

SG Series UPS 400Vac/CE

GE Consumer & Industrial
April 2004

Applications

Computer and Data Centers

Server Farms

Process Control

Broadcasting / SAT Systems

Radar control installations

Air traffic control

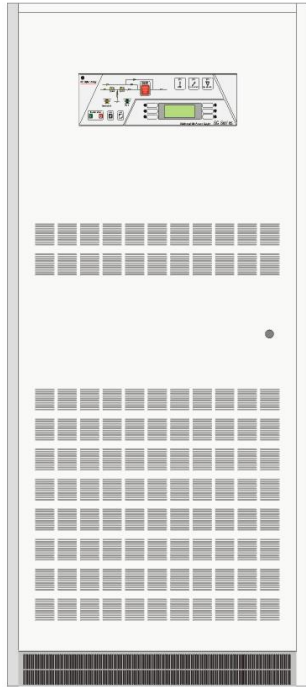
Internet Service Providers

Safety Systems in Power Plants

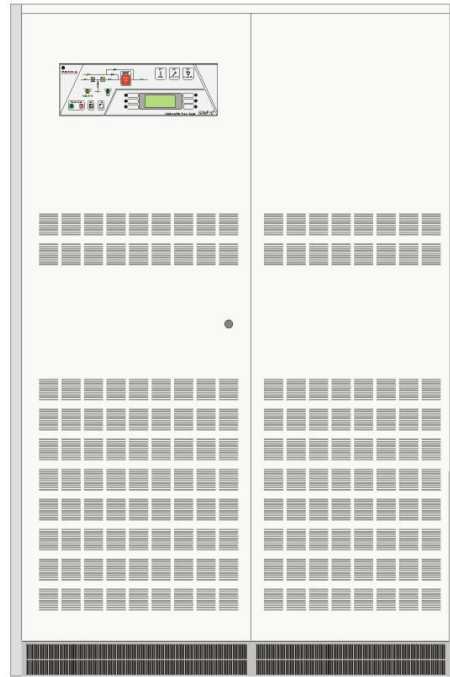
Medical Imaging Equipment

**Mission Critical Applications requiring highest levels of protection
and reliability**

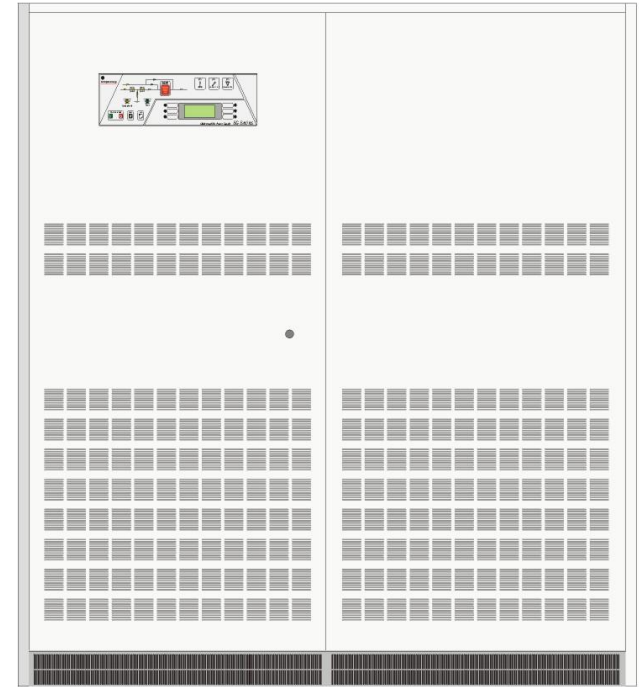
Range



80 kVA



100-120 kVA

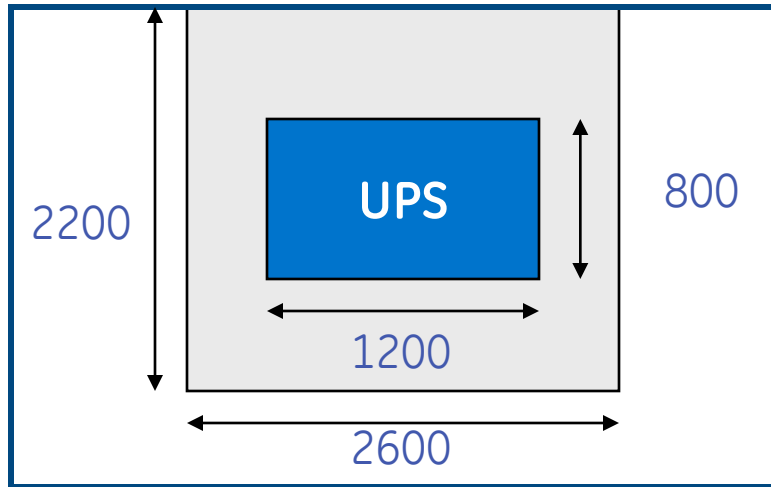


160-200 kVA

Maintenance bypass integrated
Service access via front allowing placement
against walls

