APPLICATION NOTE

Continuous Power For Critical Loads

Food and beverage industry

ABB continuous power solutions protect your critical loads from outage and abnormal supply conditions.
It ensures 24/7 continuous, clean, uninterruptible power supply, thus protecting personnel and food safety, reliability and security.

What is Continuous Power?
Due to growing demands, many F&B factories worldwide are operating 24/7 to achieve higher efficiency, productivity, safety and sustainability goals. In this era of continuous operation, uptime and on-time delivery, continuous uninterrupted clean power supply is required to protect security, personnel safety and reliability from outage and abnormal supply conditions.

Why you need Continuous Power For Critical Loads
The F&B industry has undergone huge transformations through digitalization and the increasing demand for monitoring and information systems keyed to improve productivity while complying with the many standards and regulations put in place to ensure people and food safety. But security, people safety and reliability can only be achieved by ensuring 24/7 continuous operation and protection against outage and abnormal supply conditions.

Main benefits

Continuous Operation
- Reliable double conversion UPS that protects critical loads from disturbances.
- Decentralized Parallel Architecture (DPA).
- Modules can be replaced or added without downtime (on-line swappable).

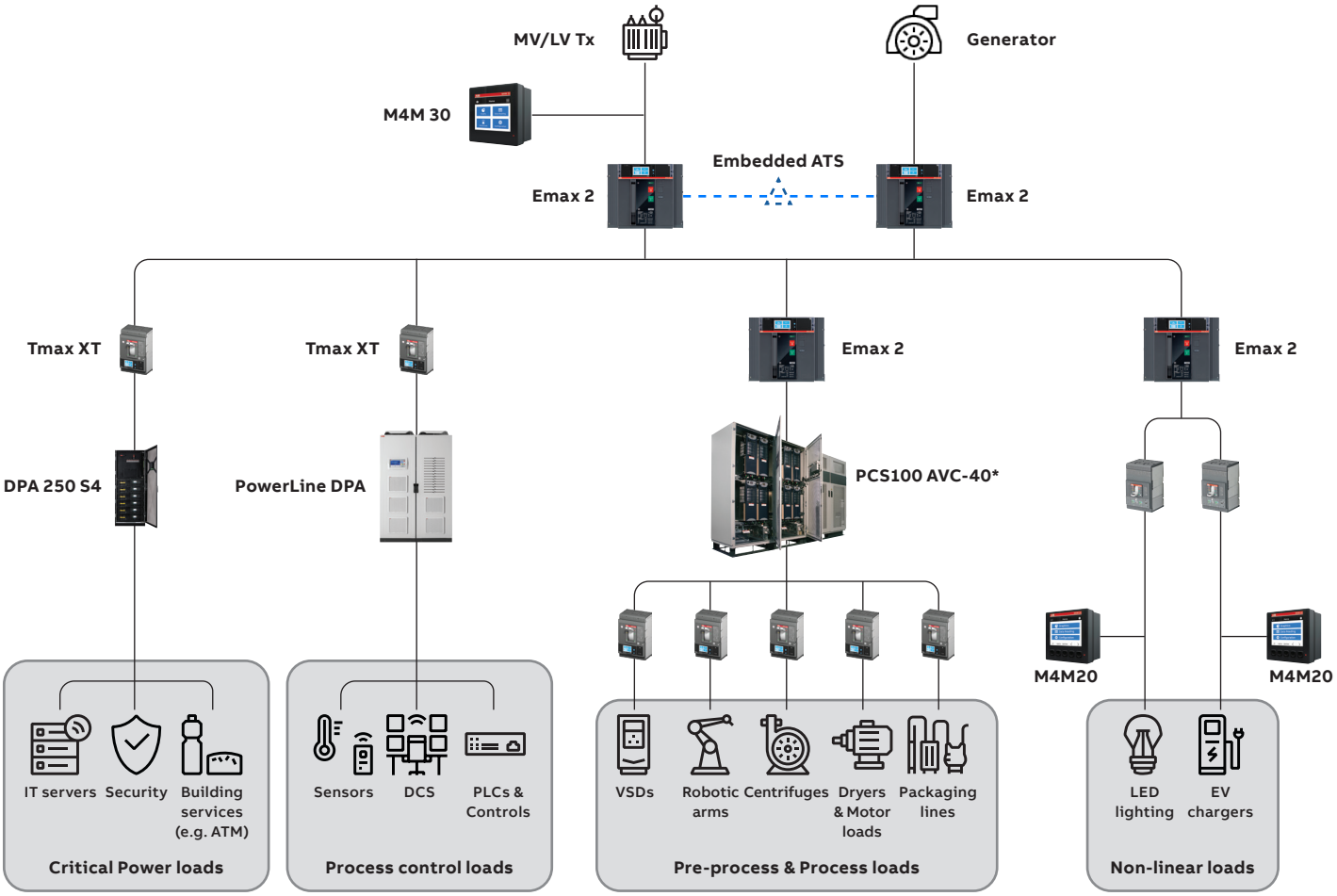
Self-optimizable projects
- Pre-designed, pre-tested and easy to commission, these solutions cut down on project time.
- Save up to 30% of UPS footprint.

