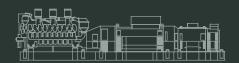


# DDUPS SYSTEMS

**U** POWER

Dynamic Diesel Uninterruptible Power Supply





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# DYNAMIC DIESEL UNINTERRUPTIBLE POWER SUPPLY



# POWER. ANYTIME. ANYWHERE.

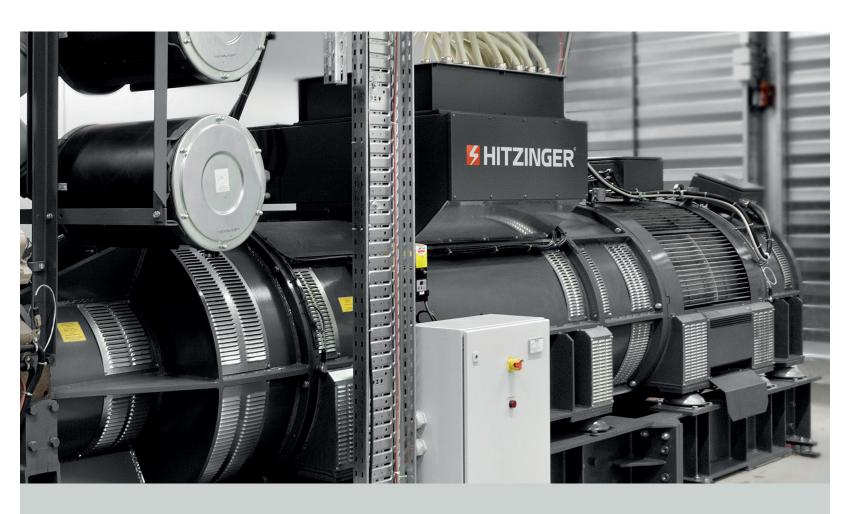
Life is made of power. In a world where continuous power supply is vital for the quality of services and success, the development of uninterruptible power supply systems requires the highest sense of responsibility, quality and efficiency.

For over 60 years, tailor-made power supply solutions have been the core of our experience. Constant innovations based on a wide range of in-house developments, demonstrate our full commitment and our deep passion for being the trusted partner when it comes to turnkey solutions in power supply security. Satisfied customers from all industries throughout the world prove us right: We are experts in our field and we ensure, that you've got the power. Anytime. Anywhere.

# **CONTENTS**

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5   Our Commitment

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# **SYSTEM**

The HITZINGER U POWER comprises five major components: the diesel engine, the electromagnetic clutch, the synchronous alternator, the kinetic energy storage module and the coupling choke. Four preconfigured systems form the basis of our solutions to meet your individual needs. With all major components built using our innovative power and experience, we are able to guarantee the highest levels of reliability, efficiency and flexibility.



# **FEATURES**

To ensure that our highest demands on efficiency and flexibility are met, the core components of our systems are completely designed and developed by our own engineers: the alternator, KIN module and control unit are 100% HITZINGER in-house developments. This enables us to achieve maximum levels of reliability and independence and sets new standards in the power protection industry. With full control over the development of our components, we are able to establish the highest levels of quality and flexibility as standard for all of our customers.



# **SUCCESS**

Our turnkey solutions include concept and design, development, manufacturing, testing and commissioning. You can trust in our experience, innovative power and reliabilty.

We are the preferred partner when it comes to clean, uninterrupted power supply. Thanks to our range of services, we can ensure smooth operation and maximum system availability.

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# 1 | FIELDS OF APPLICATION

#### HIGH-END SOLUTIONS TO MEET EVERY NEED

The world is turning faster every minute. Today's progressions in technology, information and mobility open possibilities for tomorrow that were still unthought of yesterday. New developments and the increasing pace of our everyday lives bring increased needs and demands in

flexibility, reliability and security in the field of efficent, clean, uninterrupted power supply. HITZINGER DDUPS Systems combine a maximum of possibilities in individual system configurations with the highest standards and requirements in quality and efficiency for all business sectors worldwide.







# DATA CENTRES, CORPORATIONS & BANKS

Our society depends on complex information systems. Network connectivity and data availability are the very foundation of our economic system. Private companies, data centres and financial institutions need to ensure constant operation.

HITZINGER DDUPS Systems guarantee clean, uninterrupted power supply for your facilities. Our individually optimised system configurations meet rigorous standards defined by the UPTIME institute, as well as the TIA-942 standard for TIER 1-4 standard installations.

# **TELECOMMUNICATIONS**

Today's media is the main source of information with a fast growing number and variety of broadcasting devices and channels. Live productions and highly important transmissions, in particular, require constant business operations and the highest possible quality broadcast signal.

