



YOU GOT THE  
POWER.

DYNAMIC DIESEL  
UPS SYSTEMS  
PURE SINE WAVE 24/7/365



→ [www.hitzinger.at](http://www.hitzinger.at)



- Company History, Organisation, Profile and Global Network
- NBDK – IT Power Systems  
Mechanical, Features and Benefits
- NBDK – IT Power Systems  
Electrical Operation and Energy Flow
- NBDK – IT Power Systems  
Control and Monitoring
- NBDK – IT Power Systems  
System configuration
- NBDK – IT Power Systems  
Hitzinger & On site service / maintenance / repair
- NBDK – IT Power Systems  
Summary and References



# NBDK – IT Power Systems

Company History, Organisation, Profile, Global Network

UPS-SYSTEMS



## UPS-SYSTEMS

In June 1946, Dipl. Ing. Walter Hitzinger, Dipl. Ing. Hans Schäcke founded Dipl. Ing. Hitzinger & Co. for electrical installations and repairs located in Linz.



**Dipl. Ing. Hans SCHÄCKE**



**Dipl. Ing. Walter HITZINGER**



Today, more than 230 highly skilled employees develop and produce high tech products in state-of-the-art technology in 3 production plants with a total area of 18.000 m<sup>2</sup> .



EN ISO 9001:2000  
Zertifikat Nr. 20 100 5157

### Hitzinger Products are:

- Synchronous- and Asynchronous Alternators
- Rotary Frequency Converters
- Dynamic Diesel UPS Systems
- Airport Ground Power Systems
- Diesel Generating Sets



# HITZINGER GLOBAL NETWORK

UPS-SYSTEMS

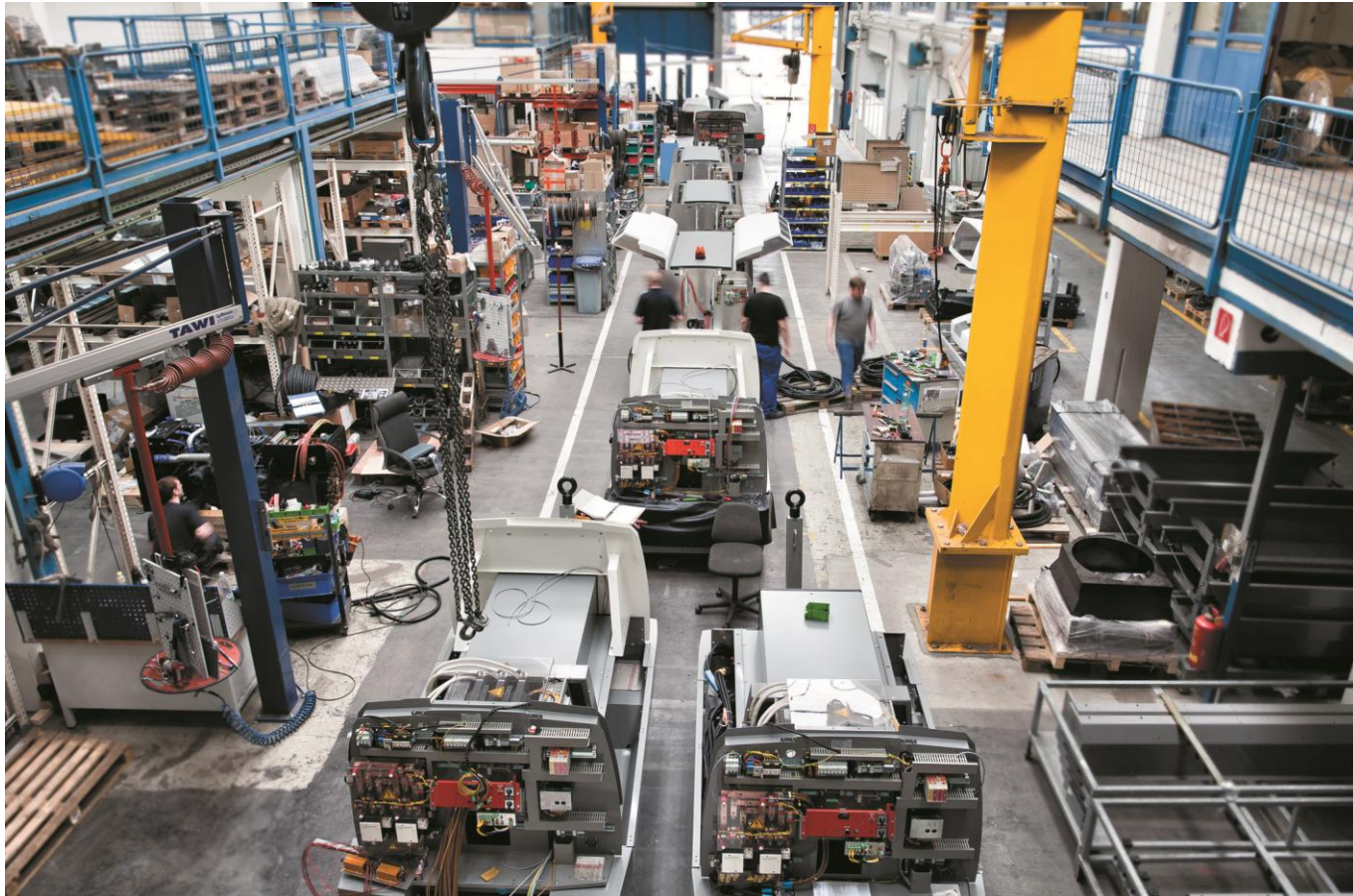


**A reliable & competent partner  
for more than 60 years !**



# Production Facilities

UPS-SYSTEMS







# Production Facilities

UPS-SYSTEMS

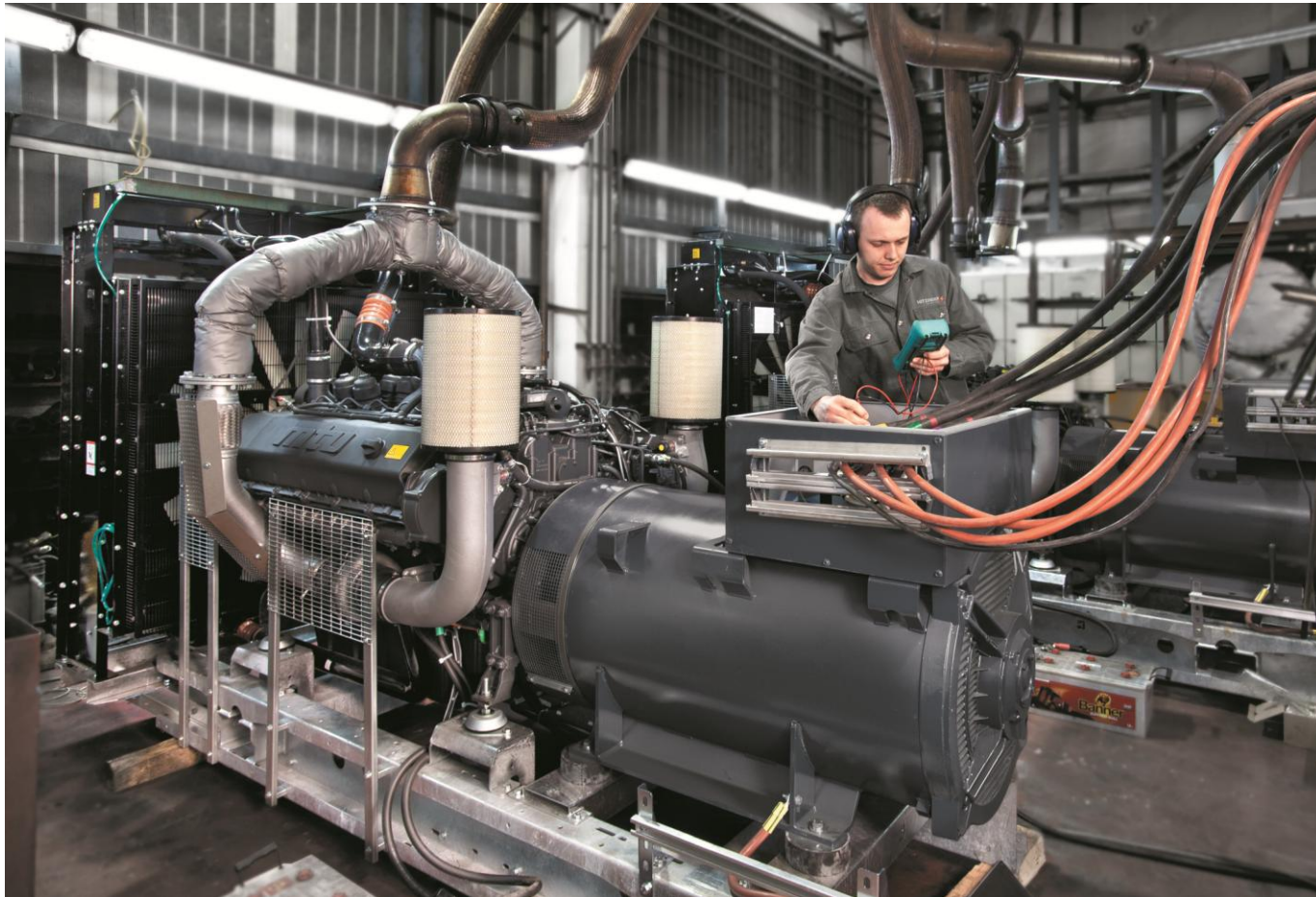






# Production Facilities

UPS-SYSTEMS





# Production Facilities

UPS-SYSTEMS





# Production Facilities

UPS-SYSTEMS

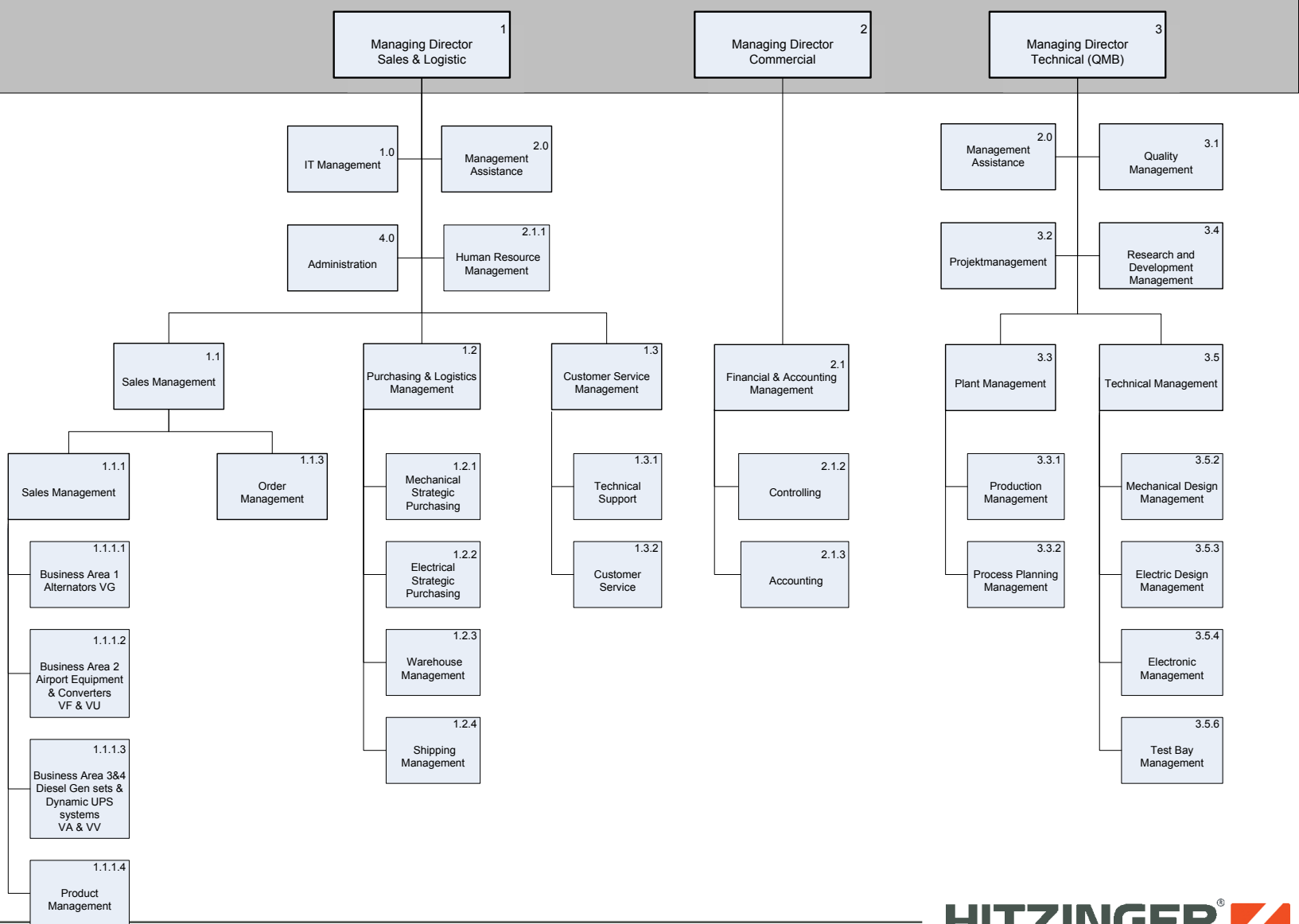






# Company Organisation

UPS-SYSTEMS

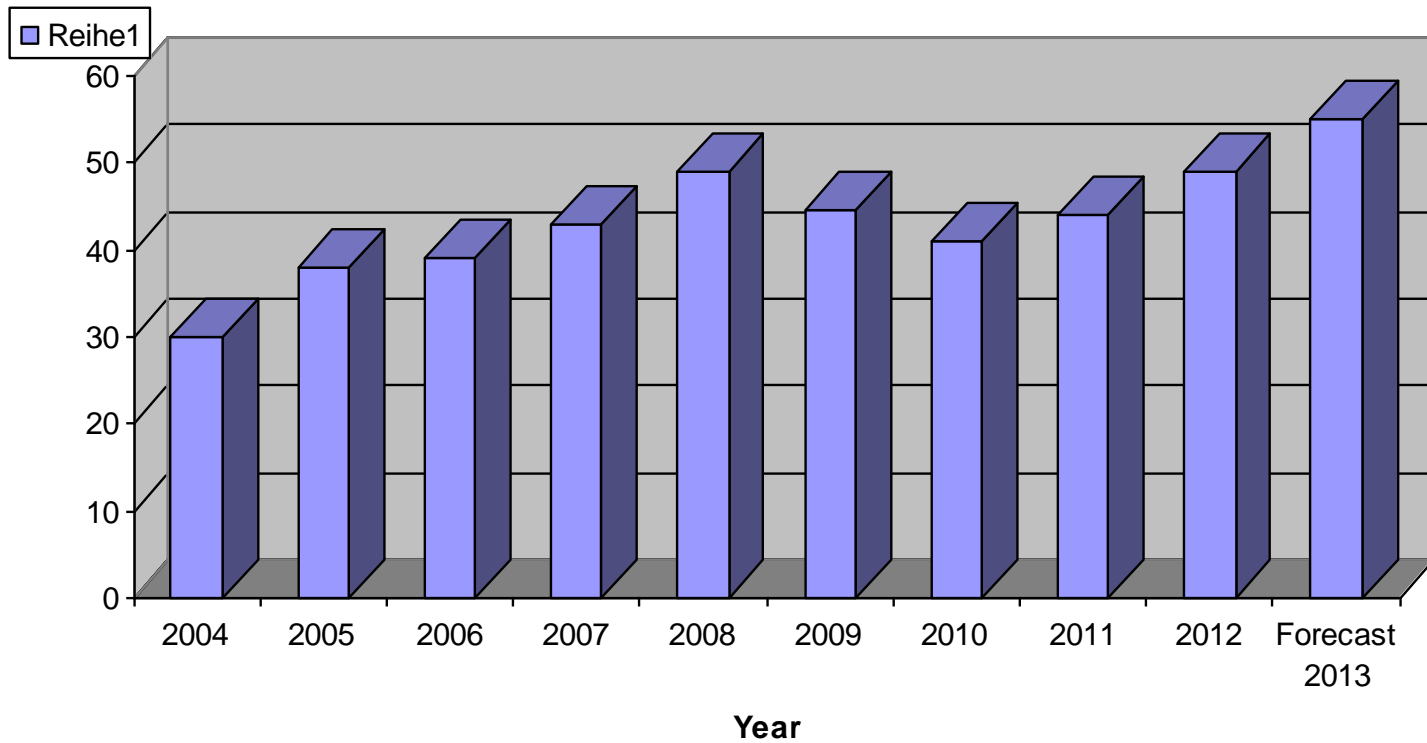






# Turnover 2004 - 2013

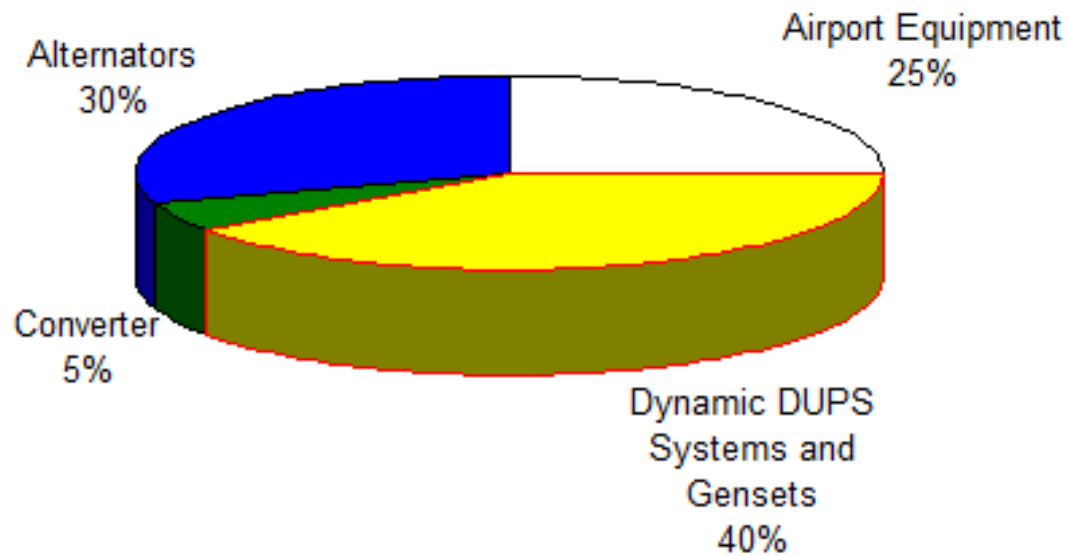
UPS-SYSTEMS





# Products

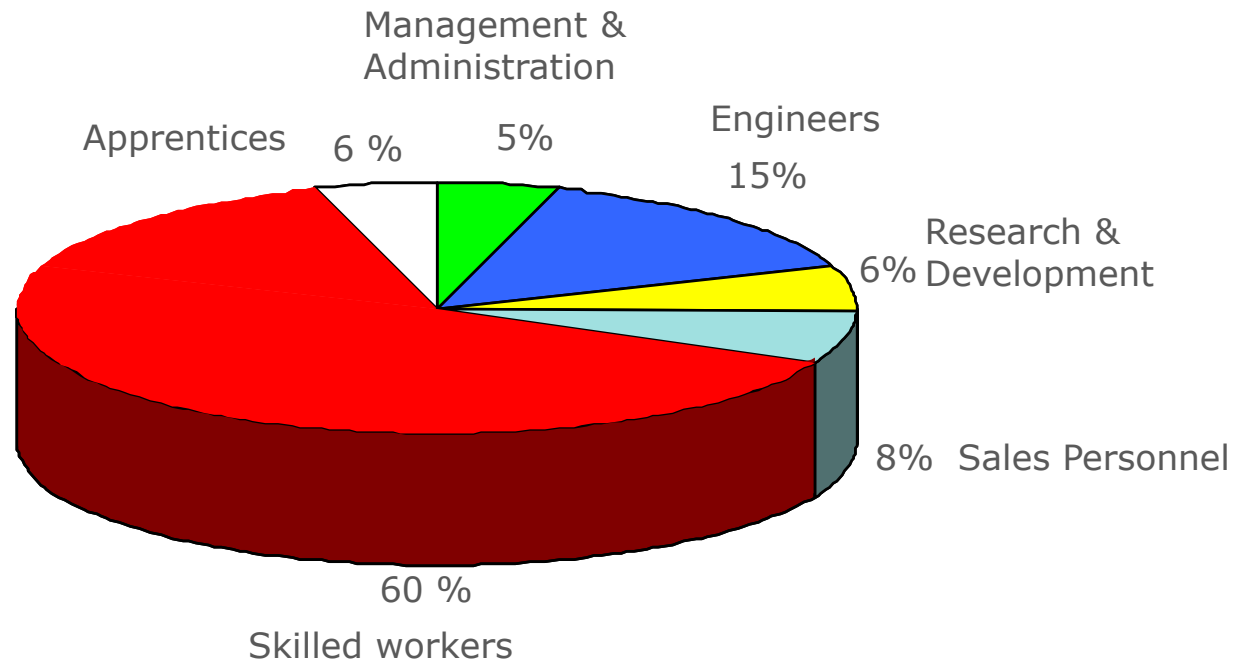
UPS-SYSTEMS





# Employees

UPS-SYSTEMS





# NBDK – IT Power Systems

Mechanical, Features and Benefits

UPS-SYSTEMS







# Why DDUPS?

## UPS-SYSTEMS

To save money!

