Battery Bank Sizing

Please make sure to go through these steps to make sure you have properly sized your system to avoid damaging your battery. There are 4 ways of properly calculating the battery bank size for a given system as outlined below:

1. **Match Overcurrent Protection Device (OPD) Ratings**
   $$\sum_{battery\ bank\ breakers} \geq \sum_{inverter\ breakers}$$
2. **Match Inverter Surge Rating to Maximum Current Rating of Battery**
   $$\sum_{battery\ bank\ cotinuous\ rating} \geq \sum_{inverter\ cotinuous\ rating}$$
   &
   $$\sum_{battery\ bank\ surge\ rating} \geq \sum_{inverter\ surge\ rating}$$
3. **Match Charge Controller to Battery Bank charge capacity**
   $$\sum_{battery\ bank} \max charge\ current \geq \sum_{charge\ controller} \max output$$
4. **Calculate the required battery bank capacity based on actual loads**
   $$\frac{\sum_{total\ energy\ used\ (kwh)}}{\sum_{total\ available\ battery\ capacity\ (kwh)}} x\ 100\% \leq 80\%$$

Calculate the required battery bank capacity based on actual loads.

Every load on the Back-Up Panel will need to be analyzed (load power and duration). All total energy is calculated by summing the individual energies for each load. Assume the following loads and a customer who wants to run 24 hours off batteries only:

1	Appliance	Running wattage	Operating hours/day	Daily Consumption
2	Refrigerator	250 W	12 hrs/day	3 kWh
3	Lights:	100 W	6 hrs/day	0.6 kWh
4	Well Pump	3000 W	1 hr/day	3.0 kWh
5	Internet and continuous Phantom Loads	100 W	24 hrs/day	2.4 kWh
6	TV	200 W	4 hrs/day	0.8 kWh
			Sum	**9.8 kWh**

REMINDER! Always try to maintain the recommended Depth of Discharge (%DOD) of 80%, for healthy battery life and performance.

- 2 *5KWH or 1* 10KWH = 10.24kwh. Compared to the required hypothetical sum, this roughly yields a 97% DOD. Therefore, not acceptable.
- Offering 2 *10KWH at 20.4 kwh yields approx. 48% DOD. Acceptable, but oversized.
- Offering 2 *7.68KWH at 15.36kwh however, would be the best option.

$$\frac{\sum_{total\ energy\ used\ (kwh)}(9.8kWh)}{\sum_{total\ available\ battery\ capacity\ (kwh)}(15.36kWh)} x\ 100\% = 63\%$$

If the customer cannot supply the load information, or assumptions cannot be made, the rule of thumb as an absolute minimum battery size is to match the power rating of the inverter in kW to the energy rating of the battery in kWh.

Inverter/Charger Settings

Parameter Setting for MeritSun Battery with Inverter

Inverter Settings		
	48(15S)	51.2(16S)
Low Battery Cut Out Voltage	46V	48 V
Bulk Voltage	54.75 V	58.4 V
MaxBulkCurrent	Suggest：50A per battery Max: 100A per battery	Suggest：50A per battery Max: 100A per battery
Max Discharge Current	Suggest：50A per battery Max: 100A per battery	
Battery Capacity	5KWH: 100 Ah per battery 7KWH: 150Ah per battery 10KWH: 200Ah per battery	
Max Charge Rate*	Suggest：50A per battery Max: 100A per battery	LSuggest：50A per battery Max: 100A per battery
Default Battery Temperature	Warm	Warm
Recharge Volts	51.5 V	54.9 V
Float Volts **	53.5~54 V	57.6 ~58V
Absorb Volts	54.75 V	58.4 V
Absorb Time	2 Minutes	2 Minutes
Low Volts Reovery	49V	51V
Low Volts Warn	47V	49V

Remark:

The above settings is as example for MeritSun Powerwall Battery,whether it is applicable depends on the setting options of the inverter

Inverter/Charger Protocol

Battery BMS protocol		
	RS485	CAN
Voltronic Inverter	✓	✓
Growatt Inverter	✓	✓
Deye Inverter	✓	✓
Sofar Inverter	✓	✓
SMK Inverter	✓	
WOW Inverter	✓	
GoodWe Inverter		✓
SMA Inverter		✓
Luxpowertek Inverter		✓
Must Inverter		✓
Victron Inverter		✓
Revo Inverter		✓
ZC Inverter		✓
Schneider Inverter	✓	✓