HITZINGER DDUPS Systems protect TV, radio and telecommunications businesses from power interruptions or loss of connection quality, with maximum levels of efficiency and flexibility in their individual configuration options.

# AIRPORTS, ROAD & RAILWAY

People and businesses are moving further and faster every day. In order to manage the growing needs of traffic control and security systems, clean and uninterrupted power supply that is independent from external conditions is indispensable.

HITZINGER DDUPS Systems prove their reliability at airports, roads and railways around the globe to ensure stable operation of lighting systems, radars and communication systems, meeting common standards, such as CAT I, II, & III of the International Civil Aviation Organisation ICAO.

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# GOVERNMENT SECTOR

Confidentiality and security are the most important requirements for governments, military and police. All measures must be taken to guarantee constant availability of high-quality power in order to protect high-level communications, projects, operations and activities.

HITZINGER DDUPS Systems stand out, thanks to their perfect operation and usage throughout their lifespan, and require a minimum level of maintenance.

# HOSPITALS AND HEALTH-CARE INSTITUTIONS

The innovations of today's technology are capable of improving the quality of our lives. When it comes to healthcare, reliability and continuity are especially vital and can have an immediate impact on human life.

HITZINGER DDUPS Systems eliminate any potential losses in supply vulnerabilities and provide clean, uninterruptible power supplies for monitoring systems, treatment rooms, intensive care units, emergency units, research units, robots and many more.

# **INDUSTRY**

Highly developed and specialised industrial sectors, such as the chemical, pharmaceutical, semiconductor or manufacturing industries, rely on sophisticated, sensitive and complex processes. Even a brief loss of power can result in contamination and production losses. Thus downtimes can have major financial impacts.

HITZINGER DDUPS Systems provide clean, uninterrupted power to eliminate costly downtimes and provide very high mean time between failures (MTBF) to ensure maximum availability for critical loads.

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# 2 | BASIC SYSTEMS

# IT POWER: **NBDK** SYSTEM

The HITZINGER NBDK System provides reliable uninterruptible power supply with high availability and quality. The kinetic energy module, alternator and coupling choke work together to provide power conditioning and ride-through energy for the DDUPS system, whilst the diesel engine ensures the long-term back-up in the event of a mains failure.

# INDUSTRIAL POWER: NBDD SYSTEM

The HITZINGER NBDD System offers a rigid steel flywheel that is directly mounted on the alternator shaft. Stored energy from the flywheel is used to bridge the time until the diesel engine is able to supply and take over the consumers during a mains failure.





# **FEATURES**

- ightarrow Single UPS unit rating up to 3000 kVA
- → System configuration rating up to 50 MVA
- → Input frequency 50/60 Hz
- ightarrow Medium-voltage systems up to 24 kV
- → Direct generated voltage up to 11 kV

# TOLERANCES DURING A MAINS FAILURE

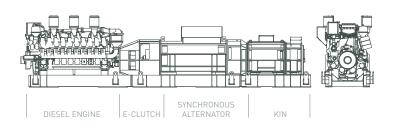
- → Frequency: ± 1%
- → Voltage: ± 5%

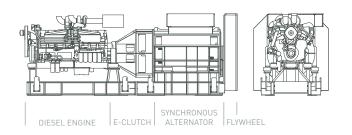
# **FEATURES**

- → Power rating 100 1000 kVA
- $\rightarrow$  Voltage up to 11 kV
- → Input frequency 50/60 Hz

# **TOLERANCES DURING A MAINS FAILURE**

- → Frequency: ± 5%
- → Voltage: ± 5%





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# PUMP POWER: **NBAP** SYSTEM

# CLEAN POWER: HPCON SYSTEM

The HITZINGER NBAP System is directly connected to a rotating machine, e.g. a pump. In the event of a mains failure, the diesel engine starts up and takes over the drive of the rotating machine. HITZINGER Dynamic Power Conditioners are used to ensure a continuous high-quality consumer supply and prevent downtimes in critical processes. The Power Conditioner System guarantees extremely low tolerances in both voltage waveform and value in the event of mains disturbances.





