

Industrial Batteries / Network Power

Restore 500



»Containerized Energy
Storage System«



ReSTORE 500

Restore 500

Shaping the future through energy

Restore 500 – The future of energy storage

The growing integration of renewable energy into the electrical grid creates new challenges to grid operators as well as producers and consumers of electrical energy. Renewable energy sources are highly volatile, and the power generation from wind or sun cannot be controlled. Therefore, energy might be generated when there is no consumption or there will be consumption when no renewable energy is available.

Battery energy storage solutions can play a major role in compensating this imbalance and its related costs. GNB[®] Industrial Power has developed Restore 500, a modular „Plug & Store“ energy storage system that helps to control energy from renewables and stabilizes the power generation and consumption.

The Restore 500 series is a turn-key solution for easy transportation and installation. The planning and execution schedules can be significantly reduced thanks to the modular and standardized assembly. GNB's integrated Battery Management System continuously detects and evaluates relevant battery data to operate the battery in partial state of charge - this ensures a significant reduction of total cost of ownership of the overall system.

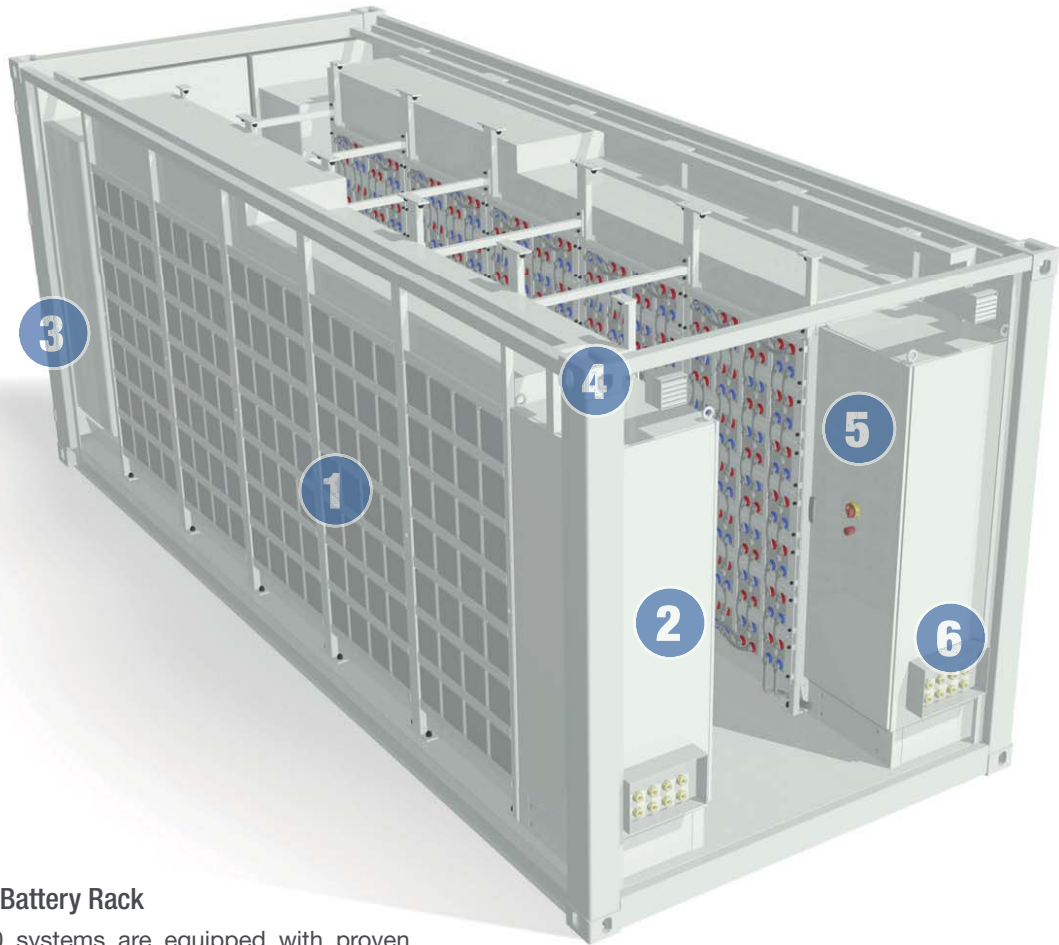
Restore 500 is the right choice for applications such as Hybrid & Green Deployment, Grid & Power Quality, Renewable Energy Management, or Back-up Power (UPS).

Benefits

- > **„Plug & Store“**
Turn-key solution, easy to install on customer site
- > **Standardized and certified design**
Standardized building blocks fulfilling all norms for battery rooms, certification according to CE, UL and TÜV
- > **Ready for worldwide use**
Fulfills all requirements for transport, auxiliary voltage and climatisation
- > **Extended cycle life**
GNB[®] battery management algorithms to maximize battery life
- > **Reduction of investment cost**
Advanced lead-acid batteries enable maximum performance at minimum invest costs.
- > **Optimization of operating cost**
Significant reduction of total cost of ownership through integration of the cost optimized and durable Restore 500
- > **Environmentally friendly and sustainable**
Recyclable and energy efficient production

Drawing and system description

3000 cycles
all-in-one system
 No assembly on site

**1**

Batteries & Battery Rack

Restore 500 systems are equipped with proven dryfit® Gel batteries, which were developed specifically for applications where high energy throughput and cycling is required.

2

Battery Monitoring and Management System

Optimized charging and control algorithms will maximize the high cycle life of the GNB batteries and ensure an optimal performance of the system.

