

PowerCache® – L (500 kVA / 500 kWh) Datasheet

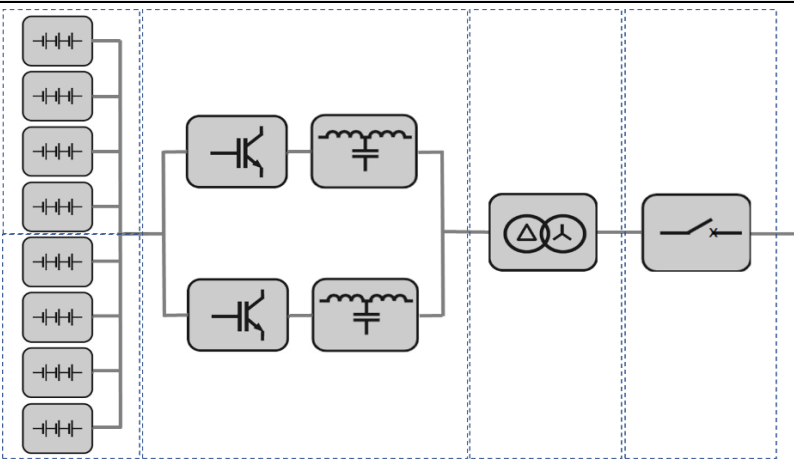
PowerCache® – L: Grid-in-a-Box

PowerCache® is a utility-grade power-system-strengthening inverter/battery system, or a “grid in a box”. It enables operators of C&I sites, microgrids and networks to resolve power constraints and safely operate an isolated network with up to 100% renewables. The versatile system combines robust, ultra-rapid-response power converters with a high-performance battery and intelligent microgrid control. It provides power system strength incl. inertia, utility-grade fault-current, and low voltage ride-through. It can participate in ancillary services markets if on-grid. PowerCache is expandable and integrates seamlessly with other systems on-site.



PowerCache-L modified battery cabinet for illustration only – PowerCache-L is composed of two cabinets

System Performance	
Nominal frequency and voltage	47Hz ... 53Hz, 415V or 400V +10%/-6%
Grid connection	3-phase/3-wire at 375V AC-LV for coupling via a transformer (YNd1) and a controlled breaker (in a separate enclosure) to the LV or HV network
Apparent power rating	$S_{Nom} = 500 \text{ kVA}$ ($I_{Nom} = 385\text{A}$) – the sustained load a system can serve at $\leq 40^\circ\text{C}$ ambient temperature within the normal range of battery SoC
Inverter maximum sustained loading	3-phase: $S_{Nom} = 500 \text{ kVA}$, single phase: $S_{Nom} / \sqrt{3}$ (other phases not loaded)
Permissible phase load imbalance	Unlimited within the rating per phase +/-
Inverter base electrical function	<ul style="list-style-type: none"> Current source (on-grid) Emulated synchronous machine (ESM) (on- & off-grid, various modes)
Harmonics	Compliant with AS4777.2
Step load capability (islanded or UPS)	Instantaneous load swing up to 220% S_{Nom} (absorbing to injecting)
Dynamic model & control sampling rate	1 ms (including for inertia, frequency PID and droop model & controls); 140 μs for current limiting and fault current control
Response time to external control signal	< 20 ms (plus any overlaid controller reaction time)
Primary frequency control step response – rise time / settling time	User definable via generator time constant and frequency PID control parameters, typically: 150 ms / 1500 ms
System overload capability	~400% instantaneous, 180% for 2s, 130% for 1 minute in 10 minutes
Fault current capability	Fault current settable up to 180% I_{Nom} (3-phase) and 310% (1-phase) for 2s Fault currents add up for sets made from parallel PowerCache systems
Other power system strength functions	Inertia, voltage disturbance- and fault ride through, direct feeder voltage control (via VT)
Ancillary services functions	FCAS (all services), FFR (2s), high-res. inertia (implemented on the inverter firmware)
Grid AC protection locations	BESS feeder and inter-tie protection of BESS with the site mains or site main generator
Grid AC protections elements	Over/under current/voltage/frequency, RoCoF, VVS, negative sequence voltage, sync-checks, anti-islanding to AS4777
Application-level protections	Over/under SoC, protection consistency, application alarms, safe states, etc
DC protection	Insulation monitoring, overcurrent/voltage, Battery OEM protections
System AC-AC round trip efficiency	> 86% including HVAC-losses, >89% excluding HVAC-losses (for a typical pattern)
Battery Performance	
Total DC energy / usable energy	620 kWh / 505 kWh at 1C (dis-)charge
Battery chemistry	NMC cathode, $\text{LiNi}_x\text{Mn}_y\text{Co}_z\text{O}_2$, pouch cell structure
Indicative battery cycle life / full cycle equivalents (FCE)	4,000 FCE at 90% DoD to 70% capacity retention; or 5,000 FCE at 80% DoD to 70% capacity retention
Battery calendar life	>13 years
Battery Protection	Cell-, rack- and system-level supervision, control and protection of current, voltage, power, SoC, SoH, temperature, imbalances, insulation

Interfaces				
System HMI	Web application via VPN, SCADA-style graphics, for local and remote operator access			
Local Data Historian Client	Logging all system actuals, modes, parameters, and features; VPN access			
Cloud-Client GUI and API	Cloud-Client GUI and API via the PaDECS®-Cloud (SaaS), for monitoring and scheduling			
Web-API	Web-API via VPN for 3 rd -part system integration			
SCADA	Modbus TCP and/or discrete hardwired alarms and E-Stop			
Mechanical - Inverter System Module				
Fire mitigation	Smoke & heat detection			
Cabinet cooling, if outdoor	Forced air cooling, air inlet: large impeller & pleat filter assembly			
Cabinet structure	Single-walled, lined with heat & noise protective foam			
Dimensions and weight (outdoor)	Hight x Width x Depth = 2,100 mm x 1,260 mm x 1,880 mm (excl. filter cowlings); 2,300 kg			
Mechanical - Battery System Module				
Fire mitigation	Novec® gaseous fire suppression system with a detector tube winding through the cabinet			
Battery Enclosure Cooling	HVAC split cycle system via four door coolers, with central environmental control			
Cabinet structure:	Double-walled, four doors			
Dimensions	Hight x Width x Depth = 2,350 mm x 1,860 mm x 1,920 mm, 6,500 kg			
Environmental				
Humidity	5% to 100% outside; 5% to 95%, non-condensing inside cabinet			
Altitude	Up to 1,000 m without derating			
Operating ambient temperature	-5° C – 40° C without derating, -20 – 50° C max (inverter); 0 – 45° C (sustained, battery)			
Noise (max. @ 1 m distance)	<65 dBA (excluding compressor) <70 dBA (compressors on)			
IP Rating	IP54 (inverter system module), IP55 (battery system module)			
Compliances include:				
AS/NZS 4777.2:2020	The inverter/filter assembly is AS4777.2 certified. Cert No.: SAA192864			
AS 5139	Safety of battery systems for use with power conversion equipment – as applicable			
IEC 61000 (Part 3), EN 61800	EMC emission limits			
AS3000, AS61429	Electrical wiring rules; switchgear assembly standard compliance as far as applicable			
System Configuration				
				
Batteries	Inverters	LCL Filters	Transformer	Switchgear
Contact				
Power Technology Engineered Solutions Pty Ltd Unit 18/25 Cook Road Mitcham 3132, Australia power-tec.com.au				