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THREE-PHASE STANDALONE UPS SYSTEM

## **SG Series UPS 10-500 KVA**

Reliable and efficient standalone UPS for critical applications



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# Power protection for a wide range of power requirements and critical applications

Modern civilization is built on a power infrastructure in which generators, transmission lines and distribution networks feed energy to the electrical components that underpin almost every aspect of industry and civic society. To make sure clean and reliable power is always available to these components, ABB has developed industry-leading, flexible power protection technologies suited to the unique challenges of each customer.



# ABB SG Series uninterruptible power supplies 10 - 500 kVA

The SG Series is one of the best performing, most reliable and most versatile three-phase UPS systems available to those who need critical power protection. Power peace-of-mind for a wide range of applications is guaranteed - at a low total cost of ownership (TCO).

This true online double conversion UPS exploits its network integration software and communication connectivity to provide comprehensive, easy-to-integrate power protection for almost any IT environment. The SG Series operates in VFI (voltage frequency independent) mode, which maximizes load protection at any time.

Instead of standard filters, the UPS runs an innovative control algorithm on the IGBT rectifier to ensure the delivery of clean power in a most efficient manner.

The SG Series UPS provides top-class reliability and performance while complying with all relevant EMC and safety standards. ABB's unique RPA™ technology (redundant parallel architecture) allows units to work in parallel, thus further increasing reliability and uptime.

Through their complete life cycle, all ABB UPS systems are fully supported by service teams that provide world-class, 24/7 preventive and corrective services, training and application expertise.



#### **Optimal performance for a wide range of power**

Excellent dynamic response in case of pulsating loads



#### **RPA™ for reliability, redundancy & scalability**

Up to six UPS systems in parallel



#### **Continuous operation**

Proven reliability



#### **Remote monitoring and connectivity**

Enhances the capability of building management systems



#### **High efficiency for low TCO**

Reduced operational costs

# SG Series 10-500 kVA UPS

## A comprehensive power solution

### Delivering high efficiency with eBoost technology

ABB's SG Series is one of the most efficient and reliable three-phase UPS systems available, providing outstanding output performance and reliable power protection for your critical application needs. SG Series UPS solutions are designed and optimized to provide high efficiency at part-load conditions too.

- High efficiency: up to 94.6 percent in double conversion mode and up to 99 percent in eBoost mode. eBoost is available on 160-500 kVA models
- eBoost operation minimizes losses and can save annual power and cooling costs of up to \$300k for a 5 MW data center (based on typical figures)
- The PurePulse IGBT rectifier keeps your supply network clean and compact by shrinking the circuit breaker, cabling and generator

The SG Series UPS ensures low input current harmonic distortion and excellent output voltage regulation and dynamic response, thus reducing operational costs - all in an environmentally friendly solution.

### Easier installation and configuration flexibility

- True front access for operation and maintenance reduces mean time to repair (MTTR)
- Small footprint
- The redundant parallel architecture delivers reliability, redundancy and scalability
- Up to six UPS frames can be paralleled

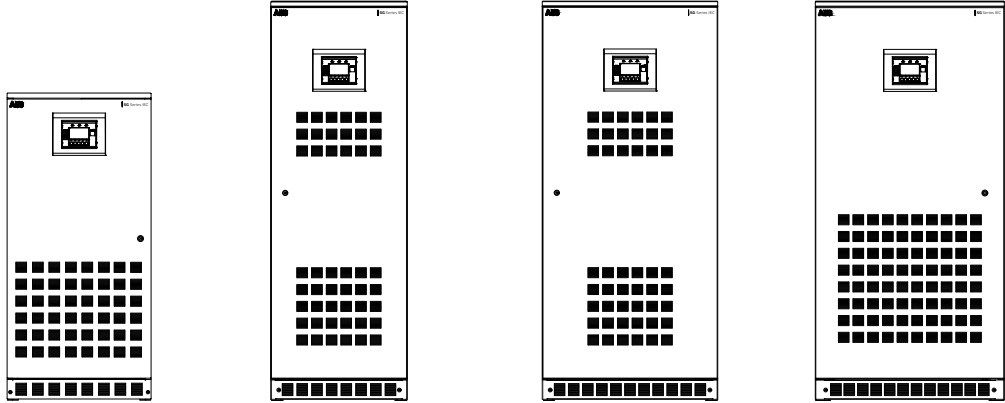
### High performance and availability

- Enhanced output performance that protects and supplies even the most sensitive IT loads with a lagging-leading power factor (0.9) without derating
- Excellent dynamic performance and low output voltage distortion
- Inverter zig-zag isolation transformer provides outstanding short-circuit capability and load galvanic separation

