

NO-BREAK KS[®] Systems





The Uninterruptible Power Supply system (UPS) is a necessity for companies, organisations, institutions or the government agencies requiring critical power protection for their daily operations.

EURO-DIESEL's high performing NO-BREAK KS® is a Diesel Rotary UPS system that uses a kinetic energy accumulator as an energy storage device, instead of traditional large lead-acid battery cells.

Placed between the mains and the load, the NO-BREAK KS® systems act as a filtering and conditioning mechanism, ensuring high quality power to the load and continuing the supply for an unlimited period of time in case of an outage.

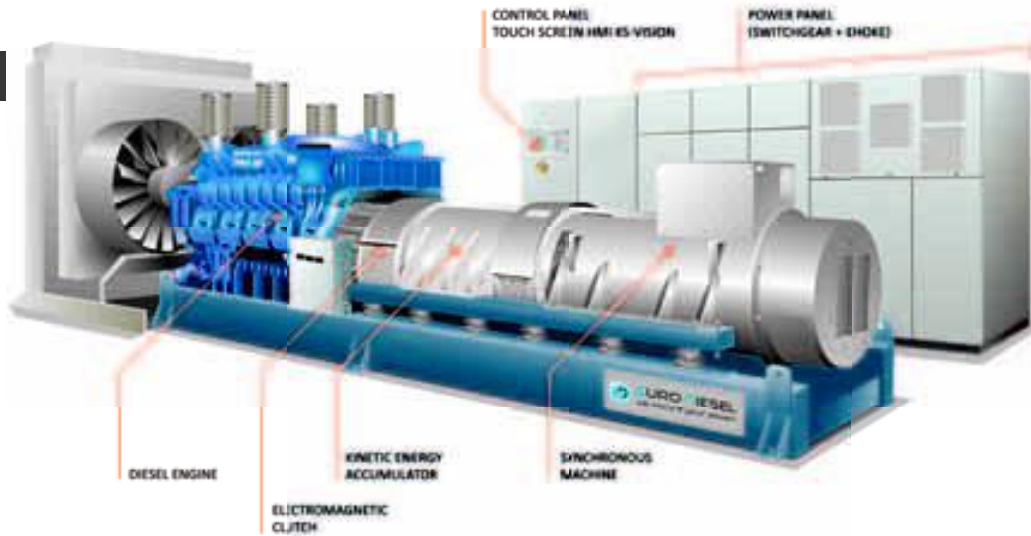
They range in small power steps from 100 kVA up to 2500 kVA per unit for 50 Hz and up to 3000 kVA for 60 Hz. For projects requiring large critical loads, the NO-BREAK KS® can be paralleled and designed in Low Voltage or in Medium Voltage configurations up to 24 kV.

Built with the latest technology, the NO-BREAK KS® system has been referenced by companies worldwide since its conception more than 20 years ago.

It is engineered to meet the most stringent level of reliability, highest efficiency, long lifespan and consequently, lowest economical and operational cost.

◀ *p12 : NO-BREAK KS® power module*

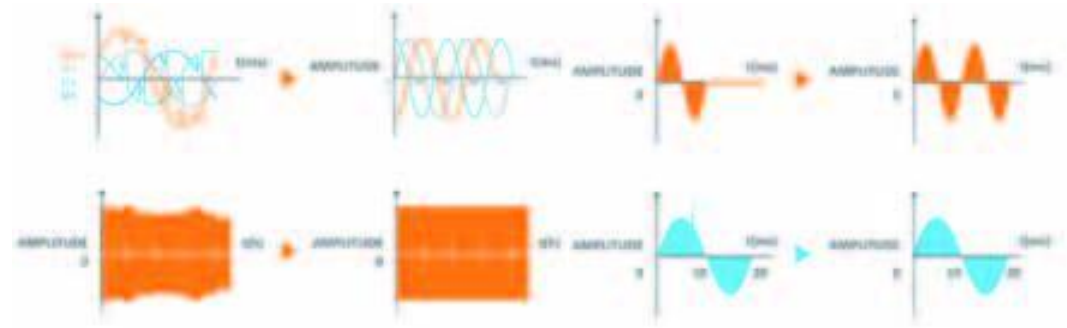
◀ *Turnkey power security solution—design, supply, testing, commissioning and installation—for Texas Instruments (The Philippines) | 30 MVA | 12 x NO-BREAK KS®5-SB Dual Output, Medium Voltage*



