WHY LITHIUM

1. Lifespan and Durability

A lead-acid battery is like a marathon runner who wears out after a few hundred races. If you discharge it past 50%, its lifespan drops significantly. Lithium batteries are the "endurance athletes" of the energy world; they can be charged and discharged thousands of times and typically last 10 times longer than lead-acid counterparts.

2. Useable Capacity (Depth of Discharge)

If you have a 100Ah lead-acid battery, you can only safely use about 50Ah before you risk damaging the cells. With a 100Ah lithium battery, you can use 80Ah to 100Ah without concern. This means a smaller lithium battery can often do the same job as a much larger lead-acid one.

3. Charging and Maintenance

- Maintenance: Traditional "flooded" lead-acid batteries require you to top them off with distilled water periodically. Lithium is completely maintenance-free.
- Charging: Lead-acid batteries have high internal resistance and get warmer as they charge, which slows the process down. Lithium accepts a high current much more efficiently, allowing for "rapid charging."

4. Cost: Upfront vs. Lifetime

This is the biggest hurdle for most users.

- **Lead-Acid** is much cheaper to buy today.
- **Lithium** is an investment. However, because you would have to replace a lead-acid battery 3 to 5 times over the life of a single lithium battery, lithium usually ends up being the cheaper option per kilowatt-hour over 5–10 years.

BATTERY COMPARISON

FEATURES	LEAD-ACID (SLA/AGM/GEL)	LITHIUM (LIFEPO4)
LIFESPAN	300–700 CYCLES	2,000–5,000+ CYCLES
DEPTH OF DISCHARGE	50% RECOMMENDED	80%–100%
WEIGHT	VERY HEAVY	60% LIGHTER
CHARGING SPEED	SLOW (8–12 HOURS)	FAST (1–3 HOURS)
EFFICIENCY	70%–85%	95%–98%
UPFRONT COST	LOW	HIGH

1KV 100AH 12V 1100VA, 1400WH



KEY FEATURES

- Peak efficiency: 94% – 96%
- Average operating efficiency: 92% – 95%
- Idle / no-load losses:Very low (especially with lithium systems)
- Battery rating: 12V × 100Ah = 1200Wh (1.2 kWh)
- Usable energy with lithium (90–95% DoD): ≈ 1080–1140 Wh
- After inverter losses (95% efficiency): ≈ 1025–1085 Wh usable AC power

A 12V Lithium (LiFePO4) battery system is significantly better than a traditional lead-acid battery used in normal inverter setups because it charges 3–5 times faster, lasts much longer (around 3000–6000 cycles compared to 300–800 cycles), and allows 80–100% of its capacity to be used, whereas lead-acid batteries safely provide only about 50% of their rated capacity. Lithium batteries are lightweight, provide stable voltage output, require almost no maintenance, and charge fully in just 2–3 hours, making them ideal in areas with frequent power cuts where electricity may return only for short periods. In contrast, lead-acid batteries are heavy, charge slowly (6–10 hours), require regular water topping and maintenance, and experience voltage drops as they discharge, which can affect sensitive electronics. Although lithium batteries cost more upfront, they typically last 8–10 years compared to 2–3 years for lead-acid batteries, making them more cost-effective in the long run while providing more reliable and efficient backup power.

SAFE USABLE INVERTER LOAD

- 1kV inverter ≈ 800W usable continuous load (to avoid overload and increase life)

Common & Practical Combinations

Option 1: Lights + Fans (Balanced Use)

- 4 ceiling fans × 75W = 300W
- 6 LED lights × 10W = 60W
  Total load = 360W

Backup time: ~2.8 – 3 hours

3KV 24V 100AH 2700VA, 2400WH



KEY FEATURES

- Peak efficiency: 95% – 97%
- Average operating efficiency: 93% – 96%
- Idle / no-load losses:Very low due to smart power management
- Battery rating: 24V × 100Ah = 2400Wh (2.4 kWh)
- Usable energy with lithium (90–95% DoD): ≈ 1080–1140 Wh
- After inverter losses (95% efficiency): ≈ 1025–1085 Wh usable AC power

A 24V lithium battery system offers significantly higher efficiency compared to traditional 12V setups by operating at a lower current for the same power output, which reduces heat loss and improves overall energy utilization. The lower current draw minimizes stress on cables and inverter components, resulting in better voltage stability under load and fewer performance drops during high-power usage. A 24V system is also better suited for mid-capacity inverters, ensuring smoother operation, higher conversion efficiency, and faster, more efficient charging. This reduced electrical stress helps extend inverter lifespan while delivering more usable backup time, especially at higher loads.
For example, a 2.5kVA inverter paired with a 24V 100Ah lithium battery can achieve up to 96% energy efficiency, providing higher usable power, quicker recharge cycles, and longer system life. Typical household loads such as

LED lights (~10W) and ceiling fans (~75W, with BLDC fans consuming much less) operate well within the optimal efficiency range of a 24V lithium system.