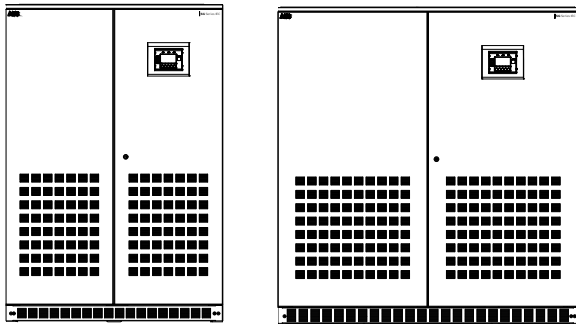


# SG Series

## Available models



Cabinet type	10 - 40 kVA	60 - 80 kVA	100 - 120 kVA	160 kVA
Dimensions w x h x d (mm)	680 x 1450 x 800	650 x 1900 x 850; 835 x 1900 x 850	835 x 1900 x 850	900 x 1900 x 850
Weight in kg (without battery)	290 - 420	550 - 630	860	1050



Cabinet type	200 - 300 kVA	400 - 500 kVA
Dimensions w x h x d (mm)	1300 x 1900 x 850	1800 x 1900 x 950
Weight in kg (without battery)	1220 - 1560	2190 - 2470

**Key features**

- eBoost technology for high efficiency - up to 99 percent
- Up to 94.6 percent efficiency
- PurePulse IGBT rectifier: clean input <2 percent THDi
- Output power factor: 1.0 (10-40 kVA), 0.9 (60-600 kVA)
- True front access design
- Small footprint
- Inverter zig-zag isolation transformer
- Extremely low output voltage distortion
- Superior battery management
- Intelligent energy management integrated (IEMi)
- Backfeed protection
- Built-in maintenance bypass
- Parallelable up to six units

# Input performance

01 Robust rectifier  
for wide input range

## PurePulse™ - IGBT rectifier clean input

PurePulse is an innovative control algorithm applied to the IGBT rectifier (available for models from 10 to 500 kVA). This current source rectifier assures an input total harmonic distortion (THDi) of less than 2 percent at full and partial loads and draws a pure sinusoidal waveform from the mains.

## Robust rectifier for a wide input range

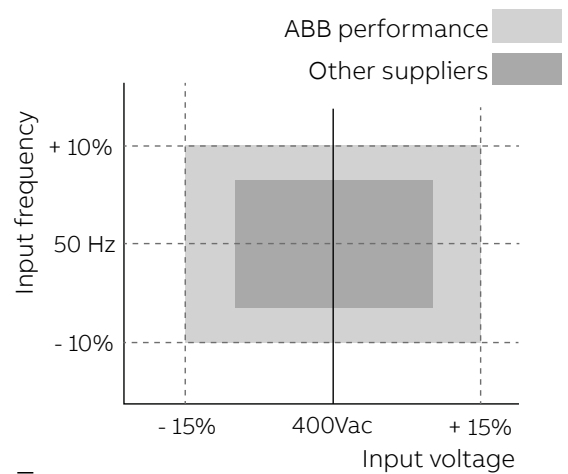
The wide AC input voltage and frequency window avoids unnecessary battery discharge even when operating from an unstable AC source (for example, a diesel generator).

## Programmable soft start

The programmable soft start allows the rectifier to ramp up in a programmable period (0-15 s), thus eliminating inrush current. This feature reduces the need to oversize the input power system (gensets, feeder cables and overcurrent devices).

## Generator compatibility

User-programmable features such as slew rate, phase angle rate-of-change and voltage rate-of-change allow the UPS to sync to a genset quickly during emergency back-up. ABB's input filter also has user-programmable features ensuring quick and continuous synchronization to generator voltage.



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# Output performance

01 SG Series  
power capability

## THDU

A distorted output voltage waveform affects the proper functioning of the load's equipment. The SG Series has very low output voltage THD, even with 100 percent unbalanced or 100 percent nonlinear loads connected.

## Transient response

With the use of ABB's space vector modulation (SVM) pulse width modulation inverter control technology and the ZigZag transformer, the ABB UPS can react very quickly to 0 to 100 percent step loads. This fast response reduces the need to oversize the UPS for severe pulse-load applications.

## Overload capabilities

The SG Series UPS has a robust inverter capable of delivering 150 percent overload for 1 min and 125 percent for 10 min, thus ensuring power protection continuity for applications requiring start-up overcurrent and for temporary peak loads.