Mains failures – even for milliseconds – can cause production and supply outages and subsequent financial problems. These sectors are plastic industry and semiconductor production, data centers, airports, hospitals and so on.

To prevent standstill or losses of production!

The increasing percentage of automation in modern production processes demands more than ever high-quality and absolute reliable and uninterruptible power supply to avoid production outages.

To be independent from extern influences!

Nowadays, a high-quality power supply system often has to be more than what can be provided by local grid providers. Certain sensitive economical fields need, more than ever, a constant mains supply quality.

These fields are, for example: hospitals, airports, semi-conductor production plants, the chemical industry, data processing centers, telecommunications, plastics-technology, computer-controlled industrial plants,...



# NBDK – IT Power systems

## UPS-SYSTEMS

A Hitzinger DDUPS system is a high-quality and permanent solution concerning clean power supply of your consumers.

Hitzinger Diesel UPS systems enable you to prevent production outages and financial losses.

A Hitzinger UPS system is a tailor made solution and guarantees a fast ROI.

- Ratings up to 2500 kVA
- Voltage up to 11 kV
- Low maintenance costs
- High alternator efficiency
- High MTBF value (1.000.000 + hours)
- Power factor regulation
- High quality of components
- High overload capacity
- Proper mains failure supervision
- In-house developed PLC control system
- Tier complaint

That's why we are sure that our no-break systems NBDK & NBDD are the best solution for our customer's power supply problems .

## TECHNOLOGY SHIFT:

### Away from:

- Lead acid batteries
- Power Electronics

### Towards:

- Kinetic Energy Storage
- Rotating Electric Machines (Alternators or Generators)

Diesel remains the common component

Redundant Power feeds are prone to common mode failure and thus offer inadequate protection

## Why these Technologies?

### Kinetic energy storage:

- clean
- Simple
- Reliable
- efficient

### Alternators and Generators:

- Achieve levels of dynamic electrical performance, which power electronics struggle to match.



Solution Class	Power Circuit Components		Ride through Energy Storage		Power Generation
	Power electronics	Rotating Electric Machine	Batteries	Kinetic Energy	Diesel
Dynamic	No	Yes	No	Yes	Yes
Hybrid (Rotary)	Yes	Yes	No*	Yes	Yes
Static	Yes	No	Yes	Yes	Yes

\* Optional

\*\* Depending on power capacity



UPS-SYSTEMS

# Product Description

## Hitzinger Dynamic Diesel UPS systems

- Hitzinger Dynamic UPS systems are a complete critical power solution in one product.
- Hitzinger Dynamic UPS employ kinetic energy to provide protection against short duration disturbances or outages.
- And an integrated diesel motor to provide protections against prolonged disturbances or outages.

Hitzinger delivers the smallest foot print 2500 kVA unit on the market.



UPS-SYSTEMS

# Product Description

## KIN module operation

### WHY USE A KIN MODULE?

- Inductive coupling allows precise speed regulation of inner rotor
- Rapid Discharge and Recharge without capacity degradation
- Reliability through a completely brushless design
- Reliability through integrated vibration monitoring.



# Standard Ratings

## 50 Hz / 60 Hz

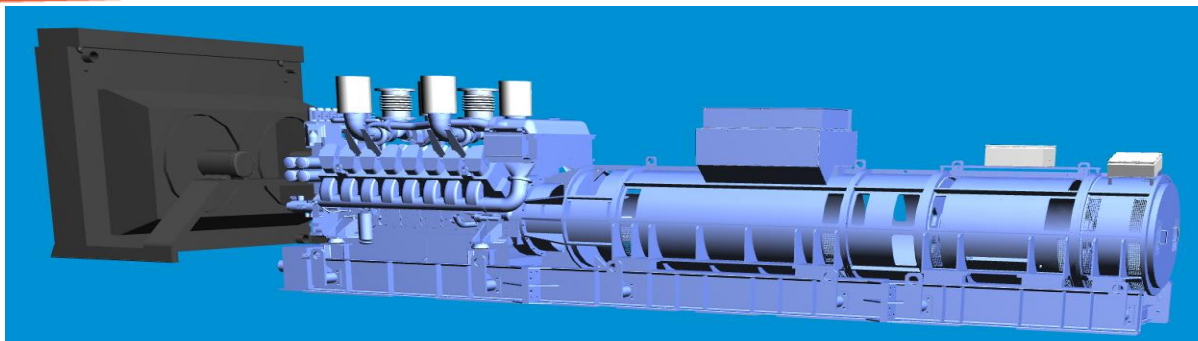
UPS-SYSTEMS

**More Scalability: Solutions for all size applications**

**Choose from a wide range of capacities and performance**

Rating (kVA)	Model
150	NBDK 1/10-150
250	NBDK 1/10-250
350	NBDK 1/10-350
500	NBDK 1/10-500
625	NBDK 1/10-625
800	NBDK 1/10-800
1000	NBDK 1/10-1000
1250	NBDK 1/10-1250
1500	NBDK 1/10-1500
1750	NBDK 1/10-1750
2000	NBDK 1/10-2000
2500	NBDK 1/10-2500





## Guaranteed values

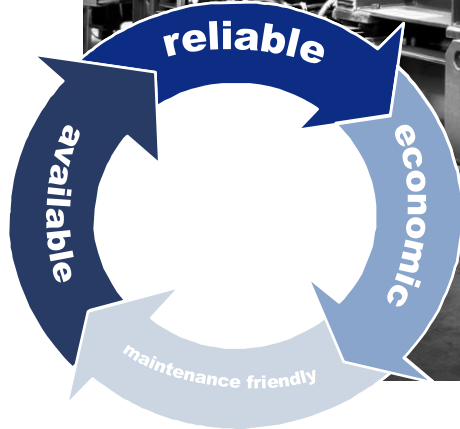
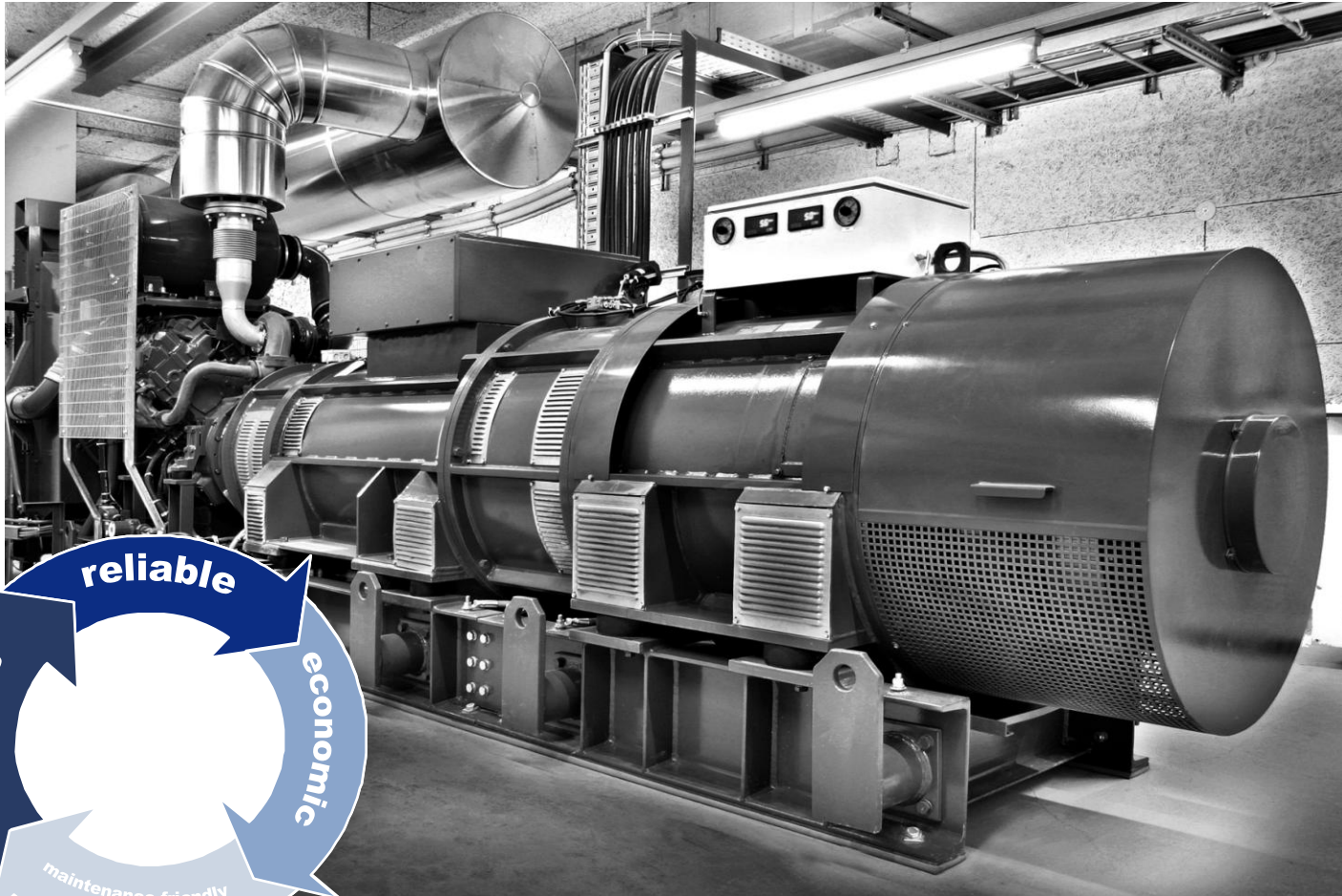
Voltage		Frequency	
Operation	Tolerance	Operation	Tolerance
Static	+/- 1%	During mains operation	= mains frequency
Dynamic		Changing from mains to diesel operation Load transfer 100%	+/- 1%
At change of nominal load, $\cos \varphi = 0,8$	+/- 10%	Static during diesel engine operation	+/- 0,5%
Voltage recovery time	0,3 s		
Short circuit at the input	+/- 10%		
After short circuit shutdown	< 10%		
Voltage recovery time	0,3 s		
Mains shutdown at nominal voltage	+/- 10%		
Voltage recovery time	0,3 s		
Other tolerance values are available on demand!			



# NBDK – IT Power Systems

## Advantages

UPS-SYSTEMS





UPS-SYSTEMS

# NBDK – IT Power Systems

## Advantages

Reliable...

... usage:

- Redundant operation possible
- High dynamic overload capacity
- Uninterruptible bypass for maintenance works
- Accurate mains failure supervision
- 100% load acceptance

... handling:

- Simple operation
- POWERCON - PLC control system (also for multiple units)
- Remote monitoring and surveillance (optional)

... design:

- Brushless technology of all components
- Robust in view of environment
- EMC Certification according to EN 300386-2

Hitzinger UPS systems are worldwide in operation for more than 40 years.



# NBDK – IT Power Systems

## Advantages

UPS-SYSTEMS

Economic...

- Optimized quality of system components, available worldwide
- Low losses due to tailor-made machines
- Low maintenance costs Short maintenance time
- High MTBF value (1.000.000 + hours)
- High life time of all parts and components
- High efficiency
- Low TCO



UPS-SYSTEMS

# NBDK – IT Power Systems

## Advantages

Maintenance friendly...

- Withdraw able type circuit breakers (optional)
- Remote diagnosis via modem (optional)
- Brushless technology in all system components
- Automatic regreasing unit (optional)
- Easy access to all maintainable parts (e.g. friction linings)
- KIN Module on the end of the machine
- Training program for users on site





UPS-SYSTEMS

# NBDK – IT Power Systems

## Advantages

Extremely available...

- High quality of system components
- Maintenance and service during operation
- Choke with natural cooling and integrated harmonic filter
- Torque limiting design for flywheel and electromagnetic clutch
- Worldwide accepted diesel engines with local services, spares and maintenance availability

# Features and Benefits

## Less Waste: Environmental impact

### REDUCING HAZARDOUS WASTE

#### EXAMPLE 1: Typical waste of a 2000 kVA UPS after 20 years

##### Static UPS



3 x 33,000 kg batteries  
(15 minutes autonomy time)  
- Plus power electronic components

##### Dynamic UPS



< 100 kg of steel  
(bearing material)

**A much GREENER Alternative!**

# Features and Benefits

## Less Waste: Environmental impact

### REDUCING HAZARDOUS WASTE

#### EXAMPLE 2: Typical waste of a 8 MVA UPS after 20 years

##### Static UPS



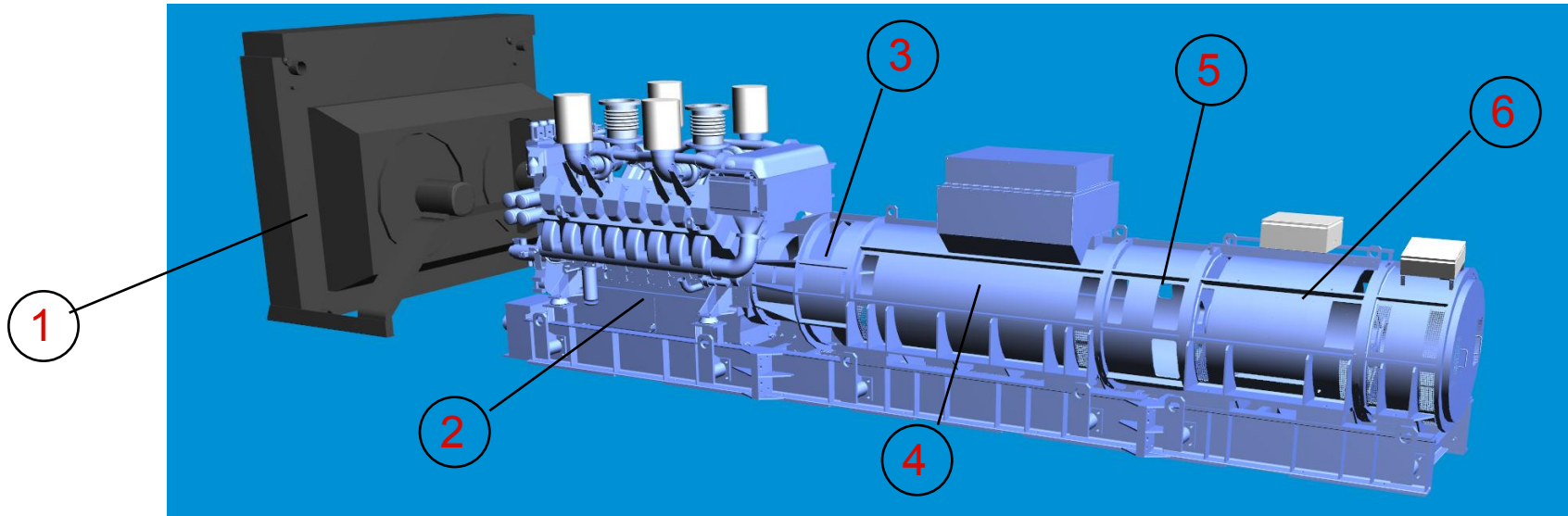
3 x 100 tonnes batteries  
- Plus power electronic components

##### Dynamic UPS

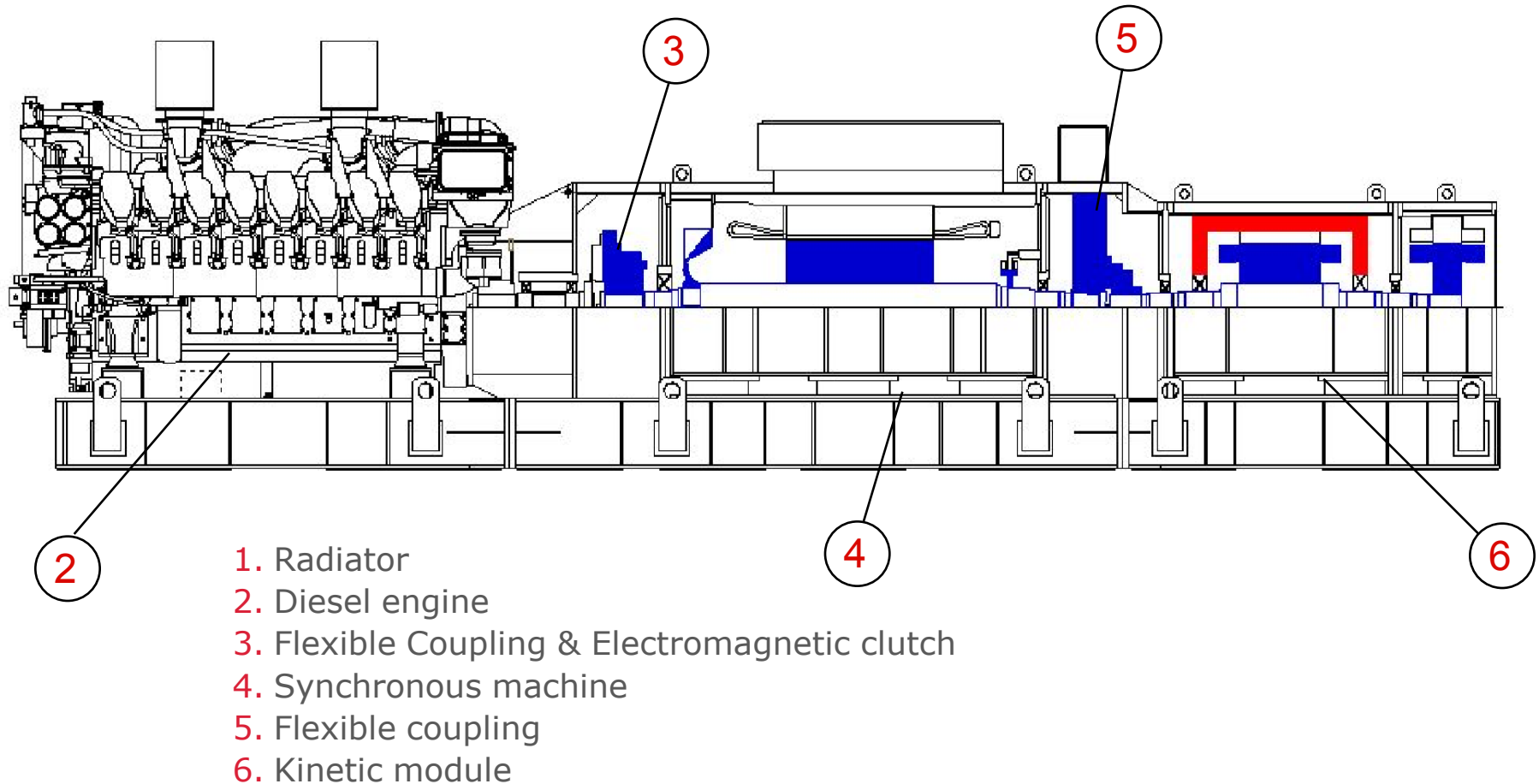


< 400 kg of steel  
(bearing material)

A much **GREENER** Alternative!