# **FEATURES**

- → Power rating 50 800 kW
- → Voltage up to 11 kV
- → Input Frequency 50 / 60 Hz

# **FEATURES**

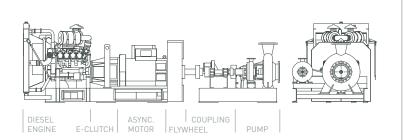
- ightarrow Power rating 100 2500 kVA
- $\rightarrow$  Voltage up to 11 kV
- → Input frequency 50/60 Hz

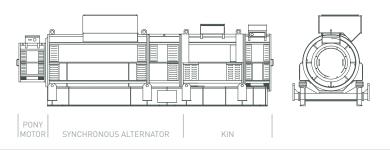
# TOLERANCES DURING A MAINS FAILURE

→ Rotating speed variation: max. 5%

# **TOLERANCES DURING A MAINS FAILURE**

- $\rightarrow$  Frequency: ± 1%
- → Voltage: ± 5%

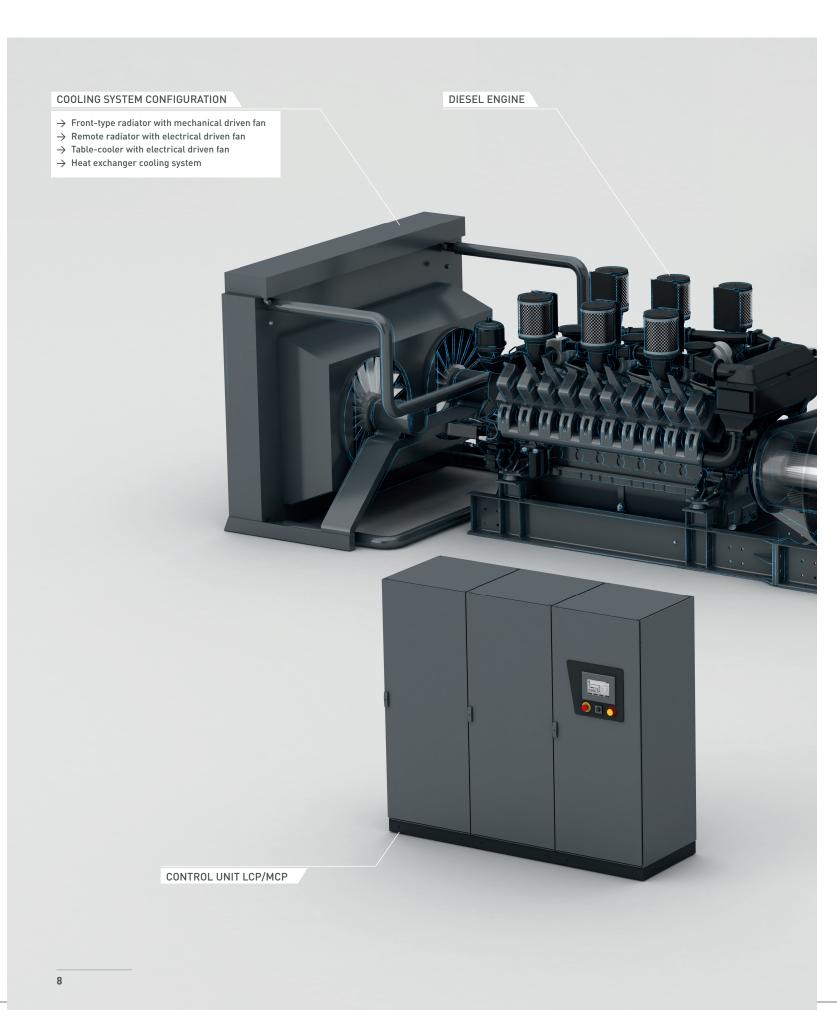




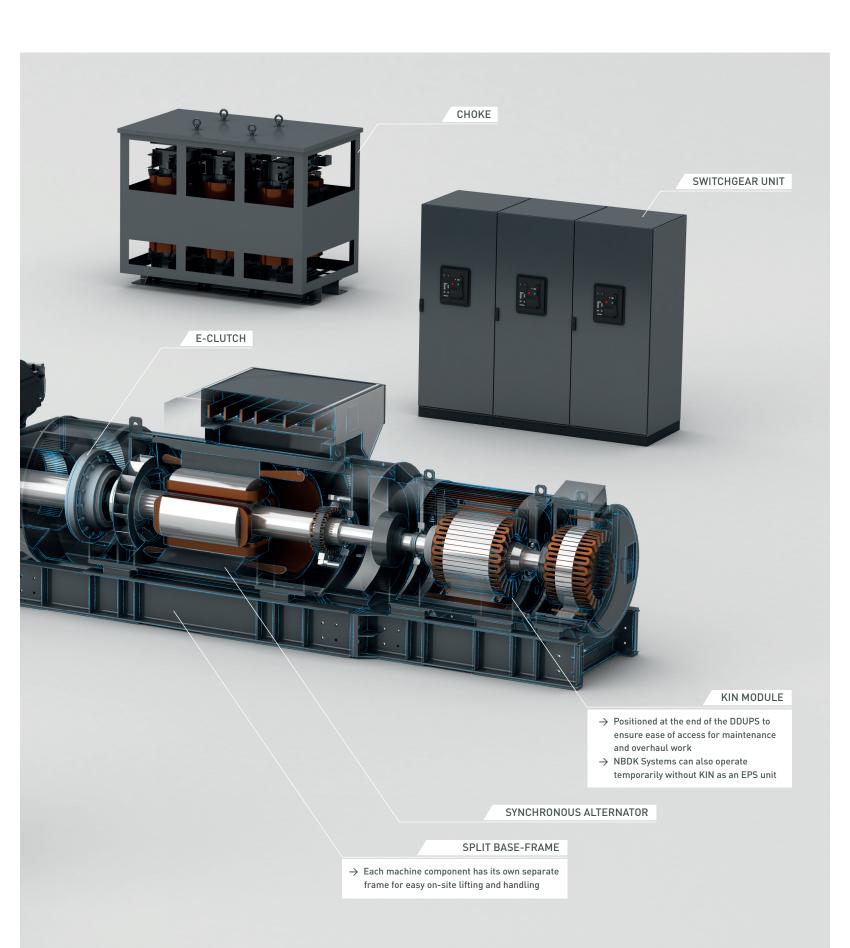
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# 3 | THE SYSTEM



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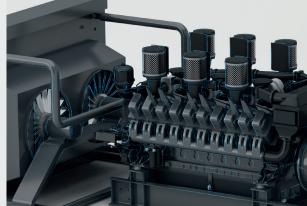


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# 3.1 | MAIN PARTS

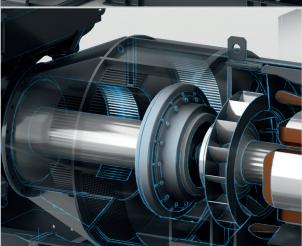
#### DIESEL ENGINE AND COOLING

Thanks to the use of heavy-duty turbocharged 4-stroke diesel engines (from reputable manufacturers such as MTU, CUMMINS and DEUTZ), we meet the high demands of engine performance and guarantee global service. These diesel engines are capable of handling specified overload to ensure long-term operation, even in the harshest environment.



# **ELECTROMAGNETIC CLUTCH**

The electromagnetic clutch combines the advantage of a frictionless system in stand-by mode with the smooth power transfer in case of diesel operation. The magnetic coils of the clutch are not in motion, therefore no brush holders, brushes or slip rings are necessary. The clutch is equipped with special long-life friction linings. Slippage control and clutch monitoring is provided within the local control panel.