Energy Efficiency
- 97.6% high efficiency thanks to three-level interleaved technology which reduces running costs without compromising reliability.
- Energy losses reduced by 30% compared to similar products on the market.

Application overview

Depending on the nature of their business, F&B industrial buildings include a mix of different processes and equipment with greatly varying power protection requirements.

They have been categorized into the following classes of loads and are protected separately but in a centralized way:



1. Critical power loads
require continuous operation, protection against outages and abnormal supply conditions in order to ensure security, personnel safety and reliability.

2. Process Control loads
require continuous operation, protection against outages and Power Quality problems in order to support process automation and equipment reliability needs.

3. Pre-process & Process loads
require continuous operation, protection against outages and Power Quality problems.

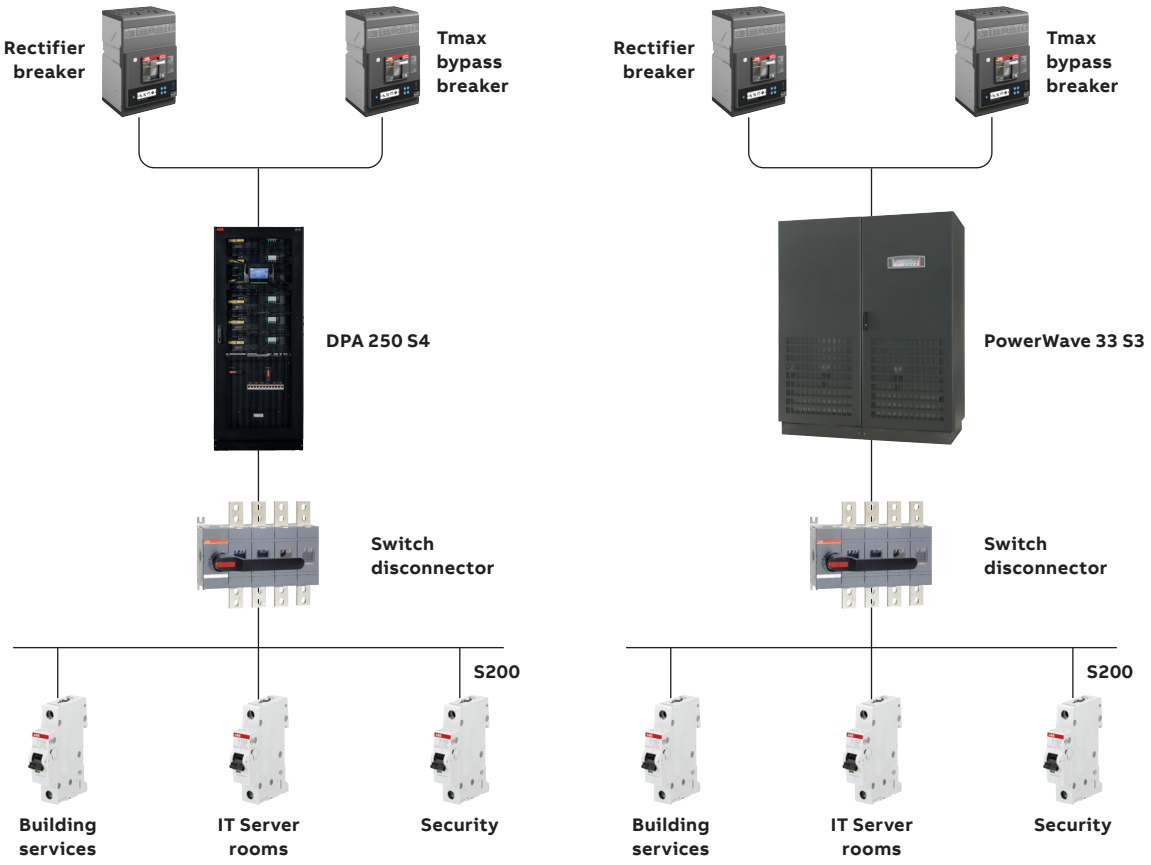
4. Non-linear loads
can trip or fail but restart without impacting the performance of the system. For this reason they do not require protection against outages but can be separated.

