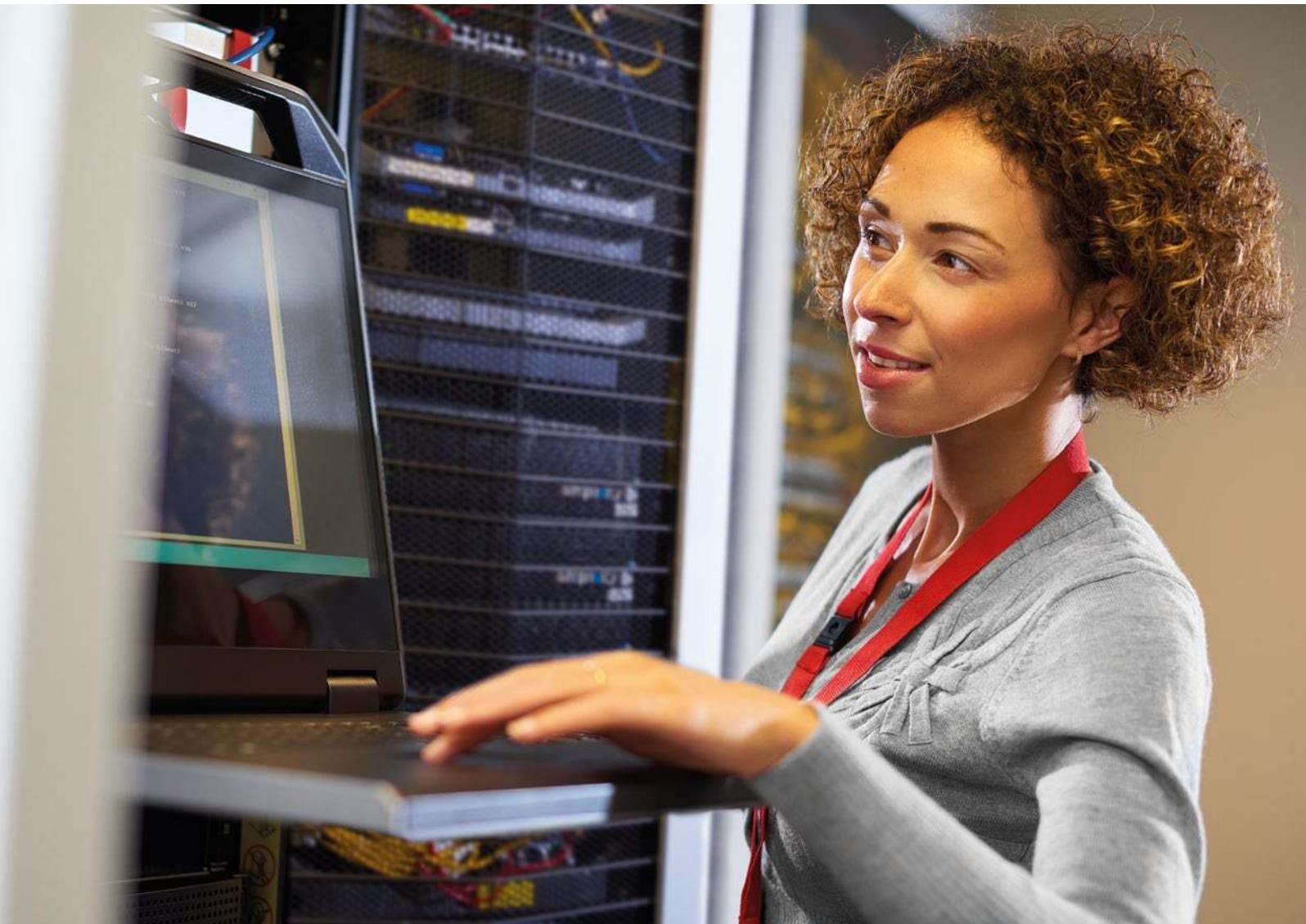


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THREE-PHASE UPS SYSTEM

## **Lithium-ion battery systems for ABB UPS solutions**

Reliable, lightweight and compact UPS energy storage for critical applications



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# Lithium-ion: the choice for critical power backup

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01 For additional battery capacity, cabinets can be installed in parallel to increase capacity up to 5 MW per single system.



