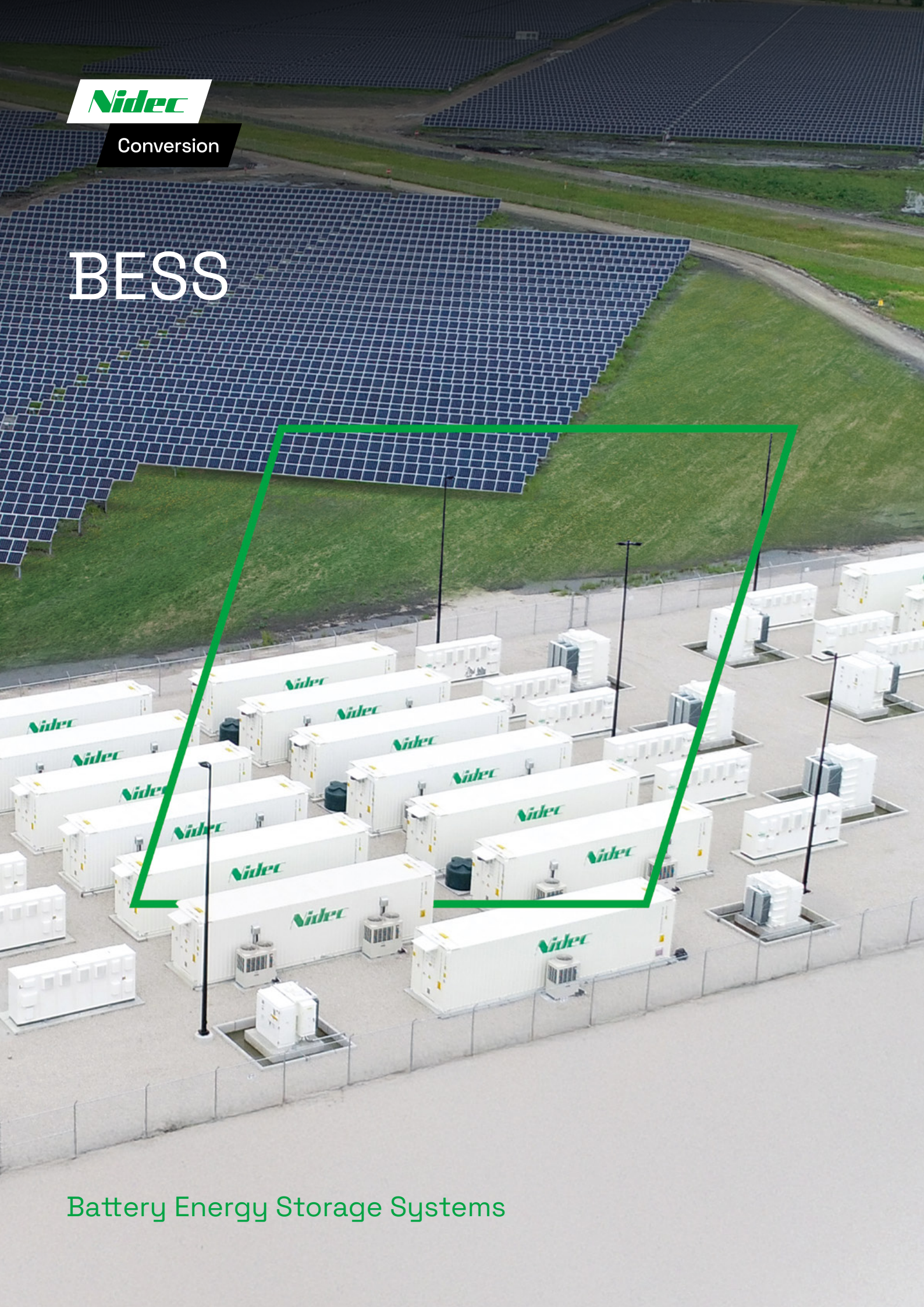
Nidec

Conversion

BESS



Battery Energy Storage Systems

Nidec - a global force

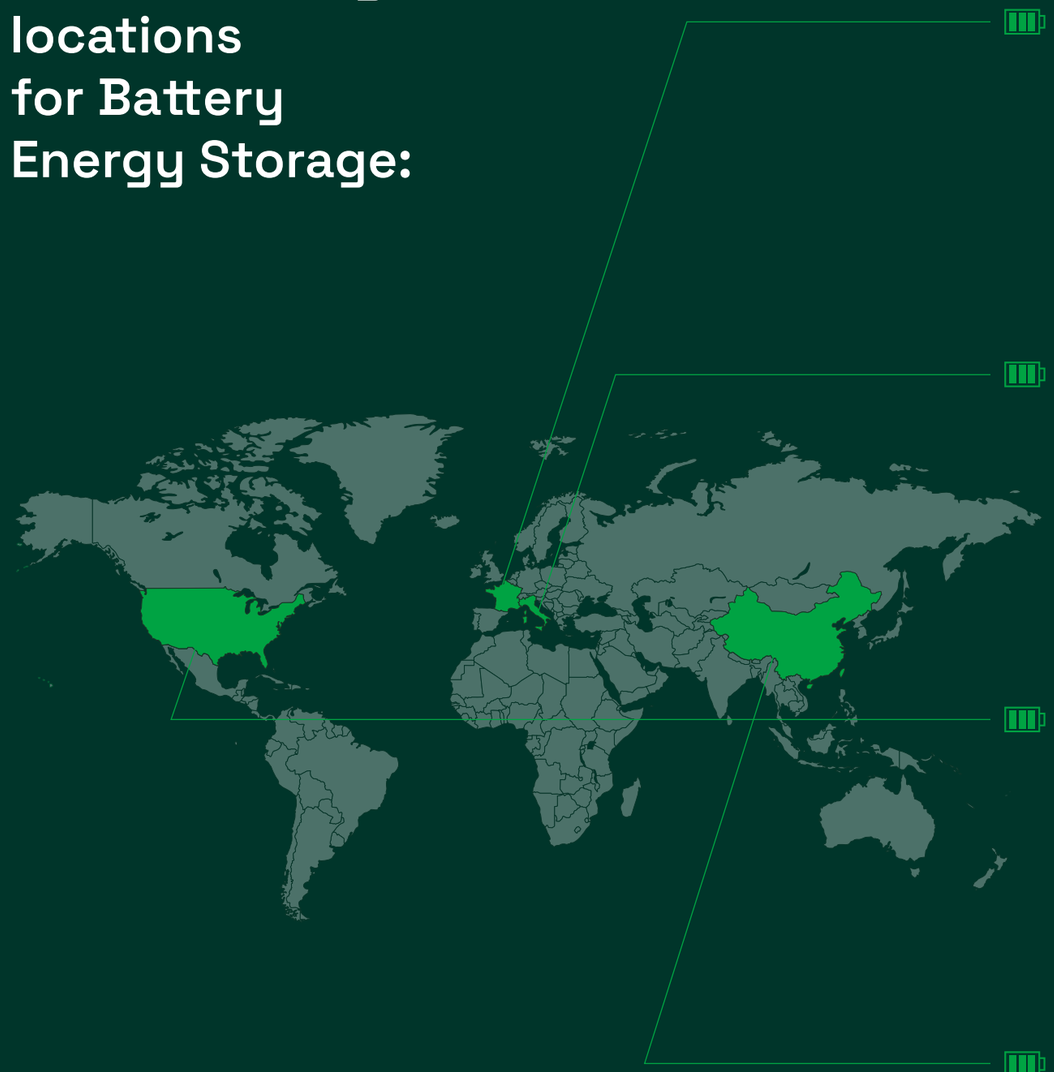
We are focused on converting Clean Energy into Power, we convert Clean Power into Motion, and we power the future, achieving a better and greener world for next generations, developing and manufacturing solutions that serve Energy, Mobility, and the Planet.

In 2013, Nidec group purchased Ansaldo Sistemi Industriali, an Italian multinational with over a century of experience in the design and manufacture of power electronics, motors and generators and automation systems for industrial applications thus entering the rapidly evolving energy sector with a focus on solutions that are transforming the industry, including Energy Storage. Nidec also owns the following industrial brands: US Motors, KatoEngineering, Leroy Somer, Control Techniques and SSB Wind Systems.