Top or bottom cable entry
Redundant cooling fans
Separate bypass feed possible

Service access via front only

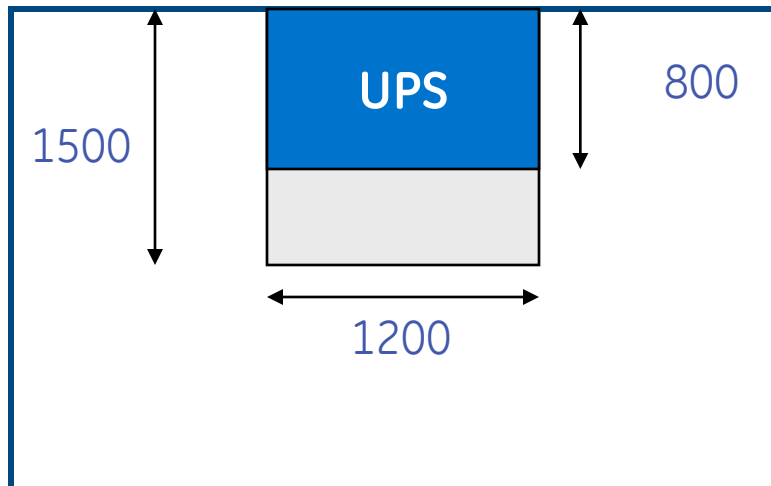


Multi Side Access Required

Footprint

UPS : $1200 \times 800 = 0.96$ sqm
Operational : $2200 \times 2600 = 5.72$ sqm

UPS needs 700mm on all sides for access



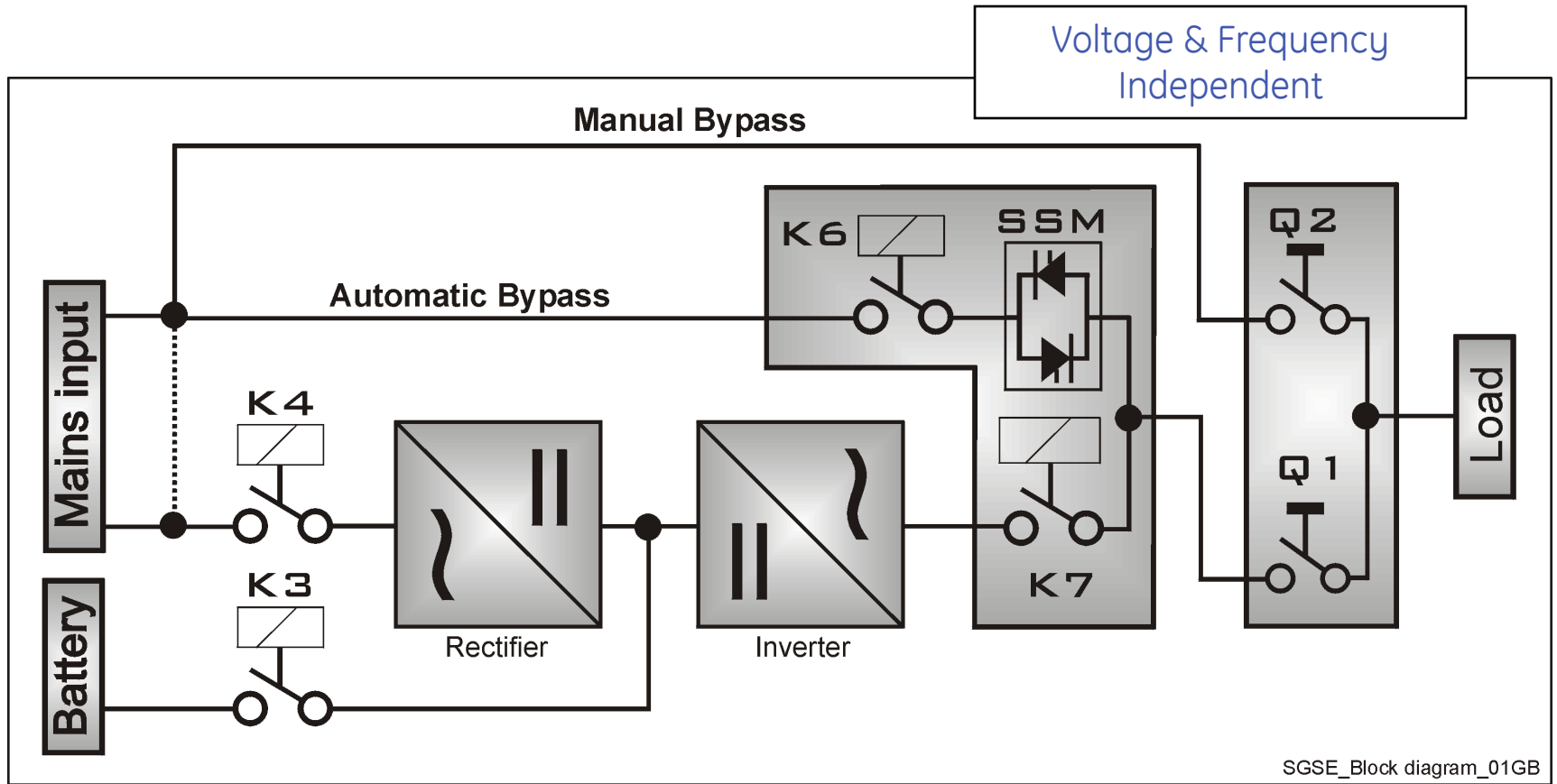
Front Access Only

Footprint

UPS : $1200 \times 800 = 0.96$ sqm
Operational : $1200 \times 1500 = 1.80$ sqm

Front access reduces operational footprint with 68%

Concept



Output voltage and frequency independent from input (VFI)