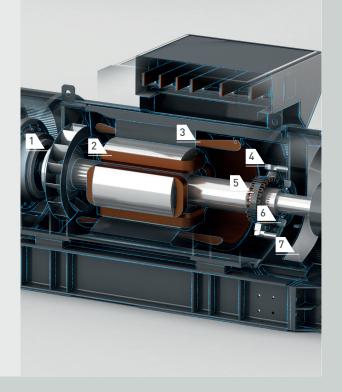
# SYNCHRONOUS ALTERNATOR

The synchronous alternator is designed as a brushless and low-reactance machine. Stator and rotor cores are made of laminated magnetic sheet steel. The rotor is shrunk onto the key shaft and is equipped with damper winding for unbalanced loads and for parallel operation. The rotor coils are secured against centrifugal forces by banding or winding supports.

The winding insulation is made of non-hygroscopic, non-tracking materials to withstand severe thermal conditions.

All windings are vacuum-pressure-impregnated with single-component resin. The winding head is also protected against severe environmental influences.

- 1 BEARING DE
- 2 ROTOR WINDING
- 3 STATOR WINDING
- 4 EXCITER STATOR
- 5 EXCITER ROTOR
- 6 BEARING NDE
- 7 FLYWHEEL MASS

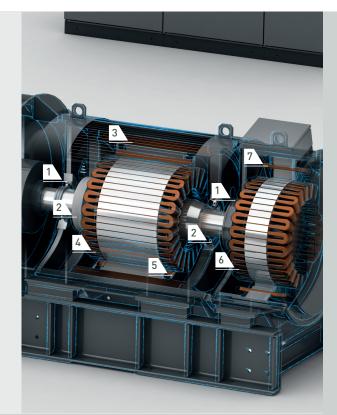


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# KIN MODULE

The kinetic energy storage module (KIN) consists of two rotating parts: the inner and the outer rotor. The outer rotor, equipped with a squirrel cage, rotates at 2750 rpm and runs freely on the shaft of the inner rotor. The inner rotor, equipped with a specially designed winding, is rotating at a synchronous speed (1500 or 1800 rpm), coupled via a flexible coupling to the synchronous alternator. In the event of a mains failure, the magnetic field of the inner rotor brakes the outer rotor and keeps the speed of the synchonous alternator constant via an electronic control unit. The kinetic energy stored in the KIN provides the UPS load until the supply through the diesel engine can be assured.