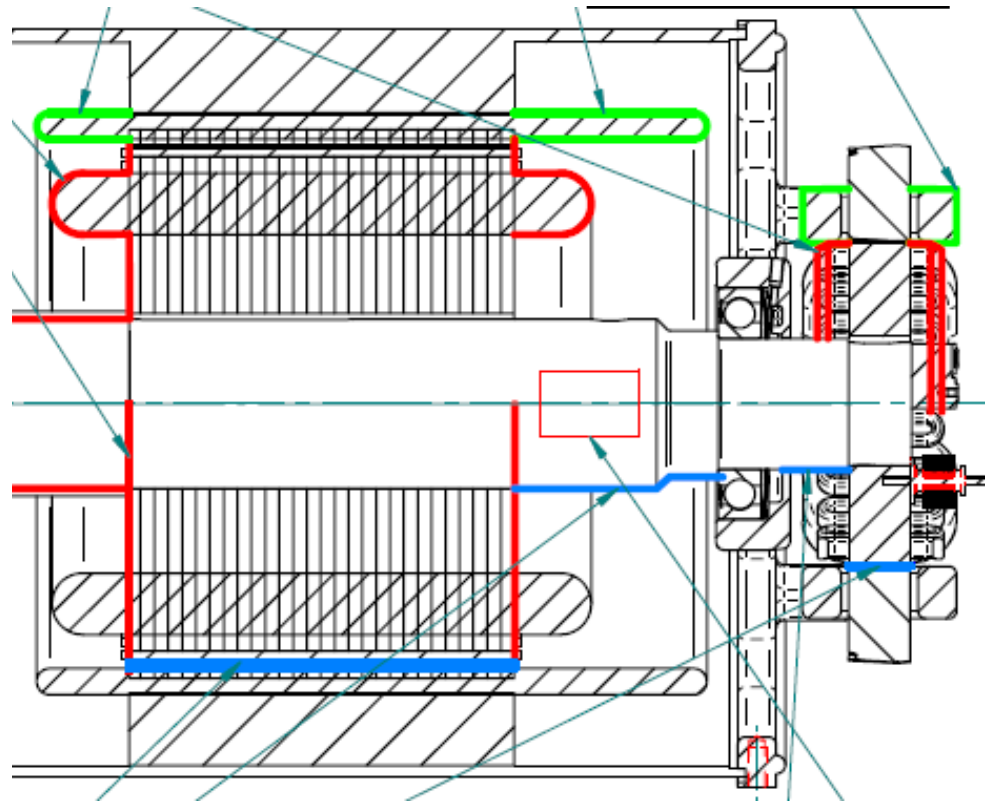


1. Radiator
2. Diesel engine
3. Flexible Coupling & Electromagnetic clutch
4. Synchronous machine
5. Flexible coupling
6. Kinetic module



finishing varnish  
1 layer

finishing varnish  
1 layer



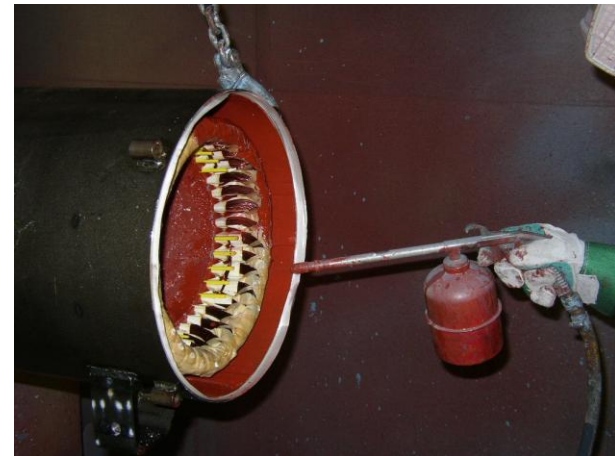
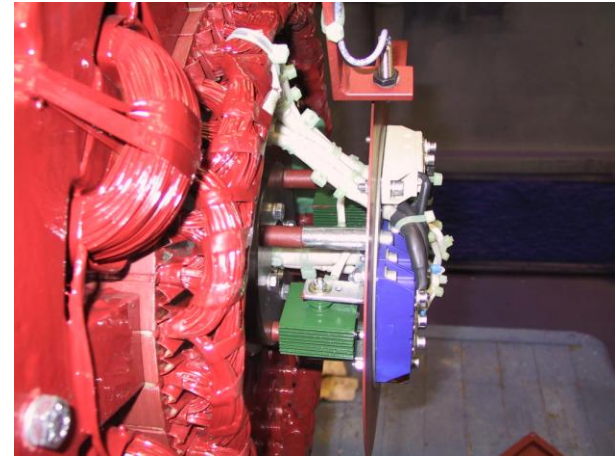
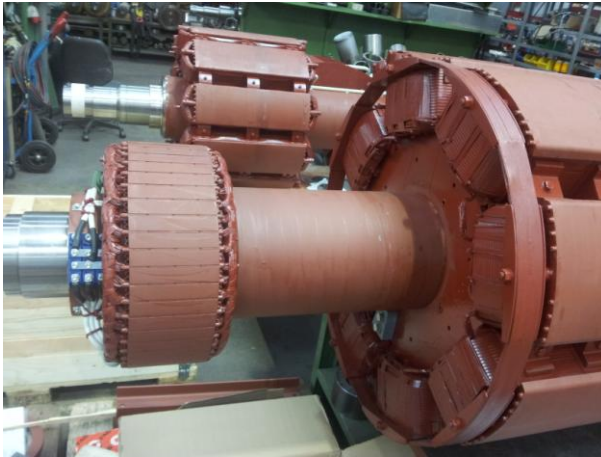
2-component varnish  
2 layers

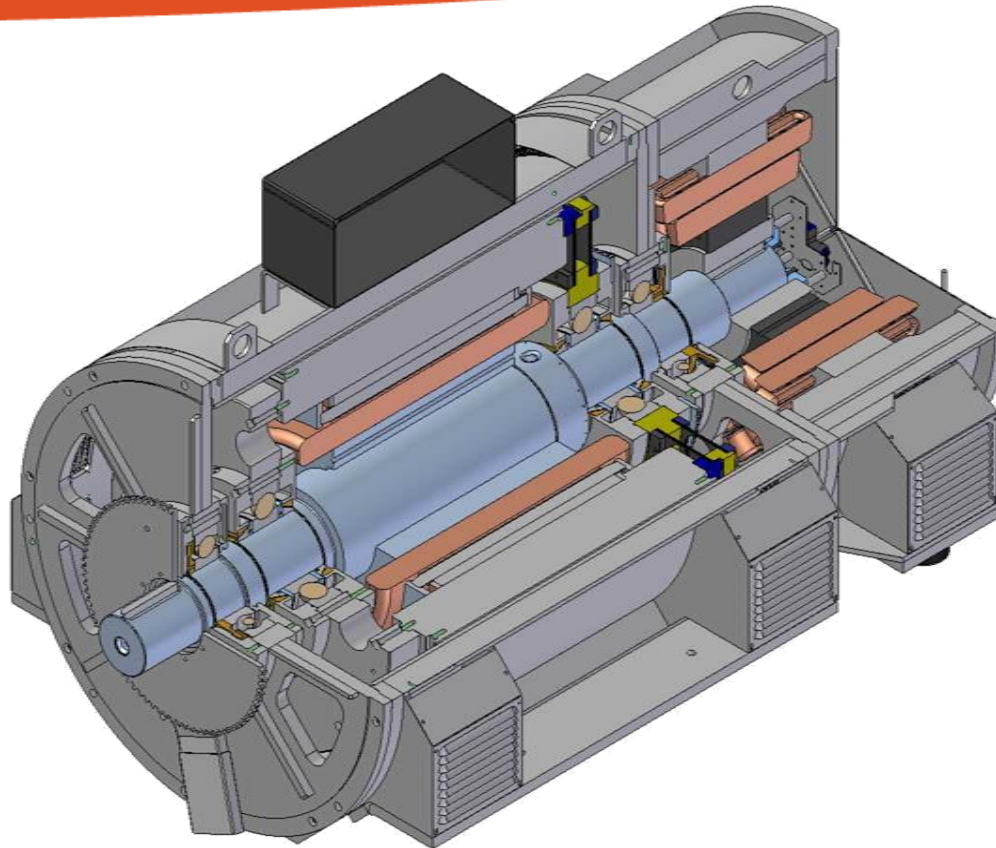




# NBDK – Corrosion Protection

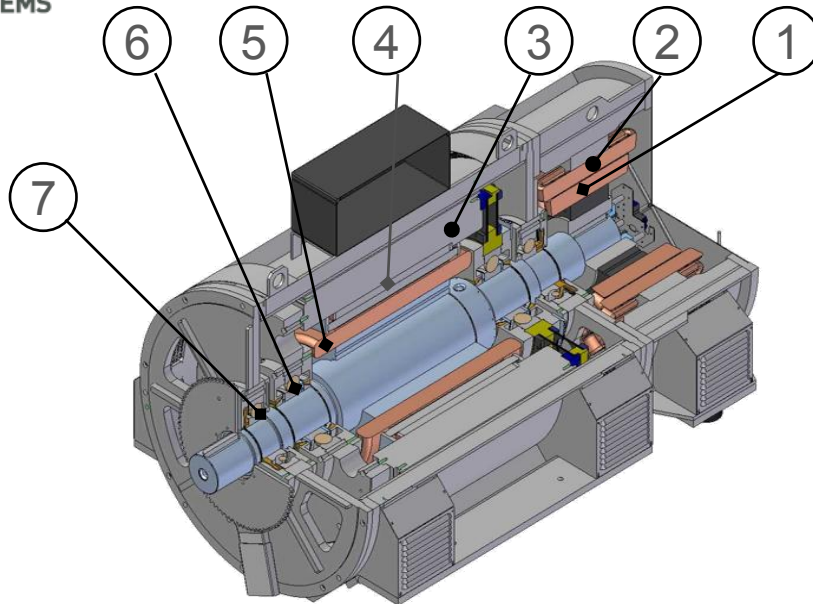
UPS-SYSTEMS





**KINETIC ENERGY STORAGE  
MODULE (KIN) for UPS-Systems  
with a frequency variation of  
max. 1 %!**

UPS-SYSTEMS



- 1) AC / DC exciter machine
- 2) Stator winding of the exciter machine
- 3) Outer rotor mass
- 4) Squirrel cage
- 5) Inner rotor with AC / DC winding
- 6) Inner KIN bearing
- 7) Outer KIN bearing

**In case of mains failure, the kinetic energy stored in the KIN provides the UPS load until the supply via the diesel engine can be assured.**

**Maximum frequency deviation : +/- 1%**

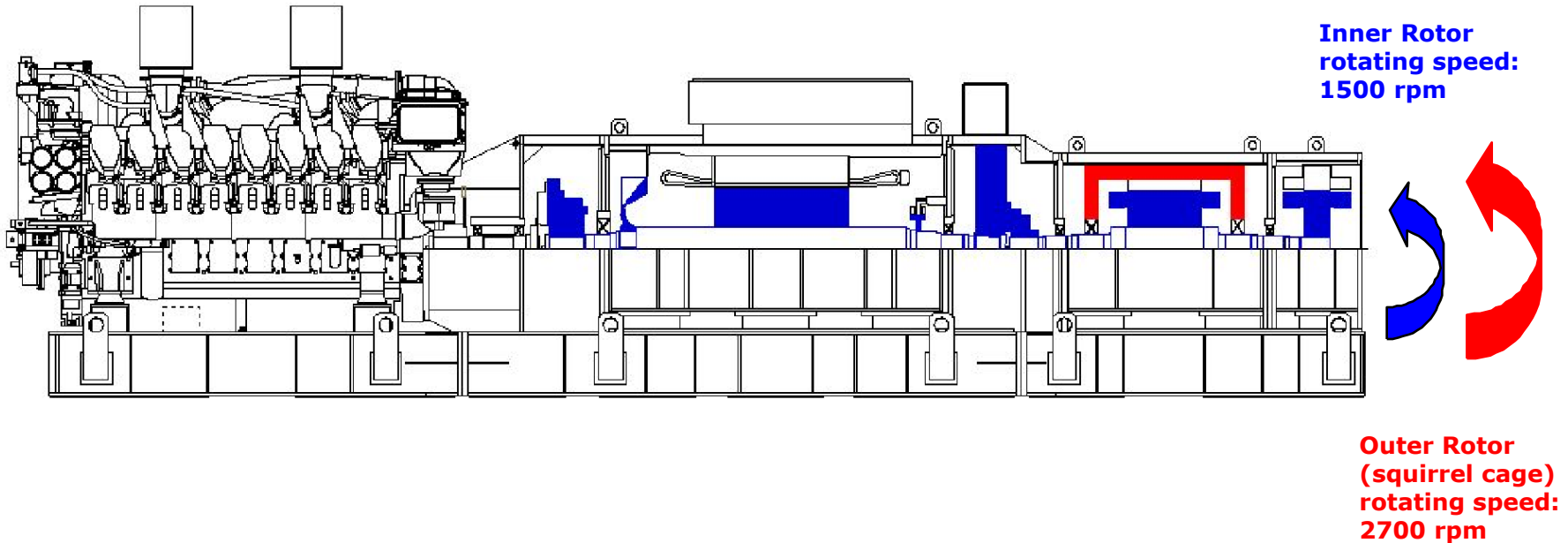
**Maximum voltage deviation : +/- 10 %**

UPS-SYSTEMS

Diesel engine

Synchronous alternator

KIN-module



**In case of mains failure, the inner rotor's magnetic field brakes the outer rotor and keeps the synchronous alternator's rotating speed constant.**

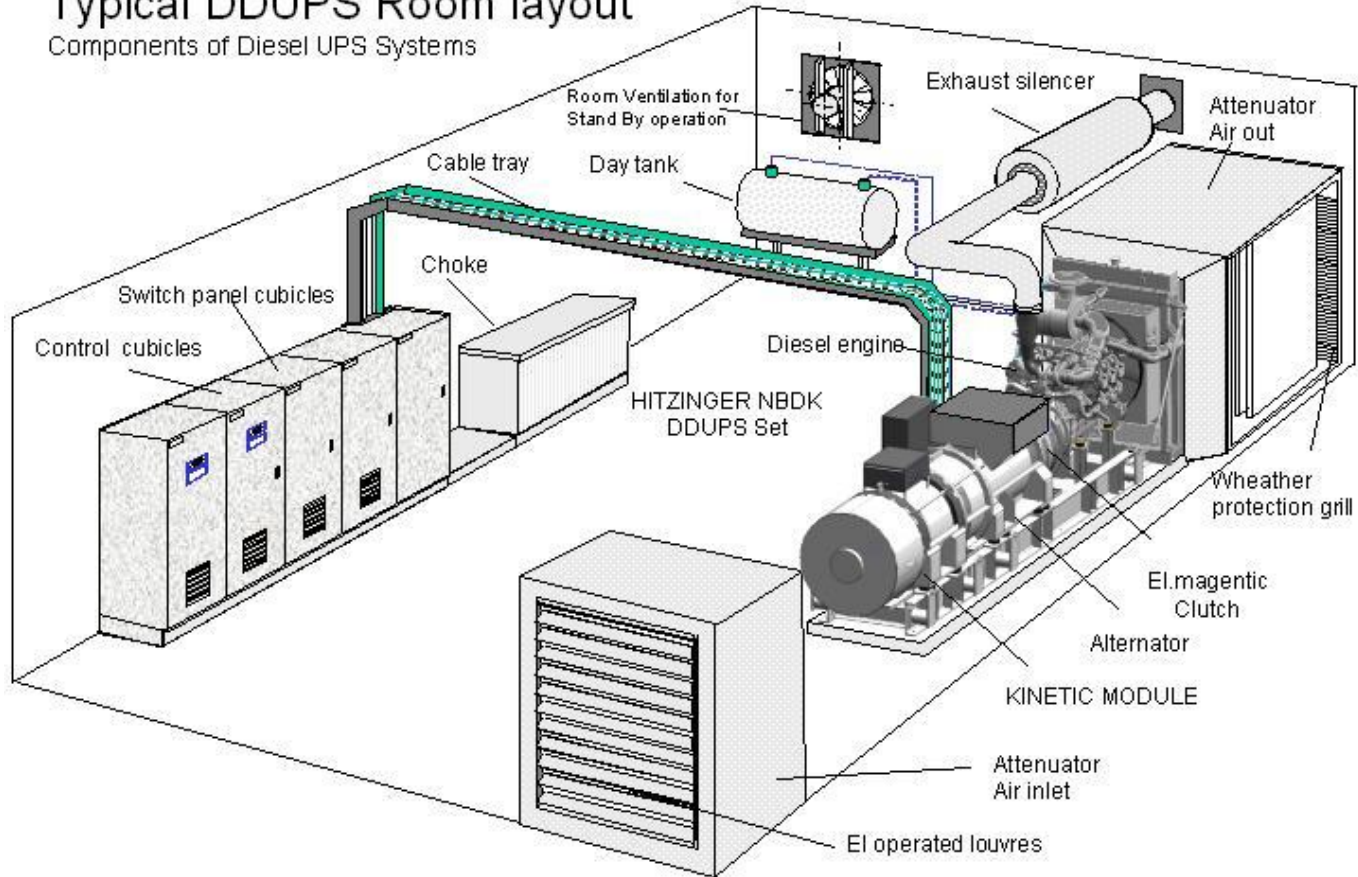
## Advantages:

- Brushless
- Low maintenance
- High reliability
- High MTBF



## Typical DDUPS Room layout

Components of Diesel UPS Systems





# NBDK – IT Power Systems

Electrical Operation and Energy Flow

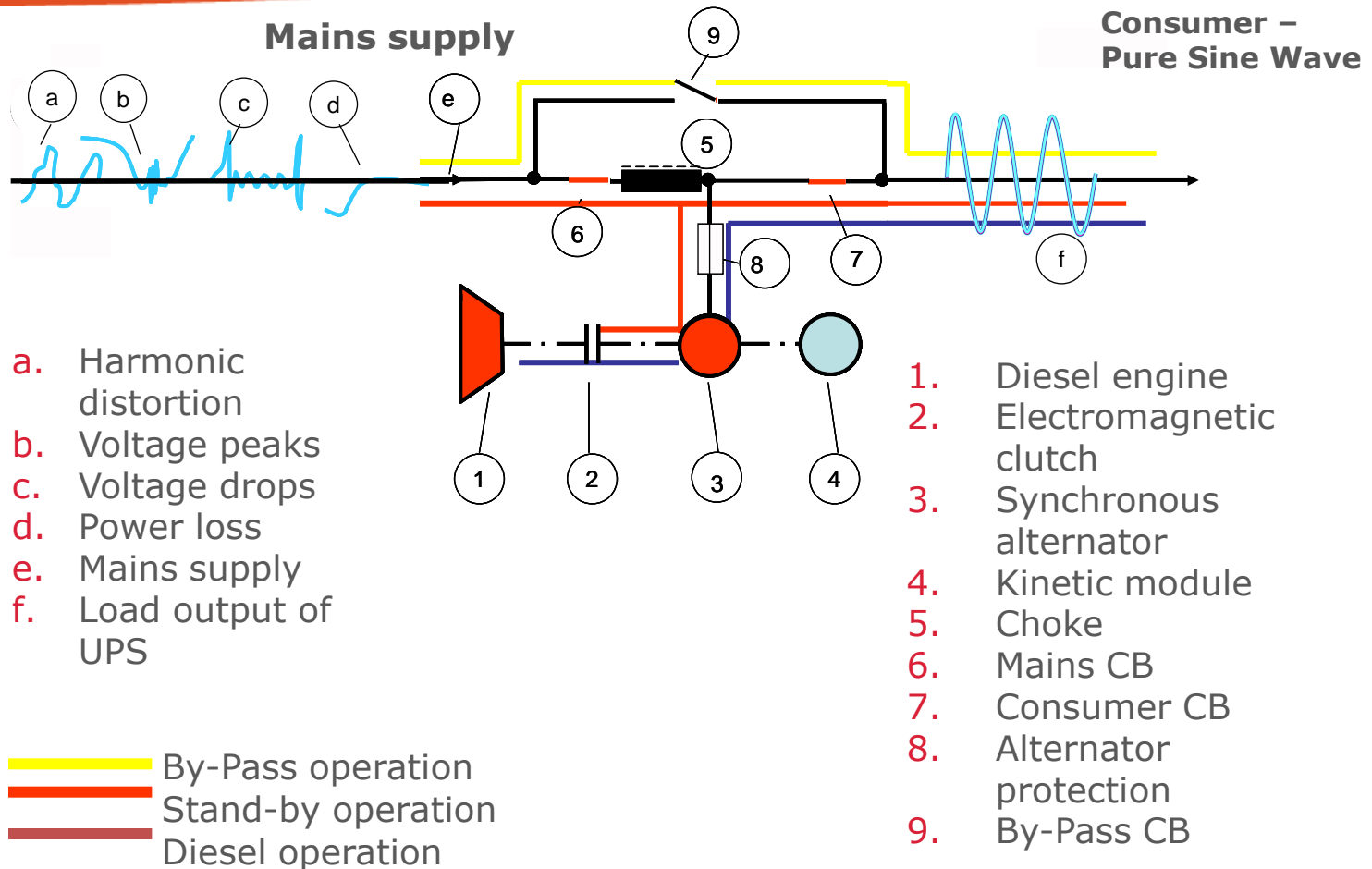
UPS-SYSTEMS





# NBDK Principle Diagram

UPS-SYSTEMS



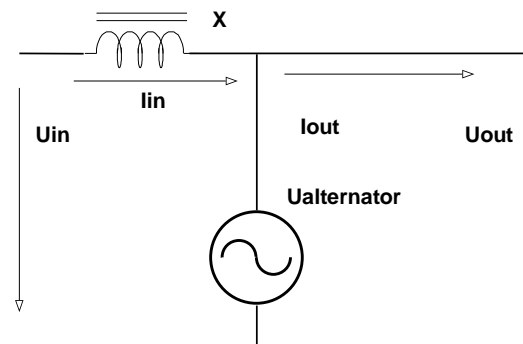
**Frequency deviation:  $\leq 1\%$**

In a UPS system, the coupling choke connects the incoming grid with the UPS output supply, that has to meet highest quality requirements.

The choke's and the alternator's special design guarantees a high degree of decoupling between the grid and the UPS output.

The choke...

- Supports static and dynamic voltage decoupling on the UPS collecting bar
- Decouples fluctuations and harmonics on the grid
- Upper harmonics filter
- Balancing of dynamic loads
- Restriction of current in case of short circuit



$I_{in}$  = line current  
 $I_{out}$  = consumer current  
 $U_{in}$  = line voltage  
 $U_{out}$  = consumer voltage  
 $U_{alternator}$  = alternator voltage

## UPS-SYSTEMS

This configuration's output voltage is completely independent from the input side. The fundamentals (50Hz or 60Hz) are only determined by the alternator. Either the choke (since the reactance of the choke depends on the frequency) or the alternator blocks possible upper harmonics and transients.

The connection between the terms  $U_{\text{choke}} = I \cdot X_{\text{choke}}$  and  $X_{\text{choke}} = 2 \cdot \pi \cdot f \cdot L$  shows, that the choke is a determining component for higher frequencies while the alternator with its special configuration of the stator winding eliminates lower frequencies' upper harmonics (e.g. 3rd, 5th, 7th,...harmonics)

### Short circuits:

In case of a short circuit on the input (equals a total mains failure in which the load is transferred from the input to the alternator via the choke), the choke limits the fault current until the cutoff of the input. The voltage drop on the choke's short circuit is added to the alternator's voltage via the choke's circuit. Therefore, the UPS's voltage equals approximately the alternator's voltage:  $\Delta U = -10\%$  to  $-15\%$  (depending on the choke's position)

### Inverse operation of the input's current transducer:

As the inverse operation of the input's current transducer depends on the temporary short circuit between two phases during the commutation period, the choke can avoid the influences on the not-affected power unit (UPS-mains), following the same principle.