## Voltage regulation

Because the SVM and the zig-zag transformer enable the inverter to react very quickly under step-load conditions, the UPS has very tight voltage regulation during step loads and 100 percent phase-to-neutral (Ph-N) load imbalances.

## Short-circuit capability

The SG Series inverter supplies 2.7 and 4.0 times (for 200 ms) the nominal current for ph-ph and ph-N/PE short-circuit respectively, ensuring the proper selectivity of the protection devices (fuses and breakers).

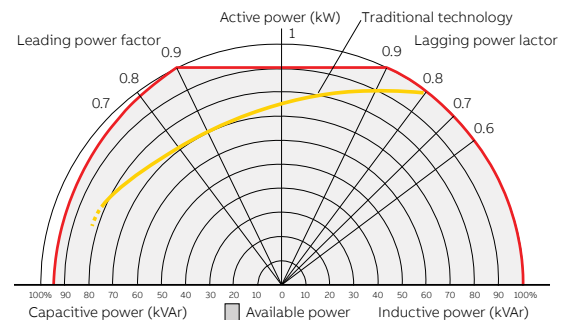
## Zig-zag output transformer

The zig-zag transformer enables the UPS to run with heavily unbalanced loads while supplying full kVA output capacity at 100 percent nonlinear load. The secondary windings of the output transformer form a zig-zag pattern to cancel third-order load harmonics. This reduces neutral conductor loading and losses in all the conductors and the input transformer. Inverter output transformer inductance filters noise during eBoost operation.

- Provides galvanic isolation from the load
- Protects inverter from high inrush loads
- No magnetizing inrush current during eBoost transfers

## SG Series power capability

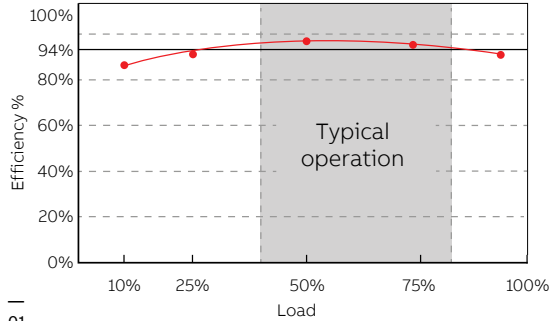
- Designed to supply real power for any type of load: inductive, resistive or capacitive
- No derating required to supply resistive and capacitive loads (0.9)
- Suitable for modern power supply application with unity or capacitive power factor, crest factor up to 3:1



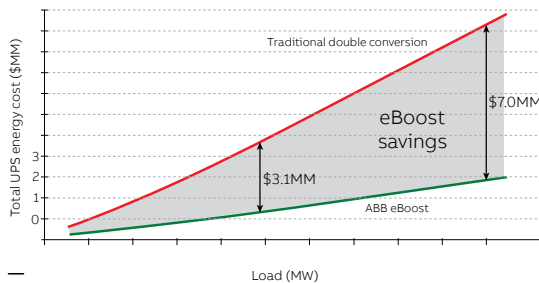
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# Ultrahigh efficiency mode eBoost

- 01 SG Series efficiency curve during load operation
- 02 eBoost savings
- 03 Reducing energy consumption
- 04 eBoost performance



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### How it works

In the SG Series UPS, the inverter output filter is energized during eBoost operation and it can, therefore, provide some degree of current conditioning.

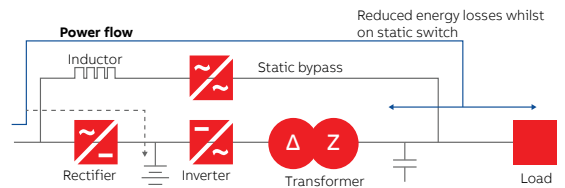
- The inverter filter capacitance may provide displacement power factor correction for inductive (lagging power factor) loads.
- The inverter output transformer features a zigzag (interconnected star) secondary winding, acting as a current triplen harmonics trap. Load neutral current resulting from nonlinear and/or unbalanced load is trapped in the zigzag winding, yielding load balancing and harmonic mitigation towards the upstream power system.
- The effectiveness of the power conditioning offered by the inverter output filter is magnified by the bypass series choke.

On average, neutral current injected in the upstream power system is reduced to less than half the downstream load neutral current.