Manual bypass (Q2) to facilitate maintenance

Output isolation transformer for galvanic separation

Back feed protection (k6) standard

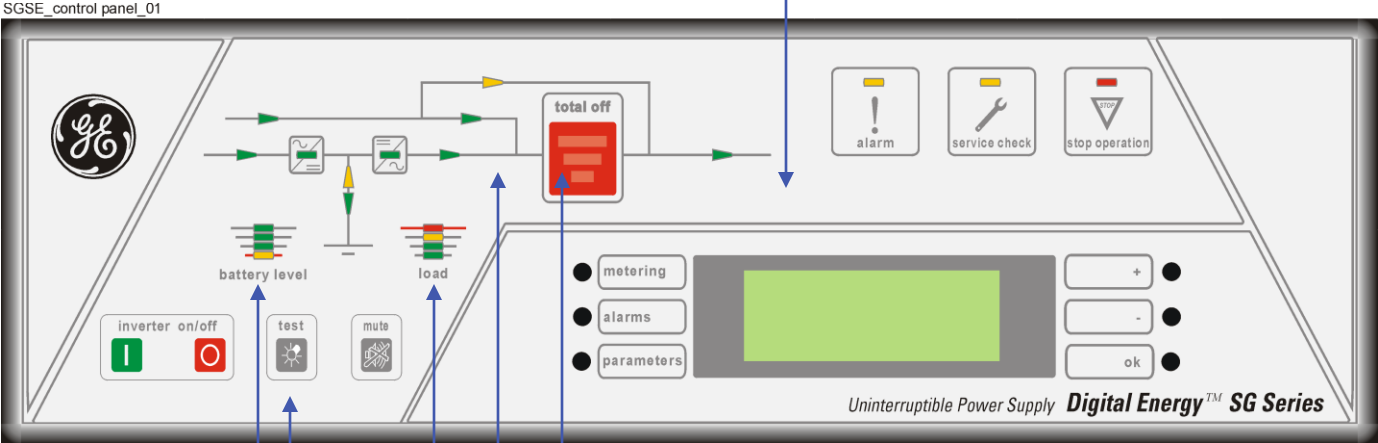
Control Panel

Stop operation LED indication

Service check LED indication

Alarm LED indication

10 language LC Display



Load off button (protected)

Simple mimic diagram

Load level indication

Lamp test

Battery charge level

Automatic
Start Up

Input Performance

Voltage Window

Less battery operations

Voltage :- 20% +15%

Frequency :+/- 10%

Harmonics Feedback

Current THDi : <6%

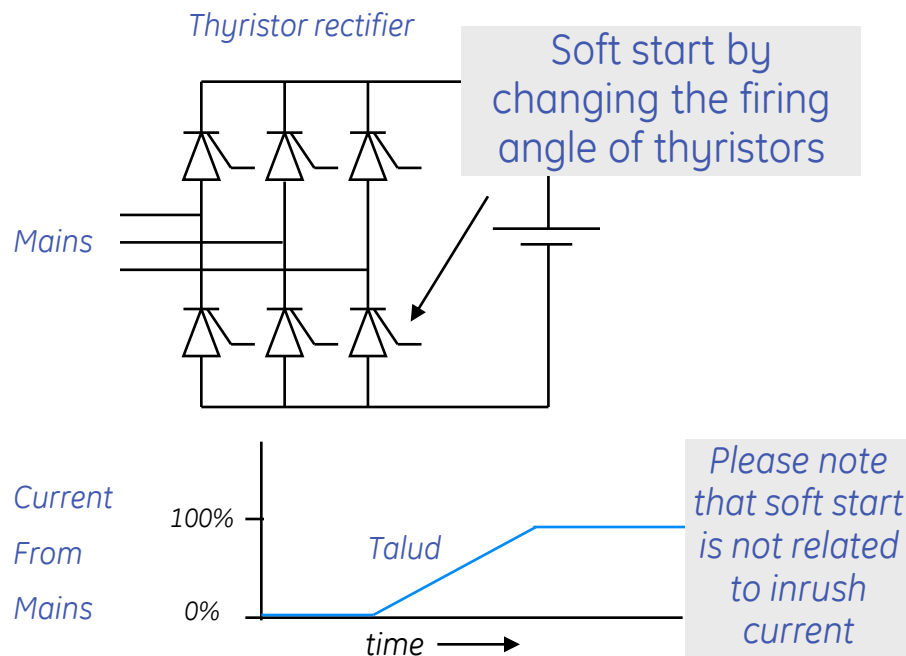
Power Factor : >0.96

(with optional filter)

More information on Active Filter Solutions in separate presentation

Soft start

The thyristor rectifier can be activated gradually. In that way the full load will not be connected to the utility or genset preventing an instable situation. Softstart is programmable (default: 30 seconds)



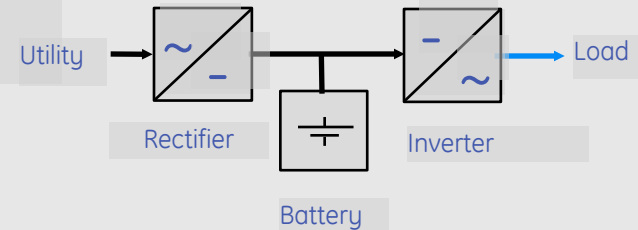
Performance IEC 62040-3

Level 1: Output voltage dependency from utility **XXX YY ZZZ**

VFI – Topology (Double conversion/on-line)

