associated technical challenges as described in Parts 1 and 2 of this series. This document will also review optional equipment and configurations that may not be part of standard installations. These options may not be available for all battery system types.

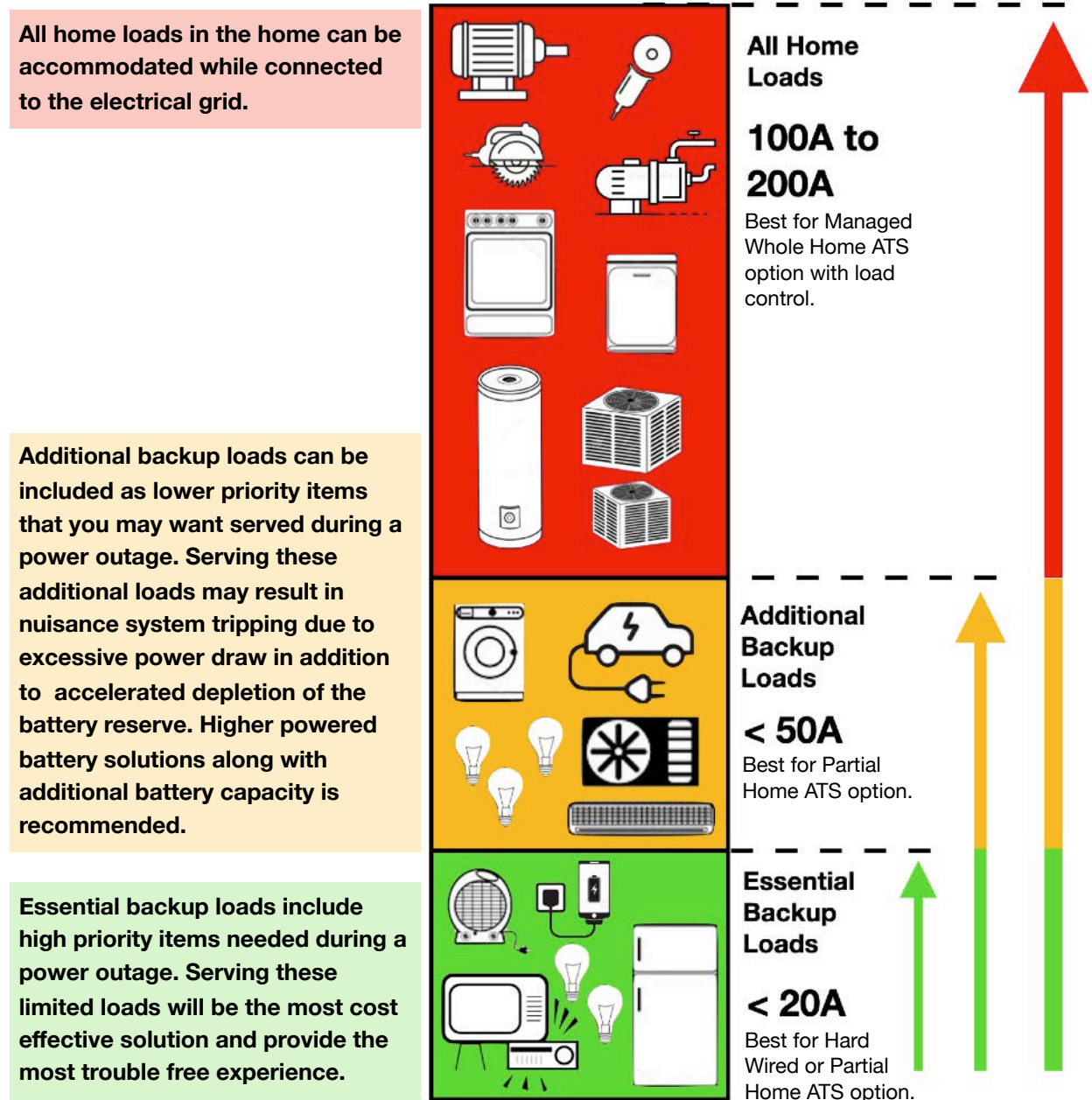
To understand the need and benefits of load control devices, let's first compare the power supply differences between the electrical grid and a battery backup circuit.