Continuous Power For Critical Loads

Critical loads are backed up by an independent source of the normal utility supply. These loads must endure abnormal electrical supply conditions if they are to support personnel and food safety, reliability, and security.
This means that critical loads require 24/7 continuous operation besides protection against outage and abnormal supply conditions.

For example, building services, IT server rooms, emergency lighting, security systems, access control systems, Fire Alarm systems, Building Management Systems (BMS), etc., are all critical loads.
As shown in the figure below, the UPS can be installed to protect all critical loads, or to protect a specific critical load (e.g. the IT server room).

Example of an SLD For Critical Loads



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DPA 250 S4

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DPA 250 S4 Catalog

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PowerWave 33 S3

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PowerWave 33 S3 Catalog

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Tmax XT

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Tmax XT Catalog

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OT

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S200

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S800

Main Components:

- **UPS:** Modular DPA 250 S4 / Standalone Powerwave 33 S3
- **Upstream Breakers:** Tmax XT (MCCBs)
- **Downstream Breakers:** S200 /S800 (MCBs)
- **Switch Disconnector:** OT Switch Disconnector

Why DPA 250 S4?

DPA 250 S4 features a modular architecture that offers the best reliability for environmentally conscious organizations that also need zero downtime and low cost of ownership. It is designed for critical, complex, high-density computing environments such as building services, security systems and IT server rooms. Scalable from 50 KW up to 1.5 MW with market-leading 97.6% efficiency for the UPS module. This high efficiency reduces operational costs and minimizes environmental impact. Cuts energy losses by 30% compared to similar products in the market.

Why Powerwave 33 S3?

Powerwave 33 S3 is an on-line double conversion standalone UPS. It delivers continuous power availability to network critical infrastructures making it perfect for building services, emergency lighting, security systems, IT server rooms and facilities. Although it offers maximum power protection, PowerWave 33 has a small footprint and uses less energy than comparable products - thus ensuring significant savings. It is is available in a 60kW to 500kW model range and can be configured to operate as a single, standalone UPS or as a multicabinet UPS system with up to ten UPS cabinets connected in parallel, thereby achieving up to 5MW total power capacity.
Find your way around selectivity when adopting UPS and circuit breakers using ABB building blocks for selectivity. The tables below contain useful information about selectivity.
They give the nominal characteristics of the selected UPS, together with all the relevant information about the required circuit breakers and switch disconnectors to make it easier for you to match them together and achieve selectivity.

