

Continuous Power solutions for Containerized power distribution in Data Centers

1200kW N+1 IT Loads | UL



To ensure Data Centers are always up and running, it is crucial to set up a continuous power solution that includes a resilient power distribution system.

Discover our pre-configured bundle to supply IT loads in Data Centers through coordinated UPSes and power distribution solutions.

What is continuous power distribution with UPS?

It is the capability of coordinating Uninterruptible Power Supply apparatuses with upstream and downstream protection devices. If you need a reliable power distribution system to supply your IT loads, ABB pre-designed solutions are the right choice.

Why you need an UPS solution for distribution selectivity

Uninterruptible Power Supply apparatuses ensure continuous power is supplied to critical loads under specific installation conditions, while if a feeder fails, continuous operation is ensured through proper coordination with the protection devices, provided that only the breaker of the feeder affected by the fault cleans the overcurrent.

Main benefits

Secure Uptime & Reliability

N+1 redundancy and pre-designed selectivity.



Flexible, scalable power

From 1200kW to 1600kW based on power block of 400k.



Sustainable power technology

Best in-class efficiency of up to 97% in double conversion mode and up to 99% in eBoost mode.



Maximized power density in compact monolithic design

Up to 40% footprint savings with ultra-high kW per square foot.



Typical containerized power distribution solution for IT Loads in Data Centers

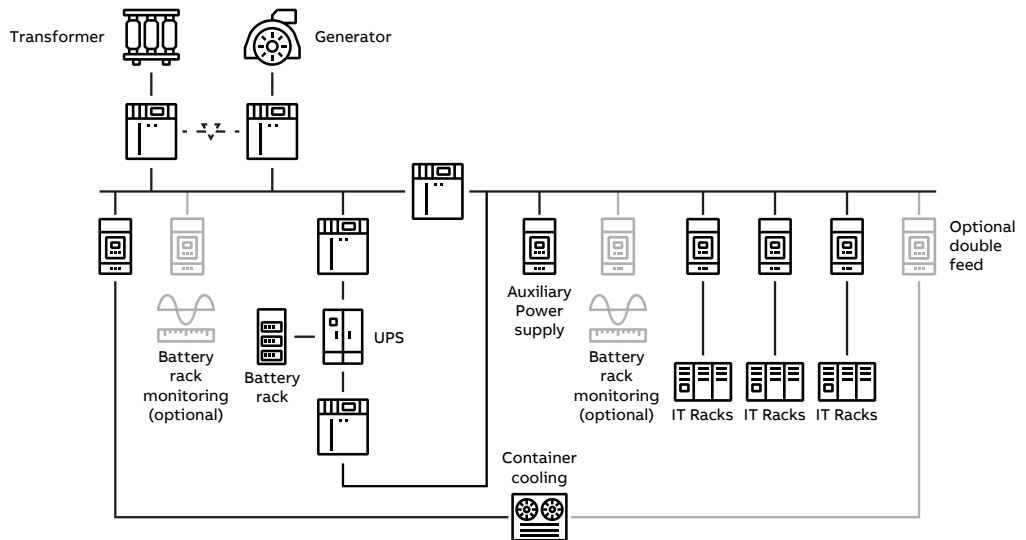
The typical containerized architecture of a power distribution solution for IT loads in data centers includes incomings for supplies from the utility and an alternative power source, typically a generator to safeguard against the risk of downtime. Distribution then passes through an Uninterruptible Power Supply (UPS) system, which provides short-term power when the input power source fails while protecting critical components against voltage spikes, harmonic distortion and other common power problems.

To ensure good operating conditions for the UPSs and batteries, a suitable cooling system must be provided inside the container.

Key characteristics of AC power distribution for IT loads in data centers:

- Connection to the utility and to back-up generator
- UPS and batteries sized to sustain IT loads
- Supply to Remote Power Panels (RPPs) typically at 480 V.

Fig.1
Containerized power distribution system for IT Loads



Continuous Power solutions for Containerized power distribution in 1200kW N+1 IT Loads in Data Centers

Our architecture solution for IT load power distribution is fed by the utility in the normal operating mode, while a transfer switching mechanism between the transformer breaker and a second incoming breaker enables the supply to be provided by backup power generation. 1200kW IT loads with N+1 redundancy are fed by two UPS connected in parallel. The ABB MegaFlex UL is a 3ph transformerless Uninterruptible Power System (UPS). It is a true online double conversion UPS with performance qualification code VFI-SS-111, which provides quality power for sensitive equipment. Each UPS has a power capacity of 1200kVA, and this particular solution consists of 2 UPSs frame with a rated power of 1200kW, each one. A lithium-ion battery type has been chosen for the battery rack solution. The battery monitoring system is available as an option. Suitable direct current protection devices and feeders to supply the battery monitoring system are also included. A system for cooling the UPSs and batteries is also required if the solution is to be installed in a container; this cooling system can be redundant as an option.

