



## EPISODE 63

# Essential Battery Tips for Home PV Energy Storage

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# Essential Battery Tips for Home PV Energy Storage

## >> Background

In the current market for household photovoltaic (PV) energy storage, the most common batteries are lithium-ion and lead-acid. When choosing a battery, users typically consider factors like cost, efficiency, and capacity. However, there are some often-overlooked parameters that also deserve attention.

## >> Battery voltage range

Different inverters have different battery voltage ranges. If the voltage range doesn't match, the system might trigger an over-voltage or under-voltage alarm. For low-voltage batteries (48V systems), the rated battery voltage should be 48V or 51.2V, whether using lithium or lead-acid batteries. This is particularly important for lead-acid batteries, as incorrect voltage can easily cause an over-voltage alarm in the inverter.

For high-voltage batteries, it's crucial to ensure proper voltage matching between batteries and inverters. Most high-voltage batteries today are built by stacking cells in series. For example, a 5.12kWh battery has a rated voltage of 204.8V, while a 10.24kWh battery is rated at 409.6V. Once a battery capacity is chosen, make sure the rated voltage aligns with the inverter's voltage range to ensure compatibility.

Battery			
Battery capacity	5.12kWh	7.68kWh	10.24 kWh
Nominal Voltage	204.8V	207.2V	409.6V
Operating Voltage	160~240V	240~360V	320~480V

## Inverter

Inverter Model	S6-EH3P(3-10)K-H-EU	S6-EH3P(12-20)K-ND-H	S6-EH3P(30-50)K-H-ND
Battery voltage range	120-600 V	120-800 V	150-800 V

## >> Battery charging/discharging current

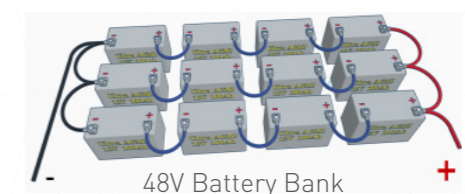
Low-power batteries can't handle high-power discharges, which means they can't effectively support backup loads. For example, colloidal, tubular, and lead-acid batteries are typically limited to supporting smaller loads.

As shown in the example:


Specification of Tubular Battery										
	Type	Volt	Overall Dimensions±2(mm)				Appox. Weight (kg)	10 HR Capacity (AH)	Back up Time	
			L	W	H	TH			154 watts	400 watts
Jumbo Tubuar (I)	TA1000	12V	347	175	265	295	30.5	80	Nil	1hr 05min
	TA1200	12V	347	175	265	295	37.7	125	Nil	1hr 40min
Jumbo Tubular (II)	TA1100	12V	506	220	253	296	41.0	90	Nil	1hr 15min
	TA1300	12V	506	220	253	296	45.9	110	Nil	2hr 00min
	TA1400	12V	506	220	253	296	47.6	135	Nil	2hr 20min
Low Height Tubular	TA1600	12V	506	220	253	296	48.9	150	Nil	2hr 40min
	TA 1500	12V	502	190	352	380	46.9	140	Nil	2hr 30min
	TA 1700	12V	502	190	352	380	53.5	170	Nil	3hr 20min
Tall Tubular	TA 2000	12V	502	190	352	380	61.5	230	Nil	4hr 10min
	TA 1800	12V	502	190	373	416	54.9	185	Nil	3hr 00min
	TA 2500	12V	502	190	373	416	63.5	230	Nil	4hr 00min
	TA 3000	12V	502	190	373	416	72.7	260	Nil	5hr 00min

If choosing a low-power or low-current battery, higher power demands will require more battery strings to be connected in parallel, for example:

48V Tubular battery string  
 Max battery discharge power  
 = 400\*4\*96%  
 = 1536W



Alternatively, user can use high-power or high-current batteries.

