



Power Conversion System for ESS
100 kW to 30 MW
Bi-directional Inverters

Energy Storage Solutions

Power Conversion Systems

With more than 125 years experience in power engineering and over a decade of expertise in developing energy storage technologies, ABB is a pioneer and leader in the field of distributed energy storage systems. Our technology allows stored energy to be accessed exactly when it is required, meeting the highest peaks of user demand at any time, resulting in optimum efficiency and cost effectiveness for both the power industry and its consumers.

Options

- Island mode
- Enclosure options (indoor cabinet, outdoor enclosure and containerization)
- Black start capability
- Dynamic control for applications such as peak-shaving, spinning reserve, etc.

Benefits

- Power system load leveling (deferred network and generation investment)
- Grid stabilisation (increased use of renewables)
- Grid compliance for renewable and generation systems
- Power quality improvement

Features

- Allows a range of energy storage devices to be coupled to the grid
- Dynamic power control (P)
- Dynamic reactive power control (Q)
- Current source mode for sub-cycle response to power commands
- Virtual Generator Control Mode providing grid stabilization via synthetic inertia and active damping
- High and low voltage ride through
- Modular inverter blocks for simple long term maintenance



Application	Benefits
Load Shifting	Store energy when demand is low and deliver energy when demand is high
Peak Power Shaving	Deliver power to the grid when peak demand is high, lowering costly demand charges and reducing the burden on the grid
Power Smoothing / Capacity Firming	"Smooth" out erratic power levels from renewable energy sources so utility receives constant and consistent power
Islanding / UPS	Supply network power to a section of the grid even though utility power is no longer present
Ancillary Services	Regulate grid frequency and voltage; balance of supply and demand
STATCOM	Correct power factor and improve voltage regulation

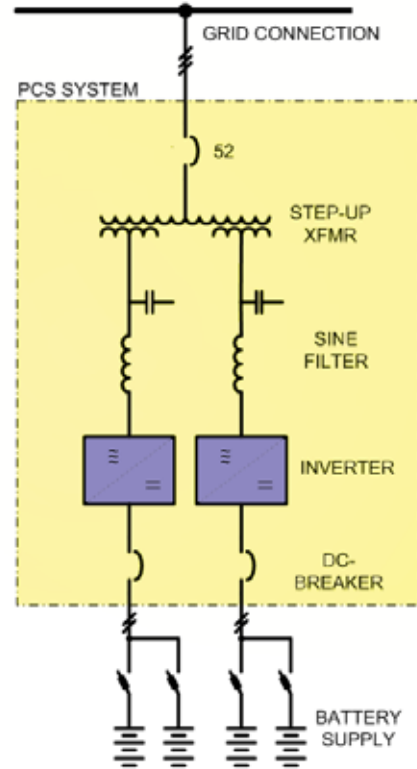
The ABB Power Conversion System is designed to be a complete package including everything between the battery and the utility bus.

Main components of the PCS

- AC circuit breakers and protection
- Main isolation/step-up transformer
- Auxiliary transformer and power distribution circuit
- Sine wave filter network
- Inverters
- DC circuit breakers and protection
- Local and remote control

The PCS enclosure houses all the main system components in one container that can be designed to cover a wide range of environmental conditions and temperatures. Advantages of a self-contained system include:

- Reduced installation and commissioning time
- Reduced transportation cost
- Future system mobility
- Fully factory tested PCS