Since the reliability of electrical distribution infrastructure in data centers is one of the key design factors and to ensure high availability, given the sensitive nature of IT loads which need clean and continuous power supplied through a UPS, selectivity coordination of different protection devices (upstream and downstream of the UPS) during faults plays a vital role in increasing the availability of the electrical network. To speed up the design stage, ABB has created standard building blocks for data centers by taking into consideration parameters such as breaker sizing, selectivity based on the UPS and bypass characteristics, including maximum input current, overload capability, short circuit, and selectivity, that is defined in UL 891. There are generally two types of selectivity: "Total selectivity", where selectivity is achieved for all the short circuit current values up to the maximum capacity of the downstream breaker, and "Partial selectivity", achieved only up to a certain level before the upstream breaker trips. In this application, all the protection devices upstream and downstream of the UPSs have been dimensioned to obtain "Total selectivity" using the Site Planning Tool, which allows you to select protection devices upstream & downstream according to any ABB UPS used.

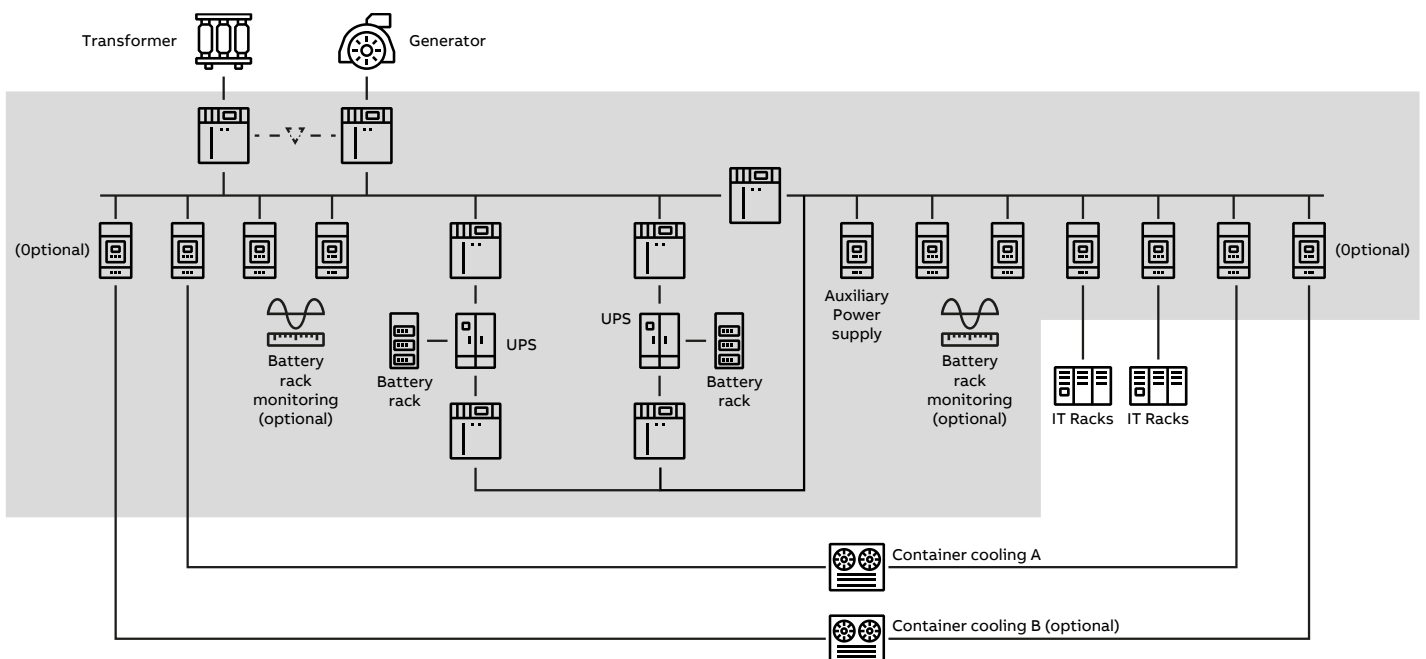


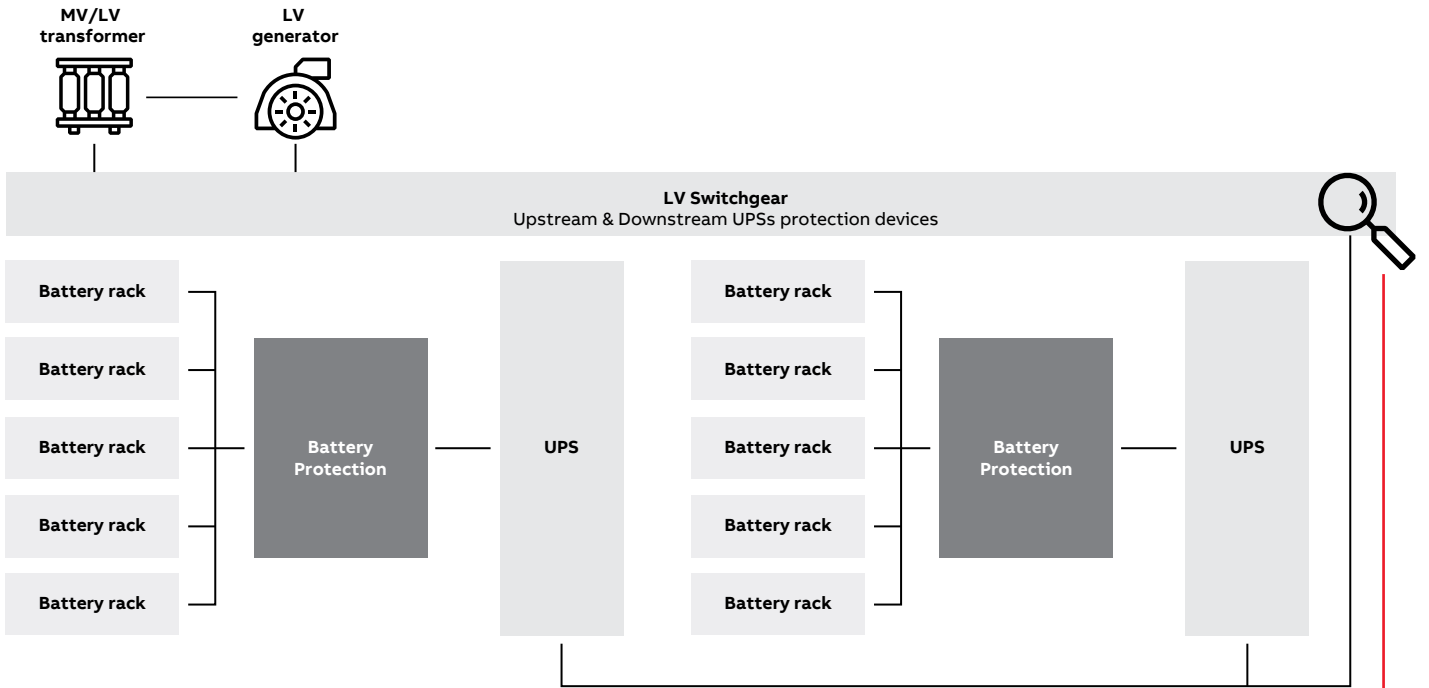
Fig.2
Containerized continuous power distribution solution for 1200kW IT Loads with N+1 redundancy

Input Data		
Rated AC Voltage	[V]	480
Total IT Loads	[kW]	1200
UPS rated power	[kW]	1200
Number of UPS cabinets in parallel		2
UPS redundancy		N+1
Rated AC Voltage	[V]	480
Transformer rated power	[kVA]	2000
Generator rated power	[kVA]	2000
Type of battery		Lithium-ion
Battery Nominal Capacity	[kWh]	34.6
Battery number of modules per rack		17
Number of battery racks		6 per UPS
Heat Dissipation UPS & Battery rack	[kW]	98
Cooling for UPS & Battery racks	[BTU/h]	334389
Operating DC Voltage	[V]	From 435 V to 571.2 V

Single-Line Diagram:



ABB offering (IEC)



Main LV Switchboard components

Incoming breakers: ACB Emax 2 (E4.2)

Bus Tie breaker: ACB Emax 2 (E2.2)

UPS incoming breaker: ACB Emax 2 (2.2)

UPS outgoing switch disconnecter: OT Switch

Feeder for IT loads: MCCB Tmax XT (XT5)

Other feeders: MCCB Tmax XT (XT2-XT1)