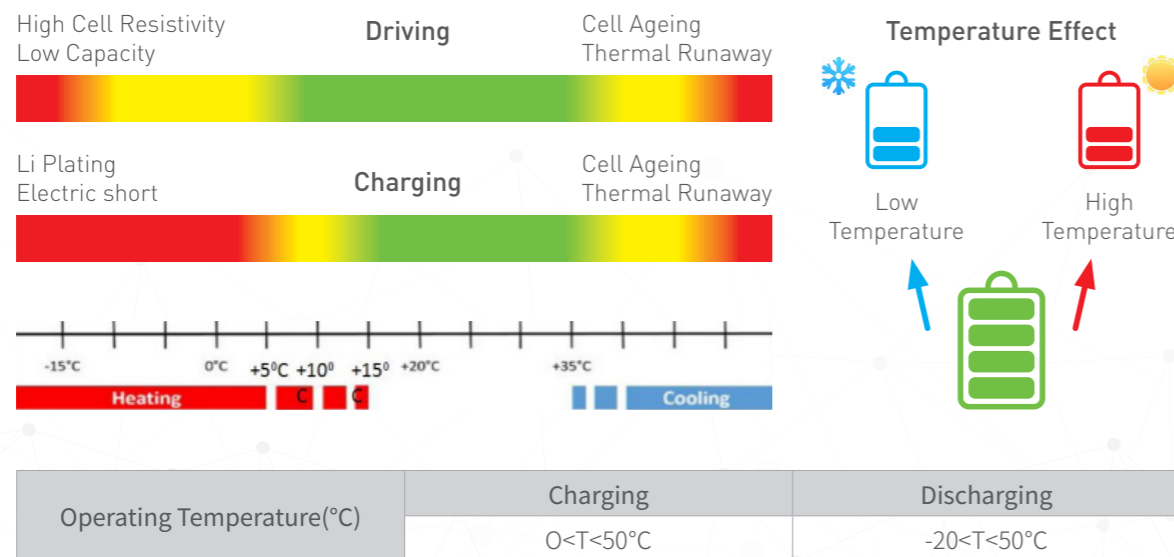


	LVS 4.0	LVS 8.0	LVS 12.0	LVS 16.0	LVS 20.0	LVS 24.0
Battery Module	LVS (4 kWh, 51.2 V, 45 kg)					
Number of Modules	1	2	3	4	5	6
Usable Energy [1]	4 kWh	8 kWh	12 kWh	16 kWh	20 kWh	24 kWh
Max Cont. Output Current [2]	65 A	130 A	195 A	250 A	250 A	250 A
Peak Output Current [2]	90 A, 5 s	180 A, 5s	270 A, 5s	360 A, 5s	360 A, 5s	360 A, 5 s

Additionally, if a customer chooses a battery that can handle 100A, but their inverter only supports 50A, the system will be limited to 50A. This mismatch results in lost battery performance. When using multiple battery groups in parallel, consider the total charging and discharging current. For example, if each battery supports 50A and three groups are used, the system might only support 100A instead of 150A, affecting overall power output.

### >> Battery operating temperature range

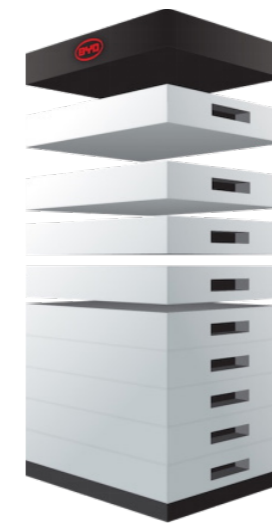
When purchasing, ask the manufacturer about the full load operating temperature range. The general temperature range often just indicates the operating range. However, if the temperature reaches a certain point within this range, the battery might experience a current limit (power reduction). This could mean everything works fine in the summer, but power output drops in the winter.



### >> Connection methods between battery modules

There are two ways to connect battery modules:

- 1) Traditional Wired Connection: During installation, connect power and communication cables between modules in sequence.
- 2) Cable-free Connection: These modules have a special structure. Once stacked, all power and communication cables connect automatically, significantly speeding up installation and improving connection stability.



Internal Plug Connection  
No Additional Wiring Required



External wired connection  
Need Additional Wiring Required