THE MAKE UP OF A NO-BREAK KS® SYSTEM

The NO-BREAK KS® is a simple piece of equipment that one might think of it as a conventional generator-set. It is made up of a *Diesel Engine* (MTU, Cummins, Mitsubishi, Deutz...), that is coupled to a *Stato-Alternator*, via an *Electromagnetic Clutch*. The *Stato-Alternator* is the combination of a *Kinetic Energy Accumulator* and a *Synchronous Machine*.

The NO-BREAK KS® system also includes chokes in a power panel as well as a control panel with an integrated touch-screen Human-Machine Interface (HMI) called KS-VISION®.



SIMPLE AND SMART DESIGN

The NO-BREAK KS® is a pure dynamic system, which means that the UPS power is supplied by a synchronous machine and the system operates without the use of bulky and heavy batteries or large power electronic components.

In **Conditioning mode**, when the mains supply is within tolerance, the synchronous machine—combined with the choke coil—acts as a conditioner to filter spikes or transient interferences and to regulate the loads' voltage within tolerance. The system also eliminates micro-cuts, reduces harmonics distortion, improves power factor and allows clearing of short-circuits on downstream feeders. As a result, the system delivers a perfect sine wave to the load at all times.

In **Independent mode**, when a voltage perturbation or power failure has occurred, the NO-BREAK KS® disconnects the mains supply and takes over the load for as long as needed or until the mains returns.



PRODUCT RANGE

Power Modules (rating per unit)	50 Hz 400/415 V	60 Hz 380/480 V	Description
NO-BREAK KS*4	100-200 kVA	120-200 kVA	Compact UPS systems for small power rating per unit.
NO-BREAK KS*5	200-2500 kVA	200-3000 kVA	UPS systems for critical loads from small to large power rating per unit.
NO-BREAK KS*5-SB	200-2500 kVA	200-3000 kVA	UPS systems from small to large rating with dual output: load is divided into critical and non-critical parts. The critical loads will be secured at all times while the non-critical loads will experience a short break of only a few seconds during an outage. This eliminates the need for generator-sets.
SYNCHROSTA*JS	300-1500 kVA	360-1500 kVA	Power conditioning devices with short duration UPS power from small to large ratings per unit.
Standby generator-sets	30-3000 kVA	30-3000 kVA	Standby generator-sets from small to large ratings.

1. Instituto Venezolano de Investigaciones Cientificas (Venezuela) | 1 x NO-BREAK KS*4 200 kVA (Single Output, Containerised) This unit has a footprint of only 14.6 m²

2. NO-BREAK KS* power module of 3000 kVA (60 Hz) with a footprint of 18.3 m²



Electromagnetical Clutch (also provides redundant start capacity)

The prime starter system consists of standard engine starting devices. This brushless clutch is lubrication-free and maintenance-free, and is the additional feature to ensure a redundant start. This system also has the possibility of performing a black start.

State-of-the-art Diesel Engines

These are no ordinary engines. They comply with the latest emission standards from EPA or TA LUFT and are pre-heated and pre-lubricated to produce quick but soft starts, thereby reducing stress and prolonging lifespan.

KS-VISION® (user-friendly touch-screen HMI)

Enjoy easy access to the electrical, mechanical and environmental measurements of the NO-BREAK KS® (V, Hz, °C, etc.), statuses, settings, control elements and more. Plus, data is easily accessible via secured Internet, LAN to the Building Management System or is simply downloadable to a USB flash drive.

Brushless Exciter

20 years of proven technology with high reliability and zero maintenance needed.

Kinetic Energy Accumulator

The outer rotor runs at 3000 rpm or less: low-speed energy accumulator for optimal storing and recovery of kinetic energy. Bearings are unstressed which reduces maintenance and extends lifespan.