- 1 OUTER KIN BEARING
- 2 INNER KIN BEARING
- 3 OUTER ROTOR MASS
- 4 INNER ROTOR (AC/DC WINDING)
- 5 SQUIRREL CAGE
- 6 EXCITER ROTOR
- 7 EXCITER STATOR



# **CONTROL & SWITCH GEAR UNIT**

HITZINGER offers a complete information software package for monitoring and control for the U POWER Systems through serial interfaces over a network, intranet or remote connectivity. Real-time operational information and historical data and events are fully available. Data can be presented in tailored touch panels, displaying electrical and mechanical schematic diagrams with an overview of the system operating elements. The control unit provides tailored data reports for event logging and allows future operation requirements to be forecast by trend analysis of loads, etc. The software is an efficient tool, simple and easy to handle.

## **CHOKE**

The coupling choke connects the input grid supply with the highquality output supply. It allows large input voltage variations and keeps the consumer supply stable at nominal values. The special design of the choke provides a high degree of decoupling in both directions beween the input and the output.





**HITZINGER** 

# 3.2 | CONTROL & SWITCH GEAR UNIT



# **CONTROL & SWITCHGEAR**

HITZINGER offers complete medium or low voltage switchgear configurations, either from our own production or from reputable manufacturers, and information software packages that are in line with our high quality standards.



# **REAL-TIME DATA**

Real-time operational information, historical data and events are fully available. Data can be presented in tailored displays, showing individual electrical, mechanical and mimic diagrams with an overview of the entire system.



# **EFFICIENT TOOLS**

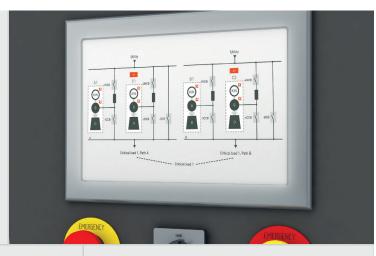
The state-of-the-art in-house developed HITZINGER control unit provides current and historical data reports for event logging and allows future operation requirements to be forecasted by trend analysis of loads etc.

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# **TOUCH PANEL**

The user-friendly HITZINGER 15.4" colour touchscreen panel enables the operator to access all electrical and mechanical measurements of the DDUPS unit as well as the status, settings and adjustments of the entire system.



# Customer Care Centre WAN Remote Interface WAN Remote Interface Internet WLAN Remote Interface (tablet, smartphone,...) Customer LAN LAN Remote Interface (notebook, computer) User Interface USB memory stick Ethernet Port TCP/IP (RJ45), Profinet, Modbus Master Control Panel (MCP) Local Control Panel (LCP) DDUPS1, DDUPS2, etc.

# MAXIMUM FLEXIBILITY

With HITZINGER's intelligent control system you have numerous ways to monitor and control your DDUPS.

#### INTELLIGENT FEATURES

- → Higher levels of reliability thanks to a redundant master control unit configuration
- → Pre-configured system for all applications
- → The software customisation function improves the high level of equipment availability in your installation
- → Display of operating hours, service and maintenance request
- ightarrow Load control and load sharing (kW and kVAr)
- ightarrow Web-based secure remote monitoring

# COMMUNICATION PROTOCOLS

- ightarrow Ethernet TCP/IP
- $\rightarrow$  Modbus
- $\rightarrow$  Profibus
- $\rightarrow$  CANopen
- → SMS/GPRS via GSM
- ightarrow Others on request

# MONITOR & CONTROL

- ightarrow Detailed management of alarms
- ightarrow System mode information
- → CB status information
- → Different language and time settings

HITZINGER

# 3.3 | CHOKE





# **HIGH POWER**

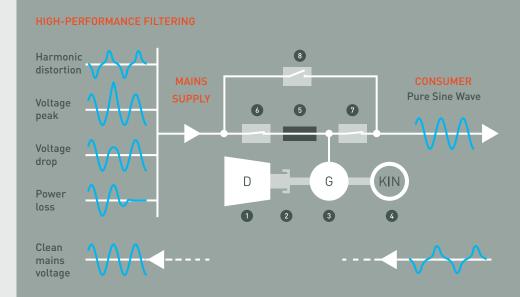
Within a UPS system, the coupling choke connects the input grid supply to the high-quality output supply. It allows large voltage differences between both AC systems by means of reactive currents in any direction, independent of the active power flow. The special design of the choke provides a high degree of decoupling between the input and output.

