

Excellent Technology, Efficiency and Quality



## ENERTRONIC Modular Storage

Peak shaving, load levelling, UPS mode,  
day to night energy transfer

Produced and developed in Germany!  
Industrial quality since 1938



# Economy and return on investment combined with security of the load

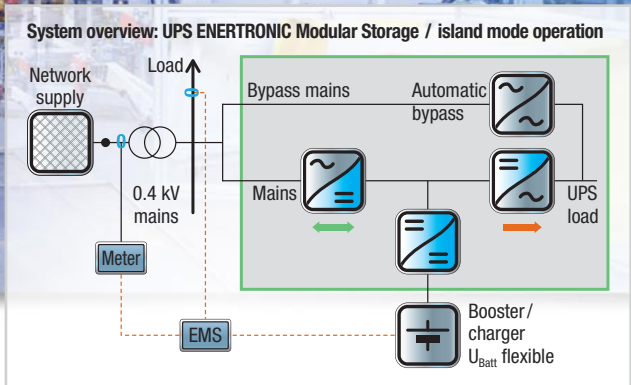
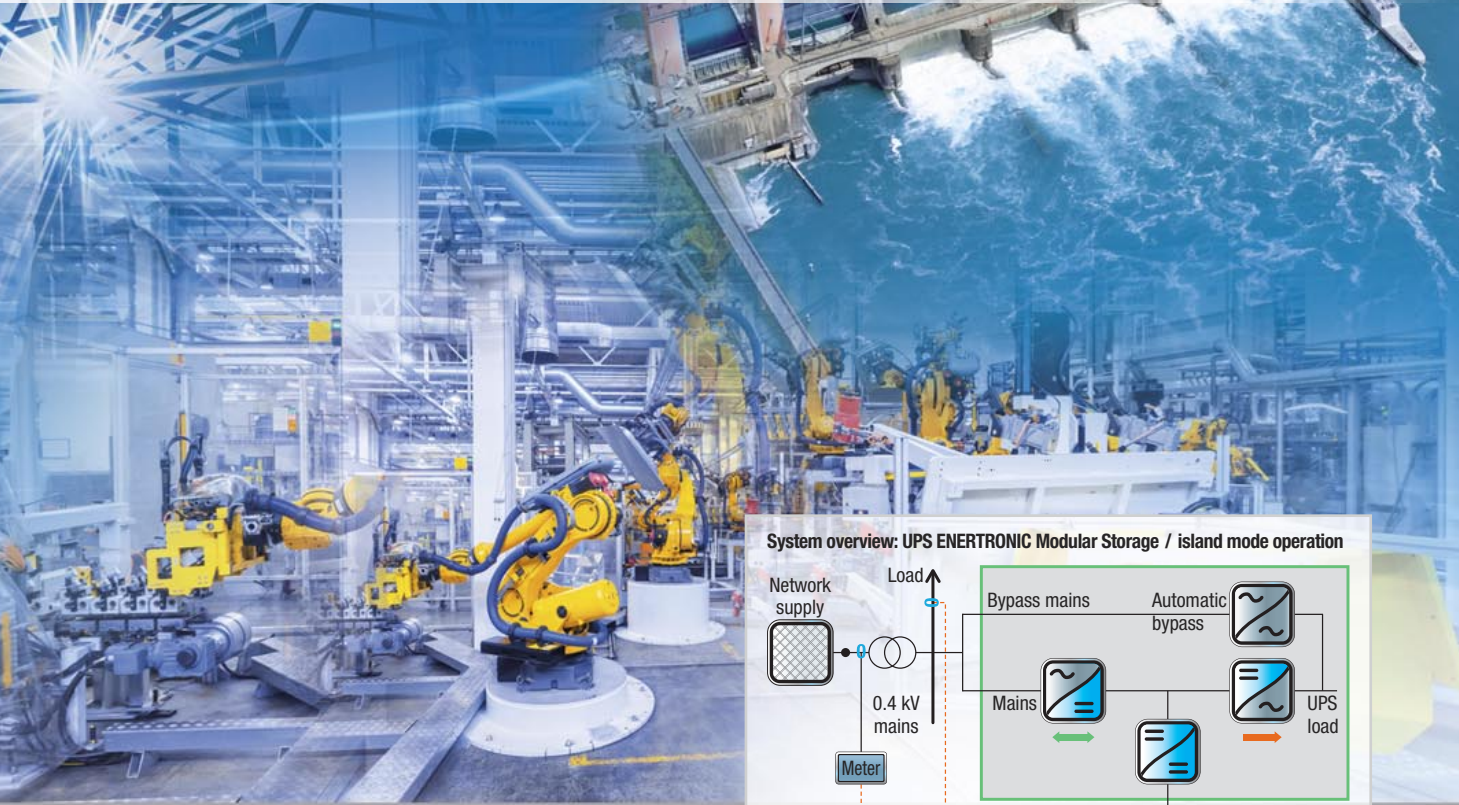