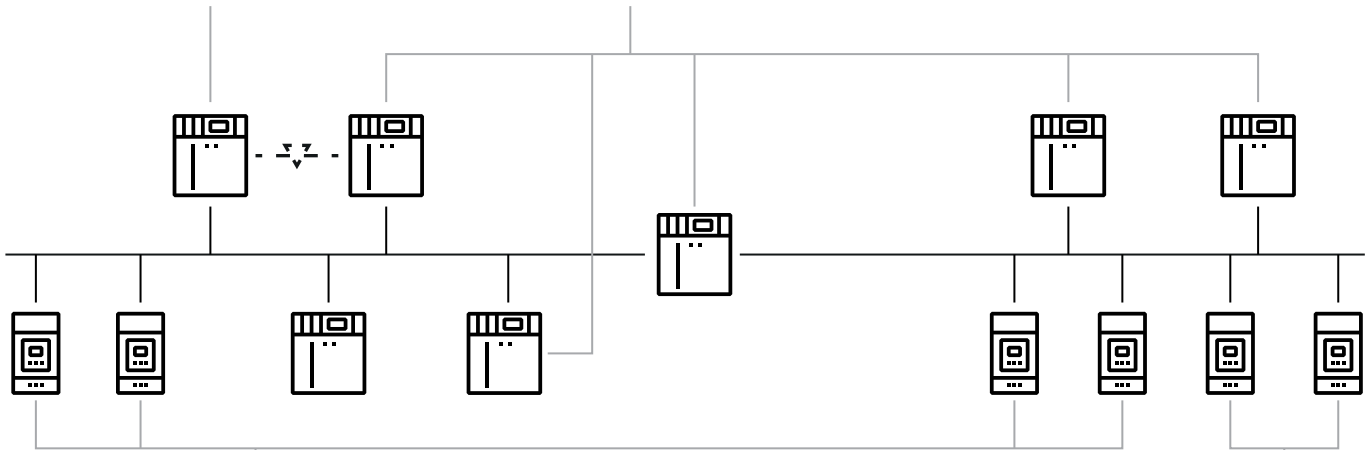
Note: breakers have been selected to ensure total selectivity



