

Hybrid Battery Storage



Energy Storage



SmartGrid ready



Sustainability

The **flexible hybrid energy storage family**: energy storage and UPS protection for Commercial & Industrial applications.

10-800 kVA



HBS
Hybrid Battery Storage

HIGHLIGHTS

- **Compatible with On Grid and Off Grid solutions**
- **Hybrid Energy Storage system: grid + renewable**
- **Quality power supply to loads with the integration of renewable energy**
- **Peak shaving and load management**
- **Grid services**
- **UPS Protection**
- **Eco sustainability**

Global energy requirements, consumption and prices are increasing. The continued supply of electricity to meet these requirements can no longer be guaranteed. After years of intensive research and extensive experience in power control and battery solutions, **the Hybrid Battery Storage (HBS) range is here; "Made in Italy", the product is a multi-functional, high flexible Energy Storage System (ESS)+UPS system.**

In combination with renewable energy (e.g., Solar inverters), each kWh produced from renewables will be fully used (100%) to supply the connected load, battery installations, subnetwork or to provide grid services. If requested nothing of this green energy production will be injected in the local Grid.

This is the Riello way to reduce the

energy production coming from fossil or nuclear energy plants. Thus, reducing CO₂ emissions.

HBS can be used for decentralized grid applications. In combination with wind or any other green energy source; HBS can store the green energy production during a possible overproduction and use this green energy storage during an possible underproduction. There is no need to add extra electricity lines, it uses the existing infrastructure so there's no additional Capex.

Generating your own energy offers protection against fluctuating electricity costs. The intelligent solution works with various energy prices per kW, and thanks to HBS, it is possible to analyse these prices and choose the most economical for the periods where you need to buy electricity.

The embedded UPS technology offers the best and highest possible protection level to avoid electrical problems. The connected batteries offer a backup protection time from many minute to multiple hours during a power failure. More electrical cars (EV) mean higher energy demand. The actual electrical grid is partly not adapted for this new demand of energy. The HBS has the unique advantage to produce a huge energy request by a mix of different energy with

renewable (PV, Wind) + batteries + Grid. This is manageable over the open-source controller of HBS, e.g. a simple internet connection. Depending on different parameters (Solar installation, type of batteries, price per kWh, UPS Power, country of installation, energy profile), the HBS offers a possible ROI between 2 to 10 years. Those above are just few example of many solutions enabled by the HBS series.

THE HYBRID BATTERY STORAGE WORKING PRINCIPLE

Hybrid Battery Storage is a real energy gateway, optimizing the concept of energy management; capable to accept energy from multiple sources and to transfer or return it in order to implement the application to be served, including grid services.

The Hybrid Battery Storage by Riello is the first smart grid enabler.



WHAT THE HYBRID BATTERY STORAGE DOES:

- **Peak Shaving**

HBS to reduce or eliminate load peaks using battery power. The battery charging is during low load period.

- **Load shifting**

HBS to store and discharge power at selected times allowing the shifting of power away from higher tariff periods.

- **Renewable optimization**

HBS to optimize the renewable energy consumption and usage from connected PV and wind supply.

- **Peak power boost**

HBS to supplement power from other sources to meet high-capacity needs.

- **Backup power**

HBS to be used as On/Off grid backup power provider, replacing or supporting conventional generator systems.

- **Micro Grids**

HBS create a network independent energy supply which can also be supplemented by renewable.

- **Energy Trading**

HBS to store energy at cheap rates and discharge when required during peak demand periods.

- **Grid Stabilization**

HBS to stabilize network electricity (example: FCR/Frequency regulation)*.

- **Black start**

HBS to restart an electric load or part of an electric grid without relying on an external electric supply.

- **Power continuity (UPS)**

HBS to provide a reliable and uninterruptible power supply to critical load.

- **Charge Shifting**

HBS to be programmed or commanded to charge battery at specific times to specific source: Grid, PV, GenSet, Wind, ..