Application Table
DPA 250 S4

UPS Power rating (kW)	CB Type (Bypass)	CB Type (Rectifier)	Switch Disconnector (optional)	CB Type (Downstream)	Selectivity with upstream bypass	Selectivity with upstream rectifier
50	XT3 N TMD 200A/ XT4 N ELT 250A	XT1 N TMD 160A/ XT2 N ELT 100A	OT160/OT250 (1)	S203 B 25A	Up to 0.6kA	Total
100	XT3 N TMD 200A/ XT4 N ELT 250A	XT3 N TMD 200A/ XT4 N ELT 250A	OT250	S203 B 25A	Up to 1,75kA	Total
150	XT5 N Ekip Dip R 320	XT5 N Ekip Dip R 320A	OT315	S203 B 63A	Up to 2,5kA	Total
200	XT5 N Ekip Dip R 400	XT5 N Ekip Dip R 400	OT400	S203 B 63A	Up to 4,2kA	Total
250	XT5 N Ekip Dip R 630	XT5 N Ekip Dip R 630	OT630	S203 B 63A	Up to 6,8kA	Total
300	XT5 N Ekip Dip R 630	XT5 N Ekip Dip R 630	OT630	S203 B 63A	Total	Total

1) OT250 for XT3 MCCB.
Note: Ekip Touch/Hi-Touch can also be used instead of Ekip Dip.

PowerWave 33 S3

UPS Power rating (kW)	CB Type (Upstream)	Selectivity with upstream rectifier	Switch disconnector (optional)	CB Type (Downstream)	Selectivity with upstream bypass	Alternative downstream breaker
60	XT1 N TMD R 160/ XT2 N Ekip Dip 100	Total	OT125/OT100	S203 B 40A	Up to 8.5kA	Total with S803 B 16A/ S203 B 16A
80	XT2 N Ekip Dip R 160	Total	OT125	S803 B 63A	Up to 28.5kA	Total with S803 B 32A/ S203 B 40A
100	XT3 N TMD 200/ XT4 N Ekip Dip R 250	Total	OT250/OT160 (1)	S803 B 50A/ S203 B 50A	Total	-
120	XT5 N TMA/ Ekip Dip R 400	Total	OT315	S803 B 63A/ S203 B 63A	Total	-

1) Maximum size of downstream breaker to achieve the selectivity level indicated in table. OT250 for XT3 CB and OT160 for XT4.
Note: Ekip Touch/Hi-Touch can be used instead of Ekip Dip. You can use the same suggested breaker, if 2 upstream breakers are installed (Bypass & Rectifier).

Main benefits

Continuous Operation

- Reliable double conversion UPS that protects critical loads from disturbance.
- UPS paralleled horizontally so as to enable redundancy.
- Selectivity between upstream and downstream protection devices.
- Decentralized Parallel Architecture (DPA) (DPA 250 S4).
- Modules can be replaced or added without downtime (on-line swappable) (DPA 250 S4).

Self-optimizable projects

- Pre-designed, pre-tested and easy to commission, these solutions cut down on project time.
- Save up to 30% of UPS footprint.
- Just 10 minutes to withdraw a module and insert it back on-line into the system. (DPA 250 S4).

Energy Efficiency

- 96% high efficiency in double conversion mode reduces running costs without compromising reliability. (Power Wave 33 S3).
- 97.6% high efficiency thanks to three-level interleaved technology. (DPA 250 S4).
- Energy losses reduced by 30% compared to similar products on the market. (DPA250 S4).
- Highly flexible battery configuration allowing the battery to be optimized and reducing the need to oversize.