During normal conditions and when the utility grid is available, the ATS supplies power to the home typically through a 100 Amp - 200 Amp grid connection. Just as long as the home is supplied by the grid connection, the home can use a lot of power for an indefinite amount of time.

During a power outage, the ATS automatically switches over to the battery backup circuit and isolates the home from the downed electrical grid. A typical battery backup system is limited to a single 20 Amp - 50 Amp backup circuit. Under these conditions the home needs to reduce its peak power (Amps) to "fit" within the power requirements of the backup circuit. If all of the loads were left unmanaged, the home would most likely experience nuisance power tripping and accelerated depletion of the battery reserve.



The illustration below breaks down typical home loads into three separate categories along with their respective estimated total power draws. As you can see, it is impractical to run all home loads while connected to the lower power emergency circuit during a grid outage.



All home loads in the home can be accommodated while connected to the electrical grid.

Additional backup loads can be included as lower priority items that you may want served during a power outage. Serving these additional loads may result in nuisance system tripping due to excessive power draw in addition to accelerated depletion of the battery reserve. Higher powered battery solutions along with additional battery capacity is recommended.

Essential backup loads include high priority items needed during a power outage. Serving these limited loads will be the most cost effective solution and provide the most trouble free experience.

Load Control Modules (LCM) are used to automatically turn off some of the largest power hungry devices in your home to prevent the battery backup system from tripping off-line or depleting the battery reserve too quickly. With a power management system, your battery backup circuit can work smarter. It protects all your home's circuits by cycling power on and off as needed for different appliances. For example, leaving on only the Essential Backup Loads from the previous illustration. They automatically “shrink” the size of the homes power draw to meet the battery backup capabilities.



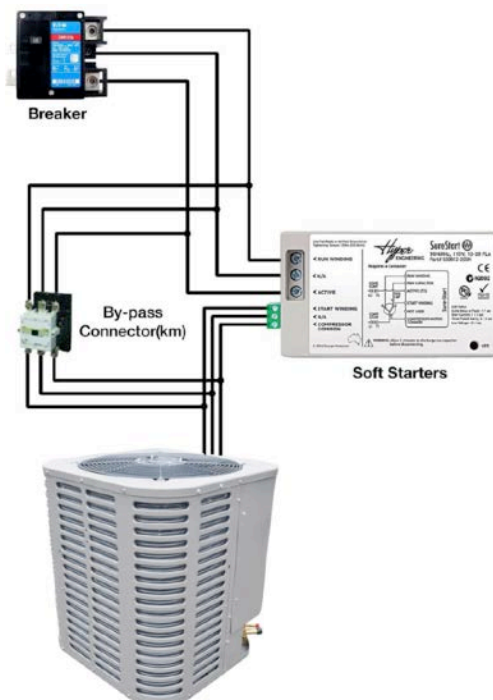
Load Control Modules (LCM)



A Motor Soft Starter is another device to help reduce the peak power requirement of the home during emergency backup. These devices are used with larger motors to temporarily reduce peak power draw during start-up and reduce nuisance trips during battery backup operation.



Motor Soft Starter



A detailed load analysis needs to be performed to determine the appropriate amount of load control modules needed to keep your homes maximum power draw within the capabilities of the battery backup system. This load analysis is also required for permitting purposed under the National Electric Code (NEC) Article 220 Part III.

By default, Kumukit battery energy storage systems that have backup power capabilities include a protected loads panel as part of our standard installation. These protected panels provide limited backup power to dedicated electrical outlets located inside the panel. Many homeowners simply plug extension cords into the convenience outlets for emergency power during a power outage, similar to a backup generator.

These protected load panels will not supply power to the entire home during a power outage. There is an option to hard-wire a limited number of circuits from within the home to this protected load panel for an additional fee. Every home's electrical layout is different, so we will need to estimate this amount on a case-by-case basis.



Convenience Outlets