- **Reactive Power compensation:** HBS to compensate reactive power thereby reducing monthly costs.

Grid connection optimization: HBS to allow users to reduce grid connection rating and minimize costs.

- **Charging:** HBS to act as a island style stress reliever for charging EV's and site equipment, also in area with weak grid coverage.

- **Local energy community:** HBS to supply energy to LEC (Local Energy Community) in rural areas.

** Available in some countries, depending on the local grid-code or HBS type.*

HYBRID BATTERY STORAGE APPLICATIONS

The HBS devices are best installed both in places connected to the grid and in geographically remote, rural or isolated areas with heavy energy demand but with unreliable grid power or power provided via generator sets; thus, in cases where energy needs to be stored – preferably from energy sources such as the sun. Let’s look at a few examples in detail:

Areas where the grid is available and there is the option of grid feeding (ON GRID)

Thanks to the batteries, the system optimises the self-consumption of the energy produced from the photovoltaic field and supplies only the grid power that is not used to supply the load or charge the battery.

ADVANTAGES:

- meets the needs of current peaks by using the energy from the battery and not the grid;
- uses energy produced when the distribution grid tariffs are most expensive;
- feeds energy into the grid when the tariffs are more convenient;
- optimises the self-consumption periods and hence reduces the plant’s TCO.

Areas where the grid is available without “Grid feeding” (ON GRID)

In areas where the energy cannot be fed into the grid, the entire production of the photovoltaic field can be used to supply the load and charge the battery. Thanks to the batteries, this system allows the self-consumption of the energy produced by the photovoltaic field to be optimized.

ADVANTAGES:

- meets the needs of current peaks by using the energy from the battery and not the grid;
- increases the self-consumption level of the renewable energy produced;
- reduces the TCO of the plant.

Areas where the grid is not available (OFF GRID)

Thanks to photovoltaic energy, this system allows electric current to be brought to areas where electricity is not available and is therefore normally produced by generator sets.

ADVANTAGES:

- meets the needs of current peaks by using the energy from the battery and not from generator sets;
- minimises generator set operation;
- lower fuel consumption and hence lower operational costs;
- less expense and inconvenience relating to transport of fuel to remote areas.

ON GRID APPLICATIONS



Business and Industry / Residential



Grid Operations / Energy Trading



Charging infrastructure



**LEC Local Energy Community
Centralized Storage**

OFF GRID APPLICATIONS



Rural Energy Community



**Hybridization of Generators
Disaster Management
Events and Exhibitions**



**Construction sites
Mining**



Telecommunications

The business segment applications are manifold, especially in the Commercial & Industrial (C&I) area.

The following are the main vertical markets.

The innovative Serie Hybrid Battery Storage offers a long list of advantages, granting a reduction of the operating costs through an accurate and smart use of the energy, combined with a safe and reliable power supply to the electrical equipment.



