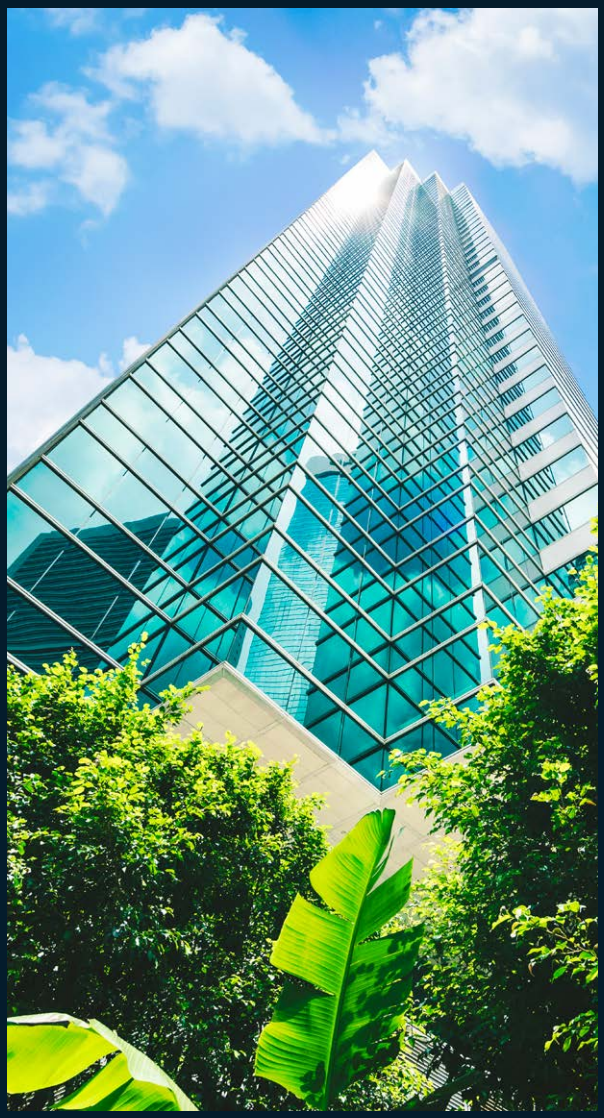
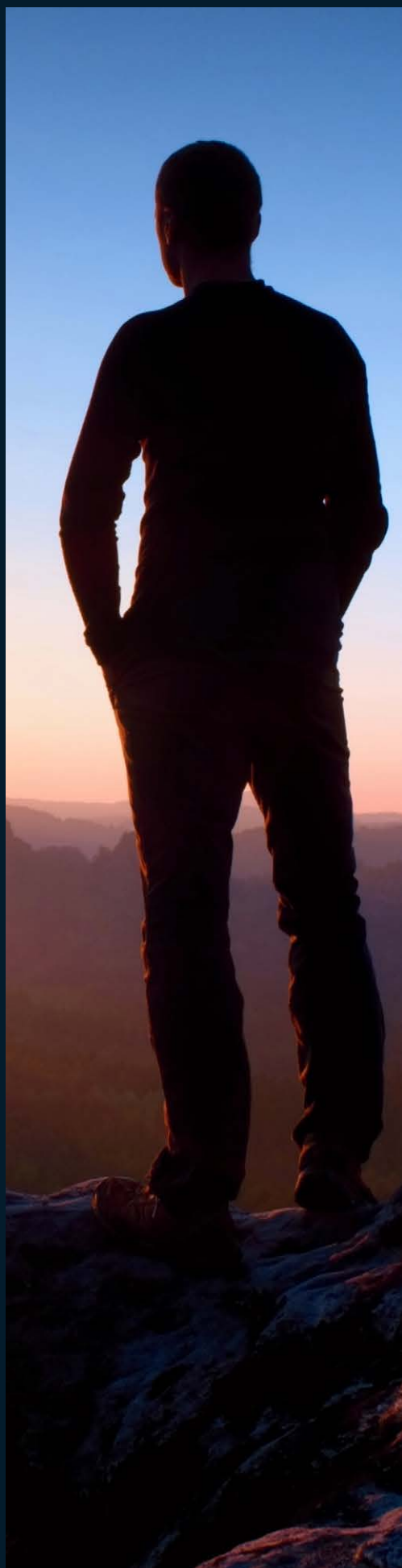
COMMERCIAL & INDUSTRIAL

STORAGE SYSTEMS





IN CHARGE

OF THE ENERGY REVOLUTION

PRAMAC


PRAMAC
GGW 400
www.pramac.com
PRAMAC
PRAMAC
GPW 60 HY 30/24 LI
PRAMAC
LX 60/100 LFP
www.pramac.com

ABOUT US

Pramac is the global benchmark for the production of generators and battery energy storage solutions. In 2016 Pramac became part of the Generac group, forming the world's third-largest generator producer. Pramac's corporate purpose is to lead the evolution toward 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 controling 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.