Figure 7: The UPS protects the critical loads from mains disruptions. At the same time, in conjunction with the "on-board" EMS, the system takes on load management tasks and thus contributes significantly to faster return of the investment compared to systems without a storage function.

## Advantages

- Storage and UPS function
- Decentralised parallel architecture
- Modular-expandable hot pluggable system
- Flexible battery configurations (accumulator, group battery, individual battery)
- Can be used in conjunction with regenerative energy systems such as PV, hydro or wind power
- Option of connecting up to low-voltage mains as per VDE AR-N4105
- Greater efficiency
- Rapid return of investment

- Maximum availability
- Minimised operating costs
- Variable component concept



Figure 8: The Monitoring and Control Unit (MCU) supports a range of protocols and interfaces for connecting the system EMS from the widest range of software manufacturers. The MCU 3000 system controller, which is installed in the cabinet door of the power supply system, has a 10.4" touchscreen.

# Key hardware for your company's energy transition



## Hardware for multiple applications

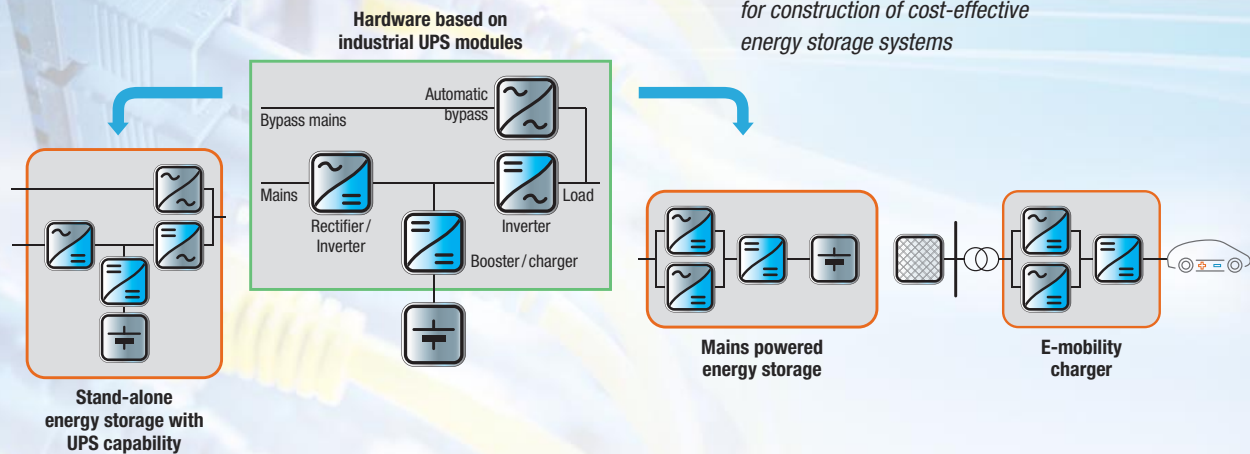


Figure 1: BENNING supplies modular architecture – based on tried & tested industry grade UPS systems – for construction of cost-effective energy storage systems

## Sustained reduction in operating costs, Increasing efficiency

Smart load management means that enhancing the reliability and efficiency of your power supply system goes hand-in-hand with a sustained reduction in operating costs. Applications whose power consumption can be fully or partially offset thanks to power storage provide an ideal opportunity.