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When you want power protection for a data center, production line or any other type of critical process, lithium-ion battery solutions provide peace of mind and the performance you need. Housed in a tough enclosure, lithium-ion battery technology provides reliable, lightweight and compact energy storage for uninterruptible power supply (UPS) systems.

## Why lithium-ion?

Valve-regulated lead acid (VRLA) batteries – sometimes known as sealed lead-acid batteries – have many advantages and have traditionally been the battery of choice for backup power in UPS systems. However, battery technology has progressed rapidly in recent years. Today, lithium-ion battery technology is an attractive option – especially where high energy density and low weight are important. Advantages such as longer lifespan, smaller size and weight, shorter recharging times and falling prices – only add to the appeal of lithium-ion battery solutions.

For best performance and lifetime, it is essential to keep VRLA battery rooms at a reasonably constant temperature (20–25 °C). Keeping things cool can be problematic and costly, especially in hot countries. With lithium-ion batteries, this problem virtually disappears, as lithium-ion batteries are much more tolerant to changes in environmental temperature and can operate over a broader temperature range.

Lithium-ion batteries are easy to handle too – they are safe and do not contain mercury, lead, cadmium, or other hazardous materials. In most cases, traditional batteries would need to be replaced multiple times before a lithium-ion battery is replaced once. When it comes to operating expenses, lithium-ion batteries offer a lower total cost of ownership.

# Features and benefits

## Outstanding performance

For most owners of critical applications, power availability is the number one priority. The power flowing to their application simply must not fail.

A lithium-ion battery system has **higher reliability** than a VRLA solution. Not only are the individual cells themselves inherently more safe and stable, but each battery module has an electronic controller that continuously checks every cell for any sign of change in performance.

Single cell temperature, current, voltage and charge status are all monitored. **Monitoring** also takes place at the cabinet level to provide a clear overview of current battery status and to predict future runtime and performance.

Lithium-ion batteries can be **charged much more quickly** than conventional batteries, so after use they can be charged back up to full strength in a shorter time. This means full availability in less time.

Lithium-ion batteries also provide **higher power density and efficiency**, especially under heavy discharge rates. This means that no battery over-sizing is needed.

## Low total cost of ownership

ABB's lithium-ion battery system demonstrates its commitment to delivering the best performance for the lowest total cost of ownership:

- Lithium-ion batteries are much **more compact** than traditional batteries. This **increased power density** means that much less real estate is needed for the battery installation. Considering the cost of space in cities, in data centers or on crowded production floors, the smaller lithium-ion battery system footprint will bring significant financial benefits.
- **Lower maintenance overhead.**
- Longer battery life. With a lifetime at least double that of VRLA equivalents, lithium-ion battery capacity costs less to buy in the long run, even with the attractive price of traditional batteries. The labor costs associated with battery removal and replacement are also dramatically reduced.
- Multiple times **more discharge/recharge cycle capability** than traditional batteries means you can use the backup facility without fear of it aging.
- The smaller room needed and less heat generated per ampere hour (Ah) of battery capacity results in **less need for cooling**, leading to lower costs and a reduced carbon footprint.
- **Low weight** (60–80 percent less than VRLA) means reduced civil engineering overhead and easier physical installation.