E-Mobility



Industrial & Data Center



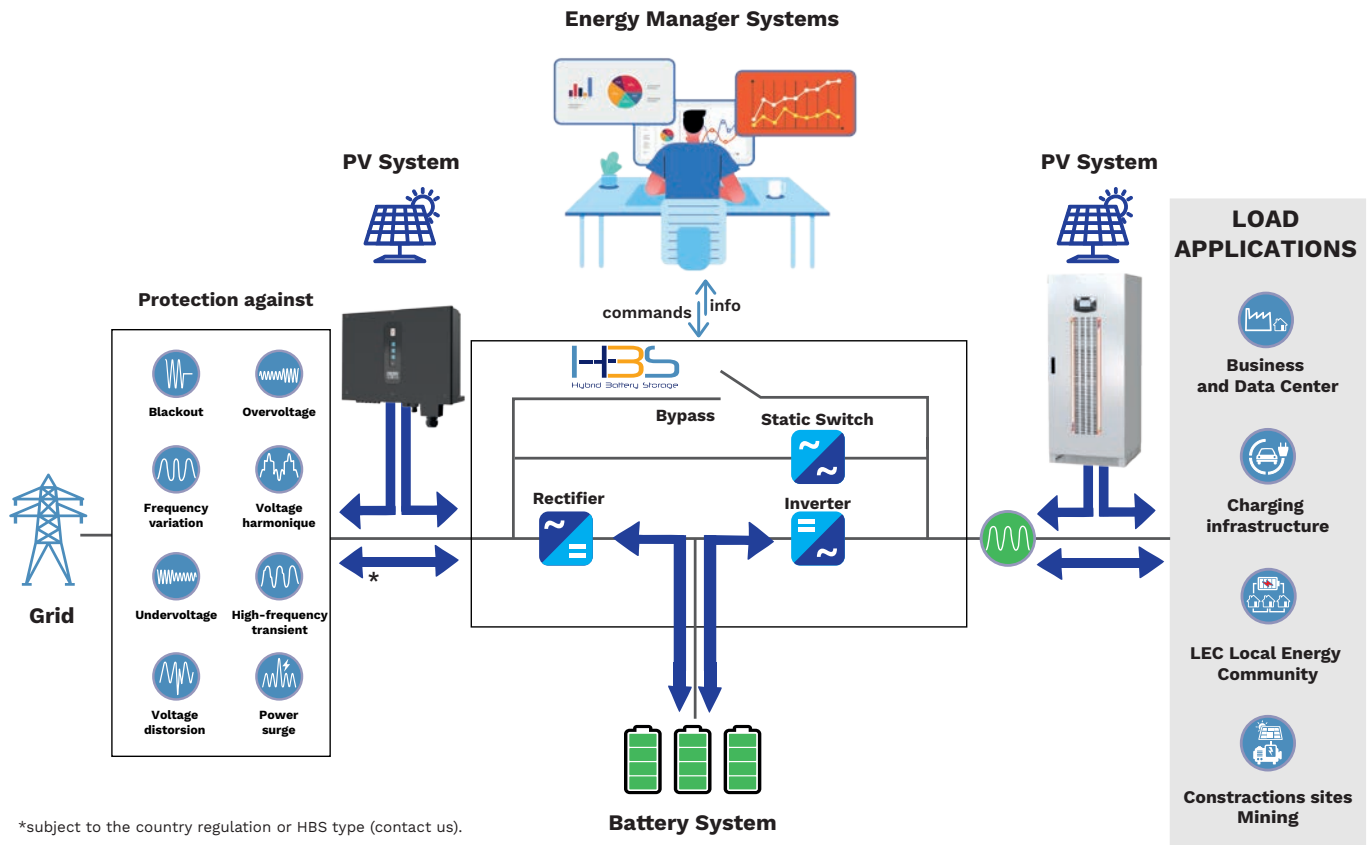
**LEC
Local Energy Community**



Energy Rental Business

THE ENERGY ARCHITECTURE OF THE HBS SERIES

HBS is a real energy gateway between Grid, Battery System and Priority Load. HBS enables the best energy usage for your specific application and use cases.



THE HBS SERIES IS POWERED BY LEAD AS WELL AS LITHIUM BATTERY SOLUTIONS

HBS is compatible with multiple energy accumulator types, enabling the selection of the right solution for each application: lead acid battery, supercaps but also lithium and 2nd life EV batteries. The Riello lithium battery proposal incorporates several solutions spanning a large number of application requirements that meet the most pressing market demands.

This is achieved through a series of products that are characterized by discharging duration time, number of battery cycles and charging / discharging current rate.

The Riello lithium battery solution offers a full proposal that includes:

- Battery Modules with integrated electronic control;

- Battery breaker protection;
- BMS unit;
- Interconnection power cables between modules;
- Internal cabinet communication cables;
- External communication cable for data exchange between the BMS unit and HBS system.