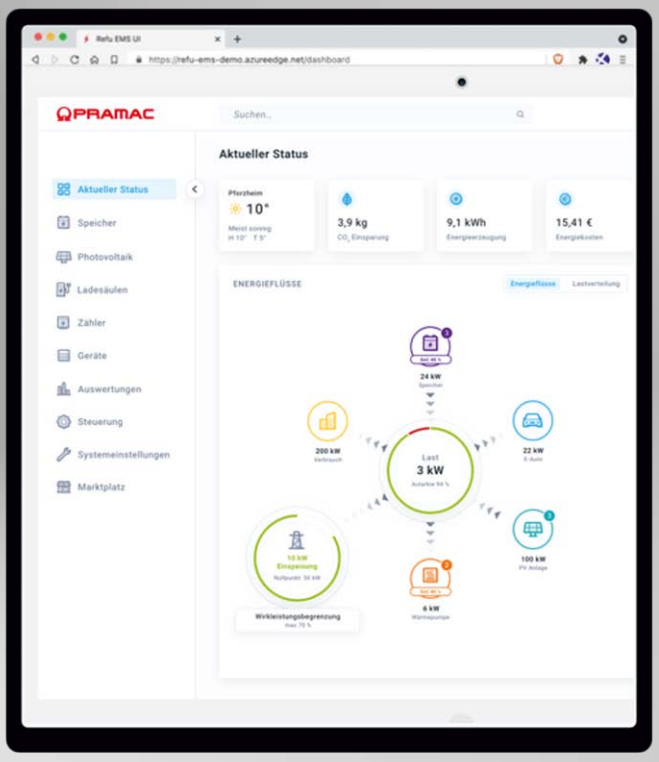
Pramac's innovative approach maximizes the economic and environmental benefits of renewable energy sources. Its storage solutions play a central role in the energy transition, helping to increase self-consumption and optimize energy costs for a sustainable and reliable energy supply, leading to more 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
- Multi-Use
- Load management with charging stations
- Modbus TCP, Local and Cloud-to-Cloud REST API to integrate external EMS or trading solutions

OUR CORE TECHNOLOGY

INVERTER

PBI Series:

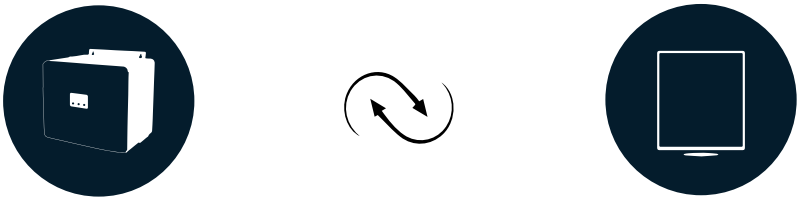
With the Pramac Inverter it is possible to reduce energy costs through peak reduction or load balancing for extended charging of electric vehicles in industrial areas.

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

Furthermore, a secure island grid can be set up with the backup version in order to be able to supply the loads efficiently in the event of a grid failure.

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
- Available in different power versions



INVERTER **ENERGY MANAGEMENT SYSTEM**

- Perfect coordination and maximum efficiency thanks to in-house development
- Consistency and Reliability
- Highest quality and Security
- Higher added value by reducing operational downtimes
- Supports autonomous energy supply - supplying critical infrastructures

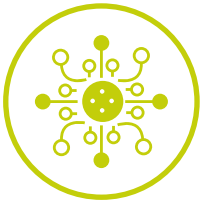
BSI / BSI PRO: INDOOR SOLUTIONS

BSI / BSI PRO Series:

Industrial battery storage systems play a central role in the energy transition.
Our industrial battery storage solutions therefore help to increase self-consumption and the self-sufficiency rate in order to optimise energy costs.