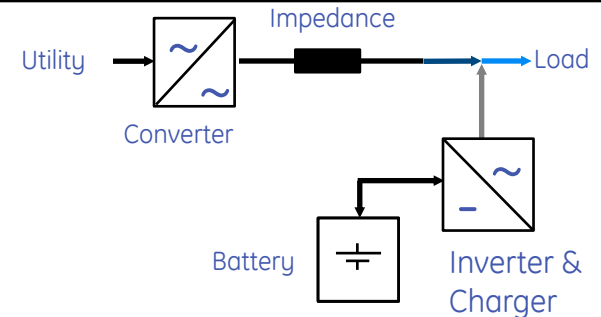
Voltage & Frequency Independent

SG Series



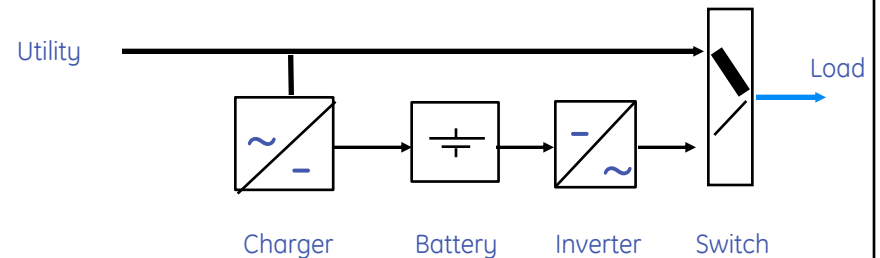
VI – Topology (UPS-Utility-Parallel operation / single conversion / Line-interactive)

Voltage Independent



VFD – Topology (off-line)

Voltage & Frequency Dependent



Performance IEC 62040-3

Level 2: Output **voltage** quality depending on load (XXX **YY** ZZZ)

S **S** Sine wave: THD < 8% (IEC 61000-2-2/-4) for all linear and non-linear loads (SG Series)

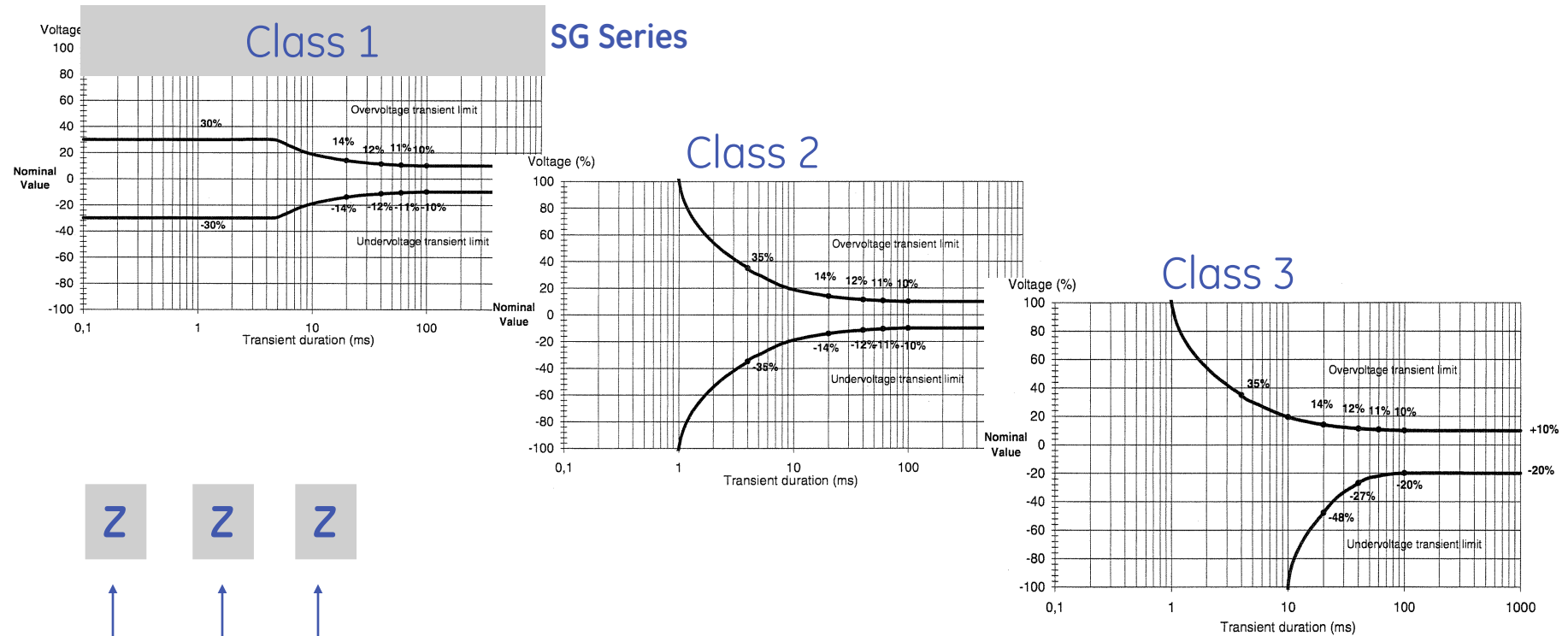
X **X** Non-sine wave: THD > 8 % with non-linear load

Y **Y** Non-sine wave: out of tolerance of IEC 61000-2-2/ -4

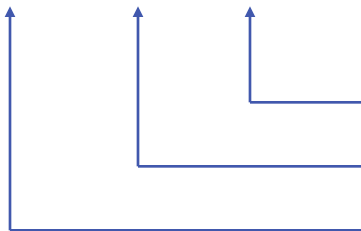
Battery operation
Normal operation

Performance IEC 62040-3

Level 3: Dynamic output voltage behaviour (XXX YY ZZZ)



Z Z Z



- Dynamic load changes with non-linear load (0% – 100% – 0%)
- Dynamic load changes with linear load (0% – 100% – 0%)
- Change of operation mode (Utility – battery / Inverter - By-pass)

