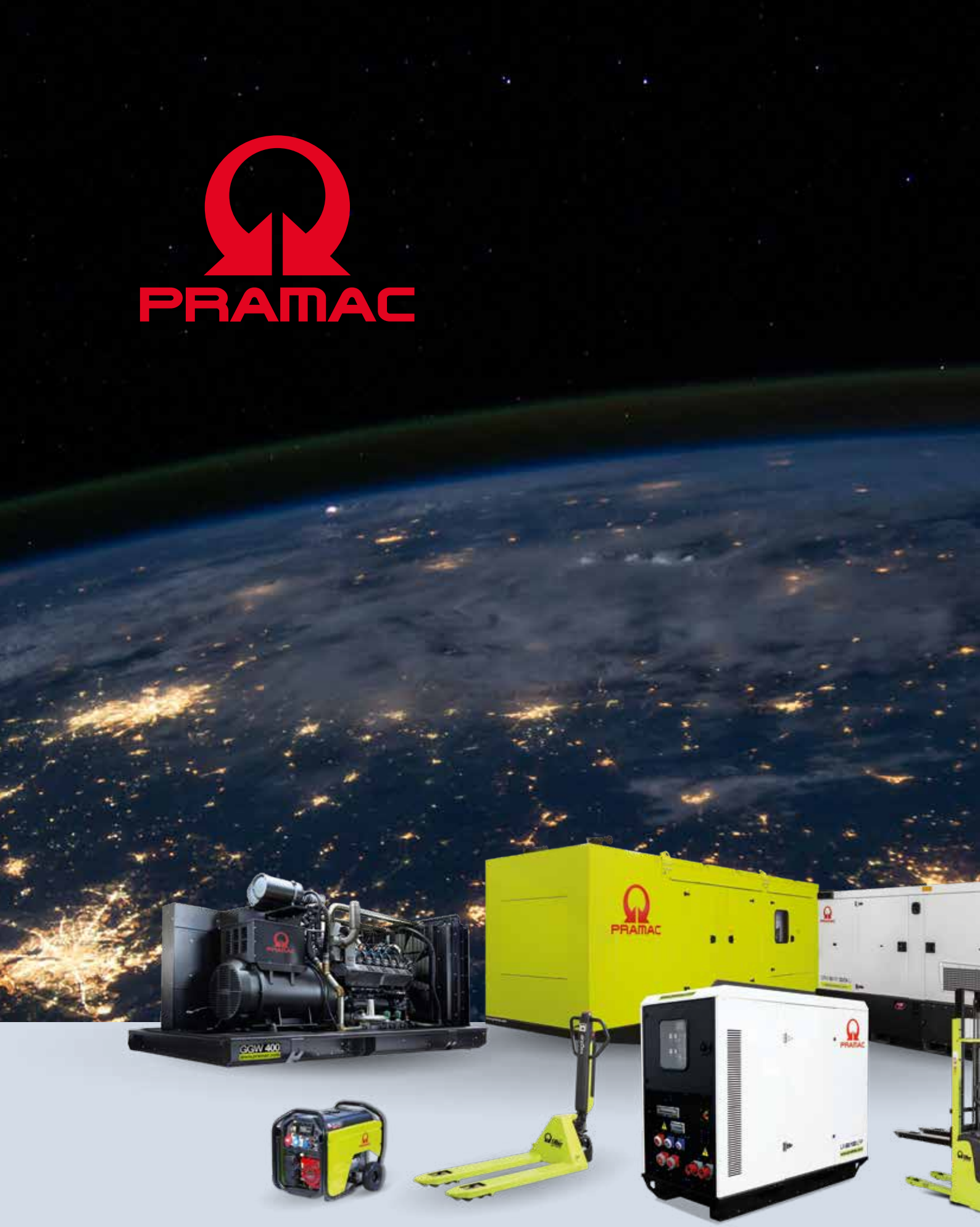
COMMERCIAL & INDUSTRIAL

STORAGE SYSTEMS

IN CHARGE

OF THE ENERGY REVOLUTION

PRAMAC



ABOUT US

Pramac is the global benchmark for the production of generators and battery energy storage solutions. In 2016 Pramac become part of the Generac group, forming the world's third-largest generator producer. Pramac corporate purpose is to lead the evolution to more resilient, efficient, and sustainable energy solutions, with a broad suite of products powering a smarter world.