Please remember

- The standalone UPS is monoblock with a single rectifier and bypass line. You lose backup power if one of the 2 lines fails.
- The modular UPS comprises several independent modules. If one module fails, the other module(s) continue to work. If redundancy is required, you can save space thanks to the easy N+1 or N+X redundancy configuration. It also allows for expansion as power requirements increase.
- The UPS rating can be sized to suit the critical loads connected downstream of the UPS and their power rating (Watt = VA x Power factor). Here are some simple steps to help you calculate your UPS rating:
  - Make a note of all the loads (DCS, Server Cabinets, Workstations etc..) as a whole VA or Watt.
  - Specify your feeder location and redundancy requirement.
  - Add all the UPS loads in the same zone and the required battery back up (e.g. select all the loads in the main control room that need 30 minutes of UPS backup).
  - Check whether the loads can be distributed over 1 or more UPS systems.
  - Consider the future extension capacity.
  - Perform an adequacy check of the UPS for the single largest load with crest factor. Make sure that the UPS is able to withstand the biggest inrush current.
- For the circuit breaker settings:
  - Overload Zone : The upstream circuit breaker and overload protection inside the UPS, and the downstream circuit breaker must trip faster (taking into account the tolerances and the real currents circulating in the circuit breakers).
  - Short Circuit Zone :
    - If the upstream circuit breaker is thermomagnetic, the magnetic threshold must be set to maximum value if it is adjustable (TMA).
    - If the upstream circuit breaker is electronic, set instantaneous protection function I to OFF.

For further information please consult our training module “Selectivity in low voltage UPS distribution networks” on ABB MyLearning
(Code : 9CSC017718-GLB-EN).

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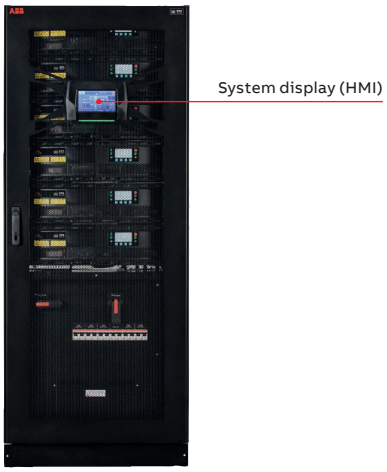
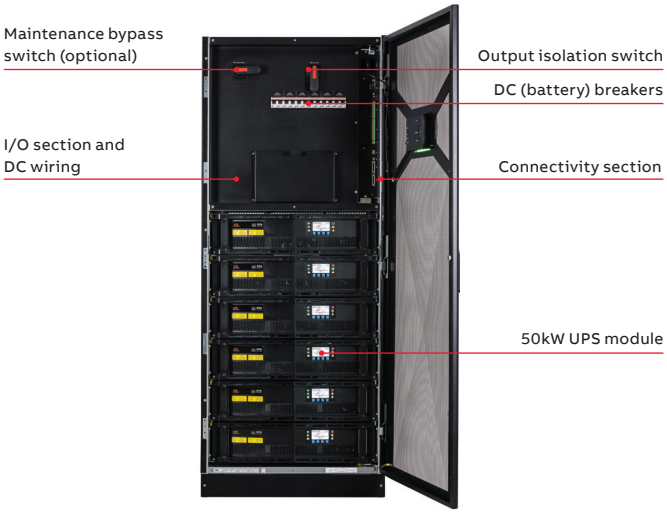
ABB MyLearning

Annex

DPA 250 S4





Features:

High Efficiency

- Reduces energy losses by 30% compared to similar products on the market.
- Over 97% energy efficiency in a wide operating range thanks to three-level interleaved technology.
- The Xtra VFI - double conversion mode maximizes efficiency under low-load conditions.

High Availability

- Decentralized Parallel Architecture (DPA).
- Replace or add modules with no downtime (online swappable).
- Secure ring communication ensures there is no single point of failure in the system.

High Flexibility

- Small footprint saves space and adapts to different installation layouts.
- Variety of options for energy backup, including lithium-ion batteries.
- Powerful battery charger, ready to support the critical load during the next outage.
- Just 10 minutes to withdraw a module and insert it back on-line into the system.

Sturdy

- Very sturdy design featuring practical handles (e.g. mechanical stoppers to prevent the modules from sliding out too far).
- 0 to +40 °C operating temperature range.