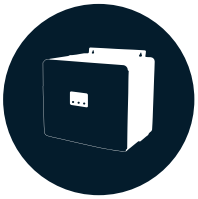
Pramac's backup solutions for the indoor area ensure that the connected loads continue to be supplied reliably even in the event of a grid failure, which reduces downtimes.

- Pre-configured indoor battery storage kit
- Easy installation and commissioning
- EMS and Battery Inverter 50K or 90K integrated
- Modular battery racks for capacity stacking
- Combiner Rack for capacity or power expansion



- C&I Buildings – Peak Shaving, Time of Use, Self-consumption, Multi-Use
- 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

BSO MAX: OUTDOOR ON-GRID SOLUTIONS

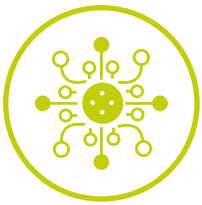
ON GRID

BSO MAX Series:

The new BSO MAX battery storage generation from Pramac is an efficient solution for sustainable energy management for a wide range of applications. The BSO MAX offers a space-saving outdoor solution, not only thanks to its significantly higher energy density, but also due to the close stackability of more parallel systems.

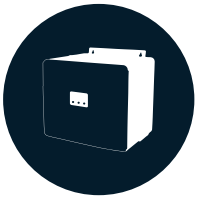
BSO MAX is ideal for optimising self-consumption and reducing peak demand, supporting smarter and more responsible energy use.

- All-in-one battery storage system for outdoor use
- Pure ON-Grid solution in a IP54 Outdoor cabinet
- Easy & quick installation – components pre-installed
- High safety standard - smoke-/ heat-sensors, Aerosol extinguishing system, water pipe connector
- Heating & cooling included
- Side-by-side installation for modular expansion without losing much space
- Redundant air conditioning units for optimum cooling and heating



- C&I Buildings – Peak Shaving, Time of Use, Self-consumption, Multi-Use
- Buffer storage for EV fast charging – increasing the usable grid connection 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

BSO MAX PRO: OUTDOOR BACK-UP SOLUTIONS

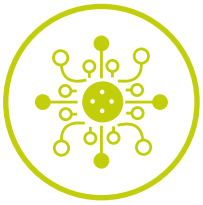
ON GRID

BACKUP

BSO MAX PRO Series:

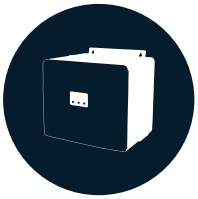
The new BSO MAX battery storage generation from Pramac offers an efficient and compact backup solution for outdoor applications with the PRO version. Thanks to the significantly higher energy density and the close stackability of more parallel systems, the BSO MAX PRO is ideal for optimising self-consumption and reducing peak demand, thus supporting a more intelligent and responsible use of energy - even in the event of a grid failure.

- All-in-one outdoor battery storage system
- On-Grid 90kVA / 75kVA backup power (120% overload)
- Phase unbalance up to 20kVA (transformerless)
- Half-wave consumer up to 1kW
- Transition from ON-Grid mode to Backup mode ≤ 5s with Pramac Transfer Switch cabinet
- High safety standard - smoke-/ heat-sensors, Aerosol extinguishing system, water pipe connector
- 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 / Multi-use