# Description of Operation



- By-pass circuit breaker closed
- Diesel engine starts
- KIN module charging
- Synchronization to mains ("Make before Break")
- Diesel engine shut down

# Description of Operation



- Supply of the consumer load via choke from mains, synchronous machine in motor operation
- Synchronous machine acts as an filter and provides stable voltage and reactive power to the consumers
- Filtering of harmonics and balancing of asymmetric loads
- Distortion factor < 3%

# Description of Operation



- Mains circuit breaker opens
- KIN module keeps load uninterruptedly supplied
- Simultaneous start of diesel engine
- Electromagnetic clutch closes
- Load transfer from KIN module to diesel engine
- Diesel engine provides the UPS supply and charges the KIN module



# Description of Operation



- Mains within permitted tolerances for a certain period
- Synchronization of the consumer load back to mains
- Electromagnetic clutch opens
- Shut down of diesel engine after cooling period

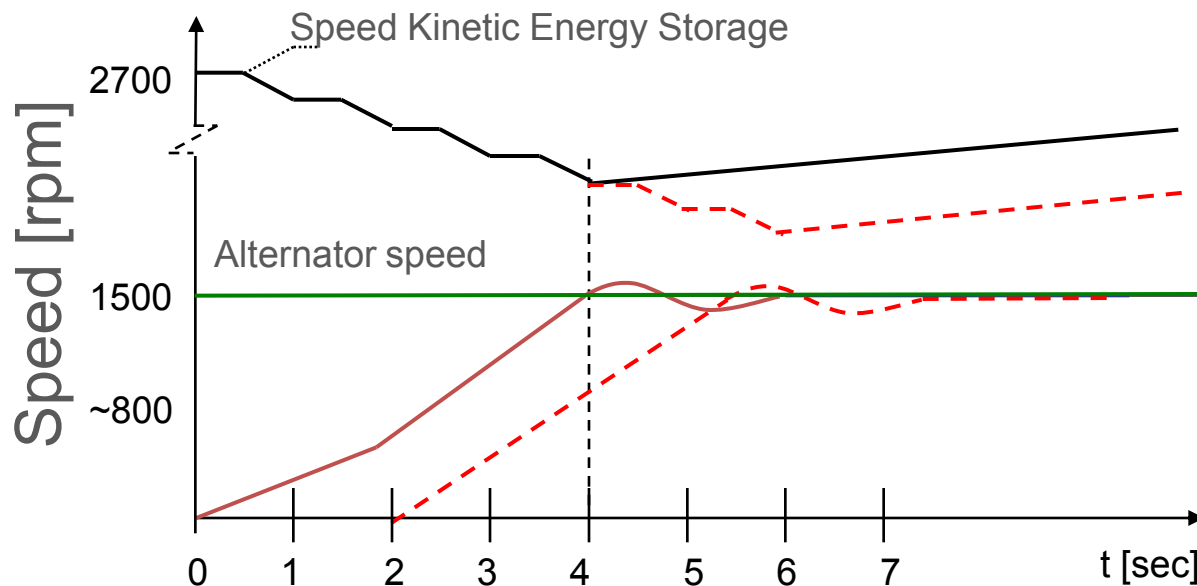
# Description of Operation



- Bypass circuit breaker closes
- Mains and consumer CB's opens
- Machine runs down (energy consumption due to internal losses)
  
- Alternative:
- Electromagnetic clutch closes
- Diesel engine ignition is blocked
- Diesel engine compression is used to increase the energy consumption → fast run down

# Alternate redundant Diesel Engine Start

UPS-SYSTEMS



## Standard Starting Procedure:

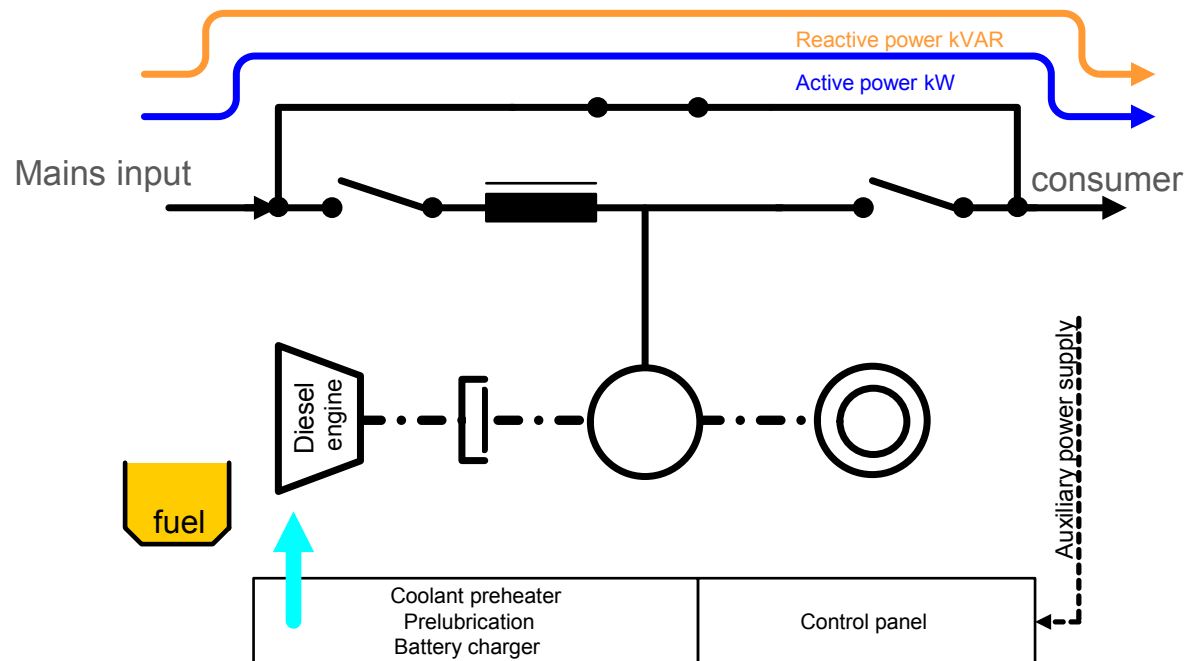
- Diesel engine starts via electrical starter
- Electromagnetic clutch closes at ~800rpm
- Additional acceleration by KIN module

## Redundant Starting Procedure:

- Electromagnetic clutch closes
- Diesel engine acceleration by KIN module to nominal speed

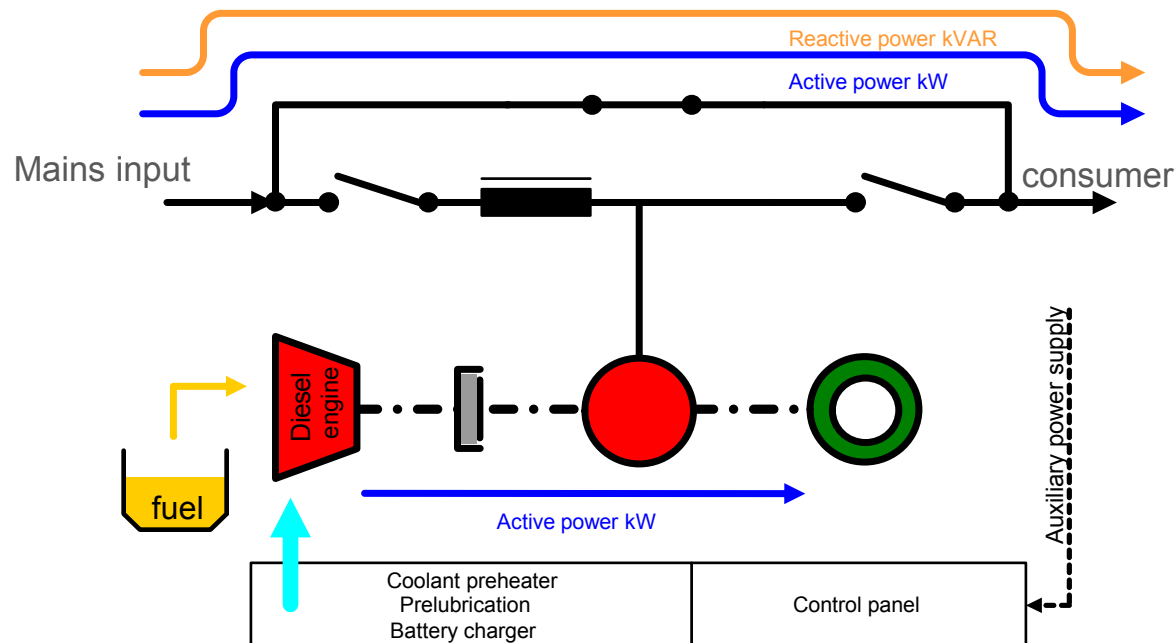
# NBDK – Energy Flow Diagram

## By-pass Operation



- Supply of the UPS load via the by-pass power switch directly from the mains
- NBDK's auxiliary power supply is taken from the UPS's consumer bar

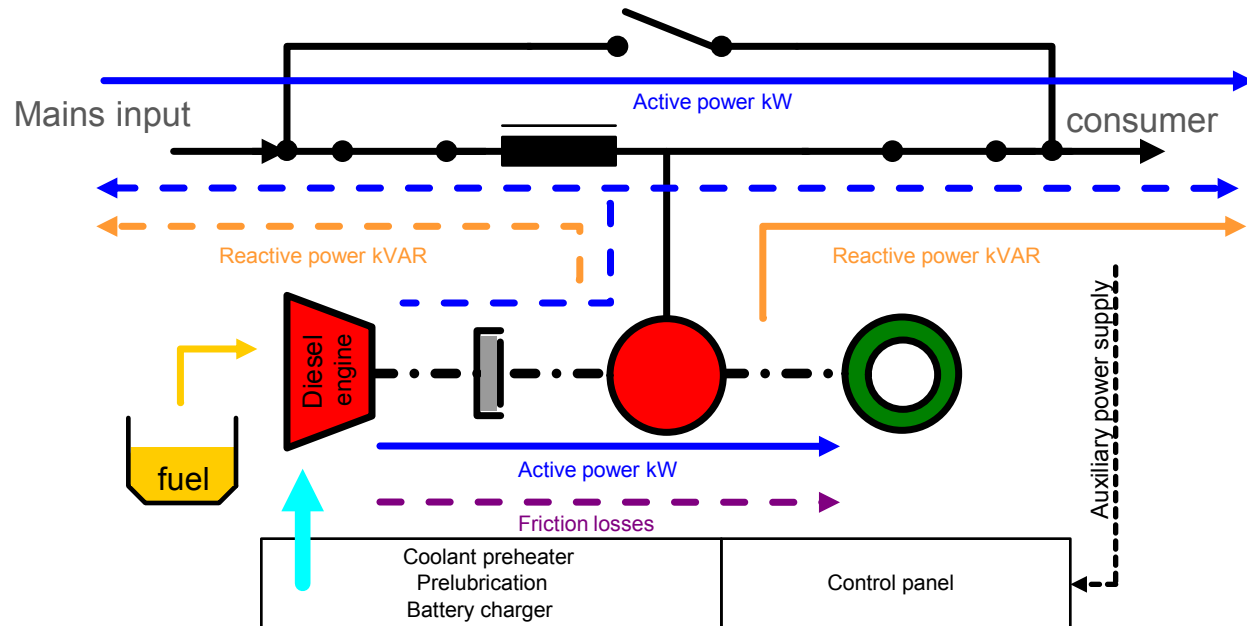
## Start up



- Supply of the UPS load via the by-pass power switch directly from the mains
- The diesel engine accelerates the synchronous machine and the KIN module up to nominal speed
- Storage of the kinetic energy (needed for providing the UPS load) in the KIN module

# NBDK – Energy Flow Diagram

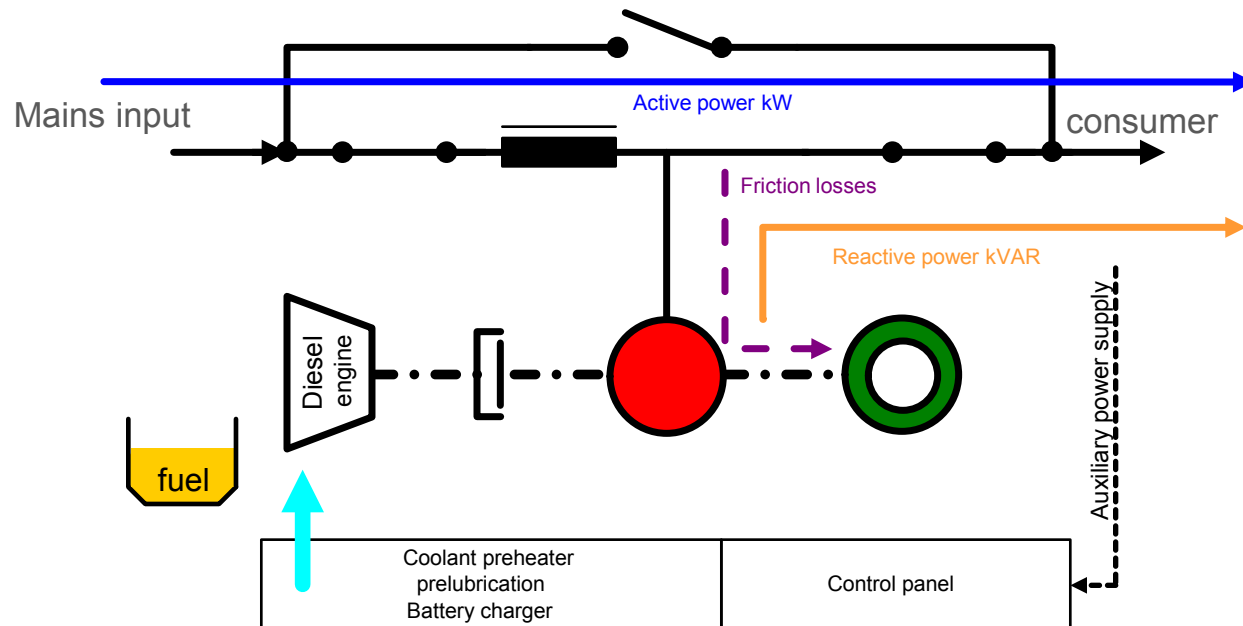
## Synchronization



- Synchronization is performed with a slightly positive beat frequency compared to the mains
- After the synchronization, the alternator delivers the reactive power
- Reactive power flows back to the mains due to choke magnetization

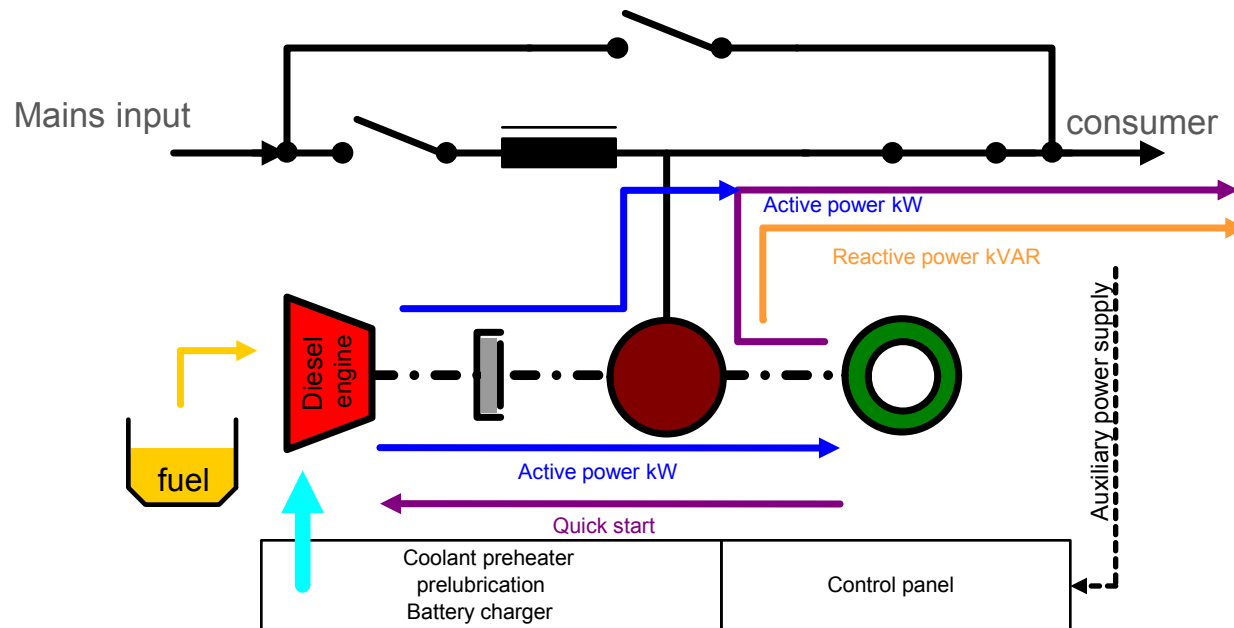


## Stand-by Operation



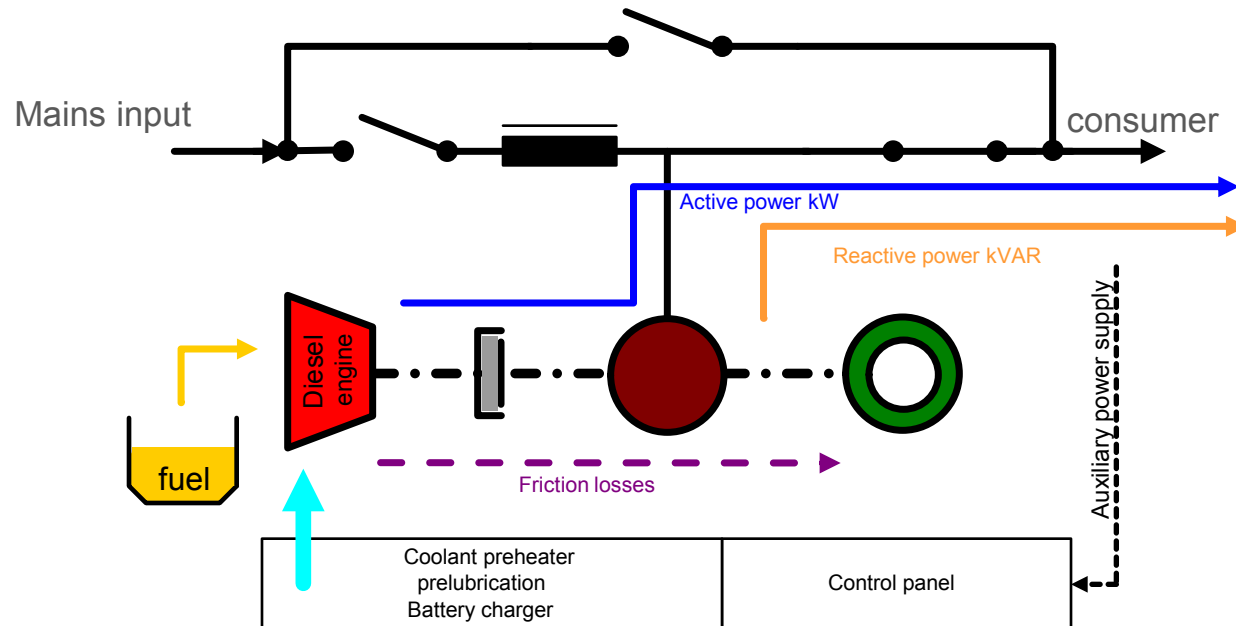
- Consumers of the UPS load are supplied directly by the mains
- The choke suppresses voltage interference caused by static discharge, commutation fall-off, overvoltage or upper harmonics
- Equalizes unbalanced load
- Diesel engine stops, synchronous machine runs as a motor

## Mains Failure



- The UPS alternator supplies the consumer load via the stored kinetic energy until the diesel engine has reached the nominal speed and can deliver full load
- Diesel engine is accelerated via quick start
- KIN module starts to charge

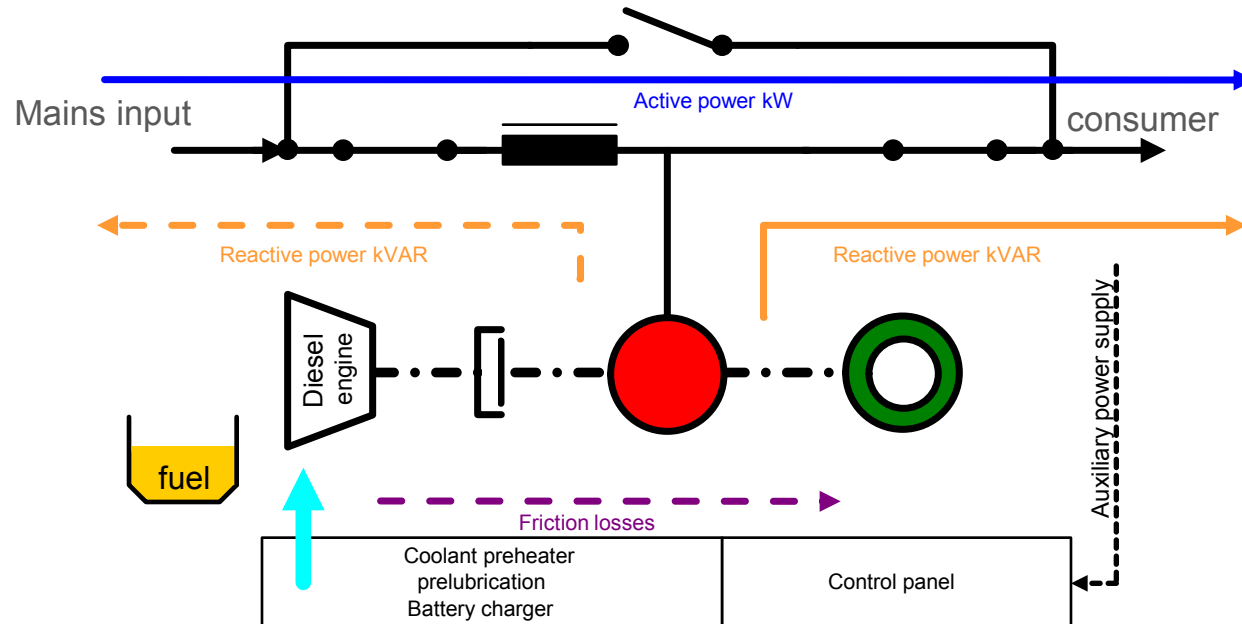
## Diesel Operation



- The diesel engine supplies the UPS load via the alternator
- Energy is also transferred to the kinetic module (to charge the KIN module and compensate the losses)