Monobloc (rigid assembly)

The system is delivered completely assembled and ready to connect with no possible misalignment on site. All sections are directly coupled, which makes the NO-BREAK KS® extremely robust and easy to handle, install and maintain.



**Power Panels
(switchgears and chokes)**

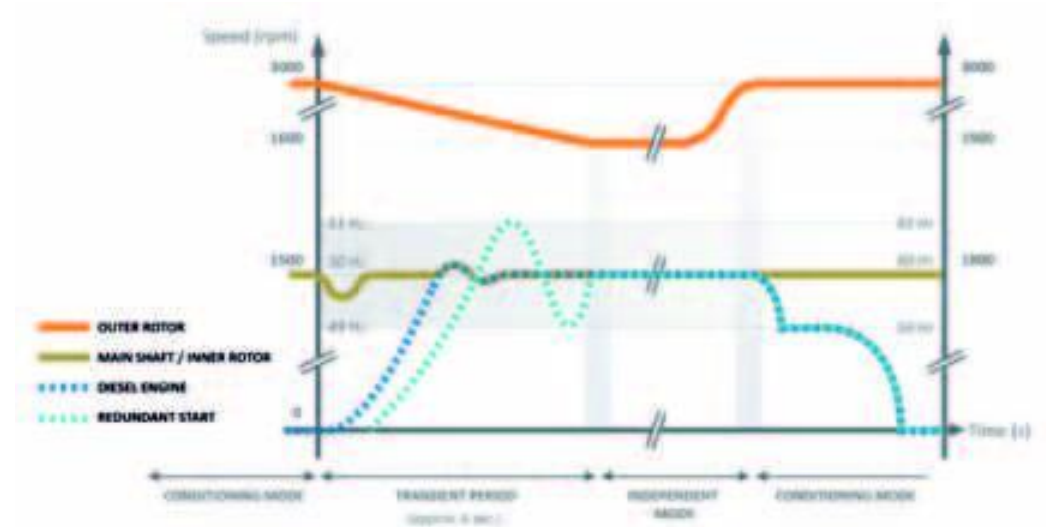
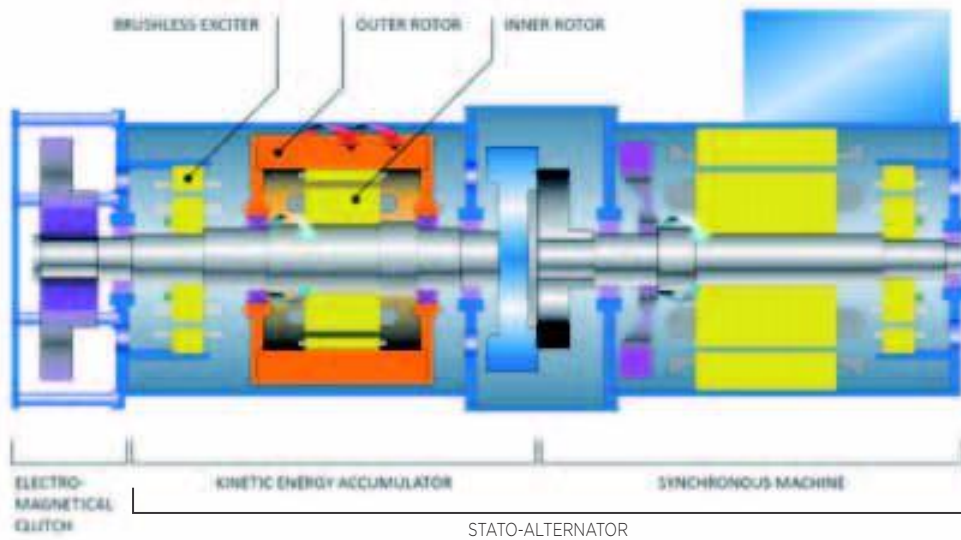
Chokes, together with the synchronous machines, are designed to perform voltage regulation at the downstream busbar and, in addition, filter out harmonics, safely attenuate voltage spikes, decrease voltage harmonics transfer from the mains and also prevent load current harmonics from returning to the mains.

Built-in Vibration Dampers

Eliminates vibrations and allows direct installation on the floor.