### Lead-acid

### Lithium-ion

Charge 0.1C  
Discharge 2C \*



**Fast charge and discharge rate**

Charge 0.5C  
Discharge 6C \*

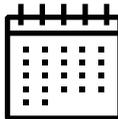
Weight 2500 kg  
Volume 2 m<sup>3</sup> \*



**Less space and weight**

Weight 550 kg  
Volume 0.8 m<sup>3</sup> \*

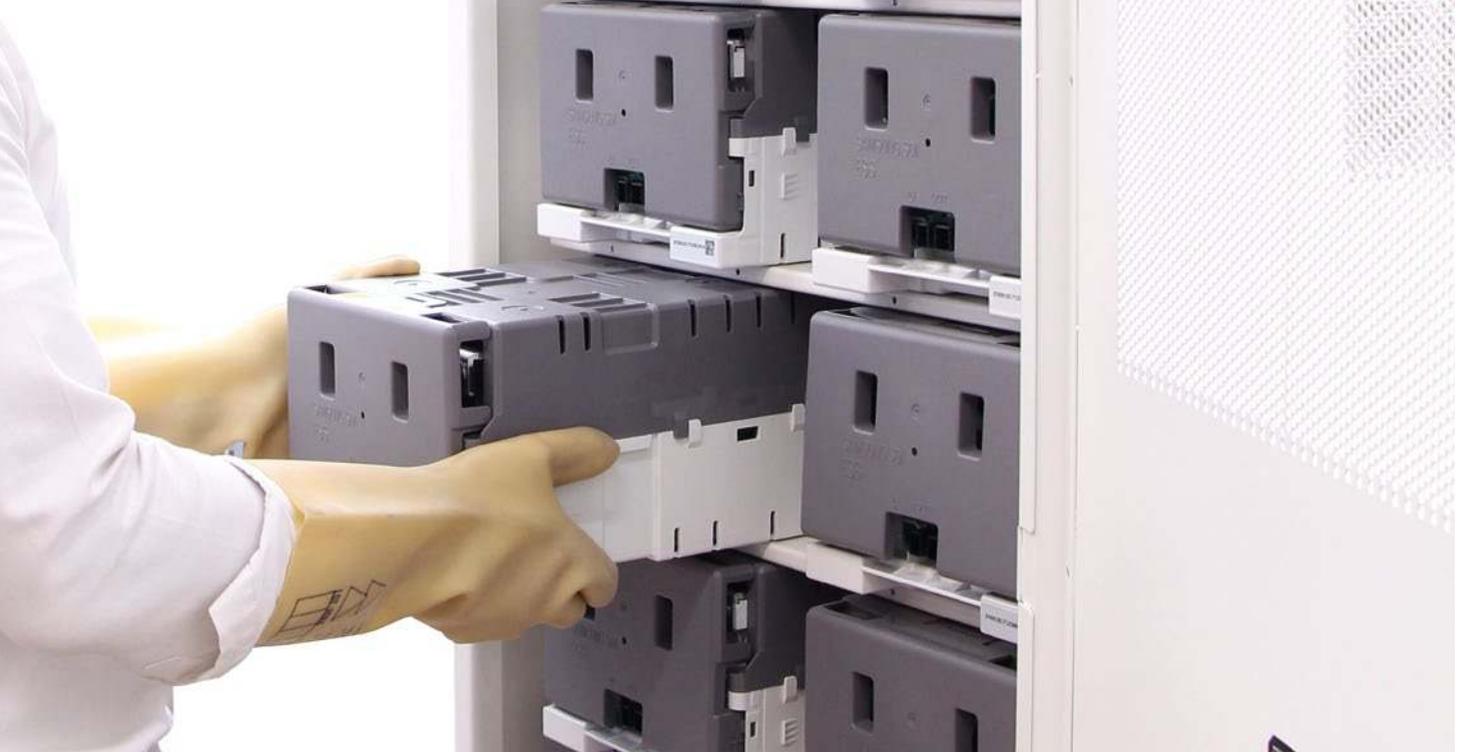
3-7 years \*



**Longer life**

15 years \*

Example: 190 kW power / 10 min. autonomy \*



01 Lithium-ion batteries

02 Lithium-ion UPS battery cabinet

**Overview of ABB lithium-ion battery system**

Lithium-ion battery solutions are accommodated in a standard 19" cabinet. All connectors are front-facing for ease of installation, maintenance and replacement. A single cabinet configuration of 34.6 kWh comprises a switchgear, a switched-mode power supply (SMPS) and 17 battery modules. Each module contains eight series-connected 67 Ah, 3.8 V cells and a dedicated battery management system (BMS) with cell balancing functionality. The switchgear collects all information about each battery cell, calculating

the state of charge (SoC) and state of health (SoH). It also contains a molded-case circuit breaker and a shunt resistor. The SMPS supplies the power for the BMS and communicates with the UPS and other connected cabinets. Battery cabinets may be connected in parallel to achieve the power needed.