As an international company, we offer a global After-Sales service.
Pramac assists customers providing service division offers, interventions on field, installations, repairs and rewinding support.

The Service and Parts division offers trainings and learning tools to help dealers and customers improve their product's technical knowledge and operational skills.

COMMERCIAL & INDUSTRIAL STORAGE SOLUTIONS

Pramac develops and provides a system of integrated, sustainable and scalable Energy Storage Solutions, striving to enable individuals and organizations to take control of their energy development opportunities.

At the heart of Pramac's energy storage offering is our proprietary Energy Management System, which optimizes the performance and efficiency of Energy Storage Systems by intelligently monitoring the flow of energy in real-time.

Pramac Commercial & Industrial Storage Systems revolutionizes the way energy is managed, through the use of energy storage systems as virtual power plants. These systems provide valuable services to the grid, such as load shifting, frequency regulation, voltage control, and grid stabilization.

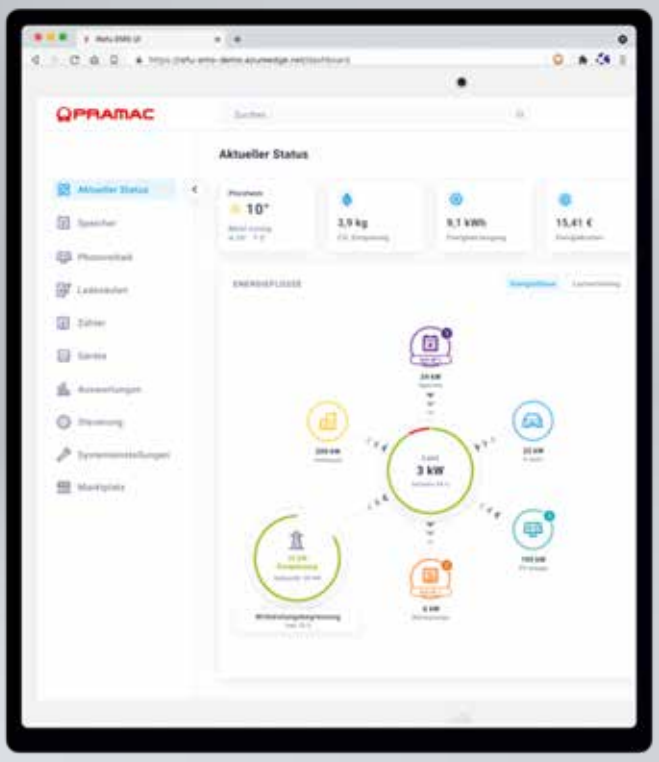
Pramac's innovative approach maximizes the economic and environmental benefits of renewable energy sources. Its storage solutions play a central role in the energy transition, helping to increase self-consumption and optimize energy costs for a sustainable and reliable energy supply, leading to more environmentally friendly energy development.

Pramac leads the revolution in the energy market.

- **Leading supplier of power electronics**
- **Proven technology for a wide range of battery applications**
- **Strong team with a network of partners**

OUR CORE TECHNOLOGY

SMART ENERGY MANAGEMENT SYSTEM



VERSATILE APPLICATIONS

EASE OF USE

COMPACT AND POWERFUL

GDPR COMPLIANT

CYBER SECURITY

SMART ENERGY
MANAGEMENT SYSTEM

The brain of Pramac's energy storage offering is our Energy Management System. It offers an aggregated overview of all connected batteries 24/7 along with the ability to quickly asses the overall battery status. With our Energy Management System it is possible to intelligently control the flow of energy, through the planning and programming convenient and intuitive operating modes, as well as maintenance and control of multi-battery systems. The server is located in Germany providing high Cyber Security and GDPR compliance.

PLUG´N PLAY SOLUTION

- Worldwide access without additional software
- Quick setup and easy configuration
- Highly intuitive operation and user guidance

ENERGY BALANCE MANAGEMENT

- Real-Time reports for all system data
- Easy exports and printouts
- Highly customizable

INTEGRATION OF PHOTOVOLTAIC PLANTS

- Measurement of production output
- Maximum efficiency with consideration in self-consumption scenarios

SMART ENERGY **CONTROLLER**

- Retrofitting of existing plants
- Monitoring – Visualization of energy flow & 24/7 data
- Local & Cloud access to the EMS
- Operations management
- Peak shaving
- Self-consumption optimization
- Time-of-Use
- Load management with charging stations
- Local and Cloud-to-Cloud REST API to integrate external EMS or trading solutions