4-Pole Synchronous Machine

This oversized, brushless and ringless alternator generates a high quality sine wave. Thanks to its very low internal impedance, it is able to accept very high short circuit currents (up to $20 \times I_n$), allow sudden current peaks and load steps, feed unbalanced loads and provide excellent voltage regulation, harmonics filtering and power factor correction without electronics.



HOW IT WORKS

In case of a power outage, the kinetic energy accumulated in the outer rotor (or accu-rotor) supplies the load until the diesel engine is running at its rated speed. Within seconds, the diesel engine becomes the source of power and this is how your critical loads are always fully secured.

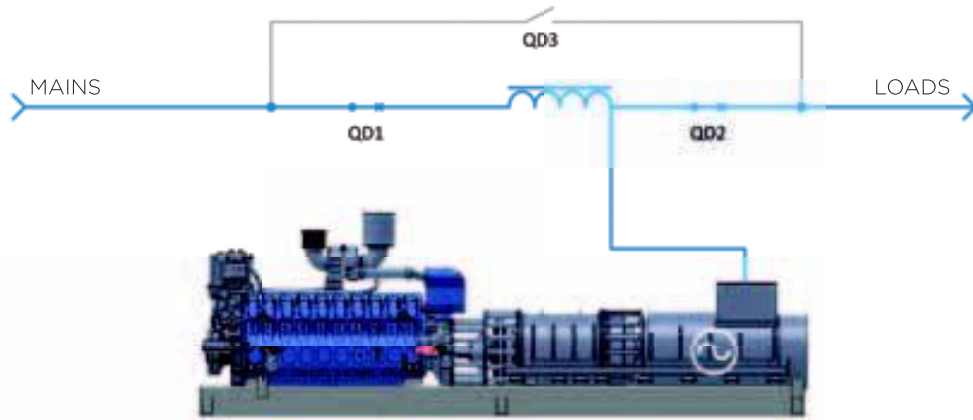
All this happens, without the slightest interruption or aberration to the load.

The Kinetic Energy Accumulator

At the heart of the NO-BREAK KS® is its kinetic energy accumulator; a clever but simple system to store and retrieve kinetic energy. It consists of two rotating parts: the outer rotor runs mechanically-free around the inner rotor.

The inner rotor, driven by the main shaft, rotates at 1500 rpm (50 Hz) or 1800 rpm (60 Hz). It contains two sets of windings; a three-phase AC winding and a DC winding.

Conditioning mode



Conditioning mode | Energy storage

In Conditioning mode, the AC winding of the inner rotor is energised to generate a rotating magnetic field to turn the outer rotor to the maximum speed of 3000 rpm. However, the relative speed between inner and outer rings of the bearings is only 1500 rpm (50 Hz), since the shaft itself is already rotating at 1500 rpm (50 Hz). The outer rotor stores kinetic energy advantageously—the amount of kinetic energy increases quadratically with every increment of the distance from the centre of rotation.

Therefore, when the mains is within tolerance, the synchronous machine acts as a motor and drives the main shaft, which also drives the outer rotor.

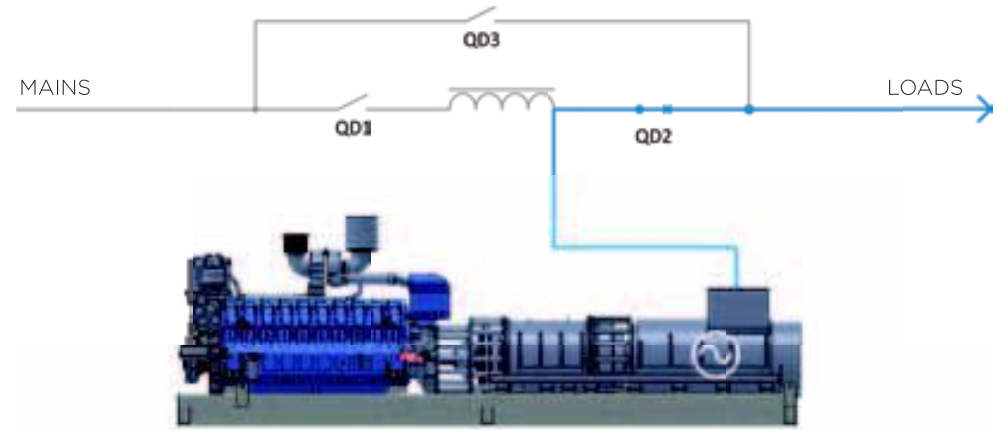
99% of the time or more, the NO-BREAK KS® operates in Conditioning mode and guarantees the supply of clean electrical power to your critical load.