**The battery of the future**

Lithium-ion battery system employs the very latest in battery technology and directly addresses the two top concerns of critical power users: availability and total cost of ownership. The system is a perfect fit for a wide range of ABB's UPS solutions. Working together, an ABB UPS and lithium-ion battery system provides users with the peace of mind that their applications are protected by the very best in power protection technology and they can be assured a constant flow of clean power.

**Lithium-ion battery solutions for:**

- Data centers (e.g. co-location, control rooms)
- Healthcare (e.g. hospitals and medical centers)
- Building infrastructures (e.g. financial institutions, education centers)
- Transportation (e.g. railway and airport infrastructure)
- Manufacturing (e.g. food & beverage industry)

**Lithium-ion battery benefits:**

- Low TCO
- Long lifespan
- High reliability
- Lightweight
- Reduced footprint and volume
- Wide operating temperature range
- Short charging time
- High safety level
- Scalable

Switchgear

Switched-mode power supply (SMPS)

Battery module



# UPS lithium-ion battery system

## Technical specifications

<b>General data</b>	
Nominal energy (kWh)	34.6
Capacity (Ah)	67
Open circuit voltage (V)	516.8
<b>Product compatibility</b>	
Conceptpower DPA 500 400 V IEC	Yes
Conceptpower DPA 500 480 V UL	Yes
Conceptpower DPA 120 208 V UL	Yes
Conceptpower DPA 240 415 V UL	Yes
PowerLine DPA	Yes
MNS-Up	Yes
<b>Batteries</b>	
Type	Li-Ion
<b>Weight</b>	
Weight with batteries (kg)	550
<b>Dimensions</b>	
Dimensions w × h × d (mm)	600 x 2055 x 650

### Autonomy table

UPS	Power (kW)	Autonomy (minutes) vs number of racks					
		1	2	3	4	5	6
<b>Conceptpower DPA 500 (IEC / UL)</b>							
	100	18.6	37.9	59.8	76.8	92.2	110.6
	200	7.2	18.6	27.8	37.9	48.0	59.2
	300	N.A.	12.4	18.6	24.0	30.3	37.9
	400	N.A.	7.2	14.1	18.6	22.6	27.8
	500	N.A.	N.A.	10.7	14.8	18.6	22.4
<b>Conceptpower DPA 120 UL</b>							
	20	92.2	184.4	276.6	368.0	462.0	554.6
	40	49.0	92.2	138.0	184.4	230.0	276.6
	60	30.3	66.5	92.2	122.8	153.7	184.4
	80	22.6	49.0	74.0	92.2	115.3	138.0
	100	18.7	37.9	59.8	76.8	92.2	110.6
	120	15.7	30.3	49.0	66.5	77.0	92.2
<b>Conceptpower DPA 240 UL</b>							
	40	49.0	92.2	138.0	184.4	230.0	276.6
	80	22.6	49.0	74.0	92.2	115.3	138.0
	120	15.7	30.3	49.0	66.5	77.0	92.2
	160	11.5	22.8	35.2	49.0	62.0	74.0
	200	7.2	18.6	27.8	37.9	48.0	59.2
	240	NA	15.7	22.8	30.3	39.5	49.0
<b>PowerLine DPA</b>							
	20	92.2	184.4	276.6	368.0	462.0	554.6
	40	49.0	92.2	138.0	184.4	230.0	276.6
	80	22.6	49.0	74.0	92.2	115.3	138.0
	120	15.7	30.3	49.0	66.5	77.0	92.2

Battery autonomy figures are for example purposes only and their values may vary depending on different factors such as production tolerance and working conditions. ABB recommends contacting the local sales organization for specific autonomy calculations.

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