

## PowerCache® – M (250 kVA / 250 kWh) Datasheet

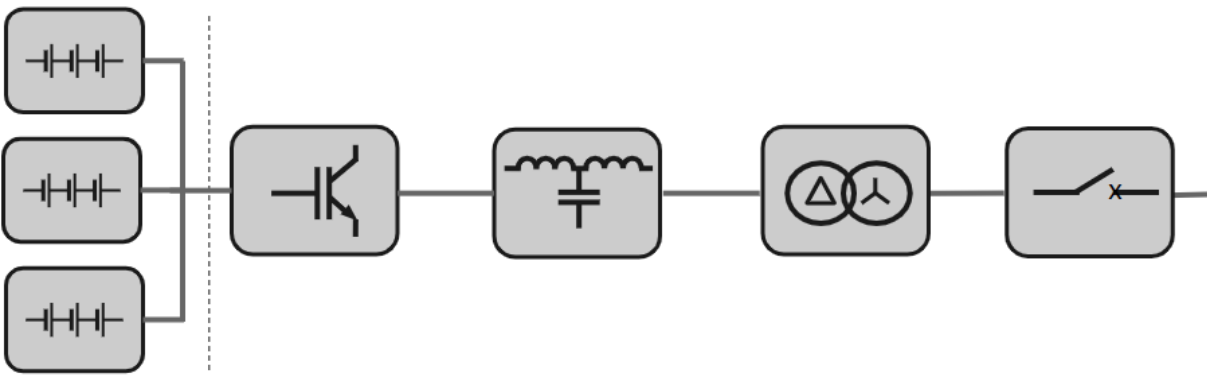
### PowerCache® – M: Grid-in-a-Box

PowerCache is a utility-grade grid in a box. It enables operators of ultra-fast EV charging, commercial or industrial sites, microgrids and communities to provide an unconstrained power user experience on a constrained network. This versatile power system combines a robust, ultra-rapid-response power converter/ controller and a high-performance battery with intelligent microgrid control. PowerCache is expandable and integrates with other systems on-site. It can participate in ancillary services markets.



System Performance	
Nominal frequency and voltage	47Hz ... 53Hz, 415V or 400V +10%/-6%
Grid connection	3-phase+N, YNd transformer-coupled
Active and reactive power rating	$S_{Nom} = 250$ kVA - 4-quadrant P&Q, symmetrical apparent power
Maximum continuous load	3-phase: $S_{Nom} = 250$ 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"> <li>Current source (on-grid)</li> <li>Emulated synchronous machine (ESM) (on- &amp; off-grid, various modes)</li> </ul>
Harmonics	Compliant with AS4777.2
Step load capability (islanded or UPS)	Instantaneous load swing up to 220% $S_{Nom}$ (absorbing to injecting)
Response time to external signal	< 50 ms
Primary frequency control step response – rise time / settling time	User definable via generator time constant and frequency PID control, typically: 150 ms / 1500 ms
System overload capability	400% instantaneous, 180% for 2 s, 110% for 1 minute in 10 minutes
Fault current capability	Fault current settable up to 180% $I_{Nom}$ (3-phase) and 310% (1-phase) for 2 s
AC protection concept	Inter-tie protection of BESS and site mains or generation points of isolation
AC protections	Over/under current/voltage/frequency, RoCoF, VVS, negative sequence voltage, sync-checks, anti-islanding to AS4777
Application-level protections	Over/under SoC, sustained overvoltage, protection consistency checks, application alarms, safe states, etc, via the PaDECS® control system
DC protection	Insulation monitoring, overcurrent/voltage, Battery OEM protections
System AC-AC round trip efficiency	>84% including HVAC-losses, >89% excluding HVAC-losses (typical)

Battery Performance	
Total DC energy / usable energy	312 kWh / 250 kWh at 1C (dis-)charge
Battery chemistry	NMC cathode, $LiNi_xMn_yCo_zO_2$ , 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

<b>Interfaces</b>				
Web-API	Web-API via VPN			
SCADA	Modbus TCP or discrete hardwired alarms and E-Stop			
System HMI	GUI web application via VPN			
Local data Historian Client	Logging all system features, parameters, modes and actuals, VPN access			
Cloud-Client GUI and API	Cloud-Client GUI and API via the PaDECS@-Cloud (SaaS)			
<b>Mechanical - Inverter System Module</b>				
Fire mitigation	Smoke & heat detection			
Cabinet cooling	Forced air cooling, air inlet: large impeller & pleat filter assembly			
Cabinet structure	Single-walled, lined with heat & noise protective foam			
Dimensions and weight	Height x Width x Depth = 2,350 mm x 1,100 mm x 1,920 mm, 2,300 kg			
<b>Mechanical - Battery System Module</b>				
Fire mitigation	Novec® gaseous fire suppression system with a detector tube			
Battery enclosure cooling	HVAC split cycle air cooled via door coolers			
Cabinet structure:	Double-walled			
Dimensions and weight	Hight x Width x Depth = 2,350 mm x 1,240 mm x 1,920 mm, 3,200 kg			
<b>Environmental</b>				
Humidity	5% to 100% outside; 5% to 95%, non-condensing inside cabinet			
Altitude	Up to 1,000 m without derating			
Operating ambient temperature	0 – 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)			
<b>Compliances include:</b>				
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			
IEC 61000 (Part 3), EN 61800	EMC emission limits			
AS 3000	Electrical wiring rules			
<b>System Configuration</b>				
 <p>The diagram illustrates the power flow from three battery packs (represented by three parallel battery symbols) through an inverter (represented by a K symbol), an LCL filter (represented by a wavy line and a capacitor symbol), a transformer (represented by two overlapping circles with a triangle and a person symbol), and finally through switchgear (represented by a switch symbol with an 'x').</p>				
Batteries	Inverter	LCL Filter	Transformer	Switchgear
<b>Contact</b>				
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