PCS Energy Storage product portfolio



Configurations	500 kW cabinet	1000 kW rack	
Protection class	NEMA 1, 3R & 4	NEMA 1, 3R & 4	
Unit continuous kW rating	70-500	300-700	650-1300
MVar System applied	All configurations can be paralleled to obtain higher ratings needed		
DC system			
DC voltage range (VDC)	400-1120	400-1120	
Voltage ripple	IEEE compliant	IEEE compliant	
AC grid			
AC grid voltage (kV)	.2 to 35	.2 to 35	
AC tolerance	+/-10%	+/-10%	
Output Frequency	50 / 60	50 / 60	
Harmonic Distortion, Current	IEEE compliant	IEEE compliant	
Efficiency			
PCS efficiency	>94%	>94%	
PCS100 inverter efficiency	>97%	>97%	
Environmental limits			
Cooling	Forced Air	Forced Air	
Ambient temperature range (nominal) ^A	0°C to 50°C	0°C to 50°C	
Relative humidity	0 to 100%	0 to 100%	
Maximum altitude ft (m) ^B	9843 (3000)	9843 (3000)	
Seismic rating	Zone 4	Zone 4	
Noise level of inverters	75-85 dBA	75-85 dBA	
Housing options - dimensions and weights			
A) Indoor package, in (mm) 0°C to 50°C ^{A,C}	32Wx32Dx85H (809x804x2154)	88Wx32Dx97H (2241x800x2464)	128Wx32Dx97H (3241x800x2464)
C) Outdoor package, in (mm) -30°C to 40°C ^A	60Wx60Dx97H (1524x1524x2464)	114Wx51Dx115H (2886x1295x2921)	153Wx51Dx115H (3886x1295x2921)
Weights outdoor, lbs (kg)	3000 (1361)	4100 (1860)	7000 (3175)
Includes grid-tie transformer in footprint	No	No	

A - PCS temperature rating depends on housing selection; PCS100 inverters are derated over 40°C

B - Systems derated above 1000 m

C - Indoor 500 kW cabinet solution control cabinet mounted in cabinet if space permits, otherwise separate mounting

D - Currently can house up to 20kV in container; higher voltages typically outside container



2 MW Container		4 MW Container	
ISO Container		ISO Container	
1000 - 2600		2000 - 5200	
All configurations can be paralleled to obtain higher ratings needed			
400-1120		400-1120	
IEEE compliant		IEEE compliant	
.2 to 35		.2 to 35	
+/-10%		+/-10%	
50 / 60		50 / 60	
IEEE compliant		IEEE compliant	
>94%		>94%	
>97%		>97%	
Forced Air or HVAC		Forced Air or HVAC	
-30°C to 50°C		-30°C to 50°C	
0 to 100%		0 to 100%	
9843 (3000)		9843 (3000)	
Zone 4		Zone 4	
75-85 dBA		75-85 dBA	
N/A		N/A	
240Wx96Dx102H (6096x2438x2591)		480Wx96Dx102H (12192x2438x2591);	
30000 (13608)		56000 (25401)	
Yes ^D		Yes ^D	