Automatic transfer switch controller



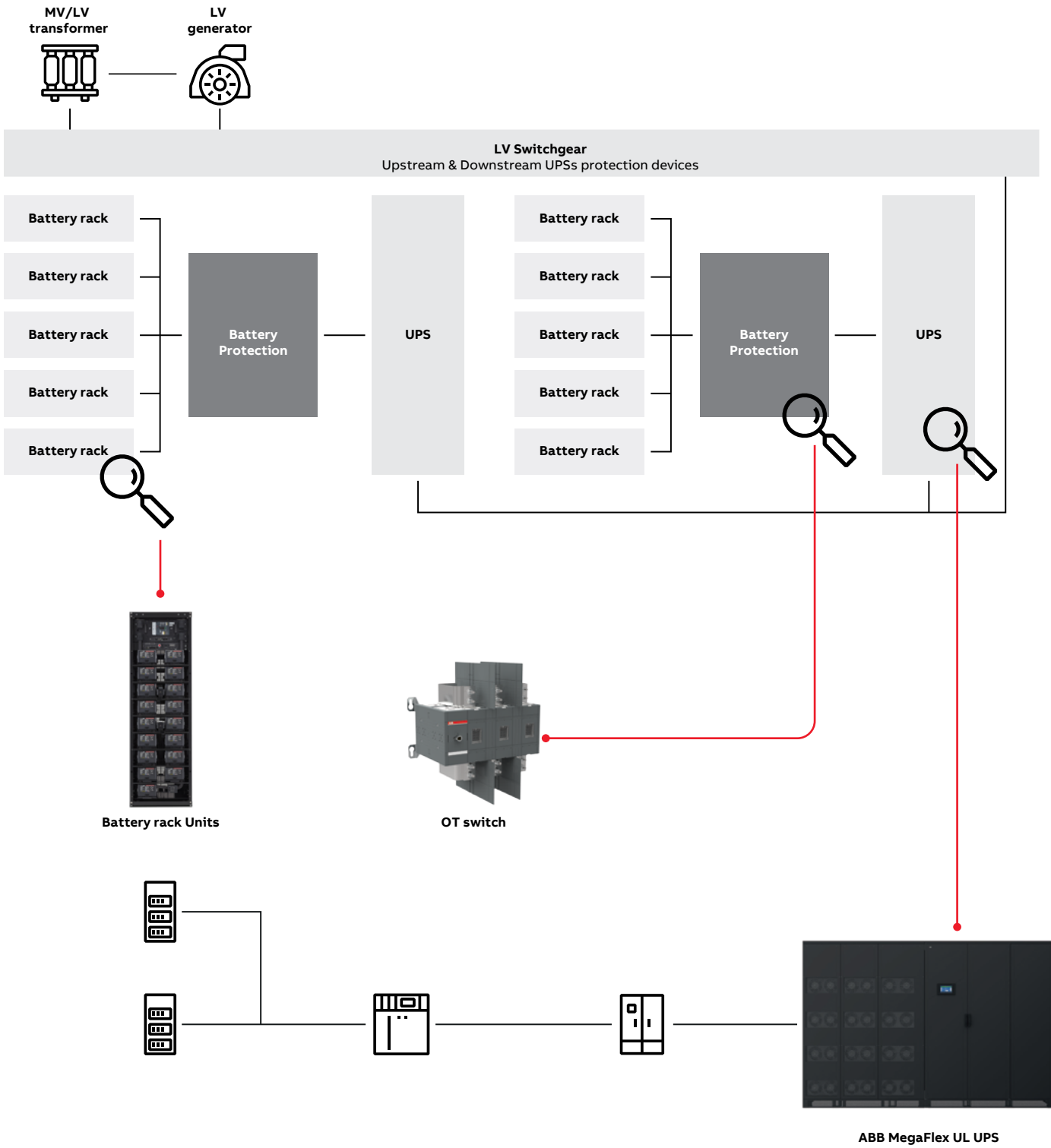
Air Circuit Breakers



Thermomagnetic
Molded-case circuit breaker



Electronic
Molded-case circuit breaker



UPS & Battery Rack components

MegaFlex UL 1200kW frame

ABB Network card for remote monitoring of the UPS

Battery Rack Unit provided with BMS for monitoring. Each rack cabinet is supplied with an individual protection device.

OT Switch/DC-E 3200A 1500V IEC four poles fixed without terminals

(installed inside Main LV switchgear) switch DC distribution system to 6 battery rack units

ABB MegaFlex UL UPS

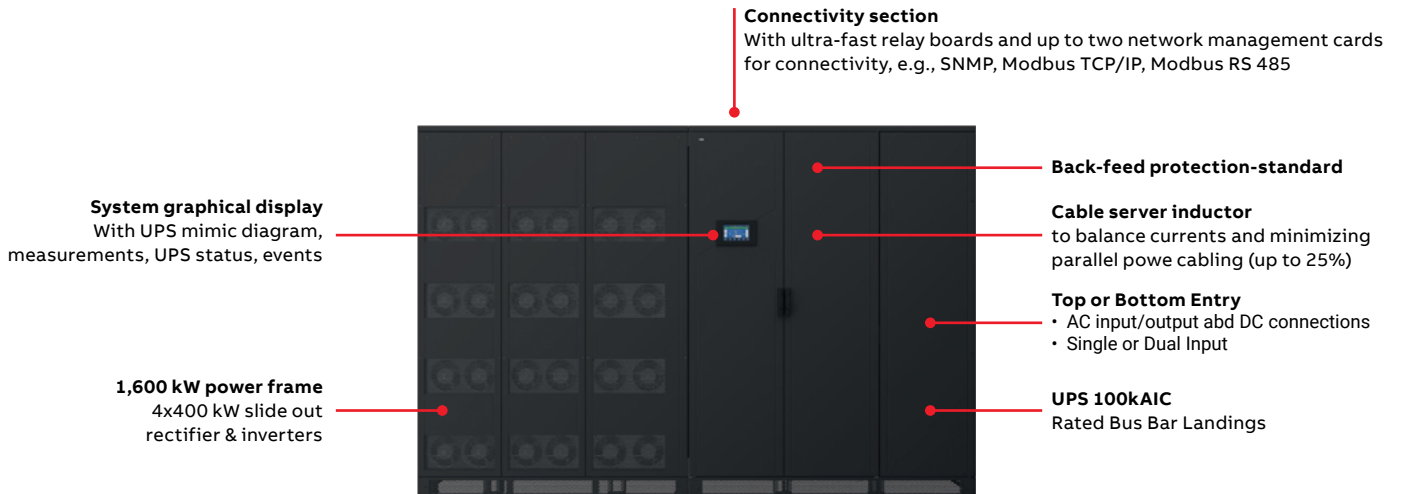
The UPS is the main component of the system that supplies IT loads. It not only ensures continuity of supply but also power quality by eliminating all voltage and frequency disturbances. A certain redundancy of UPS must be provided, depending on the required tier level. To reduce the footprint and increase energy efficiency, ABB offers a MegaFlex 480 V UL UPS system for this solution. It features a monolithic high-power density cabinet design with an industry-leading, optimized footprint. This compact system stacks three 400 kW power blocks, amounting to 1.2 MW, in one UPS cabinet and delivers reliable power with reduced energy loss. The load is shared between the 2 UPSes according to load power, while a high efficiency level (up to 99%) can be maintained thanks to the eBoost operation mode. This feature expands the classic “online double conversion” mode UPS system to a multi-mode UPS capable of maximizing operating efficiency commensurate with the stability of utility voltage and frequency, this also in parallel operation. Heat losses are reduced by 80% in the eBoost mode providing, besides the high-efficiency level, a considerable energy life cycle cost saving for a data center.