# **ADVANTAGES**

- → Static and transient voltage decoupling of the input mains and the UPS bus
- → Harmonic filtering
- → Input load levelling irrespective of 100% unbalanced output load
- → Input power factor correction >0.98 from 0 – 100% load at nominal voltage
- → Naturally cooled
- → Tropicalised vacuum-pressureimpregnated layer varnish
- → Temperature monitoring of each coil

# FAIL-SAFE

In the event of input short circuit, the current flow towards the grid network is limited by the choke to < 200 % nominal current until the input is disconnected. During this transient status, the coupling choke maintains a stable UPS bus voltage. The current feed back to the mains is reactive, which ensures that all the stored kinetic energy can be fully utilised for the critical load.



#### TWO-WAY CONDITIONING

The HITZINGER U POWER not only filters the voltage for consumers, but also filters the mains voltage reversely (THD <= 3%).

- 1. Diesel engine
- 2. Electromagnetic clutch
- 3. Synchronous machine
- 4. Kinetic energy module
- 5. Coupling choke
- 6. Mains CB
- 7. Consumer CB
- 8. Bypass CB

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# 3.4 | WORK & ENERGY FLOW

# **U** POWER

# REACTIVE POWER KVAR → Bypass circuit-breaker closed ightarrow Diesel engine starts → KIN module charging → Synchronisation to mains ("Make before break") → Consumer load transfer via choke $\rightarrow$ Diesel engine shut down > Supply of the consumer load via choke from mains, Mains operation synchronous machine in motor operation Mains input ightarrow Synchronous machine acts as filter and balances stable voltage and reactive power between mains and consumers ightarrow Filtering of harmonics and balancing of asymmetric loads Mains power failure → Mains circuit-breaker opens ightarrow KIN module keeps the load supplied without interruptions ACTIVE POWER KW → Simultaneous start of diesel engine REACTIVE POWER KVAR $\rightarrow$ Electromagnetic clutch closes → Load transfer from KIN module to synchronous alternator ightarrow The diesel engine and the alternator supply the UPS load Diesel operation ightarrow Energy is also transferred to the kinetic module (to charge the KIN module and compensate the losses) REACTIVE POWER KVAR ightarrow Diesel engine provides UPS supply and charges KIN module → Mains within permitted tolerances for a certain period Mains return ightarrow Synchronisation of the consumer load back to mains ACTIVE POWER KW → Electromagnetic clutch opens REACTIVE POWER KVAR ightarrow Shutdown of diesel engine after cooling-down period REACTIVE POWER KVAI → Bypass circuit-breaker closes → Mains and consumer CB's open ightarrow Machine runs down FRICITON LOSSES

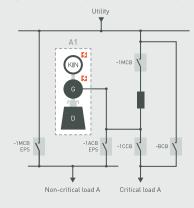
# 3.5 | SYSTEM CONFIGURATIONS

The possibilities are endless. In addition to a comprehensive basic system configuration, we provide different system layouts according to our customers' expectations for secure power supplies. Based on standard configurations, we offer a variety of additional configuration options for all versions of our DDUPS System. All of our systems can be configured to suite different classification levels (TIER standards).

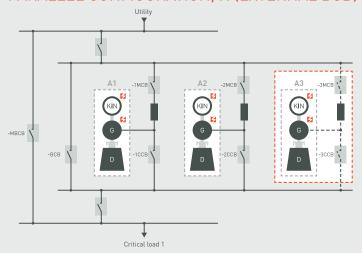
# TIER LEVELS IN COMPLIANCE WITH UPTIME INSTITUTE

	TIER I	TIER II	TIER III	TIER IV
Components & Redundancy	N	N + 1	N + 1	2 ( N + 1 )
Number of Distribution Paths	1	1	1 active and 1 alternative	2 simultaneously active
Concurrently Maintainable	No	No	Yes	Yes
Fault Tolerance	No	No	No	Yes