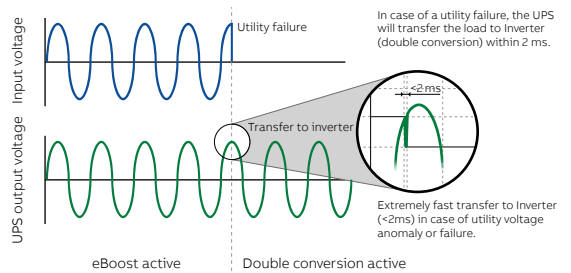
### Energy efficiency is our focus

eBoost - available on 160-500 kVA models - provides considerable additional energy cost savings over the lifetime of the UPS. The savings become particularly significant for large energy users, such as data centers. With eBoost, organizations can reduce energy costs without sacrificing system reliability.

- e = high efficiency up to 99 percent
- Boost = fast transfer to inverter < 2 ms
- Input voltage range: +/- 10 percent
- Input frequency range: +/- 2 percent
- Compliant with ITI (CBEMA) curve during transient events
- Patented power electronics and magnetics ensures less than 2 ms transfer time to the inverter
- Patented power conditioning/filtering design via bypass inductor and output transformer/capacitor while in eBoost mode
- Battery trickle charge in eBoost operating mode



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If there is a mains failure, the load is transferred to the inverter in under 2 ms, which means the load sees continuous power; the power glitch is invisible to the load.



# Redundant Parallel Architecture™ (RPA)

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01 Standard RPA configuration: true redundancy with distributed control and bypass

ABB's RPA is a unique technology that allows a UPS to run in parallel and with true redundancy by eliminating any single point of failure. RPA provides a scalable paralleling technique that reduces operating footprint and increases system reliability by eliminating the need for external paralleling equipment and cabinets (centralized bypass and master control).

One UPS in the system intelligently takes the leadership role, while the other UPSs have access to all control parameters. If one UPS fails to operate, the load is automatically redistributed among the others. If the lead UPS fails to operate, then another UPS automatically takes on the leadership role. RPA advantages are:

#### No single points of failure

The RPA system provides complete redundancy of all critical components and allows paralleling of up to six units for increased load capacity or redundancy.

#### Bypass inductor design

Ensures excellent output voltage regulation between paralleled modules and assists bypass line conditioning (eBoost only). Bypass inductor design and RPA Cable Saver is available only for eBoost units 160-500 kVA.

#### Distributed control logic

Each module in an RPA system has its own operational controller. Each controller continuously communicates with all others in order to manage the entire system.

#### Redundant communication

Redundant high-speed bus and control electronics provide higher system reliability.

#### Online maintenance

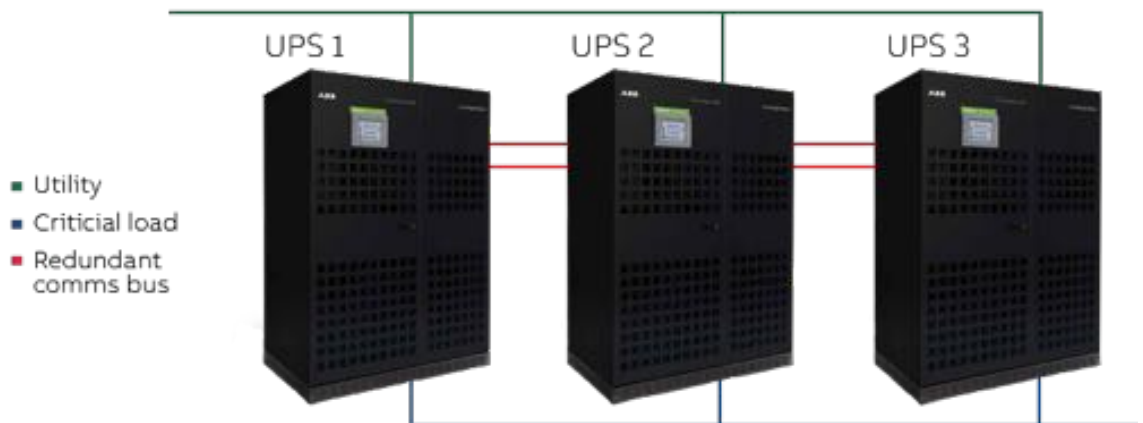
N+1 configuration allows maintenance on any single module in the system while other modules provide online protection with battery backup.

#### Sequential soft start

Provides sequential soft start of each module to reduce the instantaneous load on input feeders during mains recovery. This feature means the generator rating can be lower and cables and fuses will be subject to less thermal stress.