MegaFlex UL UPS - The best in power protection

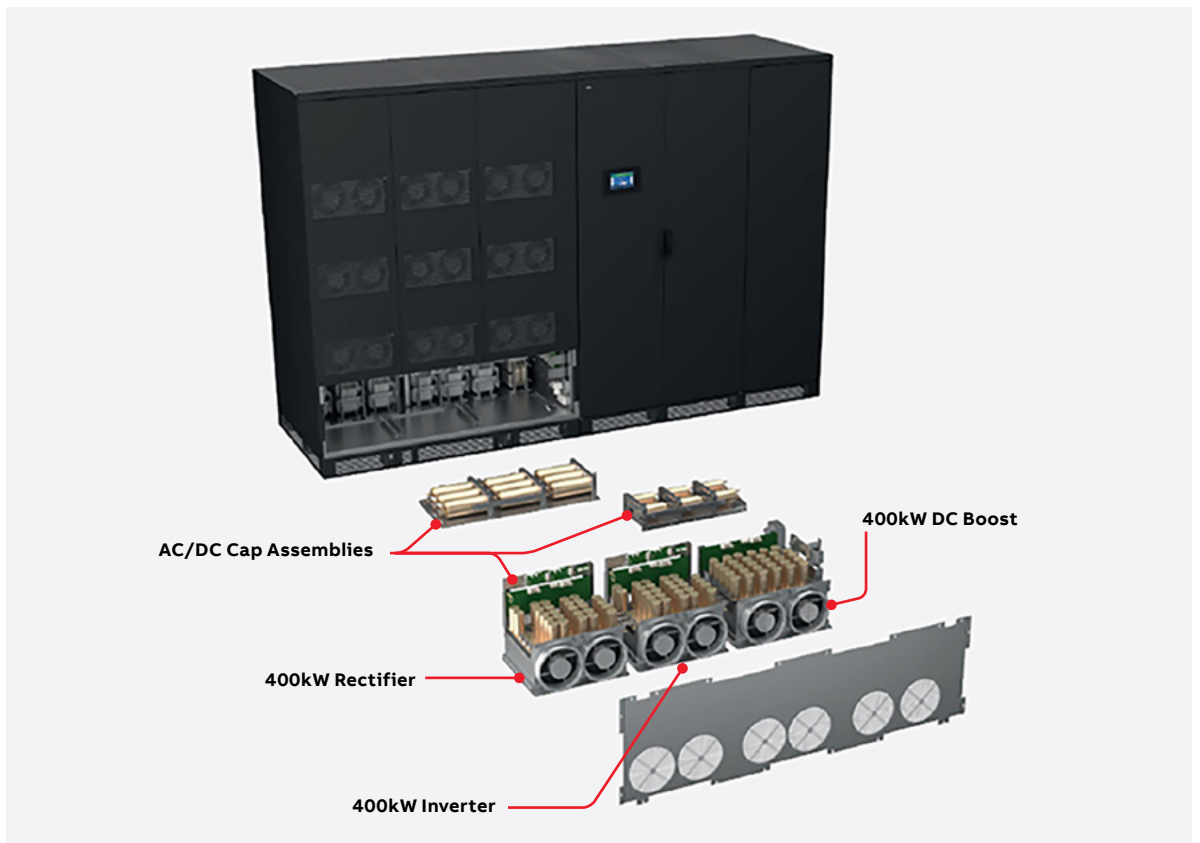


MegaFlex 480V UL UPS

1,200 kW to 1,600 kW at the first glance



Mechanical View & Slide-Out Sub-Assemblies

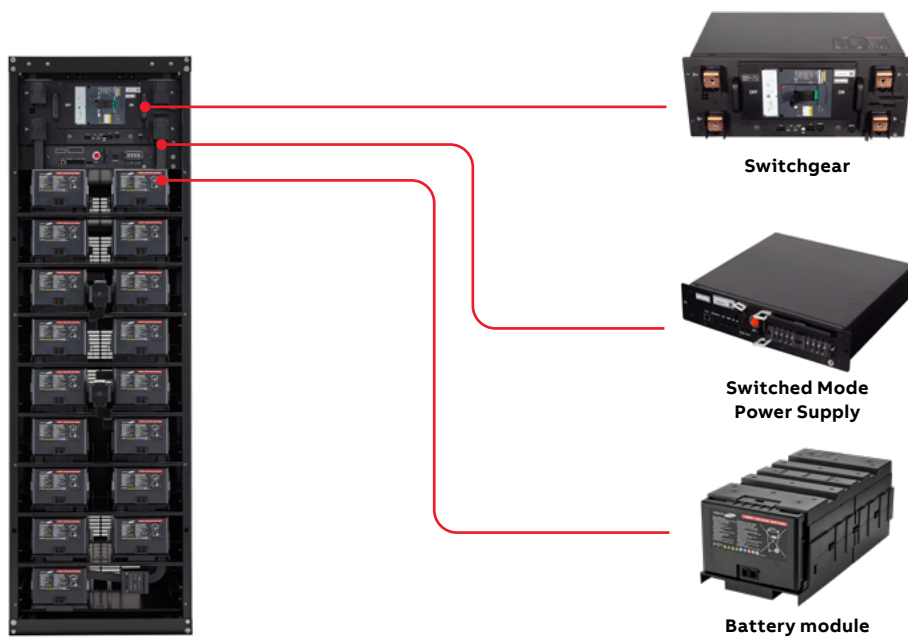


Battery Rack Units

The batteries used with the UPS provide power during unexpected lack of supply from the primary power source.

Among the several types of batteries available on the market, we selected Lithium-ion batteries for this solution since they do not contain mercury, lead, cadmium or other hazardous materials.

In addition, despite the fact that the majority of batteries require temperatures in the range of 20-25°C for high performance and lifetime, Lithium-ion batteries are much more tolerant to changes in environmental temperature and can operate over a broader temperature range of 18-28°C. Finally, when it comes to operating expenses, Lithium-ion batteries offer a lower total cost of ownership.



Each battery cabinet has various battery management systems for single modules, single strings and for complete systems (multiple racks in parallel), plus fuses and circuit breaker protection.

A single 34.6kWh cabinet configuration comprises one Switchgear, one Switched Mode Power Supply (SMPS) and 17 Battery Modules.

Bill of materials

Considered Parameters

List of parameters that were taken into consideration for the development of the bill of materials

Rated AC Voltage [V]	480	
Total IT Loads [kW]	1200	
UPS rated power [kW]	1200	
Number of UPS cabinets in parallel	2	
UPS redundancy	N+1	
Rated AC Voltage [V]	480	
Rated Power Transformer [kVA]	2000	13,8kV / 480V
Rated Power Generator [kVA]	2000	480V 60Hz
Type of battery	Lithium-ion	
Battery Nominal Capacity [kWh]	34,6	
Battery number of modules per rack	17	
Number of the battery racks	6 for each UPS	
Nominal Power Cooling UPS & Battery rack [kW]	70	
Operating DC Voltage [V]	From 435 V to 571.2 V	