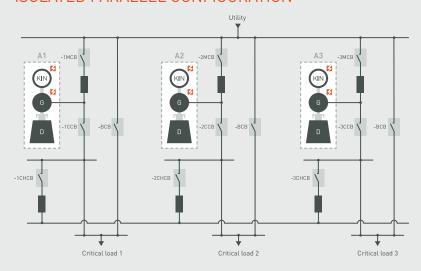
# SINGLE CONFIGURATION, UPS+EPS



# PARALLEL CONFIGURATION, N (EXTERNAL BCB)



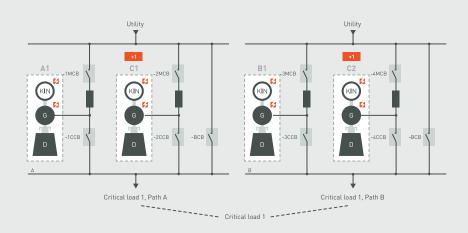
# ISOLATED PARALLEL CONFIGURATION



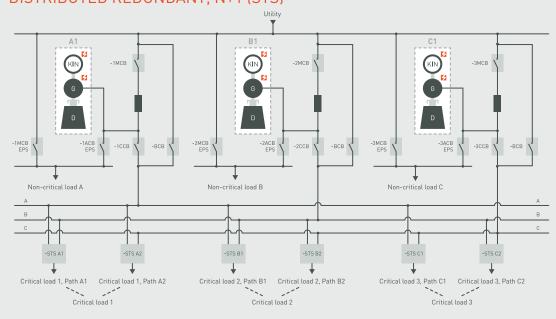
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# PARALLEL REDUNDANT CONFIGURATION, A+B Utility A A1 1MCB A2 29MCB B3 3MCB B4 3CB A3 3CCB B 4 3CCB B 5 3CCB Critical load 1, Path A Critical load 1, Path B

# ISOLATED PARALLEL REDUNDANT CONFIGURATION, A+B



# DISTRIBUTED REDUNDANT, N+1 (STS)



HITZINGER

# 3.6 | FEATURES & BENEFITS



# VERSATILITY IN AUTOMATION

With every new installation, we concentrate on achieving the highest level of efficiency, not only from the system, but also from our cooperation with our customers. A maximum level of flexibility in system configurations sets no limits to your requirements. Exceptional load handling and low maintenance costs, maximum autonomy and a low footprint: We make it happen. Anytime. Anywhere.

- → Power rating tailored to specific project requirements
- → Support of consultants and preparation of specifications
- → Turn key installation of all project specific electrical and mechanical devices
- → Splitted base-frame: each machine component on it's separate frame for easy on-site lifting and handling
- ightarrow Maximum autonomy

- → KIN module position at the end of the DDUPS for easy maintenance and overhaul access. NBDK Systems can also operate without KIN temporarely as EPS unit.
- ightarrow Double service life of static UPS
- → Exceptional load handling
- → No environmental conditioning required
- → Low maintenance costs
- → 10 year overhaul intervals

- → Low footprint, maximising plant room space
- ightarrow Battery less
- → No input and output harmonic distortion
- ightarrow Exceptional load handling
- $\rightarrow$  Input power factor > 0.98
- $\rightarrow$  Voltage range up to 11 kV
- → High efficiency up to 97 % (Green solution)
- → Single unit rating up to 3000 kVA

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# 3.7 | **OPTIONS**

# **U** POWER

Thanks to the availability of optional equipment, we are able to offer solutions to meet every individual need, such as directly generated medium voltage, cooling variants or installation methods.

- → Medium voltage synchronous machine
- $\rightarrow$  Manual bypass
- → Automatic greasing of all bearings
- → Continuous system vibration monitoring
- → Front-type radiator with mechanical driven fan
- → Remote radiator with electrical driven fan
- → Table cooler with electrical driven fans
- → Heat exchanger cooling system
- → Automatic lubricant refill for the diesel engines
- → Remote monitoring

- → Different industrial communication protocols
- → Extended warranty
- → In-house and on-site training
- → Analogue gauges
- → System configuration according to TIER

#### REDUNDANT DIESEL ENGINE START-LIP

# Speed (rpm) 2700 Speed of kinetic energy storage Alternator speed Original Redundant engine start start

#### ODIGINAL STADTING PROCEDURE

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

#### ALTERNATE REDUNDANT STARTING PROCEDURE

- $\rightarrow$  Electromagnetic clutch closes
- → Diesel engine acceleration by KIN module to nominal speed

#### **DESIGN**

We offer a wide range of design variants, such as sound-insulated containers, modular housings (built onsite), and tropicalized versions to meet local noise and climate conditions.