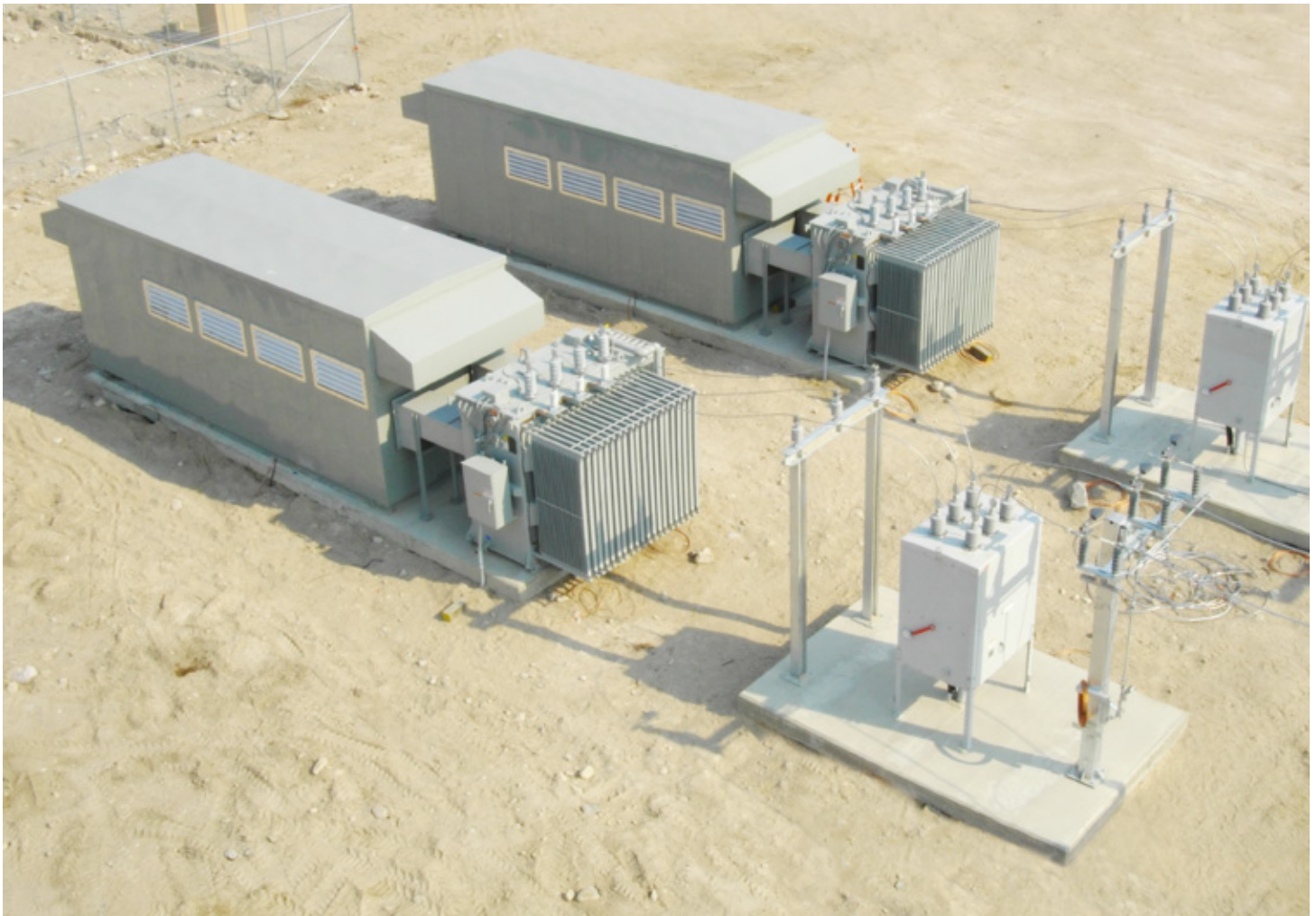
Value added solutions

Standard or engineered products

ABB's engineering team provides the necessary electrical, protective and monitoring equipment, delivering a high level of energy continuity and superior power quality in a safe and cost effective system. The PCS is available in several capacities, depending on the scope of the application.

Advantages of ABB's standard and engineered systems include:

- Scalable building block design
- Redundant inverter design increases reliability and availability
- Inverter technology is part of a proven family of global ABB products
- Containerized solution will reduce installation time and provide mobility
- Customer assistance in sizing and modeling of systems
- Internal transformer design minimizes installation costs, optimizes footprint and simplifies testing and commissioning.



Service and support

Installation, commissioning and life cycle management

Services for ABB's PCS product

- Supervision of installation and commissioning
- 24 x 365 local support line
- Worldwide service network
- Spare parts and logistics network
- Training
- Preventive maintenance contracts
- Engineering Studies

Installation and commissioning

Proper installation and commissioning of the equipment, done by qualified and certified commissioning engineers, reduces start-up time, increases safety and reliability and decreases life cycle costs. In addition, operators can be given practical training by experienced specialists on site.

Life cycle management

ABB's life cycle management model maximizes the value of the equipment and maintenance investment by maintaining high availability, eliminating unplanned repair costs and extending the lifetime of the drive. Life cycle management includes:

- spare parts and expertise throughout the life cycle
- efficient product support and maintenance for improved reliability
- functionality upgrades to the initial product

Global network, local presence

After-sales service is an integral part of providing the customer with a reliable and efficient PCS system. The ABB Group of companies operates in more than 100 countries and has a worldwide network of service operations.



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ABB (www.abb.us) is a leader in power and automation technologies that enable utility and industry customers to improve their performance while lowering environmental impact. ABB is the world's largest drives manufacturer. The ABB Group of companies operates in around 100 countries and employs more than 120,000 people.