Performance IEC 62040-3

SG Series Classification: VFI – SSS - 111

VFI Voltage & Frequency Independent
Frequency Converter operation available

SS Output voltage THD < 8% for all loads
SG Series: THD < 3% for all loads

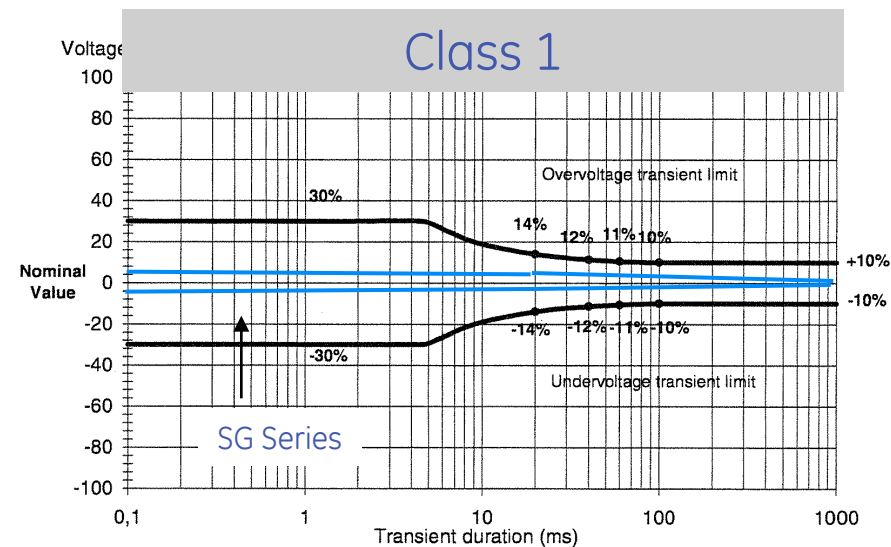
111 Class 1 performance

SG Series exceeding Class 1

“Best in Class” dynamic response:

+/-2% at load step: 0-100%-0

+/-1.5% at load step: 0-50%-0



SG Series maintains its performance, also at unbalanced loads

Electro Magnetic Compatibility IEC 62040-2 Class A

Emission

All electronic equipment emits electromagnetic waves through cables (conducted) and air (radiated)

Immunity

All electronic equipment is sensitive for electromagnetic waves. These waves can disturb the function of this equipment

Electro Magnetic Compatibility

Different types of equipment (all emitting electromagnetic waves) can work properly even when installed close to each other. They are compatible

IEC 62040-2 is a standard that defines the limits of maximum allowable levels of emission of electromagnetic disturbances for UPS systems

This certifies the proper functionality of a UPS system and other equipment close to in the environment

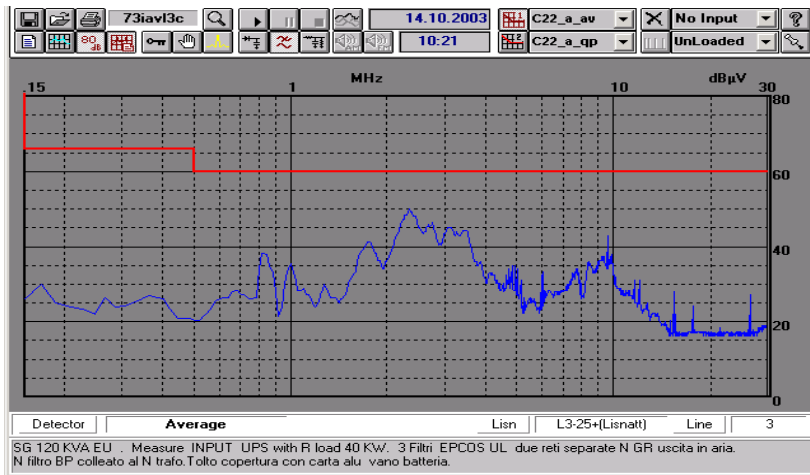


Electro Magnetic Compatibility IEC 62040-2 Class A

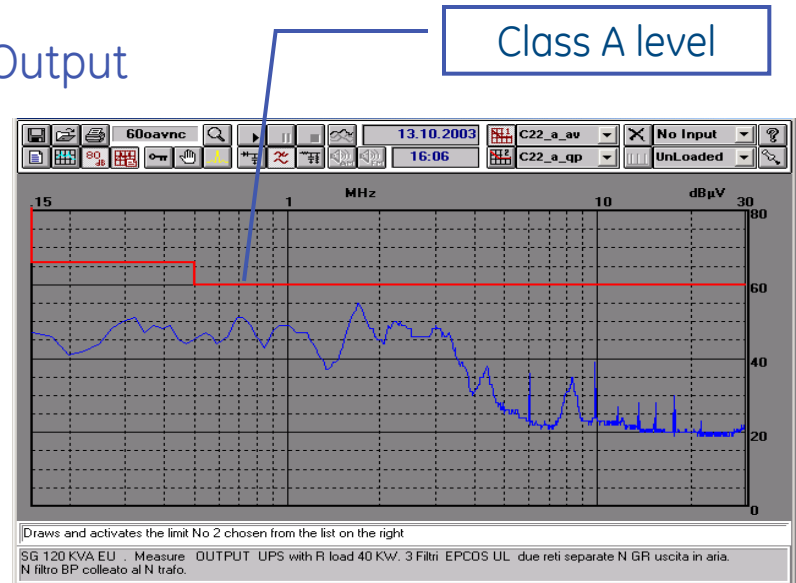
Class A EMI filter on SG Series

As an option SG Series offers an EMI filter. With this filter the SG Series complies to IEC 62040-2 Class, for input as well as the output

Input



Output



The EMI filter is recommended for broadcasting, telecom and other applications where electromagnetic interference exists or needs to be prevented