Transient Period | Energy retrieval

When the mains failure is detected, QD1 is immediately opened, the DC winding of the inner rotor is energised and the outer rotor is magnetically coupled to the inner rotor. Its kinetic energy is transferred in a controlled manner to the inner rotor, thus it drives the main shaft and maintains the frequency within narrow tolerance.

This energy transfer is regulated by controlling the current injected into the DC winding accurately. In the same instance, the synchronous machine acts as a generator and the diesel engine receives a command to start running.

Independent mode



Independent mode | Energy re-storing

When the diesel engine is at the rated speed, it is then coupled to the stator-rotor via the electromagnetic clutch and provides power to the load. The outer rotor speeds up to 3000 rpm again and stores the kinetic energy to its full capacity. The whole stator-rotor is a totally brushless and ringless system.

Conditioning mode | Mains return

Upon the return of the mains, the NO-BREAK KS® synchronises with the mains. Once the synchronisation is achieved, QD1 is closed, the mains powers the load, the electromagnetic clutch opens and the diesel engine runs at idle speed for cooling until it stops.



BY ITS CLEVER DESIGN, THE NO-BREAK KS® AND KS-VISION® BRING NUMEROUS ADVANTAGES

Sustainable UPS system

Originally designed as a system of high efficiency, this quality is further increased thanks to its energy saving features; less power is used to run the NO-BREAK KS® system and therefore, less energy is subsequently consumed from the grid, making it a greener solution.



Without the use of heavy, lead-acid batteries, where tonnes of chemical waste are generated regularly, EURO-DIESEL's solution comprises of a kinetic energy system that has neither harmful nor significant waste.

High Overall Efficiency = Low Cost of Ownership

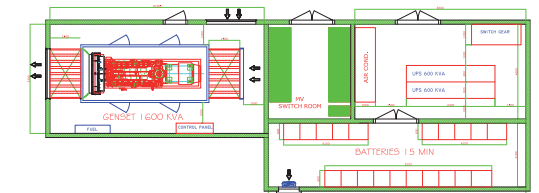
Consuming less energy means spending less money on electricity. That is why using the best overall efficiency is important because it helps to cut utility cost.

NO-BREAK KS® gives the best power efficiency in comparison to alternative UPS systems. Without the use of electronic power components and eliminating the need for a special HVAC system or an air-conditioned room to house battery cells, you can further reduce your electricity bills in the long run.

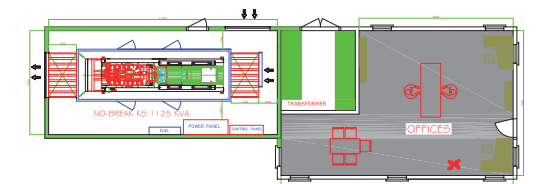


Small Footprint

The NO-BREAK KS® has the smallest footprint in the market, an incontestable aspect of the product. Thanks to its lowest component count and a monobloc structure, the NO-BREAK KS® has the most compact design which can be translated into lower real estate costs in capital investment.



Static UPS system of 1200 kVA



NO-BREAK KS® 1125 kVA (space saving of 80 m²)



Easy and Standard Integration

Installation is as simple as installing a standard diesel engine generator-set.

As a monobloc design, there is no need for complex alignment during installation.

User-friendly Control Panel

KS-VISION® is a human machine interface that facilitates the monitoring of the NO-BREAK KS® system. By a few clicks, you can collect a wide array of data and control your DRUPS system.

You can also clearly monitor an overview of the performance of your critical power network with ease from the control room, your office or anywhere else with internet connection.