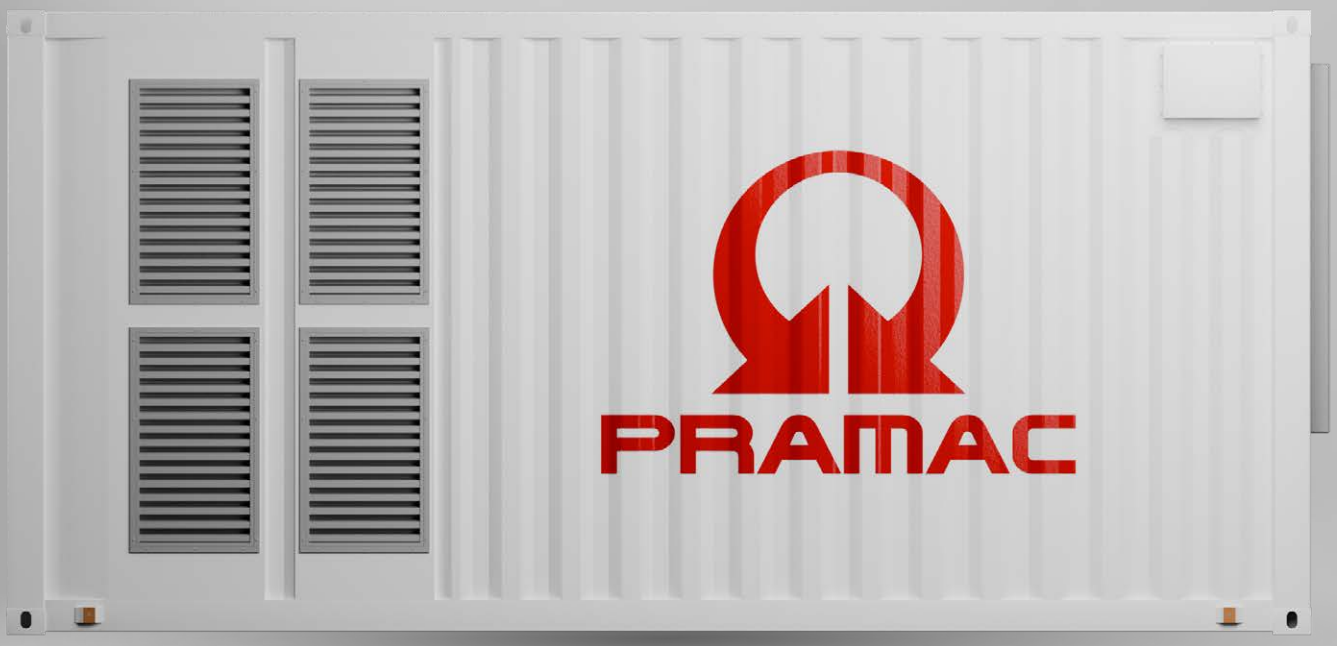
OUR CORE TECHNOLOGY



INVERTER

ENERGY MANAGEMENT SYSTEM

BSC: CONTAINERIZED SOLUTIONS

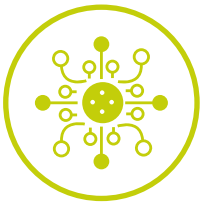


BSC Series:

Industrial battery storage systems play a central role in the energy transition and are a crucial component for a sustainable and reliable energy supply.

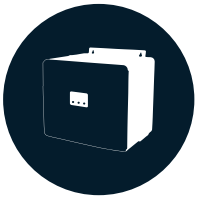
Our modular battery storage solutions in containers help operators to increase self-consumption, optimise energy costs and ensure a more environmentally friendly energy supply.

