

APStorage ENERGY STORAGE

(CAPACITY FROM 5KWH TO 1.280 MWH)

Intended for
the following industries:



APStorage is a small scale energy storage device (energy from several watt-hours to several megawatt-hours). The system is composed of a two-way inverter, a controller (including algorithms used to set values and direction of active and reactive power to execute functions of the system) and a chemical energy storage (depending on required charging and discharging currents, environment in which it is installed and an economy, we may use the following types of batteries: lithium and ion, acid and lead, nickel and cadmium or hydride).

The need to store energy is a significant element of a modern power system, which improves power balance and eliminates disruptions resulting from this. APStorage causes increase of efficiency of energy use,

manages supply and demand, active improvement of energy quality, ensures smoothing of peaks and equalising of load profiles, as well as provides a possibility to switch to an island operation.

Areas of use of APStorage:

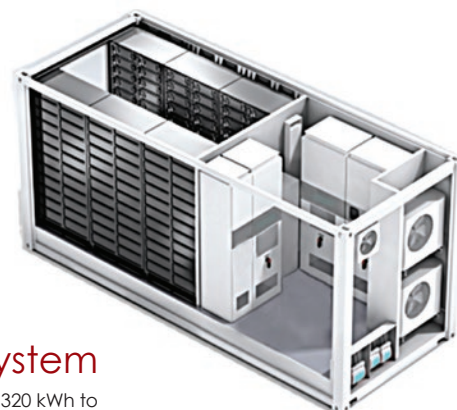
- distribution systems operators (OSD),
- industrial facilities,
- prosumers: housing society micro-networks, individual consumers etc.

APStorage is produced in two configurations:



Cabinet system

The cabinet system (of energy capacity from 5 kWh to 320 kWh), this system contains a two-way inverter mounted in a cabinet, its energy storage controller is integrated with the inverter's controller, the chemical accumulator is located on racks or installed in a cabinet.



Container system

The container system (of energy capacity from 320 kWh to 1.280 kWh), 20 ft. containers including an integrated anti-burglary, as well as fire and air conditioning systems.

Energy storage functions:

OSD operators: local control and voltage stabilisation, energy quality improvement, peaks smoothing (peak power limitation and levelling of dips), limiting transfer losses, reactive power compensation, ensuring local island operation and micro-networks balancing.

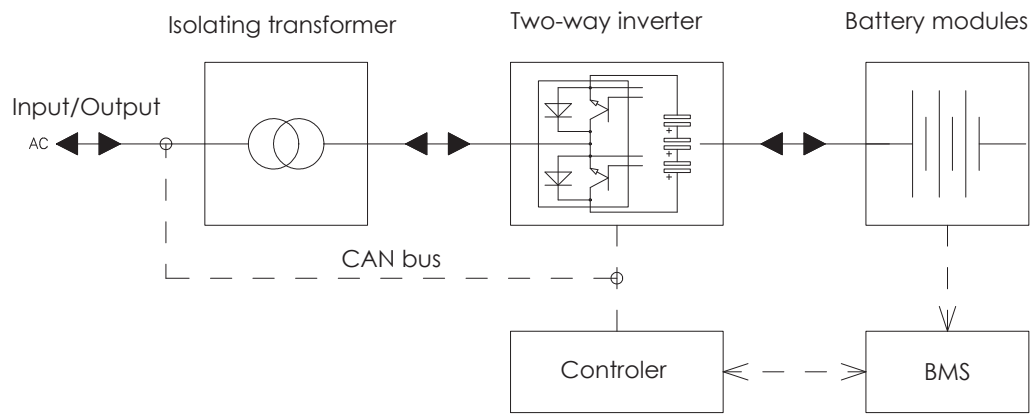
Prosumers: postponing of energy supply, e.g. in beneficial tariffs, ensuring local island operation and reactive power compensation.

The energy storage controller executes its tasks via an active and reactive power indicating unit and an operation mode selection unit (automatic, remote and local). Functions are implemented on the basis of network algorithms modified in terms of the energy storage operation nature and its expected functions.

System features:

- execution of functions according to the user's requirements,
- scalability and expansion capabilities,
- modular construction,
- full automation,
- communication with MODBUS RTU, DNP-3, IEC 870-5-103 master system,
- constant monitoring of the status of all elements of the device, control of their operation and reporting any failures,
- displaying the device operating state on the console – LCD screen and LEDs,
- communication between elements of CAN-open storage,
- on-grid, off-grid operation mode.

APStorage conceptual design:



APSTORAGE TECHNICAL PARAMETERS – CABINET SYSTEM

Storage energy capacity	kWh	from 5 to 320
Storage power	kW	from 5 to 400
Rated power supply voltage	VAC	3x400 +/-15%
Supply voltage frequency	Hz	50 +/-5%
Auxiliary power supply voltage	VAC	230/400 +/-15%
Chemical battery voltage	VDC	24, 48, 110, 220, 400, 690
Network rated voltage	VAC	3x400
HOUSING		
Housing type		Rittal type industrial cabinet, ZPAS or equivalent
Protection grade (EN 60529)	IP	from 20 to 54
Mounting		freestanding
Cabling connection		from the bottom
Colour	RAL	7035 or to be agreed

APSTORAGE TECHNICAL PARAMETERS – CONTAINER SYSTEM

Storage energy capacity	kWh	od 320 do 1280
Storage power	kW	od 320 do 2000
Rated power supply voltage	VAC	3x400 +/-15%
Supply voltage frequency	Hz	50 +/-5%
Auxiliary power supply voltage	VAC	230/400 +/-15%
Chemical battery voltage	VDC	690 V
Network rated voltage	VAC	SN 6 kV, 15 kV
HOUSING		
Housing type		20 ft. and 40 ft. container
Size	IP	20 ft. for 320 kWh capacity
Container retrofitting systems		fire fighting, air conditioning, access control
Colour	RAL	to be agreed

APSTORAGE CHEMICAL BATTERY SELECTION PARAMETERS, CABINET AND CONTAINER SYSTEM

Parameter/Battery type	Pb-LA	Ni-Cd	Ni-MH	Li-Ion NMC	Li-Ion LFP	Li-Ion LTO
Rated voltage [V]	2	1,2	1,2	3,6	3,2	2,8
Energy density [Wh/kg]	from 20 to 30	from 30 to 40	50	from 150 to 200	from 120 to 140	from 80 to 100
Efficiency [%]	from 65 to 80	from 70 to 80	from 80 to 90	from 85 to 95	from 85 to 95	from 85 to 90
Charging current [multiples of C capacity]	0,1 C (max 0,3 C)	0,1 C (max 0,3 C)	from 1 to 2 C	from 2 to 3 C	from 2 to 4 C	from 5 to 10 C
Discharge current [multiples of C capacity]	to 10 C	to 10 C	from 2 to 5 C	from 2 to 3 C	from 2 to 4 C	from 5 to 10 C
Number of cycles	from 600 to 1500	from 800 to 1200	1000	to 5000	to 3000	from 10000 to 20000
Service life [years]	from 5 to 15	from 10 to 20	from 10 to 15	from 15 to 20	from 15 to 20	from 15 to 20
Operating temperature range [°C]	from 0 to 35	from -20 to 50	from 0 to 35	from -10 to 70	from -20 to 55	from -10 to 50

Inverters

Static Switch

Converter Hz/Hz

Rectifiers

Converter DC/DC

Control Systems

Special Systems