BENNING, with its new ENERTRONIC Modular Storage range, offers individually tailored energy storage systems with genuine UPS operation and “on-board” EMS (Energy Management System).

### ENERTRONIC Modular Storage is tailored for:

- Industrial applications
- Storage of regeneratively sourced power
- Micro grids

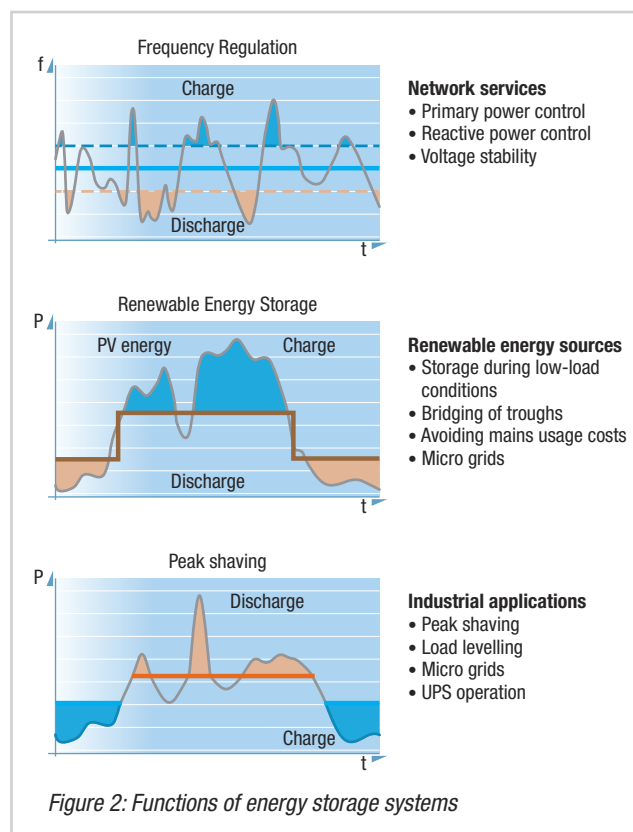


Figure 2: Functions of energy storage systems



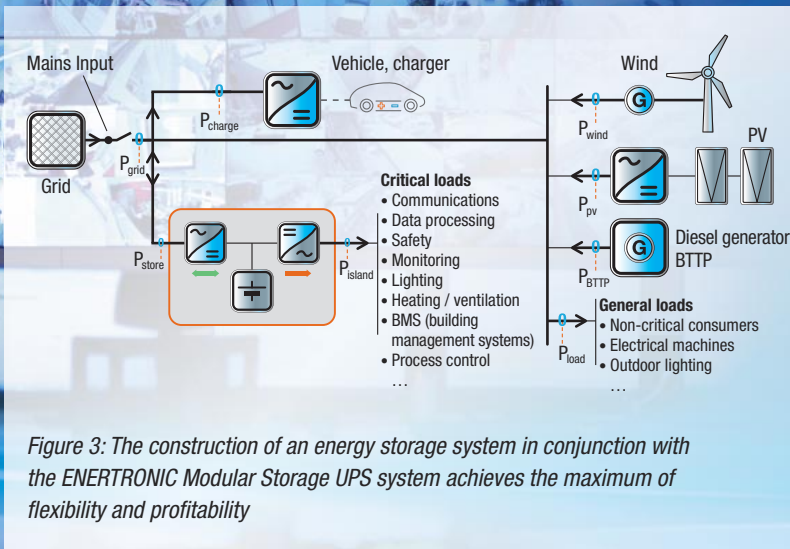


Figure 3: The construction of an energy storage system in conjunction with the ENERTRONIC Modular Storage UPS system achieves the maximum of flexibility and profitability



Figure 4: ENERTRONIC Modular Storage

### Storage systems with UPS capability provide flexibility and economy

- Peak shaving
- Load levelling
- Optimised power take-up (7000 h rule)
- Day-to-night energy transfer
- Flexibly definable energy reserve
- Storage during low-load conditions
- Boost power during high-load conditions
- Suitable for lead and lithium batteries
- Optimising internal consumption
- Reliable UPS operation (VFI-SS-111)
- Reactive power compensation