#### **VARIANTS**

- → Indoor stationary installation
- → Drop over indoor canopy
- $\rightarrow$  Container solutions
- ightarrow Canopy installations
- ightarrow Soundlevel limit based on costumer specification



HITZINGER

# 4 | OUR SOLUTION



# FROM CONCEPT TO FINISH

With more than 60 years of experience in tailored power supply solutions, we are the preferred global partner when it comes to indiviudal turnkey solutions. And we know why: Insights and developments from all divisions blend in our unique approach of working and enable us to deliver and fully concentrate on vital, relevant solutions. In the development and construction of generating sets, alternators or converters, as well as in the fields of airport technologies: we ensure innovation, value and service. Customized. Straight to the point.

From the very first steps, we work with our customers on a foundation of cooperative partnership. You are the experts, when it comes to defining your needs and we are the experts, when it comes to exceeding these needs to the best results. We consult, support, refine and develop unique solutions for unique customers. We design, develop, manufacture, install and offer service for our systems, always aware of the primordial need defined. We are your strong partner, from concept to finish. And beyond.

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# **CONCEPT & DESIGN**

Individual requirements demand individual planning right from the start. Our know-how and experience form the basis but never a complete solution to all challenges. Only with joint forces we can meet the individual demands that arise from each project. We work with our customers to consult, calculate, project and design their very own solution.

# **DEVELOPMENT**

To meet individual requirements effectively, we guarantee efficient and structured execution of all projects, from the project order, milestone plans, risk analyses and a standardised reporting system, through to the complete documentation of the project. Our consistent approach is an indispensable basis for our quality assurance and the continued further development of our customer service.



# MANUFACTURING & ASSEMBLING

HITZINGER DDUPS Systems guarantee 100% Austrian development quality. From generator winding to control and distribution cabinets and electronic monitoring devices, from the assembly to the installation of the complete system: Each step in the production process is carried out by our own, highly qualified team using state-of-the-art machinery and processes.



# FACTORY TESTING

Each project and system is put through an intensive and comprehensive testing process before delivery. Qualification acceptance is carried out by our experienced professionals. Our intensive internal tests can reduce the on-site commissioning time to a minimum. No system will ever leave our plant without receiving the seal of quality from our testing department.



# COMMISSIONING

Our specialists in transport, installation and commissioning know how to set up a system smoothly and professionally. Regardless of how big the challenges are that arise from our customers' requirements, our skilled professionals guarantee reliability, proactivity and dedication. Once the system is commissioned, maintenance and operation manuals will be provided together with the as-built drawings.



HITZINGER®

# 5 | OUR COMMITMENT



# **OUR COMMITMENT TO YOUR NEEDS**

As the leading expert in the field of uninterruptible power and standby power supply, it is our commitment to fully understand our customers needs in all fields of operation and ensure the highest level of operational safety. This can only be achieved with high-quality continuous service measures and tests.

# HIGH-QUALITY SERVICE FOR UNINTERRUPTED SAFETY

Our rapid response teams are reliable, fast and precise. Their only job is to solve any problem you may have, anytime, anywhere. In our range of services, we are setting new standards in maintenance, delivery of spare parts, inspection, repair and at the help desk. Our hotline offers emergency assistance 24/7. Thanks to the simple access to system profiles, service preparations and maintenance work can be carried out immediately in detail while all expert opinions can be involved.

Our engineers are on duty around the clock, guaranteeing fast and comprehensive support. Our training and further education opportunities for our customers' employees round off our service offer and support smooth operation and maximum system availability.

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# **EXPERIENCE**

Our strength in constantly developing perfect solutions is based on our broad and specialist experience in every field of the power supply industry. We have been developing turnkey solutions for over 60 years. We know what we are doing. And we do it right. Making us the trusted partner for all our customers.



# **GLOBAL**

Thanks to our global network of offices, subsidiaries and partners, we are a world leader in individual power supply systems. Wherever our customers are, we are present, supplying just the right solutions: From consulting to installation and maintenance. We are at your service. Anytime. Anywhere.

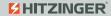


# **FLEXIBILITY**

The wide range of HITZINGER solutions in the field of power supply systems and our open DDUPS Systems allow a maximum level of flexibility when it comes to meeting individual needs.

Every installation of a HITZINGER DDUPS System is unique and stands for 100% tailor-made Austrian craftsmanship.





FOR OVER 70 YEARS EXPERIENCE, QUALITY, EFFICIENCY AND DURABILITY HAVE BEEN THE FOUNDATIONS OF OUR SUCCESS. COUNTLESS INDUSTRIES THROUGHOUT THE WORLD PLACE THEIR TRUST IN US TO PROTECT AND POWER THEIR BUSINESSES AT EVERY MOMENT OF EVERY DAY.

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