Output Power Factor

Trend: most computer power supplies have power factor correction

That means UPS systems have to supply loads with a high power factor

SG Series has an output power factor (PF) higher than industry standard

This prevents the need for over sizing the UPS

Example Load:	Standard UPS:	SG Series:
80 kVA / 70 kW PF: $70/80 = 0.875$	80 kVA / 64 kW PF: $64/80 = 0.80$	80 kVA / 72 kW PF: $72/80 = 0.90$

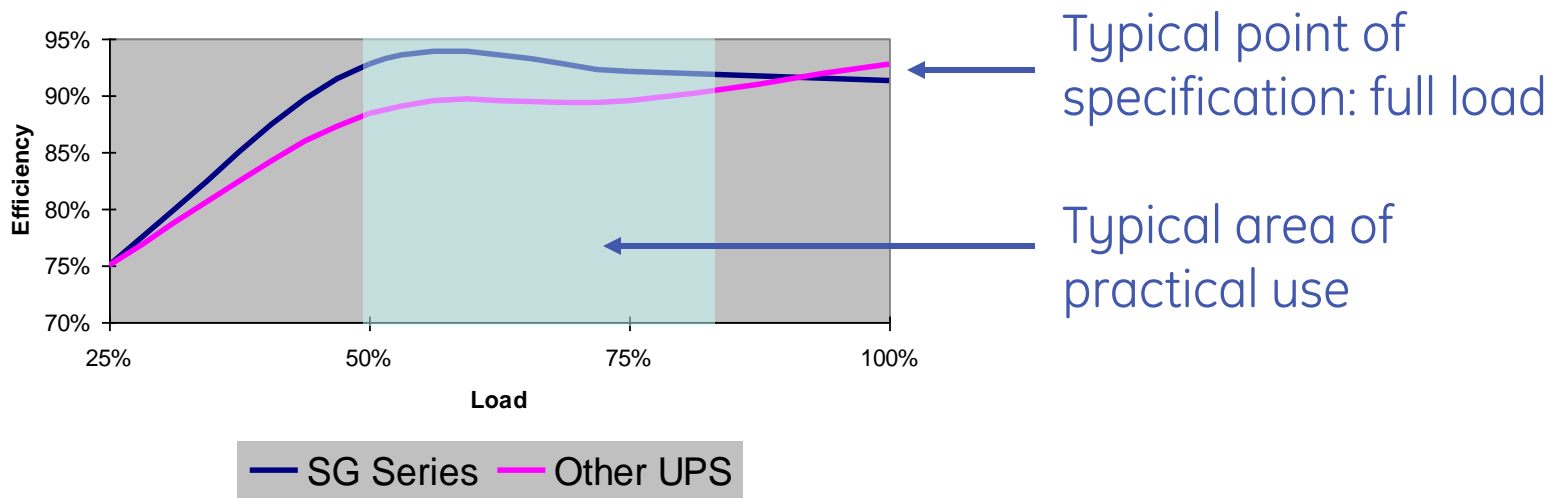
In this case a standard UPS with output power factor 0.8 is not sufficient to supply the load, even though the rating is 80kVA.

SG Series can deliver more active power (kW) in comparison to an other UPS of the same rating

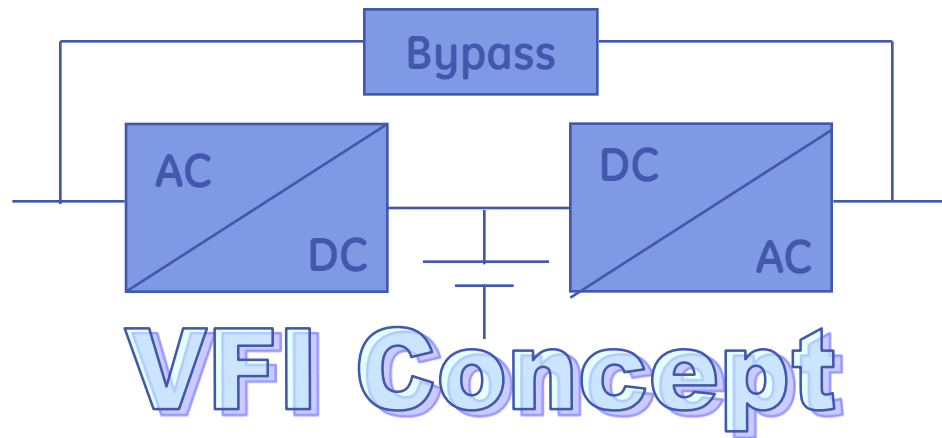
Efficiency

Often a UPS is oversized with respect to the load
Usually it runs at partial load (in particular in parallel configurations)
For most UPS systems this is not the optimal working point
This causes the efficiency to be lower than at nominal power
With a special inverter control strategy the SG Series has a very constant efficiency, for every load situation

Efficiency vs. Load



Efficiency – Super ECO Mode



VFI Concept:

- + optimal protection for mission critical applications
- energy losses

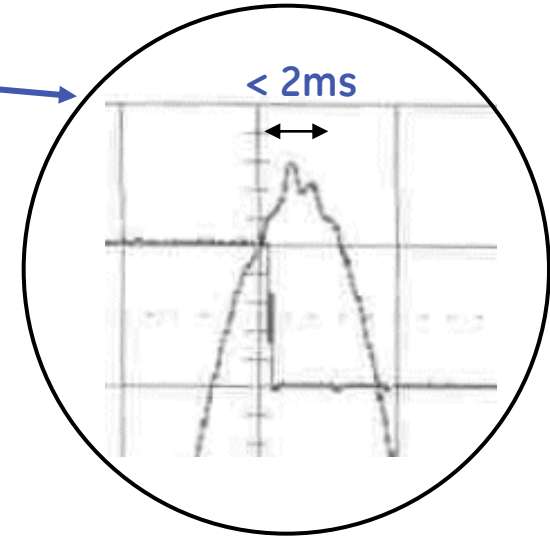
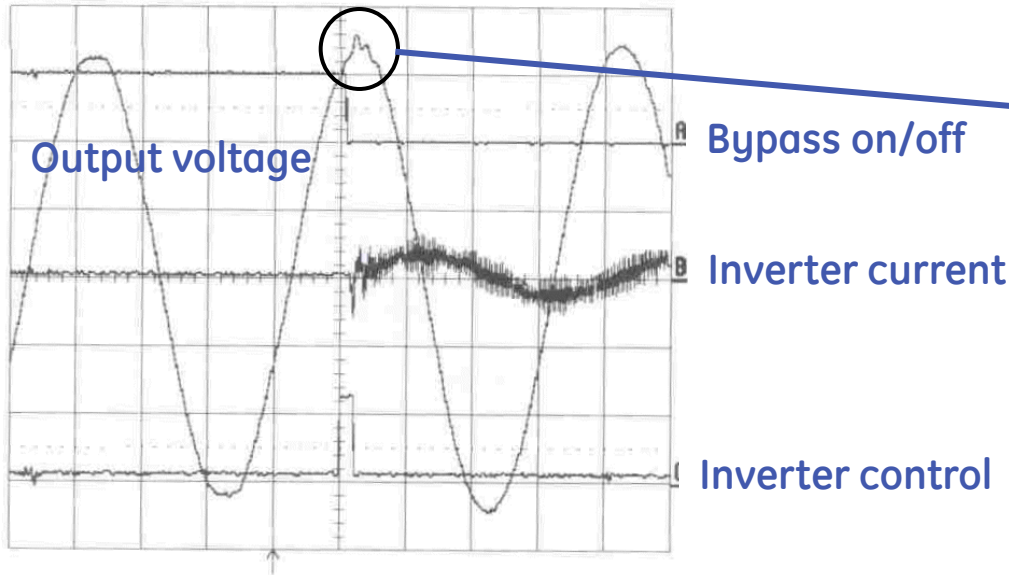
Balance:

For less critical loads run UPS on bypass continuously

In case mains is out of limits transfer the load to inverter

Super ECO Mode: not only is the load supplied on bypass, but the inverter is also switched off, increasing energy savings

Efficiency – Super ECO Mode



Fast Transfer to Inverter

Super ECO mode

- Efficiency : 98%
- to Inverter in case Bypass is out of limits
- Fast error detection
- Extremely short transfer times (<2 ms)
- User definable scheduling
- Available for 10 – 500 kVA

More details on Super
ECO Mode in
separate
presentation

Superior Battery Management

SLA and NiCad batt

Application flexibility

High recharge current available

To support large battery capacities

Prediction of true backup time

No surprises

Charger temp. compensated

To prevent overcharging

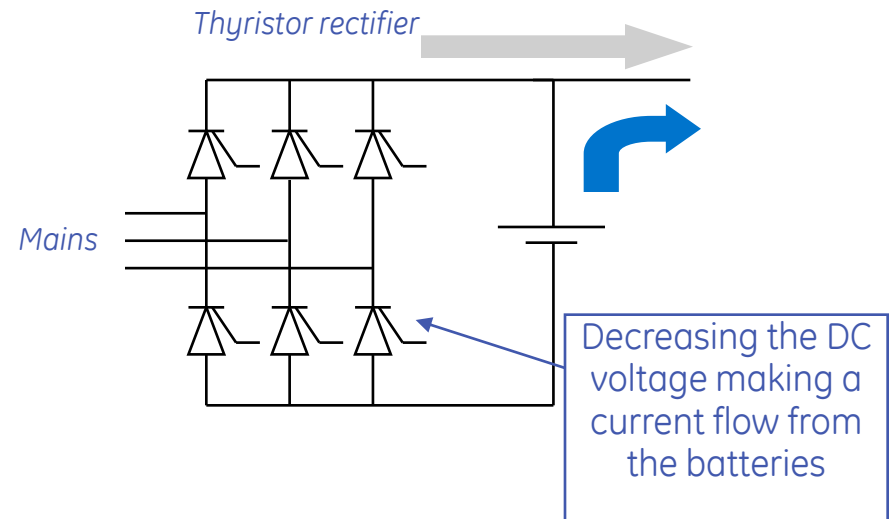
Programmable safe battery test

No risk to interrupt load supply

Battery earth fault detection

Safety for personell

Because the thyristor rectifier can be controlled, the DC voltage can regulated down; just below the battery voltage. In that way the batteries can be tested. In case the batteries would have a failure, the rectifier is still supplying sufficient DC voltage to support the inverter.