SAFE USABLE INVERTER LOAD

- 2.5kV inverter ≈ 2,000W continuous safe load

Common & Practical Combinations

Option 1: Typical Home Setup (Balanced)

- 8 ceiling fans × 75W = 600W
- 12 LED lights × 10W = 120W

Total load = 720W

Backup time: ~2.8 – 3 hours

Option 2: Light-Heavy Setup

- 5 ceiling fans × 75W = 375W
- 18 LED lights × 10W = 180W

Total load = 555W

Backup time: ~3.8 – 4 hours

Option 3: Fan-Heavy Setup

- 10 ceiling fans × 75W = 750W
- 8 LED lights × 10W = 80W

Total load = 830W

Backup time: ~2.3 – 2.5 hours

5KV 48V 100AH 4400VA, 4800WH



KEY FEATURES

- Peak efficiency: 96% – 98%
- Average operating efficiency: 95% – 97%
- Idle losses:Extremely low with smart power management
- Battery rating: 48V × 100Ah = 4800Wh (4.8 kWh)
- Usable energy with lithium (90–95% DoD): ≈ 4320–4560 Wh
- After inverter losses (95% efficiency): ≈ 4150–4380 Wh usable AC output

A 4 kVA inverter operating on a 48 V lithium battery bank offers superior efficiency because the higher DC voltage results in significantly lower current draw. This reduction in current minimizes heat loss, improves overall system efficiency, and enhances stability under heavy loads. As a result, the system can handle higher power demands while providing longer and more reliable backup performance.
The 48 V configuration also enables faster charging with reduced stress on internal components, which contributes to a longer lifespan for both the inverter and the battery. Compared to 12 V and 24 V systems, a 48 V lithium setup delivers the highest efficiency and consistent performance, making it ideal for high-capacity, solar, and hybrid power systems.

A 4 kVA inverter paired with a 48 V 100 Ah lithium battery can achieve up to 97% energy efficiency, ensuring maximum usable power, quicker recharge cycles, and long-term reliability.

SAFE USABLE INVERTER LOAD

- 4 kV inverter ≈ 4200W continuous safe load

Common & Practical Combinations

Option 1: Large Home /Office Setup (Balanced)

- 16 ceiling fans × 75W = 1200W
- 25 LED lights × 10W = 250W

Total load = 1450W

Backup time: ~2.8 – 3 hours

Option 2: Light-Heavy Setup

- 10 ceiling fans × 75W = 750W
- 35 LED lights × 10W = 350W

Total load = 1100W

Backup time: ~3.7 – 4 hours

Option 3: Fan-Heavy Setup

- 18 ceiling fans × 75W = 1350W
- 20 LED lights × 10W = 200W

Total load = 1550W

Backup time: ~2.5 – 2.7 hours

- With BLDC Fans (Energy-Efficient Scenario) BLDC fan: 25–30W

Example:
- 20 BLDC fans × 30W = 600W
- 30 LED lights × 10W = 300W

Total = 900W

Backup time: ~4.5–5 hours

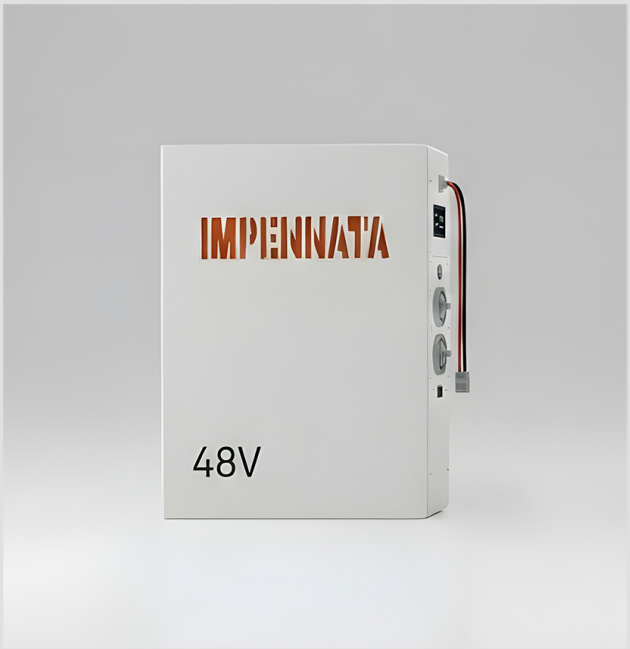
IMPENNATA

ONLINE UPS



. From **1Kv-200kv** available

LITHIUM BATTERY PACKS



Customisable as per requirements Lithium battery packs

. **From 12 v- 96v**