3

Climate Control

The climate control ensures optimal and controlled operating temperature of the cells even at harsh environmental conditions.

4

Ventilation

The ventilation system is designed according to DIN EN 50272-2 which defines the safety standards for batteries.

5

Monitoring and Control Unit

Peripheral equipment such as uninterruptible power supply, circuit breaker and communication infrastructure are included in the electrical cabinets.

6

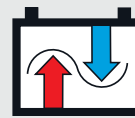
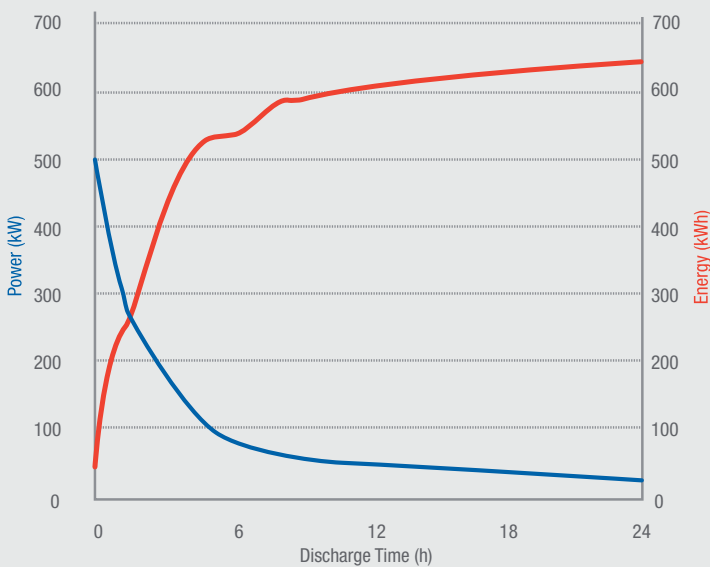
Connection Unit

Restore 500 can be connected easily to the complete system due to „Plug & Play“.

Specifications

Dimensions	20-foot Standard Sea Container (Length 6.06 m x Width 2.44 m x Height 2.60 m)	
Weight	27 t (Fully assembled system is transportable via road and ship)	
Battery voltage	560 V (Voltage adjustment possible)	
DC voltage range	476 V to 756 V (Voltage adjustment possible)	
Auxiliary AC voltage	88 V to 260 V, 50 Hz – 60 Hz, 1 Phase	
BMS	Integrated Battery Monitoring and Management System	
DATA storage / logger	Up to 8 GB local, additional centralized data storage over via reliable data communication such as e.g. VPN	
UPS System	Integrated uninterruptible power supply	
Communication	VPN communication, IPsec, Modbus TCP IP/ UDP, Modbus RTU / ASCII, CAN, Profibus, RS232 und RS485	
Environmental conditions	Outside temperature: -20 °C to +44 °C	
	Height above sea level 3500 m	
	Optional:	Ambient temperatures of -40 °C to +56 °C possible Protection against harsh environmental conditions such as e.g. dust, sand and spin drift etc. Up to 4500 m above sea level
IP protection class	IP 44	

Restore 500 mit A602 1130 Solar*



3000+ cycles*
at 60% DoD
C₁₀



Recyclable



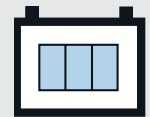
Valve regulated
lead-acid
batteries



Proof against
deep
discharge



Maintenance-
free (no
topping up)



Tubular plate

* Final discharge voltage 1.6 Vpc (Volt per cell)

** With IUI charging, at 20 °C

Restore 500 Applications

+ + + Hybrid & Green Deployment

Optimising or replacing diesel generators
Grid stabilisation
Grid building



Combining and optimising different power sources and storage devices to reduce operating costs and CO₂ footprint.

TELECOM

OIL & GAS

MINING

REMOTE COMMUNITIES

+ + + Renewable Energy Management

Own consumption
Generation smoothing
Ramp rate control



Improve and increase the integration of renewable energy sources into the existing grids to enhance CO₂-free power production and make renewable energy more controllable.

RESIDENTIAL, COMMERCIAL & INDUSTRIAL

POWER PLANT

+ + + Grid & Power Quality

Grid stabilisation
Peak shaving
Control power
Intra day



Ensure the availability and quality of the electrical grid. Stabilize frequency and voltage and reduce the requirement for grid extension. Balance power production and consumption at different grid levels.

TRANSMISSION SYSTEM OPERATOR

DISTRIBUTION SYSTEM OPERATORS

POWER PLANT

+ + Back-Up Power (UPS)



Ensure your operation runs 24/7, even during periods with limited or weak energy supply.

TELECOM

OIL & GAS

ENERGY

SECURITY

+ ON-GRID

+ SMART GRID

+ OFF-GRID



Exide Technologies, with operations in more than 80 countries, is one of the world's largest producers and recyclers of lead-acid batteries. Exide Technologies provides a comprehensive and customized range of stored electrical energy solutions. Based on over 120 years of experience in the development of innovative technologies, Exide Technologies is an esteemed partner of OEMs and serves the spare parts market for industrial and automotive applications.

GNB Industrial Power – A division of Exide Technologies – offers an extensive range of storage products and services, including solutions for telecommunication systems, railway applications, mining, photovoltaic (solar energy), uninterrupted power supply (UPS), electrical power generation and distribution, fork lifts and electric vehicles.

Exide Technologies takes pride in its commitment to a better environment. An integrated approach to manufacturing, distributing and recycling of lead-acid batteries has been developed to ensure a safe and responsible life cycle for all of its products.

GNB® INDUSTRIAL POWER devises enduring energy concepts that convince with efficiency, flexibility and profitability.