OUR CORE TECHNOLOGY

INVERTER

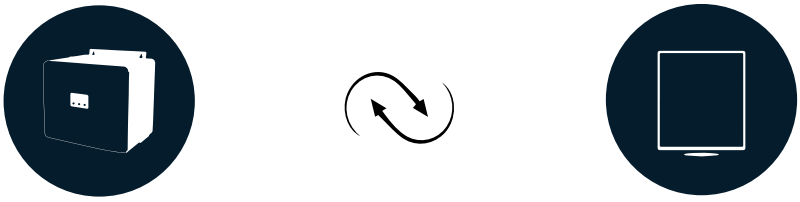
PBI Series:

With the Pramac Inverter it is possible to reduce energy costs through peak reduction or load balancing for extended charging of electric vehicles in industrial areas.

The inverter can be commissioned via the app (available for iOS and Android), which seamlessly connects to the inverter via Bluetooth®.

The integrated, fail-safe Ethernet connection enables cost-effective, high-speed monitoring without requiring special accessories.

- Maximum power density
- Highest serviceability
- Suitable for 2nd life battery applications
- Wide AC and DC voltage range above average
- Modular design for easy installation



INVERTER **ENERGY MANAGEMENT SYSTEM**

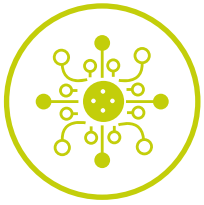
- Perfect coordination and maximum efficiency thanks to in-house development
- Consistency and Reliability
- Highest quality and Security

INDOOR
SOLUTIONS

BSI Series:

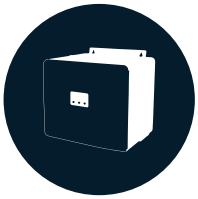
Industrial battery storage plays a central role in the energy transition, which is why our industrial battery storage solutions help increase self-consumption and optimize energy costs.

- Pre-configured indoor battery storage kit
- Easy installation and commissioning
- EMS and Battery Inverter 50K or 88K integrated
- Modular battery racks for capacity stacking
- Combiner Rack for capacity or power expansion



- C&I Buildings – Peak Shaving, Time of Use, Self-consumption
- Buffer storage for EV fast charging – increasing the usable output
- Agricultural buildings – use of PV electricity after end of subsidy
- Urban storage or new buildings – reducing the load on the transformer

OUR CORE TECHNOLOGY



INVERTER

ENERGY MANAGEMENT SYSTEM

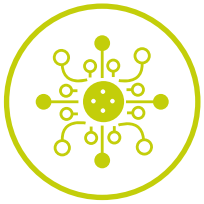
OUTDOOR SOLUTIONS

ON GRID

BSO Series:

Pramac battery storage provides a crucial component for a sustainable and reliable energy supply, ensuring more environmentally friendly energy development.

- All-in-one battery storage system for outdoor use
- Outdoor cabinet with protection type IP65 / IP54
- Easy & quick installation – components pre-installed
- High safety standard – gas & smoke sensors, fire protection system
- Heating & cooling included



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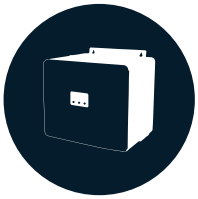
OUR CORE TECHNOLOGY



INVERTER

ENERGY MANAGEMENT SYSTEM

PRO OUTDOOR
SOLUTIONS

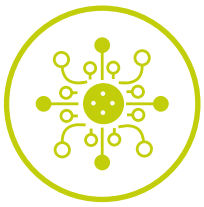
ON GRID

BACKUP

BSO PRO Series:

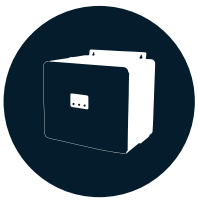
Pramac's battery storage systems are a crucial component for a sustainable and reliable energy supply. The on-grid systems as well as the new backup solutions ensure more environmentally friendly energy utilisation - even in the event of a grid outage

- All-in-one outdoor battery storage system – ON/OFF grid capable
- On-Grid 90kVA / 75kVA backup power (120% overload)
- Phase unbalance up to 20kVA (transformerless)
- Black start capable
- Half-wave consumer up to 1kW
- On/Off grid switching ≤ 5 s with Pramac Smart Transfer Switch cabinet
- High HW safety standard – fire protection system, gas & smoke sensors
- High security due to state-of-the-art SW architecture – encrypted communication, digital cloud twin and 2-factor authentication