With over 11.0 GWh of energy storage across the globe in 170 projects, Nidec is one of the world's leading providers of large scale energy storage solutions. Whether you are investing in Primary Frequency Regulation, Power Balancing, Peak Shaving, Peak Shifting or Microgrid applications we have the right solution to fit your needs.

#1 in Europe. Ranked in top 3 for Utility Scale BESS Globally.

Primary manufacturing locations for Battery Energy Storage:



France

Located in central France, our Roche-la-Moliere e La Fouillouse facilities are the global Center of Excellence for Energy Storage Systems with global responsibility for the development of our Power and Energy Management System (PEMS) as well as the design and construction of our containerized BESS solutions such as the all-in-one ACBOX and battery-only DC blocks.

Italy

Located in northern Italy, our Milan and Vicenza facilities are the global Center of Excellence for Power Electronics. Our Power Conversion Systems are designed, developed and manufactured based on our more than 100 years of experience in the manufacturing of power electronics for heavy industrial applications.

USA

Nidec Group expanded its USA operations with the opening of a facility in Cleveland (Ohio). The state-of-the-art facility features a purpose-built area for the assembly and testing of extensive industrial controls and automation systems, Battery Energy Storage Systems (BESS), and Medium Voltage Drives, along with a cutting-edge production area for Nidec's Avtron Encoders.

China

SSB Wind Energy Technology (Qingdao) Co.,Ltd. was established in 2005 . Nidec Energy Storage R&D center in China has developed the world's leading energy storage products with high quality and reliability based on Europe's leading battery management technology, energy storage converter technology and energy management technology. Additionally, SSB has been a major supplier and technology leader in pitch control systems for wind power.

Our components and systems offer safe, reliable performance over their entire lifetime backed by nearly a century of experience in the design, manufacture and supply of electrical systems. Our expertise in power conversion, power management and power quality is your key to a successful project.

Power Conversion

Our Power Conversion Systems are designed and built in-house using the same components of our industrial product line, which means spare parts and upgrades will be available for the life of the equipment. Rugged and robust, these products have a proven track record for performance and efficiency.

Power Management

ARTICS Smart Energy is our proprietary, real-time integrated Power and Energy Management System which operates on standard hardware platforms. With a vast library of functions, the system can quickly be configured to your plant's requirements. Based on our industrial platform it is a tried and true solution used in thousands of plants across the globe and can be seamlessly integrated with third party arbitrage or supervisory software.

The Benefits of Bess

Technology helps improve energy flow at every stage of the energy transmission chain. It can reduce generation costs, managing and flattening the load profile and consequently avoid costly grid upgrades such as additional peaker stations. Furthermore, energy from renewable sources can be integrated with BESS to optimize the plant's generation profile to either obtain a flat profile or store excess production to release later when required. Moreover, BESS makes the grid smarter and capable of using electrical power at the grid level when it is most needed.

Hassle-Free Projects in three simple steps

Nidec Conversion acts as a turn-key system supplier or electrical partner to suit your needs. Our systems are fully manufactured in-house using our proprietary Power Conversion Systems and our own Power Management System for a truly integrated solution.

Nidec Conversion takes a partnership approach with customers and ensures that the experience of working with us is always positive. Our expert engineering and project management team has fine-tuned our process into three simple steps:

- Configure
- Assemble & Test
- Install & Commission

The Extraordinary value of experience

18
Service centers

11.0 GWh
Energy storage

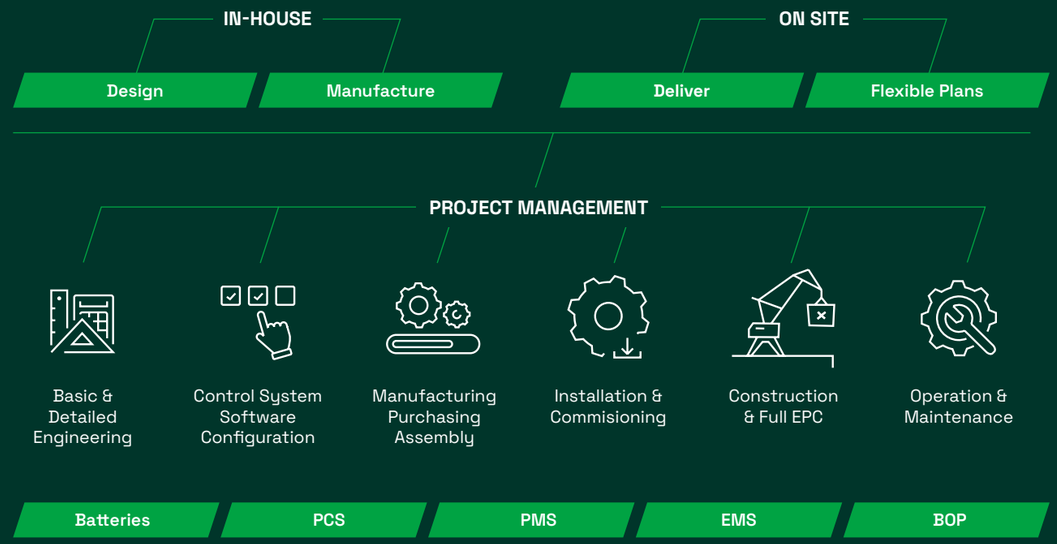
9
Manufacturing sites

170
Projects

4.3 GW
Installed capacity

28
Countries

Plug & Play Storage System



ACBOX V4 | All-in-one solutions

ACBOX V4 are all-in-one solutions based on a proprietary design comprising batteries, 4-quadrant AC/DC power conversion, efficient thermal management through an embedded water-cooling system, and state-of-the-art safety features. ACBOX V4 units are delivered in rugged high-cube containers, ensuring maximum robustness and compatibility with the harshest environmental conditions.

ACBOX V4 units are complemented by an external MV/LV transformer and MV switchgear also configured and supplied by Nidec. Seamless integration with Nidec Conversion's Power and Energy Management Systems ensures maximum flexibility in meeting customer application demands and grid code requirements.

1 Energy

Tier-1, 0.5P LFP batteries to meet demands from all applications and for the longest lifetime.

2 Distributed AC/DC

SiC-based independent AC/DC converters deliver top-of-the-class RTE and maximum energy yield and system availability

3 Embedded TMS

Embedded custom-designed liquid cooling system for optimal performance in the most compact footprint.

4 Safety Systems

- Fire detection and aerosol-based suppression
- Early gas detection
- NFPA 68, 69-compliant deflagration panels.

5 Easy Access

Non-walk-in design enables access to all equipment through doors on two sides only.

6 AC Port

Thermal Management System (TMS)

A custom-designed liquid cooling system delivers the benefits of a rugged industrial chiller while optimizing auxiliary consumption across the whole operating range, thanks to its free-cooling capability and tunable ventilation and liquid flow, continuously adapted in real time. Maintenance is minimized thanks to the lack of air filters and thanks to an embedded auto-refill system which ensures the maximum system availability.

Safety and compliance

ACBOX V4 solutions deliver the highest safety levels by adhering to the most stringent regulatlons in all its parts.

- Batteries: UL 1973, UL 9540A, IEC 62619, IEC 63056, UN 3536
- Power Conversion: IEC 62109-1, IEC 62909-1, IEC 62477-1
- System: IEC 62933-5-2
- Cyber-Security: IEC 62433
- Grid Code: EN 50549 | Finland SJV2024 | Germany VDE-AR-N 4110, 4120, 4130, VDE FNN Guidelines for grid forming | Italy Terna Allegato A.79, CEI 0-16 | Spain NTS v2.1, Capacidades grid forming | UK G99 | US UL 1741 SB, IEEE 2800

Ready for next generation grids

Grid-connected grid forming operation with fault ride-through and synthetic inertia capabilities make Nidec Power Conversion Systems ready to support grids in the face of ever increasing penetration of non-programmable power generation.