# NBDK – Energy Flow Diagram

## Mains Return



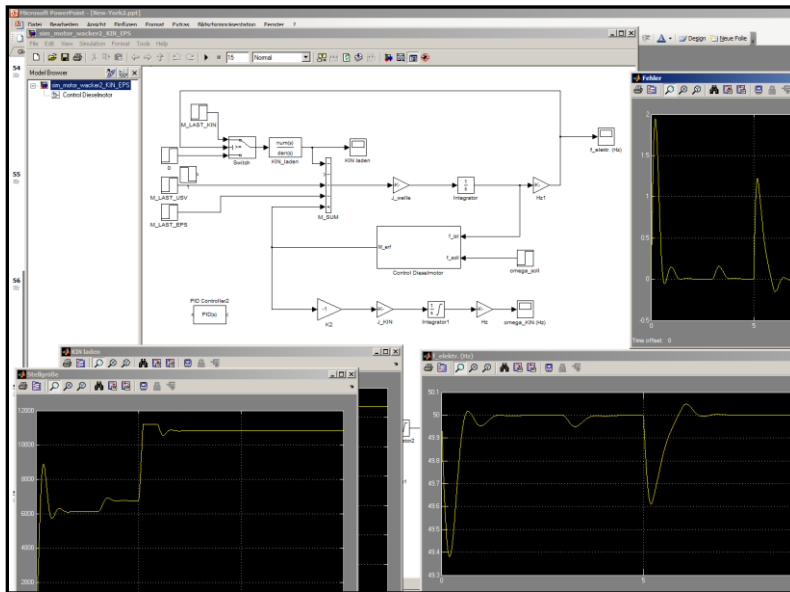
- Synchronization to the mains frequency
- Transfer of the UPS load via the choke to the synchronized mains
- Shutdown of the diesel engine after a cooling-down period
- Machine returns to stand-by operation



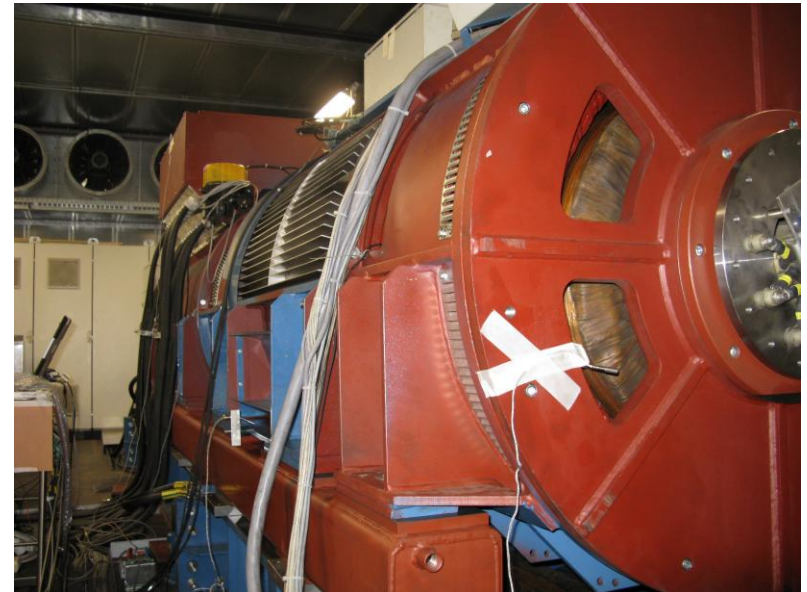
# NBDK – Performance Tests

UPS-SYSTEMS

## Software - Simulations



## Test Cabine - Measurements





# NBDK – Performance

UPS-SYSTEMS

## Mains Failure Simulation

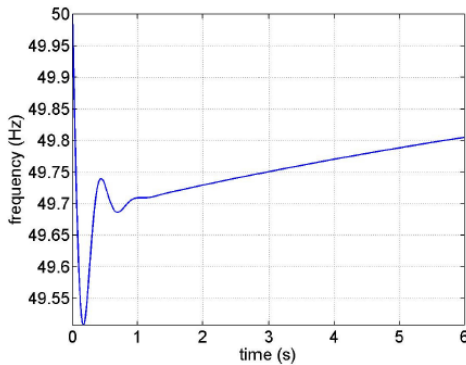
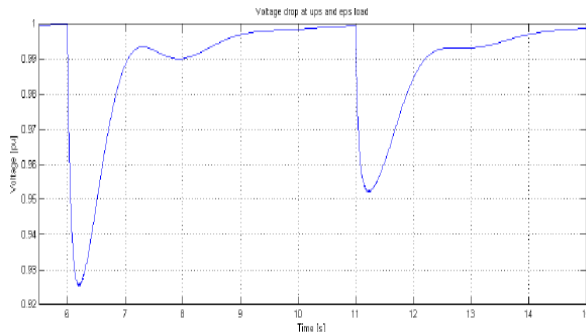
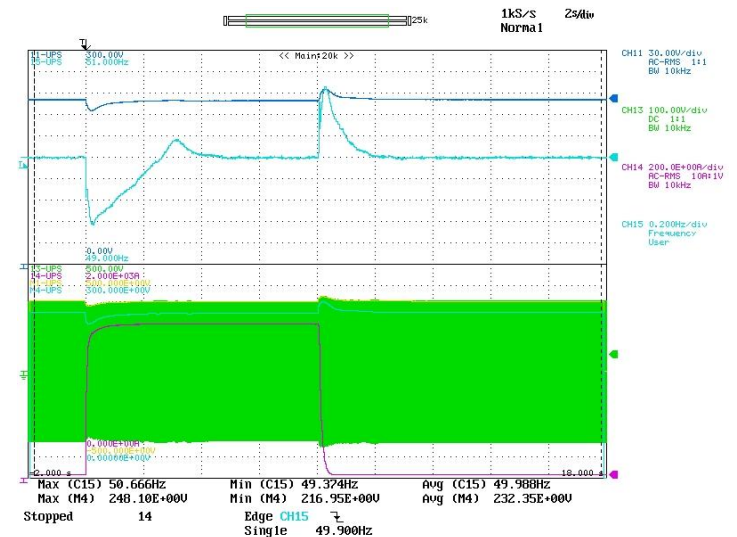


Figure 1: Frequency curve during mains failure



**Tolerances NBDK:**  
**Frequency:  $\pm 1\%$**   
**Voltage:  $\pm 10\%$**

## Mains Failure Measurement





# NBDK – IT Power Systems

## Control and Monitoring

UPS-SYSTEMS





## UPS-SYSTEMS

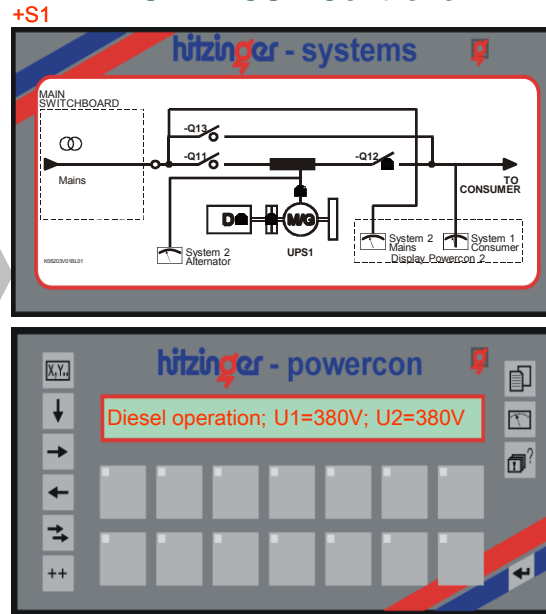
### EPS ROOM

### POWERCON [EPS]

MONITORING  
&  
OPERATION

power  
monitoring

### UPS SYSTEM with POWERCON Controller



SYSTEM 1

SYSTEM 2

Mains input

Alternator output

### Office



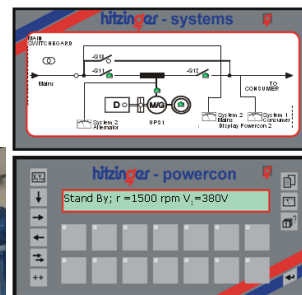
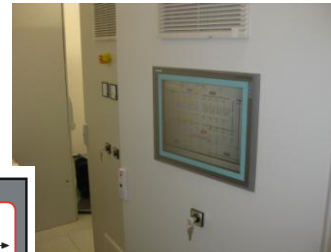
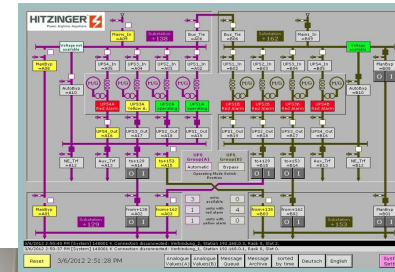
RS232/485  
Converter





# Control and Monitoring

UPS-SYSTEMS

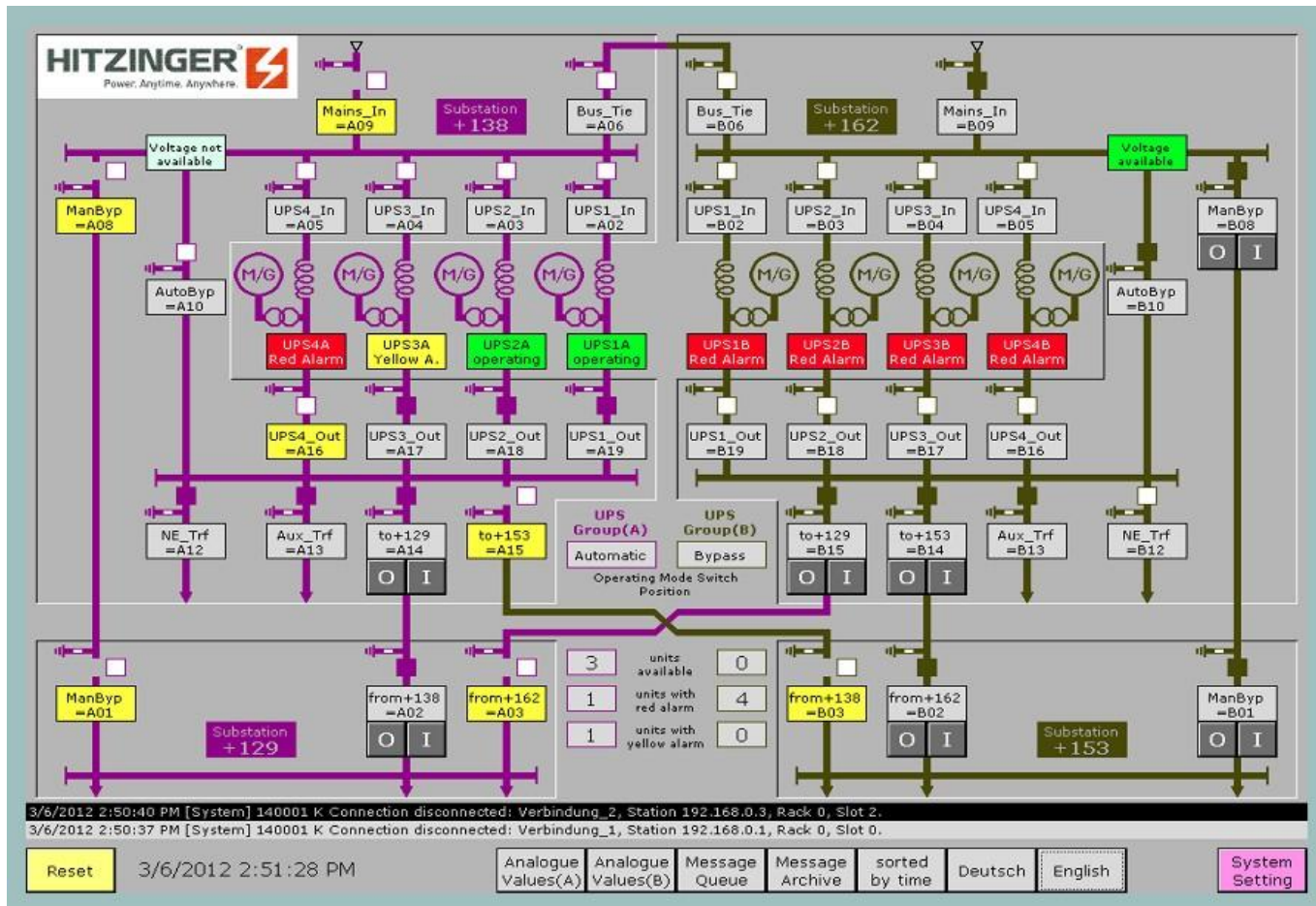


DDUPS -> Local PLC -> Master PLC -> Office  
Communication via Modbus / Profibus



# Control and Monitoring

## UPS-SYSTEMS





# NBDK – IT Power Systems

## System Configurations

UPS-SYSTEMS





# System Configurations

## TIER Requirements Summary

### UPS-SYSTEMS







	TIER I	TIER II	TIER III	TIER IV
Active Capacity Components to Support IT Load	N	N+1	N+1	N after any failure
Distribution Paths	1	1	1 active and 1 alternative	2 simultaneously active
Concurrently Maintainable	No	No	Yes	Yes
Fault Tolerance (single event)	No	No	No	Yes
Compartmentalization	No	NO	No	Yes
Continuous Cooling	Load density dependent	Load density dependent	Load density dependent	Yes (class A)



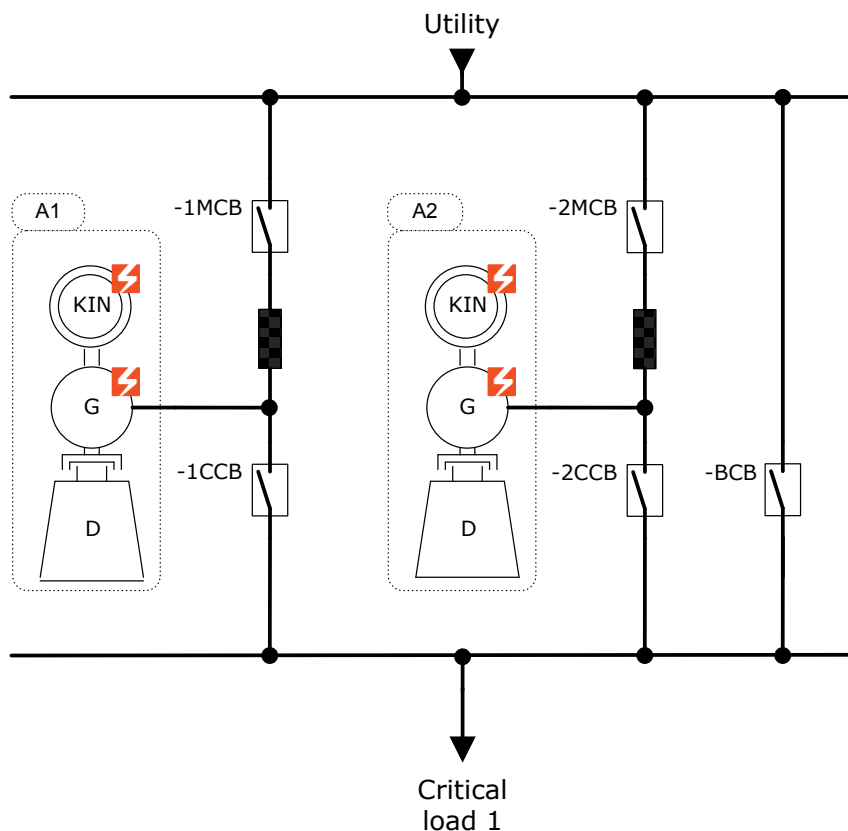
# System Configurations

## TIER Requirements Summary

UPS-SYSTEMS

TIER I	TIER II	TIER III	TIER IV
Single source No redundancy 	Single source After „N+1“ 	Double source 2 x „N“ „A-B“-supply Path A  Path B 	Double source Each N+1 Path A  Path B 
Enduser availability 99,67 %	Enduser availability 99,75 %	Enduser availability 99,98 %	Enduser availability 99,99 %
Enduser downtime 28,8 h	Enduser downtime 22,0 h	Enduser downtime 1,6 h	Enduser downtime 0,8 h
First introduced 1960-1970	First introduced 1960-1990	First introduced since 1990	First introduced Since 1994





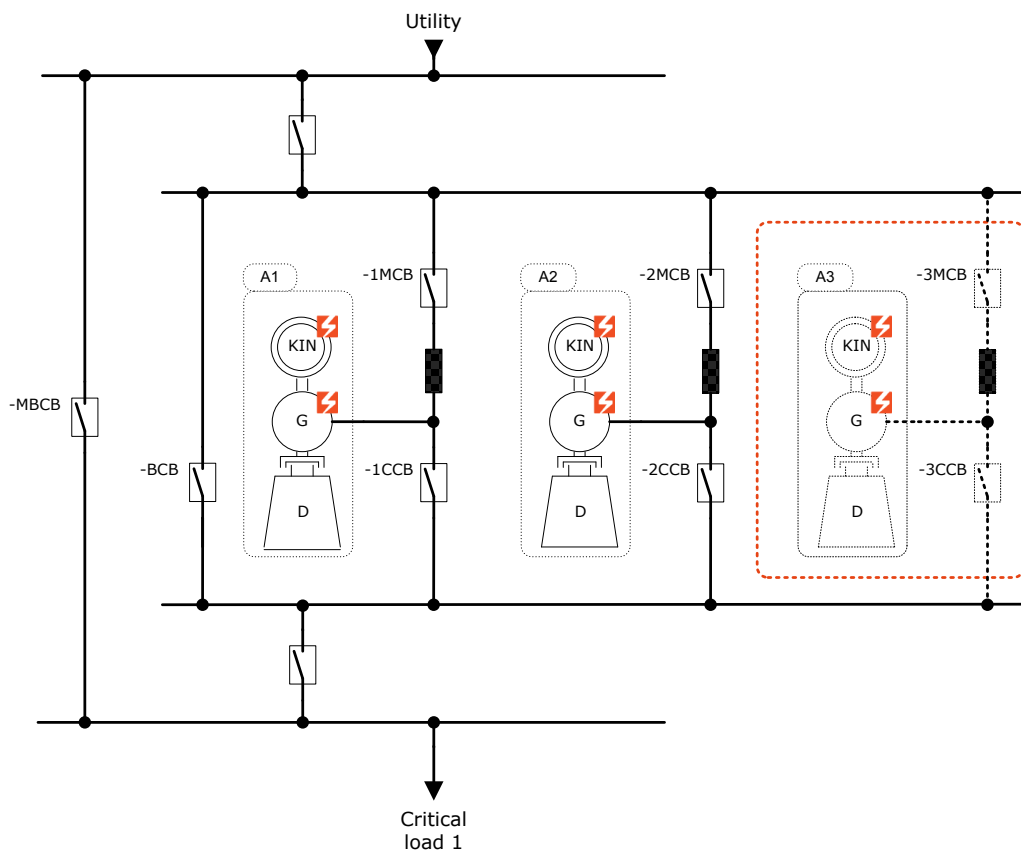
- Example:  
Two single units paralleled , one Bypass- CB
- System configuration:  
Parallel
- System components:  
 $(N+I)$   
 $2 + 0$
- Number of paths:  
 $(P)$   
1
- Description:  
N... number of UPS needed to supply the load  
  