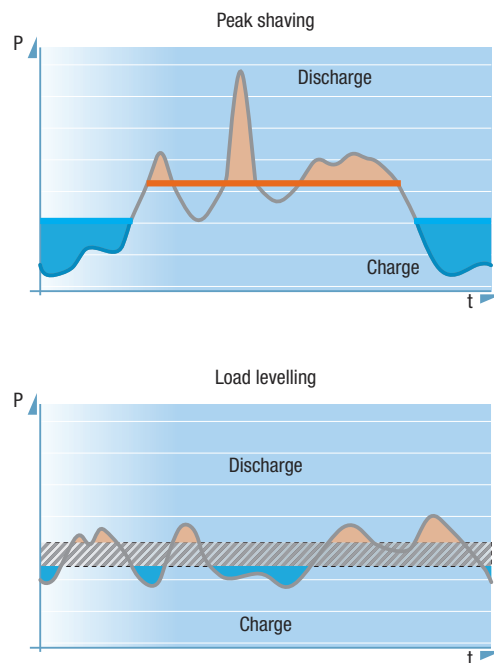


Figure 5: ENERTRONIC Modular Storage covers load management functions such as load levelling and peak shaving

# Reduce your companies impact of rising energy costs

## Technical data

ENERTRONIC Modular Storage		
Power (cos $\varphi$ = 1.0)	20 ... 500 kW	40 ... 1000 kW
Module power	20 kW	40 kW
USB cabinet footprint (W x D)	600 x 800 mm	600 x 800 mm
Output per m <sup>2</sup>	up to 250 kW/m <sup>2</sup>	up to 415 kW/m <sup>2</sup>
Maximum number of modules per system	25	
Operating temperature range	0 ... 40 °C (above which: power is reduced)	
Relative atmospheric humidity	5 ... 95 % (non-condensing)	
Noise level	typically < 65 dBA (dependent on output)	
Protection mode	IP20 (details on request)	
Installation height	1000 m (without power loss)	
Cable entry	bottom (or specify top entry)	
Colour	RAL 7035 / RAL 7021 (or others on request)	
Ventilation	forced ventilation with redundancy	
Classification as per IEC / EN 62040-3	VFI-SS-111	
Standards		
Safety	IEC / EN 62040-1, IEC / EN 60950-1	
EMC	IEC / EN 62040-2	
Output	IEC / EN 62040-3	

Input	
Voltage	380 / 400 / 415 V $\pm$ 15 % 3ph + N
Frequency	50 Hz $\pm$ 5 % / 60 Hz $\pm$ 5 %
Total harmonic distortion THDi (100% load)	$\leq$ 3 %
Input power factor	$\geq$ 0.99
Output (inverter mode)	
Voltage	380 V / 400 V / 415 V
Voltage tolerance (static)	$\pm$ 1 %
Frequency tolerance	$\pm$ 0.1 %
Total distortion THDu	Linear load: $\leq$ 1 %
Efficiency	99 % (SE Mode), 96 % (double conversion mode)
Inverter overload mode	150 % for 60 s, 125 % for 10 min, 110 % for 30 min
Overload mode bypass	1000 % for 100 ms, 150 % for 10 min, 125 % continuous
Inverter short-circuit characteristics	> 300 % for 40 ms, > 220 % for 1 s
Short-circuit characteristics, bypass	1000 % for 100 ms
Battery	
Voltage range	396 – 691 V
Battery technologies	Lithium ion, lead, nickel cadmium

Subject to technical changes

## Turnkey – your turnkey energy systems solutions, from a single source

BENNING offers turnkey solutions both for grid-dependent and for off grid self-managed systems (refer Figure 3). These systems comprise a range of outputs of up to a megawatt for a single power feed. In addition, even larger systems can be installed, with further power feeds within a single user's network. Furthermore, this decentralised scalability enables optimised, cost-effective integration into existing infrastructures. Finally, you can make use of modular UPS technology to upgrade or retrofit your existing power storage systems to the level of smart power supply systems with independent capability.