- 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



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

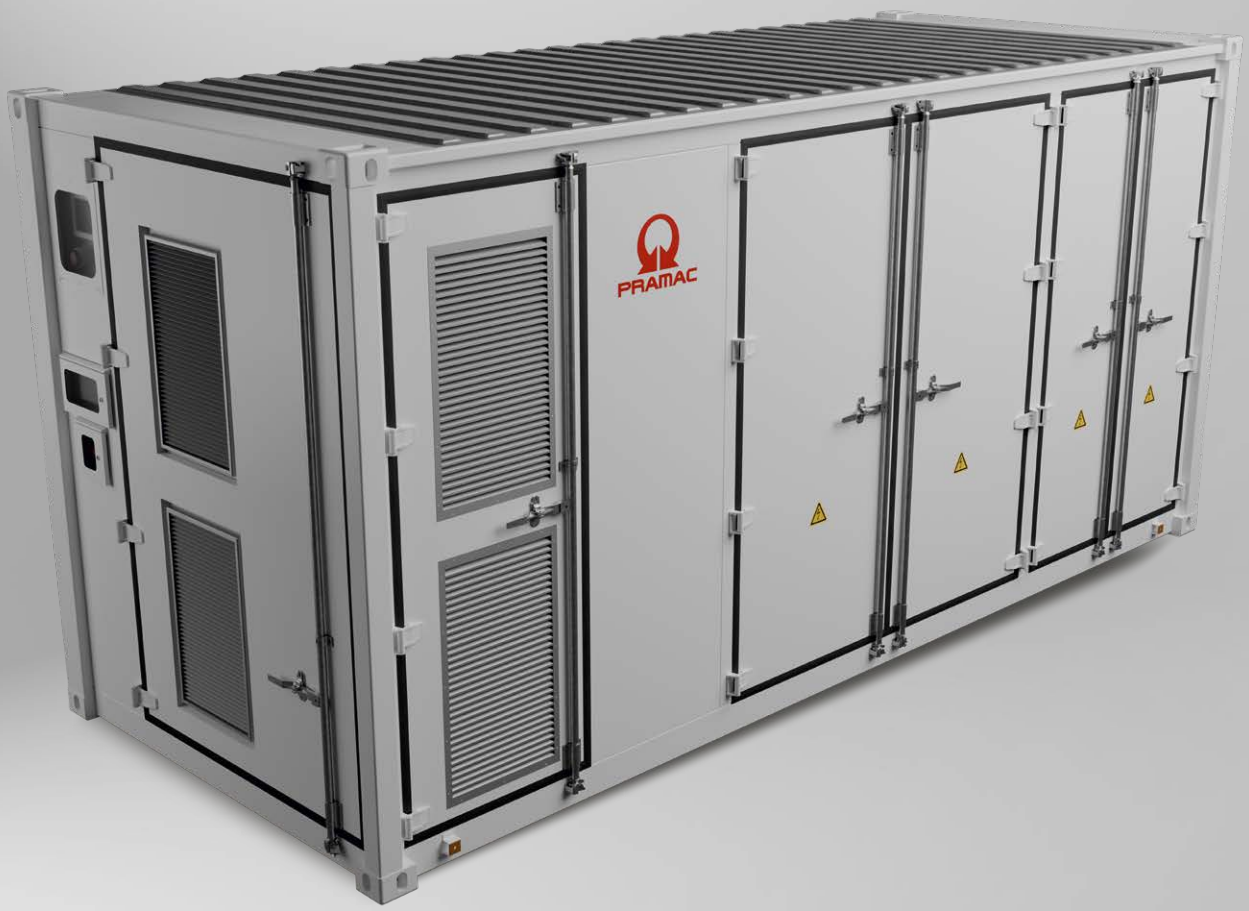
OUR CORE TECHNOLOGY



INVERTER

ENERGY MANAGEMENT SYSTEM

BSC MAX / PWR: CONTAINERIZED SOLUTIONS



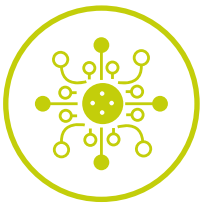
BSC MAX / PWR Series:

The BSC MAX / PWR is Pramac's new industrial containerised battery storage solution with significantly higher energy density in 10 and 20ft designs. Thanks to the compact design, the solutions offer maximum flexibility in site selection and system planning.

With in-house development and production at the Pramac Factory, the BSC MAX /PWR solution offers everything from a single source – a central point of contact, customised solutions and the highest quality standards.

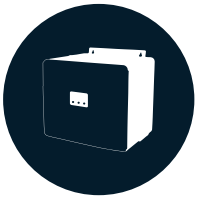
This covers the growing energy requirements of commercial and industrial users, optimising self-consumption, balancing load peaks and improving efficiency.

- Pre-installed battery container all-in-one solution - on a reduced footprint
- In-house power and control electronics – Perfectly optimised with maximum safety and efficiency
- State-of-the-art safety technology (monitoring / aerosol / smoke / heat)
- Latest cell technology – Highest quality, durability and safety
- Scalable performance and capacity
- Energy-optimized air-air battery cooling system for higher efficency



- Commercial and industrial plants – Peak Shaving, Time of Use, Self-consumption, Energy Trading, Multi-Use
- 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

BSI / BSI PRO - INDOOR

TECHNICAL DATA	BSI 50	BSI PRO 90*	BSI 100	BSI 180
Rated Power (kVA)	50	90 On-Grid / 75 Backup Power	2x50	2x90
Total capacity range (kWh)	109 - 436		218 - 872	
Rated net capacity range (kWh) (90%DoD)	98 - 392		192 - 785	
Max. C-Rate	0.82 C			
Cell Type	LFP (Pouch)			
Cycles	7.300 @ 90% DoD | 65% SoH			
Operating temperature range (min / max)	+10°C / +40°C			
Humidity (%, RH)	5-95, non-condensing			
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 - 800			
H (mm)	2.200			
Protection type	IP20			
Warranty	5 years product warranty / 10 years performance warranty			