See page 22 for more information on KS-VISION®

Best Overall Performance

Benefit from the best voltage regulation and filtration of harmonics, the highest peak current acceptance (up to 20 x In), reduced voltage distortion in case of upstream or downstream short circuits and power factor improvement at no extra costs.

Entirely brushless and ringless, the kinetic energy accumulator is a low speed energy device with bearings rotating at maximum 1500 rpm (50 Hz). Lower bearing speed gives lesser stress and longer lifespan to the bearings. In the end, the number of maintenances required in a life cycle is significantly reduced.

Unbeatable Resilience

The start of the engine is guaranteed. It does not matter if the conventional starting system is out of service because the smart electromagnetic clutch system will start the engine nevertheless.

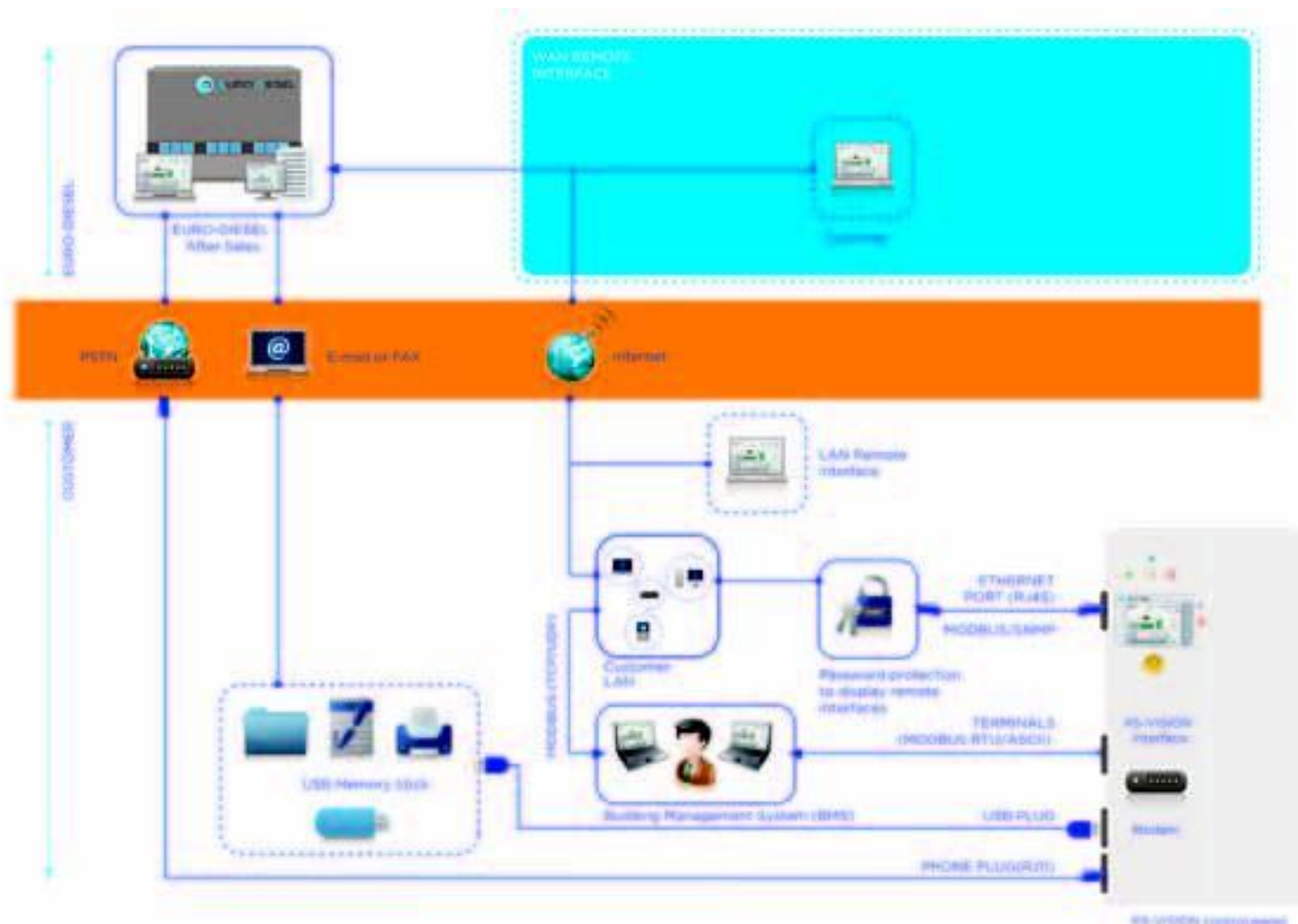
A minimised downtime is achieved by having regular maintenance programs and proper servicing. Another intelligent feature of the KS-VISION® generates instant servicing and maintenance alerts, as well as prompt warnings when the need to troubleshoot arises.