Monitoring

- Easy monitoring at system and module level
- ABB Ability™ SmartTracker.
- Communication interfaces: RS-232 and USB ports, I/O dry contacts (EPO, GEN On, …) and interface for external key interlock (bypass).
- Control and monitoring (ModBus RS-485, ModBus TCP/IP, SNMP and others).

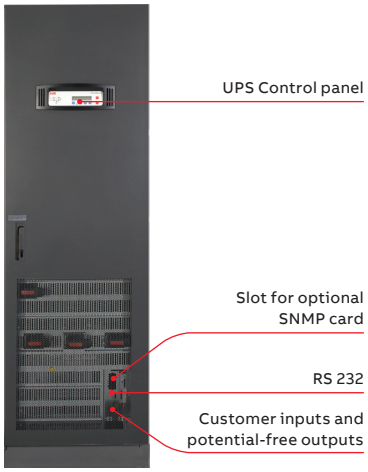
Battery Bank

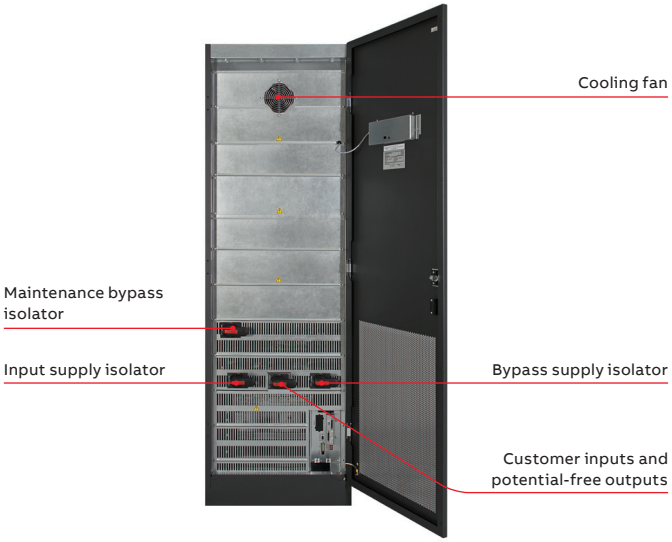
- Uses VRLA / Open Cells /NiCad / Li-Ion batteries.
- Fast recharging.

Standards

- IEC/EN 62040-1 General & Safety
- IEC/EN 62040-2 Electromagnetic compatibility (EMC).
- IEC/EN 62040-3 Performance & Testing.
- ISO 9001:2015, ISO 14001:2015, OHSAS18001.

PowerWave 33 S3





Features:

High reliability

- On-line double conversion technology.
- Parallelable systems for increased redundancy.
- Extendable backup time.
- Ripple-free and temperature controlled battery .
- Chargers extend battery life time performance.

Compact

- Small footprint saves expensive floor space.
- Cooling air exhausted through the top of the cabinet. No rear cabinet clearance is required (only 60-120kW and 400 to 500kW units).

Efficient

- Up to 96% efficiency in double conversion mode across a wide load range.
- Up to ≥99% efficiency in eco-mode.
- 1.0 rated output power factor.
- User-friendly LCD.
- Remote monitoring and connectivity options.

Sturdy

- Parallel configuration of up to 10 units with system power up to 5 MW.
- IP 20 protection (must be kept indoors, away from liquids).
- 0 to +40 °C operating temperature range.

Battery

- Uses sealed, lead-acid, maintenance-free or NiCd batteries.
- External battery cabinet.
- Battery temperature sensor.

Standards

- IEC/EN 50171 Central Power Supply Systems.
- IEC/EN 62040-1 General & Safety.
- IEC/EN 62040-2 Electromagnetic compatibility (EMC).
- IEC/EN 62040-3 Performance & Testing.
- ISO 9001:2015, ISO 14001:2015, OHSAS18001.

To discover more

APPLICATION FINDER

Find the reference architecture tailored to your needs and speed up your project thanks to our new Application Finder Tool!

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