*** This model requires the Accessory Product Pramac Smart Transfer Switch (PSTS)**

BSO MAX / BSO MAX PRO - OUTDOOR

TECHNICAL DATA	BSO MAX 90	BSO MAX PRO 90/188*
Rated Power (kVA)	90	90 On-Grid / 75 Backup Power
Total capacity (kWh)	188	
Rated net capacity (kWh) (90%DoD)	169	
Max. C-Rate	0.5 C	
Cell Type	LFP (Prismatic)	
Cycles	7.300 @ 90% DoD | 65% SoH	
Operating temperature range (min / max)	-20°C / +50°C	
Humidity (%, RH)	5-95, non-condensing	
Max. permissible installation height (m)	3.000	
Weight range, assembled (kg)	2.600	
Dimensions WxDxH (mm)	1.300x1.354x2.387	
Protection type	IP54	
Interfaces	RJ45 (Ethernet)	
Safety devices	Permanent monitoring of the Battery cells / Smoke-/Heat-Sensor / Aerosol Generator / Water Pipe connector / Overpressure flap	
Warranty	5 years product warranty / 10 years performance warranty	

*** This model requires the Accessory Product Pramac Smart Transfer Switch (PSTS)**

BSC - CONTAINER

TECHNICAL DATA	BSC 10’	BSC 20’ HQ
Rated Power range (kVA)	90 - 360	180 - 720
Total capacity range (kWh)	218 - 436	237 - 1066
Rated net capacity range (kWh) (90%DoD)	196 - 392	213 - 959
Max. C-Rate	0.82 C	
Cell Type	LFP (Pouch)	
Cycles	7.300 @ 90% DoD | 65% SoH	
Operating temperature range (min / max)	-20°C / +50°C	
Humidity (%, RH)	5-95, non-condensing	
Max. permissible installation height (m)	2.000	
Weight range, assembled (kg)	6.500 - 9.000	9.400 - 17.800
Dimensions WxDxH (mm)	2.991x2.438x2.591	6.058x2.438x2.896
Protection type	IP54	
Interfaces	RJ45 (Ethernet)	
Safety devices	Permanent monitoring of the Battery cells / Smoke-/Heat-Sensor / Aerosol Generator / Overpressure flap	
Warranty	10 years product and performance warranty	

BSC MAX / BSC PWR - CONTAINER

TECHNICAL DATA	BSC MAX 10’	BSC MAX 20’	BSC PWR 10’	BSC PWR 20’
Rated Power Range (kVA)	270 - 540	540 - 1080	270 - 540	540 - 1080
Total gross capacity range (kWh)	564 - 1129	1129 - 2258	266 - 532	532 - 1064
Rated net capacity range (kWh) (90%DoD)	507 - 1016	1016 - 2032	239 - 479	479 - 957
Max. C-Rate	0.5 C		1 C	
Cell Type	LFP (Prismatic)			
Cycles @ 90% DoD | 65% SoH | 1C/1C	7.300 @ 90% DoD | 65% SoH			
Operating temperature range (min / max)	-20°C / +50°C			
Humidity (%, RH)	5-95, non-condensing			
Max. permissible installation height (m)	3.000			
Weight Container range, assemled (kg)	7.900 - 12.000	17.400 - 26.300	6.300 - 9.500	14.300 - 19.400
Dimensions (WxDxH) (mm)	2.991x2.438x2.591	6.058x2.438x2.896	2.991x2.438x2.591	6.058x2.438x2.896
Protection type	IP54			
Interfaces	RJ45 (Ethernet)			
Safety Devices	Permanent monitoring of the Battery cells / Smoke-/Heat-Sensor / Aerosol Generator / Overpressure flap			
Warranty	10 years product & performance warranty			

OPERATING **MODES**

Pramac's Battery Energy Storage can be used in a variety of operating modes, depending on the application area and specific customer needs.

SELF-CONSUMPTION (SCO)

- Surpluses from renewable PV generation are used to cover consumption at a later time.

PEAK SHAVING (PS)

- BESS is used to reduce the power drawn from the grid. BESS is charged when there is a low demand for power from the grid.
  If a power peak occurs, the BESS is discharged.