The Riello lithium battery cabinet

CUSTOMER BENEFITS

Riello and the HBS series bring load protection and innovative energy storage technology to your premises:

- Decades of Riello's expertise in power quality and power solutions.
- High performance with durability.
- High application flexibility: a energy solution for every needs.
- 2 in 1: ESS and UPS fuctions is one product.
- HBS to support the high efficiency grade applications.
- Massive cost savings via peak shaving and load shifting.

- Renewable energy usage optimization: 100% of renewable energy usage all over the day.
- Cost savings and substantial reduction of CO₂ emissions when used in combination with generators: fuel reduction of up to 40% and maintenance and operating costs of up to 50%.
- High ROI with short payback time
- International professional service support.
- Global sales structure.
- Made in Italy.



REFERENCES



RWE and RIELLO developed a solution model to make Data Centers as Partners of the Energy Transition

RWE is one of the largest utility companies in Europe, supplying more than 20 million electricity customers and 10 million gas customers.

Riello and RWE have jointly started a project to developing a solution making Data Centres a Partner of the Energy Transition with our innovative product and profit from the opportunities in the energy markets. The idea is the utilization of the stored energy in Data Centres for primary regulation of the grid, with reciprocal advantages for the utility company and the data centre itself.



AUDI Brand Experience Center at Munich Airport: Efficient energy management in the charging park for e-mobility.

Inside Munich Airport, Audi AG manages approximately 78 AC charging points and six HPC charging points (High Power Charging, fast charging) for Electrical Vehicles.

Riello was involved in this project to ensure the energy storage and protection of the Audi Brand Experience Center. The Audi Brand Experience is equipped with ca 1500 photovoltaic panels, which generate approximately 40,000 kWh of energy per year. The energy produced in excess, thanks to our product, can either be fed directly into the electricity grid or temporarily stored and used for the subsequent sustainable operation of the buildings and the fast EV charging stations.



Biohotel Eggensberger Germany

Biohotel Eggensberger is one of the first organic hotels in Germany, In 2010 they became the first climate-neutral hotel in the region!

Riello participate to this outstanding result via its hybrid energy storage system to realize the Germany's largest battery storage system in an hotel, the "core" of the climate-neutral concept.

MODELS	HBS 10	HBS 15	HBS 20	HBS 30	HBS 40	HBS 60	HBS 80
INPUT							
Nominal voltage [V]	400 three-phase + N						
Voltage tolerance [V]	400 +20% -25% at full load ¹						
Frequency [Hz]	45 - 65						
Soft start	0 - 100% in 120 sec (selectable)						
Allowed frequency tolerance	±2% (selectable from ±1% to ±5% from front panel)						
Standard equipment	Back-feed protection; detachable bypass line						
OUTPUT							
Nominal power [kVA]	10	15	20	30	40	60	80
Active power [kW]	9	13.5	18	27	36	54	72
Number of phases	3 + N						
Nominal voltage [V]	400 three-phase + N						
Static stability	±1%						
Dynamic stability	±5% in 10 msec.						
Voltage distortion	<1% with linear load / <3% with non-linear load						
Crest factor [lpeak/lrms]	3:1						
Frequency stability on battery	0.05%						
Frequency [Hz]	50 or 60 (selectable)						
Overload	110% for 60 min.; 125% for 10 min.; 150% for 1 min.						
BATTERIES							
Type	VRLA AGM / GEL; NiCd; Supercaps; Li-ion						
Residual ripple voltage	<1%						
Max Battery charging current from HBS input without load [A]	24	36	48	72	96	144	192
Max Battery charging current from HBS output – PV Inverters [A]	24	36	48	72	96	144	192
GENERAL SPECIFICATIONS							
Weight [kg]	228	241	256	315	335	460	520
Dimensions (WxDxH) [mm]	555x740x1400					800x740x1400	
Remote signals	voltage-free contacts (configurable)						
Remote controls	ESD and bypass (configurable)						
Communications	Dual RS232 + voltage-free contacts + 2 slots for communication interface						
Ambient temperature	From 0 °C to +40 °C						
Relative humidity range	5–95% non-condensing						
Colour	Dark grey RAL 7016						
Noise level at 1 m [dBA]	62						
Protection level	IP20 (other available on request)						
Regulations	European Directives: L V 2014/35/EU Low Voltage Directive EMC 2014/30/EU Electromagnetic Compatibility Directive Standards: Safety IEC EN 62040-1; EMC IEC EN 62040-2; RoHS compliant						
Classification according to EN 62040-3	(Voltage Frequency Independent) VFI - SS - 111						
HBS handling	Pallet truck						