I... number of redundant units  
  
P.. number of paths



# System Configurations

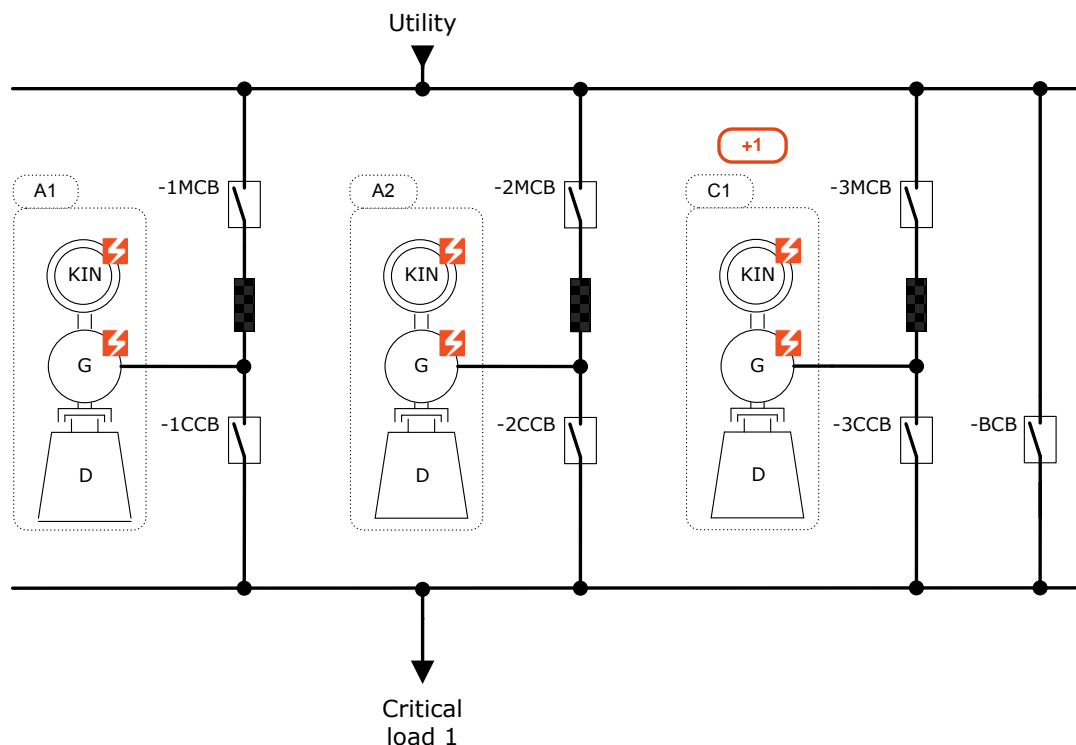
## Parallel Configuration, N

### UPS-SYSTEMS



- **Parallel Configuration**  
To achieve a higher level of output availability in N or N+1 configuration
- N:**  
System components ; paths  
3 ; 1 ; (Tier1)  
(unit A1+A2+A3 needed to supply the load)
- **Number of units:**  
Low voltage- limited due short-circuit power (8MWconfiguration)  
Middle voltage- nearby unlimited
- **Further Configuration:**  
Further configurations are simplified without manual Bypass-CB's or additional switching devices

### UPS-SYSTEMS



- Parallel Configuration  
To achieve a higher level of output availability in N or N+1 configuration

### N+I:

System components ; paths

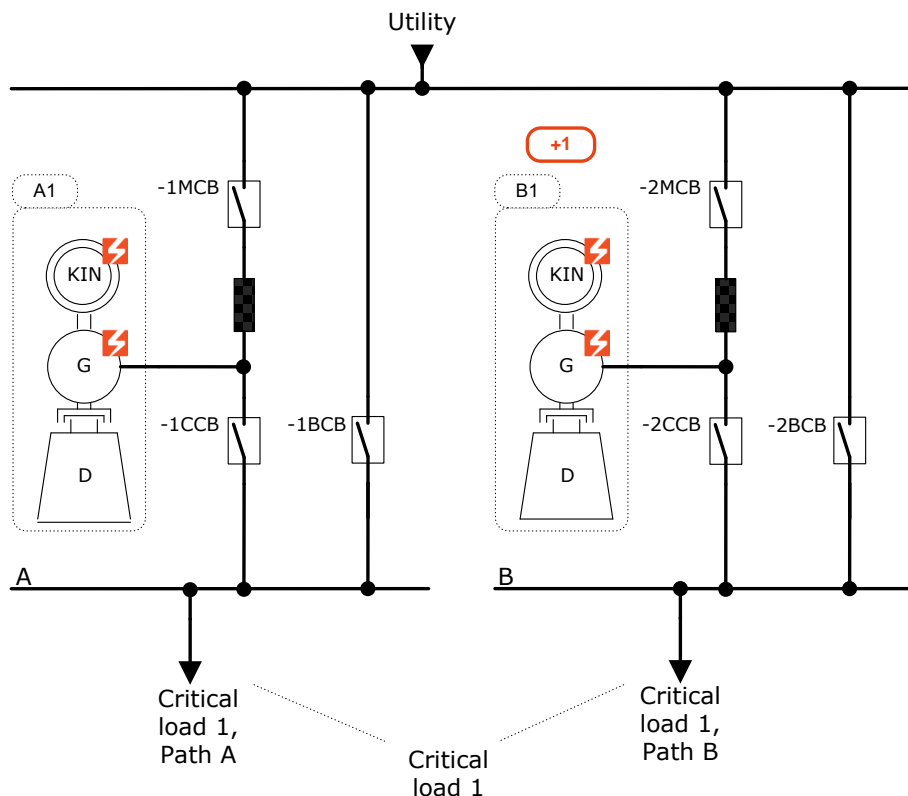
2+1 ; 1 ; (Tier2)

$A1 + A2 \geq \text{load}$ ,

$A1 + C1 \geq \text{load}$ ,

$A2 + C1 \geq \text{load}$ ,

- Key benefits:
  - Simple design
  - Small number of components
  - Easy Expandable
- Drawbacks:
  - Single point of failure, failure on the common bus bar affects the consumers/load



- Isolated Configuration  
There is a higher level of output availability possible, due independent/individual load supply

### N+I:

System components ; paths

1+1 ; 2 ; (Tier3)

A1 >= load,

A2 >= load,

- Key benefits:
  - This kind of system configuration eliminates the single point of failure
  - Higher number of components
- Drawbacks:
  - Higher Acquisition costs
  - Higher Operating costs

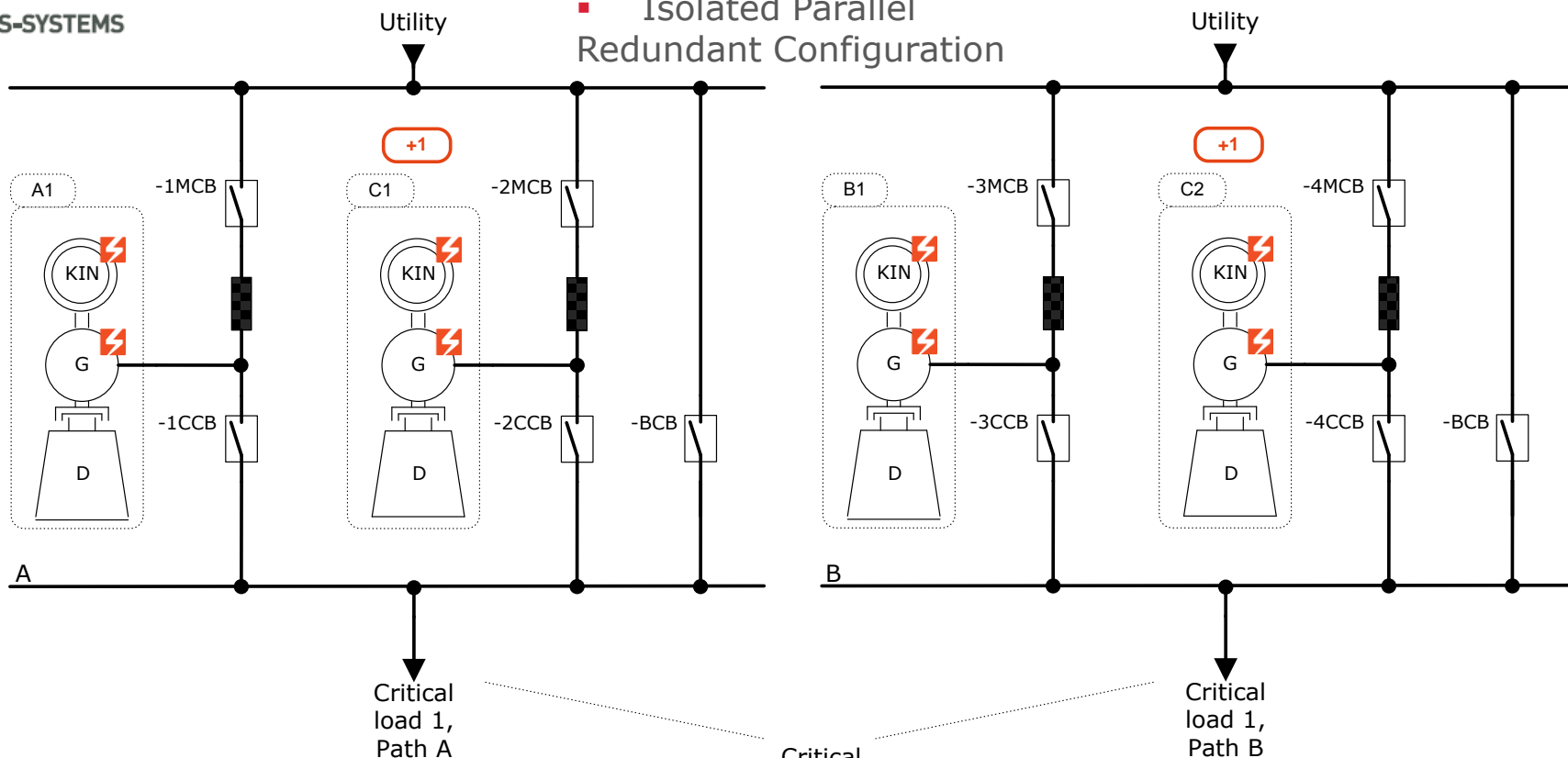


# System Configurations

## Isolated Parallel Redundant Configuration

UPS-SYSTEMS

### Isolated Parallel Redundant Configuration



Highest level of possible output availability

**(N+I)+(N+I):**

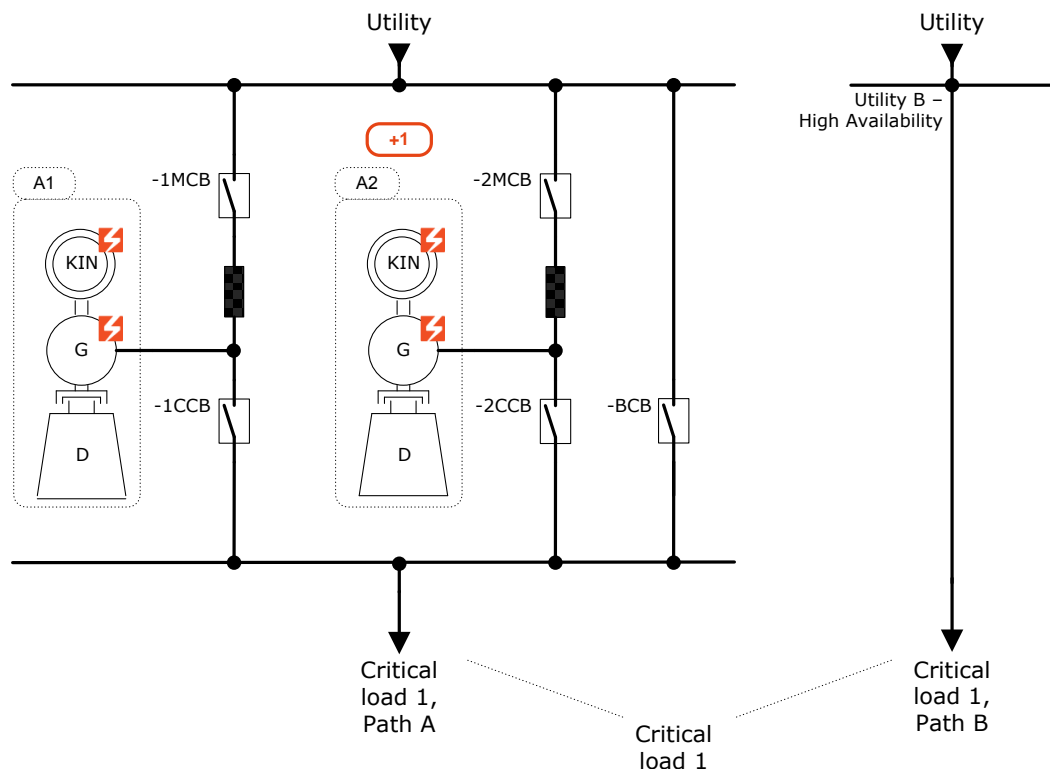
System components ; paths | (1+1)+(1+1) ; 2 ; (Tier4)

Shown in this special configuration - each unit (A1,C1,B1,C2) able to supply the load.

# System Configurations

## Isolated Parallel Configuration

### UPS-SYSTEMS



### Isolated Parallel Configuration

#### N+I:

System components ; paths

1+1 ; 2 ; (Tier3)

A1 >= load,

A2 >= load,

### Key benefits:

- This kind of system uses the high availability of a second Utility
- This kind of system configuration eliminates the single point of failure
- Higher number of components
- If there are two independent grid's available it is a really Operating costs optimized solution

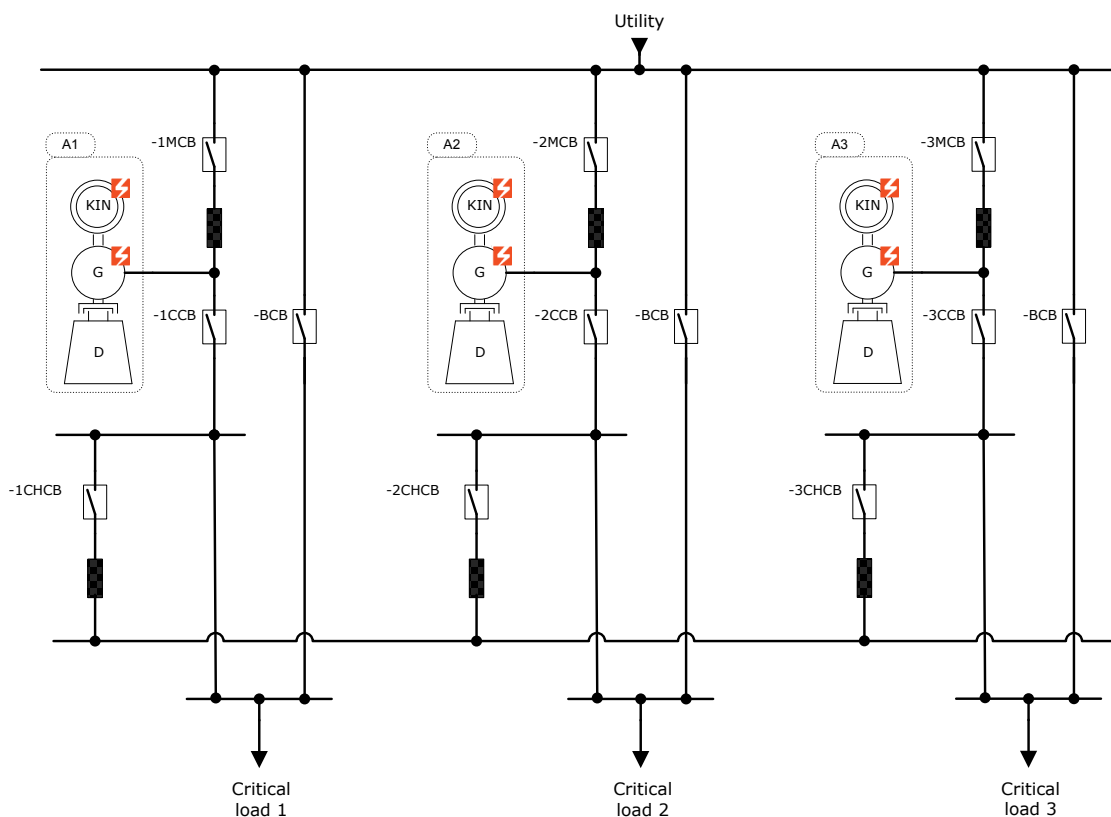
### Drawbacks:

- High Acquisition costs
- High Operating costs

# System Configurations

## Isolated Parallel Configuration

UPS-SYSTEMS



- Isolated Parallel Configuration  
All units are connected to a common bus (IP-Bus) by isolation chokes  
In case of short-circuit on the bus or unit failure, this chokes minimize fault currents to an acceptable level

### N+I:

System components ; paths  
1+1 ; 1 ; (Tier2)

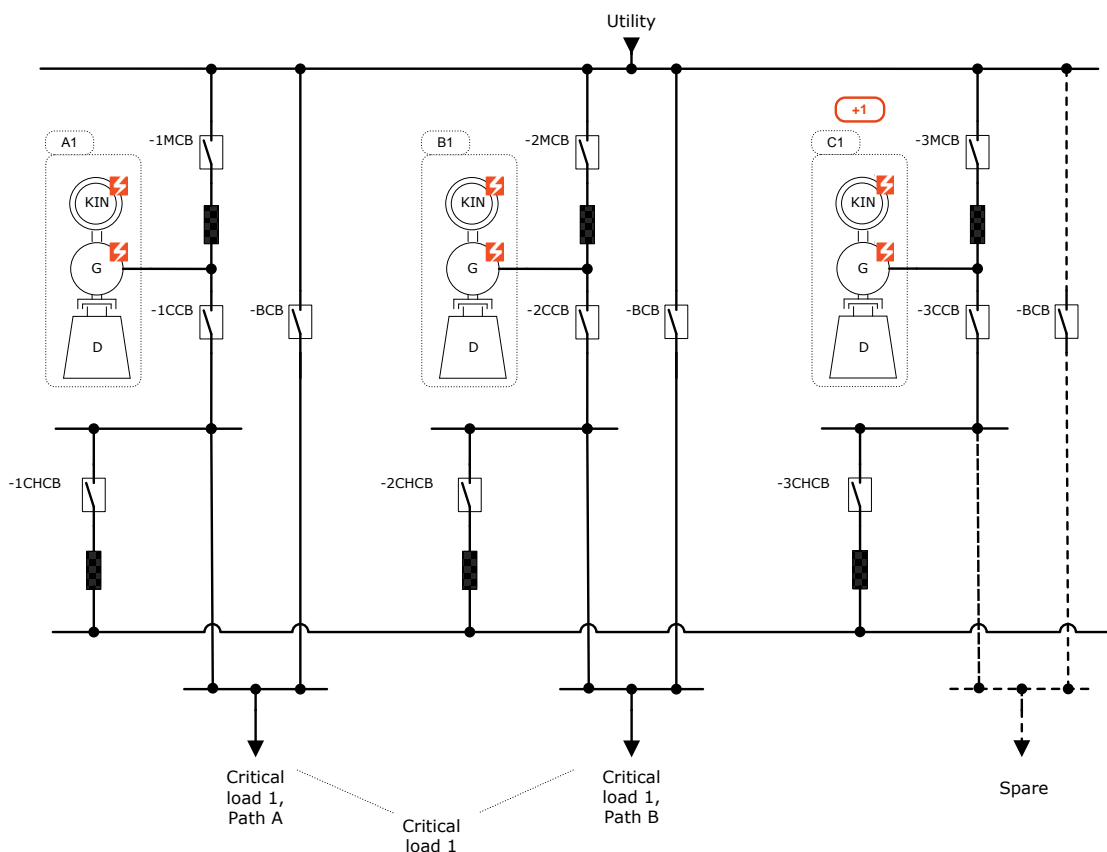
power outage of two units  
>= total load,

- Key benefits:
  - Load management for better efficiency possible, this depends on the systems load configuration.
- Drawbacks:
  - High Acquisition costs
  - not comparable to a totally isolated system configuration, small influences in case of bus bar failure

# System Configurations

## Isolated Parallel Configuration

### UPS-SYSTEMS



- Isolated Parallel Configuration  
All units are connected to a common bus (IP-Bus) by isolation chokes  
In case of short-circuit on the bus or unit failure, this chokes minimize fault currents to an acceptable level

#### N+I:

System components ; paths  
1+1 ; 2 ; (Tier3)

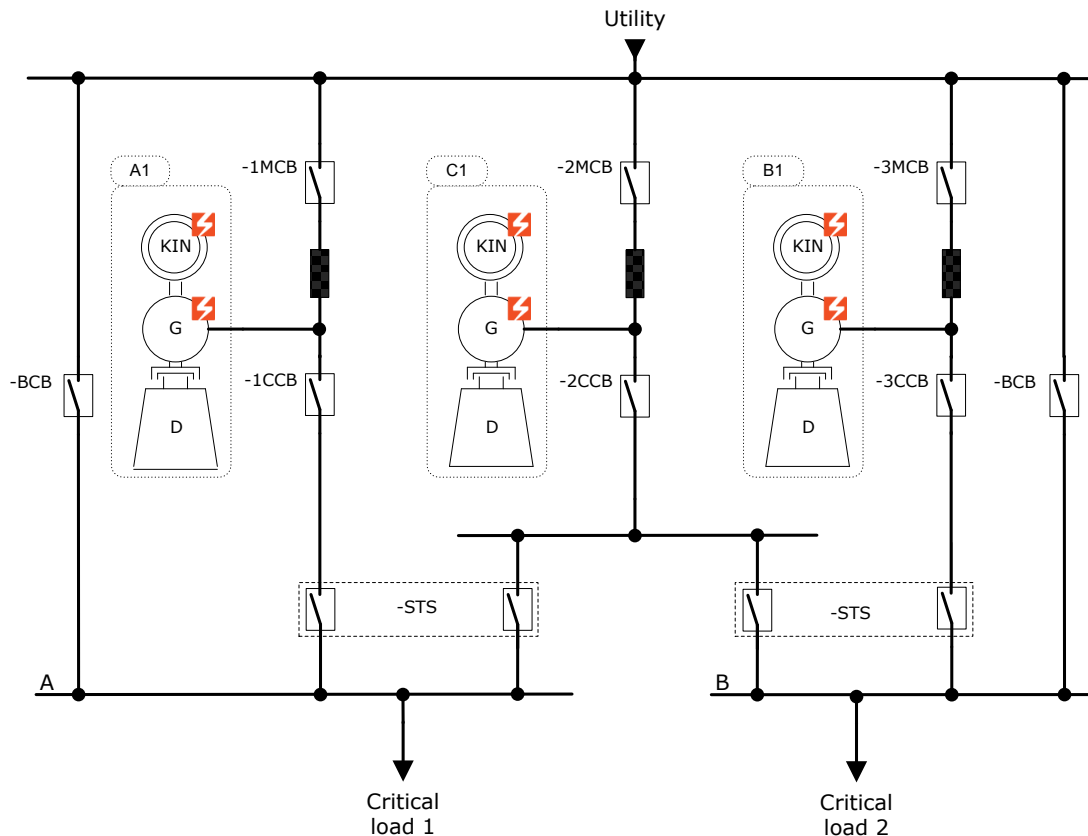
power outage of two units  
>= total load,

- Key benefits:
  - Load management for better efficiency possible, this depends on the systems load configuration.
- Drawbacks:
  - High Acquisition costs
  - not comparable to a totally isolated system configuration, small influences in case of bus bar failure





### UPS-SYSTEMS



- Parallel Configuration  
Additional unit is operating parallel to the 2 load bus bars, they are connected due Static Load Transfer Switches.  
In case of unit failure the static transfer switches to the remaining available supply.