MULTI-USE

- Combination of Peak Shaving and SCO
- State of Charge as configurable threshold:
  - If below, switch from SCO to PS
  - If exceeded, switch from PS to SCO

EV LOAD MANAGEMENT

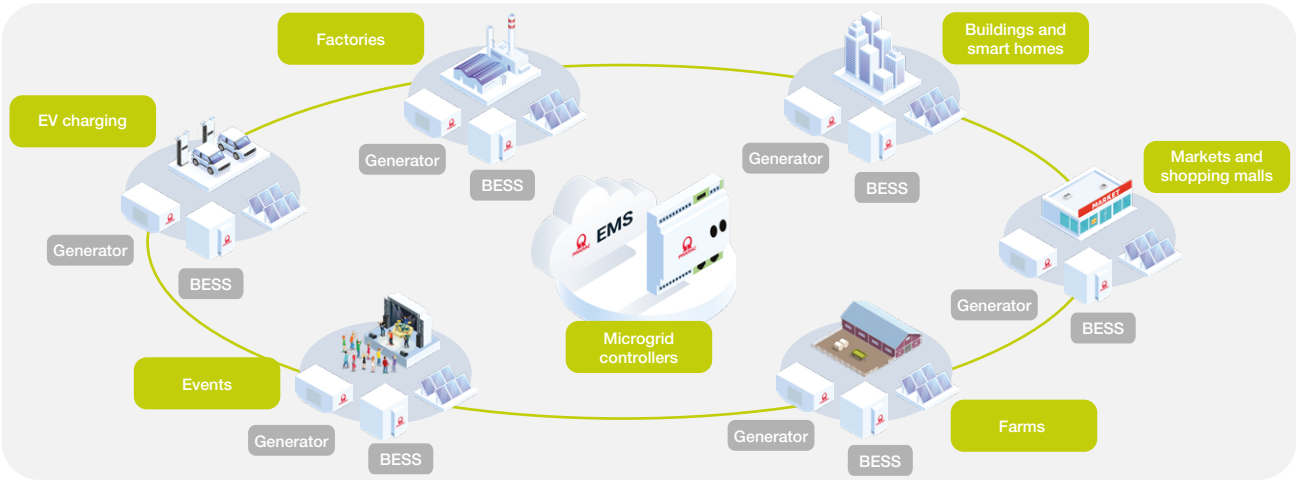
- Expansion of grid connection capacity without expansion of the public grid
- Charging purely via renewable energies

USE IN **MICROGRID SYSTEMS**

Many companies are embracing microgrid systems as an innovative solution to new energy challenges such as utility grid disruptions and volatile energy markets, not to mention rising awareness of climate change.

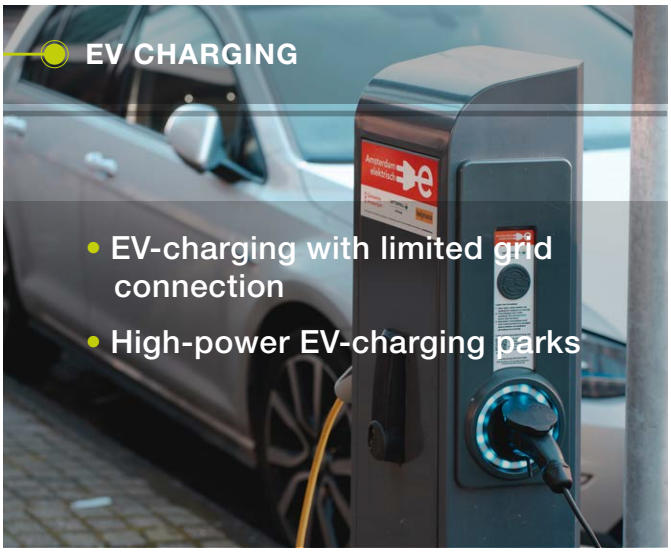
Pramac's energy storage systems are the perfect solution for individualised microgrid energy management. With Pramac's wide range of products and the in-house developed microgrid controller, important key objectives such as energy cost optimisation, resilience and decarbonisation are pursued.

Examples of microgrid applications:



Each site is equipped with its own local EMS and microgrid controller, available with standard or customized solutions.