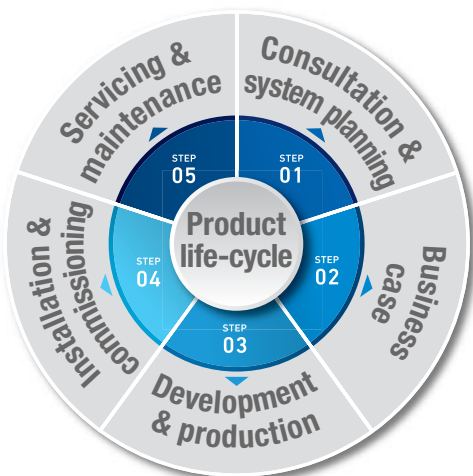


Figure 6: Support throughout life-cycle

## BENNING offers you a total range of solutions from a single source

- System analysis in your company
- Optimum sizing for plant & battery output – depending on your starting point
- Total cost of ownership study as basis for your investment decision
- Hardware supply, installation and commissioning
- Incorporation of integrated EMS into your building management infrastructure
- Support for integration into existing EMS
- Servicing, maintenance or responsible operation management throughout life-cycle

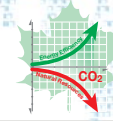
**BENNING worldwide**

ISO  
9001

ISO  
14001

ISO  
50001

SCCP



**Austria**

Benning GmbH  
Elektrotechnik und Elektronik  
Eduard-Klinger-Str. 9  
3423 ST. ANDRÄ-WÖRDERN  
Tel.: +43 (0) 22 42 / 3 24 16-0  
Fax: +43 (0) 22 42 / 3 24 23  
E-mail: info@benning.at

**Belarus**

000 «BENNING Elektrotechnik  
und Elektronik»  
Masherova Ave., 6A, 1003  
224030, BREST  
Tel.: +375 162 / 51 25 12  
Fax: +375 162 / 51 24 44  
E-mail: info@benning.by

**Belgium**

Benning Belgium  
branch of Benning Vertriebsges. mbH  
Assesteenweg 65  
1740 TERNAT  
Tel.: +32 (0) 2 / 5 82 87 85  
Fax: +32 (0) 2 / 5 82 87 69  
E-mail: info@benning.be

**Croatia**

Benning Zagreb d.o.o.  
Trnjanska 61  
10000 ZAGREB  
Tel.: +385 (0) 1 / 6 31 22 80  
Fax: +385 (0) 1 / 6 31 22 89  
E-mail: info@benning.hr

**Czech Republic**

Benning CR, s.r.o.  
Zahradní ul. 894  
293 06 KOSMONOSY  
Tel.: +420 / 3 26 72 10 03  
E-mail: odbyt@benning.cz

**France**

Benning  
conversion d'énergie  
43, avenue Winston Churchill  
B.P. 418  
27404 LOUVIERS CEDEX  
Tel.: +33 (0) / 2 32 25 23 94  
Fax: +33 (0) / 2 32 25 13 95  
E-mail: info@benning.fr

**Germany**

Benning Elektrotechnik und Elektronik  
GmbH & Co. KG  
Factory I: Münsterstr. 135-137  
Factory II: Robert-Bosch-Str. 20  
46397 BOCHOLT  
Tel.: +49 (0) 28 71 / 93-0  
Fax: +49 (0) 28 71 / 9 32 97  
E-mail: info@benning.de

**Great-Britain**

Benning Power Electronics (UK) Ltd.  
Oakley House, Hogwood Lane  
Finchampstead  
BERKSHIRE  
RG 40 4QW  
Tel.: +44 (0) 1 18 / 9 73 15 06  
Fax: +44 (0) 1 18 / 9 73 15 08  
E-mail: info@benninguk.com

**Greece**

Benning Hellas  
Chanion 1, Lykovrisi 141 23  
ATHENS  
Tel.: +30 (0) 2 10 / 5 74 11 37  
Fax: +30 (0) 2 10 / 5 78 25 54  
E-mail: info@benning.gr

**Hungary**

Benning Kft.  
Power Electronics  
Rákóczi út 145  
2541 LÁBATLAN  
Tel.: +36 (0) 33 / 50 76 00  
Fax: +36 (0) 33 / 50 76 01  
E-mail: benning@benning.hu