- Higher added value – by reducing operational downtimes
- Autonomous energy supply – supplying critical infrastructure
- Self-sufficiency in remote areas
- Supports the use cases – Self-consumption / Charging solutions / Trading / Peak Shaving / Time of Use (ToU) / Grid Services

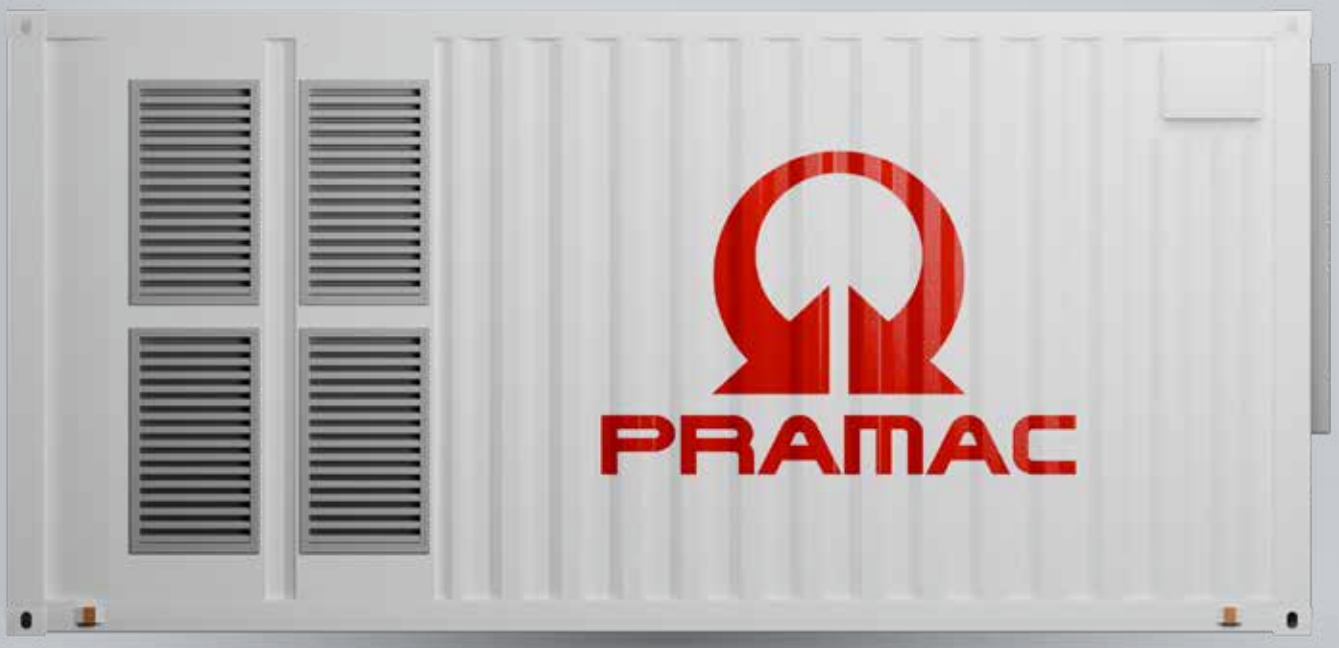
OUR CORE TECHNOLOGY



INVERTER

ENERGY MANAGEMENT SYSTEM

BATTERY STORAGE CONTAINER

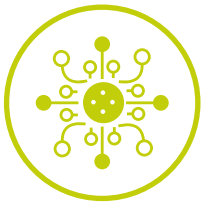


BSC Series:

Industrial battery storage plays a central role in the energy transition and provides a crucial component for a sustainable and reliable energy supply.

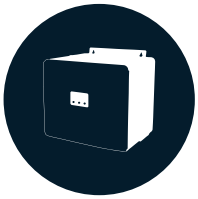
Our containerized battery storage solutions help operators increase self-consumption and optimize the energy cost, ensuring a more environmentally friendly energy supply.