	U1	U2	U3
Nameplate energy	5.03 MWh	6.71 MWh	8.39 MWh
Power	Up to 3 MVA	Up to 3 MVA	Up to 2.5 MVA
Footprint	22 ft HC	28 ft HC	34 ft HC
Cell density	315 Ah	315 Ah	315 Ah
Cell rating	0.5P	0.5P	0.5P
Rack configuration	1P416S	1P416S	1P416S
System configuration	12 racks	16 racks	20 racks
Independent AC/DC	Up to 12	Up to 16	Up to 20
Weight	42000 kg	60000 kg	75000 kg

Power Conversion System - UniQube

Leveraging its extensive expertise in power electronics, Nidec developed 4-quadrant, water-cooled power conversion solutions compatible with batteries rated up to 1500 V.

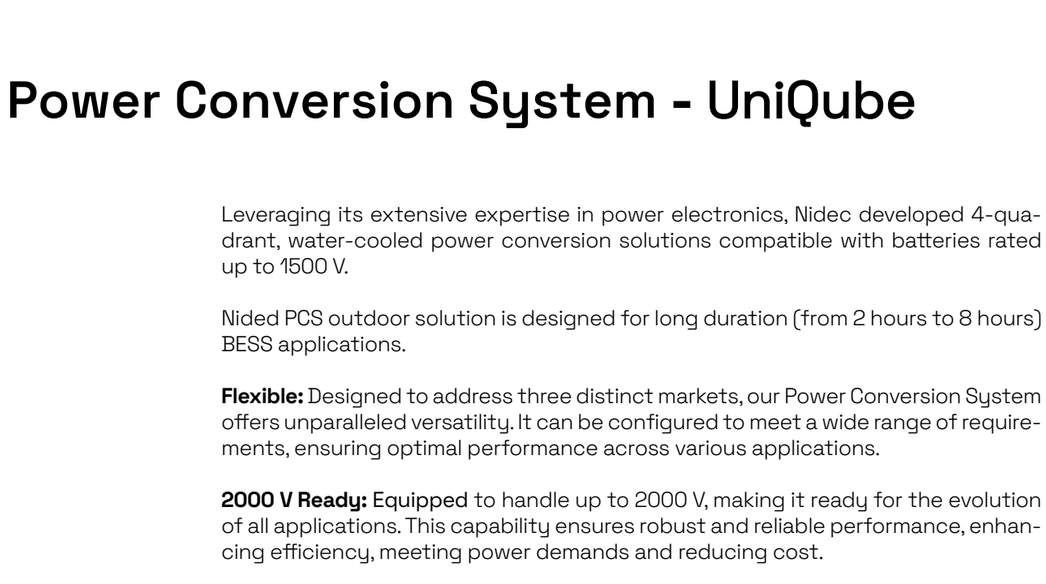
Nided PCS outdoor solution is designed for long duration (from 2 hours to 8 hours) BESS applications.

Flexible: Designed to address three distinct markets, our Power Conversion System offers unparalleled versatility. It can be configured to meet a wide range of requirements, ensuring optimal performance across various applications.

2000 V Ready: Equipped to handle up to 2000 V, making it ready for the evolution of all applications. This capability ensures robust and reliable performance, enhancing efficiency, meeting power demands and reducing cost.

High Power Density: Designed for skid integration to reach one of the highest power density in the market, manteining maximum efficiency and performance without taking up valuable space.

Silent: Eliminate disruptive operations with our cutting-edge technology. Our optional noise reduction kit guarantees that your power conversion process remains nearly silent without sacrificing efficiency or dependability.



Power Unit (PU)

Nidec Power Unit is a complete plug & play skid solution that includes the MV switchgear, the power transformer and the Power Conversion Systems.

Compliance
Nidec Power Unit meet requirements by all major international standards.

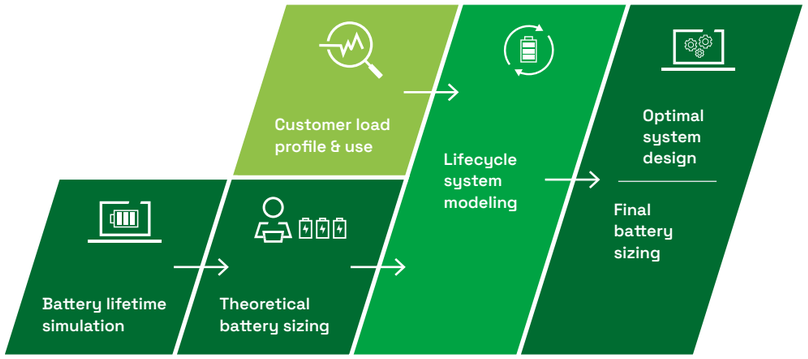
Ready For Next Generation Grids
Grid-connected grid forming operation with fault ride-through and synthetic inertia capabilities make Nidec Power Unit ready to support grids in the face of ever increasing penetration of non-programmable power generation.