#### Smaller footprint

RPA eliminates centralized control and external static bypass cabinet.



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# Features and technology

## Superior battery management (SBM)

Every SG Series UPS incorporates SBM, which allows the battery system to be tested periodically and true battery runtime to be calculated. SBM uses measured values of temperature and load.

- Works with flooded, VRLA and NiCd batteries
- Online battery test: Periodic rectifier/battery testing reduces the risk of the load losing power
- Monitors all key parameters of the battery bank to maximize reliability and lifetime, and warn of possible problems

## Digital signal processor (DSP)

The DSP's high performance enables the fast waveform sampling rates needed for current and voltage monitoring and control.

- High-speed sampling rate for precise RPA control
- Faster transient response time
- Redundant high-speed communication
- All digital controls for increased reliability and stability
- All system control parameters are adjustable from the front panel



# SG Series

## Technical specification

<b>General data</b>						
System power range	10 – 40 kVA	60 – 80 kVA	100 – 120 kVA	160 kVA	200 – 300 kVA	400 – 500 kVA
Active power / frame	10/15/20/30/ 40 kW	54 / 72 kW	90 / 108 kW	144 kW	180/ 225 / 270 kW	360 / 450 kW
Output power factor	0.9 lead – 0.6 lag					
Topology	Online double conversion					
UPS type	Standalone, transformer-based					
Parallel configuration	Up to 6 units in parallel with Redundant Parallel Architecture (RPA)					
<b>Input</b>						
Nominal input voltage	3 x 380/400/415 V + N					
Voltage tolerance	340-460 V					
Input distortion THDi	<3%					
Frequency	50/60 Hz					
Frequency range	45-66 Hz					
Power factor	>0.99					
Walk-in / soft start	Yes					
<b>Output</b>						
Rated output voltage	3 x 380/400/415 V + N					
Voltage tolerance	+/-1% static, +/-3% dynamic, +/-3% unbalanced load					
Voltage distortion THDU	<2% linear load, <3% nonlinear load (EN 62040)					
Frequency	50/60 Hz					
Overload capability	150% 1 min, 125% 10 min					
Output short circuit capability	2.7*In(Ph-N) / 4*In(Ph-Ph) for 200 ms					
Crest factor	<3:1					
<b>Efficiency</b>						
Overall efficiency	Up to 92.3%	Up to 91.9%	Up to 92.1%	Up to 94.2%	Up to 94.6%	Up to 94.2%
In eco-mode (eBoost) configuration	Up to 98%	Up to 97.9%	Up to 97.9%	Up to 98.4%	Up to 98.5%	Up to 98.7%
<b>Environment</b>						
Storage temperature	UPS: -25 °C +55 °C					
Operating temperature	0-40 °C					
Humidity	Max. 95% (non-condensing)					
Altitude configuration	Up to 1000 m with no derating, at 1500 m:-2.5%/ 2000 m:-5%/ 2500 m:-7.5%/ 3000 m:-10% (EN/IEC 62040-3)					
<b>Communications</b>						
HMI	Multilingual graphic display (LCD)					
Relay contractors	6 voltage-free contacts for 27 programmable alarms					
Input signals	EPO, Gen-ON (emergency power supply ON, n/o contact), 1 auxiliary signal (settable functionality)					
Communication ports	RS232, SNMP (Modbus IP, RS232, RS485 & BacNet IP)					
<b>Electrical / Mechanical</b>						
Degree of protection	IP20					
Color	10-120 kVA RAL 9003 (white), 160-500 kVA RAL 9005 (black)					
Cable entry	Bottom (top optional)					
Back-feed protection	Built-in as standard					
Serviceability	Fully front serviceable					
Ventilation	From front to top					
Audible noise	<65 dB(A)	63 dB(A)	63 dB(A)	69 dB(A)	69 dB(A)	69 dB(A)
<b>Batteries</b>						
Type	VRLA batteries, vented lead-acid batteries, wet batteries, NiCd, flywheel					
DC floating voltage	409-436 V					
<b>Standards</b>						
Safety	IEC / EN 62040-1					
Electromagnetic compatibility (EMC)	IEC / EN 62040-2					
Performance	IEC / EN 62040-3					
Product certification	CE marking					
Manufacturing	ISO 9001					
<b>Weight, dimensions</b>						
Weight (Kg)	290-420	550-630	860	1050	1220-1560	2190-2470
Dimensions w x h x d (mm)	680x1450x800	650x1900x850	835x1900x850	900x1900x850	1300x1900x850	1800x1900x950



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