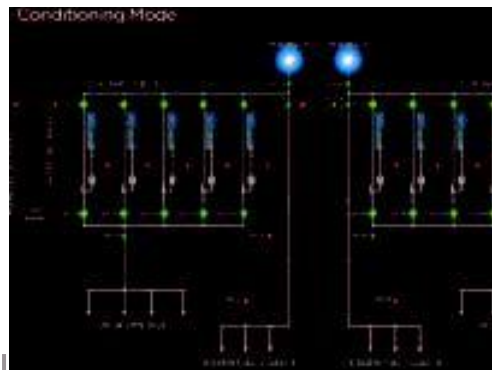
It is a proven advantage that the NO-BREAK KS® helps to achieve close to zero downtime of the load.

The robustness of the NO-BREAK KS® only requires an overhaul interval of 2 to 3 times longer than that of an alternative UPS system.

FEATURES AND FUNCTIONS

- 12" Colour Touch-Screen
- Web-based and enhanced distance monitoring
- Dynamic or static IP address for external communication via Ethernet
- Automatic recognition of single or parallel system configuration
- Intelligent features:
 - i. Diesel start reduction,
 - ii. Peak-shaving, and
 - iii. Energy saving feature in Conditioning mode
- Data display:
 - i. Input and output voltage,
 - ii. Frequencies,
 - iii. Temperature,
 - iv. Power demand,
 - v. Currents, and
 - vi. Power factor
- System mode information with regards to Conditioning mode, Independent mode and Bypass mode
- Detailed management of alarms
- Information on statuses such as breaker positions
- Controlling and scheduling of maintenance and system tests: Engine start-up, energy storage/recovery, etc.
- Personalised settings for language, time, communication protocols, etc.
- Other communication protocols: Modbus and USB as standard interfaces
- Other options: Profibus, SNMP, OPC, etc.





CONCEPTION AND DESIGN

We design power security systems layout in a room or fitted within acoustic enclosures with the integration of the NO-BREAK KS® systems including the LV or MV switchgear, control and power cabling, exhaust and noise attenuation systems, cooling system, room ventilation including air inlet and outlet, fuel system for the diesel engine consisting of fuel tanks, pumps and so on.

- ◀ *An international IT network company in the USA | 21 MVA | 8 x NO-BREAK KS®5-SB (Dual Output), using Medium Voltage configuration.*



MANUFACTURING AND ASSEMBLING



We manufacture and acquire the necessary components for your secure power system, using high quality materials.

All NO-BREAK KS® systems including power and control panels are assembled in our facility in Belgium by skilled staffs using high technology equipment.



FACTORY TESTING



Each and every NO-BREAK KS® system has to pass a series of stringent tests and checks before being shipped out of the factory. Tests are conducted with regards to functionality, robustness and performance within user's specifications.

A customised Factory Acceptance Test can also be performed upon special request.



DELIVERY AND INSTALLATION

Collaborating with our professional freight service partners, we package the equipment and handle the transportation with great care.

Every NO-BREAK KS® system and its associated auxiliaries are delivered to site and installed accordingly.

COMMISSIONING

Upon completion of the NO-BREAK KS® system installation, a commissioning engineer will be on site to perform a comprehensive series of tests to ensure that the NO-BREAK KS® and all the auxiliaries conform to the required specifications as well as the electrical and mechanical norms in practise.

Once the system is commissioned, Maintenance and Operation manuals will be provided together with the as-built drawings to the end-user.