Available configurations
Nidec Power Unit is available in 2 alternative configurations:

- 5 MVA in a 20’ skid
- 10 MVA in a 30’ skid

Battery sizing and ARTICS smart energy

Battery sizing is one of the most critical steps in developing the optimal bess system. At nidec we have developed an advanced lifecycle system modeling tool that allows us to take the user's load profile and the battery manufacturer's theoretical life cycle and run a simulation of how the batteries will actually perform to determine the ideal battery sizing for the application.

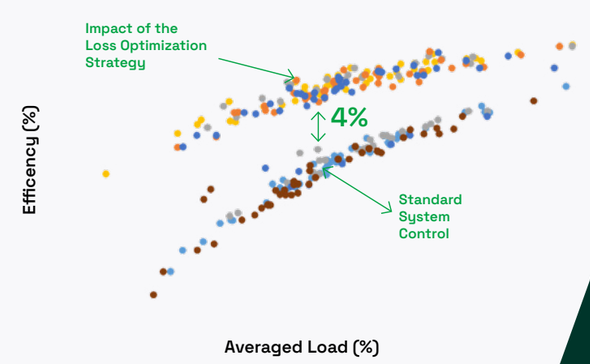


Our systems are battery agnostic. Nidec has vast experience working with different types of batteries in various applications.

Battery Technology	Power Density	Energy Density	Life Cycle	Efficiency	Price	Environmental Impact
LI-ION	▮▮▮▮	▮▮▮▮	▮▮▮▮	▮▮▮▮	▮▮	▮▮▮
LEAD ACID	▮▮▮	▮▮▮	▮	▮▮	▮▮▮▮	▮▮
MOLTEN METAL/SALT	▮▮	▮▮	▮▮	▮▮	▮▮	▮▮▮▮
NICKEL BASED	▮▮	▮▮	▮▮	▮▮	▮▮▮	▮▮

Minimizing the losses

Efficient power dispatching



- Testing over 300 days
- Each point is a day
- In the standard control mode, the system is balancing the SOC of the batteries.
- The algorithms in our PMS are based on a "Loss Optimization Strategy" which grants chances to further reduce losses through optimized usage of our inverters.

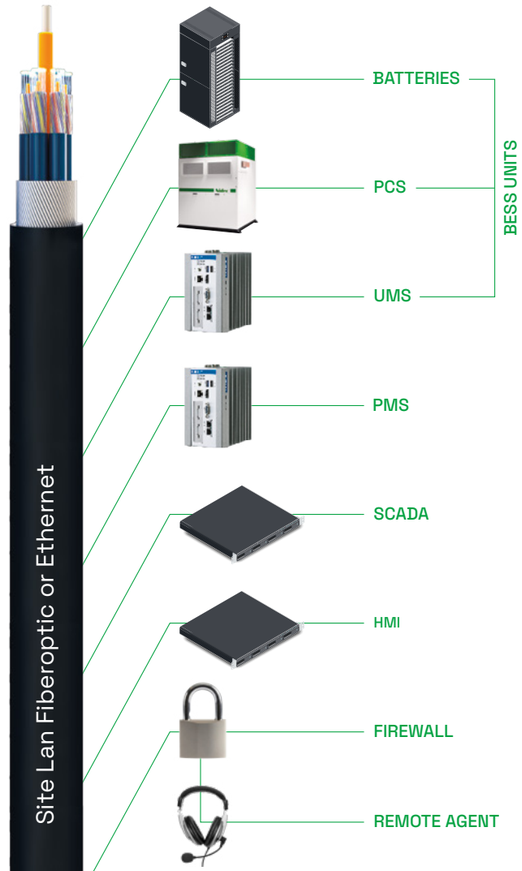
ARTICS Smart Energy is a configurable, open platform that offers maximum reliability based on our industrial automation suite used in more than 900 plants worldwide.