**Italy**

Benning Conversione di Energia S.r.l.  
Via Cimarosa, 81  
40033 CASALECCHIO DI RENO (BO)  
Tel.: +39 0 51 / 75 88 00  
Fax: +39 0 51 / 6 16 76 55  
E-mail: info@benningitalia.com

**Netherlands**

Benning NL  
branch of Benning Vertriebsges. mbH  
Peppelkade 42  
3992 AK HOUTEN  
Tel.: +31 (0) 30 / 6 34 60 10  
Fax: +31 (0) 30 / 6 34 60 20  
E-mail: info@benning.nl

**Poland**

Benning Power Electronics Sp. z o.o.  
Korczykowska 30  
05-503 GŁOSKÓW  
Tel.: +48 (0) 22 / 7 57 84 53  
Fax: +48 (0) 22 / 7 57 84 52  
E-mail: biuro@benning.biz

**P. R. China**

Benning Power Electronics (Beijing) Co., Ltd.  
No. 6 Guangyuan Dongjie  
Tongzhou Industrial Development Zone  
101113 BEIJING  
Tel.: +86 (0) 10 / 61 56 85 88  
Fax: +86 (0) 10 / 61 50 62 00  
E-mail: info@benning.cn

**Russian Federation**

000 Benning Power Electronics  
Domodedovo town,  
microdistrict Severny,  
"Benning" estate, bldg. 1  
142000 MOSCOW REGION  
Tel.: +7 4 95 / 9 67 68 50  
Fax: +7 4 95 / 9 67 68 51  
E-mail: benning@benning.ru

**Slovakia**

Benning Slovensko, s.r.o.  
Šenkvičká 3610/14W  
902 01 PEZINOK  
Tel.: +421 (0) 2 / 44 45 99 42  
Fax: +421 (0) 2 / 44 45 50 05  
E-mail: benning@benning.sk

**South East Asia**

Benning Power Electronics Pte Ltd  
85, Defu Lane 10  
#05-00  
SINGAPORE 539218  
Tel.: +65 / 68 44 31 33  
Fax: +65 / 68 44 32 79  
E-mail: sales@benning.com.sg

**Spain**

Benning Conversión de Energía S.A.  
C/Pico de Santa Catalina 2  
Pol. Ind. Los Linares  
28970 HUMANES, MADRID  
Tel.: +34 91 / 6 04 81 10  
Fax: +34 91 / 6 04 84 02  
E-mail: benning@benning.es

**Sweden**

Benning Sweden AB  
Box 990, Hovslagarev. 3B  
19129 SOLLENTUNA  
Tel.: +46 (0) 8 / 6 23 95 00  
Fax: +46 (0) 8 / 96 97 72  
E-mail: power@benning.se

**Switzerland**

Benning Power Electronics GmbH  
Industriestrasse 6  
8305 DIETLIKON  
Tel.: +41 (0) 44 / 8 05 75 75  
Fax: +41 (0) 44 / 8 05 75 80  
E-mail: info@benning.ch

**Turkey**

Benning GmbH Turkey Liaison Office  
19 Mayıs Mah. Kırkkçi Sokak No:16/A  
34736 KOZYATAGI  
KADIKÖY / ISTANBUL  
Tel.: +90 (0) 2 16 / 4 45 71 46  
Fax: +90 (0) 2 16 / 4 45 71 47  
E-mail: info@benning.com.tr

**UAE**

Benning Power Systems  
Middle East / Office: 918,  
9th Floor, AYA Business Center  
ADNIC Building, Khalifa Street  
ABU DHABI  
Tel.: +971 (0) 2 / 4 18 91 50  
E-mail: benningme@benning.fr

**Ukraine**

Benning Power Electronics  
3 Sim'yi Sosninykh str.  
03148 KYIV  
Tel.: 0038 044 501 40 45  
Fax: 0038 044 273 57 49  
E-mail: info@benning.ua

**U.S.A.**

Benning Power Electronics, Inc.  
1220 Presidential Drive  
RICHARDSON, TEXAS 75081  
Tel.: +1 2 14 / 5 53 14 44  
Fax: +1 2 14 / 5 53 13 55  
E-mail: sales@benning.us