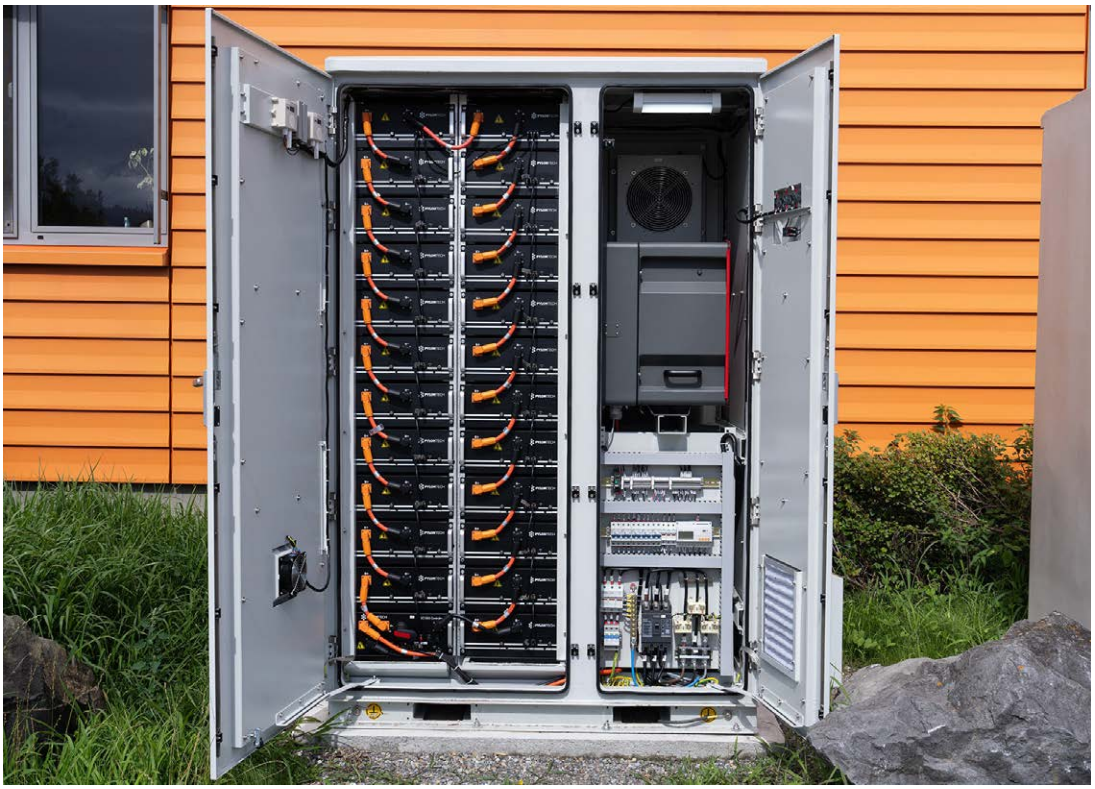
CLEAN AND EFFICIENT ENERGY SOLUTIONS ACROSS **A WIDE RANGE OF APPLICATIONS**



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 / 100 kW

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

AN INNOVATIVE FAST-CHARGING PARK FOR ELECTRIC CARS WITH INTEGRATION OF PV AND CHP IN A LIMITED POWER GRID

BKP EV charging park was developed to offer a high-performance, accessible, and environmentally friendly solution for users of electric vehicles. It integrates PV solar systems, a battery storage unit, and future biogas solutions to ensure a sustainable and reliable energy supply. The charging park features covered charging stations and a range of amenities such as a snack vending machine, bicycle rental, vacuum cleaners for cars, lounge area, and bathrooms.

Challenge: The grid connection is currently limited to 400 kVA and could handle a maximum of 1.3 MVA.

LOCATION:
SCHNELLDORF

COUNTRY:
GERMANY

SIZE RANGE:
BSC 264/1066/20
STORAGE CONTAINER
1066 kWh / 264 kW

THE SOLUTION

- 10 Alpitronic charging columns (300 kW) | 2 Alpitronic charging columns (400 kW) planned | E-bike rental in planning
- PV system with 712 kWp installed, expandable to up to 1 MWp, plus additional connection to 3.5 MWp of ground-mounted PV
- Pramac battery storage buffers the energy and supplies it via EVO/LSK to the vehicles; surplus electricity is fed into the grid
- **Future plans:** Expansion with CHP, energy trading of surplus energy, a feed-in model is in preparation for even faster amortization

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

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.

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