#### N+I:

System components ; paths  
1+1 ; 1 ; (Tier2)

A1 or B1 or C1  $\geq$  load1 or load2,

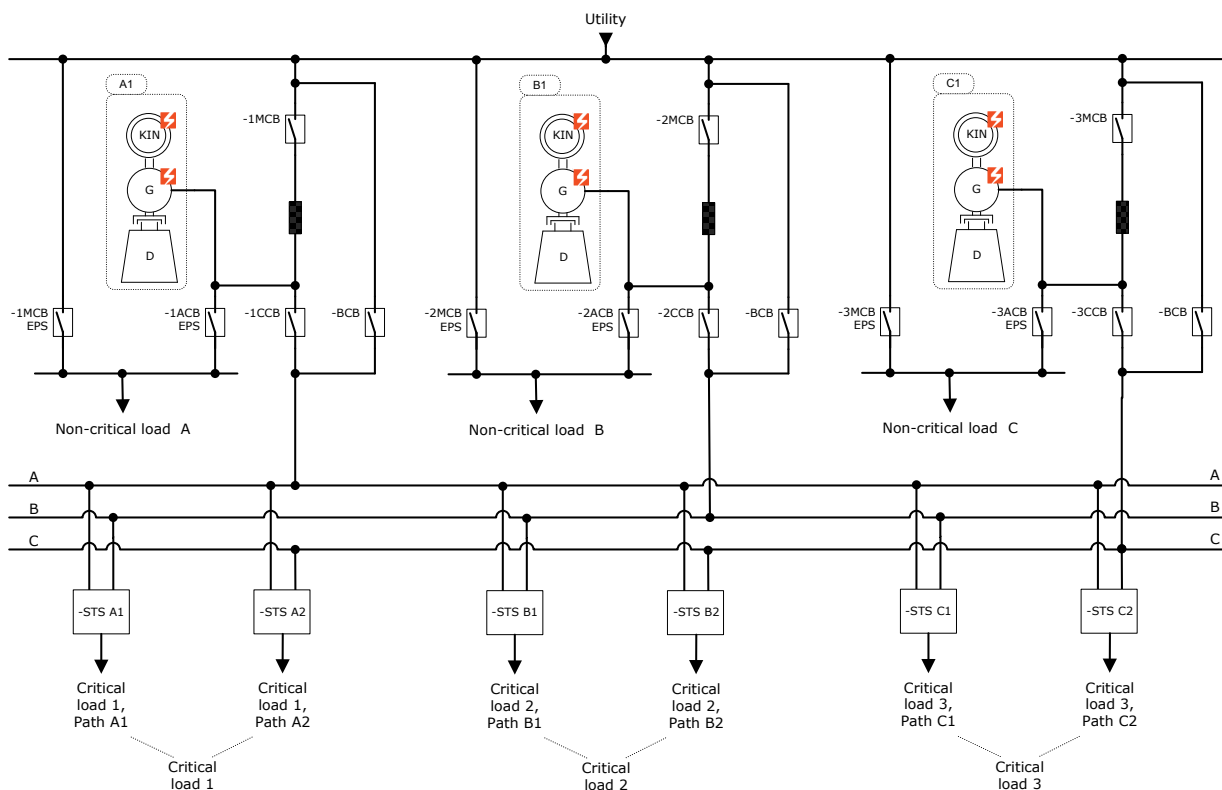
- Key benefits:
  - Redundant UPS is able to supply each load without influencing to the other consumers.
  - Maintenance
- Drawbacks:
  - available only in the low voltage range

# System Configurations

## Parallel Configuration, STS

UPS-SYSTEMS

### ■ Isolated Parallel Configuration



High level of possible output availability  
The Availability depends from load conditions

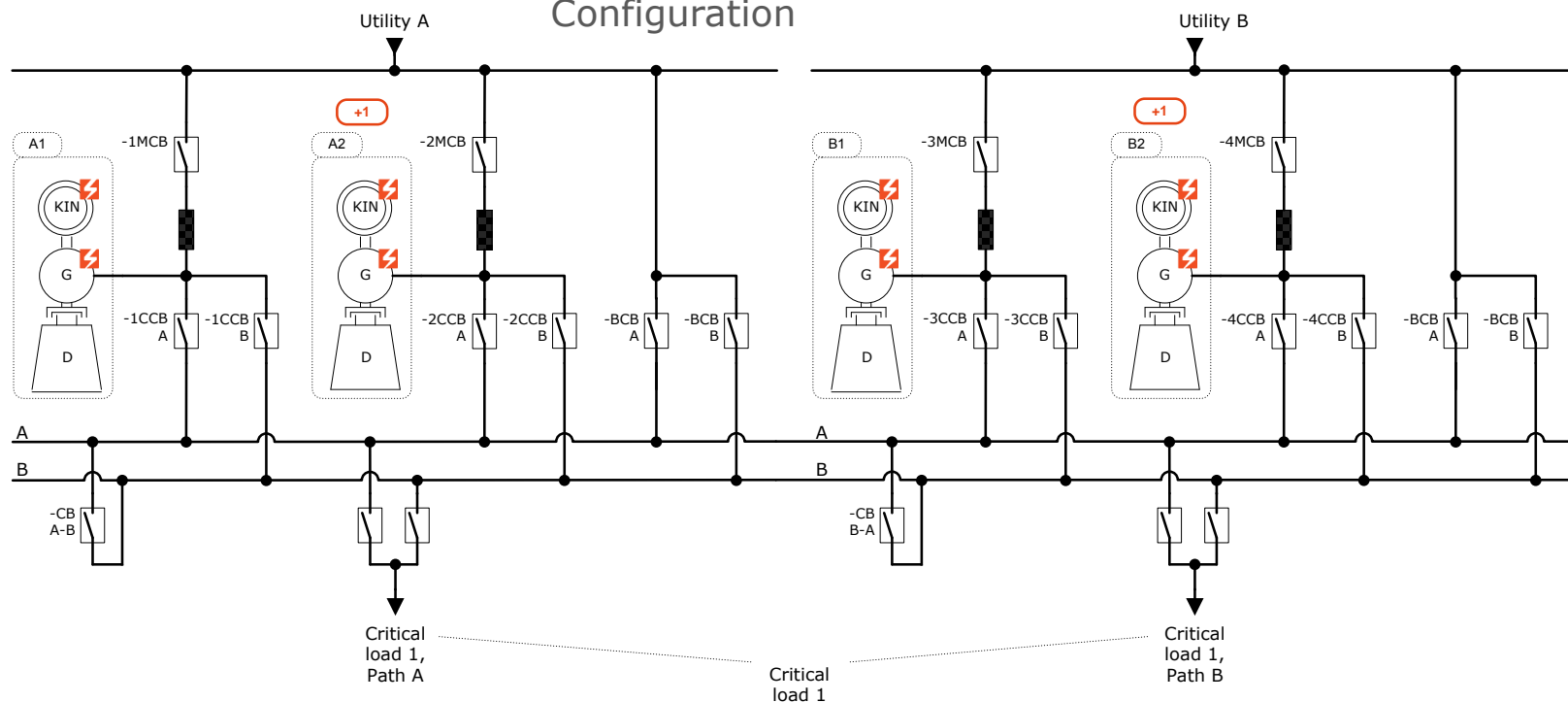


# System Configurations

## Parallel Configuration

UPS-SYSTEMS

### ■ Isolated Parallel Configuration



Highest level of possible output availability

**(N+I)+(N+I):**

System components ; paths | (1+1)+(1+1) ; 2 ; (Tier4)



# NBDK – IT Power Systems

Hitzing & on site service / maintenance / repair

UPS-SYSTEMS



- Competent and experienced service team
- 24/7/365 service hotline
- Worldwide services available through agents / representatives
- Available on site within 48 hours (in middle east countries with no visa requirements)



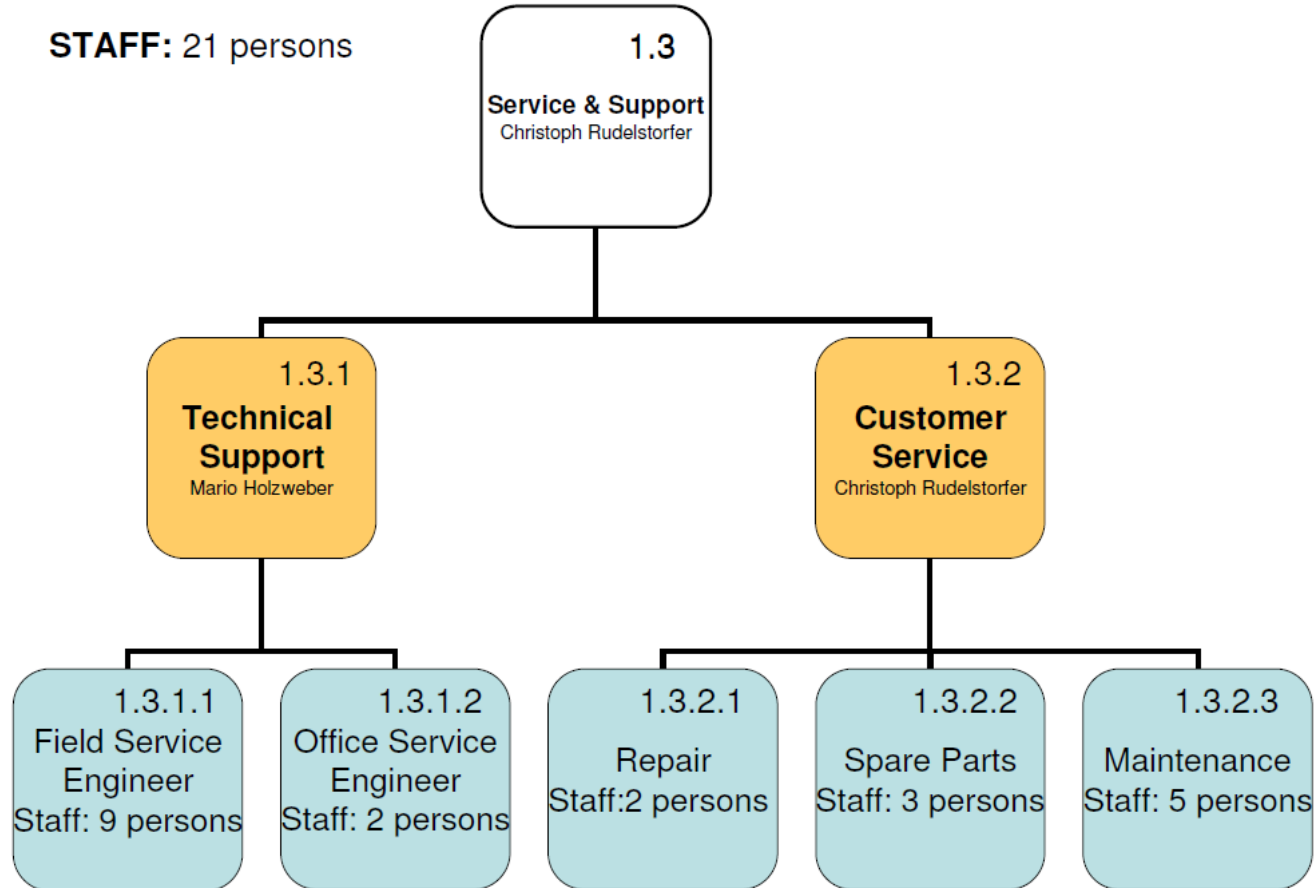


# HitZinger Maintenance

## Organisation

UPS-SYSTEMS

**STAFF:** 21 persons



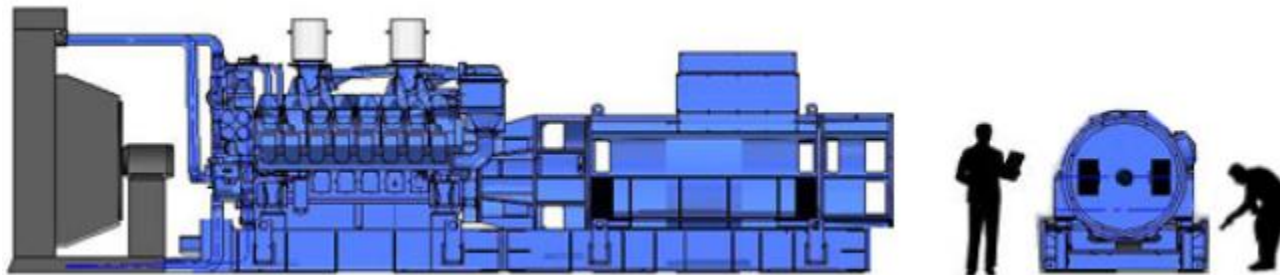
**Total work experience: > 300 years!**

# Hitzinger Maintenance

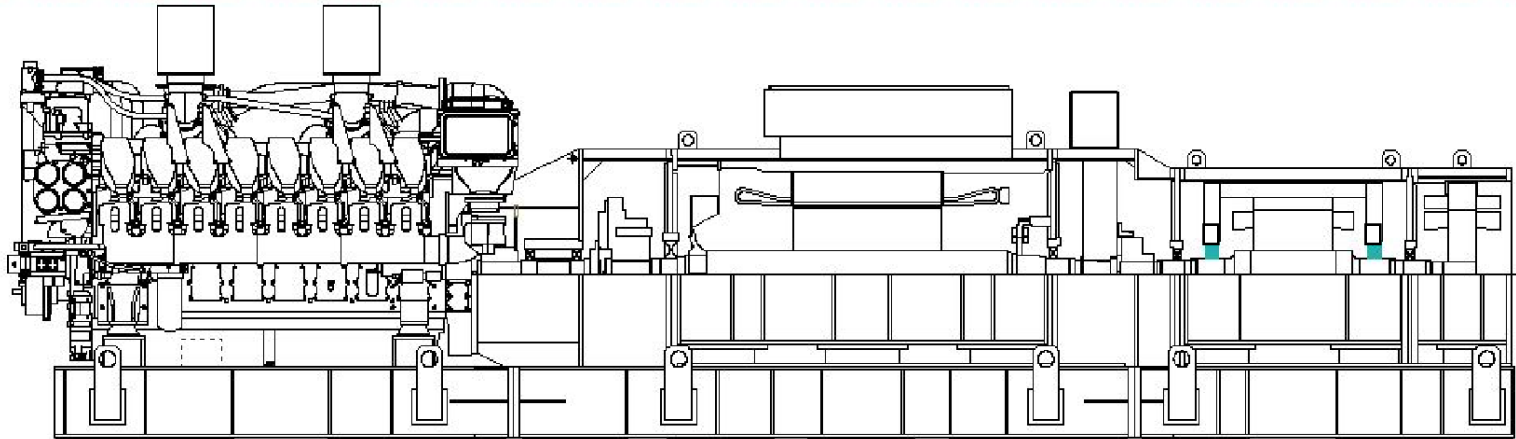
## More Reliability: Less maintenance

### Choose a solution which facilitates maintenance

- Low annual service requirements
- Automatic lubrication options
- Module arrangement gives better KIN module access facilitating:
  - Easier routine maintenance
  - Quicker overhauls







## Qualification:

Level M1 ... trained personal (customer operator)

Level M2 ... qualified personal (HitZinger service and maintenance partner)

Level M3 ... specialist of DDUPS manufacturer and service and maintenance partner

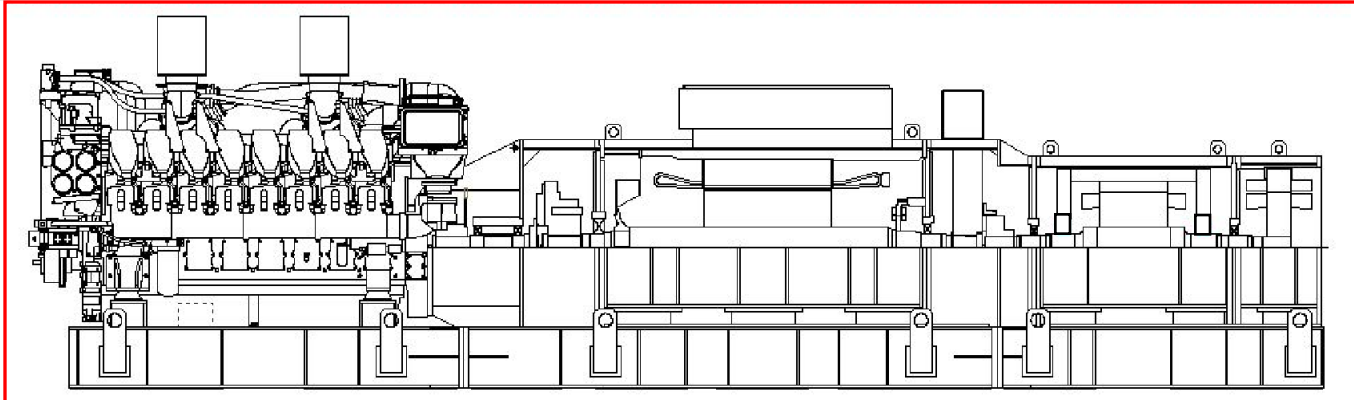
## Operation mode:

A ... automatic

M ... maintenance

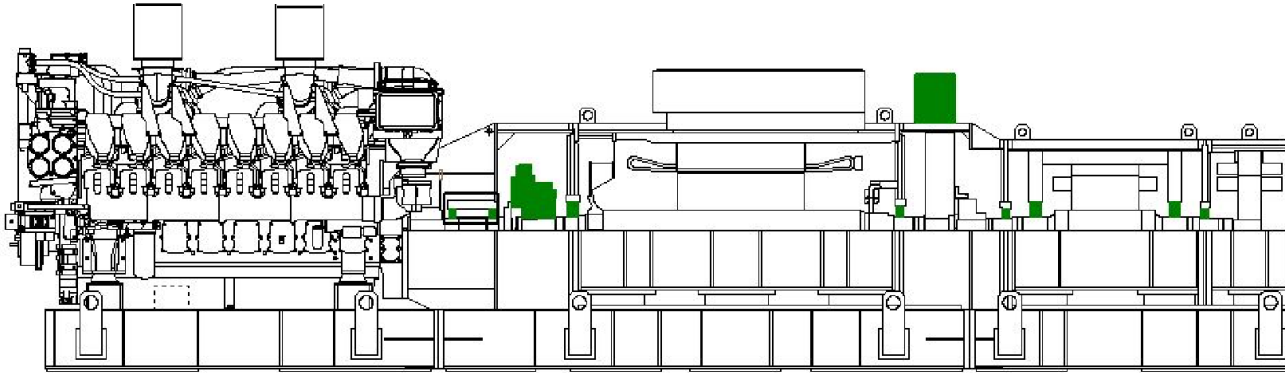
T ... test

## UPS-SYSTEMS



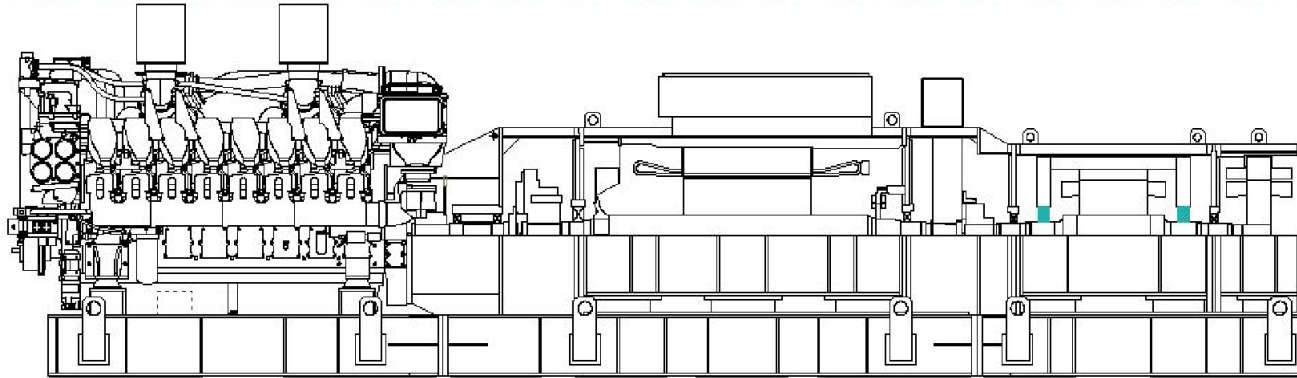
Unit to be maintained Tasks	Qualifi- cation	Operation Mode	Daily	1 Monthly	4 Months	1 Year	Max. Years	Special period or time limitation
<b>Visual inspections</b>								
<ul style="list-style-type: none"> <li>- alternator</li> <li>- kinetic energy module</li> <li>- re-greasing unit</li> <li>- cooling system</li> <li>- fuel system</li> <li>- exhaust system</li> <li>- ducts</li> </ul>	M1	A		•	•	•		
<b>Bearing re-grease</b>								
<ul style="list-style-type: none"> <li>- electromagnetic clutch</li> <li>- alternator</li> <li>- kinetic energy module (outer bearings)</li> </ul>	M1	A						automatic