- Pre-installed battery container all-in-one solution – Power and capacity up to the MW or MWh range
- In-house power and control electronics – Perfectly optimised with maximum safety and efficiency
- Latest cell technology – Highest quality, durability and safety
- Modular scalable in performance and capacity – stackable containers



- Commercial and industrial plants – Peak Shaving, Time of Use, Self-consumption, Energy Trading
- Buffer storage for EV fast charging – increase of usable power
- Control power – balancing grid fluctuations
- Urban district storage or new buildings – Transformer load relief

OUR CORE TECHNOLOGY



INVERTER

ENERGY MANAGEMENT SYSTEM

TECHNICAL SPECIFICATIONS

INDOOR SOLUTIONS

TECHNICAL DATA	BSI 50	BSI 88	BSI 100	BSI 176
Rated Power (kW)	50	88	2x50	2x88
Total gross capacity range (kWh)	109 - 436		218 - 872	
Rated net capacity range (kWh) (90%DoD)	98 - 392		192 - 785	
Max. C-Rate	1 C			
Cell Type	LFP (Pouch)			
Cycles @ 90% DoD | 65% SoH | 1C/1C	7.300			
Operating temperature range (°C)	+10°C - +40°C			
Humidity (%, RH) non-condensing	5-95			
Max. permissible installation height (m)	2.000			
Weight range, assembled (kg)	1.400 - 5.500		2.900 - 10.500	
W (mm)	From 1.488 to 4.060		From 2.430 to 7.320	
D (mm)	659			
H (mm)	2.130			
Protection type	IP20			

OUTDOOR SOLUTIONS

TECHNICAL BATTERY DATA	BSO 50/109	BSO 88/109	BSO PRO 90/109*
Rated Power (kW)	50	88	90 On Grid / 75 Backup Power
Total capacity (kWh)	109		
Rated net capacity (kWh) (90%DoD)	98		
Rated voltage (Vdc)	736		
Max. Charge/discharge current (A)	148		
Cell type	Li-Ion (LFP) Pouch		
Cycles @ 90% DoD | 65% SoH | 0,5C/0,5C	7.300		
Operating temperature range (°C)	-20 to +50		
Humidity (%, RH)	5-95, non-condensing		
Max. permissible installation height (m)	3.000		
Total weight (kg) Incl. batteries and inverter	2.100	2.100	2.150
Protection class	IP 65 (Battery room) / IP 54 (Inverter room)		
Interfaces	RJ45 (Ethernet)		

*** The BSO PRO 90/109 required the Accessory Product Pramac Smart Transfer Switch (PSTS)**

BATTERY STORAGE CONTAINER

TECHNICAL BATTERY DATA	10 ft	20 ft HQ	40 ft HQ
Rated Power Range (kW)	88 - 352	176 - 704	176 - 1408
Total gross capacity range (kWh)	218 - 436	237 - 1066	711 - 2133
Rated net capacity range (kWh) (90%DoD)	196 - 392	213 - 959	640 - 1920
Max. C-Rate		1 C	
Cell Type		LFP (Pouch)	
Cycles @ 90% DoD | 65% SoH | 1C/1C		7.300	
Operating temperature range (°C)		-20°C - +50°C	
Humidity (%, RH) non-condensing		5-95	
Max. permissible installation height (m)		2.000	
Weight Container range, assemled (kg)	6.500 - 9.000	9.400 - 17.800	24.700 - 34.800
Dimensions (WxDxH) (mm)	2.991×2.438×2.591	2.991×2.438×2.591	12.192×2.438×2.896
Protection type		IP65 (Battery room) / IP54 (Inverter room)	
Interfaces		RJ45 (Ethernet)	
Protection devices		Permanent monitoring of the Battery cells Temperature and Smoke sensors, Overpressure flap Fire extinguisher with Novec 1230	

CASE STUDY

OUTDOOR STORAGE SYSTEMS AT MAX MÜLLER SPEDITION GMBH

The Max Müller GmbH, based in Opfenbach, offers freight forwarding services and comprises five companies in the Lake Constance, Allgäu and Upper Swabia regions. At the Opfenbach location, the logistics center has a large PV system that generates more electricity than the company needs during the day, especially in summer. A way was therefore sought to store the electricity generated so that it could be used at night for lighting and to charge the forklift batteries.

LOCATION:
OPFENBACH

COUNTRY:
GERMANY

SIZE RANGE:
2X OUTDOOR STORAGE SYSTEMS
196 kWh/100kW

THE SOLUTION

In June 2023, Allgäu Batterie put two outdoor commercial storage units into operation at its Opfenbach site. These temporarily store the solar energy generated and make it available again when needed. This enables Max Müller to optimize his own consumption, significantly reduce his energy costs and make an active contribution to the energy transition.