Reliability

SG Series is one of the most Reliable UPS systems in the market, using proven technology

To increase system reliability more units can be connected in parallel with GE's unique RPA concept



RPA features

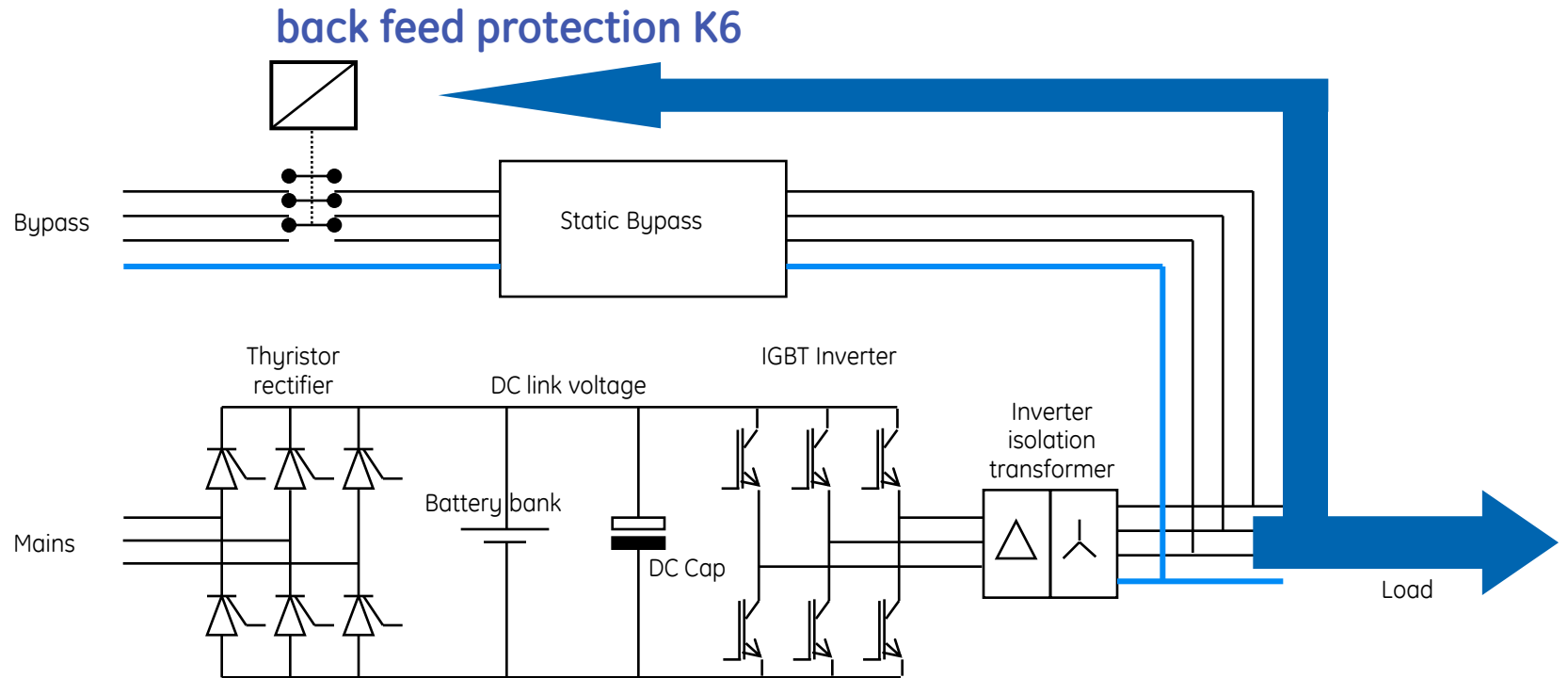
- Up to 8 units in parallel
- Any UPS able to be the logic leader
- Decentralized bypass
- Redundant Communication Bus
- Transparent failover and recovery process
- True redundancy with no single point of failure

RPA

Redundant Parallel
Architecture

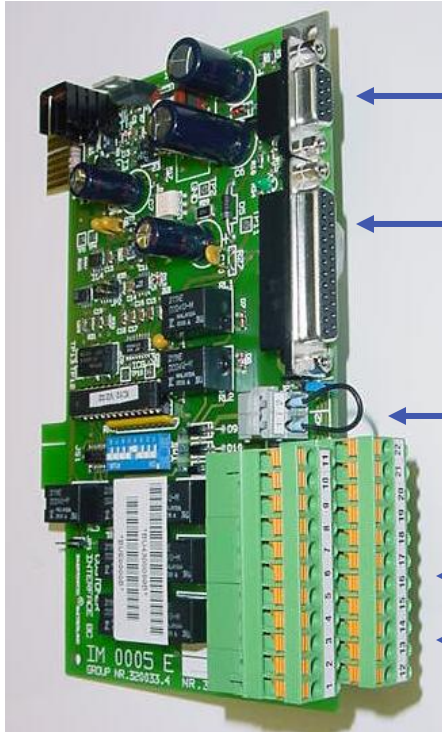
More information
about RPA in separate
presentation

Back feed protection



- Back feed protection K6 : preventing feedback to the mains from the inverter in case of mains failure and a fault in the bypass circuit
- It provides a safer environment for end users and engineers
- GE provides back feed protection as a standard. Others as option
- Back feed protection is mandatory according to EN62040-1 (UPS safety)

Interfacing Features



1x RS232 Serial Communication Port

6 programmable potential free alarm contacts:

- D plug
- Terminals blocks

1x Emergency Power OFF contact

1x Gen-ON Input contact

1x Control Input contact

Optional:

SNMP Interface Card (10/100Mbps auto-select)

MODBUS RTU Interface (RS232 or RS485)

Options for SG Series

5th Harmonic filter in UPS cabinet

5th + 11th Harmonic filter in UPS cabinet

12 pulse rectifier

Active Filter

5 year or 10 year lifetime batteries

Output cabinets to connect units in parallel

RPA Redundant Parallel Architecture

ISM Intelligent Synchronisation Module

EMI filter (in cabinet) for compliance to IEC 62040-2 Class A

SNMP and MODBUS interface

Isolation and/or voltage adaptation transformers

Conclusion

Highly Reliable

VFI concept

Redundant fans

RPA

Excellent Performance

Front Access

Softstart

Input voltage window

Harmonics

Output exceeding standards

Constant efficiency

Superior Battery Management

Super ECO Mode

Many Options