Part Number	Local Part Number	Product Description	Quantity
1SDA078459R1	Z4SGULAB000A000000XX	Moving part for c.Breaker sace eMax2 E4.2S-A 2500 UL three-pole with solid-state release in AC EKIP/DIP-LSI R 2500 fitted with: 4 auxiliary contact and c.breaker in position open-closed	3
1SDA079702R1	Z4A32A0XX	Fixed part withdrawable for c.breaker SACE EMAX2 E4.2-A 3200 three-pole with rear vertical terminals	3
1SDA102482R1	XT5SU340ABFF0000XX	C.breaker TMAX XT5S 400 UL/CSA fixed three-pole with front terminals and thermomagnetic release TMA R 400 I3=2000...4000 A a fully rated neutral	4
1SDA104711R1	KXT5WMP400-3	Kit conversion for moving part withdrawable three-pole XT5 400	4
1SDA104872R1	KXT5FLDW	Front panel for withdrawable circuit-breaker XT5	4
1SDA104685R1	KXT5UWFPHR4-3	Fixed part withdrawable for c.breaker XT5 400 three-pole with rear horizontal terminals ul	4
1SDA074694R1	XT1HU3015AFF0000XX	Xt1h 125 tmf 15-500 3p f f ul/csa	21
1SDA077629R1	Z2NFUKAB000A000000XX	Moving part for c.breaker SACE EMAX2 E2.2N-A 2000 UL three-pole with solid-state release in AC EKIP/DIP-LSI R 2000 fitted with: 4 auxiliary contact and c.breaker in position open-closed	2
1SDA079698R1	Z2A20A0XX	Fixed part withdrawable for c.breaker SACE EMAX2 E2.2-A 2000 three-pole with rear horizontal terminals	2
1SDA102491R1	XT5SU340AFF0000XX	C.breaker TMAX XT5S 400 UL/CSA fixed three-pole with front terminals and solid-state release in AC EKIP DIP LSI R 400	3
1SDA104711R1	KXT5WMP400-3	Kit conversion for moving part withdrawable three-pole XT5 400	3
1SDA104872R1	KXT5FLDFP	Front panel for fixed-plug-in circuit-breaker XT5	3
1SDA104685R1	KXT5UWFPHR4-3	Fixed part withdrawable for c.breaker XT5 400 three-pole with rear horizontal terminals UL	3
1SCA117313R1001	OT2000U03P	OT2000U03 SWITCH-DISCONNECTOR 3-pole, front operated, base mounted non-fusible disconnect switch, handle and shaft are not included, terminal bolt kit included	2
1SDA115431R1	PCSH00Z00000000000XX	E4.2S-A MS/DC-E 3200 VR	1
1SDA115482R1	1SDA115482R1	KitJumpE4.2 3200 UL -A- 2psLS INST	1
4NWP106510R0001		MegaFlex 1.2MW UPS 480V 60Hz	2
7GSP000114R0001		UPS OPT RPA KIT	2
4NWP104024R3602		LIB_1Rack_17x8_SMPS with BMS_CE9540_136S1P	12
4NWA7000368206A		Interface Kit for SDI CE9540 lithium-ion batteries	12
Optional item if eBoost feature required			
4NWA8600398419P		eBoost License	2
Optional item if container cooling redundancy is required			
Optional item if monitoring of the UPS & battery racks is required			
4NWP107574R0001		Datalogger for SDI CE9540 lithium-ion batteries	2
4NWP106924R0001		ANC-ABB Network Card-Slot	2

APPLICATION FINDER

We've made it simpler for you to set up your project!
Click here to find the reference architecture that best fits your needs and download the Bill of Materials.



Product offering

Emax 2:




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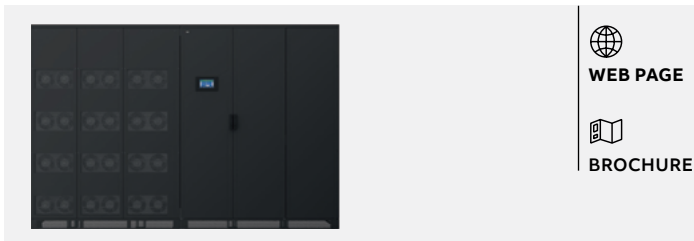
Tmax XT:




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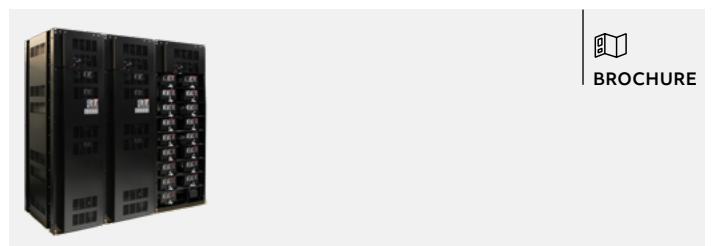
ABB MegaFlex UL UPS:




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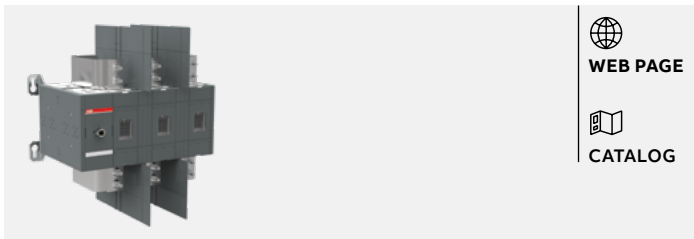
BROCHURE

Lithium-ion Battery:




BROCHURE

OT switch:




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