Annual Electricity Consumption 2022 (Grid Consumption)	**375.000 kWh**
Heat Pump Electricity Consumption 2022 (Grid Consumption)	**125.000 kWh**
Expected Grid Power Consumption with Battery Storage and PV	**275.000 kWh**

ADVANTAGES

- Meets all relevant safety requirements
- Buffer storage for PV energy
- Increasing the level of self-sufficiency to 45%
- Increase in own consumption to 61%

	Without Storage Solution at 266kWP	**With Storage Solution at 266kWP**
Self Consumption	**45%**	**75%**
Degree of Self-Sufficiency	**34%**	**45%**

CASE STUDY

STORAGE CONTAINER AT HARRY WUBBEN

Harry Wubben, greenhouse horticulture company, was frustrated with fluctuating electricity prices. The company had to buy 500 kWh at high prices during peak times but got nothing for supplying electricity back to the grid. For example, prices could peak at 600 euros per MW at noon and drop to minus 200 euros per MW at 5:00 PM. The imbalance is caused by the rapid increase in solar panels and electric cars in the Netherlands, leading to grid disruptions and price volatility.

LOCATION:
NOOTDORP

COUNTRY:
NETHERLANDS

SIZE RANGE:
BSC 704/948/20
STORAGE CONTAINER
948 kWh/ 704 kW

THE SOLUTION

Harry Wubben has integrated the container's software into the company's system to take advantage of the energy storage system from both ends. The container will be kept at about 50% capacity on average, allowing it to charge and discharge energy as needed. It's essentially an energy-trading container.

The container is fully at the service of TenneT, the national high-voltage grid operator of the Netherlands. When there is an imbalance on the high-voltage grid, the container is controlled to be able to supply in the event of a shortage and to purchase in the event of a surplus. This imbalance is determined nationally per quarter of an hour and is very difficult to predict, unlike the imbalance of the low-voltage network, which anyone with a battery can bid on because these hourly rates are announced 1 day in advance. Anticipation is necessary, but not with TenneT. Therefore, it is essential to always respond within 1 second by supplying and consuming from the grid. In practice, the battery will often be around 50% SoC.

This trade can generate approximately €100,000 annually with 704 kW power and 1 MW capacity, resulting in a payback period of around 4 years.

CASE STUDY

COMMERCIAL STORAGE INSTALLATION AT BROSCH STANDARDLIFT GMBH

By integrating a commercial storage system from AkkuSmart Energielösung GmbH, Brosch Standardlift GmbH is optimizing its own consumption of the electricity it generates itself from its photovoltaic system. This reduces operating costs and minimizes the purchase of expensive grid electricity. Particularly interesting: an energy management solution for storage provides the opportunity to combine dynamic electricity prices with a spot market-based electricity tariff, allowing electricity consumption when it is cheapest.

LOCATION:
25474 ELLERBEK

COUNTRY:
GERMANY

SIZE RANGE:
BATTERY STORAGE SYSTEM
109 kWh/88 kW

KEY FEATURES

Battery Storage System consisting of Pylontech Commercial Storage and Pramac Inverter:

- Capacity: 109 kWh
- Power output: 88 kW
- Battery type: Lithium iron phosphate

ADVANTAGES

Peak Shaving and Self-consumption Optimization:

- Storing PV Power
- Minimizing electricity drawn from the grid
- Reducing operating costs

CASE STUDY

ENERGY HUB WITH CHARGING PARK AT AKKU SYS

The energy hub with charging park of the value-added distributor AKKU SYS illustrates sector coupling and application possibilities of commercial storage systems at the production and logistics site in Süderholz.

LOCATION:
POMMERNDREIECK 2A
SÜDERHOLZ

COUNTRY:
GERMANY

SIZE RANGE:
INDOOR
COMMERCIAL
STORAGE SYSTEMS
218 kWh / 176 kW

KEY FEATURES AND ADVANTAGES

- 114 kWp PV system

- 176 kW total battery inverter capacity

- 218 kWh total capacity of the indoor commercial storage units

- Control of the entire system by a central energy management system

- Self-consumption optimization of the PV system on the site's roof through battery storage

- Charging park consisting of four public fast-charging points, each with 50 kW, and additionally four charging points, each with 22 kW, equipped with dynamic load management

- Commercial storage units shave peak loads, which are, for example, generated by the charging infrastructure

- Energy hub enables testing of components and functions under real conditions

PRAMAC

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