¹ Additional conditions apply for greater tolerances.

MODELS	HBS HE 100	HBS HE 120	HBS HE 160	HBS HE 200	HBS HE 250	HBS HE 300	HBS HE 400	HBS HE 500	HBS HE 600	HBS HE 800
INPUT										
Nominal voltage [V]	400 three-phase + N									
Voltage tolerance [V]	400 V +20% -10% at full load ¹ , + 20% , - 40 % (at 65% Load)									
Frequency [Hz]	45 - 65									
Power factor	>0.99									
Harmonic current distortion (THDi)	<3%									
Soft start	0 - 100% in 120 sec (selectable)									
Frequency tolerance	±2% (selectable from ±1% to ±5% from front panel)									
Standard equipment	Back-feed protection; detachable bypass line									
OUTPUT										
Nominal power [kVA]	100	120	160	200	250	300	400	500	600	800
Active power [kW]	100	120	160	200	250	300	400	500	600	800
Number of phases	3 + N									
Nominal voltage [V]	400 three-phase + N									
Static stability	±1%									
Dynamic stability	±5% in 10 msec.									
Voltage distortion	<1% with linear load / <3% with non-linear load									
Crest factor [lpeak/lrms]	3:1									
Frequency stability On battery	0.05%									
Frequency [Hz]	50 or 60 (selectable)									
Overload	110% for 60 min.; 125% for 10 min.; 150% for 1 min.									
BATTERIES										
Type	VRLA AGM / GEL; NiCd; Supercaps; Li-ion									
Ripple current	Zero									
Max Battery charging current from HBS input without load [A]	175	210	280	350	435	525	700	875	1050	1400
Max Battery charging current from HBS output – PV Inverters [A]	225	270	360	450	560	675	900	1125	1350	1800
GENERAL SPECIFICATIONS										
Weight [kg]	705	760	835	1075	1305	1868	2050	3026	3080	4004
Dimensions (WxDxH) [mm]	800x850x1900		1000x850x1900			1500x1000x1900		2100x1000x1900		3200x1000x1900
Remote signals	Voltage-free contacts (configurable)									
Remote controls	ESD and bypass (configurable)									
Communications	Dual RS232 + remote contacts + 2 slots for communication interface									
Ambient temperature	From 0 °C to +40 °C									
Relative humidity range	5–95% non-condensing									
Colour	Dark grey RAL 7016									
Noise level (at 1 m) [dBA]	65	68				72				
Protection level	IP20 (others available on request)									
Regulations	European Directives: L V 2014/35/EU Low Voltage Directive EMC 2014/30/EU Electromagnetic Compatibility Directive Standards: Safety IEC EN 62040-1; EMC IEC EN 62040-2; RoHS compliant									
Classification according to IEC 62040-3	(Voltage Frequency Independent) VFI - SS - 111									

¹ Additional conditions apply for greater tolerances.



RIELLO SOLARTECH

RPS S.p.A. - Viale Europa, 7 - 37045 Legnago (VR) Italy

Riello Solartech division
Via Somalia, 20 - 20032 Cormano (MI)
Tel. 800 48 48 40
info@riello-solartech.com

www.riello-solartech.com