## UPS-SYSTEMS



Unit to be maintained Tasks	Qualifi- cation	Operation Mode	Daily	1 Monthly	4 Months	1 Year	Max. Years	Special period or time limitation
<b>Functional tests, visual inspection and cleaning</b>								
<ul style="list-style-type: none"> <li>- Alternator and KIN module</li> <li>- automatic re-greasing unit</li> <li>- cooling and fuel system</li> <li>- local and master control panels</li> </ul>	M2	T			•	• • •		
<b>Electromagnetic Clutch</b>								
Check and re-adjust gap clearance	M2	M			•	•		Readjustment after 100 HSS
Replace friction linings	M2	M					10	Theoretical figure
<b>Kinetic Energy Storage Unit</b>								
Change lubrication oil of inside bearings	M2	M			•	•		Max. 3500 AWH

## UPS-SYSTEMS



Unit to be maintained Tasks	Qualifi- cation	Operation Mode	Daily	1 Monthly	4 Months	1 Year	Max. Years	Special period or time limitation
<b>Kinetic Energy Storage Unit</b>								
Replace KIN-module inner bearings	M3	M					5	Theoretical figure



# Hitzinger Services

in Turkey

UPS-SYSTEMS

- Local support through Powerelektronik
  - Powerelektronik has various UPS installations above 20KVA
  - maintenance and service team for UPS
  - highly qualified trained engineers for UPS and electronic equipments support
  - Our main office is Istanbul
  - Hitzinger has already set a training program for 3 engineers from Powerelektronik in Linz / Austria



# Spare parts availability

Stock items at Powerelektronik

UPS-SYSTEMS

- Bearings
- Clutch linings
- PLC's incl. input and output modules
- KIN control box
- AVR
- Relays
- Battery chargers
- Special tools



# Hitzipger Services

in Turkey

UPS-SYSTEMS

Power Elektronik San. ve Tic. A.Ş.  
Armağanevler Mh. Samanyolu Cd.  
İpekçi Sk. No : 12 Ümraniye  
**ISTANBUL**

Power Elektronik San. ve Tic. A.Ş.  
ANKARA BÖLGE MÜDÜRLÜĞÜ  
2. Cadde 1315. Sk. No: 12/A-14  
Asagi Övecler, Cankaya  
**ANKARA**





# NBDK – IT Power Systems

Summary and references

UPS-SYSTEMS



## Lower Total Cost of Ownership

- Direct savings:
  - Total system efficiency ~ 94-96%
  - No additional heat input into the facility
  - No Air Conditioning or infrastructure costs. Just ambient air.
  - No major consumables to change during service life
- Indirect savings:
  - Redefined space requirements
  - Less expensive “garage” style building
  - Reduced space requirements
- MINIMISE ENVIROMENTAL IMPACT
  - Total system efficiency minimises GHG emissions
  - Eliminate the hazardous waste of batteries
- RELIABILITY
  - Simple design low component count: System MTBF 1.000.000+ hours
  - Redundant diesel start
  - Completely brushless design
  - Designed for 25 yr service life
  - Vibration monitoring

## DYNAMIC ELECTRICAL PERFORMANCE

Achieved by Hitzingers own tailored range of synchronous alternators

- Power capacities 150kVA – 2.5 MVA
- Scalability – 11 kV models
- High fault clearing / overload capability
- Mains filtering and harmonics attenuation
- Dynamic power factor correction
- Operates with leading, lagging or unity PF devices
- Completely brushless design

## Energy Storage

Achieved by Hitzingers range of KIN modules

- Wide range of power capacities 150kVA – 2.5 MVA
- Lowest RPM design increases bearing service life
- Rapid discharging and recharging without degradation
- Easy access for maintenance and overhaul
- Vibration monitoring



# EN ISO 9001 Certificate

UPS-SYSTEMS



**CERTIFICATE**

**TÜV AUSTRIA**

Management system as per  
EN ISO 9001:2008

In accordance with TÜV AUSTRIA CERT procedures, it is hereby certified that

**hitzinger**  
POWER. AT THE RIGHT MOMENT.

Dipl. Ing. Hitzinger Gesellschaft m.b.H.  
Helmholtzstraße 56  
4021 Linz  
AUSTRIA

applies a management system in line with the above standard for the  
following scope

**development, planning, production, installation and service of  
power supply systems**

Certificate Registration No. 20 100 5157 Valid until 2013-12-15

*R. F. Schick*  
Certification Body  
at TÜV AUSTRIA CERT GMBH Vienna, 2010-12-16

This certification was conducted in accordance with TÜV AUSTRIA CERT auditing and certification  
procedures and is subject to regular surveillance audits.  
TÜV AUSTRIA CERT GMBH Krugerstraße 16 A-1015 Wien [www.tuv.at](http://www.tuv.at)

**A**  
Z  
PROTECTOR

ZERTIFIKAT | CERTIFICATE | CERTIFICAT | CERTIFICADO | CERTIFICAT | 證書 | 인증서



# Italy

## UPS-SYSTEMS



**Memc - Meran:**

**2 x 340 kW**

**2 x 150 kW**

**Mechanical UPS – uninterrupted drive of rotating machines (e.g. pumps).**

**STMicroelectronics Catania:**  
**4 x 1750kVA**





UPS-SYSTEMS



**International Airport Athens:  
4 x 450kVA**



**Governmental Data Centers**  
 2 x 2000 kVA (dual output)  
 2 x 2000 kVA (dual output)  
 2 x 475 kVA (dual output)







# Great Britain

UPS-SYSTEMS



**Data Centre – Global Switch London (22MVA in parallel Operation)  
11 x 2000 kVA (11kV)**



# Austria

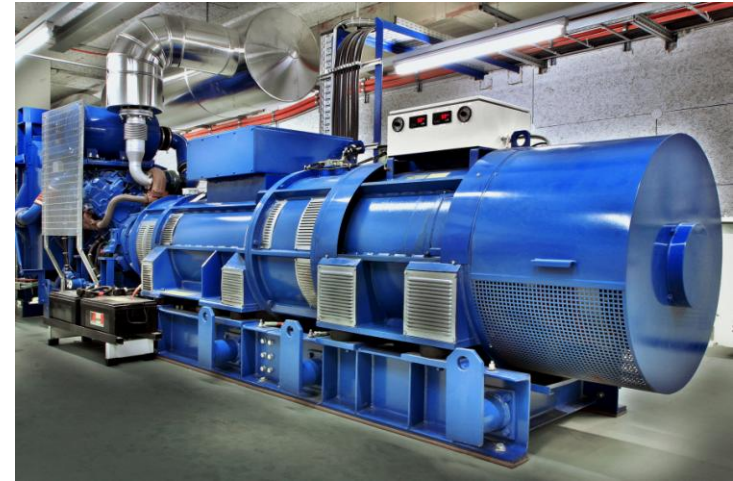
UPS-SYSTEMS



## General Hospital Linz

**1 x 150 kVA**  
**1 x 450 kVA**  
**1 x 630 KVA**  
**1 x 800 kVA**

**More than 10 MVA UPS power  
installed all over Austria.**



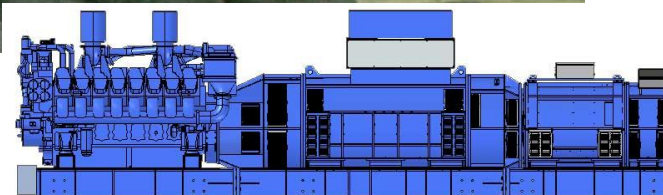
## Hospital Braunau

**1 x 350kVA**

# Austria



**Austrian Parliament Vienna:**  
**1 x 1225 kVA**







# Switzerland

UPS-SYSTEMS



Prodor Piaget SA Geneva  
1 x 850 kVA

Data Centre Bern  
3 x 2000 kVA



UPS-SYSTEMS



**International Airport Lefkosa**  
1 x 325 kVA

**International Airport Ljubljana**  
1 x 500 kVA

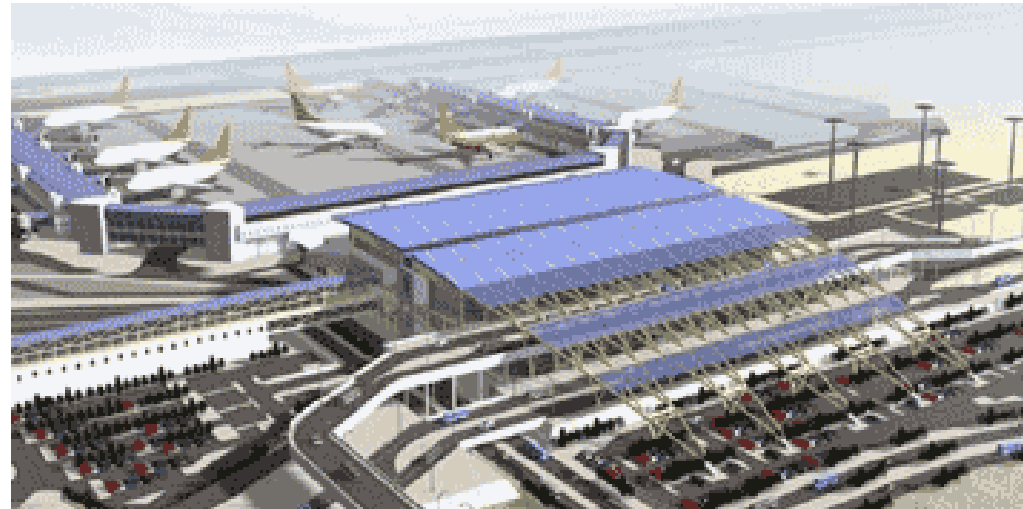


# Egypt & Malawi

**Reserve Bank Malawi - Blantyre**  
**1 x 1000 kVA (dual output)**



**International Airport Cairo:**  
**2 x 600 kVA**  
**2 x 800 kVA**



# Nigeria & Zimbabwe

UPS-SYSTEMS



**International Airport Lagos**  
2 x 250 kVA

**International Airports Harare and Bulawayo**  
2 x 200 kVA  
1 x 50 kVA





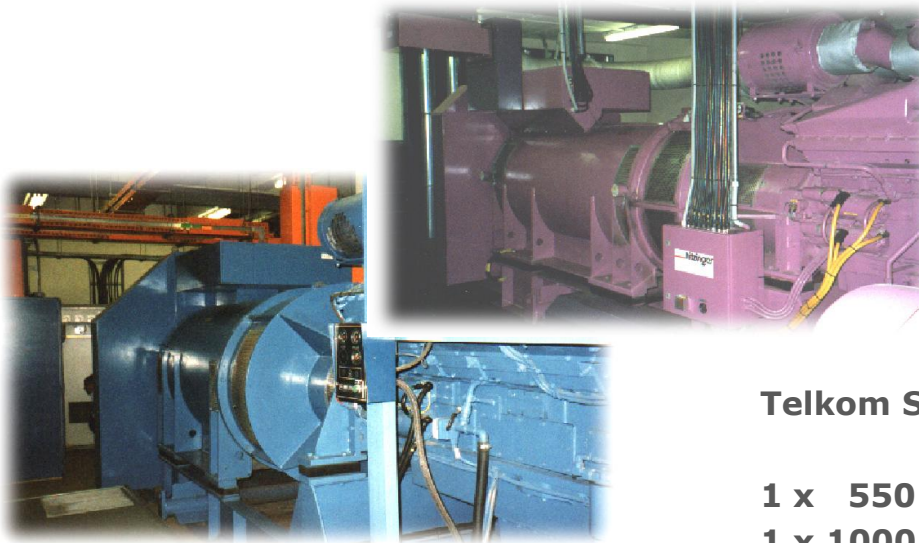
# South Africa



**Green Point Stadium – Cape Town**  
**1 x 1000 kVA + Genset 1000kVA as Backup**

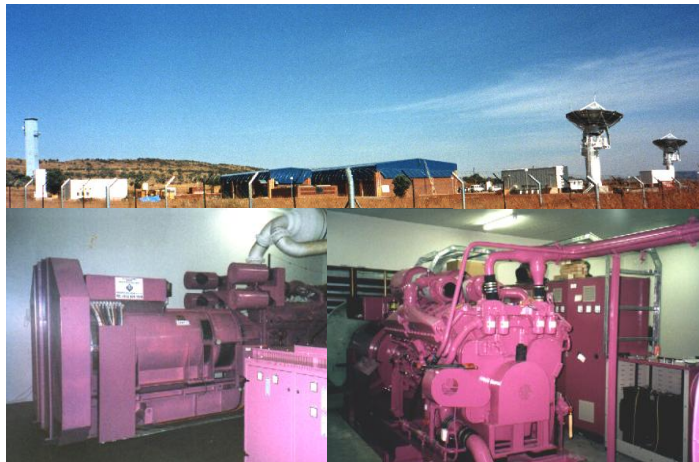


**Nelson Mandela Bay Stadium - Port Elizabeth**  
**4 x 550 kVA (dual output)**



## Telkom SA – Projects:

- 1 x 550 kVA
- 1 x 1000 kVA
- 2 x 800 kVA
- 2 x 1000 kVA
- 2 x 1500 kVA (dual output)
- 2 x 1500 kVA (dual output)
- 1 x 660 kVA (dual output)
- 1 x 1000 kVA
- 1 x 1000 kVA (dual output)
- 1 x 1000 kVA
- 1 x 750 kVA (dual output)





# Tanzania

UPS-SYSTEMS



**Bank of Tanzania**  
**4 x 2000 kVA**



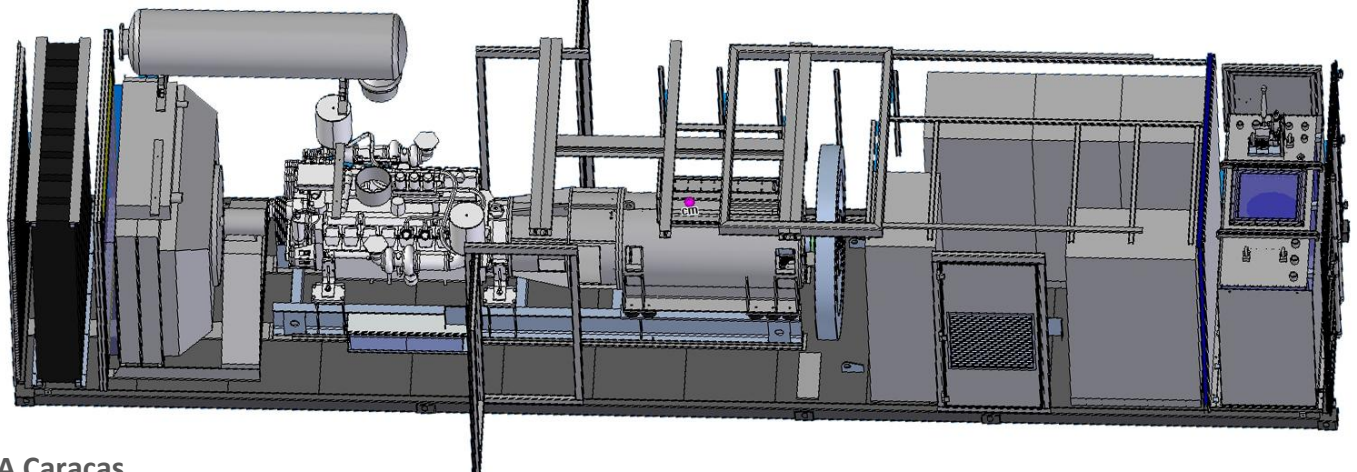


UPS-SYSTEMS



International Airport Cancun  
1 x 290 kVA (60Hz)

## UPS-SYSTEMS



Venefoil C.A Caracas  
1 x 1000 kVA (60Hz; dual output)



# Azerbaijan

UPS-SYSTEMS



International Airports  
Uch Kuduk & Baku  
2 x 300 kVA

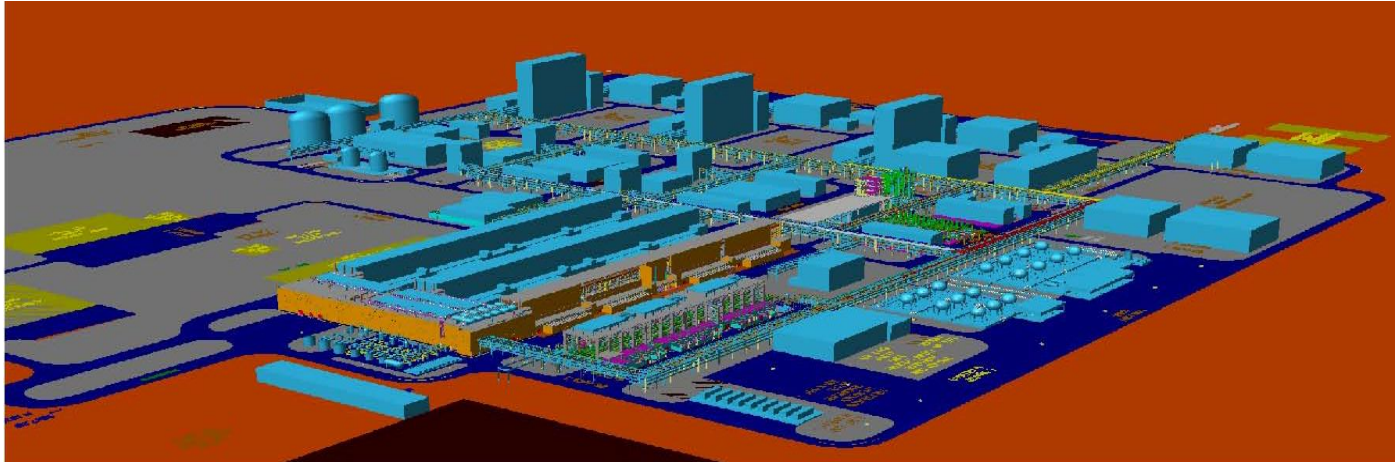






# China

UPS-SYSTEMS



**ITT – LDK Solar:**

**9 x 55 kW**

**9 x 90 kW**

**9 x 225 kW**

**9 x 500 kW**







**PVD Plast Mould Industries Ltd. \*\*Fiberweb (INDIA) Ltd:**  
**1 x 500 kVA**  
**1 x 1000 kVA**





## Various Hospitals:

**1 x 100 kVA**

**1 x 250 kVA**

**3 x 250 kVA**

**6 x 1000 kVA**

## UPS-SYSTEMS



**Avgol Ltd. Barkan**

**1 x 975 kVA**

**2 x 1000 kVA**

**3 x 1500 kVA (dual output)**

**4 x 1300 kVA (dual output)**





# Malaysia

UPS-SYSTEMS



**X-FAB - Kuching**  
**(previous 1st Silicon Waferfab Plant)**  
**4 x 1500 kVA**





## UPS-SYSTEMS



**Securities Commission Building, Kuala Lumpur**  
2 x 150 kVA USV

**Infineon Power Fab Kulim**  
6 x 2000 kVA USV (6,6kV)  
2 x 2250 kVA ESV (6,6kV)



**Prime Minister Office Putrajaya**  
1 x 1500 kVA (dual output)

## UPS-SYSTEMS

### International Airport Lahore:

1 x 200 kVA

1 x 250 kVA



### Adamjee Group:

1 x 500 kVA



# Russian Federation



**Moscow Government Central District:**  
**1 x 150 kVA**

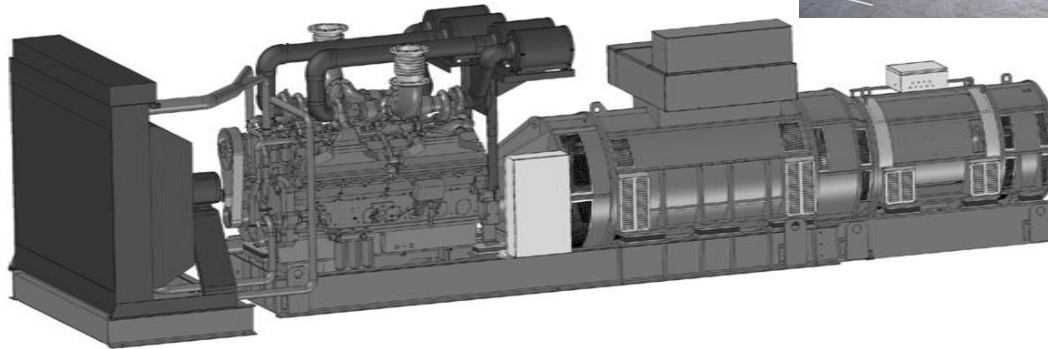
**Unicom Bank Moscow:**  
**1 x 250 kVA**

**Moscow Interbank Currency Exchange:**  
**1 x 500 kVA**



## UPS-SYSTEMS

**Siltronic Samsung PTE Ltd**  
**1 x 2000 kVA (dual output)**



### **STMicroelectronics:**

**2 x 2000 kVA (dual output)**  
**1 x 625 kVA (dual output)**  
**2 x 1500 kVA**  
**1 x 330 kVA (H-Vcon)**



# Taiwan

UPS-SYSTEMS



Veterans Hospital Taipei

2 x 400 kVA 60 Hz

2 x 600 kVA 60 Hz

UPS-SYSTEMS

**Royal Thai Air Force:**  
**1 x 120 kVA**



**VVIP Terminal – Suvarnabhumi Airport Bangkok:**  
**1 x 550 kVA**