Key functions include:

- Power metering
- Historical data collection
- RES production prediction and management
- Forecast of energy profile for the next day
- Real-time control for loads and generators for grid stability and max RES production purposes
- Measure and analysis of the electric distribution system
- Emergency and protection management
- System Synchronization
- On-Grid & Off-Grid operations
- Monitoring and supervision system

Nidec portfolio includes a fully integrated control architecture collecting data from BMS on one end and interacting with the grid and TSO on the other, to deliver optimal battery performance and grid code compliance through a set of proprietary software solutions:

- Power Conversion System Control
- Unit Management System
- Power Management System
- Energy Management System
- SCADA and HMI



Operation & Maintenance

Nidec provides warranties with optional long term operation and maintenance contracts for full life cycle support. Our operating and maintenance philosophy represents our company's general partnership approach - the scope of work can be adapted to the customer's needs and requirements.

Operation & Maintenance are an optional service that we can provide to customers.
This service can be tailored to our customer's specific needs.

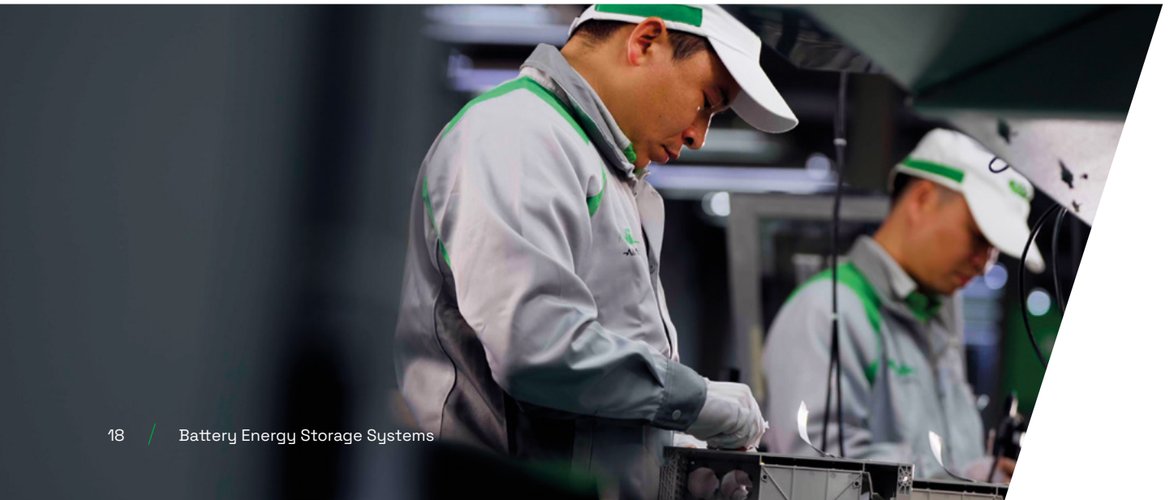
Nidec is able to offer customers 24/7 remote plant operation control and monitoring, including reporting of site operation and performance data. As the plant operator, Nidec will manage scheduling for preventive and corrective maintenance programs as well as ensuring spare parts are always available and up to date. Plant performance reporting includes regular performance analysis with both monthly and annual status updates. Furthermore, Nidec can manage customer invoicing to third parties. Yearly qualification testing can also be included in the contract.

Our maintenance programs include the following activities:
- First Level Intervention
- Preventive Maintenance
- Corrective Maintenance
- Hot Line Support, through a dedicated
- Help-Desk
- Remote Access Support

Under Long Term contracts, Customers are expected to ensure that a minimum stock of spare parts are available on-site but these can be managed by Nidec.

Nidec can also provide technical training for the Customer's Plant personnel, including Corrective Maintenance, troubleshooting, and equipment repairs so that the customer's Staff can repair the failure within the minimum possible time.

Nidec offers various communication strategies to minimize eventual downtime periods including: Maximum Notification Period, 24h Desk Support, Remote Support (via authorized VPN tunnel), Single Call Procedure.



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